

Flora of the Sudan-Uganda border area east of the Nile

II. Catalogue of vascular plants, 2nd part, vegetation and phytogeography

By IB FRIIS and KAJ VOLLESEN

With interpretation of satellite imagery by ERIK PRINS and IB FRIIS
and a chapter on zoogeography by JON FJELDSÅ



Biologiske Skrifter **51:2**

Det Kongelige Danske Videnskabernes Selskab
The Royal Danish Academy of Sciences and Letters

Copenhagen 2005

DET KONGELIGE DANSKE VIDENSKABERNES SELSKAB

Udgiver følgende publikationsrækker:

THE ROYAL DANISH ACADEMY OF SCIENCES AND LETTERS

issues the following series of publications:

<i>Historisk-filosofiske Meddelelser</i> , 8°	<i>Authorized Abbreviations</i> Hist.Fil.Medd.Dan.Vid.Selsk. (printed area 175 x 104 mm, 2700 units)
<i>Historisk-filosofiske Skrifter</i> , 4° (History, Philosophy, Philology, Archaeology, Art History)	Hist.Filos.Skr.Dan.Vid.Selsk. (printed area 2 columns, each 199 x 77 mm, 2100 units)
<i>Matematisk-fysiske Meddelelser</i> , 8° (Mathematics, Physics, Chemistry, Astronomy, Geology)	Mat.Fys.Medd.Dan.Vid.Selsk. (printed area 180 x 126 mm, 3360 units)
<i>Biologiske Skrifter</i> , 4° (Botany, Zoology, Palaeontology, General Biology)	Biol.Skr.Dan.Vid.Selsk. (printed area 2 columns, each 199 x 77 mm, 2100 units)
<i>Oversigt, Annual Report</i> , 8°	Overs.Dan.Vid.Selsk.

Correspondence

Manuscripts are to be sent to

The Editor

Det Kongelige Danske Videnskabernes Selskab

H.C. Andersens Boulevard 35

DK-1553 Copenhagen V, Denmark

Tel: +45 33 43 53 00 Fax: +45 33 43 53 01

E-mail: e-mail@royalacademy.dk

www.royalacademy.dk

Questions concerning subscription to the series should be directed to the Academy

Editor Flemming Lundgreen-Nielsen

© 2005. Det Kongelige Danske Videnskabernes Selskab. All rights reserved. No part of this publication may be reproduced in any form without the written permission of the copyright owner.

Flora of the Sudan-Uganda border area east of the Nile

II. Catalogue of vascular plants, 2nd part, vegetation and phytogeography

By IB FRIIS *and* KAJ VOLLESEN

With interpretation of satellite imagery by ERIK PRINS and IB FRIIS
and a chapter on zoogeography by JON FJELDSÅ



Biologiske Skrifter **51:2**

Det Kongelige Danske Videnskabernes Selskab
The Royal Danish Academy of Science and Letters

Copenhagen, 2005

Synopsis

This study deals with the vegetation and vascular plant flora of the mountain massifs and adjacent lowlands along the border between Uganda and the Sudan to the east of the Nile. The mountains of this area rise abruptly from the Nile Valley plains at 500-700 m., with crests reaching altitudes between 2000 and 3200 m., and consist of rocks of the crystalline basement complex. The rocks of the mountains are much older than the large volcanic highlands of Ethiopia and tropical East Africa (Uganda, Kenya and Tanzania), but the uplifting of the mountain massifs has taken place as part of the East African Rift Valley formation, the same process, which created the volcanic mountains. The three principal massifs dealt with here are the Imatong Mountains group, the Dongotona Mountains and the Didinga Mountains. The first volume of this work dealt with the geographical delimitation of the study area and history of exploration of the flora, and it included the first part of the catalogue (Pteridophyta to Asteraceae). The current volume deals with the remaining families (Gentianaceae to Poaceae), and contains general chapters on vegetation and biogeography. The vascular plant flora of the study area contains 110 species of ferns and fern allies, 4 species of gymnosperms and 2135 taxa (species, subspecies and varieties) of flowering plants. The flora of the study area has been analysed by investigating the geographical distribution of all species both within the study area (by dividing the study area into a western, a central and an eastern part and in altitudinal zones) and in a global context. There is a notable east-west gradient through the study area, with stronger links to the Guineo-Congolese region in the west than in the east, and stronger links to the Somalia-Masai region in the east than in the west. The largest component of the flora is shared with East Africa, which agrees with the position of the study area at the northern limit of the East African highlands. Declining numbers of taxa are shared with Ethiopia and Eritrea, from the highlands of which the mountains of the study area are separated by lowlands, with central and western Africa, with south central Africa, with south tropical Africa and with regions elsewhere. The study area as a whole has a rather low species density of vascular plants when compared with East Africa and Ethiopia. This is probably due to extensive areas with rather uniform grassland in the northern and eastern parts of the study area, while the montane areas have a high species density. Endemism is moderate, but again with higher values in the mountains than in the plains. The altitudinal zones at 915-1220 m. and 1525-1830 m. have the highest plant taxon richness and the highest number of plant endemics. The altitudes at which the diversity peaks varies between the different vegetation types, and peaks in diversity at altitudes between 915 and 1830 m. are more prominent in forest and grassland than in woodland. But generally, the plant diversity drops off in with increasing altitudes according to a linear function, agreeing with the declining areas of the upper altitudinal zones according to well-known relations between species richness and area. The zonation in the flora is not prominent, but there are slight discontinuities in the interval 1800-2100 m. in the flora as a whole and in grassland, bushland and woodland vegetation, and at 1200-1500 m. in forest vegetation.

Ib Friis
Botanical Garden and Museum
The Natural History Museum of Denmark
University of Copenhagen
130, Gothersgade
DK-1123 Copenhagen K
Denmark

Kaj Vollesen
The Herbarium
Royal Botanic Gardens
Kew, Richmond, Surrey
TW9 3AE
England, UK

Contents

Foreword: Plan of the current work	399
Order 61. Gentianales Lindl.	402
Fam. 129. Gentianaceae Juss.	402
Order 62. Primulales Dumort.	403
Fam. 130. Primulaceae Vent.	403
Fam. 131. Plumbaginaceae Juss.	404
Order 63. Plantaginales Lindl.	405
Fam. 132. Plantaginaceae Juss.	405
Order 64. Campanulales Rchb.f.	405
Fam. 133. Campanulaceae Juss.	405
Order 65. Boraginales Dumort.	409
Fam. 134. Boraginaceae Juss.	409
Order 66. Solanales Dumort.	412
Fam. 135. Solanaceae Juss.	412
Fam. 136. Convolvulaceae Juss.	416
Order 67. Scrophulariales Lindl. (Syn.: <i>Personatae</i> Lindl., <i>Personales</i> Benth.)	422
Fam. 137. Scrophulariaceae Juss.	422
Fam. 138. Lentibulariaceae Rich.	430
Fam. 139. Gesneriaceae Dum.	432
Fam. 140. Bignoniaceae Juss.	432
Fam. 141. Pedaliaceae R. Br.	434
Fam. 142. Acanthaceae Juss.	435
Fam. 143. Selaginaceae Choisy	456
Order 68. Lamiales Bromhead	457
Fam. 144. Verbenaceae Jaume St-Hill.	457
Fam. 145. Lamiaceae Lindl.	462
Monocotyledons (Class Liliiopsida Cronquist, Takht. & W. Zimm.; <i>Monocotyledones</i> Juss., nom. altern.)	474
Order 69. Butomales Hutch.	474
Fam. 146. Hydrocharitaceae Juss.	474
Fam. 147. Potamogetonaceae Dumort.	475
Order 70. Commelinales Dumort.	475
Fam. 148. Commelinaceae R. Br.	475
Order 71. Xyridales Lindl.	482
Fam. 149. Xyridaceae C. Agardh	482
Order 72. Eriocaulales Nakai	482
Fam. 150. Eriocaulaceae Desv.	482
Order 73. Zingiberales Griseb.	483

Fam. 151. Musaceae Juss.	483
Fam. 152. Zingiberaceae Lindl.	483
Fam. 153. Marantaceae Petersen	485
Fam. 154. Cannaceae Juss.	485
Order 74. Liliales Perleb	486
Fam. 155. Hyacinthaceae Batsch	486
Fam. 156. Colchicaceae DC.	488
Fam. 157. Asphodelaceae Juss.	488
Fam. 158. Aloaceae J. Agardh	489
Fam. 159. Asparagaceae Juss.	490
Fam. 160. Anthericaceae J. Agardh	491
Fam. 161. Eriospermaceae Endl.	494
Fam. 162. Smilacaceae Vent.	494
Order 75. Arales Dumort.	495
Fam. 163. Araceae Juss.	495
Order 76. Amaryllidales Bromhead	496
Fam. 164. Amaryllidaceae Jaume St-Hill.	496
Fam. 165. Iridaceae Juss.	498
Order 77. Dioscoreales Hook. f.	501
Fam. 166. Dioscoreaceae R. Br.	501
Order 78. Agavales Hutch.	502
Fam. 167. Dracaenaceae Salisb.	502
Order 79. Arecales Bromhead	504
Fam. 168. Areaceae Schultz-Schultzenst.	504
Order 80. Pandanales Lindl.	505
Fam. 169. Pandanaceae R. Br.	505
Order 81. Haemodorales Hutch.	506
Fam. 170. Hypoxidaceae R. Br.	506
Fam. 171. Velloziaceae Endl.	507
Fam. 172. Taccaceae Dumort.	507
Order 82. Orchidales Raf.	508
Fam. 173. Orchidaceae Juss.	508
Order 83. Juncales Dumort.	521
Fam. 174. Juncaceae Juss.	521
Order 84. Cyperales Hutch.	522
Fam. 175. Cyperaceae Juss.	522
Order 85. Poales Small	544
Fam. 176. Poaceae Barnh.	544
Appendix A. Additional records to Vol. 1	598
Appendix B. Botanical collectors and collections	635
Appendix C. Collecting localities	642
II. Environmental conditions and biotic factors influencing vegetation	655
(1) Climate	655
(A) Rainfall	655

(B) Temperature	658
(C) Wind	658
(2) Geology and soil	659
(3) Biotic influence on the vegetation	661
(A) Animals	661
(a) Wild mammals	661
(b) Wild birds	664
(c) Cattle grazing	665
(B) Man-made fires	665
(C) Shifting cultivation	668
(D) Felling of trees for timber	668
(E) The development projects in the study area	669
III. Satellite-image analysis of the vegetation (by Erik Prins and Ib Friis)	672
(1) Introduction	672
(2) Materials and method	672
(A) Image processing	672
(a) Rectification of the image	672
(b) Image analysis	674
(c) Image classification	675
(3) Results and discussion	675
(a) The burnt areas	679
(b) The areas with open ground cover	679
(c) The areas with medium-dense ground cover	680
(d) The areas with dense vegetation cover	681
(e) Limitations	681
IV. The Habitats and their vegetation	683
(1) Lowland vegetation	688
(A) Lowland woodlands to the north-west, west and south of the Imatong Mountains group	688
Seasonality	694
(B) Lowland swamps, valley-bottom grassland and semi-aquatic vegetation	696
(C) Gallery forests of the lowland woodlands to the west of the Imatong Mountains group	697
(D) Transition from lowland woodland to lowland forest	698
(E) Closed lowland forest (<i>Khaya</i> forest)	700
(F) The dry plains with <i>Acacia</i> - and <i>Acacia-Commiphora</i> bushland to the north-east of the Imatong Mountains group and towards the Dongotona Mountains and the Didinga Mountains group	704
(G) Open bushland and grassland to the north and east of the Didinga Mountains	707
(H) Fringing forests of the <i>Acacia</i> bushland to the east of the Imatong Mountains group	709

(I)	Bare rock faces of the lower dry hill-slopes of the mountain groups and of large rocky outcrops	710
(K)	Woodland on bouldery soil of the lower hill sides	711
(L)	Lower hill-slopes of the mountain groups with woodland on shallow soil	713
(M)	Lower hill-slopes of the mountain groups with woodland on deeper soil	713
(N)	<i>Oxytenanthera</i> bamboo belt	714
(O)	Upper hill-slopes with lowland vegetation on the Imatong and Dongotona Mountain groups	714
(P)	Fringing forests of the hill-sides of the mountain groups	715
(2)	Transitional vegetation	715
(A)	Transitional forest (<i>Entandophragma-Manilkara</i> intermediate forest)	716
(B)	Transitional woodland and grassland (<i>Combretum-Entada</i> wooded grassland) of the Imatory Mountains	717
(3)	Montane vegetation	718
(A)	Lower Afromontane grasslands and forests	719
(a)	Rocky outcrops, <i>Loudetia</i> grassland and scattered woody vegetation of <i>Protea</i>	719
(b)	<i>Acacia abyssinica</i> woodland	725
(c)	Afromontane <i>Albizia</i> woodland or forest and the transition to Afromontane <i>Podocarpus</i> forest	726
(d)	<i>Vernonia</i> thickets	731
(e)	Afromontane forest dominated by <i>Podocarpus latifolius</i> , <i>Olea capensis</i> and <i>Syzygium guineense</i>	732
(f)	Afromontane forest with other dominant species	736
(g)	Broken Afromontane forest	737
(h)	Riparian vegetation in the lower Afromontane zone	737
(B)	The high-altitude Afromontane forests and grasslands	738
(a)	High-altitude Afromontane grasslands, <i>Hagenia abyssinica</i> woodlands and transition to forest	738
(b)	High-altitude Afromontane moist grasslands and swamps	739
(c)	High-altitude Afromontane forest	740
(d)	Afromontane bamboo forest	741
(4)	The Ericaceous zone (Afromontane heathland)	741
V.	Zoogeographical analyses of the Imatong Mountains area (by Jon Fjeldså)	744
(1)	The birds	744
(A)	The biogeographic relationships of the avifauna	745
(B)	Forest birds	746
(C)	Endemism in birds	750
(2)	The mammals	751

(A) Forest mammals	752
(3) Other groups	754
(4) Some concluding remarks	755
VI. Phytogeographical analyses of zonation, plant-diversity and	
-distribution patterns of the Imatong Mountains area	757
(1) Taxon richness and endemism in a tropical African context ..	757
(2) A data base for analysis of plant distributions	759
(3) Local distribution of the flora; local variation in floristic	
richness and endemism	760
(4) Similarity between the floristic regions	761
(5) Floristic richness and endemism in altitudinal zones	762
(6) Zonation of the flora	771
(7) Overall distribution of the flora	774
(8) Review of the findings	779
VII. References	780
VIII. Index to plant taxa	786

Foreword: Plan of the second part of the current work; acknowledgements

The work on the flora of the Sudan-Uganda border area east of the Nile has been scheduled to appear in two volumes according to the following plan.

Volume one included a geographical definition of the study area and a historical survey of its botanical exploration, especially the study of the mountain massifs, as well as a general introduction to the catalogue of vascular plants of the study area. The main part of Volume one was taken up by the first part of this catalogue, which included the Ferns, Gymnosperms and the major part of Dicotyledons including the families from the Annonaceae to the Asteraceae. The families were arranged according to the same classification system as the one used in F.W. Andrews' Flowering Plants of the (Anglo-Egyptian) Sudan, Vol. 1-3, (1950-1956). Genera and species were arranged alphabetically.

Volume two includes the catalogue of the remaining part of the Dicotyledons and the Monocotyledons according to the same classification system. A separate section of the catalogue includes three appendices. These are: (A) Updated information about some taxa, especially critical comments on a survey of the biodiversity in Ugandan forest reserves carried out by Uganda Forest Department and published in collaboration with UNDP(GEF), FAO and EU Natural Forest Management and Conservation Project. Lwanga (1996) wrote up the results of these studies in the Agoro-Agu and in the Lokung Forest Reserves, and his findings are commented upon. The two remaining appendices are (B) a list of the names of collectors mentioned in the catalogue, with short biographical notes, if these have been possible to find, and with emphasis on the collectors' ac-

tivities in the southern Sudan, and (C) a commented lists of names of localities referred to in the catalogue, where these place names have been geographically localised as far as possible.

Chapter II, *Environmental conditions and biotic factors influencing vegetation*, describes what is known about the environmental conditions and biotic factors that may influence vegetation. This chapter is mainly based on what can be inferred from northern Uganda and summarised from the works of the late colonial period, especially Jackson (1956), and information gathered during the peaceful interval from the late 1970es and early 1980es, including observations made by the current authors. Chapter III, *Satellite-image analysis of the vegetation*, contains an analysis of the vegetation based on satellite imagery; this analysis has been carried out by Erik Prins, Copenhagen, in collaboration with Ib Friis. Chapter IV, *The Habitats and their vegetation*, contains qualitative descriptions of the habitats and their vegetation and has been compiled from previous sources, largely the same as the ones mentioned above for Chapter II, the current authors own observations and the information provided in the catalogue part of this work; the identification of all species cited from previous sources has been verified and the plant names updated wherever necessary and possible. Chapter V, *Zoogeographical analyses of the Imatong Mountains area*, contains a biogeographical study of the mammals and birds of the region, with emphasis on the Imatong Mountains group, has kindly been provided by Jon Fjeldså of the Zoological Museum, Copenhagen, and the analyses are based on data gathered by Jon Fjeldså's group working on a biodiversity atlas of Africa. Chapter VI, *Phytogeographical analyses*

of zonation, plant-diversity and -distribution patterns of the Imatong Mountains area, provides a geographical study of the vascular plants in the catalogue and compares it with the zoogeographical findings. Volume 2 is concluded by a comprehensive *Index to plant taxa*, including accepted names as well as synonyms; it refers to plant names mentioned in the catalogue as well as in the vegetation descriptions. In this way it should be possible to cross reference between catalogue and vegetation descriptions and thus use both parts of the work together. It will also make it possible to trace name changes made in relation to earlier literature about the study area.

The two field trips in 1980 and 1982, with which this work took its beginning, were financed by the Danish Natural Science Research Council. The two main authors wish to express their gratitude for these grants. Ib Friis also wants to thank the board and staff of San Cataldo, the Danish retreat for scholars and artists in the small town of Scala, Italy, for excellent working facilities on two occasions. The board granted him a stay at the institution, free of charge, for four weeks in 2003, during which he could work on the manuscript, and in 2004 he was permitted a further two weeks stay, allowing him to give the manuscript a final touch.

The trip to the Imatong Mountains group in 1980 was joined by the zoologist Dr. Jens B. Rasmussen, specialist in snakes, from the Zoological Museum, University of Copenhagen, and two students; it is therefore very sad for the two main authors here to record the untimely death of Dr. Rasmussen on the 3rd of May, 2005. Jens was an excellent travel companion, undaunted by the difficulties of the trip and with a quiet sense of humor.

Both main authors would like to thank their co-authors Erik Prins and Jon Fjeldså for collaboration on this volume. The institutions of all authors, the Botanical Museum and Library, University of Copenhagen (Ib Friis), the

Herbarium, Royal Botanic Gardens, Kew (Kaj Vollesen), the Zoological Museum, University of Copenhagen (Jon Fjeldså), and Ornithology Consult (Erik Prins) are thanked for facilities that allowed them to carry out the work.

The main authors are also indebted to the keepers of the herbaria in which specimens for this study have been consulted: The Natural History Museum, London (BM), the Botanical Museum and Library, Copenhagen (C), the East African Herbarium, Nairobi (EA), the Forest Herbarium, Oxford (FHO), the Khartoum University Herbarium, Khartoum (KHU), the Herbarium of the Forest Research and Education institute, Soba near Khartoum (KHF), the Makerere University Herbarium, Kampala (MUH) and the Herbarium of the Gezira Research Station, Agricultural Research Division, Wad Medani, Gezira (WM).

The main authors are grateful to the many who have helped them with information, and they are particularly pleased to have been in contact with so many, who have collected in or visited the study area. These are too many to thank individually, but they are all mentioned in the list of collectors (Appendix B). A much appreciated recent input is the air photographs in colour of vegetation on the Uganda side of the Imatong Mountains. These excellent air photographs were taken in March 2005 by Dr. Andrew J. Plumtre, Director of the Albertine Rift Programme, Wildlife Conservation Society, during a flight over northern Uganda in a small aeroplane. The authors are grateful for permission to reproduce some of these air photographs in this volume.

Finally, the authors wish to thank the Royal Danish Academy of Sciences and Letters for undertaking the publication of this account of the flora and vegetation of a poorly known and inaccessible part of the world. It has been a lengthy and complicated work to gather all the necessary data from institutions in Scandinavia, Great Britain, Sudan and Uganda, to

analyse the material and to produce a publishable manuscript that takes equal account of previous knowledge that had to be updated and new findings. The patience and liberality of the Academy in connection with this process has been particularly appreciated.

What remains is to express the wish that the political strife, which has amounted to an almost constant civil war since 1983 and which has almost totally destroyed all the development that the region saw in the late 1970es and

early 1980es, will soon end in a satisfactory and lasting settlement so that the results of this work may be used locally and on the ground. It is also hoped that renewed studies of the natural resources of the southern Sudan and northern Uganda may soon again be possible so that it will be possible to supplement and correct this work.

Ib Friis

Kaj Vollesen

Metachlamydeae (continued)

Order 61. **Gentianales** Lindl.

Fam. 129. **Gentianaceae** Juss.

Canscora Lam.

Canscora decussata Roem. & Schult.

FTA 4,1: 558 (1903); FS: 300 (1929); FPS 3: 64 (1956); FWTA 2: 300 (1963); FAC, Gentianac.: 30 (1972); WICKENS 1976: 139; FZ 7,4: 37 (1990).

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on land with rocky outcrops, 29.11.1980, Friis & Vollesen 531 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude deciduous woodland and wooded grassland, especially in damp places and at rocky outcrops.

General distribution: Guinea Bissau and Senegal to Sudan, Uganda and Kenya, south to Malawi and Mozambique; also in tropical Asia to North Australia.

Exacum L.

Exacum oldenlandioides (S. Moore) Klackenb. KLACKENBERG 1985: 88; FZ 7,4: 8 (1990).

Syn.: [*Exacum quinquerivium* auct., non Griseb.: FTA 4,1: 546 (1903); FWTA 2: 298 (1963), excl. specim. ex Madagascar; FAC, Gentianac.: 53 (1972)].

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, Kielland-Lund 562 (C, NLH);

Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on land with rocky outcrops, 29.11.1980, Friis & Vollesen 525 (C).

General habitat range: in lowland and medium-altitude deciduous woodland and wooded grassland, especially in sandy pan margins and at river banks.

General distribution: Senegal to Sudan, Uganda and Kenya, south to Angola and South Africa (Transvaal). First record from the Sudan.

Neurotheca Salisb. ex Benth.

Neurotheca loeselioides (Progel) Baill.

FTA 4,1: 560 (1903); FS: 300 (1929); FWTA 2: 298 (1963); FAC, Gentianac.: 16 (1972).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, Friis & Vollesen 583 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to Sudan and Uganda, south to Angola; also in Madagascar. Also recorded from tropical South America. First record from the Sudan.

Sebaea Soland. ex R. Br.

Sebaea pumila (Bak.) Schinz

FWTA 2: 299 (1963); FAC, Gentianac.: 47 (1972); FZ 7,4: 13 (1990).

Imatong Mountains group, Sudan side: Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, *Friis & Vollesen* 582 (C, K).

General habitat range: in lowland and medium-altitude deciduous woodland and wooded grassland.

General distribution: Nigeria to Sudan, Uganda and Tanzania, south to Zambia and Mozambique. First record from the Sudan.

Swertia L.

Swertia eminii Engl.

FTA 4,1: 580 (1903); FPNA 2: 68 (1947); FAC, Gentianac.: 8 (1972); FZ 7,4: 30 (1990); UKWF: 233 (1994).

Imatong Mountains group, Sudan side: Itibol, 1980 m., in fell-fields, 16.8.1940, *Myers* 13,416 (K).

General habitat range: in medium-altitude and montane deciduous woodland and evergreen bushland.

General distribution: Cameroon to Sudan, Uganda and Kenya, south to Zambia, Zimbabwe, Malawi and Mozambique.

Swertia schimperi (Hochst.) Griseb.

GRISEBACH 1845: 563; FTA 4,1: 573 (1903); FRIIS 1993a:188-189.

Syn.: *Monobothrium schimperi* Hochst. in sched. Schimper, Un. Itin. iter Abyssinicum, Sect. II, no. 1241 (1842-43). *Ophelia fimbriata* Hochst.: HOCHSTETTER 1844: 28. *Swertia fimbriata* (Hochst.) Cufod.: CUFODONTIS 1960: 681 & 1969: XXX.

Imatong Mountains group, Sudan side: between Kinyeti and Kipia, 2700 m., 1.6.1950, *Jackson* 1543 (K, WM); Mt. Kinyeti, summit area, 3150

m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 837 (C); Mt. Kinyeti, 3110 m., 27.7.1939, *Myers* 11,663 (K, WM); summit of Mt. Kinyeti, 3170 m., 21.9.1940, *Tothill* in *Myers* 13,516 (K).

General habitat range: in montane bushland and grassland and ericaceous bushland.

General distribution: South Sudan, Ethiopia and South West Tanzania.

Swertia sp. cf. S. schimperi (flowers poorly developed).

Imatong Mountains group, Sudan side: Kipia, 2590 m., in meadow, 30.12.1935, *Thomas* 1881 (BM, K).

Order 62. Primulales Dumort.

Fam. 130. Primulaceae Vent.

Anagallis L.

Anagallis djaloni A. Chev.

FTEA, Primulac.: 17 (1958); FWTA 2: 303 (1963); FAC, Primulac.: 12 (1971); FZ 7,1: 195 (1983).

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on land with rocky outcrops, 29.11.1980, *Friis & Vollesen* 526 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude forest, often along trails.

General distribution: Guinée and Sierra Leone to South Sudan and Kenya, south to Angola, Zambia, Malawi and Tanzania. First record from the Sudan.

Anagallis pumila Sw.

FWTA 2: 303 (1963); FAC, Primulac.: 12 (1971); FZ 7,1: 195 (1983); UKWF: 234 (1994).
var. **barbata** P. Taylor

FTEA, Primulac.: 17 (1958); FWTA 2: 303 (1963); FAC, Primulac.: 12 (1971).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 2.12.1980, *Friis & Vollesen* 623 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude damp places.

General distribution: Mali to Sudan, south to Angola, Zambia, Zimbabwe and Mozambique. Species as a whole also widespread in tropical Asia and in warmer parts of America.

Anagallis serpens Hochst. ex DC.

HEDBERG 1957: 149; FTEA, Primulac.: 13 (1958); UKWF: 234 (1994); HYF: 132 (1997).

subsp. **serpens**

FTEA, Primulac.: 14 (1958).

Imatong Mountains group, Sudan side: below Kipia, 2660 m., mountain meadow, 28.7.1939, *Myers* 11,701 (K).

General habitat range: in montane grassland, usually by streams and in bogs.

General distribution: Sudan, Ethiopia and Zimbabwe; also in tropical Arabia.

Ardisiandra Hook. f.**Ardisiandra sibthorpioides** Hook. f.

FTA 3: 489 (1877); FTEA, Primulac.: 2 (1958); FWTA 2: 304 (1963); FAC, Primulac.: 2 (1971); FZ 7,1: 185 (1983); UKWF: 233 (1994).

Syn.: *Ardisiandra engleri* Weim.: FPNA 2: 37 (1947). *Ardisiandra engleri* Weim. var. *microphylla* Weim.: FPS 3: 65 (1956) {Imatong Mountains, River Imisu}.

Imatong Mountains group, Sudan side: between Itibol and Issore, at River Imisu, 1950 m., on

rocks by the water, 20.12.1935, *Thomas* 1712 (BM, K); Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 9.11.1980, *Friis & Vollesen* 90 (C, K, KHF).

General habitat range: in medium-altitude and montane forest and evergreen bushland.

General distribution: Cameroon to Ethiopia, south to Malawi and Tanzania.

Lysimachia L.**Lysimachia ruhmeriana** Vatke

FTA 3: 489 (1877); FTEA, Primulac.: 5 (1958); FAC, Primulac.: 5 (1971); FZ 7,1: 187 (1983); UKWF: 233 (1994); HYF: 131 (1997).

Syn.: *Lysimachia africana* Engl.: FPS 3: 66 (1956) {Imatong Mountains, Lomuleng}.

Imatong Mountains group, Sudan side: Lomuleng, 2440 m., in scrub, 30.12.1935, *Thomas* 1887 (BM, K); above Lomuleng, 2650 m., mountain meadow, 26.7.1939, *Myers* 11,601 (K); Gilo to Mt. Konoro, 1850 m., seepage meadow on edge between upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea* and grassland with *Loudetia arundinacea*, 18.11.1980, *Friis & Vollesen* 313 (C, K, KHF).

General habitat range: in medium-altitude and montane swamps and damp grassland.

General distribution: Cameroon to Ethiopia, south to South Africa (Natal); also in Madagascar and tropical Arabia.

Fam. 131. **Plumbaginaceae** Juss.**Plumbago** L.**Plumbago zeylanica** L.

FTA 3: 486 (1877); FS: 301 (1929); FPS 3: 68 (1956); FWTA 2: 306 (1963); FTEA, Plumbaginac.: 6 (1976); WICKENS 1976: 139; FZ 7,1:

182 (1983); UKWF: 234 (1994); HYF: 96 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, between residence and Kinyeti River, 700 m., 23.11.1983, *Kielland-Lund* 35 (C, NLH).

Didinga Mountains: Iwowa, 1620 m., among rocks in khor, 22.4.1939, *Myers* 11,027 (K); foot of Didinga Mountains., 16 km. west of Kapoeta, no alt., 23.8.1940, *Myers* 13,436 (K).

General habitat range: in lowland and medium-altitude forest, especially along edges, evergreen bushland and deciduous woodland, especially by rivers.

General distribution: Senegal to Ethiopia, south to South Africa; also in tropical Asia, including tropical Arabia, and in tropical America.

Order 63. **Plantaginales** Lindl.

Fam. 132. **Plantaginaceae** Juss.

Plantago L.

Plantago palmata Hook. f.

FTA 5: 504 (1900); FPNA 2: 317 (1947); FWTA 2: 306 (1963); FTEA, Plantaginac.: 2 (1971); FAC, Plantaginac.: 2 (1972); UKWF: 235 (1994).

Imatong Mountains group, Sudan side: along path from Bushbuck Hill to Mt. Konoro, 2400 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, at small brook in forest, 23.2.1982, *Friis & Vollesen* 1011 (C, K, KHf).

General habitat range: in clearings in montane forest.

General distribution: Cameroon to Ethiopia, south to Malawi and Zimbabwe. First record from the Sudan.

Order 64. **Campanulales** Rchb. f.

Fam. 133. **Campanulaceae** Juss. (Syn.: *Lobeliaceae* R. Br.)

Canarina L.

Canarina abyssinica Engl.

FTEA, Campanulac.: 2 (1976); UKWF: 235 (1994).

Imatong Mountains group, Sudan side: Itibol, 1950 m., 14.6.1939, *Andrews* 1989 (K); Gilo, no alt., 18.6.1953, *Prowse* 368 (KHU).

Imatong Mountains group, Uganda side: in hills behind Agoro, no alt., climber among bamboo, 6.1942, *Eggeling* 5099 (EA, MHU).

General habitat range: in montane forest, especially in clearings, and in wooded grassland.

General distribution: South Sudan, Ethiopia, Uganda, Kenya and Tanzania.

Canarina eminii Asch. & Schweinf.

FPS 3: 70 (1956) {Imatong Mountains, Gilo}; FTEA, Campanulac.: 4 (1976); FAC, Campanulac.: 3 (1977); FZ 7,1: 88 (1983); UKWF: 235 (1994).

Imatong Mountains group, Sudan side: Katire to Gilo, 1520 m., in ravine forest along the road near to coffee plantation, 23.6.1947, *MacLeay* 29 (BM, K); Observation Hill, 1980 m., in rocky crevice at the top of the hill, 19.6.1953, *Prowse* 370 (KHU); Itibol, 1950 m., 14.6.1939, *Andrews* 1989 (K).

Imatong Mountains group, Uganda side: Langia, 2830 m., mountain grassland, 4.1943, *Purse-glove* 1433 (EA, K); 2620 m., 4.1938, *Eggeling* 3604 (K); Lomwaga, 2630 m., in *Exothea-Elionurus* grassland, on rocks, 5.4.1945, *Greenway & Hummel* 7284 (EA, K).

Didinga Mountains: Mt. Lotuke, 2440 m., on mossy rocks in *Podocarpus latifolius* forest, 18.4.1939, *Myers* 10,888 (K); Mt. Lotuke, 2600 m., on rocks in *Podocarpus latifolius* forest, 30.3.1950, *Jackson* 1351 (BM).

General habitat range: in montane forest, also riverine forest and montane grassland.

General distribution: East Congo [previously Zaire] to Ethiopia, south to Malawi.

Lobelia L.

Lobelia dissecta M.B. Moss in Chipp

CHIPP 1929: 192 & 197; FPS 3: 74 (1956) {Imatong Mountains}; FTEA, Lobeliac.: 23 (1984).

subsp. **dissecta**

Imatong Mountains group, Sudan side: without further locality, no alt., 12.2.1936, *Johnston* 1514 (K); without further locality, no alt., 1939, *Andrews* 1972 (K); Itibol, 1940 m., edge of forest, 17.12.1935, *Thomas* 1628 (BM, K); Dumuso Ridge, 2450 m., montane evergreen bushland with scattered *Protea gaguedi*, *Nuxia congesta* and stunted *Podocarpus latifolius*, 8.3.1982, *Friis & Vollesen* 1132 (C, K); Kipia, 2680 m., rocky places, 12.1938, *MacDonald* 24 (BM); Kipia, 2740 m., rocky ground above rest house, 4.7.1947, *MacLeay* 191 (KHU); ridge leading to summit of Mt. Kinyeti, 3000 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, *Friis & Vollesen* 1288 (BR, C, K, KHf); Mt. Kinyeti, 3050 m., rocky summit, 30.12.1935, *Thomas* 1835 (BM, K); summit of Mt. Kinyeti, 3170 m., in rocky crevices on the very summit ("the highest phanerogam in the Sudan"), *Chipp* 63 (K, holotype of *L. dissecta*); Mt. Kinyeti, 3180 m., rocky summit, 1.1.1939, *MacDonald* 31 (BM); summit of Mt. Kinyeti, 3170 m., 21.9.1940, *Tothill* in *Myers* 13,517 (K); summit of Mt. Kinyeti, 3180 m., rocky summit, 14.11.1949, *Jackson* 924 (WM); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 822 (C, K, KHf).

General habitat range: As indicated above.

General distribution: Not found elsewhere.

subsp. **humidulorum** *Friis & Vollesen*

Imatong Mountains group, Sudan side: Gilo, near bridge on Ngairigi River, 1700 m., among short grass in thin soil over rock, 11.11.1949, *Jackson* 895 (BM); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, *Friis & Vollesen* 18 (C, holotype of subsp. *humidulorum*, BR, EA, K, KHf, isotypes).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, below peak, 2260 m., open short turf over rock, moist at time of collection, 26.8.1968, *Lock* K 5 (EA, MHU).

General habitat range: in open short turf over rocks.

General distribution: South Sudan, North Uganda and Burundi.

Note: Thulin (in FTEA, Lobeliac.: 24 (1984)) considered *L. dissecta* as one variable species without the distinction of the subsp. *humidulorum*; he accepts, however, that the plants from Mt. Kinyeti are all more or less distinctly perennial, while all plants from other localities are annuals which tend to have smaller flowers than the perennial form from Mt. Kinyeti and Itibol. We find these reasons sufficient to maintain our two infraspecific taxa.

Lobelia flaccida (Presl) A.DC.

FZ 7,1: 128 (1983); THULIN 1983: 374; FTEA, Lobeliac.: 25 (1984); UKWF: 238 (1994).

subsp. **granvikii** (Th.C.E. Fr.) Thulin

THULIN 1983: 375; FTEA, Lobeliac.: 25 (1984).

Didinga Mountains: Nagichot, 1980 m., muddy edge of stream, 25.4.1939, *Myers* 11,119 (K, WM).

General habitat range: in medium-altitude and montane grassland, often in marshy ground, on rocky outcrops and at forest edges.

General distribution: South Sudan, Uganda and Kenya. Species as a whole through medium-altitude and montane habitats south to South Africa (East Cape Prov.).

Lobelia giberroa Hemsl.

FTA 3: 465 (1877); CHIPP 1929: 192; FPS 3: 73 (1956) (Imatong Mountains); FPNA 2: 411 (1947); FZ 7,1: 120 (1983); FTEA, Lobeliac.: 9 (1984); SOMMERLATTE 1990: 342, commonly found in mixed *Podocarpus latifolius* forest, also in *Acacia abyssinica* woodland and in *Hagenia* woodland; UKWF: 237 (1994); KTSL: 570 (1994).

Imatong Mountains group, Sudan side: between Itibol and Atiaro, near Atiaro, 1950 m., *Acacia abyssinica* woodland, 18.12.1935, Thomas 1657 (BM, K); Mt. Nargi, 1830-2140 m., no date, Andrews 1960 (K); Issore, 1680 m., in sheltered ravines, 9.2.1929, Chipp 56 (K, WM).

Imatong Mountains group, Uganda side: Agoro, 1990 m., 12.1932, Eggeling 800 (K, MHU). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

General habitat range: in montane forest, especially along edges, evergreen bushland and swamps.

General distribution: North East Congo [previously Zaire] to Ethiopia, south to Zambia and Malawi.

Lobelia inconspicua A. Rich.

FTA 3: 467 (1877); FS: 298 (1929); FZ 7,1: 135 (1983); FTEA, Lobeliac.: 34 (1984); UKWF: 238 (1994).

Syn.: *Lobelia heyneana* Roem. & Schult. var. *inconspicua* (A. Rich.) E. Wimmer: FWTA 2: 313 (1963).

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope, 8.11.1980, Friis & Vollesen 19 (C, K).

General habitat range: in medium-altitude and montane grassland and woodland, roadsides and ditches.

General distribution: Nigeria and Cameroon to Ethiopia, south to Congo [previously Zaire], Malawi and Tanzania; also in India.

Lobelia molleri Henriques

FWTA 2: 313 (1963); FZ 7,1: 134 (1983); FTEA, Lobeliac.: 31 (1984).

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 8.11.1980, Friis & Vollesen 28 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude and montane forest and evergreen bushland.

General distribution: Cameroon to Sudan, Uganda and Tanzania, south to Zambia and Malawi.

Note: The only other known collection of this species from the Sudan is Jackson 3987 from Wau in South West Sudan.

Lobelia trullifolia Hemsl.

FZ 7,1: 126 (1983); THULIN 1983: 374; FTEA, Lobeliac.: 20 (1984).

subsp. **trullifolia**

FTEA, Lobeliac.: 21 (1984).

Imatong Mountains group, Sudan side: Gilo to Itibol, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 11.11.1980, Friis & Vollesen 160 (C, K, KHF).

General habitat range: in medium-altitude and montane grassland, forest margins, stream-sides, roadsides, often in rocky places.

General distribution: South Sudan to South West Ethiopia and Kenya, south to East Zambia, Malawi and Mozambique. Species as a whole within the same general distribution area. First record from the Sudan.

Wahlenbergia Schrad. ex Roth

Wahlenbergia flexuosa (Hook. f. & Thoms.) Thulin

FTEA, Campanulac.: 24 (1976); FAC, Campanulac.: 26 (1977); FZ 7,1: 103 (1983).

Imatong Mountains group, Sudan side: Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees of *Terminalia laxiflora*, *T. brownii*, *Pterocarpus lucens*, *Combretum collinum* and *Vitex doniana* on rocky outcrop, 5.12.1980, *Friis & Vollesen* 701 (C).

General habitat range: in medium-altitude and montane grasslands or deciduous woodlands.

General distribution: Nigeria and Cameroon to Ethiopia, south to Malawi; also in India. First record from the Sudan.

Wahlenbergia hirsuta (Edgew.) Tuyn
FTEA, Campanulac.: 27 (1976); FAC, Campanulac.: 26 (1977); WICKENS 1976: 140; FZ 7,1: 106 (1983); UKWF: 236 (1994); HYF: 278 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on land with rocky outcrops, 29.11.1980, *Friis & Vollesen* 524 (C); Talanga, 950 m., 8.12.1980, *Friis & Vollesen* 859 (BR, C, FT, K, KHF).

General habitat range: in medium-altitude and montane grassland or deciduous woodland, also a weed in cultivated ground.

General distribution: Senegal and Ghana to Ethiopia, south to Zambia, Malawi and Zimbabwe; also in Madagascar, Comoro Islands, tropical Arabia and India.

Wahlenbergia napiformis (A. DC.) Thulin
FTEA, Campanulac.: 18 (1976); FAC, Campanulac.: 19 (1977); FZ 7,1: 98 (1983); UKWF: 236 (1994).

Syn.: *Lightfootia napiformis* A. DC.: FTA 3: 475 (1877). [*Lightfootia abyssinica* auct., non A. Rich.: FPS 3: 71 (1956); JACKSON 1956: 362].

Imatong Mountains group, Sudan side: Palotaka, 1200 m., woodland, 31.1.1979, *Shigeta* 149 (EA); Itibol, 1980 m., grassland, 18.12.1935, *Thomas* 1648 (BM, K); Mt. Loka, no alt., on freshly burnt ground, 28.1.1938, *Myers* 8380

(K); Kinyeti Valley, 16 km. north of Katire, 900 m., woodland with *Combretum collinum*, *C. molle*, and *Annona senegalensis*, 22.2.1982, *Friis & Vollesen* 992 (C, KHF); Kinyeti Valley, above Katire, on road to Gilo, at turn off to Itibol, 1650 m., wooded grassland with *Combretum molle*, *Cussonia arborea*, *Stereospermum kunthianum*, *Erythrina abyssinica*, *Entada abyssinica*, etc., 7.3.1982, *Friis & Vollesen* 1120 (BR, C, EA, KHF); Mt. Itibol, 1950 m., forest, 15.6.1939, *Andrews* 2013 (K).

Imatong Mountains group, Uganda side: 2 km. north-east of Lututuru, near end of road, 1800 m., grassland, 17.2.1969, *Lye* 2053 (K, MHU, NLH, UPS).

General habitat range: in lowland and medium-altitude deciduous woodland and bushland.

General distribution: Central African Republic to Ethiopia, south to Namibia, Botswana, Zimbabwe and Mozambique.

Wahlenbergia silenoides Hochst. ex A. Rich.
FTA 3: 478 (1877); FPS 3: 71 (1956) {Imatong Mountains, Itibol}; FTEA, Campanulac.: 12 (1976); FAC, Campanulac.: 12 (1977); UKWF: 236 (1994).

Imatong Mountains group, Sudan side: near Itibol, 1950 m., dry scrub, 20.12.1935, *Thomas* 1715 (BM, BR, K); ridge leading to the summit of Mt. Kinyeti, 3000 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, *Friis & Vollesen* 1290 (C, K).

General habitat range: in montane grassland and along forest edges.

General distribution: Nigeria and Cameroon to Ethiopia, south to East Congo [previously Zaire] and Tanzania.

Wahlenbergia virgata Engl.
FPS 3: 71 (1956) {Imatong Mountains, Itibol}; FTEA, Campanulac.: 9 (1976); FAC, Campanulac.: 11 (1977); FZ 7,1: 92 (1983).

Imatong Mountains group, Sudan side: above Gilo Pool, in grassland (4° 02' N, 32° 50' E), no alt.,

15.1.1984, *Kielland-Lund* 642 (C, NLH); Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 13.11.1980, *Friis & Vollesen* 189 (BR, C, K, KHF); Katire to Itibol, path above camp at Itibol, 2000 m., frequent, 17.12.1935, *Thomas* 1643 (BM, K ["1642" in Thomas' notes]); Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland on shallow soil and frequently burnt, appearing after fire, 21.2.1982, *Friis & Vollesen* 974 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: without further locality, 2320-2630 m., grassland, 4.1938, *Eggeling* 3537 (K); Langia, grassland, 4.1943, *Purseglove* 1389 (EA, K); 2 km. north-east of Lututuru, near end of road, 1800 m., grassland, 17.2.1969, *Lye* 2072 (K, MHU, NLH).

Didinga Mountains: Nagichot, 1980 m., forest edge, 25.4.1939, *Myers* 11,117 (K); slope of Mt. Lotuke, no alt., in *Protea* grassland, 3.1950, *Jackson* 1317 (BM).

General habitat range: in medium-altitude and montane grassland.

General distribution: South Sudan, Burundi and Uganda to Ethiopia, south to South Africa (Transvaal, Natal).

Order 65. Boraginales Dumort.

Fam. 134. Boraginaceae Juss.

Cordia L.

Cordia africana Lam.

FWTA 2: 320 (1963); FAC, Boraginac.: 4 (1971); FZ 7,4: 61 (1990); FTEA, Boraginac.: 31 (1991); KTSL: 573 (1994); HYF: 236 (1997). Syn.: *Cordia abyssinica* R. Br.: FTA 4,2: 8 (1905); FS: 302 (1929); FPNA 2: 126 (1947); ITU: 46 (1952); FPS 3: 77 (1956); WICKENS 1976: 140. *Cordia holstii* Guerke: FTA 4,2: 8 (1905); FS: 303

(1929); JACKSON 1956: 64 {Talanga, Lotti, Laboni} & 357, transitional forest.

Imatong Mountains group, Sudan side: in heavy gallery forest near Issore, 1340 m., 3.8.1939, *Myers* 11,785 (K).

Imatong Mountains group, Uganda side: Lututuru, no alt., 1992, *Katende* (sight record). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 113 documents this record).

Didinga Mountains: valley below Iwowa, 1550 m., a residual tree in a largely cleared valley bottom, 22.4.1939, *Myers* 11,018 (K).

General habitat range: at edges, in clearings and regrowth of medium-altitude and montane forest, in riverine forest and moist woodland.

General distribution: Guinée to Ethiopia and Kenya, south to Angola, Zimbabwe and South Africa (North Transvaal); also in tropical Arabia. Sometimes cultivated in tropical Asia.

Cordia crenata Del.

FTA 4,2: 16 (1905); FS: 303 (1929); FPS 3: 78 (1956); FTEA, Boraginac.: 19 (1991); KTSL: 574 (1994).

subsp. **meridionalis** Warfa

FTEA, Boraginac.: 20 (1991); KTSL: 574 (1994).

Syn.: *Cordia* sp. (2) sensu ITU: 49 (1952).

Imatong Mountains group, Uganda side: Agoro, no alt., riparian scrub, 12.1932, *Eggeling* 793 (MHU); Agoro, 1530 m., *Acacia-Balanites* bushland, 9.4.1945, *Greenway & Hummel* 7330 (EA, K).

General habitat range: in deciduous woodland, in dry areas often riparian.

General distribution: Uganda to Somalia, south to Tanzania; species as a whole also in Sudan, Ethiopia, tropical Arabia and India.

Cordia millenii Bak.

FTA 4,2: 11 (1905); FPNA 2: 127 (1947); ITU: 48 (1952); FPS 3: 77 (1956); FWTA 2: 320 (1963); FAC, Boraginac.: 10 (1971); SOMMER-

LATTE 1990: 172, in canopy of lowland and medium-altitude forest; FTEA, Boraginac.: 13 (1991); KTSL: 575 (1994).

Imatong Mountains group, Sudan side: Talanga, 1100 m. (4° 00' N, 32° 45' E), edge of forest, on steep slope, 8.3.1950, *Jackson* 1200 (K, KHF); Talanga to Upper Talanga, 1100 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, canopy tree in somewhat degraded patch, 10.12.1980, *Friis & Vollesen* 798 (C, also carpological collection, accession no. 15943, KHF).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 112 documents this record).

General habitat range: in lowland and transitional rain forest.

General distribution: Guinée to South Sudan, Uganda and West Kenya, south to Congo [previously Zaire] and Tanzania.

***Cordia monoica* Roxb.**

FZ 7,4: 65 (1990); FTEA, Boraginac.: 15 (1991); KTSL: 575 (1994).

Syn.: *Cordia ovalis* R. Br.: FTA 4,2: 15 (1905); FPNA 2: 127 (1947); ITU: 49 (1952); FPNA 2: 127 (1947); FPS 3: 77 (1956); FAC, Boraginac.: 13 (1971); HYF: 237 (1997).

Imatong Mountains group, Sudan side: near Torit, east of airstrip (4° 25' N, 32° 35' E), 650 m., 9.12.1983, *Kielland-Lund* 275 (C, NLH); Kinyeti Valley, Hiliu (4° 16' N, 32° 48' E), near water-tower, no alt., 2.6.1984, *Kielland-Lund* 832 (C, NLH).

Didinga Mountains: 16 km. west of Kapoeta, on bank of khor, no alt., 23.8.1940, *Myers* 13,435 (K, WM); Boya Hill, Kimatong, 700 m., rocky outcrop in bushland, 17.1.1985, *Fukui* 84-66 (EA).

General habitat range: Widespread in a range of fairly open habitats (often riverine).

General distribution: Congo [previously Zaire] east to Ethiopia and Somalia, south to Namibia and South Africa; also in tropical Arabia and India.

***Cordia quercifolia* Klotzsch**

FTEA, Boraginac.: 22 (1991); KTSL: 575 (1994).

Syn.: *Cordia nevillei* Alston: WARFA 1990: 652. [*Cordia gharaf* auct., non Aschers.: ITU: 48 (1952)].

Imatong Mountains group, Uganda side: Agoro, no alt., 3.1935, *Eggeling* 1707 (MHU, photo K); Agoro, 1380 m., rocky hillside, 13.11.1945, *Thomas* 4369 (EA, K).

General habitat range: in lowland and medium-altitude scattered tree grassland and bushland.

General distribution: Mauritania, Mali and Niger to Ethiopia, Somalia and Kenya, south to Zambia and Mozambique; also in Arabia, India and Ceylon.

***Cordia sinensis* Lam.**

FZ 7,4: 69 (1990); FTEA, Boraginac.: 21 (1991); KTSL: 575 (1994); HYF: 237 (1997).

Syn.: *Cordia rothii* Roem. & Schult.: FTA 4,2: 19 (1905); FS: 303 (1929); FPS 3: 78 (1956).

Imatong Mountains group, Sudan side: south of Torit, no alt., 9.3.1948, *Jackson* 201 (KHF).

Imatong Mountains group, Uganda side: Agoro, no alt., 3.1935, *Eggeling* 1707 (MHU).

Lafit, Dongotona and Nangeya Mountains: 1 km. south of Lafon (5° 02' N, 32° 27-28' E), no alt., 28.12.1983, *Kielland-Lund* 502 (C, NLH).

Didinga Mountains: Loyoro, near Kapoeta, 650 m., open bushland, 9.1985, *Bodoegaard* 85/7 (EA).

General habitat range: in bushland, mainly riverine, or in *Acacia-Commiphora* bushland.

General distribution: Ghana to Somalia, south to Namibia, Zimbabwe and Mozambique; also in Egypt and Israel, eastwards through tropical Arabia to India and Ceylon.

Cynoglossum L.**Cynoglossum lanceolatum** Forssk.

FTA 4,2: 54 (1905); FS: 307 (1929); FPNA 2: 130 (1947), pro parte; FPS 3: 78 (1956); FWTA 2: 324 (1963); FAC, Boraginac.: 50 (1971), pro parte; WICKENS 1976: 141; FZ 7,4: 105 (1990); FTEA, Boraginac.: 106 (1991); UKWF: 241 (1994); HYF: 241 (1997).

Imatong Mountains group, Sudan side: Katire, 1080 m., weed in millet patch, 15.12.1935, Thomas 1571 (BM, K); Mt. Angargi, no alt., 14.6.1939, Andrews 1943 (K).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., 19.4.1939, Myers 10,947 (K).

General habitat range: in disturbed lowland, medium-altitude and montane places.

General distribution: Widespread in tropical Africa; also in tropical Arabia and widespread in tropical Asia.

Cynoglossum sp. cf. C. aequatoriale T.C.E. Fr. FTEA, Boraginac.: 113 (1991).

Didinga Mountains: Nagichot, 1980 m., open grassland, 26.4.1939, Myers 11,141 (K, WM).

Note: See discussion of the possible taxonomic position of this specimen in FTEA, Boraginac.: 113 (1991). *C. aequatoriale* is widespread in montane grasslands on rocks of the basement complex in South Sudan, Uganda and Kenya.

Ehretia P. Browne**Ehretia braunii** Vatke

FTA 4,2: 23 (1905); FS: 303 (1929); FPS 3: 81 (1956).

Imatong Mountains group, Sudan side: south of Torit, 650 m., on termite mound, 21.4.1949, Jackson 695 (KHF); Kinyeti Valley, 10 km. north of Hiliu towards Torit, 650 m., 8.12.1983, Kielland-Lund 261 (C, NLH); north-eastern side of the mountains, 8 km. south east of Ngarama on the track to Molongori, 700 m., *Acacia seyal*-

Combretum deciduous bushland, 10.3.1982, Friis & Vollesen 1161 (BR, C, K, KHF).

General habitat range: in lowland woodland and deciduous bushland.

General distribution: Somalia, South Sudan.

Note: It is doubtful if this taxon, described from the mountains of North Somalia, is distinct from *Ehretia obtusifolia* Hochst. ex DC., distributed from Ethiopia, Somalia, through East Africa to Angola, Botswana, Namibia and South Africa (Transvaal); *E. obtusifolia* also occurs in Arabia, Pakistan and North West India.

Ehretia sp. cf. E. amoena Klotzsch

Syn.?: *Ehretia stuhlmannii* Guerke: FPS 3: 81 (1956).

Imatong Mountains group, Sudan side: south of Torit, 650 m., on termite mound with *Vepris nobilis*, *Ziziphus pubescens*, etc., 27.5.1949, Jackson 777 (FHO, KHF); at the northernmost point of the continuous mountain chain of the Imatong Mountains, just south east of Ngarama on the track to Molongori, 700 m., open woodland with *Acacia seyal*, *Albizia amara* subsp. *sericocephala*, *Lannea humilis*, etc., on sandy soil, on old termite mound, 13.3.1982, Friis & Vollesen 1195 (BR, C, K); Kinyeti Valley, west side of hill near Imatong junction and Ngarama (4° 21' N, 32° 38' E), no alt., in dry *Combretum* woodland, 24.5.1984, Kielland-Lund 710 (C, NLH).

Note: See discussion by Brenan in Mem. N. Y. Bot. Gard. 9: 4 (1954) about the circumscription of *E. amoena* and FTEA, Boraginac.: 34 (1991) about the position of the specimens from the study area.

Heliotropium L.**Heliotropium zeylanicum** (Burm. f.) Lam.

FTA 4,2: 31 (1905); FS: 305 (1929); FPS 3: 82 (1956); FZ 7,4: 89 (1990); FTEA, Boraginac.: 56 (1991); UKWF: 240 (1994); HYF: 239 (1997).

Syn.: *Heliotropium subulatum* (Hochst. ex DC.) Vatke

Imatong Mountains group, Uganda side: Agoro, 910 m., woodland, 4.1943, *Purseglove* 1376 (EA, K).

General habitat range: in deciduous bushland and in disturbed places.

General distribution: Widespread throughout lowland habitats in the drier parts of tropical Africa; also in tropical Arabia and India.

Lithospermum L.

Lithospermum afromontanum H. Weim.

HEDBERG 1957: 158; FAC, Boraginac.: 57 (1971); UKWF: 523 (1974); FZ 7,4: 108 (1990); FTEA, Boraginac.: 77 (1991); UKWF: 241 (1994).

Syn.: [*Lithospermum officinale* auct., non L.: FPNA 2: 135 (1947); FPS 3: 88 (1956) {Imatong Mountains}].

Imatong Mountains group, Sudan side: without further locality, 1830-2130 m., 2.1936, *Johnston* 1422 (K); Mt. Kinyeti, 3050 m., rocky summit, 30.12.1935, *Thomas* 1852 (BM, K).

General habitat range: in montane forest and grassland.

General distribution: Ethiopia and South Sudan west to East Congo [previously Zaire] and south to Zimbabwe and South Africa (Natal).

Trichodesma R. Br.

Trichodesma physaloides (Fenzl) A. DC.

FTA 4,2: 46 (1905); FS: 306 (1929); CHIPP 1929: 192; FPS 3: 88 (1956); FAC, Boraginac.: 39 (1971); FZ 7,4: 96 (1990); FTEA, Boraginac.: 100 (1991); UKWF: 240 (1994).

Imatong Mountains group, Sudan side: near Laboni Forest, 1220 m., in fire-swept grassland, appearing after grass fires, 8.2.1929, *Chipp* 34 (K, WM).

General habitat range: in woodland and disturbed places.

General distribution: West Ethiopia and Sudan south to South Africa (Transvaal, Natal).

Trichodesma zeylanicum (Burm. f.) R. Br.

FTA 4,2: 51 (1905); FS: 307 (1929); FPS 3: 90 (1956); FAC, Boraginac.: 37 (1971); UKWF: 520 (1974); FZ 7,4: 95 (1990); FTEA, Boraginac.: 92 (1991); UKWF: 240 (1994); HYF: 240 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, south east of compound, 700 m., in cultivation, 2.12.1983, *Kielland-Lund* 154 (C, NLH); Katire, 1080 m., weed in millet patch, 15.12.1935, *Thomas* 1570 (BM, K).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1830 m., grassland, 2.1960, *Wilson* 850 (EA).

General habitat range: in bushland and as weed in cultivations.

General distribution: Sudan and Ethiopia, south to South Africa (Transvaal, Natal); also in tropical Asia, including tropical Arabia, and in Australia.

Order 66. Solanales Dumort.

Fam. 135. Solanaceae Juss.

Discopodium Hochst.

Discopodium penninervium Hochst.

FTA 4,2: 253 (1905); FPNA 2: 203 (1947); ITU: 413 (1952); FWTA 2: 328 (1963); KTSL: 578 (1994).

Imatong Mountains group, Sudan side: Mt. Kedong [4° 01' N, 32° 40' E], 2100 m., in *Dombeya* forest, 10.2.1948, *Jackson* 259 (FHO); at Ngairigi River, 1600 m., edge of forest, 8.1.1950, *Jackson* 1042 (FHO, KHF); 1980 m., open forest, 31.1.1976, *Howard* IM 28 (K, KHF); Gilo to Mt. Konoro, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 24.11.1980, *Friis & Vollesen* 436 (C).

Imatong Mountains group, Uganda side: Aringa River Headwaters, 2440 m., *Podocarpus-Syzygium* forest, 6.4.1945, *Greenway & Hummel* 7300 (EA, FHO, K, MHU). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, slope of Mt. Emogadung, 2200 m., understory in *Podocarpus latifolius* forest on steep rocky slope, 21.5.1950, *Jackson* 1092 (FHO).

General habitat range: in montane forest, often at edges.

General distribution: Cameroon to Ethiopia, south to North Malawi.

Physalis L.

Physalis peruviana L.

FTA 4,2: 248 (1905); FPS 3: 90 (1956); FWTA 2: 329 (1963); WICKENS 1976: 142; UKWF: 244 (1994).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., riverine forest, 25.2.1979, *Shigeta* 219 (EA); Gilo, 1800-1900 m., disturbed places in upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 1980, *Friis & Vollesen* (sight record).

General habitat range: disturbed places in medium altitude and montane forest, often at edges, or evergreen bushland.

General distribution: Indigenous in tropical South America; widely cultivated and naturalised elsewhere in the warm parts of both hemispheres.

Solanum L.

Solanum aculeastrum Dunal

FTA 4,2: 243 (1905); FPNA 2: 214 (1947); ITU: 413 (1952); FWTA 2: 332 (1963); UKWF: 244 (1994); KTSL: 579 (1994).

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 24.11.1980, *Friis & Vollesen* 440 (C, K, KHF); Mt. Agnargi, 1830-2130 m., 14.6.1939, *Andrews* 1954 (K).

Imatong Mountains group, Sudan side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

General habitat range: frequently cultivated as a hedge plant and becoming naturalised in clearings in medium-altitude and montane forest.

General distribution: Throughout the tropics.

Solanum aculeatissimum Jacq.

FTA 4,2: 228 (1905); FS: 309 (1929); FPNA 2: 214 (1947); FPS 3: 102 (1956); FWTA 2: 334 (1963); UKWF: 243 (1994).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 6.1.1979, *Shigeta* 217 (EA).

Imatong Mountains group, Uganda side: Langia, 2740 m., montane grassland, 4.1943, *Purseglove* 1413 (K).

Didinga Mountains: upland pasture near Nagichot, 2040 m., 24.4.1939, *Myers* 11,101 (?K, not traced).

General habitat range: in medium-altitude and montane grassland and evergreen bushland, often in disturbed places, and in regrowth in montane forest.

General distribution: Throughout tropical Africa and in South Africa.

Solanum americanum Mill.

HAWKES & EDMONDS 1972: 197; JAEGER 1985: 293.

Imatong Mountains group, Sudan side: Mt. Angargi, 1830-2140 m., 14.6.1939, *Andrews* 1947 (K).

General habitat range: in disturbed places.

General distribution: Indigenous in tropical America; now naturalised throughout the tropics and in the warm parts of the temperate regions.

Solanum anguivi Lam.

UKWF: 243 (1994).

Syn.: *Solanum indicum* L., nom. rej. subsp. *distichum* (Thonn.) Bitter: FWTA 2: 333 (1963). *Solanum indicum* L., nom. rej., pro parte: FTA 4,2: 232 (1906); UKWF: 526 (1974). *Solanum senegambicum* Dunal: FTA 4,2: 222 (1906).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 1979, *Shigeta* 205 (EA, identified and listed by M.G. Gilbert, not traced); Hiliu, in compound, 700 m., 23.11.1983, *Kielland-Lund* 38 (C, NLH); Gilo, at bridge on Ngairigi River, 1800 m., dense *Combretum* woodland at edge between upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea* and *Loudetia arundinacea* grassland with scattered trees, 19.11.1980, *Friis & Vollesen* 339 (C, K, KHF).

Didinga Mountains: upland pasture near Nagichot, 2040 m., 24.4.1939, *Myers* 11,102 (K); between Nagichot and Duguru village (4° 16' N, 33° 35' E), 2000 m., 17.12.1983, *Kielland-Lund* 367 (C, NLH).

General habitat range: in lowland and medium-altitude grassland and evergreen bushland, especially in disturbed sites, and in old cultivations.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa.

Solanum campylacanthum Hochst. ex A. Rich.

FTA 4,2: 239 (1906); FPS 3: 99 (1956).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

General habitat range: in medium altitude and montane evergreen forest and bushland, often in disturbed places.

General distribution: Sudan, Ethiopia, Kenya, Uganda, Tanzania, Mozambique.

Note: A species with poorly known distribution; the record needs confirmation.

Solanum coagulans Forssk.

UKWF: 243 (1994); HYF: 227 (1997).

Syn.: *Solanum dubium* Fresen.: FTA 4,2: 235 (1906); FS: 309 (1929); FPS 3: 99 (1956).

Didinga Mountains: 8 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K013 (K, WM).

General habitat range: in dry lowland and medium-altitude bushland.

General distribution: Sudan, Ethiopia and Somalia through eastern Africa, south to North Tanzania; also in tropical Arabia.

Solanum dasyphyllum Schumach. & Thonn.

FTA 4,2: 244 (1906); FPNA 2: 216 (1947); FWTA 2: 334 (1963); UKWF: 243 (1994).

Syn.: *Solanum duplosinuatatum* Klotzsch: FTA 4,2: 243 (1906); FS: 310 (1929); FPS 3: 99 (1956).

Imatong Mountains group, Sudan side: Talanga, 1000 m., *Combretum* woodland, 25.2.1950, *Jackson* 1156 (BM, KHF); Talanga to Upper Talanga, 1100 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophloeum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in clearing along trail, 10.12.1980, *Friis & Vollesen* 800 (C, K).

Didinga Mountains: valley north of Chukudum, 1100 m., 22.12.1983, *Kielland-Lund* 437 (NLH).

General habitat range: in lowland and medium-altitude grassland and evergreen bushland, especially in disturbed sites, and in old cultivations.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa.

Solanum giganteum Jacq.

FTA 4,2: 229 (1906); ITU: 414 (1952); FWTA 2: 332 (1963); UKWF: 243 (1994); KTSL: 580 (1994).

Imatong Mountains group, Sudan side: Talanga to Upper Talanga, 1000 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophloeum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in clearing along trail,

7.12.1980, *Friis & Vollesen* 759 (C, K, KHF); Mt. Baghanj, 1830-2140 m., 14.6.1939, *Andrews* 1939 (K); Itibol, 1900 m., forest regrowth, 23.3.1950, *Jackson* 1265 (BM).

General habitat range: in montane forest and evergreen bushland.

General distribution: Cameroon to Ethiopia and Kenya, south to South Africa; also in India and Sri Lanka.

***Solanum incanum* L.**

FTA 4,2: 238 (1906); FS: 310 (1929); FPS 3: 98 (1956); FWTA 2: 332 (1963); WICKENS 1976: 142; UKWF: 244 (1994); KTS: 581 (1994); HYF: 228 (1997).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 5.1.1979, *Shigeta* 3 (EA); Kinyeti Valley, Hiliu, near compound, 700 m., 23.11.1983, *Kielland-Lund* 38 (C, NLH).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

Didinga Mountains: Boya Hill, Kimatong, 700 m., open woodland near village compound, 17.11.1983, *Fukui* 83-10 (EA).

General habitat range: in lowland grassland and woodland.

General distribution: Mali to Ethiopia and Kenya, south to South Africa; also in tropical Arabia and northern India.

***Solanum nigrum* L. (sensu latior)**

FTA 4,2: 218 (1906); FS: 308 (1929); FPNA 2: 210 (1947); FPS 3: 96 (1956); FWTA 2: 335 (1963); WICKENS 1976: 142; UKWF: 242 (1994); HYF: 228 (1997).

Syn.: *Solanum nodiflorum* Jacq.: FTA 4,2: 218 (1906); FS: 308 (1929).

Imatong Mountains group, Sudan side: Loa, Moli-tokoro village north of Kerepi (3° 55' N, 31° 55' E), no alt., 5.6.1984, *Kielland-Lund* 855 (C, NLH); Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, *Kielland-*

Lund 570 (C, NLH); Palotaka, 1200 m., open woodland, 5.1.1979, *Shigeta* 28 (EA); Lowiliwili, 2700 m., along path in *Podocarpus latifolius* forest, 14.11.1949, *Jackson* 902 (BM); ridge leading to the summit of Mt. Kinyeti, 3000 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, *Friis & Vollesen* 1280 (C).

Didinga Mountains: Boya Hill, 1200 m., rocky outcrop, 22.12.1982, *Fukui* 82-29 (EA).

General habitat range: Occurs generally in disturbed places.

General distribution: Widespread throughout the world.

***Solanum terminale* Forssk.**

FTA 4,2: 213 (1906); FWTA 2: 331 (1963), pro parte; UKWF: 242 (1994); KTS: 583 (1994); HYF: 228 (1997).

Imatong Mountains group, Sudan side: Mt. Baghanj, 1830-2140 m., in gully, 14.6.1939, *Andrews* 1430 (K).

General habitat range: in medium-altitude and montane forest.

General distribution: North Nigeria to Ethiopia and Kenya, south to Tanzania; also in tropical Arabia.

***Solanum welwitschii* C.H. Wright**

FTA 4,2: 213 (1906).

Syn.: *Solanum welwitschii* C.H. Wright var. *strictum* C.H. Wright: FPS 3: 96 (1956). *Solanum terminale* Forssk. subsp. *welwitschii* (C.H. Wright) Heine: FWTA 2: 331 (1963).

Imatong Mountains group, Sudan side: Lotti, 1000 m., rain forest, 24.6.1953, *Jackson* 3045 (K); Talanga, 950 m., lowland rain forest with *Chryso-phyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 4.12.1980, *Friis & Vollesen* 683 (C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Guinée to Sudan, south to Angola and Congo [previously Zaire].

Withania Pauq.

Withania somnifera (L.) Dunal

FTA 4,2: 249 (1906); FS: 311 (1929); FPNA 2: 204 (1947); FPS 3: 102 (1956); FWTA 2: 330 (1963); WICKENS 1976: 142; UKWF: 244 (1994); KTSL: 583 (1994); HYF: 229 (1997).

Imatong Mountains group, Uganda side: Agoro, no alt., 3.1935, *Eggeling* 1752 (K, MHU).

General habitat range: in lowland and medium-altitude dry grassland and deciduous bushland, often in disturbed places.

General distribution: Mali to Ethiopia and Kenya, south to South Africa; also in the Atlantic Islands, tropical Arabia and India.

(BR, C, EA, K, KHF); Kinyeti Valley, Imatong Junction between Torit and Hiliu, near Ngarama (4° 20' N, 32° 38' E), no alt., 14.1.1984, *Kielland-Lund* 629 (C, NLH); 8 km. south of Hiliu along Katire road (4° 12' N, 32° 40' E), no alt., in woodland, 30.5.1984, *Kielland-Lund* 792 (C, NLH); near Imeila, 850 m., woodland with *Albizia zygia*, *Annona senegalensis*, *Lonchocarpus laxiflorus*, etc., 24.2.1982, *Friis & Vollesen* 1021 (BR, C, K, KHF); Hiliu, east of compound, 700 m., 29.11.1983, *Kielland-Lund* 81 (C, NLH).

General habitat range: in lowland and medium-altitude grassland and woodland.

General distribution: Cameroon to Ethiopia, south to Namibia and South Africa (Natal). Species as a whole also in West Africa.

Note: All the material cited here from the study area approaches *Astripomoea malvacea* var. *floccosa* (Vatke) Verdc.

Fam. 136. **Convolvulaceae** Juss.

Astripomoea A. Meeuse

Astripomoea malvacea (Klotzsch) A. Meeuse
FTEA, Convolvulac.: 74 (1963); WICKENS 1976: 143; FZ 8,1: 51 (1987); UKWF: 248 (1994).

Syn.: *Astrochlaena malvacea* (Klotzsch) Hall. f.: FTA 4,2: 121 (1905); FS: 321 (1929); FPS 3: 104 (1956). *Astrochlaena engleriana* Dammer: FTA 4,2: 121 (1905); FS: 321 (1929).

var. **volkensisii** (Dammer) Verdc.

FTEA, Convolvulac.: 76 (1963); WICKENS 1976: 143.

Syn.: *Astrochlaena volkensisii* Dammer: FTA 4,2: 120 (1905); FS: 321 (1929). *Astrochlaena philippisae* Rendle: FTA 4,2: 121 (1905).

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 8.12.1980, *Friis & Vollesen* 778

Cuscuta L.

Cuscuta kilimanjari Oliv.

FTA 4,2: 205 (1906); FPNA 2: 109 (1947); FPS 3: 109 (1956) (Imatong Mountains); FTEA, Convolvulac.: 6 (1963); FZ 8,1: 133 (1987); FAC, Cuscutac.: 4 (1993); UKWF: 245 (1994).

var. **kilimanjari**

FTEA, Convolvulac.: 6 (1963); FZ 8,1: 1983 (1987); FAC, Cuscutac.: 4 (1993).

Imatong Mountains group, Sudan side: Itibol, 1980 m., in *Podocarpus latifolius* forest, parasitising on Acanthaceae herbs, 18.12.1935, *Thomas* 1647 (BM, K); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, *Friis & Vollesen* 33 (C); Kipia, 2520 m., montane woodland, 6.7.1947, *MacLeay* 187 (BM).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1800 m., gap in old high forest, 16.5.1972, *Synnott* 983 (EA, MHU).

General habitat range: a parasitic twining herb,

predominantly parasitising herbaceous species of Acanthaceae on the forest floor, sometimes in lowland forest, but most frequent in medium-altitude and montane forest.

General distribution: East Congo [previously Zaire] to Ethiopia and North Somalia, south to South Africa (Transvaal).

Dichondra L.

Dichondra repens J.R. & G. Forster

FTA 4,2: 65 (1905); FS: 323 (1929); FPNA 2: 110 (1947); FPS 3: 109 (1956); FTEA, Convolvulac.: 12 (1963); FZ 8,1: 10 (1987); UKWF: 246 (1994); HYF: 231 (1997).

var. **repens**

FTEA, Convolvulac.: 12 (1963); FZ 8,1: 10 (1987).

Imatong Mountains group, Uganda side: 4 km. south east of Lomwaga, 1900 m., low ground in tall-grass grassland, 18.7.1974, *Katende* 2131 (MHU).

General habitat range: in disturbed places in lowland, medium-altitude and montane grassland or woodland or along paths in forest.

General distribution: Throughout the warm parts of both the Old and the New World; this is the only variety known from East Africa.

Evolvulus L.

Evolvulus alsinoides (L.) L.

FTA 4,2: 67 (1905); FS: 322 (1929); FPNA 2: 110 (1947); FPS 3: 109 (1956); FWTA 2: 339 (1963); FTEA, Convolvulac.: 18 (1963); WICKENS 1976: 143; FZ 8,1: 14 (1987); UKWF: 246 (1994); HYF: 231 (1997).

Imatong Mountains group, Sudan side: 5 km. south east of Torit, 630 m., sandy soil in *Acacia* bushland, 12.6.1961, *Jackson* 4234 (K); Kinyeti Valley, Hiliu, between residence area and Kinyeti River, 700 m., 23.11.1983, *Kielland-Lund*

29 (C, NLH); Hiliu, along main road, 700 m., 28.11.1983, *Kielland-Lund* 66 (C, NLH).

General habitat range: in lowland and medium-altitude dry woodland, bushland and grassland, often in disturbed places.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; throughout the warm parts of both the Old and the New World.

Hewittia Wight & Arn.

Hewittia malabarica (L.) Suresh

NICOLSON, SURESH & MANILAL 1988: 88.

Syn.: *Hewittia bicolor* (Vahl) Wight & Arn.: FCap 4: 68 (1904); FTA 4,2: 100 (1905). *Hewittia sublobata* (L. f.) O. Kuntze.: FPS 3: 3: 109 (1956); FWTA 2: 342 (1963); FTEA, Convolvulac.: 45 (1963); UKWF: 247 (1994). *Hewittia scandens* (Milne) Mabberley: FZ 8,1: 31 (1987); HYF: 234 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, 3 km. south of Hiliu along Katire road (4° 14' N, 32° 40' E), no alt., near charcoal pit, 30.5.1984, *Kielland-Lund* 799 (C, NLH).

General habitat range: in lowland and medium-altitude grassland, bushland and woodland, also along forest edges, and occasionally in waste places.

General distribution: Gambia to Ethiopia and Somalia, south to South Africa; also widespread in tropical Asia, including tropical Arabia, Malaysia and Polynesia; escaped in Jamaica.

Ipomoea L.

Ipomoea blepharophylla Hall. f.

FTA 4,2: 141 (1905); FS: 313 (1929); FPS 3: 120 (1956); FTEA, Convolvulac.: 96 (1963); FWTA 2: 350 (1963); FZ 8,1: 66 (1987); UKWF: 250 (1994).

Imatong Mountains group, Sudan side: Kinyeti Valley, 16 km. north of Katire, 900 m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, 22.2.1982, Friis & Vollesen 993 (C, K).

General habitat range: in medium-altitude grassland and woodland.

General distribution: Senegal to Ethiopia, south to Angola, Malawi, Zimbabwe and Mozambique.

***Ipomoea cairica* (L.) Sw.**

FPNA 2: 120 (1947); FPS 3: 119 (1956); FTEA, Convolvulac.: 125 (1963); FWTA 2: 351 (1963); FZ 8,1: 105 (1987); UKWF: 252 (1994); HYF: 235 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, 18 km. north of Katire, 750 m., edge of riverine forest along Kinyeti River, 18.3.1982, Friis & Vollesen 1252 (C, K).

General habitat range: in a wide range of habitats, often in disturbed places.

General distribution: Throughout tropical Africa; also in the eastern Mediterranean region and throughout tropical Asia, including tropical Arabia.

***Ipomoea coptica* (L.) Roem. & Schult.**

FPNA 2: 120 (1947); FPS 3: 115 (1956); FTEA, Convolvulac.: 128 (1963); FWTA 2: 350 (1963); FZ 8,1: 108 (1987).

Syn.: *Ipomoea dissecta* Willd.: FCap 4: 67 (1904); FTA 4,2: 176 (1905); FS: 317 (1929).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, along road through compound, 700 m., 26.11.1983, Kielland-Lund 46 (C, NLH).

General habitat range: in lowland and medium-altitude grassland, bushland and woodland, becoming a weed of roadsides, cultivated and waste ground.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa (Transvaal);

also in tropical Asia, southern China and northern Australia.

***Ipomoea eriocarpa* R. Br.**

FTA 4,2: 136 (1905); FS: 313 (1929); FPS 3: 113 (1956); FTEA, Convolvulac.: 91 (1963); FWTA 2: 350 (1963); WICKENS 1976: 143; FZ 8,1: 61 (1987); UKWF: 250 (1994); HYF: 235 (1997).

Syn.: *Ipomoea hispida* (Vahl) Roem. & Schult., nom. illeg., non Zucc.: FPNA 2: 116 (1947).

Imatong Mountains group, Sudan side: Talanga, 950 m., rocky outcrop in wooded grassland with *Terminalia laxiflora*, *T. brownii*, *Pterocarpus lucens*, *Combretum collinum* and *Vitex doniana*, grass cover dominated by *Loudetia*, 28.11.1980, Friis & Vollesen 516 (C, K, KHF).

General habitat range: in lowland grassland, woodland and cultivated land.

General distribution: Senegal to Egypt, Sudan and Ethiopia, south to South Africa (Transvaal); also in Madagascar, tropical Asia, including tropical Arabia, and North Australia.

***Ipomoea fulvicaulis* Hall. f.**

FTA 4,2: 143 (1905); FTEA, Convolvulac.: 97 (1963); FZ 8,1: 68 (1987); UKWF: 250 (1994).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., 19.4.1939, Myers 10,948 (K).

General habitat range: in lowland, medium-altitude and montane grassland.

General distribution: Congo [previously Zaire] to Ethiopia, south to Angola, Malawi, Zimbabwe and Mozambique.

***Ipomoea heterotricha* F. Didr.**

FTEA, Convolvulac.: 107 (1963); FWTA 2: 347 (1963); FZ 8,1: 80 (1987).

Syn.: *Ipomoea amoena* Choisy, nom. illeg., non Blume: FTA 4,2: 154 (1905); FS: 315 (1929). *Ipomoea amoenula* Dandy: FPS 3: 112 (1956).

Imatong Mountains group, Sudan side: Talanga, 950 m., climber on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjensis*, *Aeollanthus spp.*, *Aloe sp.* and many an-

nuals, 2.12.1980, *Friis & Vollesen* 632 (BR, C, K, KHF); Kinyeti Valley, Hiliu, 700 m., agricultural land, 28.11.1983, *Kielland-Lund* 59 (C, NLH); hill 3 km. south of Hiliu, 700 m., stony hillside, 6.12.1983, *Kielland-Lund* 218 (C, NLH).

General habitat range: in lowland, medium-altitude and montane woodland and grassland.

General distribution: Senegal to South Sudan and Uganda, south to Angola, Zambia and Malawi; also in Cape Verde Islands.

***Ipomoea involucreta* P. Beauv.**

FTA 4,2: 150 (1905); FS: 315 (1929); FPNA 2: 121 (1947); FPS 3: 112 (1956); FTEA, Convolvulac.: 104 (1963); FWTA 2: 347 (1963); WICKENS 1976: 143; FZ 8,1: 75 (1987); UKWF: 251 (1994).

Imatong Mountains group, Sudan side: Gilo, 1700 m., in secondary scrub, 9.11.1949, *Jackson* 890 (BM); Gilo to Itibol, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 11.11.1980, *Friis & Vollesen* 159 (C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and grassland.

General distribution: Senegal to South Sudan, Uganda and West Kenya, south to Angola and South Africa (Transvaal).

***Ipomoea mauritiana* Jacq.**

FTEA, Convolvulac.: 135 (1963); FWTA 2: 351 (1963); FZ 8,1: 117 (1987); KTS: 587 (1994).
Syn.: [*Ipomoea digitata* auct., non L.: FTA 4,2: 189 (1905); FPS 3: 119 (1956)].

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 2.12.1980, *Friis & Vollesen* 633 (C, K, KHF).

General habitat range: in lowland and medium-altitude forest, evergreen bushland and wooded grassland.

General distribution: Senegal to South Sudan and a few places in Uganda, Kenya and Tanza-

nia, south to Angola and South Africa (Natal); throughout the tropics.

***Ipomoea obscura* (L.) Ker-Gawl.**

FTA 4,2: 164 (1905); FS: 316 (1929); FPS 3: 116 (1956); FTEA, Convolvulac.: 116 (1963); FWTA 2: 349 (1963); FZ 8,1: 91 (1987).

Syn.: *Ipomoea fragilis* Choisy: FTA 4,2: 165 (1905); FPS 3: 116 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, in compound, 700 m., 26.11.1983, *Kielland-Lund* 54 (C, NLH).

Imatong Mountains group, Uganda side: Madi Opei, 4.1943, no alt., *Purseglove* 1503 (K).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and woodland, and along forest edges; also a weed in cultivated ground and along roadsides.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in Madagascar and the Mascarene Islands, the Seychelles and through tropical Asia and China to northern Australia and Fiji.

***Ipomoea ochracea* (Lindl.) G. Don**

FTA 4,2: 166 (1905); FTEA, Convolvulac.: 115 (1963); FWTA 2: 349 (1963); WICKENS 1976: 144; FZ 8,1: 89 (1987); UKWF: 251 (1994).

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 8.12.1980, *Friis & Vollesen* 776 (BR, C, K, KHF).

Didinga Mountains: Longumu Valley north of Chukudum (4° 20' N, 33° 23' E), 900 m., 20.12.1983, *Kielland-Lund* 396 (C, NLH).

General habitat range: in lowland and medium-altitude evergreen and deciduous bushland.

General distribution: Senegal to Ethiopia, south to Angola, Botswana, Zimbabwe and Mozambique.

***Ipomoea prismatosyphon* Welw.**

FTA 4,2: 181 (1905); FTEA, Convolvulac.: 142 (1963).

Syn.: *Ipomoea magnifica* Hall. f.: FS: 318 (1929); FPS 3: 119 (1956).

Imatong Mountains group, Sudan side: without further locality, 1520-1830 m., 12.6.1939, *Andrews* 1829 (K); slope of Mt. Lohocho (Ilungi), above the Katire-Gilo road, 1900 m., *Loudetia arundinacea* grassland with scattered trees, recently burnt, 7.3.1982, *Friis & Vollesen* 1122 (C, also carpological collection, accession no. 15954, K, KHf).

Imatong Mountains group, Uganda side: without further locality, 1220 m., woodland, 4.1943, *Purseglove* 1437 (EA, ?K); without further locality, 2290 m., 4.1938, *Eggeling* 3625 (K); Lututuru, no alt., 5.6.1963, *Kertland* s.n. (K); north of Okako, south of Mingaro, no alt., tufted montane grassland, 9.6.1973, *Katende* 1867 (EA, MHU); 4 km. south east of Lomwaga, no alt., tall-grass grassland with scattered trees, 18.7.1974, *Katende* 2124 (EA, MHU).

Didinga Mountains: Nagichot, 1980 m., 26.4.1939, *Myers* 11,150 (K, WM).

General habitat range: in medium-altitude and montane woodland and grassland.

General distribution: Nigeria and Cameroon to South Sudan and Uganda, south to Angola and Tanzania.

***Ipomoea sinensis* (Desr.) Choisy**

FTEA, Convolvulac.: 100 (1963); FWTA 2: 349 (1963); WICKENS 1976: 144; FZ 8,1: 70 (1987); UKWF: 251 (1994); HYF: 236 (1997).

subsp. **blepharosepala** (A. Rich.) A. Meeuse

FTEA, Convolvulac.: 101 (1963); WICKENS 1976: 144; FZ 8,1: 72 (1987).

Syn.: *Ipomoea cardiosepala* Bak. & Wright: FCap 4: 61 (1904); FTA 4,2: 147 (1905).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, along main road, 700 m., 28.11.1983, *Kielland-Lund* 67 (C, NLH).

Imatong Mountains group, Uganda side: 4 km.

south east of Lomwaga, 1900 m., tall-grass grassland with scattered trees, 18.7.1974, *Katende* 2138 (MHU).

General habitat range: in lowland and medium-altitude grassland, sometimes seasonally flooded, *Acacia* wooded grassland, becoming a weed of cultivated land.

General distribution: Uganda to Ethiopia and Somalia, south to Namibia, Swaziland and South Africa (Natal); also in Arabia. Species as a whole also in West Tropical Africa, in tropical Arabia, and throughout tropical Asia to Taiwan.

***Ipomoea spathulata* Hall. f.**

FTA 4,2: 198 (1906); FTEA, Convolvulac.: 145 (1963); UKWF: 252 (1994); KTSL: 587 (1994).

Imatong Mountains group, Uganda side: Agoro, no alt., arid hills, 12.1932, *Eggeling* 833 (K, MHU); Agoro, 1220 m., valley floor, 14.6.1941, *Maxwell Forbes* 162 (K); Agoro, 1380 m., stony hillside, 13.11.1945, *Thomas* 4366 (EA, K). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Didinga Mountains: foot of Didinga Mountains, 3 km. west of Kidepo River, no alt., 27.8.1940, *Myers* 13,449 (K); half way between Keiala and Chukudum, no alt., 22.12.1983, *Kielland-Lund* 449 (C, NLH).

General habitat range: in lowland and medium-altitude deciduous bushland with *Acacia* and *Commiphora*.

General distribution: South Sudan and Uganda to Ethiopia, south to Kenya.

***Ipomoea stenobasis* Brenan**

FTEA, Convolvulac.: 121 (1963); FWTA 2: 349 (1963).

Imatong Mountains group, Sudan side: Lawurong (4° 5' N, 32° 37' E), 900 m., over gneiss rocks, 6.11.1948, *Jackson* 487 (BM); Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp.,

Aloe sp. and many annuals, on rocks along brook, 2.12.1980, Friis & Vollesen 626 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude woodland, often among rocks.

General distribution: Nigeria to South Sudan, south to Uganda.

***Ipomoea tenuirostris* Choisy**

FTA 4,2: 143 (1905); FPS 3: 115 (1956) {Imatong Mountains}; FTEA, Convolvulac.: 101 (1963); FWTA 2: 349 (1963); FZ 8,1: 72 (1987); UKWF: 251 (1994).

subsp. ***tenuirostris***

FTEA, Convolvulac.: 101 (1963); FZ 8,1 73 (1987); UKWF: 251 (1994).

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, Johnston 1477 (K); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, climber at edge of forest clearing, 11.12.1980, Friis & Vollesen 807 (BR, C, K, KHF); near pool in River Kinyieti near Gilo, 1750 m., 26.12.1983, Kielland-Lund 480 (C, NLH); between Gilo and Bushbuck Hill, 2000 m., clearing in *Cupressus lusitanica* plantation, with regrowth of *Albizia-Croton-Macaranga* forest, 10.11.1980, Friis & Vollesen 125 (C, K, KHF); Ibahin to Itibol, 1980 m., common in secondary scrub, 19.12.1935, Thomas 1680 (BM, K).

General habitat range: in lowland and medium-altitude evergreen bushland.

General distribution: Cameroon to Ethiopia, south to Zambia, Malawi and Zimbabwe. Species as a whole also in West Tropical Africa, and with same general distribution in eastern Africa.

***Ipomoea wightii* (Wall.) Choisy**

FTA 4,2: 157 (1905); FPNA 2: 121 (1947); FTEA, Convolvulac.: 110 (1963); UKWF: 251 (1994).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1750 m., upland rain

forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 17.11.1950, Friis & Vollesen 291 (C, K, KHF).

General habitat range: in lowland, medium-altitude and montane bushland and grassland.

General distribution: Uganda to Ethiopia, south to South Africa (Transvaal, Natal); also in Madagascar and widespread in tropical Asia. First record from the Sudan.

***Jacquemontia* Choisy**

***Jacquemontia tamnifolia* (L.) Griseb.**

FPS 3: 123 (1956); FTEA, Convolvulac.: 35 (1963); FWTA 2: 340 (1963); FZ 8,1: 25 (1987). Syn.: *Jacquemontia capitata* (Desr.) G. Don: FCap 4: 69 (1904); FTA 4,1: 85 (1905).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, east of *Leucaena* trial plot, 700 m., 26.11.1983, Kielland-Lund 48 (C, NLH).

General habitat range: in lowland grassland, bushland, woodland, and at edges of riverine forest, thicket, and as a weed in cultivated and waste ground, often in sandy or rocky soil.

General distribution: Senegal to Sudan and Ethiopia, south to South Africa; also in Madagascar, the Mascarene Islands, and tropical America.

***Merremia* Endl.**

***Merremia kentrocaulos* (C.B. Clarke) Rendle**

FTA 4,2: 103 (1905); FS: 319 (1929); FPS 3: 124 (1956); FTEA, Convolvulac.: 59 (1963); WICKENS 1976: 144; FWTA 2: 342 (1963); FZ 8,1: 40 (1987).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 9.1.1979, Shigeta 77 (EA).

General habitat range: in lowland and medium-altitude woodland.

General distribution: Senegal to Ethiopia, south to Angola and South Africa (Transvaal, Natal).

Merremia pterygocaulos (Choisy) Hall. f.
FTA 4,2: 105 (1905); FS: 319 (1929); FPNA 2:
113 (1947); FPS 3: 124 (1956); FTEA, Con-
volvulac.: 57 (1963); FWTA 2: 342 (1963);
WICKENS 1976: 144; FZ 8,1: 42 (1987); UKWF:
248 (1994).

Imatong Mountains group, Uganda side: 2 km. east
of Lututuru, near a rivulet, 1400 m., in open
woodland, 17.2.1969, *Lye* 2093 (MHU); 3-5 km.
south east of Lututuru, 1400 m., in open wood-
land, 17.2.1969, *Lye* 2105 (MHU, NLH, UPS).

Didinga Mountains: Longumu Valley north of
Chukudum, 900 m., 20.12.1983, *Kielland-Lund*
395 (NLH).

General habitat range: in lowland and medium-
altitude grassland, often near streams in dry
country.

General distribution: Senegal to Ethiopia, south
to Botswana and South Africa (Natal); also in
Madagascar and the Mascarene Islands.

Seddera Hochst.

Seddera bagshawei Rendle
FPS 3: 127 (1956); FTEA, Convolvulac.: 24
(1963); UKWF: 246 (1994).

Didinga Mountains: [4° 40' N, 33° 35' E], no
alt., 27.8.1953, *Peers* KO14 (K).

General habitat range: in medium-altitude de-
ciduous bushland.

General distribution: Sudan to Ethiopia, south
to Tanzania.

Stictocardia Hall. f.

Stictocardia beraviensis (Vatke) Hall. f.
FPNA 2: 123 (1947); FPS 3: 127 (1956); FTEA,
Convolvulac.: 69 (1963); FWTA 2: 352 (1963);
FZ 8,1: 49 (1987); UKWF: 248 (1994).

Syn.: *Argyreia beraviensis* (Vatke) Bak.: FTA 4,2:
201 (1906).

Imatong Mountains group, Sudan side: Talanga to

Upper Talanga, 1100 m., lowland rain forest
with *Chrysophyllum albidum*, *Cola gigantea*, *Ery-
throphleum suaveolens*, *Alstonia boonei*, *Parinari ex-
celsa* and *Milicia excelsa*, climber in forest,
7.12.1980, *Friis & Vollesen* 751 (BR, C, K, KHF).

General habitat range: in lowland and medium-
altitude grassland and woodland and forest.

General distribution: Guinea Bissau and Mali to
Ethiopia and South Sudan, south to Zambia;
also in Madagascar.

Order 67. **Scrophulariales** Lindl. (Syn.: *Person-
atae* Lindl., *Personales* Benth.)

Fam. 137. **Scrophulariaceae** Juss.
(Syn.: *Orobanchaceae* Vent.)

Alectra Thunb.

Alectra sessiliflora (Vahl) O. Kuntze
FWTA 2: 367 (1963); FZ 8,2: 86 (1990); WICKENS
1976: 145; UKWF: 258 (1994); HYF: 264 (1997).
var. **senegalensis** (Benth.) Hepper
FWTA 2: 368 (1963); WICKENS 1976: 145; FZ
8,2: 88 (1990).

Syn.: *Alectra senegalensis* Benth.: FTA 4,2: 371
(1906); FPNA 2: 235 (1947); JACKSON 1956:
362.

Imatong Mountains group, Sudan side: Gilo, 1850
m., upland rain forest with *Albizia*, *Macaranga*,
Croton and *Ocotea*, forest edge, 8.11.1980, *Friis
& Vollesen* 17 (BR, C, EA, FT, K, KHF); near Iti-
bol, 1940 m., in scrub, 17.12.1935, *Thomas* 1627
(BM, K); Mt. Kinyeti, summit area, 3150 m.,
rocky area with montane grassland and scat-
tered, low ericaceous scrub, low subshrubs and
herbs in rock crevices, 13.12.1980, *Friis & Volle-
sen* 847 (C).

General habitat range: in lowland, medium-alti-
tude and montane grassland.

General distribution: Senegal to Ethiopia, south
to Zimbabwe and Mozambique. Species as a

whole also in the Mascarene Islands, in tropical Arabia, and in tropical Asia to Taiwan.

Bartsia L.

Bartsia trixago L.

FTA 4,2: 459 (1906); UKWF: 262 (1994).

Syn.: *Bellardia trixago* (L.) All.: FPS 3: 133 (1956) [Imatong Mountains]; WICKENS 1976: 145.

Imatong Mountains group, Sudan side: Mt. Kinyeti, 3150 m., rocky summit, 30.12.1935, *Thomas* 1839 (BM, K); summit of Mt. Kinyeti, 3180 m., rocky ground at summit, 15.11.1949, *Jackson* 933 (BM).

General habitat range: in montane and ericaeous grassland and bushland.

General distribution: Egypt to Kenya and in South Africa; also in South Europe, widespread in the Middle East, North Africa, Arabia and Australia.

Buchnera L.

Buchnera nuttii Skan

FTA 4,2: 388 (1906); FZ 8,2: 100 (1990); UKWF: 259 (1994).

Imatong Mountains group, Sudan side: Mt. Itibol, 1950 m., 14.6.1939, *Andrews* 1971 (K, WM); at Itibol, 1980 m., *Loudetia* grassland, 16.8.1940, *Myers* 13,415 (K).

General habitat range: in medium-altitude and montane deciduous woodland and grassland.

General distribution: South Sudan and Kenya to Zambia, Malawi and Tanzania.

Craterostigma Hochst.

Craterostigma plantagineum Hochst.

FTA 4,2: 329 (1906); FPS 3: 134 (1956); WICKENS 1976: 145; FZ 8,2: 56 (1990); FISCHER 1992: 87; UKWF: 256 (1994); HYF: 263 (1997).

Imatong Mountains group, Uganda side: 4 km. south east of Mt. Lomwaga, no alt., on rocks in tall-grass grassland, 18.7.1974, *Katende* 2134 (MHU).

Didinga Mountains: at eastern side of mountains near Chukudum, no alt., roadside, 15.4.1939, *Myers* 10,868 (K).

General habitat range: in lowland, medium-altitude and montane wooded grassland and grassland, often in disturbed places.

General distribution: Niger to Sudan, Ethiopia, Uganda and Kenya, south to Angola and South Africa (Transvaal); also in tropical Arabia and India.

Cycnium E. Mey. ex Benth.

Cycnium adonense E. Mey. ex Benth.

FTA 4,2: 431 (1906); FS: 332 (1929); FPS 3: 135 (1956); FZ 8,2: 140 (1990); UKWF: 260 (1994). subsp. **adonense**

HANSEN 1978: 52; UKWF: 260 (1994).

Imatong Mountains group, Sudan side: plain south east of Torit, between Torit and Ngarama (4° 22' N, 32° 37' E), no alt., 28.5.1984, *Kieland-Lund* 772 (C, NLH).

Imatong Mountains group, Uganda side: Langia, 2440 m., montane grassland, 4.1943, *Purseglove* 1403 (EA, K).

Didinga Mountains: Naligede, 1770 m., 21.4.1939, *Myers* 10,981 (K); Mt. Lotuke, Char, 1830 m., wooded grassland, 19.4.1939, *Myers* 10,924 (K).

General habitat range: in lowland, medium-altitude and montane woodland and grassland.

General distribution: South Sudan through eastern Africa to South Africa (Transvaal, Natal, East Cape Prov.).

subsp. **camporum** (Engl.) O.J. Hansen.

HANSEN 1978: 53.

Syn.: *Cycnium camporum* Engl.: FTA 4,2: 432 (1906); FPS 3: 136 (1956); FWTA 2: 373 (1963); WICKENS 1976: 145.

Imatong Mountains group, Sudan side: south east of Torit, between Torit and Ngarama (4° 22' N, 32° 37' E), no alt., 28.5.1984, *Kielland-Lund* 772 (C, NLH); Kinyeti Valley, 16 km. north of Katire, 900 m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, 22.2.1982, *Friis & Vollesen* 985 (C, K, KHF); Ibahin to Itibol, 1860 m., rocky pasture, 19.12.1935, *Thomas* 1695 (BM, K); lower southern slope of Mt. Kinyeti, 2100 m., *Loudetia arundinacea* grassland with scattered trees on shallow soil, 2.3.1982, *Friis & Vollesen* 1069 (C, K, KHF); **Didinga Mountains:** Mt. Lotuke, slope of Mt. Lotuke [4° 07'N, 33° 47'E], 1900 m., in *Protea* grassland, 29.3.1950, *Jackson* 1307 (BM).

General habitat range: in lowland, medium-altitude and montane grassland, woodland and bushland.

General distribution: Guinée to Ethiopia, south to Angola and East Zimbabwe.

Cycnium erectum Rendle

FTA 4,2: 434 (1906); HANSEN 1978: 56; UKWF: 260 (1994).

Imatong Mountains group, Sudan side: Katire to Itibol, 1830 m., 17.12.1935, *Thomas* 1619 (BM, K); Gilo, 1800 m., in *Rubus* tangle, 2.1950, *Jackson* 1759 (K); Gilo, 1900 m., 27.8.1957, *Jackson* 3814 (K); Gilo to Itibol, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 11.11.1980, *Friis & Vollesen* 140 (C, K, KHF); Ras Logoforok, 1950 m., 24.7.1939, *Myers* 11,557 (K).

Imatong Mountains group, Uganda side: Langia, 2130 m., mountain grassland, 4.1943, *Purse-glove* 1399 (EA, K); Agoro, 2130 m., woodland, 15.11.1945, *Thomas* 4383 (EA, K).

General habitat range: in montane grassland, woodland and bushland, and at forest margins.

General distribution: Ethiopia, South Sudan, East Uganda and West Kenya.

Cycnium recurvum (Oliv.) Engl.

HANSEN 1978: 25; FZ 8,2: 137 (1990); UKWF: 260 (1994).

Syn.: *Ramphicarpa recurva* Oliv.: FTA 4,2: 420 (1906); FPS 3: 141 (1956) {summit of Mt. Iro, Opari-Torit road}.

Imatong Mountains group, Sudan side: Opari-Torit road, summit of Mt. Iro, no alt., 5.10.1938, *Myers* 9517 (K).

Imatong Mountains group, Uganda side: without further locality, 1830 m., rocky outcrop, no date, *Eggeling* 2376 (K).

General habitat range: in lowland and medium-altitude deciduous woodland.

General distribution: East Congo [previously Zaire] to South Sudan, Uganda and Kenya, south to North Malawi.

Cycnium tenuisectum (Standl.) O.J. Hansen
HANSEN 1978: 28; UKWF: 260 (1994).

Syn.: *Ramphicarpa tenuisecta* Standl.: FPS 3: 141 (1956) {Imatong Mountains}. [*Ramphicarpa recurva* auct., non Oliv.: CHIPP 1929: 192; FPS 3: 141 (1956) quoad specim. ex Imatong Mountains, Mt. Kinyeti].

Imatong Mountains group, Sudan side: without further locality [Mt. Kinyeti], 3050 m., 12.2.1936, *Johnston* 1509 (K) & 1525 (K); Kipia, 2440 m., grassland, 29.12.1935, *Thomas* 1819 (BM, K); Kipia, 2720 m., clearing in montane forest, 4.7.1947, *MacLeay* 146 (BM); summit of Mt. Kinyeti, 3170 m., rocky summit, 11.2.1929, *Chipp* 68 (K); summit of Mt. Kinyeti, 3180 m., 27.7.1939, *Myers* 11,647 (K); summit of Mt. Kinyeti, 3130 m., grassland, 17.6.1953, *Prowse* 320 (KHU); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 823 (C).

General habitat range: in montane and ericaceous bushland and grassland.

General distribution: South Ethiopia, South Sudan, East Uganda, West Kenya and North Tanzania.

Diclis Benth.**Diclis ovata Benth.**

FTA 4,2: 287 (1906); FWTA 2: 354 (1963); FZ 8,2: 12 (1990); UKWF: 254 (1994).

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 8.11.1980, *Friis & Vollesen* 12 (C, K, KHF).

General habitat range: in lowland, medium-altitude and montane shaded and moist woodland or in clearings or along tracks in forest.

General distribution: Cameroon to Ethiopia, south to Angola, Zambia, Zimbabwe and Mozambique; also in Madagascar and Mascarene Islands. First record from the Sudan.

Halleria L.**Halleria lucida L.**

FTA 4,2: 295 (1906); FZ 8,2: 16 (1990); SOMMERLATTE 1990: 258, in *Hagenia* woodland; KTSL: 590 (1994); HYF: 262 (1997).

Imatong Mountains group, Sudan side: without further locality [probably near Gilo], 2290 m., in *Hagenia* woodland, 10.3.1976, *Howard* IM 74 (K, KHF); Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 20.11.1980, *Friis & Vollesen* 350 (C, K, KHF).

Imatong Mountains group, Uganda side: Agoro, 2140 m., montane forest, 14.11.1945, *Thomas* 4376 (EA, K). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

General habitat range: in montane forest and evergreen bushland.

General distribution: South Sudan and Ethiopia south to Angola and South Africa (Cape Prov.); also in tropical Arabia.

Harveya Hook.**Harveya sp.**

FPS 3: 136 (1956) {Laboni, at Laneka River}.

Imatong Mountains group, Sudan side: Laboni forest, in gallery forest of the River Laneka, no alt., on forest floor, 15.10.1938, *Myers* 9755 (K, WM).

Note: 5-10 cm. tall root parasite with slender stems and waxy white flowers with sulphurous spot in throat. The material seems not to match any named material at Kew.

Hedbergia Molau**Hedbergia abyssinica (Benth.) Molau**

FZ 8,2: 156 (1990); UKWF: 262 (1994).

Syn.: *Bartsia abyssinica* Benth.: FTA 4,2: 460 (1906); FPNA 2: 245 (1947).

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1429 (K); Gilo to Mt. Konoro, 1850 m., *Loudetia arundinacea* grassland with scattered trees, 18.11.1980, *Friis & Vollesen* 320 (BR, C, K, KHF); Itibol, 1950 m., in scrub, 20.12.1935, *Thomas* 1716 (BM, K).

General habitat range: in montane evergreen bushland and grassland.

General distribution: Nigeria and Cameroon to Ethiopia, south to Zambia, Malawi and Tanzania.

Lindernia All.

(Syn.: *Ilysanthes* Raf.)

Lindernia abyssinica Engl.

FTA 4,2: 343 (1906); FWTA 2: 364 (1963); FISCHER 1992: 252; UKWF: 257 (1994).

Imatong Mountains group, Sudan side: Dumuso, 2450 m., on gneiss rock, 31.5.1950, *Jackson* 1519 (K); Kipia, 2590 m., in rock crevices beside a stream, 4.7.1947, *MacLeay* 149 (BM).

General habitat range: in montane woodland and grassland, often in rocky places.

General distribution: Nigeria and Cameroon to Ethiopia, south to Tanzania.

Lindernia debilis Skan

FTA 4,2: 344 (1906); FS: 328 (1929); FPS 3: 138 (1956); FWTA 2: 364 (1963); FISCHER 1992: 306.

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, Friis & Vollesen 556 (BR, C, EA, K, KHF).

General habitat range: in damp places in lowland woodland.

General distribution: Senegal to Sudan, Uganda and Tanzania, south to South Africa.

Lindernia exilis Philcox

FZ 8,2: 70 (1990); FISCHER 1992: 276.

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, Friis & Vollesen 557 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude wooded grassland, especially associated with rocky outcrops.

General distribution: Sierra Leone and Ivory Coast to Sudan and Burundi.

Lindernia nummulariifolia (D. Don) Wettst.

FTA 4,2: 341 (1906); FPNA 2: 227 (1947); FWTA 2: 364 (1963); WICKENS 1976: 146; FZ 8,2: 65 (1990); FISCHER 1992: 267; UKWF: 257 (1994).

Imatong Mountains group, Sudan side: Lotti, no alt., 8.6.1939, Andrews 1699 (K, WM); Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 2.12.1980, Friis & Vollesen 630 (BR, C, K,

KHF); Lotti, 1000 m., edge of road in forest, 24.6.1953, Jackson 3033 (K); at Ngairigi River, 1530 m., on rocks, 7.1946, Sangster 819 (MHU); Gilo, at bridge on Ngairigi River, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 21.11.1980, Friis & Vollesen 378 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude wooded grassland and woodland.

General distribution: Sierra Leone to Sudan and Ethiopia, south to Angola, Zambia, Zimbabwe, Malawi and Mozambique; also in tropical Asia to South West China.

Lindernia oliveriana Dandy

FPS 3: 139 (1956); FWTA 2: 364 (1963); WICKENS 1976: 146; FZ 8,2: 64 (1990); FISCHER 1992: 267; UKWF: 257 (1994).

Syn.: *Vandellia lobelioides* Oliv., non F. Muell. *Lindernia lobelioides* (Oliv.) Engl.: FTA 4,2: 340 (1906); FS: 328 (1929).

Didinga Mountains: Nagichot, 1980 m., frequent at muddy edge of stream, 25.4.1939, Myers 11,120 (K, WM); between Nagichot and Duguru village (4° 16' N, 33° 35' E), 2000 m., 17.12.1983, Kielland-Lund 354 (C, NLH).

General habitat range: in lowland and medium-altitude grasslands, often in damp places.

General distribution: Nigeria to Ethiopia, south to Angola, Zambia, Zimbabwe, Malawi and Mozambique.

Lindernia parviflora (Roxb.) Haines

FPS 3: 139 (1956); FZ 8,2: 69 (1990); FISCHER 1992: 312; UKWF: 257 (1994).

Syn.: *Ilysanthes parviflora* (Roxb.) Benth.: FTA 4,2: 346 (1906); FS: 328 (1929); FPNA 2: 228 (1947).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), near dam, 800 m., 6.1.1984, Kielland-Lund 600 (C, NLH); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Ery-*

throphleum suaveolens, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, at small pool along forest trail, 5.12.1980, *Friis & Vollesen* 716 (C, K, KHF).

General habitat range: in lowland and medium-altitude streamsides, ephemeral ponds in grassland and margins of pans.

General distribution: Senegal to Ethiopia, south to South Africa; also on Madagascar, and in tropical Asia from India to Vietnam.

Lindernia pulchella (Skan) Philcox

FZ 8,2: 69 (1990); FISCHER 1992: 300; UKWF: 257 (1994).

Syn.: *Ilysanthes pulchella* Skan: FTA 4,2: 348 (1906).

Imatong Mountains group, Sudan side: without further locality, 1520-1830 m., 12.6.1939, *Andrews* 1850 (K); Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, *Friis & Vollesen* 581 (BR, C, EA, K, KHF); Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 21.11.1980, *Friis & Vollesen* 377 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude and montane grassland, often associated with rocky outcrops.

General distribution: Congo [previously Zaire] to Sudan and Ethiopia south to Angola and South Africa (Transvaal).

Lindernia schweinfurthii (Engl.) Dandy

FPS 3: 139 (1956); FZ 8,2: 72 (1990); UKWF: 257 (1994).

Syn.: *Ilysanthes schweinfurthii* Engl.: FTA 4,2: 350 (1906); FS: 329 (1929); FWTA 2: 365 (1963).

Lindernia madiensis Dandy: FPS 3: 139 (1956) {Opari, Acholi Hills [Imatong Mountains]}. *Bonnaya trichotoma* Oliv., non *Lindernia tri-*

chotoma Schlechter. *Ilysanthes trichotoma* (Oliv.) Urb.

Imatong Mountains group, Sudan side: Acholi Hills, on ridge between Issore and Lomariti, 1680 m., in shallow soil overlying rocks, 21.4.1930, *Snowden* 1695 (BM, K); Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, *Friis & Vollesen* 572 (BR, C, EA, FT, K, KHF).

General habitat range: in lowland and medium-altitude woodland and wooded grassland, usually associated with crevices in rocky outcrops.

General distribution: Senegal to Ethiopia, south to Zambia.

Lindernia sudanica Fischer & Hepper

FISCHER & HEPPER 1991: 530; FISCHER 1992: 289.

Imatong Mountains group, Sudan side: Gilo, 1830 m., rocky outcrop, 7.1946, *Sangster* 828 (MHU); Gilo, 1830 m., in crevices of flat rocks near waterfall, 28.6.1947, *MacLeay* 106 (BM, KHU); Gilo to Mt. Konoro, 1800 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 24.11.1980, *Friis & Vollesen* 426 (C, K, KHF); at Lobeke, 1970 m., rocky outcrop in *Loudetia* grassland, 1.8.1938, *Myers* 11,744 (K, holotype of *L. sudanica*; WM, isotype); summit of Mt. Lohocho (Ilungi), above Kinyeti-Gilo road, 2100 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, in small pockets of soil on the rock surface, 7.3.1982, *Friis & Vollesen* 1128 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: Paimol, no alt., *Eggeling* 1763 (K).

General habitat range: in medium-altitude and montane grassland on thin soil in wet flushes.

General distribution: Not known outside the study area.

Lindernia whytei Skan

FTA 4,2: 340 (1906); FPNA 2: 227 (1947); FZ 8,2: 62 (1990); UKWF: 257 (1994).

Syn.: *Crepidorrhodon whytei* (Skan) Fischer: FISCHER 1989: 444.

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 1850 m., seepage meadow on edge between upland rain forest with *Albizia*, *Maca-ranga*, *Croton* and *Ocotea* and grassland with *Loudetia arundinacea*, 18.11.1980, Friis & Vollesen 316 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude swamps and seepage areas in montane forest and evergreen bushland.

General distribution: Congo [previously Zaire] to Sudan and Ethiopia, south to Angola, Zimbabwe and Mozambique.

Orobanche L.

Orobanche minor Sm.

FTA 4,2: 467 (1906); FPNA 2: 255 (1947); FPS 3: 152 (1956) {Imatong Mountains}; FTEA, Orobanchac.: 5 (1957); FZ 8,2: 161 (1990); UKWF: 263 (1994); HYF: 267 (1997).

Imatong Mountains group, Sudan side: without further locality, 2440 m., no date, *Unknown collector* s.n. (KHU); Gilo, 1850 m., clearing with many weeds in *Cupressus lusitanica* plantation, 17.11.1980, Friis & Vollesen 302 (C); Mt. Kinyeti, 2870 m., in grassland, 30.12.1935, *Thomas* 1860 (BM, K).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, near the peak of Mt. Lonyili, 2100 m., among rocks, 17.5.1972, *Synnott* 1021 (MHU).

General habitat range: in medium-altitude and montane grasslands, woodlands and forest (or as weed in cultivations).

General distribution: Widespread throughout

tropical Africa; also in North Africa, South Europe, Middle East, tropical Arabia and North America.

Rhamphicarpa Benth.

Rhamphicarpa fistulosa (Hochst.) Benth.

FTA 4,2: 419 (1906); FS: 331 (1929); FPS 3: 140 (1956); FWTA 2: 370 (1963); HANSEN 1975: 117; WICKENS 1976: 146; FZ 8,2: 133 (1990); UKWF: 261 (1994).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), near pond, 800 m., 3.1.1984, *Kielland-Lund* 576 (C, NLH); Talanga, 950 m., on rocky outcrop with thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp., 26.11.1980, Friis & Vollesen 454 (C, K, KHF).

Imatong Mountains group, Uganda side: 5 km. south east of Lomwaga, 1500 m., shallow soil over rock in grassland, 18.7.1974, *Katende* 2183 (MHU).

General habitat range: in deciduous woodland and wooded grassland, often associated with rocky outcrops or streams.

General distribution: Senegal to Sudan, Uganda and Kenya, south to South Africa; also in Madagascar, New Guinea and Australia.

Sopubia Buch.-Ham. ex D. Don

Sopubia ramosa (Hochst.) Hochst.

FTA 4,2: 449 (1906); FS: 332 (1929); FPNA 2: 238 (1947); FPS 3: 142 (1956); FWTA 2: 369 (1963); HANSEN 1975: 546; WICKENS 1976: 146; FZ 8,2: 145 (1990); UKWF: 258 (1994).

Imatong Mountains group, Sudan side: without further locality, 2740 m., 12.2.1936, *Johnston* 1497 (K); Iribo (4° 2' N, 32° 50' E), 1500 m., *Acacia abyssinica* woodland with tangle of *Maesa lanceolata*, 25.10.1949, *Jackson* 843 (BM); Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees,

13.11.1980, *Friis & Vollesen* 196 (C, K, KHF); Gilo, 1990 m., edge of grassland, 26.6.1947, *MacLeay* 78 (BM); Kipia, 2440 m., in grassland, 29.12.1935, *Thomas* 1816 (BM, K).

Imatong Mountains group, Uganda side: Lututuru, no alt., 5.6.1963, *Kertland* s.n. (MHU); 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2046 (MHU).

General habitat range: in medium-altitude and montane deciduous woodland, wooded grassland and forest edges.

General distribution: Sierra Leone and Guinée to Ethiopia, south to Angola, Zambia, Zimbabwe, Malawi and Mozambique.

Stemodiopsis Engl.

Stemodiopsis rivae Engl.

FTA 4,2: 315 (1906); FZ 8,2: 42 (1990); UKWF: 255 (1994).

Syn.: *Stemodiopsis humilis* Skan: FTA 4,2: 316 (1906); FWTA 2: 357 (1963).

Imatong Mountains group, Sudan side: Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees of *Terminalia laxiflora*, *T. brownii*, *Pterocarpus lucens*, *Combretum collinum* and *Vitex doniana*, on rocky outcrop, 5.12.1980, *Friis & Vollesen* 700 (C, K, KHF).

Imatong Mountains group, Uganda side: 2 km. east of Lututuru, near a rivulet, 1400 m., in cracks of rocks in open woodland, 17.2.1969, *Lye* 2113 (MHU).

General habitat range: in lowland and medium-altitude grassland and deciduous woodland, always restricted to rock crevices.

General distribution: Cameroon to Sudan and Ethiopia, south to South Africa (Transvaal).

Striga Lour.

Striga gesnerioides (Willd.) Vatke

FPNA 2: 243 (1947); FPS 3: 144 (1956); FWTA

2: 373 (1963); FZ 8,2: 131 (1990); UKWF: 261 (1994); HYF: 265 (1997).

Syn.: *Striga orobanchoides* (R. Br.) Benth.: FTA 4,2: 402 (1906).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, between compound and river, 700 m., 28.11.1983, *Kielland-Lund* 71 (C, NLH).

General habitat range: in lowland and medium altitude grassland, bushland and woodland, parasitising a wide range of grasses, sedges and herbs.

General distribution: Mauritania and Senegal to Ethiopia and Somalia, south to Namibia and South Africa (Transvaal); also in India.

Striga hermonthica Benth.

FTA 4,2: 407 (1906); FS: 330 (1929); FPNA 2: 242 (1947); FPS 3: 145 (1956); FWTA 2: 372 (1963); WICKENS 1976: 147; FZ 8,2: 129 (1990); UKWF: 261 (1994).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, between compound and river, 700 m., 28.11.1983, *Kielland-Lund* 72 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, 1530 m., in millet fields, 12.1932, *Eggeling* 785 (K, MHU).

General habitat range: in lowland and medium-altitude woodlands, usually parasitising grass-roots (usually species of *Sorghum*).

General distribution: Senegal to Ethiopia, south to South Africa (Transvaal); also in Madagascar.

Torenia L.

Torenia thouarsii (Cham. & Schlechtend.) O. Kuntze

FPS 3: 142 (1956); FWTA 2: 363 (1963); FZ 8,2: 57 (1990); FISCHER 1992: 333; UKWF: 256 (1994).

Imatong Mountains group, Sudan side: Talanga, 950 m., small grass swamp in *Albizia zygia-Combretum* woodland, 17.3.1982, *Friis & Vollesen* 1238 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude swamps, at lakes and rivers.

General distribution: Senegal to Sudan, Uganda and Kenya, south to South Africa (Transvaal); also in Mascarene Islands, India, and in central and tropical South America.

Verbascum L.
(Syn.: *Celsia* L.)

Verbascum brevipedicellatum (Engl.) Hub.-Mor.

UKWF: 254 (1994).

Syn.: *Celsia brevipedicellata* Engl.: FTA 4,2: 285 (1906); FPNA 2: 221 (1947); FPS 3: 134 (1956) {Imatong Mountains, Ibahin to Itibol}; HEDBERG 1957: 164. *Celsia floccosa* Benth.: FTA 4,2: 283 (1906).

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1436 (K) & 1489 (K); Gilo to Mt. Konoro, 1850 m., *Loudetia arundinacea* grassland with scattered trees, 18.11.1980, *Friis & Vollesen* 319 (C, K, KHf); Ibahin-Itibol, 1980 m., secondary scrub, 19.12.1935, *Thomas* 1679 (K).

General habitat range: in montane grassland.

General distribution: Cameroon to Ethiopia, south to Tanzania.

Verbascum scrophulariaefolia (A. Rich.) Hub.-Mor.

UKWF: 254 (1994).

Syn.: *Celsia scrophulariaefolia* A. Rich.: FTA 4,2: 284 (1906); HEDBERG 1957: 166. *Verbascum schimperii* Skan: FTA 4,2: 280 (1906).

Imatong Mountains group, Sudan side: Kipia, 2650 m., in forest clearing, 4.7.1947, *MacLeay* 140 (KHU); Kipia, 2680 m., *Podocarpus latifolius* forest, 26.7.1939, *Myers* 11,619 (K, WM); Mt. Kinyeti, 3180 m., rocky summit, 1.1.1939, *MacDonald* 39 (BM); Mt. Kinyeti, 3180 m., rocky summit, 15.11.1949, *Jackson* 954 (BM).

General habitat range: in montane and erica-

ceous bushland and grassland, and at forest margins.

General distribution: Cameroon to Ethiopia, south to North Tanzania.

Veronica L.

Veronica abyssinica Fresen.

FTA 4,2: 358 (1906); FPNA 2: 232 (1947); FPS 3: 149 (1956) {Imatong Mountains, Lomuleng}; HEDBERG 1957: 169; FWTA 2: 355 (1963); FZ 8,2: 82 (1990); UKWF: 258 (1994).

Imatong Mountains group, Sudan side: between Gilo and Bushbuck Hill, 2000 m., clearing in *Cupressus lusitanica* plantation, with regrowth of *Albizia-Croton-Macaranga* forest, 10.11.1980, *Friis & Vollesen* 123 (BR, C, K, KHf); Lomuleng, 2440 m., in forest, 29.12.1935, *Thomas* 1788 (BM, K); Lowiliwili, 2900 m., in *Dombeya-Podocarpus latifolius* forest, 15.11.1949, *Jackson* 944 (BM, WM); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 821 (C).

Didinga Mountains: Mt. Lotuke, 2750 m., in *Podocarpus latifolius* forest, 30.3.1950, *Jackson* 1338 (BM).

General habitat range: in medium-altitude and montane forest, especially in clearings and along edges, evergreen bushland and damp grassland.

General distribution: Nigeria and Cameroon to Ethiopia and North Somalia, south to Zimbabwe and Malawi; also in tropical Asia.

Fam. 138. **Lentibulariaceae** Rich.

Utricularia L.

Utricularia andongensis Hiern

FTA 4,2: 481 (1906); FWTA 2: 377 (1963); FAC,

Lentibulariac.: 8 (1972); FTEA, Lentibulariac.: 6 (1973); FZ 8,3: 20 (1988); TAYLOR 1989: 392.

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 2.12.1980, Friis & Vollesen 622 (C, K, KHF).

General habitat range: in moist places in lowland and medium-altitude grassland, woodland and other similar habitats, often on moist rocks.

General distribution: Guinée to South Sudan, south to Angola, Zambia and Tanzania.

Utricularia arenaria A. DC.

FWTA 2: 378 (1963); FAC, Lentibulariac.: 22 (1972); FTEA, Lentibulariac.: 11 (1973); FZ 8,3: 12 (1988); TAYLOR 1989: 218; UKWF: 263 (1994).

Syn.: *Utricularia tribracteata* A. Rich.: FTA 4,2: 475 (1906); FPS 3: 153 (1956) [excl. specim. marked "Imatong Mts., Kipia, 8500 ft." (2590 m.)]. *Utricularia kirkii* Stapf: FTA 4,2: 476 (1906).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 2.12.1980, Friis & Vollesen 621 (C, K); Kimisu [Dumuso], 2070 m., on damp rocks, 20.12.1935, Thomas 1723 (BM, K).

General habitat range: in a wide range of lowland, medium-altitude and montane habitats.

General distribution: Senegal to Ethiopia, south to Namibia and South Africa (Transvaal, Natal); also in Madagascar and India.

Utricularia livida E. Mey.

FAC, Lentibulariac.: 24 (1972); FTEA, Lentibulariac.: 11 (1973); FZ 8,3: 13 (1988); TAYLOR 1989: 221; UKWF: 263 (1994).

Syn.: *Utricularia sanguinea* Oliv.: FTA 4,2: 475 (1906). *Utricularia transrugosa* Stapf: FTA 4,2: 473 & 574 (1906).

Imatong Mountains group, Sudan side: Kipia, 2590 m., in mountain meadow, swampy patch, 30.12.1935, Thomas 1882 (BM, K).

General habitat range: in lowland, medium-altitude and montane grassland.

General distribution: Ethiopia south to South Africa (Cape Prov.); also in Madagascar and Mexico.

Utricularia pentadactyla P. Taylor

FAC, Lentibulariac.: 14 (1972); FTEA, Lentibulariac.: 9 (1973); FZ 8,3: 16 (1988); TAYLOR 1989: 216; UKWF: 263 (1994).

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 23.11.1980, Friis & Vollesen 418 (C, K, KHF).

General habitat range: in medium-altitude and montane grassland.

General distribution: East Congo [previously Zaire] and Uganda to Ethiopia, south to Angola, Zimbabwe and Malawi.

Utricularia reflexa Oliv.

FTA 4,2: 492 (1906); FS: 334 (1929); FWTA 2: 380 (1963); FAC, Lentibulariac.: 45 (1972); FTEA, Lentibulariac.: 17 (1973); FZ 8,3: 31 (1988); UKWF: 263 (1994).

Syn.: *Utricularia diploglossa* Oliv.: FTA 4,2: 434 (1906). *Utricularia charoidea* Stapf: FTA 4,2: 493 (1906).

Imatong Mountains group, Uganda side: Paranga, 1070 m., in pool, 12.12.1935, Thomas 1556 (BM).

General habitat range: in lowland and medium-altitude swamps and pools.

General distribution: Senegal to Ethiopia, south to Namibia and South Africa (Transvaal, Natal).

Note: In FTEA, Lentibulariac.: 19 (1973) P. Taylor has recognised varieties of *U. reflexa*, according to which the material from the study

area belongs to var. *reflexa*; no infraspecific taxonomy of *U. reflexa* is recognised in Taylor (1989).

Utricularia stellaris L.f.

FTA 4,2: 489 (1906); FS: 334 (1929); FPS 3: 154 (1956), excl. syn.; FAC, Lentibulariac.: 16 (1973); FTEA, Lentibulariac.: 16 (1973); WICKENS 1976: 147; FZ 8,3: 30 (1988).

Syn.: *Utricularia trichoschiza* Stapf: FTA 4,2: 488 (1906). *Utricularia inflexa* Forssk. var. *stellaris* (L. f.) P. Taylor: FWTA 2: 380 (1963).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), in pond, 800 m., 3.1.1984, *Kielland-Lund* 577 (C, NLH).

General habitat range: in lowland and medium-altitude swamps and pools, also in slow flowing rivers.

General distribution: Mauritania and Senegal to Ethiopia and Somalia, south to South Africa (Cape Prov.), north to Egypt; also Madagascar, the Mascarene Islands, tropical Asia and northern Australia.

Fam. 139. **Gesneriaceae** Dum.

Epithema Blume

Epithema tenue C.B. Clarke

FTA 4,2: 502 (1906); FWTA 2: 383 (1963); FC 27: 6 (1984); FG 27: 7 (1985).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 26.11.1980, *Friis & Vollesen* 462 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude rain forest, on rocks in deep shade.

General distribution: Guinée to Cameroon and from South Sudan and Uganda. First record from the Sudan.

Streptocarpus Lindl.

Streptocarpus elongatus Engl.

FTA 4,2: 509 (1906); FWTA 2: 382 (1963); FC 27: 10 (1984).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on large boulders on forest floor, 1.12.1980, *Friis & Vollesen* 616 (C).

General habitat range: in lowland and medium-altitude forest.

General distribution: Sierra Leone to Cameroon and from South Sudan. First record from the Sudan.

Fam. 140. **Bignoniaceae** Juss.

Kigelia DC.

Kigelia africana (Lam.) Benth.

FTA 4,2: 536 (1906); FWTA 2: 385 (1963); FAC, Bignoniac.: 4 (1977); WICKENS 1976: 148; FC 27: 32 (1984); FG 27: 27 (1985); FZ 8,3: 83 (1988); KTSL: 591 (1994).

Syn.: *Kigelia aethiopica* Decne.: FTA 4,2: 538 (1906); FS: 335 (1929); ITU: 38 (1952). *Kigelia aethiopum* (Fenzl) Dandy: FPS 3: 156 (1956).

Imatong Mountains group, Sudan side: without further locality, no alt., 1947, *Maxwell Forbes* 93 (K); between Loa and Magwe (4° 02' N, 32° 10' E), no alt., 6.6.1984, *Kielland-Lund* 864 (C, NLH).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; as "*Kigelia africana* (... , *moosa*, ...)"; no specimen documents this record).

General habitat range: in lowland and medium-altitude woodland and wooded grassland, often along edges of riverine vegetation or in temporarily damp sites.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa.

Kigelia moosa Sprague

FTA 4,2 536 (1906); FPNA 2: 252 (1947); ITU: 38 (1952); FPS 3: 158 (1956) {Laboni Forest}; JACKSON 1956: 354 {Lotti, Laboni}; KTSL: 591 (1994).

Syn.: [*Kigelia aethiopica* auct., non Decne.: CHIPP 1929: 192].

Imatong Mountains group, Sudan side: Laboni, no alt., in the closed forest, associated with *Coffea canephora*, 8.2.1929, *Chipp* 44 (K); Laboni, Khor Laneka, no alt., edge of gallery forest merging into bowl forest, 16.10.1938, *Myers* 9769 (K, WM); Lotti, no alt., 18.10.1939, *Myers* 9783 (K, WM); at Ngairigi River, 1700 m., tree arching over water, 23.3.1950, *Jackson* 1262 (K, WM); valley of the River Iyedo, 1800 m., edge of montane forest, 12.2.1951, *Jackson* 1690 (KHF, WM); Mt. Baghanj, 1830-2130 m., in gully, 14.6.1939, *Andrews* 1929 (K); Gilo, at a tributary to the Ngairigi River, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, at forest edge, single tree arching over river, 1.3.1982, *Friis & Vollesen* 1067 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; as "*Kigelia africana* (... *moosa*, ...)"; no specimen documents this record).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1830 m., riverine vegetation, 4.1960, *Wilson* 1018 (EA).

General habitat range: in lowland, medium-altitude and montane forest, often along rivers.

General distribution: Sierra Leone to South Sudan and Kenya, south to Tanzania.

Markhamia Baill.

Markhamia lutea (Benth.) K. Schum.

FTA 4,2: 525 (1906); FWTA 2: 387 (1963);

WICKENS 1976: 148; FAC, Bignoniac.: 28 (1977); FC 27: 36 (1984); FG 27: 34 (1985); KTSL: 592 (1994).

Syn.: *Markhamia platycalyx* (Bak.) Sprague: ITU: 41 (1952); FPS 3: 158 (1956).

Imatong Mountains group, Sudan side: Laboni forest, along the River Laneka, 1000 m., in gallery forest, 15.10.1938, *Myers* 9757 (K, WM).

Imatong Mountains group, Uganda side: Lututuru, no alt., 1992, *Katende* (sight record). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; as "*Markhamia platycalyx*"; specimen no. 369 documents this record).

General habitat range: in lowland rain forest.

General distribution: Ghana to South Sudan and Kenya, south to Tanzania.

Spathodea P. Beauv.

Spathodea campanulata P. Beauv.

FTA 4,2: 529 (1906); ITU: 42 (1952); JACKSON 1956: 351, forest pioneer; FWTA 2: 386 (1963); FAC, Bignoniac.: 21 (1977); FC 27: 44 (1984); FG 27: 40 (1985); SOMMERLATTE 1990: 192, pioneer species in lowland and medium-altitude forest; KTSL: 592 (1994).

subsp. **nilotica** (Seem.) Bidgood

Syn.: *Spathodea nilotica* Seem.: FTA 4,2: 529 (1906); FS: 334 (1929); FPNA 2: 247 (1947); FPS 3: 158 (1956).

Imatong Mountains group, Sudan side: 30 km. south of Hiliu along Katire road, no alt., 26.12.1983, *Kielland-Lund* 452 (C, NLH); Katire, on Kinyeti River, 1000 m., edge of galley forest, 10.1948, *Jackson* 400 (FHO, KHF); Katire to Gilo, near road to Itibol, 1500 m., secondary transitional forest with *Harungana madagascariensis*, forest edge, 12.11.1980, *Friis & Vollesen* 177 (C, K, KHF).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 370 documents this record).

General habitat range: in lowland and medium-altitude forest and at forest margins.

General distribution: Nigeria to South Sudan and West Kenya, south to Angola and West Tanzania. Species as a whole from Guinée to South Sudan, south to Angola, Congo [previously Zaire] and Tanzania.

Stereospermum Cham.

Stereospermum kunthianum Cham.

FTA 4,2: 518 (1906); FS: 335 (1929); ITU: 42 (1952); FPS 3: 158 (1956); JACKSON 1956: 249, moist savannah; FWTA 2: 386 (1963); WICKENS 1976: 148; FAC, Bignoniaceae: 14 (1977); FC 27: 48 (1984); FZ 8,3: 77 (1988); SOMMERLATTE 1990: 120; KTSL: 593 (1994); HYF: 277 (1997).

Imatong Mountains group, Sudan side: without further locality, no alt., 1947, *Maxwell Forbes* 71 (K); Refugee Camp north of Loa (3° 48' N, 31° 59' E), no alt., 5.6.1984, *Kielland-Lund* 862 (C, NLH); Laboni forest, 1000 m., in *Vitex* woodland, 30.1.1949, *Jackson* 614 (FHO, KHF); Palotaka, 1200 m., open woodland, 23.1.1979, *Shigeta* 84 (EA); between Palotaka and Magwe, 1000 m., wooded grassland and open woodland with *Combretum*, *Lonchocarpus laxiflora*, *Terminalia*, etc., 19.2.1984, *Sommerlatte* 13 (EA); Kinyeti Valley, hill 3 km. south of Hiliu, stony hillside, c. 700 m., 6.12.1983, *Kielland-Lund* 220 (NLH); above Katire, 1200 m., woodland with *Combretum molle*, *Cussonia arborea*, *Stereospermum kunthianum*, *Erythrina abyssinica*, *Entada abyssinica*, etc., 24.3.1982, *Friis & Vollesen* 1306 (C, K, KHF).

Imatong Mountains group, Uganda side: 2 km. north-east of Lututuru, near end of road, 1800 m., wooded grassland, 17.2.1969, *Lye* 2084 (EA, MHU, NLH). Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to Ethiopia and Kenya, south to Zambia, Zimbabwe, Malawi and Mozambique; also in tropical Arabia.

Fam. 141. Pedaliaceae R. Br.

Ceratotheca Endl.

Ceratotheca sesamoides Endl.

FTA 4,2: 563 (1906); FS: 337 (1929); FTEA, Pedaliac.: 14 (1953); FPS 3: 160 (1956); FWTA 2: 391 (1963); WICKENS 1976: 148; UKWF: 264 (1994).

Imatong Mountains group, Sudan side: 2 km. south of Torit (4° 23' N, 32° 35' E), 650 m., 13.12.1983, *Kielland-Lund* 311 (C, NLH); Kinyeti Valley, Hiliu, east of compound and stream, 700 m., 9.12.1983, *Kielland-Lund* 281 (C, NLH).

General habitat range: in lowland and medium-altitude woodland and bushland, often with sandy soil; also often in waste places.

General distribution: Senegal to South Sudan and Kenya, south to Namibia, Zimbabwe and Mozambique.

Pterodiscus Hook.

Pterodiscus ruspolii Engl.

FTA 4,2: 544 (1906); FTEA, Pedaliac.: 8 (1953); UKWF: 264 (1994).

Didinga Mountains: 55 km. north of Kapoeta, 3 km. west of Kidepo River, no alt., 7.9.1940, *Myers* 13,460 (K).

General habitat range: in lowland and medium-altitude semi-desert scrub or dry grassland.

General distribution: Sudan to Ethiopia and Somalia, south to Kenya.

Sesamum L.**Sesamum angustifolium** (Oliv.) Engl.

FTA 4,2: 554 (1906); FS: 336 (1929); FPNA 2: 253 (1948); FTEA, Pedaliac.: 19 (1953); FPS 3: 163 (1956); FWTA 2: 391 (1963); WICKENS 1976: 148.

Imatong Mountains group, Sudan side: Kinyeti Valley, c. 200 m. from Hiliu towards Torit, no alt., 21.11.1983, *Kielland-Lund* 11 (C, NLH).

General habitat range: in lowland and medium-altitude dry grassland and deciduous bushland, usually on sandy soil, also in waste areas and along roads, a weed in cultivations.

General distribution: Nigeria to South Sudan, south to Namibia, Botswana, Zimbabwe, Malawi and Mozambique.

Sesamum orientale L.

Seegeler 1989: 656.

Syn.: *Sesamum indicum* L.: FTA 4,2: 558 (1906); FS: 336 (1929); FPNA 2: 253 (1947); FTEA, Pedaliac.: 17 (1953); FPS 3: 160 (1956); FWTA 2: 391 (1963); Wickens 1976: 148; HYF: 277 (1997).

Imatong Mountains group, Sudan side: near Torit, east of airstrip (4° 25' N, 32° 35' E), 650 m., 9.12.1983, *Kielland-Lund* 277 (C, NLH); c. 3 km. south of Torit (4° 23' N, 32° 36' E), 650 m., 13.12.1983, *Kielland-Lund* 325 (C, NLH) & 326 (C, NLH).

General habitat range: in lowland and medium-altitude cultivations and in waste land and along roads, usually on sandy soil.

General distribution: Widely cultivated for the seeds, which are rich in oil, and frequently naturalised throughout tropical Africa and in many other parts of the tropics.

Fam. 142. **Acanthaceae Juss.****Acanthopale C.B. Clarke**

Acanthopale pubescens (Lindau) C.B. Clarke
FTA 5: 64 (1899); FPNA 2: 285 (1947); UKWF: 270 (1994); KTSL: 596 (1994).

Imatong Mountains group, Sudan side: Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 15.11.1980, *Friis & Vollesen* 235 (BR, C, K, KHF); Lomuleng, 2440 m., *Podocarpus latifolius* forest, 29.7.1939, *Myers* 11,709 (K).

General habitat range: in montane forest.

General distribution: South Sudan and South West Ethiopia through East Congo [previously Zaire] and eastern Africa to East Zimbabwe. First record from the Sudan.

Acanthus L.**Acanthus eminens** C.B. Clarke

FTA 5: 107 (1899); FPS 3: 166 (1956) {Torit}; SOMMERLATTE 1990: 344, in understory in mixed *Podocarpus latifolius* forest; UKWF: 274 (1994); KTSL: 596 (1994).

Imatong Mountains group, Sudan side: near Gilo Pool (4° 02' N, 32° 50' E), no alt., 15.1.1984, *Kielland-Lund* 637 (NLH); Itibol, 1830 m., understory in *Podocarpus latifolius* forest, 30.1.1947, *Jackson* 169 (FHO, KHF); Lomuleng, 1830 m., 2.1936, *Johnston* 1427 (K).

Imatong Mountains group, Uganda side: Lututuru, no alt., 1992, *Katende* (sight record). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

General habitat range: in montane forest.

General distribution: South Sudan and Ethiopia through Uganda to Kenya.

Acanthus pubescens (Oliv.) Engl.

ITU: 1 (1952); JACKSON 1956: 352, forest pioneer; UKWF: 274 (1994); KTSL: 596 (1994).

Syn.: [*Acanthus arboreus* auct., non Forssk.: FTA 5: 106 (1899); FPS 3: 165 (1956)].

Imatong Mountains group, Sudan side: Lotti, 1040 m., scrub at forest edge, 26.12.1935, *Thomas* 1760 (BM, K); Palotaka, 1200 m., 1979, *Shigeta* 116 (EA, identified and listed by M.G. Gilbert, not traced).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as "*Acanthus arborescens* (*pubescens*)"); no specimen documents this record.

General habitat range: in medium-altitude woodland and bushland and at forest margins.

General distribution: South Sudan and Ethiopia through East Congo [previously Zaire], Uganda and Kenya to West Tanzania.

Asystasia Blume**Asystasia africana** (S. Moore) C.B. Clarke

FTA 5: 134 (1899); FG 13: 141 (1966).

Syn.: *Styasasia africana* (S. Moore) S. Moore

Imatong Mountains group, Sudan side: Lotti rest-house, no alt., forest, 9.6.1939, *Andrews* 1763 (K).

General habitat range: in lowland forest.

General distribution: Gabon, Uganda, Sudan and Angola. First record from the Sudan.

Asystasia gangetica (L.) T. Anderson

FPNA 2: 294 (1947); FPS 3: 166 (1956); FWTA 2: 413 (1963); FG 13: 134 (1966); WICKENS 1976: 148; UKWF: 275 (1994); HYF: 273 (1997).

Syn.: *Asystasia coromandeliana* Nees: FTA 5: 131 (1899); FS: 343 (1929); JACKSON 1956: 354 [Lotti].

Imatong Mountains group, Sudan side: without further locality, no alt., no date, *Maxwell Forbes* 54 (K); Talanga, 900 m., in closed forest on

bank at stream, no date, *Jackson* 479 A (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scrambling herb, 5.12.1980, *Friis & Vollesen* 710 (C, K, KHF); Kinyeti Valley, 14 km. south of Hiliu on Katire road, 700 m., in teak-plantation, 7.12.1983, *Kielland-Lund* 254 (C, NLH); Katire, 900 m., in ravine, no date, *Jackson* 396 (BM); Katire to Itibol, near Itibol camp, 1940 m., in scrub, 17.12.1935, *Thomas* 1638 (BM, K); Gilo, 1890 m., along road in woodland, 24.6.1947, *MacLeay* 31 (BM); Gilo, 1890 m., along road in forest, 12.7.1947, *MacLeay* 221 (BM); Gilo, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, edge of forest, 24.11.1980, *Friis & Vollesen* 423 (BR, C, K, KHF); Gilo, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, edge of forest, 24.11.1980, *Friis & Vollesen* 424 (C).

General habitat range: in a wide range of habitats and altitudes.

General distribution: throughout the tropics of Africa and Asia, including tropical Arabia; introduced in tropical America.

Note: *Friis & Vollesen* 710 represents a peloric form which was dominant in the population observed in the forest at Talanga.

Asystasia guttata (Forssk.) Brummitt

HYF: 273 (1997).

Syn.: *Asystasia coleae* Rolfe: FTA 5: 134 (1899).

Imatong Mountains group, Uganda side: 2 km. north-east of Lututuru, near end of road, 1800 m., grassland, 17.2.1969, *Lye* 2066 (K, MHU, NLH).

General habitat range: in medium-altitude and montane grassland.

General distribution: Somalia, South Ethiopia, North Uganda, Kenya and North Tanzania; also in tropical Arabia.

Asystasia mysorensis (Roth) T. Anderson
UKWF: 275 (1994).

Syn.: *Asystasia schimperi* T. Andersson: FTA 5: 135 (1899); HYF: 273 (1997).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, *Kielland-Lund* 556 (C, NLH).

General habitat range: in lowland and medium-altitude grassland and bushland, often in disturbed places.

General distribution: South East Sudan to Ethiopia, south through eastern Africa to Botswana, Namibia and South Africa (Transvaal); also in India. First record from the Sudan.

Asystasia vogeliana Benth.

FTA 5: 133 (1899); FWTA 2: 412 (1963); FG 13: 130 (1966).

Imatong Mountains group, Sudan side: Lotti, 1000 m., in undergrowth of closed forest, 17.1.1949, *Jackson* 589 (BM); Lotti, 1000 m., with large herbs along stream in closed forest, 2.1.1950, *Jackson* 1022 (BM); Lotti forest near Palotaka, 1200 m., 23.1.1979, *Shigeta* 89 (EA); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 26.11.1980, *Friis & Vollesen* 478 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Sierra Leone to South Sudan, south to Congo [previously Zaire] and Uganda. First record from the Sudan.

Barleria L.

Barleria acanthoides Vahl

FTA 5: 152 (1899); FS: 342 (1929); FPS 3: 169 (1956); UKWF: 272 (1994); HYF: 271 (1997).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, *Eggeling* 5097 (EA).

General habitat range: in dry deciduous bushland.

General distribution: Egypt, Sudan, Ethiopia and Somalia to North Tanzania; also in tropical Arabia.

Barleria brownii S. Moore

FWTA 2: 420 (1963); FG 13: 166 (1966).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scrambling herb in forest, 6.12.1980, *Friis & Vollesen* 731 (BR, C, K, KHF).

General habitat range: in lowland rain forest.

General distribution: Ghana to South West Ethiopia, south to Angola, Congo [previously Zaire], Uganda and North West Tanzania. First record from the Sudan.

Barleria submollis Lindau

UKWF: 273 (1994).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, rocks near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund* 133 (C, NLH).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland.

General distribution: South Ethiopia, South East Sudan, North East Uganda, Kenya, North Tanzania. First record from the Sudan.

Barleria ventricosa Hochst. ex Nees.

FTA 5: 164 (1899); FS: 342 (1929); FPNA 2: 287 (1947); FPS 3: 170 (1956); UKWF: 273 (1994); KTSL: 600 (1994); HYF: 273 (1997).

Imatong Mountains group, Sudan side: at Lotti forest near Palotaka, 1200 m., edge of forest, 23.1.1979, *Shigeta* 83 (EA); Mt. Baghanj, 1830-2130 m., 13.6.1939, *Andrews* 1898 (K); Itobol [Itibol], 1950 m., 15.6.1939, *Andrews* 2001 (K); Gilo, 1890 m., on rocks along road in disturbed forest, 12.7.1947, *MacLeay* 219 (BM); Gilo, 1900 m., in tangle colonising forest, 20.1.1949, *Jackson* 601 (BM); Gilo, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Oco-*

tea, in undergrowth near forest edge, 19.2.1982, *Friis & Vollesen* 959 (C, K, KHF).

General habitat range: in medium-altitude and montane forest, often along edges and in clearings.

General distribution: Sudan and Ethiopia through East Congo [previously Zaire], Uganda and Kenya to Tanzania; also in tropical Arabia.

Barleria vix-dentata C.B. Clarke

FTA 5: 165 (1899).

Imatong Mountains group, Sudan side: without further locality, 1200 m., 2.1.1983, *Kosper* 201 (K); Talanga Forest, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 2.12.1980, *Friis & Vollesen* 644 (C, K, KHF); Katire, 1000 m., woodland, 28.12.1949, *Jackson* 1017 (BM).

General habitat range: in medium-altitude woodland and grassland, and at forest margins.

General distribution: South Sudan and Uganda. First record from the Sudan.

Blepharis Juss.

Blepharis edulis (Forssk.) Pers.

FTA 5: 102 (1899).

Syn.: [*Blepharis linariifolia* auct., non Pers.: FTA 5: 100 (1899); FS: 340 (1929); FPS 3: 171 (1956); FWTA 2: 410 (1963); WICKENS 1976: 148. *Blepharis persica* auct., non (Burm. f.) O. Kuntze: FPS 3: 171 (1956). *Blepharis ciliaris* auct., non (L.) B.L. Burt: UKWF: 274 (1994); HYF: 268 (1997)].

Didinga Mountains: south of Kapoeta, on road to Nathilani, no alt., 27.8.1953, *Peers* KM7 (K, WM).

General habitat range: in dry deciduous bushland and subdesert grassland.

General distribution: Mauritania, Senegal and

Mali to Ethiopia and Somalia, south to Tanzania; also in dry parts of tropical Arabia and the Middle East to Iran.

Blepharis integrifolia (L.f.) Schinz

FPNA 2: 289 (1947); Fl. Rwanda 3: 441 (1985); UKWF: 274 (1994).

var. **integrifolia**

Syn.: *Blepharis molluginifolia* Pers.: FTA 5: 98 (1899).

Imatong Mountains group, Sudan side: Kinyeti Valley, Imatong Junction, between Torit and Hiliu, near Ngarama (4° 20' N, 32° 38' E), no alt., 14.1.1984, *Kielland-Lund* 621 (C, NLH).

General habitat range: in lowland and medium-altitude grassland, bushland and woodland.

General distribution: South East Sudan and North East Uganda to Eritrea and Ethiopia, through eastern Africa south to Botswana, Namibia and South Africa; also in India and Sri Lanka. First record from the Sudan.

Blepharis maderaspatensis (L.) Roth

FPNA 2: 289 (1947); FPS 3: 171 (1956); FWTA 2: 410 (1963); WICKENS 1976: 148; UKWF: 274 (1994); HYF: 268 (1997).

Syn.: *Blepharis boerhaviifolia* Pers.: FTA 5: 96 (1899); FS: 340 (1929).

Imatong Mountains group, Sudan side: Kinyeti valley, Hiliu, bank near compound, 700 m., 30.11.1983, *Kielland-Lund* 112 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, 910 m., in thickets, 10.1947, *Dale* U481 (EA, K, MHU).

General habitat range: in a wide range of dry habitats at lowland and medium-altitudes.

General distribution: Throughout tropical and subtropical Africa; also in tropical Arabia and in Asia from India to Vietnam.

Blepharis sp.

Imatong Mountains group, Uganda side: Agoro, no alt., arid hills, 12.1932, *Eggeling* 835 (MHU).

Brillantaisia P. Beauv.**Brillantaisia cicatricosa** Lindau

FTA 5: 39 (1899); FPNA 2: 270 (1947); Fl. Rwanda 3: 446 (1985).

Syn.: *Brillantaisia kirungae* Lindau: SIDWELL 1998: 93.

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, along stream at forest edge, 8.11.1980, *Friis & Vollesen* 58 (C, K, KHF).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as "*Brillantaisia kirungae*", no specimen documents this record).

General habitat range: in wet montane forest.

General distribution: East Congo [previously Zaire], South Sudan, Uganda, Rwanda, Burundi, Tanzania, Malawi, Zimbabwe and Mozambique.

Brillantaisia lamium (Nees) Benth.

FTA 5: 38 (1899); FWTA 2: 406 (1963); FG 13: 88 (1966); UKWF: 267 (1994); SIDWELL 1998: 97.

Syn.: *Brillantaisia eminii* Lindau: FTA 5: 38 (1899); FPS 3: 172 (1956).

Imatong Mountains group, Sudan side: Upper Talanga Tea project, 1800 m., upland forest, 11.1981, *Howard* UTT 16 (BR, C, K); Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, growing along small brook, 2.12.1980, *Friis & Vollesen* 619 (BR, C, K, KHF).

General habitat range: in damp and sometimes open places in lowland and medium-altitude forest.

General distribution: Guinée to South West Ethiopia, south to Angola and North West Tanzania.

Brillantaisia madagascariensis Lindau

FTA 5: 43 (1899); FWTA 2: 406 (1963); UKWF: 267 (1994); SIDWELL 1998: 104.

Imatong Mountains group, Sudan side: Lotti, 1000 m., ground layer in forest, 2.1.1950, *Jackson* 1023 (BM); at Lotti forest near Palotaka, 1200 m., forest, 1979, *Shigeta* 130 (EA); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in small swamp along river, 1.12.1980, *Friis & Vollesen* 613 (BR, C, K, KHF); Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, in small forest swamp, 15.11.1980, *Friis & Vollesen* 228 (C, K, KHF).

General habitat range: in damp places in lowland and medium-altitude forest.

General distribution: Guinée to Ethiopia, south to North Zambia and Tanzania; also in Madagascar.

Note: Only other known record from the Sudan from the Boma Plateau (*Myers* 10,476).

Brillantaisia owariensis P. Beauv.

FTA 5: 40 (1899); FWTA 2: 406 (1963); UKWF: 267 (1994); SIDWELL 1998: 90.

Syn.: *Brillantaisia nyanzarum* Burkill: FPNA 2: 272 (1947); FPS 3: 171 (1956).

Imatong Mountains group, Sudan side: Lotti forest near Palotaka, 1200 m., in forest, 9.1.1979, *Shigeta* 80 (EA); Lotti forest near Palotaka, 1200 m., in forest, 31.1.1979, *Shigeta* 155 (EA); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 26.11.1980, *Friis & Vollesen* 483 (C, K, KHF); Talanga, towards Katire, 970 m., in long grassland, 16.12.1935, *Thomas* 1595 (BM, BR, K); Kinyeti Valley, along Kinyeti River at Katire, 900 m., riparian vegetation, 23.3.1982, *Friis & Vollesen* 1299 (C, K); near Katire, 1200 m., in gallery forest, 9.2.1950, *Jackson* 1144 (BM); between Katire and Gilo, 1700 m., 26.12.1983, *Kielland-Lund* 482 (C, NLH); Lomaru, 1920 m., at stream, 28.12.1935, *Thomas* 1768 (BM, BR, K).

Imatong Mountains group, Uganda side: Agoro,

no alt., in dense shade along stream, no date, *Eggeling* 798 (K).

General habitat range: in lowland, medium-altitude and montane forest, often along streams.

General distribution: Sierra Leone to Sudan, south to North Angola and West Tanzania.

Brillantaisia vogeliana (Nees) Benth.

FTA 5: 40 (1899); FPNA 2: 272 (1947); FWTA 2: 406 (1963); FG 13: 92 (1966); UKWF: 267 (1994); SIDWELL 1998: 95.

Imatong Mountains group, Sudan side: Laboni, no alt., lowland forest, no date, *Myers* 9702 (K); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in small swamp along river, 1.12.1980, *Friis & Vollesen* 612 (BR, C, EA, KHF); Talanga, at River Loboli, 970 m., between rocks at the river, 16.12.1935, *Thomas* 1582 (BM, K).

General habitat range: in damp places.

General distribution: Ghana to Sudan, south to Uganda and West Kenya.

Crabbea Harv.

Crabbea velutina S. Moore

FTA 5: 119 (1899); UKWF: 271 (1994).

Imatong Mountains group, Sudan side: Torit, 620 m., on termite mound, 5.6.1949, *Jackson* 781 (BM); north-east side of mountains, just north of Molongori, 750 m., almost bare rocky slope with *Boswellia papyrifera*, *Terminalia brownii*, *Lanena fulva*, *Euphorbia magnicapsula*, *Xerophyta simulans*, etc., under big boulders, 10.3.1982, *Friis & Vollesen* 1148 (C, K, KHF).

Imatong Mountains group, Uganda side: Agoro, no alt., at forest trial plots below bamboo thicket, 9.6.1973, *Katende* 1850 (EA, MHU).

General habitat range: in lowland and medium altitude dry deciduous bushland and grassland.

General distribution: Easternmost Congo [previously Zaire] and South Sudan to South Ethiopia and Somalia, through Eastern Africa to Botswana.

Crossandra Salisb.

Crossandra massaica Mildbr.

FPNA 2: 294 (1947); FWTA 2: 409 (1963); VOLLESEN 1990: 511; UKWF: 274 (1994).

Syn.: *Crossandra nilotica* Oliv. subsp. *massaica* (Mildbr.) Napper

Didinga Mountains: lower slope of Mt. Lotuke, 1400 m., under shade of boulders on rocky hillside with *Terminalia*, 29.3.1950, *Jackson* 1297 (BM).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland, often in rocky places under scrub.

General distribution: Ghana, Sudan and Ethiopia, south to North Tanzania.

Crossandra nilotica Oliv.

FTA 5: 115 (1899); FS: 343 (1929); FPNA 2: 294 (1947); Fl. Rwanda 3: 450 (1985); VOLLESEN 1990: 508.

Imatong Mountains group, Sudan side: Kinyeti Valley, 15 km. north of Katire, 800 m., low riverine forest along temporary stream, 6.3.1982, *Friis & Vollesen* 1110 (C); Lofulong [4° 07'N, 32° 54'E], 900 m., on rocky soil near stream, in shade of *Ficus*, 12.11.1949, *Jackson* 516 (BM).

Imatong Mountains group, Uganda side: Agoro, no alt., 20.1.1946, *Dawkins* 162 (MHU).

Didinga Mountains: Boya Hill, Karauili, 1200 m., rocky outcrop, 22.12.1982, *Fukui* 82-39 (EA); rocks north-east of Chukudum (4° 15' N, 33° 27' E), 1100 m., 21.12.1983, *Kielland-Lund* 422A (C, NLH).

General habitat range: in dry lowland and medium-altitude forest, scrub and woodland.

General distribution: Sudan and Ethiopia

through East Congo [previously Zaire], Uganda and West Kenya to Angola, North Zambia and North Malawi.

Crossandra subacaulis C.B. Clarke

FTA 5: 116 (1899); FS: 343 (1929); FPS 3: 172 (1956); VOLLESEN 1990: 520; UKWF: 274 (1994).

Imatong Mountains group, Sudan side: Longairu (4° 29' N, 32° 21' E), west of Acholi Mountains, 700 m., in grassland, on termite mound, 15.4.1950, *Jackson* 1397 (BM, KHF); Torit, 630 m., in annually burnt *Combretum* woodland, 23.4.1949, *Jackson* 711 (BM); Kinyeti Valley, Imatong Junction, between Torit and Hiliu, near Ngarama (4° 20' N, 32° 38' E), no alt., 14.1.1984, *Kjelland-Lund* 622 (NLH); Hiliu, south east of compound, 700 m., burnt woodland, 2.12.1983, *Kjelland-Lund* 162 (C, NLH); Lokedeng, 910 m., under shade near stream, 22.6.1953, *Prowse* 378 (KHU); Lowiliwili, foot of hills, 900 m., in open *Combretum* woodland, 27.3.1950, *Jackson* 1286 (BM, WM).

Imatong Mountains group, Uganda side: north of Madi Opei, 910 m., wooded grassland, 4.1943, *Purseglove* 1371 (EA); north of Okako, south of Mingaro, no alt., woodland, 10.6.1973, *Katende* 1879 (MHU).

Didinga Mountains: Iwowa, 1620 m., on stony places, 23.4.1939, *Myers* 11,080 (K).

General habitat range: in lowland and medium-altitude grassland, wooded grassland, deciduous bushland and woodland.

General distribution: Central African Republic to South Sudan, south to Tanzania.

Dicliptera Juss.

Dicliptera laxata C.B. Clarke

FTA 5: 258 (1900); FPNA 2: 307 (1947); FWTA 2: 426 (1963); UKWF: 276 (1994).

Imatong Mountains group, Sudan side: Bushbuck Hill, 2150 m., upland forest with *Podocarpus lat-*

ifolius, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, 10.11.1980, *Friis & Vollesen* 117 (C, K, KHF).

General habitat range: in medium-altitude and montane forest.

General distribution: Nigeria to Ethiopia, south to Malawi. First record from the Sudan.

Dicliptera maculata Nees

FTA 5: 257 (1900); FS: 348 (1929); FPS 3: 173 (1956).

Imatong Mountains group, Sudan side: Talanga, 1000 m., open spaces in forest, 28.12.1949, *Jackson* 1008 (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 4.12.1980, *Friis & Vollesen* 684 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest and woodland.

General distribution: South Sudan and Ethiopia through eastern Africa to Tanzania.

Dicliptera pumila (Lindau) Dandy

FPS 3: 173 (1956); UKWF: 276 (1994).

Syn.: *Peristrophe usta* C.B. Clarke: FTA 5: 244 (1900); CHIPP 1929: 193; *Peristrophe pumila* (Lindau) Lindau.

Imatong Mountains group, Sudan side: near Laboni, no alt., in fire-swept grassland, appearing after grass fires, 1929, *Chipp* 41 (K); Kinyeti Valley, c. 18 km. north of Katire, 750 m., woodland with *Combretum collinum*, *C. molle*, *Annona senegalensis*, etc., 18.3.1982, *Friis & Vollesen* 1247 (BR, C, EA, K, KHF); lower southern slope of Mt. Konoro, 2300 m., *Loudetia arundinacea* grassland on shallow soil, recently burnt, 18.2.1982, *Friis & Vollesen* 937 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: Langia, 2840 m., montane grassland, 4.1943, *Purseglove* 1431 (K); north-east slope of Mt. Lomwaga, 2600 m., *Protea-Combretum* grassland, 6.4.1945, *Greenway & Hummel* 7298 (EA, K).

Didinga Mountains: Chukudum Regional Dis-

tract Centre (4° 14' N, 33° 29' E), 1100 m., 16.12.1983, *Kielland-Lund* 336 (C, NLH); Mt. Lotuke, Char, 1710 m., grassland, 3.1939, *MacDonald* 95 (BM); Mt. Lotuke, 1900 m., *Protea* grassland, 29.3.1950, *Jackson* 1311 (BM).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and woodland.

General distribution: Central African Republic to West Ethiopia, south to Angola and Zimbabwe.

Dicliptera umbellata (Vahl) Juss.

FTA 5: 259 (1900); FPS 3: 173 (1956) {Imatong Mountains}.

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1461 (K); Bushbuck Hill, 2200 m., *Hagenia abyssinica* woodland with undergrowth of *Loudetia*, near forest edge, 16.2.1982, *Friis & Vollesen* 921 (BR, C, K, KHF).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Moimoi, 1960 m., forest edge, 21.1.1950, *Jackson* 1100 (BM).

General habitat range: in medium-altitude and montane forest, often disturbed or secondary, and in moist woodland.

General distribution: Cameroon to South Sudan, south to Tanzania.

Dyschoriste Nees

Dyschoriste clinopodioides Mildbr.

FPNA 2: 283 (1947); Fl. Rwanda 3: 454 (1985); UKWF: 269 (1994).

Imatong Mountains group, Sudan side: lower southern slope of Mt. Konoro, 2100 m., *Loudetia arundinacea* grassland on shallow soil, recently burnt, 18.2.1982, *Friis & Vollesen* 950 (BR, C, K, KHF).

General habitat range: in wet montane grassland and bushland, swamps, forest clearings, also in secondary communities.

General distribution: South Sudan and Ethiopia through eastern Africa to Tanzania. First record from the Sudan.

Dyschoriste nagchana (Nees) Bennet

UKWF: 269 (1994).

Syn.: *Dyschoriste perrottetii* (Nees) O. Kuntze: FTA 5: 72 (1899); FS: 339 (1929); FPNA 2: 283 (1947); FPS 3: 173 (1956); FWTA 2: 404 (1963); WICKENS 1976: 149; Fl. Rwanda 3: 545 (1985).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in sand along brook, 4.12.1980, *Friis & Vollesen* 676 (BR, C, K, KHF); along trail from Itibol to Issore, west of Kinyeti River, 1850 m., along paths in abandoned fields, 9.3.1982, *Friis & Vollesen* 1143 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude wet grassland and swamps, riverbanks and riverine forest, often also in secondary grassland and bushland, roadside and old cultivations.

General distribution: Guinée to Ethiopia, south to South Africa; also in Arabia and tropical Asia.

Dyschoriste radicans Nees

FTA 5: 73 (1899); FPNA 2: 283 (1947); WICKENS 1976: 149; Fl. Rwanda 3: 454 (1985); UKWF: 269 (1994); HYF: 269 (1997).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., scrub along road, 17.2.1969, *Lye* 2035 (MHU).

General habitat range: in medium-altitude and montane grassland and bushland, often in secondary bushland, at roadsides, and in old cultivations.

General distribution: Sudan, Ethiopia and Somalia, through eastern Africa to Burundi and Tanzania; also in Tropical Arabia.

Elytraria Michx.**Elytraria marginata** Vahl

FG 13: 155 (1966).

Syn.: [*Elytraria crenata* auct., non Vahl: FTA 5: 27 (1899), excl. syn.; FTA 5: 509 (1900); FS: 338 (1929)].

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 27.11.1980, Friis & Vollesen 510 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude rain forest.

General distribution: Guinée to South Sudan, south to Angola and Uganda.

Eremomastax Lindau**Eremomastax speciosa** (Hochst.) Cufod.

FG 13: 30 (1966); UKWF: 268 (1994).

Syn.: *Paulowilhelmia speciosa* Hochst.: FPNA 2: 276 (1947). *Paulowilhelmia polysperma* Benth.: FTA 5: 52 (1899); JACKSON 1956: 355 {Laboni}. *Eremomastax polysperma* (Benth.) Dandy: FPS 3: 174 (1956); FWTA 2: 397 (1963).

Imatong Mountains group, Sudan side: Between Laboni forest and Issore, 1300 m., beside a stream, 21.12.1935, Thomas 1733 (BM, K); Loti forest, 1000 m., on ground floor in closed forest, 2.1.1950, Jackson 539 (BM); Issore, 1200 m., in gallery forest, 16.11.1948, Jackson 1026 (BM).

General habitat range: in lowland and medium-altitude forest.

General distribution: Guinée to Ethiopia, south to North West Tanzania.

Hygrophila R. Br.**Hygrophila auriculata** (Schumach.) Heine

FWTA 2: 395 (1963); WICKENS 1976: 149; Fl. Rwanda 3: 456 (1985); UKWF: 268 (1994).

Syn.: *Hygrophila spinosa* T. Anderson: FTA 5: 31 (1899); FS: 338 (1929). *Asteracantha longifolia* (L.) Nees: FPNA 2: 274 (1947); FPS 3: 166 (1956).

Imatong Mountains group, Sudan side: Hiliu, near river, c. 700 m., 29.11.1983, Kielland-Lund 95 (C, NLH); near Kinyieti River 7 km. south of Hiliu along road to Katire, 700 m., 7.12.1983, Kielland-Lund 243 (C, NLH).

Didinga Mountains: ca. 8 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, Peers KMI (K, WM).

General habitat range: in damp places in lowland and medium-altitude woodland and grassland.

General distribution: Senegal to Ethiopia, south to South Africa; also in tropical Asia.

Hypoestes Solander ex R. Br.**Hypoestes aristata** (Vahl) Roem. & Schult.

FTA 5: 245 (1900); FPS 3: 176 (1956) {Imatong Mountains, Itibol}; FWTA 2: 431 (1963); FG 13: 231 (1966); UKWF: 277 (1994).

Imatong Mountains group, Sudan side: Katire to Itibol, 2000 m., edge of forest, 17.12.1935, Thomas 1644 (BM, K); Bushbuck Hill, 2150 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, 10.11.1980, Friis & Vollesen 120 (C, K, KHF).

General habitat range: in medium-altitude and montane forest.

General distribution: Nigeria and Cameroon to Ethiopia, south to South Africa.

Hypoestes consanguinea Lindau

FWTA 2: 431 (1963).

Syn.: [*Hypoestes rosea* auct., non P. Beauv.: FTA 5: 248 (1900); FPNA 2: 300 (1947)].

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scrambling herb in forest, 5.12.1980, Friis & Vollesen 711 (C, K, KHF); Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, in small forest swamp, 15.11.1980, Friis & Vollesen 227 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude and montane forest.

General distribution: Togo and Nigeria to South Sudan, south to Uganda.

Hypoestes forskalii (Vahl) R. Br.

FTA 5: 249 (1900); FS: 349 (1929); WICKENS 1976: 149; UKWF: 277 (1994); HYF: 277 (1997).

Syn.: *Hypoestes verticillaris* (L. f.) Solander ex Roem. & Schult., nom. rej.: FTA 5: 250 (1900); FS: 349 (1929); FPNA 2: 298 (1947); FPS 3: 177 (1956); FWTA 2: 431 (1963); FG 13: 227 (1966).

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, Johnston 1440 (K); without further locality, 2440 m., 10.2.1936, Johnston 1474 (K) & 1533 (K); without further locality, 2130 m., ground layer in *Podocarpus latifolius* forest, 13.2.1976, Howard IM 43 (K, KHF); Kinyeti Valley, Hiliu, near river by bridge west of town, 700 m., 30.11.1983, Kielland-Lund 135 (C, NLH); Hiliu, near compound, 700 m., below tree with dense crown, 2.12.1983, Kielland-Lund 176 (C, NLH); Lofulong, 900 m., near stream, 11.11.1948, Jackson 519 (BM); Bushbuck Hill, 2150 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, 10.11.1980, Friis & Vollesen 108 (C); between Lowiliwili and Dumuso, 2400 m.,

undergrowth in forest, 25.4.1950, Jackson 1441 (K); Kipia, 2690 m., forest, 1.1939, MacDonald 45 (BM).

Didinga Mountains: Mt. Lotuke, 2400 m., *Podocarpus latifolius* forest, 30.3.1950, Jackson 1355 (BM).

General habitat range: in open places in medium-altitude and montane forest, and in lowland, medium-altitude and montane woodland and bushland.

General distribution: Senegal to Ethiopia, south to South Africa; also in tropical Arabia.

Hypoestes triflora (Forssk.) Roem. & Schult.

FTA 5: 247 (1900); FPNA 2: 299 (1947); FPS 3: 177 (1956) {Imatong Mountains}; FWTA 2: 431 (1963); UKWF: 277 (1997); HYF: 277 (1997).

Imatong Mountains group, Sudan side: without further locality, no alt., 12.2.1936, Johnston 1516 (K) & 1517 (K); Ngairigi River, 1600 m., along stream, 8.1.1950, Jackson 1032 (BM); Bushbuck Hill, 2100 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, partly cleared and replaced with *Cupressus lusitanica* plantation, on forest floor, 16.2.1982, Friis & Vollesen 900 (BR, C, K); Lomuleng, 2440 m., forest, 29.12.1935, Thomas 1798 (BM, K); Kipia, 2690 m., bamboo forest, 12.1938, MacDonald 14 (BM).

Didinga Mountains: Mt. Lotuke, 2600 m., *Podocarpus latifolius* forest, 30.3.1950, Jackson 1329 (K).

General habitat range: in medium-altitude and montane forest.

General distribution: Guinée to Ethiopia, south to South Africa; also in tropical Arabia.

Hypoestes sp.

Imatong Mountains group, Sudan side: Issore, 1200 m., colonising *Combretum collinum* subsp. *binderianum* woodland, 3.3.1951, Jackson 1764 (WM).

Isoglossa Oerst.

Isoglossa punctata (Vahl) Brummitt & Wood
HYF: 274 (1997).

Syn.: *Isoglossa oerstediana* Lindau: FTA 5: 232 (1900); UKWF: 278 (1994).

Imatong Mountains group, Sudan side: Talanga to Upper Talanga, 1100 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scandent herb in forest, 7.12.1980, *Friis & Vollesen* 744 (BR, C, K, KHF); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 31 (C, K); Gilo, 1900 m., *Podocarpus latifolius* forest, 11.11.1949, *Jackson* 899 (BM).

General habitat range: in lowland and medium-altitude forest.

General distribution: South Sudan and Ethiopia through East Congo [previously Zaire], Rwanda, Uganda and West Kenya to Burundi and North Tanzania; also in tropical Arabia. First record from the Sudan.

Isoglossa somalensis Lindau

FTA 5: 231 (1900).

Syn.: [*Isoglossa ovata* auct., non E.A. Bruce: FPS 3: 177 (1956) {Imatong Mountains}. *Isoglossa sp. near I. ovata* sensu Jackson: JACKSON 1956: 367 {Imatong Mountains, upper *Podocarpus latifolius* forest}].

Imatong Mountains group, Sudan side: without further locality, no alt., 1936, *Johnston* 1480 (K); without further locality, no alt., 13.2.1976, *Howard* IM 44 (K, KHF); Gilo, no alt., 1952, *Jackson* 3132 (K, KHF); between Katire and Gilo, 1700 m., 26.12.1983, *Kielland-Lund* 479 (C, NLH); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 5 (BR, C, K, KHF); Gilo to Mt. Konoro, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 23.11.1980, *Friis & Vollesen* 406 (C, K, KHF); between Itibol and Ibahin, 1950 m., in *Acacia abyssinica*

woodland, 18.12.1935, *Thomas* 1658 (BM, K); Kipia, 2690 m., closed forest, 12.1938, *MacDonald* 18 (BM); Kipia, no alt., 1.1939, *MacDonald* 421 (BM); Kipia, 2900 m., forest edge, 4.7.1947, *MacLeay* 168 (BM); Lowiliwili, 2700 m., undergrowth in *Podocarpus latifolius* forest, 11.1949, *Jackson* 901 (BM, KHF).

General habitat range: in medium-altitude and montane forest and moist woodland.

General distribution: South Sudan and Ethiopia.

Justicia L.**Justicia afromontana** Hedrén

HEDRÉN 1989: 101.

Syn.: [*Justicia whytei* auct., non S. Moore: CHIPP 1929: 193; FPS 3: 180 (1956) {Imatong Mountains, Mt. Kinyeti}].

Imatong Mountains group, Sudan side: without further locality [Mt. Kinyeti], 3050 m., 12.2.1936, *Johnston* 1510 (K); without further locality [Mt. Kinyeti], 3170 m., 21.2.1976, *Howard* IM 60 (K); Kipia, 2440 m., in scrub, 29.12.1935, *Thomas* 1811 (BM, K); Kipia, no alt., 2.1936, *Johnston* 1425 (K); Kipia, 2690 m., rocky hillside, 1.1939, *MacDonald* 52 (BM); ridge leading to the top of Mt. Kinyeti, 3000 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, *Friis & Vollesen* 1281 (C, K); Mt. Kinyeti, 3050 m., in mountain meadow, 11.2.1929, *Chipp* 79 (K); summit of Mt. Kinyeti, 3180 m., 27.7.1939, *Myers* 11,641 (K); summit of Mt. Kinyeti, 3180 m., rocky summit with sclerophyllous herbs, 14.11.1949, *Jackson* 927 (BM); summit of Mt. Kinyeti, 2740 m., 17.6.1953, *Prowse* 338 (KHU); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 829 (C, K).

General habitat range: in montane and ericaceous grassland and bushland.

General distribution: South Sudan and North Uganda.

Justicia anselliana (Nees) T. Anderson

FTA 5: 208 (1900); FS: 346 (1929); FPNA 2: 314 (1947); FPS 3: 179 (1956); FWTA 2: 427 (1963); ENSERMU 1990: 74; UKWF: 279 (1994).

Imatong Mountains group, Sudan side: without further locality, no alt., 1947, *Maxwell Forbes* 80 (K); Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), near dam, 800 m., 6.1.1984, *Kielland-Lund* 597 (C, NLH).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., scrub along road, 17.2.1969, *Lye* 2038 (MHU); 4 km. south east of Lomwaga, no alt., on rocks in grassland, 18.7.1974, *Katende* 2133 (MHU).

General habitat range: in lowland and medium-altitude woodland, wooded grassland and bushland.

General distribution: Liberia to South Sudan, south to Angola and Zambia.

Justicia betonica L.

FTA 5: 184 (1899); FS: 345 (1929); FPNA 2: 312 (1947); FPS 3: 178 (1956); FWTA 2: 427 (1963); UKWF: 279 (1994).

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1403 (K); Palotaka, 1200 m., open woodland, 9.1.1979, *Shigeta* 71 (EA); Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on land with rocky outcrops, 29.11.1980, *Friis & Vollesen* 539 (C, K, KHF); Kinyeti Valley, c. 15 km. north of Katire, 800 m., open woodland with *Combretum collinum*, *C. molle*, *Steganotaenia araliacea*, etc., on rocky outcrop, 6.3.1982, *Friis & Vollesen* 1115 (BR, C, K, KHF); Talanga, 1000 m., recently burnt *Imperata* grassland, 9.3.1950, *Jackson* 1211 (BM).

Imatong Mountains group, Uganda side: 2 km. north-east of Lututuru, near end of road, 1800

m., grassland, 17.2.1969, *Lye* 2067 (K, MHU, NLH).

General habitat range: in lowland and medium-altitude woodland, wooded grassland and bushland.

General distribution: Senegal to Ethiopia, south to South Africa; also in tropical Asia.

Justicia caerulea Forssk.

UKWF: 279 (1994); HYF: 275 (1997).

Didinga Mountains: 8 km. south of Kapoeta on road to Nathilani (33° 35' E, 4° 40' N), no alt., sandy soil, 27.8.1953, *Peers* KO15 (K) & KO16 (K).

General habitat range: in lowland and medium-altitude grassland and bushland, often on black cotton soil.

General distribution: South Sudan, Ethiopia and Somalia through East Uganda and Kenya to North Tanzania; also in tropical Arabia.

Justicia exigua S. Moore

FTA 5: 514 (1900); ENSERMU (1990): 71.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, between compound and river, 700 m., 28.11.1983, *Kielland-Lund* 78 (C, NLH); Hiliu, near compound, 700 m., open soil in harvested cultivation, 3.12.1983, *Kielland-Lund* 201 (C, NLH).

General habitat range: in lowland and medium-altitude woodland and bushland, often in disturbed places.

General distribution: East Congo [previously Zaire], Uganda and Sudan to Ethiopia, south through eastern Africa to Angola, Botswana, Namibia and South Africa (Transvaal).

Justicia extensa T. Anderson

FTA 5: 206 (1900); FWTA 2: 428 (1963); FG 13: 224 (1966); UKWF: 280 (1994); KTS: 603 (1994).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*,

Alstonia boonei, *Parinari excelsa* and *Milicia excelsa*, 26.11.1980, *Friis & Vollesen* 458 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Guinée and Sierra Leone to South Sudan, south to Uganda and West Kenya. First record from the Sudan.

Justicia flava (Vahl) Vahl

FTA 5: 190 (1899); FS: 345 (1929); FPNA 2: 312 (1947); FPS 3: 179 (1956); FWTA 2: 427 (1963); UKWF: 279 (1994); HYF: 275 (1997).

Imatong Mountains group, Sudan side: Opari rest house, no alt., 8.6.1939, *Andrews* 1688 (K); Torit, 630 m., termite mound, 23.4.1949, *Jackson* 712 (BM); Longiaru, 700 m., on termite mound, 15.4.1950, *Jackson* 1396 (BM); between Hiliu and Ngarama, 700 m., on gravelly soil in thorn thicket, 12.6.1961, *Jackson* 4233 (K); Hiliu, 700 m., in compound, 21.11.1983, *Kielland-Lund* 3 (C, NLH); Kinyeti Valley, between Imeila and Hiliu, c. 2 km. south of Hiliu, 700 m., wooded grassland with *Acacia sieberiana*, *Tamarindus indica* and *Ziziphus mauritiana*, 27.2.1982, *Friis & Vollesen* 1040 (BR, C, EA, K).

General habitat range: in lowland and medium-altitude woodland, wooded grassland and bushland.

General distribution: Senegal to Ethiopia and West Kenya, south to South Africa; also in tropical Arabia.

Justicia ladanoides Lam.

HEDRÉN 1989: 88.

Syn.: *Justicia schimperi* (Hochst.) Dandy: FPS 3: 180 (1956). *Justicia lithospermifolia* Jacq. *Justicia calcarata* Hochst. ex C.B. Clarke, non Wall.: FTA 5: 195 (1900). *Justicia kotschyi* (Hochst.) Dandy: FPS 3: 180 (1956). [*Justicia insularis* auct., non T. Anderson: FS: 345 (1929)].

Imatong Mountains group, Sudan side: without further locality, no alt., 1947, *Maxwell Forbes* 77 (K); Palotaka, 1200 m., open woodland, 8.1.

1979, *Shigeta* 62 (EA); Kinyeti Valley, Hiliu, in compound, 700 m., 29.11.1983, *Kielland-Lund* 82 (C, NLH); Upper Talanga Tea Project, 1800 m., upland rain forest, 11.1981, *Howard* UTT 27 (C, K); Katire, 940 m., along path in forest, 10.1948, *Jackson* 380 (BM); Katire, 1000 m., woodland, 23.10.1949, *Jackson* 994 (BM); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 2 (BR, C, K, KHF); Gilo, at bridge on Ngairigi River, 1700 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 17.11.1980, *Friis & Vollesen* 294 (C, K, KHF).

Imatong Mountains group, Uganda side: 4 km. south east of Lomwaga, 1500 m., tall-grass grassland with scattered trees, 18.7.1974, *Katende* 2166 (MHU) & 2191 (MHU).

General habitat range: in lowland, medium-altitude and montane grassland, wooded grassland and forest, usually at margins and in clearings.

General distribution: Senegal to North Somalia, south to North Congo [previously Zaire], Uganda and Kenya.

Justicia matammensis (Schweinf.) Oliv.

FTA 5: 209 (1900); FS: 347 (1929); FPNA 2: 314 (1947); FPS 3: 180 (1956); ENSERMU 1990: 78.

Imatong Mountains group, Sudan side: without further locality, 1520-1830 m., 12.6.1939, *Andrews* 1836 (K); Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, *Friis & Vollesen* 565 (BR, C, K, KHF); Kinyeti Valley, hill 3 km. south of Hiliu, 700 m., stony hillside, 6.12.1983, *Kielland-Lund* 216 (C, NLH); south west of Hiliu (4° 16' N, 32° 48' E), no alt, near big stone in flat area, 25.5.1984, *Kielland-Lund* 732 (C, NLH); Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 17.11.1980, *Friis & Vollesen* 290 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: 3-5 km. south east of Lututuru, 1400 m., rocky outcrop, 17.2.1969, *Lye* 2103 (K, MHU, NLH).

General habitat range: in lowland and medium-altitude woodland, bushland and grassland.

General distribution: Central African Republic to West Ethiopia, south to South Africa (Transvaal).

Justicia nyassana Lindau

FTA 5: 192 (1899); FPS 3: 179 (1956) [Imatong Mountains, Ibahin]; UKWF: 280 (1994).

Imatong Mountains group, Sudan side: Kinyeti Valley, 4 km. south of Hiliu on Katire road, 700 m., in teak-plantation, 7.12.1983, *Kielland-Lund* 250 (C, NLH); Gilo, 1850 m., edge of upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 10 (BR, C, K, KHF); Itibol-Ibahin, 1980 m., near camp in forest, 18.12.1935, *Thomas* 1672 (BM, K).

General habitat range: in medium-altitude and montane forest, often at edges and in clearings.

General distribution: South Sudan and South West Ethiopia through eastern Africa to Zimbabwe.

Justicia pinguior C.B. Clarke

FTA 5: 197 (1900); HEDRÉN 1989: 84; UKWF: 280 (1994).

Imatong Mountains group, Sudan side: Dumuso, 2290 m., grassy clearing in *Podocarpus latifolius* forest, 3.7.1947, *MacLeay* 124 (BM).

General habitat range: in medium-altitude and montane forest, usually in clearings, and in grassland.

General distribution: South Sudan, East Congo [previously Zaire] (Ruwenzori), Uganda and West Kenya.

Justicia scandens Vahl

HANSEN 1989: 204.

Syn.: *Justicia glabra* Roxb.: FTA 5: 208 (1900); FPS 3: 179 (1956); JACKSON 1956: 355 [Lottii]; FWTA 2: 428 (1963).

Imatong Mountains group, Sudan side: Issore, 1200 m., undergrowth in gallery forest of medium-altitude type, 16.11.1948, *Jackson* 540 (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scrambling herb along trails in forest, 6.12.1980, *Friis & Vollesen* 723 (C); Talanga forest, 1000 m., edge of forest, colonising old woodland, 4.3.1950, *Jackson* 1192 (BM).

General habitat range: in lowland and medium-altitude forest, especially along trails and in clearings.

General distribution: Ivory Coast to South West Ethiopia, south to South Africa (Transvaal, Natal); also in India and tropical South East Asia.

Justicia tenella (Nees) T. Anderson

FTA 5: 187 (1899); FPNA 2: 312 (1947); FPS 3: 178 (1956); FWTA 2: 428 (1963); FG 13: 215 (1966).

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 3.12.1980, *Friis & Vollesen* 657 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest, often in disturbed places.

General distribution: Senegal to South Sudan, south to Tanzania, Malawi, Zimbabwe and Mozambique; also in Madagascar.

Lankesteria Lindl.

Lankesteria elegans (P. Beauv.) T. Anderson

FTA 5: 70 (1900); CHIPP 1929: 193; FPS 3: 181 (1956); FWTA 2: 407 (1963); FG 13: 96 (1966).

Imatong Mountains group, Sudan side: Laboni, no alt., in closed forest in association with *Coffea canephora*, 1929, *Chipp* 43 (K, WM); Laboni, 1000 m., in forest, 17.2.1951, *Jackson* 1734

(KHF); Lotti, no alt., forest, 28.2.1939, *Myers* 10,566 (K); Lotti, 1000 m., forest, 17.1.1949, *Jackson* 583 (BM); Lotti forest near Palotaka, 1200 m., forest, 25.1.1979, *Shigeta* 100 (EA); Lotti forest near Palotaka, 1200 m., forest, 1.2.1979, *Shigeta* 162 (EA).

General habitat range: in lowland and medium-altitude forest.

General distribution: Sierra Leone to South West Ethiopia, south to Uganda.

Lepidagathis Willd.

Lepidagathis diversa C.B. Clarke

FTA 5: 126 (1899); FPS 3: 183 (1956); MORTON 1988: 343.

Syn.: [*Lepidagathis collina* auct., non (Endl.) Milne-Redh., sensu str.: FWTA 2: 416 (1963), p.p.].

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near compound, 700 m., in cultivation, 5.12.1983, *Kielland-Lund* 209 (C, NLH).

General habitat range: in lowland and medium-altitude bushland and woodland.

General distribution: Ghana to South Sudan, West Ethiopia and Uganda.

Lepidagathis glandulosa A. Rich.

FTA 5: 128 (1899); UKWF: 271 (1994).

Imatong Mountains group, Sudan side: Issore, 1200 m., grassland, 17.1.1948, *Jackson* 544 (BM); Gilo to Itibol, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 11.11.1980, *Friis & Vollesen* 161 (BR, C, EA, K, KHF); Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 8.12.1980, *Friis & Vollesen* 774 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude grassland, woodland and at forest margins.

General distribution: South Sudan and Ethiopia through Western Kenya to North Tanzania. First record from the Sudan.

Lepidagathis hamiltoniana Wall.

MORTON 1988: 340.

subsp. **collina** (Endl.) J.K. Morton

MORTON 1988: 341.

Syn.: *Lepidagathis radicalis* Hochst. ex Nees: FTA 5: 123 (1899); FS: 344 (1929). *Lepidagathis collina* (Endl.) Milne-Redhead: FPS 3: 182 (1956); FWTA 2: 416 (1963), p.p.; WICKENS 1976: 149.

Imatong Mountains group, Sudan side: Kinyeti Valley, Imatong Junction, between Torit and Hiliu, near Ngarama (4° 20' N, 32° 38' E), no alt., 14.1.1984, *Kielland-Lund* 623 (C, NLH).

General habitat range: in lowland and medium-altitude bushland and woodland.

General distribution: Guinea Bissau to West Ethiopia, Uganda and West Kenya.

Mellera S. Moore

Mellera lobulata S. Moore

FTA 5: 50 (1899); JACKSON 1956: 354 {Talanga}.

Imatong Mountains group, Sudan side: Lotti, 1000 m., understorey of closed forest, 17.1.1949, *Jackson* 588 (BM); Talanga, 1000 m., undergrowth in closed forest along track, 28.12.1949, *Jackson* 1014 (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 25.11.1980, *Friis & Vollesen* 444 (BR, C, K, KHF); Gilo, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, in forest, 19.2.1982, *Friis & Vollesen* 956 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: north of Agoro Rest House, no alt., in ravine forest, 20.1.1946, *Dawkins* 161 (EA, MHU).

General habitat range: in lowland and medium-altitude forest.

General distribution: Central African Republic to South West Ethiopia, south to Zimbabwe.

Mendoncia Vell. ex Vand.

Mendoncia gilgiana (Lindau) Benoist
FWTA 2: 403 (1963); FG 13: 70 (1966).

Syn.: *Afromendoncia gilgiana* Lindau: FTA 5: 7 (1899).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, climber in forest, 27.11.1980, Friis & Vollesen 494 (BR, C, K, KHF).

General habitat range: in lowland forest.

General distribution: Liberia to South Sudan, south to Uganda and West Kenya. First record from the Sudan.

Metarungia Baden

Syn.: *Macrorungia* C.B. Clarke

Metarungia pubinervia (T. Anderson) Baden
BADEN 1984: 638.

Syn.: *Macrorungia pubinervia* (T. Anderson) C.B. Clarke: FTA 5: 255 (1900); UKWF: 276 (1994); KTSL: 605 (1994). *Anisotes pubinervis* (T. Anderson) Heine: FG 13: 189 (1966).

Imatong Mountains group, Sudan side: Lotti, 1000 m., in scrub layer of rain forest, 2.1.1950, Jackson 1021 (BM); Talanga to Upper Talanga, 1100 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, shrub in forest, 7.12.1980, Friis & Vollesen 747 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: South Sudan and South West Ethiopia through East Congo [previously Zaire], Burundi and eastern Africa to Zimbabwe.

Mimulopsis Schweinf.

Mimulopsis solmsii Schweinf.

FTA 5: 55 (1899); JACKSON 1956: 354 {Lotti, Laboni}; FPS 3: 183 (1956) {Imatong Mountains, Ibahin}; FWTA 2: 403 (1963); UKWF: 269 (1994); KTSL: 605 (1994).

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, Johnston 1437 (K); without further locality, no alt., 2.1936, Johnston 1447 (K); without further locality, no alt., 2.1936, Johnston 1463 (K); without further locality, 2130 m., in *Podocarpus latifolius*-*Olea capensis* forest, 12.3.1976, Howard IM 76 (K); Upper Talanga, 1200 m., tea project area, 1978, Howard UTT 9 (BR, C, K) & UTT 26 (BR, C, K); Ibahin, 1890 m., forest, 18.12.1935, Thomas 1667 (BM, K); Bushbuck Hill, 2300 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, in forest, 21.2.1982, Friis & Vollesen 983 (C, K); below summit of Mt. Kinyeti, 2600 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, with open glades and patches of mountain bamboo and *Hagenia abyssinica* and *Hypericum revolutum* woodland, this species dominant on forest floor with *Isoglossa* sp. and *Hypoestes* sp., 23.3.1982, Friis & Vollesen 1292 (BR, C, K).

Didinga Mountains: Mt. Lotuke, 2600 m., *Podocarpus latifolius* forest, 30.3.1950, Jackson 1344 (BM).

General habitat range: in montane forest and evergreen bushland.

General distribution: Cameroon to Ethiopia and West Kenya, south to Zimbabwe.

Monechma Hochst.

Monechma ciliatum (Jacq.) Milne-Redh.

FPS 3: 184 (1956); FWTA 2: 429 (1963); WICKENS 1976: 150.

Syn.: *Monechma hispidum* Hochst.: FTA 5: 213 (1900); FS: 347 (1929).

Imatong Mountains group, Sudan side: Kinyeti Valley, 14 km. south of Hiliu on Katire road, 700 m., roadside, 7.12.1983, *Kielland-Lund* 256 (C, NLH).

General habitat range: in lowland and medium-altitude grassland and bushland, often on clay.

General distribution: Senegal to Ethiopia, south to Zambia and Malawi.

Monechma debile (Forssk.) Nees

FPNA 2: 309 (1947); FPS 3: 184 (1956); UKWF: 281 (1994); HYF: 275 (1997).

Syn.: *Monechma bracteatum* Hochst.: FTA 5: 214 (1900).

Imatong Mountains group, Sudan side: Molongori, 700 m., weed, 17.1.1950, *Jackson* 1057 (BM).

General habitat range: in lowland and medium-altitude woodland, bushland and grassland.

General distribution: Sudan and Ethiopia through eastern Africa to Namibia and South Africa (Transvaal, Natal); also in tropical Arabia and India.

Monothecium Hochst.

Monothecium aristatum (Nees) T. Anderson
FTA 5: 176 (1899).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 26.11.1980, *Friis & Vollesen* 480 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: South Sudan through Uganda and Kenya to Tanzania, and in Angola; also in India. First record from the Sudan.

Monothecium glandulosum Hochst.

FTA 5: 175 (1899); FPNA 2: 297 (1947); UKWF: 278 (1994).

Imatong Mountains group, Sudan side: near Katire, 1100 m., gallery forest, 8.2.1950, *Jackson* 1132 (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 4.12.1980, *Friis & Vollesen* 689 (C, K); Gilo to Mt. Konoro, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 18.11.1980, *Friis & Vollesen* 327 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Central African Republic to Ethiopia, south to Uganda, Kenya and North West Tanzania. First record from the Sudan.

Nelsonia R. Br.

Nelsonia canescens (Lam.) Spreng.

FPS 3: 184 (1956); FWTA 2: 418 (1963); FG 13: 158 (1966); WICKENS 1976: 150; VOLLESEN 1994: 322.

Syn.: *Nelsonia campestris* R. Br.: FTA 5: 28 (1899); FS: 338 (1929).

Imatong Mountains group, Sudan side: Molongori, 720 m., in wall of rest-house compound, 17.1.1950, *Jackson* 1047 (BM, KHF).

General habitat range: in lowland and medium altitude woodland, bushland and grassland, often in disturbed habitats.

General distribution: Senegal to West Ethiopia, south to Botswana; also in Madagascar and India. Introduced in tropical America.

Nelsonia smithii Oerst.

VOLLESEN 1994: 322.

Imatong Mountains group, Sudan side: Talanga, 900 m., swampy area, 21.3.1950, *Jackson* 1250

(BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in small swamp along brook, 1.12.1980, Friis & Vollesen 606 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest, often in swampy places or along streams.

General distribution: Guinée to South West Ethiopia, south to North Zambia and North Malawi.

Oreacanthus Benth.

Oreacanthus sudanicus Friis & Vollesen
FRIIS & VOLLESEN 1982: 465.

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 25.11.1980, Friis & Vollesen 448 (C, holotype of *O. sudanicus*; BR, EA, K, KHF, isotypes).

General habitat range: lowland rain forest.

General distribution: Not known elsewhere.

Paulowilhelmia Hochst., see **Eremomastax**
Lindau.

Peristrophe Nees

Peristrophe paniculata (Forssk.) Brummitt
HYF: 276 (1997).

Syn.: *Peristrophe bicalyculata* (Retz.) Nees: FTA 5: 242 (1900); FS: 348 (1929); FPS 3: 185 (1956); FWTA 2: 424 (1963); WICKENS 1976: 150; UKWF: 275 (1994).

Imatong Mountains group, Uganda side: Agoro, 1370 m., old fields, 12.11.1945, Thomas 4357 (EA, K).

General habitat range: in lowland and medium-altitude woodland, bushland and grassland.

General distribution: Cape Verde Islands to Ethiopia and Egypt, south to Namibia and South Africa; also in tropical Arabia and India.

Phaulopsis Willd.

Phaulopsis imbricata (Forssk.) Sweet
FPNA 2: 275 (1947); FPS 3: 185 (1956); FWTA 2: 399 (1963); UKWF: 268 (1994); MANKTELOW 1996: 126; HYF: 269 (1997).

subsp. **imbricata**

MANKTELOW 1996: 128.

Syn.: [*Phaulopsis parviflora* auct., non Willd.: FTA 5: 83 (1899)].

Imatong Mountains group, Sudan side: without further locality, 1200 m., 1.1.1983, Kasper 194 (K); Gilo, 1850 m., edge of upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, Friis & Vollesen 1 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude and montane woodland and forest.

General distribution: East Congo [previously Zaire] to Ethiopia, south to South Africa (Transkei); also in tropical Arabia.

subsp. **poggei** (Lindau) Manktelow

MANKTELOW 1996: 138.

Syn.: *Phaulopsis poggei* (Lindau) Lindau: FTA 5: 85 (1899); FG 13: 48 (1966).

Imatong Mountains group, Sudan side: Talanga, 1000 m., edge of road in closed forest, 28.12.1949, Jackson 1009 (BM); Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 8.12.1980, Friis & Vollesen 769 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and forest.

General distribution: Guinea to Ethiopia, south to North Zambia.

Pseuderanthemum Radlk.**Pseuderanthemum ludovicianum** (Buettn.) Lindau

FPNA 2: 296 (1947); FPS 3: 186 (1956); JACKSON 1956: 354 {Talanga, Lotti}; FWTA 2: 421 (1963); FG 13: 170 (1966); UKWF: 275 (1994); KTSL: 606 (1994).

Syn.: *Eranthemum ludovicianum* Buettn.: FTA 5: 172 (1899).

Imatong Mountains group, Sudan side: without further locality, no alt., *Trought* s.n. (fide Aylmer [unpublished], specimen not traced); Lotti, 1000 m., in undergrowth of closed forest, 2.1.1950, *Jackson* 1027 (BM); Lotti, 1000 m., in forest understorey, 17.1.1949, *Jackson* 586 (BM, KHF); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 27.11.1980, *Friis & Vollesen* 500 (BR, C, EA, K, KHF); Talanga, 1000 m., in undergrowth of closed forest, 28.12.1949, *Jackson* 1016 (BM).

General habitat range: in lowland and medium-altitude rain forest.

General distribution: Liberia to South Sudan and West Kenya, south to Angola and West Tanzania.

Note: The only other record from the Sudan is from the Aloma Plateau (*Myers* 10,217).

Pseuderanthemum tunicatum (Afzel.) Milne-Redh.

FWTA 2: 421 (1963); FG 13: 168 (1966); KTSL: 606 (1994).

Syn.: *Eranthemum nigritianum* T. Andersson: FTA 5: 171 (1899). *Eranthemum lindauii* C.B. Clarke: FTA 5: 173 (1899).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 1.12.1980, *Friis & Vollesen* 602 (C, K, KHF).

General habitat range: in lowland and medium-altitude rain forest.

General distribution: Sierra Leone to South West Ethiopia and Kenya, south to Angola, Zambia and Malawi. First record from the Sudan.

Ruellia L.**Ruellia bignoniiflora** S. Moore

FTA 5: 48 (1899).

Syn.: *Ruellia megachlamys* S. Moore: FTA 5: 48 (1899); UKWF: 270 (1994); KTSL: 607 (1994).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near compound, 700 m., 28.11.1983, *Kielland-Lund* 70 (C, NLH); Kinyeti Valley, just south of Imeila, 850 m., woodland with *Albizia zygia*, *Annona senegalensis*, *Combretum collinum* and *Lonchocarpus laxiflorus*, 24.2.1982, *Friis & Vollesen* 1022 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and bushland.

General distribution: South Sudan to South Ethiopia, south to Angola, Zimbabwe, Zambia and Malawi. First record from the Sudan.

Ruellia patula Jacq.

FTA 5: 45 (1899); FS: 339 (1929); FPS 3: 187 (1956); WICKENS 1976: 150.

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), below Dam, 800 m., 6 January 1984, *Kielland-Lund* 588 (C, NLH).

General habitat range: in lowland and medium-altitude grassland, bushland and woodland.

General distribution: Chad to Ethiopia and Somalia, south to Namibia and South Africa (Transvaal, Natal); also in Madagascar, tropical Arabia and India.

Ruellia prostrata Poir.

FTA 5: 46 (1899); UKWF: 270 (1994); HYF: 270 (1997).

Syn.: *Ruellia sudanica* (Schweinf.) Lindau: FTA

5: 46 (1899); CHIPP 1929: 192; FPNA 2: 284 (1947); FPS 3: 187 (1956).

Imatong Mountains group, Sudan side: near Laboni, no alt., in fire-swept grassland, appearing shortly after grass fires, 8.2.1929, *Chipp* 32 (K).

Didinga Mountains: Mt. Lotuke, 1830 m., woodland, 9.4.1939, *Myers* 10,926 (K); Mt. Lotuke, 1740 m., grassland, 31.3.1950, *Jackson* 1361 (BM).

General habitat range: in dry, fire-swept low and medium-altitude woodland or bushland.

General distribution: South Sudan to South West Ethiopia and North Uganda, through eastern Africa to South Africa; also in tropical Arabia and tropical Asia.

Ruellia sp.

Imatong Mountains group, Uganda side: 2 km. north-east of Lututuru, 1800 m., dry grassland, 17.2.1969, *Lye* 2066 (MHU).

Rungia Nees

Rungia buettneri Lindau

FTA 5: 253 (1900).

Imatong Mountains group, Sudan side: Talanga to Upper Talanga, 1000 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 7.12.1980, *Friis & Vollesen* 756 (BR, C, EA, K, KHF).

General habitat range: in lowland forest.

General distribution: Cameroon to South Sudan, south to Congo [previously Zaire], Burundi and Uganda. First record from the Sudan.

Rungia grandis T. Anderson

FTA 5: 252 (1900); FPNA 2: 308 (1947); JACKSON 1956: 355 {Lotti}; FWTA 2: 430 (1963); FG 13: 205 (1966).

Imatong Mountains group, Sudan side: Lotti, 1000 m., closed forest, 19.3.1947, *Jackson* 587 (BM);

Talanga, 900 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 1.3.1982, *Friis & Vollesen* 1059 (BR, C, K, KHF).

General habitat range: in lowland forest and woodland.

General distribution: Mali and Guinea Bissau to South West Ethiopia, south to Uganda.

Ruspolia Lindau

Ruspolia decurrens (Nees) Milne-Redh.

FPS 3: 187 (1956); WICKENS 1976: 150.

Syn.: *Eranthemum decurrens* Nees: FTA 5: 170 (1899); FS: 343 (1929).

Imatong Mountains group, Sudan side: Imatong foothills, Lofulong [4° 07' N, 32° 54' E], 900 m., rocky streambeds, no date, *Jackson* 518 (BM).

Didinga Mountains: rocks north-east of Chukudum (4° 15' N, 33° 27' E), 1100 m., 21.12.1983, *Kielland-Lund* 422B (C, NLH).

General habitat range: in lowland and medium-altitude woodland, bushland and dry forest.

General distribution: Central African Republic to South Sudan, south through eastern Africa to Zimbabwe; also in Madagascar.

Stenandrium Nees

Syn.: *Stenandriopsis* S. Moore

Stenandrium guineense (Nees) Vollesen

VOLLESEN 1992: 182.

Syn.: *Crossandra guineensis* Nees: FTA 5: 117 (1899); FWTA 2: 409 (1963). *Stenandriopsis guineensis* (Nees) Benoist: FG 13: 102 (1966).

Imatong Mountains group, Sudan side: Lotti, no alt., forest, 5.8.1939, *Myers* 11,810 (K); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excel-*

sa, on forest floor. 26.11.1980, *Friis & Vollesen* 466 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude rain forest.

General distribution: Sierra Leone to South Sudan and Uganda, south to Gabon and Congo [previously Zaire].

Thunbergia Retz.

Thunbergia alata Sims

FTA 5: 16 (1899); FS: 337 (1929); FPNA 2: 266 (1947); FPS 3: 189 (1956); FWTA 2: 400 (1963); UKWF: 266 (1994).

Imatong Mountains group, Sudan side: without further locality, 1980 m., 2.1936, *Johnston* 1465 (K); Palotaka, 1200 m., open woodland, 9.1.1972, *Shigeta* 72 (EA); Palotaka, 1200 m., forest, 2.1979, *Shigeta* 206 (EA); Talanga Forest, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 25.11.1980, *Friis & Vollesen* 450 (C, K, KHF); Kinyeti Valley, 14 km. south of Hiliu on Katire road, 700 m., in teak-plantation, 7.12.1983, *Kielland-Lund* 253 (C, NLH); Katire, 1000 m., at road in woodland, 24.10.1949, *Jackson* 842 (BM); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, *Friis & Vollesen* 50 (BR, C, K, KHF); Gilo, 1900 m., 27.8.1957, *Jackson* 3816 (K).

General habitat range: in a wide range of habitats and at widely ranging altitudes.

General distribution: Sierra Leone to Ethiopia, south to South Africa; frequently cultivated and naturalised in all the warmer parts of the World.

Thunbergia battiscombei Turrill

FPS 3: 191 (1956); UKWF: 266 (1994).

Imatong Mountains group, Sudan side: without further locality, 1980 m., 2.1936, *Johnston* 1406 (K); Kinyeti Valley, 16 km. north of Katire, 900

m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, 22.2.1982, *Friis & Vollesen* 984 (BR, C, K, KHF); Talanga to Katire, 910 m., scrub, 16.12.1935, *Thomas* 1599 (BM, K); Talanga Forest, 950 m., edge of lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa*, and *Milicia excelsa*, 25.11.1980, *Friis & Vollesen* 447 (C, K, KHF); Talanga, 1000 m., in *Combretum* woodland, appearing after burning, 28.2.1950, *Jackson* 1169 (BM).

Imatong Mountains group, Uganda side: Mt. Lomwaga, 2290 m., *Protea* grassland, 4.4.1945, *Greenway & Hummel* 7269 (EA, K); Lututuru, Agoro to Agu, 1530 m., grassland, 10.1947, *Dale* U480 (EA, K, MHU); 2 km. north-east of Lututuru, near end of road, 1800 m., woodland and grassland, 17.2.1969, *Lye* 2083 (K, MHU, NLH).

Lafit, Dongotona and Nangeya Mountains: above Sadit, 1400 m., 24.1.1950, *Jackson* 1120 (BM, KHF); Nangeya Mountains, Mt. Lonyili, 1830 m., *Hyparrhenia* grassland, 2.1960, *Wilson* 816 (EA).

General habitat range: in lowland, medium-altitude and montane woodland, bushland and grassland, and at forest margins.

General distribution: South Sudan, North East Congo [previously Zaire], Uganda and West Kenya.

Thunbergia fasciculata Lindl.

FTA 5: 15 (1899); FPNA 2: 265 (1947); FPS 3: 189 (1956) {Imatong Mountains, at Laneka River}; JACKSON 1956: 354 {Lotti, Laboni}; FWTA 2: 400 (1963); UKWF: 266 (1994).

Imatong Mountains group, Sudan side: Laboni, no alt., gallery forest at River Laneka, 15.10.1938, *Myers* 9756 (K, WM).

General habitat range: in lowland and medium-altitude forest and woodland.

General distribution: Nigeria and Cameroon to South West Ethiopia, south to Uganda.

Thunbergia vogeliana Benth.

FTA 5: 10 (1899); FPNA 2: 265 (1947); FWTA 2: 402 (1963).

Syn.: [*Thunbergia affinis* auct., non. S. Moore: FPS 3: 188 (1956); JACKSON 1956: 354 {Lotti}].

Imatong Mountains group, Sudan side: Lotti, no alt., forest, no date, *Jackson* in *Bally* 10,829 (K); Mt. Lotti, no alt., 8.10.1938, *Myers* 9603 (K, WM); specimen made from a plant cultivated in T. Jackson's garden at Mt. Elgon, originally collected at Lotti forest, no alt, 12.8.1958, *Symes* 401 (EA, K); Lotti forest near Palotaka, 1200 m., forest, 31.1.1979, *Shigeta* 131 (EA); Talanga to Upper Talanga, 1000 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scrambling along trail, 7.12.1980, *Friis & Vollesen* 761 (C, K); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 63 (C, K, KHF); Gilo, 1900 m., edge of forest, no date, *Jackson* 414 (BM, FHO, KHF).

General habitat range: in lowland and medium-altitude rain forest.

General distribution: Ghana to South Sudan, south to West Tanzania.

Whitfieldia Hook.

Whitfieldia elongata (P. Beauv.) De Wild. & T. Durand

FTA 5: 66 (1899); FPNA 2: 286 (1947); FPS 3: 191 (1956); JACKSON 1956: 354 {Talanga, Lotti, Laboni}; FWTA 2: 398 (1963); FG 13: 34 (1966); UKWF: 270 (1994); KTSL: 610 (1994).

Syn.: *Whitfieldia longifolia* T. Anderson: FTA 5: 66 (1899); CHIPP 1929: 193.

Imatong Mountains group, Sudan side: Laboni, no alt., in closed forest in association with *Coffea canephora*, 8.2.1929, *Chipp* 42 (K); Lotti forest near Palotaka, 1200 m., forest, 1.1979, *Shigeta* 137 (EA); Lotti, 1000 m., understory in closed forest, 17.1.1949, *Jackson* 585 (BM); Ta-

langa, 970 m., shrub in forest understory, 16.12.1935, *Thomas* 1586 (BM, K); Talanga, 1000 m., undergrowth in closed forest, 28.12.1949, *Jackson* 1015 (BM); Talanga, 1000 m., in forest understory, 2.1951, *Jackson* 1754 (KHF); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scandent in forest, 1.12.1980, *Friis & Vollesen* 598 (C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Nigeria to Ethiopia and Kenya, south to Tanzania.

Fam. 143. **Selaginaceae** Choisy**Hebenstretia** L.**Hebenstretia angolensis** Rolfe

FZ 8,2: 163 (1990).

Syn.: *Hebenstretia bequaertii* De Wild.: FPNA 2: 229 (1947). [*Hebenstretia dentata* auct., non L.: FTA 5: 265 (1900); CHIPP 1929: 192; FPS 3: 192 (1956) {Imatong Mountains}].

Imatong Mountains group, Sudan side: without further locality, 2130 m., 11.2.1936, *Johnston* 1500 (K); along path from Bushbuck Hill to Mt. Konoro, 2300 m., rocky outcrop in *Loudetia* grassland, 5.3.1982, *Friis & Vollesen* 1094 (BR, C, K, KHF); Lomuleng, 2440 m., in scrub, 29.12.1935, *Thomas* 1786 (BM, K); Mt. Kinyeti, 3050 m., in mountain meadow, 11.2.1929, *Chipp* 81 (K); summit of Mt. Kinyeti, 3100 m., ericaceous bushland, 15.11.1949, *Jackson* 972 (BM); summit of Mt. Kinyeti, 3180 m., rocky ground at summit, 27.7.1939, *Myers* 11,652 (K).

General habitat range: in medium-altitude and montane evergreen bushland and grassland.

General distribution: Ethiopia and Somalia south to Angola and South Africa (Transvaal, Natal, East Cape Prov.).

Note: The well known name for this taxon,

Hebenstreitia dentata L., is now considered to apply to a species which is endemic to Namibia.

Order 68. Lamiales Bromhead

Fam. 144. Verbenaceae Jaume St-Hill.

Clerodendrum L.

Clerodendrum capitatum (Willd.) Schumach. & Thonn.

FTA 5: 305 (1900); FS: 353 (1929); FPNA 2: 143 (1947); FPS 3: 195 (1956); FTEA, Verbenac.: 103 (1992); UKWF: 283 (1994); KTSL: 613 (1994).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., forest, 1979, *Shigeta* 125 (EA, identified and listed by M.G. Gilbert, not traced); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, climber in forest, 6.12.1980, *Friis & Vollesen* 718 (C, K, KHF); Kinyeti River, 8 km. downstream from Katire, 900 m., gallery forest, 23.8.1959, *Jackson* 3804 (K); Mt. Itibol, 1950 m., 15.6.1939, *Andrews* 2006 (K).

General habitat range: in lowland and medium-altitude forest, evergreen bushland and moist woodland.

General distribution: Senegal to Ethiopia and Kenya, south to Angola, Zambia and Tanzania.

Clerodendrum johnstonii Oliv.

FTA 5: 300 (1900); FPNA 2: 146 (1947); FTEA, Verbenac.: 118 (1992); UKWF: 283 (1994); KTSL: 614 (1994).

subsp. **johnstonii**

FTEA, Verbenac.: 614 (1994).

Imatong Mountains group, Sudan side: Gilo, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 9.11.1980, *Friis & Vollesen* 66

(C, K, KHF); at the path from Gilo to Mt. Garia, 1700 m., in evergreen scrub with *Vernonia spp.*, *Guizotia arborescens*, *Abutilon longicuspe*, *Solanecio mannii*, etc., 12.3.1982, *Friis & Vollesen* 1174 (C, K); Gilo, 1900 m., in secondary growth, 10.1948, *Jackson* 415 (FHO, KHF); Lomuleng, 2010 m., *Podocarpus latifolius* forest, secondary growth, 29.7.1939, *Myers* 11,714 (K, WM); Lowiliwili, 2300 m., edge of forest, 16.11.1949, *Jackson* 983 (FHO, KHF).

General habitat range: in medium-altitude and montane forest and evergreen bushland.

General distribution: East Congo [previously Zaire] to South Sudan, Uganda and Kenya, south to Zambia, Malawi and Tanzania. Species as a whole within the same distribution area.

Clerodendrum myricoides (Hochst.) Vatke

FTA 5: 310 (1900); FS: 353 (1929); FPNA 2: 147 (1947); FPS 3: 195 (1956); FTEA, Verbenac.: 130 (1992); UKWF: 283 (1994); KTSL: 615 (1994); HYF: 244 (1997).

subsp. **myricoides**

FTEA, Verbenac.: 131 (1992).

var. **myricoides**

FTEA, Verbenac.: 132 (1992).

Imatong Mountains group, Sudan side: without further locality, 1530-1830 m., 12.6.1939, *Andrews* 1856 (K, WM).

var. **discolor** (Klotzsch) Bak.

FTEA, Verbenac.: 132 (1992).

Syn.: *Clerodendrum discolor* (Klotzsch) Vatke: FPNA 2: 147 (1947).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, east of compound and stream, 700 m., 5.12.1983, *Kielland-Lund* 211B (C, NLH); Iribo, 1600 m., *Acacia abyssinica*-*Maesa lanceolata* forest, 25.10.1949, *Jackson* 849 (BM); near Katire, no alt., in woodland, 10.6.1961, *Jackson* 4215 (K); near pool in Kinyeti River near Gilo, 1750 m., 26.12.1983, *Kielland-Lund* 486 (C, NLH); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, *Friis & Vollesen* 30 (C, K); Gilo, 1890 m., wayside, 17.6.1953,

Prowse 343 (KHU); Itibol, in scrub, no alt., 1935, *Thomas* 1622 (?BM, K).

Imatong Mountains group, Uganda side: near Lututuru, 1220 m., grassland, 6.1950, *Dale* U798 (K, MHU).

Didinga Mountains: Iwowa, 1620 m., 23.4.1939, *Myers* 11,055 (K).

General habitat range: in medium-altitude and montane forest, evergreen bushland and grassland, in the latter variety often associated with heavy clay soils or rocky outcrops.

General distribution: Congo [previously Zaire] to Ethiopia and North Somalia, south to Tanzania. Species as a whole very polymorphic and with numerous infraspecific taxa, south to Angola, Zambia, Malawi and Mozambique; also in tropical Arabia.

Clerodendrum rotundifolium Oliv.

FTA 5: 308 (1900); FPNA 2: 143 (1947); FTEA, Verbenac.: 99 (1992); UKWF: 283 (1994); KTSL: 615 (1994).

Imatong Mountains group, Sudan side: without further locality, no alt., 1947, *Maxwell Forbes* 129 (K); specimen made from a plant cultivated in T. Jackson's garden at Mt. Elgon, originally collected at Lotti forest, at forest edge, no date, *Symes* 631 (EA, K).

Imatong Mountains group, Uganda side: near Agoro, no alt., 3.1935, *Eggeling* 1719 (K, MHU).

Didinga Mountains: above Nathilani, 1200 m., scrub along stream, 9.4.1949, *Jackson* 670 (KHF).

General habitat range: in lowland and medium-altitude evergreen bushland, deciduous bushland and woodland.

General distribution: Congo [previously Zaire] to South Sudan, Uganda and Kenya, south to Congo [previously Zaire], Tanzania, Malawi and Mozambique.

Clerodendrum schweinfurthii Guerke

FTA 5: 296 (1900); FS: 353 (1929); FPNA 2: 144

(1947); FPS 3: 194 (1956); FTEA, Verbenac.: 112 (1992).

Imatong Mountains group, Sudan side: Lotti, no alt., gallery forest, 1.3.1939, *Myers* 10,580 (K); Lotti forest, 1220 m., no date, *T.E. Jackson* s.n. (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, climber in forest, 27.11.1980, *Friis & Vollesen* 488 (C).

General habitat range: in lowland and medium-altitude forest and evergreen bushland, often in swampy places.

General distribution: Sierra Leone to South Sudan, south to Angola and Tanzania.

Clerodendrum umbellatum Poir.

FWTA 2: 442 (1963); WICKENS 1976: 150; FTEA, Verbenac.: 97 (1992); UKWF: 283 (1994).

Syn.: *Clerodendrum cordifolium* (Hochst.) A. Rich.: FTA 5: 304 (1900); CHIPP 1929: 193; FS: 353 (1929); FPS 3: 195 (1956).

Imatong Mountains group, Sudan side: Loa, Moli-tokoro village north of Kerepi (3° 55' N, 31° 55' E), no alt., 5.6.1984, *Kielland-Lund* 852 (C, NLH); slopes of Imatong Mountains, 1530 m., eroded slope, no date, *T.E. Jackson* s.n. (BM); Odouro, in fire-swept woodland, 8.2.1929, *Chipp* 48 (K) & 49 (K); Imatong, without further locality, no alt., 2.1936, *Johnston* 1402 (K); Lotti, near rest house, no alt., 8.6.1939, *Andrews* 1691 (K); Palotaka, 1200 m., open woodland, 1979, *Shigeta* 31 (EA, identified and listed by M.G. Gilbert, not traced); specimen made from a plant cultivated in T. Jackson's garden at Mt. Elgon, originally collected at Lotti forest, at forest edge, no date, *Symes* 654 (EA); Kinyeti valley, 16 km. north of Katire, 900 m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, 22.2.1982, *Friis & Vollesen* 997 (C, K, KHF); Kinyeti Valley, above Katire (4° 02' N, 32° 50' E), no alt., 15.1.1984, *Kielland-Lund* 634b (C, NLH).

Imatong Mountains group, Uganda side: 3 km.

south west of Lututuru, near Patika, 1600 m., scrub along road, 17.2.1969, *Lye* 2040 (EA, K, MHU, NLH).

Didinga Mountains: Chukudum Regional District Centre (4° 14' N, 33° 29' E), 1100 m., 16.12.1983, *Kielland-Lund* 343 (C, NLH); Mt. Lotuke, Char, 1710 m., rather wooded parts of forest-grassland mosaic, 3.1939, *MacDonald* 98 (BM).

General habitat range: in lowland and medium-altitude wooded grassland and bushland.

General distribution: Senegal to Ethiopia, south to Congo [previously Zaire] and Tanzania.

Duranta L.

Duranta erecta L.

FTEA, Verbenac.: 48 (1992); KTSL: 615 (1994).

Syn.: *Durantia repens* L.: FPS 3: 142 (1956); KTSL: 616 (1994).

Didinga Mountains: between Naligede and Iwowa, 1710 m., in edge of gallery forest, 22.4.1939, *Myers* 11,016 (K, WM).

General habitat range: in lowland and medium-altitude forest and in evergreen bushland, especially along rivers.

General distribution: Indigenous in Central America, but now widely cultivated and naturalised in all parts of the tropics.

Lantana L.

Lantana trifolia L.

FTA 5: 277 (1900); FPS 3: 196 (1956); FWTA 2: 435 (1963); FTEA, Verbenac.: 46 (1992); KTSL: 617 (1994).

Syn.: *Lantana mearnsii* Mold.: FPNA 2: 137 (1947); JACKSON 1956: 362, in lower montane forest zone & 363, in *Acacia abyssinica* woodland.

Imatong Mountains group, Sudan side: without

further locality, 1980 m., 2.1936, *Johnston* 1469 (K); without further locality, no alt., 1947, *Maxwell Forbes* 128 (K); Gilo, 1900 m., secondary forest, 3.6.1953, *Jackson* 3001 (K); Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 20.11.1980, *Friis & Vollesen* 364 (BR, C, K, KHF); Gilo, 1900 m., secondary forest, 27.8.1957, *Jackson* 3812 (K); Itibol, 1950 m., 15.6.1939, *Andrews* 2010 (K).

Imatong Mountains group, Uganda side: Agoro, no alt., south of forest trials below bamboo forest, 9.6.1973, *Katende* 1852 (MHU). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Didinga Mountains: near Loming north of Nagichot, 2000 m., 18.12.1983, *Kielland-Lund* 380 (NLH); between Naligede and Iwowa, 1710 m., 22.4.1939, *Myers* 11,011 (K).

General habitat range: in lowland and medium-altitude grassland, bushland and woodland.

General distribution: Probably indigenous in Central America, but now widely naturalised in the tropics of the Old World.

Lantana viburnoides (Forssk.) Vahl

FTA 5: 276 (1900); FS: 349 (1929); FPS 3: 196 (1956); FWTA 2: 435 (1963); FTEA, Verbenac.: 40 (1992); KTSL: 617 (1994); HYF: 242 (1997). subsp. **viburnoides**

FTEA, Verbenac.: 41 (1992); KTSL: 617 (1994).

Imatong Mountains group, Sudan side: without further locality, no alt., 13.4.1933, *Smith* 12 (KHF); 5 km. south east of Torit, 630 m., thorn bushland, 12.6.1961, *Andrews* 4237 (K).

Didinga Mountains: between Duguru village and Nagichot (4° 16' N, 33° 35' E), 2000 m., 17.12.1983, *Kielland-Lund* 349 (C, NLH).

General habitat range: in lowland and medium-altitude deciduous and evergreen bushland.

General distribution: Nigeria to eastern Africa, where it occurs from as far north as South Egypt, south to Angola, Zambia, Zimbabwe,

Malawi and Mozambique; also in tropical Arabia. Species as a whole in the same general distribution area.

Lippia L.

Lippia abyssinica (Otto & Dietr.) Cufod.

FTEA, Verbenac.: 29 (1992).

Syn.: *Lippia grandifolia* Hochst. ex Walp.: FPNA 2: 138 (1947); FPS 3: 197 (1956); KTS: 618 (1994). *Lippia adoensis* Hochst. ex Schauer: FTA 5: 280 (1900).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 9.1.1979, *Shigeta* 73 (EA); Kinyeti Valley, Hiliu, east of compound, 700 m., edge of temporary water course, 2.12.1983, *Kielland-Lund* 164 (C, NLH); Hiliu, east of compound and stream, 700 m., 5.12.1983, *Kielland-Lund* 212 (C, NLH); near Katire, 1100 m., old cultivations, 8.2.1950, *Jackson* 1135 (BM); Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on land with rocky outcrops, 29.11.1980, *Friis & Vollesen* 533 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: Lututuru, no alt., 5.6.1963, *Kertland* s.n. (MHU).

Didinga Mountains: Chukudum Regional District Centre (4° 14' N, 33° 29' E), 1100 m., 16.12.1983, *Kielland-Lund* 341 (C, NLH).

General habitat range: in medium-altitude and montane woodland and bushland.

General distribution: East Congo [previously Zaire] to Ethiopia and Kenya, south to Tanzania.

Lippia woodii Moldenke

FTEA, Verbenac.: 33 (1992); UKWF: 282 (1994).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2140 m., grassland, 4.1960, *Wilson* 913 (EA).

General habitat range: in medium-altitude and montane wooded grassland and grassland.

General distribution: South Sudan, Uganda and Kenya through eastern Africa, Rwanda and Burundi to Zimbabwe.

Premna L.

Premna angolensis Guerke

FTA 5: 289 (1900); ITU: 442 (1952); FWTA 2: 438 (1963); JACKSON 1956: 353 {Talanga, Lotti}; FTEA, Verbenac.: 70 (1992); KTS: 620 (1994).

Imatong Mountains group, Sudan side: Torit District, no alt., 9.6.1939, *Andrews* 1723 (K); Lotti, near rest house, no alt., 9.6.1939, *Andrews* 1742 (K); Lotti, 1000 m., near forest edge, 24.6.1953, *Jackson* 3031 (FHO, KHF).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 266 documents this record).

General habitat range: in lowland and medium-altitude forest, especially along edges, and in bushland and woodland.

General distribution: Senegal to South Sudan, Uganda and Kenya, south to Angola, Congo [previously Zaire] and Tanzania.

Premna schimperii Engl.

FPS 3: 198 (1956) {Imatong Mountains}; FTEA, Verbenac.: 76 (1992).

Imatong Mountains group, Sudan side: Loyaru, 1920 m., 28.12.1935, *Thomas* 1772 (K, WM); Lomuleng, 2010 m., *Podocarpus latifolius* forest, 29.7.1939, *Myers* 11,716 (K); hill between Mt. Konoro and Mt. Garia, 1800 m., *Loudetia arundinacea* grassland with scattered trees on shallow soil, 12.3.1984, *Friis & Vollesen* 1177 (C, K, KHF).

General habitat range: in medium-altitude and montane evergreen bushland and grassland.

General distribution: South Sudan and Uganda

to Ethiopia and Somalia, south to North Tanzania.

Note: The specimen *Friis & Vollesen* 1177 represents a very hairy form.

Vitex L.

Vitex doniana Sw.

FTA 5: 323 (1900); ITU: 443 (1952); FPS 3: 200 (1956); JACKSON 1956: 349, moist savannah; WICKENS 1976: 151; SOMMERLATTE 1990: 88, in lowland woodland, often persisting in cultivated land as it is valued for its fruits; FWTA 2: 446 (1963); FTEA, Verbenac.: 62 (1992); KTSL: 622 (1994).

Syn.: *Vitex cuneata* Schum. & Thonn.: FTA 5: 328 (1900).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 1979 *Shigeta* 104 (EA, identified and listed by M.G. Gilbert, not traced); West of Torit, 700 m., woodland near base of rock, 28.4.1949, *Jackson* 746 (FHO); Palwar to Talanga, near Palwar, 1000 m., open *Combretum* woodland, 29.3.1984, *Sommerlatte* 42 (EA).

Imatong Mountains group, Uganda side: Lututuru, 1530 m., 7.6.1963, *Kertland* s.n. (MHU). Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; no specimen documents this record).

Didinga Mountains: Iwowa, 1620 m., large tree in deep khor, 22.4.1939, *Myers* 11,036 (K).

General habitat range: in lowland and medium-altitude woodland.

General distribution: Senegal to South Sudan, Uganda and Kenya, south to Angola, Zambia, Malawi and Mozambique.

Vitex ferruginea Schumach. & Thonn.

FTA 5: 324 (1900); FWTA 2: 447 (1963); FTEA, Verbenac.: 66 (1992); KTSL: 622 (1994).

subsp. **ferruginea**

FTEA, Verbenac.: 66 (1992).

Syn.: *Vitex amboniensis* Guerke: ITU: 442 (1952); FPS 3: 202 (1956) {Lotti}.

Imatong Mountains group, Sudan side: Lotti, near rest house, no alt., 9.6.1939, *Andrews* 1751 (K); Lotti, no alt., forest, 5.8.1939, *Myers* 11,814 (K); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 17.3.1982, *Friis & Vollesen* 1226 (C, K); Talanga, 900 m., moist valley in closed forest, 21.3.1950, *Jackson* 1257 (K).

General habitat range: in lowland and medium-altitude forest, often riverine.

General distribution: Guinea Bissau to South Sudan, Uganda and Kenya, south to Congo [previously Zaire] and Tanzania. Species as a whole also in lowland and medium-altitude bushland, dry lowland forest and woodland south to South Africa (Transvaal).

Vitex fischeri Guerke

FTA 5: 330 (1900); ITU: 445 (1952); FPS 3: 200 (1956); FTEA, Verbenac.: 59 (1992); KTSL: 622 (1994).

Syn.: ? *Vitex* sp. aff. *V. amboniensis* Guerke: JACKSON 1956: 353 {Talanga, Lotti}.

Imatong Mountains group, Sudan side: Katire, 1000 m., edge of plot of woodland being colonised by forest species, 16.8.1958, *Jackson* 3884 (K, KHF).

Imatong Mountains group, Uganda side: 6 km. east of Lututuru, 1500 m., beside rock in wooded grassland, 19.7.1974, *Katende* 2193 (EA, MHU).

Lafit, Dongotona and Nangeya Mountains: 1 km. south of Lafon (5° 02' N, 32° 27-28' E), no alt., 28.12.1983, *Kielland-Lund* 507 (C, NLH).

General habitat range: in lowland and medium-altitude woodland, often associated with rocky outcrops.

General distribution: Congo [previously Zaire] to South Sudan, Uganda and Kenya, south to Angola, Zambia and Tanzania.

Vitex madiensis Oliv.

FTA 5: 322 (1900); ITU: 445 (1952); FPS 3: 200 (1956); FWTA 2: 447 (1963); FTEA, Verbenac.: 60 (1992).

subsp. **madiensis**

FTEA, Verbenac.: 60 (1992).

Syn.: *Vitex simplicifolia* Oliv.: FTA 5: 320 (1900); ITU: 442 (1952); FPS 3: 200 (1956); FWTA 2: 447 (1963). *Vitex camporum* Büttn.: FTA 5: 323 (1900). *Vitex vogelii* Bak.: FTA 5: 319 (1900). *Vitex schweinfurthii* Bak.: FTA 5: 322 (1900). *Vitex barbata* Bak.: FTA 5: 323 (1900). *Vitex diversifolia* Bak.: FTA 5: 323 (1900).

Imatong Mountains group, Uganda side: No specimen seen. Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

General habitat range: in lowland and medium-altitude woodland.

General distribution: Gambia to Sudan, south to Angola, Zambia and Mozambique. Other subspecies within the same general area.

Fam. 145. **Lamiaceae** Lindl.
(*Labiateae* Juss., nom. altern.)

Acrocephalus Benth.

See **Haumannistrum** Duvign. & Plancke

Achyropermum Blume**Achyropermum axillare** E.A. Bruce

BRUCE 1936: 56.

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 27.11.1980, Friis & Vollesen 501 (C), & 5.12.1980, Friis & Vollesen 709 (BR, C, FT, K, KHF).

General habitat range: in lowland forest.

General distribution: South Sudan and Uganda. First record from the Sudan.

Achyropermum parviflorum S. Moore

BRUCE 1936: 58; UKWF: 287 (1994); KTSL: 625 (1994).

Imatong Mountains group, Sudan side: Talanga, 1000 m., *Chrysophyllum-Khaya* forest, 8.11.1948, Jackson 494 (BM); Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 15.11.1980, Friis & Vollesen 247 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: South Sudan, South West Ethiopia, East Congo [previously Zaire], Uganda and West Kenya. First record from the Sudan.

Achyropermum schimperi (Briq.) Perkins

BRUCE 1936: 59; FPNA 2: 160 (1947); UKWF: 287 (1994); KTSL: 626 (1994).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., forest, 31.1.1979, Shigeta 153 (EA); Gilo, 1700-1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, at forest edges, Friis & Vollesen (sight record).

General habitat range: in medium-altitude and montane forest.

General distribution: South Sudan, Ethiopia, East Congo [previously Zaire], Rwanda, Burundi, Uganda and Kenya. First record from the Sudan.

Aeollanthus Mart.**Aeollanthus densiflorus** Ryding

RYDING 1986: 137.

Syn.: [*Aeollanthus stormsii* auct., non Guerke: UKWF: 630 (1974)].

Imatong Mountains group, Sudan side: without further locality, 1530-1830 m., 12.6.1939, Andrews 1844 (K); Iribo, 1550 m., trailing over rocks, 25.10.1949, Jackson 858 (BM); Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamn-*

jamensis, *Aeollanthus* spp., *Aloe* sp. and many annuals, 24.11.1980, *Friis & Vollesen* 431 (C, K, KHF); Gilo, 1990 m., crevices in rocks in burnt montane grassland, 28.6.1947, *MacLeay* 107 (BM); Lomuleng, 2310 m., rocky outcrop in mountain meadow, 25.7.1939, *Myers* 11,573 (?K, not traced); Kipia, 2740 m., 28.7.1939, *Myers* 11,706 (K, WM).

Imatong Mountains group, Uganda side: Lututuru, no alt., 27.5.1944, *Maxwell Forbes* 111 (PRE, according to *Ryding* l.c.).

General habitat range: on rocks or in shallow soil in lowland, medium-altitude and montane woodlands.

General distribution: South Sudan to South Ethiopia, south to Kenya and Tanzania.

***Aeollanthus myrianthus* Bak.**

FTA 5: 396 (1900); *RYDING* 1986: 81.

Imatong Mountains group, Sudan side: Opari, no alt., no date, *Myers* 9503 (K); Mt. Iro, Opari-Torit road, no alt., no date, *Myers* 9515 (K); Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, *Friis & Vollesen* 575 (C, K, KHF).

General habitat range: on rocks and in shallow soil in lowland, medium-altitude and montane wooded grassland and woodland.

General distribution: East Congo [previously Zaire] to South Ethiopia and Kenya, south to Zambia, Malawi and Mozambique.

***Aeollanthus repens* Oliv.**

FTA 5: 395 (1900); *FPNA* 2: 167 (1947); *FPS* 3: 205 (1956) {Imatong Mountains}; *FWTA* 2: 457 (1963); *RYDING* 1986: 75; *UKWF*: 289 (1994).

Imatong Mountains group, Sudan side: Katire to Itibol, 1940 m., rocky outcrop, 17.12.1935, *Thomas* 1640 (K); Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 23.11.1980, *Friis &*

Vollesen 413 (C, K); Loyaru, 2320 m., 29.12.1935, *Thomas* 1780 (K); Lomuleng, 2310 m., 25.7.1939, *Myers* 11,573 (K); Dumuso, 2450 m., 4.5.1950, *Jackson* 1520 (K).

General habitat range: on rocks in medium-altitude and montane wooded grassland.

General distribution: East Congo [previously Zaire], Rwanda and Burundi to South Sudan, Uganda and Kenya, south to Tanzania.

***Aeollanthus suaveolens* Spreng.**

RYDING 1986: 77.

Syn.: *Aeollanthus heliotropioides* Oliv.: FTA 5: 393 (1900); FS: 359 (1929); *FPS* 3: 205 (1956).

Imatong Mountains group, Sudan side: Mt. Iro, Opari-Torit road, no alt., 5.10.1938, *Myers* 9514 (K, WM); Talanga, 910 m., 16.12.1935, *Thomas* 1596 (K); Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, *Friis & Vollesen* 574 (BR, C, EA, K, KHF).

General habitat range: on rocks or in shallow soil over lateritic clay in lowland, medium-altitude and montane woodlands.

General distribution: Central African Republic and Nigeria to South Sudan, Uganda and Tanzania, south to Angola and South Africa (Transvaal).

***Basilicum* Moench.**

***Basilicum polystachion* (L.) Moench**

FPS 3: 205 (1956); *FWTA* 2: 454 (1963); *WICKENS* 1976: 151.

Syn.: *Moschosma polystachyon* (L.) Benth.: FTA 5: 353 (1900); FS: 356 (1929).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, south east of compound, 700 m., in cultivation, 2.12.1983, *Kielland-Lund* 160 (C, NLH).

Lafit, Dongotona and Nangeya Mountains: 1 km. south of Lafon, (5° 02' N, 32° 27-28' E), no alt.,

28 December 1983, *Kielland-Lund* 501 (C, NLH).

General habitat range: in lowland and medium-altitude grassland and bushland, often around water holes.

General distribution: Ivory Coast to Ethiopia and Somalia, south to Angola and South Africa (Transvaal). Also widespread in tropical Asia.

Becium Lindl.

Becium obovatum (E. Mey. ex Benth.) N.E. Br. FS: 357 (1929); FPS 3: 206 (1956); FWTA 2: 453 (1963); WICKENS 1976: 151; PATON 1995: 225; UKWF: 296 (1994); HYF: 247 (1997).

subsp. **obovatum**

PATON 1995: 225.

Syn.: *Ocimum affine* Hochst.: FTA 5: 342 (1900).

Becium affine (Hochst.) Chiov.: FPS 3: 206 (1956) [Imatong Mountains, Itibol]. [*Ocimum knyanum* auct., non Vatke: FTA 5: 346 (1900)].

Imatong Mountains group, Sudan side: Kinyeti Valley, plain between Torit and Ngarama, Iyedo (4° 22' N, 32° 37' E), no alt., 29.5.1984, *Kielland-Lund* 778 (C, NLH); 10 km. north of Katire, 850 m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, with many rocky outcrops, 3.3.1982, *Friis & Vollesen* 1092 (BR, C, K, KHF); Talanga forest, 1000 m., in woodland, appearing after burning, 9.3.1950, *Jackson* 1210 (BM); above Gilo Pool (4° 02' N, 32° 50' E), no alt., 15.1.1984, *Kielland-Lund* 652 (C, NLH); Itibol, in rock clefts, 1980 m., 18.12.1935, *Thomas* 1652 (BM, K); lower southern slope of Mt. Konoro, 2300 m., *Loude-tia arundinacea* grassland on shallow soil, recently burnt, 18.2.1982, *Friis & Vollesen* 940 (C, K, KHF).

Imatong Mountains group, Uganda side: Mt. Lomwaga, 2620 m., common with *Dolichos* and *Crepis* in burnt *Hyparrhenia* grassland on grey sandy loam, 5.4.1945, *Greenway & Hummel* 7275

(K); 2 km. north-east of Lututuru, near end of road, 1800 m., grassland, 17.2.1969, *Lye* 2065 (EA, K, MHU, NLH).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1850 m., grassland on upper mountain slopes, 17.5.1972, *Synnott* 994 (EA, MHU).

Didinga Mountains: Nagichot, 1000 m., in annually burnt grassland, 7.4.1948, *Jackson* 655 (BM); Mt. Lotuke, Char, 1830 m., wooded grassland, 19.4.1939, *Myers* 10,922 (K); slope of Mt. Lotuke, 1900 m., in *Protea* grassland, 29.3.1950, *Jackson* 1308 (BM).

General habitat range: in lowland, medium-altitude and montane woodland, grassland and bushland, often in areas prone to burning.

General distribution: Guinée to Ethiopia, south to South Africa; also in Madagascar and tropical Arabia.

Englerastrum Briq.

Englerastrum schweinfurthii Briq.

FTA 5: 445 (1900); FS: 359 (1929); FPS 3: 210 (1956); FWTA 2: 465 (1963); UKWF: 290 (1994).

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on land with rocky outcrops, 29.11.1980, *Friis & Vollesen* 530 (C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and wooded grassland, usually in damp places.

General distribution: Senegal to Ethiopia, south to Namibia and Zimbabwe.

Geniosporum Wall. ex Benth.
See **Platostoma** P. Beauv.

Haumaniastrum Duvign. & Plancke
Syn.: *Acrocephalus* Benth.

Haumaniastrum villosum (Benth.) Paton
PATON 1997b: 370.

Syn.: *Acrocephalus cylindraceus* Oliv.: FPNA 2: (1947). *Haumaniastrum cylindraceum* (Oliv.) Cufod. *Haumaniastrum galeopsifolium* (Bak.) Duvign. & Plancke: FWTA 2: 455 (1963); WICKENS 1976: 151. *Acrocephalus galeopsifolius* Bak.: FTA 5: 356 (1900); FPS 3: 204 (1956) {Imatong Mountains, Katire}.

Imatong Mountains group, Sudan side: Iribo (4° 02' N, 32° 50' E), 1600 m., weed of cultivation in cleared *Acacia abyssinica* woodland, 25.10.1949, Jackson 861 (BM); Katire to Gilo, near road forking off towards Itibol, 1500 m., secondary transitional forest with much *Harungana madagascariensis*, forest edge, 17.11.1980, Friis & Vollesen 292 (BR, C, EA, K, KHF); Katire to Itibol, 1430 m., at path, 17.12.1935, Thomas 1610 (BM, K).

General habitat range: in medium-altitude grassland and woodland, and at forest margins and in clearings, often in disturbed places.

General distribution: Guinée to Ethiopia, south to Zimbabwe; also in Madagascar.

Hoslundia Vahl

Hoslundia opposita Vahl

FTA 5: 377 (1900); FS: 357 (1929); FPNA 2: 190 (1947); FPS 3: 210 (1956); FWTA 2: 456 (1963); WICKENS 1976: 151; UKWF: 294 (1994); KTSL: 627 (1994).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 8.1.1979, Shigeta 56 (EA); Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njam-njamensis*, *Aeollanthus* spp., *Aloe* sp. and many an-

nuals, on rocks along small brook, 2.12.1980, Friis & Vollesen 627 (C, K, KHF); Kinyeti Valley, Hiliu, near compound (4° 16' N, 32° 48' E), no alt., 28.5.1984, Kielland-Lund 776 (C, NLH).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; as "*Huslondia opposita*"; no specimen documents this record).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to Ethiopia and Kenya, south to South Africa; also in Madagascar.

Hyptis Jacq.

Hyptis spicigera L.

FTA 5: 448 (1900); FWTA 2: 466 (1963).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, east of compound and stream, 700 m., 9.12.1983, Kielland-Lund 283 (C, NLH); 3 km. south of Torit (4° 23' N, 32° 36' E), 650 m., 13.12.1983, Kielland-Lund 312 (C, NLH).

General habitat range: in lowland and medium-altitude disturbed ground, often as a weed along roadsides, occasionally in disturbed bushland.

General distribution: Gambia and Senegal to Ethiopia, south to South Africa; originally from tropical America, now widespread throughout the tropics as a weed.

Isodon (Schrad. ex Benth.) Spach

Isodon ramosissimum (Hook. f.) Codd
UKWF: 294 (1994).

Syn.: *Plectranthus ramosissimus* Hook. f.: FTA 5: 418 (1900); FPNA 2: 169 (1947); FPS 3: 223 (1956) {Imatong Mountains, Ibahin}. *Homa-locheilos ramosissimus* (Hook. f.) J.K. Morton: FWTA 2: 460 (1963).

Imatong Mountains group, Sudan side: Katire to

Gilo, near road to Itibol, 1500 m., secondary transitional forest with *Harungana madagascariensis*, forest edge, 12.11.1980, *Friis & Vollesen* 176 (BR, C, K, KHf); Itibol to Ibahin, 1980 m., secondary scrub, 19.12.1935, *Thomas* 1681 (BM, K).

General habitat range: in medium-altitude and montane grassland and evergreen bushland, and at forest edges.

General distribution: Sierra Leone to Ethiopia, south to Zimbabwe.

Isodon schimperi (Vatke) J.K. Morton
MORTON 1998: 265.

Syn.: *Plectranthus schimperi* Vatke: FTA 5: 418 (1900).

Imatong Mountains group, Sudan side: above Lomuleng, 2440 m., mountain meadow, 25.7.1939, *Myers* 11,579 (K); Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 9.11.1980, *Friis & Vollesen* 85 (C, K, KHf).

General habitat range: in medium-altitude and montane forest, usually along margins and in clearings, and in montane grassland.

General distribution: South Sudan, Uganda and Ethiopia.

Leonotis (Pers.) R. Br.

Leonotis nepetifolia (L.) R. Br.

FTA 5: 491 (1900); FS: 363 (1929); FPNA 2: 155 (1947); FPS 3: 212 (1956); FWTA 2: 470 (1963); WICKENS 1976: 151; UKWF: 285 (1994); KTSL: 628 (1994).

Imatong Mountains group, Sudan side: Kinyeti valley, hill 3 km. south of Hiliu, 700 m., stony hillside, 6.12.1983, *Kielland-Lund* 221 (C, NLH).

Imatong Mountains group, Uganda side: 2 km. east of Lututuru, near a rivulet, 1400 m., in open woodland, 17.2.1969, *Lye* 2104 (MHU).

Didinga Mountains: Longumu River north of

Chukudum (4° 21' N, 33° 21' E), 900 m., 20.12.1983, *Kielland-Lund* 407 (C, NLH).

General habitat range: in lowland and medium-altitude woodland and bushland, often in disturbed places.

General distribution: Senegal to Ethiopia and Kenya, south to South Africa; also in Madagascar and India.

Leonotis ocymifolia (N.L. Burm.) Iwarsson
UKWF: 285 (1994).

var. **raineriana** (Vis.) Iwarsson
UKWF: 285 (1994).

Syn.: *Leonotis velutina* Fenzl: FTA 5: 492 (1900); FS: 363 (1929); CHIPP 1929: 193. *Leonotis raineriana* Vis.: FPS 3: 213 (1956).

Imatong Mountains group, Sudan side: Ras Logo-forok, in ravines on the east slopes of the Imatong Mountains at 1520-2440 m., 12.2.1929, *Chipp* 107 (K, WM); Itibol, in scrub, 1935, *Thomas* 1620 (?BM, ?K, neither traced); on the Itibol-Kipia track, 2590 m., 20.9.1940, *Myers* 13,484 (?K, not traced); Kipia, 2680 m., in clearing, 20.9.1940, *Myers* 13,488 (K).

General habitat range: in medium-altitude and montane bushland and scrub.

General distribution: South Sudan and Ethiopia through East Congo [previously Zaire], Rwanda, Burundi and eastern Africa to Angola and South Africa.

Leucas R. Br.

Leucas calostachys Oliv.

FTA 5: 486 (1900); FPS 3: 215 (1956) {Imatong Mountains, Lomuleng}; SEBALD 1980: 107; UKWF: 286 (1994); KTSL: 629 (1994).

Syn.: *Leucas schweinfurthii* Guerke: FTA 5: 480 (1900); FS: 363 (1929). *Leucas calostachys* Oliv. var. *schweinfurthii* (Guerke) Sebald

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1400 (K); Palotaka, 1200 m., forest, 23.1.1979, *Shige-*

ta 88 (EA); Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on land with rocky outcrops, 29.11.1980, *Friis & Vollesen* 540 (C, K, KHF); Katire, 1100 m., edge of old cultivation, 8.2.1950, *Jackson* 1131 (BM); Lomuleng, 2440 m., grassland, 31.12.1935, *Thomas* 1894 (BM, K); Gilo to Mt. Konoro, 2000 m., *Loudetia arundinacea* grassland with scattered trees, 16.11.1980, *Friis & Vollesen* 266 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude and montane bushland and grassland.

General distribution: South Sudan and Ethiopia, through East Congo [previously Zaire], Rwanda, Burundi and eastern Africa to North Tanzania.

Note: There seems to be a completely smooth transition from specimens with interrupted inflorescence, called var. *schweinfurthii* by Sebald (l.c.) who included *Johnston* 1400 in this, to var. *calostachys* with continuous inflorescence. The two taxa are therefore not upheld here.

Leucas deflexa Hook. f.

FTA 5: 487 (1900); FPNA 2: 156 (1947); FWTA 2: 470 (1963); SEBALD 1980: 123; UKWF: 286 (1994).

var. **deflexa**

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 13.11.1980, *Friis & Vollesen* 212 (C, K, KHF).

General habitat range: in lowland and medium-altitude evergreen bushland and at forest edges.

General distribution: Ghana to Ethiopia, south to Angola and Malawi. First record from the Sudan.

Neohyptis J.K. Morton

Neohyptis paniculata (Bak.) J.K. Morton

MORTON 1962: 259, 273; FWTA 2: 466 (1963); UKWF: 288 (1994).

Syn.: *Geniosporum paniculatum* Bak.: FTA 5: 351 (1900).

Imatong Mountains group, Sudan side: Katire, 1000 m., woodland on hillside, 21.6.1953, *Jackson* 3013 (K); Talanga, 950 m., small grass swamp in *Albizia zygia*-*Combretum* woodland, 17.3.1982, *Friis & Vollesen* 1239 (C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and wooded grassland, especially in swamps.

General distribution: Guinea Bissau to Ethiopia, south to Angola and Botswana.

Note: According to O. Ryding (pers. com.) this taxon is identical with **Plectranthus guerkei** Briq. (based on *Geniosporum paniculatum* Baker, non *Plectranthus paniculatus* Baker), although a formal reduction has not yet been published. The reduction does not change the range of the species.

Ocimum L.

Ocimum americanum L.

FPNA 2: 198 (1947); FPS 3: 218 (1956); PATON 1992b: 424; UKWF: 296 (1994).

Syn.: *Ocimum canum* Sims: FTA 5: 337 (1900); FS: 355 (1929); FWTA 2: 452 (1963).

Imatong Mountains group, Sudan side: Loa, Moli-tokoro village north of Kerepi (3° 55' N, 31° 55' E), no alt., 5.6.1984, *Kielland-Lund* 856 (C, NLH); Palotaka, 1200 m., open woodland, 6.1.1979, *Shigeta* 30 (EA); Molongori [4° 10', 32° 52'E], 800 m., in rock crevices, 12.11.1948, *Jackson* 526 (BM); Katire, 1000 m., among grass and in waste places, 10.4.1950, *Jackson* 1393 (BM, KHF).

General habitat range: widespread as a weedy

species in lowland and medium-altitude woodland, deciduous bushland and waste places.

General distribution: Senegal to Ethiopia, south to South Africa; widespread throughout the tropics.

***Ocimum gratissimum* L.**

FPNA 2: 198 (1947); FWTA 2: 452 (1963); PATON 1992b: 411; UKWF: 296 (1994); HYF: 246 (1997).

var. **gratissimum**

PATON 1992b: 414.

Syn.: *Ocimum suave* Willd.: FTA 5: 338 (1900); FS: 355 (1929); FPNA 2: 198 (1947); FPS 3: 218 (1956); WICKENS 1976: 152. *Ocimum viride* Willd.: FTA 5: 337 (1900).

Imatong Mountains group, Sudan side: Laboni forest, no alt., secondary growth, 14.10.1938, Myers 9711 (WM); Iribo, 1600 m., weed in cultivation in cleared *Acacia abyssinica* woodland, 25.10.1949, Jackson 856 (BM); Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 19.11.1980, Friis & Vollesen 334 (C).

Didinga Mountains: near Longumu River north of Chukudum (4° 22' N, 33° 21' E), 900 m., disturbed ground, 20.12.1983, Kielland-Lund 419 (C, NLH).

General habitat range: in lowland and medium-altitude secondary evergreen bushland, often along trails and around villages.

General distribution: Senegal to Ethiopia, south to South Africa (Natal); also in tropical Arabia; probably originally introduced from Asia.

***Orthosiphon* Benth.**

***Orthosiphon rubicundus* (D. Don) Benth.**

FWTA 2: 454 (1963); UKWF: 297 (1994).

Syn.: *Orthosiphon salagensis* Bak.: FTA 5: 368 (1900).

Imatong Mountains group, Uganda side: without further locality, 2380 m., grassland, 4.1938,

Eggeling 3570 (K); Langia, 1830 m., grassland, 4.1943, *Purseglove* 1390 (EA, K); 2 km. north-east of Lututuru, near end of road, 1800 m., grassland, 17.2.1969, Lye 2055 (K, MHU, NLH).

Didinga Mountains: Mt. Lotuke, Char, 1710 m., forest-grassland mosaic, 3.1939, MacDonalld 87 (BM); Mt. Lotuke, Char, 1830 m., wooded grassland, 19.4.1939, Myers 10,921 (?K, not traced, WM).

General habitat range: in lowland, medium-altitude and montane woodland and wooded grassland.

General distribution: Mali to Ethiopia, south to South Africa; also in India (Himalaya).

Note: According to O. Ryding (pers. comm.) this taxon is conspecific with *Orthosiphon schimperi* Benth., described from Ethiopia, while *Orthosiphon rubicundus* may be restricted to tropical Asia.

***Platostoma* P. Beauv.**

***Platostoma africanum* P. Beauv.**

FTA 5: 349 (1900); FPS 3: 222 (1956); FWTA 2: 453 (1963); UKWF: 295 (1994); PATON 1997: 277.

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m, 3.1.1984, Kielland-Lund 566 (C, NLH).

General habitat range: in lowland and medium-altitude woodland and bushland, usually in shady places, also at forest margins and in clearings.

General distribution: Senegal to West Ethiopia, south to Congo [previously Zaire], Angola, Zambia and Malawi; also in India and the Lesser Sunda Islands.

***Platostoma rotundifolium* (Briq.) A.J. Paton**
PATON 1997a: 287.

Syn.: *Geniosporum rotundifolium* Briq.: FTA 5: 351 (1900); FWTA 2: 453 (1963); UKWF: 295

(1994). *Geniosporum angolense* Briq.: FTA 5: 351. *Geniosporum affine* Gürke: FTA 5: 352. *Geniosporum paludosum* Bak.: FTA 5: 352 (1900); FPNA 2: 194 (1947); FPS 3: 210 (1956) {Imatong Mountains, Itibol, Laboni}.

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1443 (K); Laboni, no alt., in secondary growth, 15.10.1938, *Myers* 9751 (K, WM); Talanga, 1000 m., moist places in grassland, 8.3.1950, *Jackson* 1208 (BM, WM); Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 13.11.1980, *Friis & Vollesen* 199 (BR, C, K, KHf); Katire to Itibol, 1940 m., 17.12.1935, *Thomas* 1632 (BM, K); Itibol, 1950 m., 14.6.1939, *Andrews* 1962 (K).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, below peak, no alt., edge of forest, 4.12.1971, *Katende* 1387 (EA, MHU).

Didinga Mountains: near Duguru village, Nagichot (4° 16' N, 33° 35' E), 2000 m., near stream, 17.12.1983, *Kielland-Lund* 362 (C, NLH).

General habitat range: in medium-altitude and montane grassland, usually in moist places.

General distribution: Sierra Leone to Ethiopia, south to Angola and Tanzania.

Plectranthus L'Hér.

Plectranthus alpinus (Vatke) Ryding
RYDING 1999: 147.

Syn.: *Plectranthus assurgens* (Bak.) J.K. Morton
FWTA 2: 459 (1963); UKWF: 293 (1994). *Coleus assurgens* Bak.: FTA 5: 428 (1900). *Coleus alpinus* Vatke: FTA 5: 439.

Imatong Mountains group, Sudan side: just below Gilo Forest Project Centre, 1800 m., 26.12.1983, *Kielland-Lund* 468 (C, NLH).

General habitat range: in medium-altitude and montane forest, especially in clearings and along edges.

General distribution: Nigeria to Ethiopia, Uganda and Kenya, south to Tanzania and Malawi. First record from the Sudan.

Plectranthus caninus Roth

WICKENS 1976: 152; UKWF: 292 (1994).

Syn.: *Coleus comosus* A. Rich.: FTA 5: 426 (1900), p.p. *Coleus flavovirens* Guerke: FPNA 2: 181 (1947).

Imatong Mountains group, Sudan side: Hiliu, between compound and the stream, 700 m., 23.11.1983, *Kielland-Lund* 30 (C, NLH).

General habitat range: in lowland and medium-altitude grassland and woodland.

General distribution: North East Congo [previously Zaire] to Eritrea, Ethiopia and Somalia, through eastern Africa south to Angola, Zambia and Zimbabwe; also in India.

Plectranthus cyaneus Guerke

FTA 5: 409 (1900); FWTA 2: 459 (1963); UKWF: 292 (1994).

Imatong Mountains group, Sudan side: Bushbuck Hill, 2150 m., *Loudetia arundinacea* grassland with scattered trees, 10.11.1980, *Friis & Vollesen* 137 (C, K).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2070 m., forest edge, 21.1.1950, *Jackson* 1094 (BM).

General habitat range: in montane grassland and evergreen bushland, often at forest edges.

General distribution: Cameroon to South Sudan, south to Tanzania. First record from the Sudan.

Plectranthus defolius Hochst. ex Benth.

FTA 5: 417 (1900); FPS 3: 223 (1956) {Imatong Mountains, Itibol camp}.

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1464 (K); Katire to Itibol, near Itibol camp, 1940 m., in scrub, 17.12.1935, *Thomas* 1629 (BM, K).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, near Moimoi, 1960 m., *Aca-*

cia abyssinica woodland, 21.1.1950, *Jackson* 1097 (BM); Nangeya Mountains, Mt. Lonyili, near peak of mountain, 1700 m., tall-grass grassland, 4.12.1971, *Katende* 1393 (MHU).

General habitat range: in medium-altitude and montane bushland and grassland.

General distribution: South Sudan and Ethiopia through Uganda and West Kenya to Angola, Zambia and Malawi.

***Plectranthus glandulosus* Hook. f.**

FTA 5: 411 (1900); FWTA 2: 460 (1963).

Syn.: *Plectranthus hylophilus* Guerke: FTA 5: 413 (1900). *Plectranthus urticoides* Bak.: FTA 5: 412 (1900).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in small clearing at river, 1.12.1980, *Friis & Vollesen* 599 (BR, C, K, KHF).

Didinga Mountains: Mt. Lotuke, 1900 m., *Protea* grassland, 29.3.1950, *Jackson* 1305 (BM).

General habitat range: in medium-altitude (rarely lowland) and montane forest, especially in clearings and along edges, and in evergreen bushland.

General distribution: Mali to Ethiopia, south to North Tanzania. First record from the Sudan.

***Plectranthus gracillimus* (T.C.E. Fr.) Hutch. & Dandy**

HUTCHINSON & DANDY 1926: 481.

Syn.: *Englerastrum gracillimum* T.C.E. Fr.: FWTA 2: 465 (1963).

Imatong Mountains group, Sudan side: Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees of *Terminalia laxiflora*, *T. brownii*, *Pterocarpus lucens*, *Combretum collinum* and *Vitex doniana*, in rock crevices, 3.12.1980, *Friis & Vollesen* 664 (C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Mali to South Sudan, and

from Tanzania to Angola and Zimbabwe. First record from the Sudan.

***Plectranthus grandicalyx* (E.A. Bruce) J.K. Morton**

MORTON 1998: 265.

Syn.: *Coleus grandicalyx* E.A. Bruce: FPS 3: 208 (1956) [Imatong Mountains, Lomuleng]. *Coleus* sp.: CHIPP 1929: 193.

Imatong Mountains group, Sudan side: without further locality [Mt. Kinyeti], 3050 m., 12.2.1939, *Johnston* 1482 (K); without further locality [Mt. Kinyeti], 3170 m., ericaceous thicket, 21.2.1976, *Howard* IM 59 (K, KHF); along path from Bushbuck Hill to Mt. Konoro, 2400 m., rocky outcrop in *Hagenia abyssinica* woodland, 23.2.1982, *Friis & Vollesen* 1007 (C, K, KHF); Lomuleng, 2440 m., edge of forest, 29.12.1935, *Thomas* 1800 (K, holotype of *C. grandicalyx*; BM, isotype); Itibol-Kipia track, 2590 m., mountain meadow, 20.9.1940, *Myers* 13,484 (K); Kipia, 2740 m., exposed rocky places, 12.1938, *MacDonald* 20 (BM); Mt. Kinyeti, 2740 m., in mountain ravines, 11.2.1929, *Chipp* 91 (K, WM); summit of Mt. Kinyeti, 3100 m., *Erica arborea*-*Myrica* scrub, 15.11.1949, *Jackson* 947 (BM); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 827 (C).

General habitat range: in montane and ericaceous grassland and bushland.

General distribution: South Sudan, South West Ethiopia and North Uganda.

***Plectranthus lactiflorus* (Vatke) Agnew**

UKWF: 292 (1994); KTSL: 633 (1994).

Syn.: *Coleus lactiflorus* Vatke: FPS 3: 208 (1956); JACKSON 1956: 362.

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 13.11.1980, *Friis & Vollesen* 193 (BR, C, K, KHF); Itibol to Katire, 1550 m., in scrub on

rocky ground, 17.12.1935, *Thomas* 1616 (BM, K).

Didinga Mountains: Chukudum Regional District Centre (4° 14' N, 33° 29' E), 1100 m., 16.12.1983, *Kielland-Lund* 334 (C, NLH); Nagichot, 2010 m., 30.10.1941, *Myers* 14,199 (K).

General habitat range: in medium-altitude and montane bushland and grassland.

General distribution: South Sudan and South Ethiopia through Uganda and Kenya to North Tanzania.

Plectranthus longipes Bak.

FTA 5: 406 (1900); UKWF: 293 (1994).

Imatong Mountains group, Sudan side: Iribo, 1500 m., swampy ground along stream, 25.10.1949, *Jackson* 850 (BM).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., 19.4.1939, *Myers* 10,941 (K).

General habitat range: in lowland and medium-altitude grassland and bushland.

General distribution: South Sudan and Ethiopia through eastern Africa to Tanzania.

Pycnostachys Hook.

Pycnostachys batesii Bak.

FTA 5: 386 (1900).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scandent in forest, 1.12.1980, *Friis & Vollesen* 588 (BR, C, K, KHF).

General habitat range: in lowland forest.

General distribution: Cameroon, South Sudan and West Uganda. First record from the Sudan.

Pycnostachys meyeri Guerke

FTA 5: 384 (1900); FPNA 2: 178 (1947); FPS 3: 224 (1956) {Imatong Mountains, Itibol}; UKWF: 290 (1994); KTS: 634 (1994).

Imatong Mountains group, Sudan side: Itibol,

1830 m., in scrub, 17.12.1935, *Thomas* 1621 (?BM, K); Gilo to Itibol, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 11.11.1980, *Friis & Vollesen* 144 (C, K, KHF).

General habitat range: in medium-altitude and montane forest, especially in clearings and along edges.

General distribution: Guinée to Ethiopia and Kenya, south to Tanzania and North Zimbabwe.

Salvia L.

Salvia nilotica Juss. ex Jacq.

FTA 5: 458 (1900); FPNA 2: 161 (1947); HEDBERG 1957: 160; UKWF: 288 (1994); HYF: 253 (1997).

Imatong Mountains group, Sudan side: Kipia, 2630 m., among rocks near stream through grassland, 4.7.1947, *MacLeay* 153 (BM).

General habitat range: in montane grassland and bushland.

General distribution: South Sudan and Ethiopia through East Congo [previously Zaire], Rwanda, Burundi and Eastern Africa to Zimbabwe; also in tropical Arabia. First record from the Sudan.

Satureja L.

Satureja abyssinica (Benth.) Briq.

HEDBERG 1957: 164; SEYBOLD 1988: 15; UKWF: 288 (1994).

Syn.: *Micromeria abyssinica* Benth.: FTA 5: 453 (1900); FPS 3: 217 (1956); HYF: 252 (1997).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 17.11.1980, *Friis & Vollesen* 289 (C, K).

Didinga Mountains: Iwowa, 1620 m., 23.4.1939, *Myers* 11,043 (K).

General habitat range: in medium-altitude and montane grassland and bushland.

General distribution: South Sudan and Ethiopia, through eastern Africa to Tanzania; also in tropical Arabia.

Satureja imbricata (Forssk.) Briq.

SEYBOLD 1988: 21.

Syn.: *Micromeria imbricata* (Forssk.) C.Chr.: HYF: 252 (1997). *Satureja biflora* (Buch.-Ham. ex D. Don) Benth.: HEDBERG 1957: 162; UKWF: 288 (1994). *Micromeria biflora* (Buch.-Ham. ex D. Don) Benth.: FTA 5: 452 (1900); CHIPP 1929: 193; FS: 361 (1929); FPNA 2: 162 (1947); FPS 3: 217 (1956) [Imatong Mountains]. *Satureja punctata* (Benth.) Briq.: HEDBERG 1957: 161; FWTA 2: 467 (1963); WICKENS 1976: 152. *Micromeria punctata* Benth. var. *purtschelleri* (Guerke) [authority not stated]: JACKSON 1956: 370 [Imatong Mountains].

Imatong Mountains group, Sudan side: without further locality, 2740 m., 12.2.1936, *Johnston* 1498 (K); without further locality, 10.2.1936, *Johnston* 1529 (K); without further locality [Mt. Kinyeti], 3050 m., 21.2.1976, *Howard* IM 61 (EA, K, KHF); Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 19.11.1980, *Friis & Vollesen* 331 (C, K, KHF); Issore to Itibol, 1950 m., 20.12.1935, *Thomas* 1718 (BM, K); Kipia, 2440 m., grassland, 29.12.1935, *Thomas* 1818 (BM, K); Kipia, 2650 m., 28.7.1939, *Myers* 11,687 (K); Kipia, 2690 m., mountain meadow, 12.1938, *MacDonald* 7 (BM); Kipia, 2690 m., mountain meadow, 12.1938-1.1939, *MacDonald* 50 (BM); Mt. Kinyeti, 3170 m., on rocky summit, 11.2.1929, *Chipp* 76 (K); summit of Mt. Kinyeti, 3180 m., rocky places, 15.11.1949, *Jackson* 926 (BM); summit of Mt. Kinyeti, 3180 m., mountain top, 15.11.1949, *Jackson* 941 (BM).

Didinga Mountains: between Iwowa and Nagichot, 1920 m., 24.4.1939, *Myers* 11,092 (K).

General habitat range: in montane and ericaceous grassland and evergreen bushland.

General distribution: Cameroon to Ethiopia, south to South Africa; also in tropical Arabia.

Satureja simensis (Benth.) Briq.

HEDBERG 1957: 163; SEYBOLD 1988: 3; UKWF: 288 (1994).

Syn.: *Calamintha* sp.: FPS 3: 206 (1956) [Imatong Mountains, Loyaru]. *Calamintha simensis* Benth.: FTA 5: 455 (1900); FPNA 2: 163 (1947); JACKSON 1956: 370.

Imatong Mountains group, Sudan side: without further locality, 2290 m., grassy clearing in forest, 13.2.1976, *Howard* IM 47 (EA, KHF); Bushbuck Hill, 2150 m., *Loudetia arundinacea* grassland with scattered trees, 10.11.1980, *Friis & Vollesen* 132 (BR, C, K, KHF); Loyaru, 2320 m., edge of forest, 29.12.1935, *Thomas* 1781 (K); summit of Mt. Kinyeti, 3180 m., mountain top, 15.11.1949, *Jackson* 956 (BM).

General habitat range: in montane and ericaceous bushland and grassland.

General distribution: Nigeria to Ethiopia, south to Malawi and Mozambique.

Satureja sp.

Imatong Mountains group, Sudan side: Dumuso, 2400 m., in *Hagenia* woodland, 23.4.1950, *Jackson* 1449 (WM).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2440 m., 28.10.1941, *Myers* 14,191 (?K, not traced).

Scutellaria L.

Scutellaria schweinfurthii Briq.

FTA 5: 461 (1900); FS: 361 (1929); FPS 3: 224 (1956); PATON 1992a: 42.

subsp. **paucifolia** (Bak.) Paton

PATON 1992a: 43.

Syn.: *Scutellaria paucifolia* Bak.: FTA 5: 462 (1900); CHIPP 1929: 193; FPS 3: 224 (1956) {Laboni}; JACKSON 1956: 350; UKWF: 619 (1974).

Imatong Mountains group, Sudan side: Laboni, no alt., in fire-swept grassland, appearing shortly after grass fires, 1220 m., 8.2.1929, *Chipp* 38 (K); Kinyeti valley, 16 km. north of Katire, 900 m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, 22.2.1982, *Friis & Vollesen* 1000 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: without further locality, 2380 m., grassland, 4.1938, *Eggeling* 3560 (K); near Agoro, 1990 m., grassland, no date, *Eggeling* 802 (K); Mt. Lomwaga, 2620 m., in *Hyparrhenia-Exothea* grassland, 5.4.1945, *Greenway & Hummel* 7276 (EA, K).

Didinga Mountains: Nagichot, 1980 m., 25.4.1939, *Myers* 11,128 (K).

General habitat range: in lowland, medium-altitude and montane grassland and woodland.

General distribution: Senegal to South Sudan, south to Zimbabwe.

Solenostomon Thonn.

Solenostomon autranii (Briq.) J.K. Morton
MORTON 1998: 266.

Syn.: *Coleus autranii* Briq.: FTA 5: 439 (1900).

Imatong Mountains group, Sudan side: Kipia, 2740 m., 12.2.1936, *Johnston* 1479 (K); summit of Mt. Kinyeti, 3100 m., *Erica arborea* scrub, 15.11.1949, *Jackson* 953 (BM).

General habitat range: in montane grassland and at forest margins.

General distribution: South Sudan, Ethiopia and Uganda.

Solenostomon latifolius (Benth.) J.K. Morton
FWTA 2: 463 (1900); WICKENS 1976: 153;
UKWF: 291 (1994); HYF: 251 (1997).

Syn.: *Coleus latifolius* Benth.: FTA 5: 437 (1900);
FS: 358 (1929); FPS 3: 209 (1956).

Imatong Mountains group, Sudan side: Talanga to Upper Talanga, 1400 m., medium-altitude rain forest with *Diospyros abyssinica*, *Garcinia buchananii*, *Uvariopsis congoensis*, *Turraea floribunda*,

Manilkara butugi, etc., swamp in clearing in forest, 10.12.1980, *Friis & Vollesen* 804 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude woodland, often among rocks, and in swamps in forest clearings.

General distribution: Mali to Ethiopia, south to South Africa; also in tropical Arabia.

Solenostomon porpeodon (Bak.) J.K. Morton
MORTON 1998: 266.

Syn.: *Plectranthus porpeodon* Bak.: FTA 5: 525 (1900).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, *Friis & Vollesen* 562 (BR, C, K, KHF); Mt. Labuki, 1530-1830 m., 12.6.1939, *Andrews* 1835 (K, WM); Gilo, 1830 m., rock crevices in burnt grassland, 28.6.1947, *MacLeay* 100 (BM); Gilo, 1920 m., undergrowth in woodland, 12.7.1947, *MacLeay* 220 (BM); Gilo, 1900 m., on stony ground, 27.8.1957, *Jackson* 3811 (K); Upper Talanga Tea Project, 1800 m., 11.1981, *Howard UTT* 14 (C, K); Itibol to Issore, near bridge on Kinyeti River, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 11.11.1980, *Friis & Vollesen* 154 (C, K, KHF); Kipia, 2690 m., forest clearings, 1.1939, *MacDonald* 43 (BM); Ras Logoforok, 1960 m., 29.7.1939, *Myers* 11,721 (K).

General habitat range: in medium-altitude and montane forest, often in clearings, and in grassland and bushland.

General distribution: Sudan and Ethiopia through Uganda and Kenya to North Tanzania.

Tetradenia Benth.

Syn.: *Iboza* N.E. Br.

Tetradenia riparia (Hochst.) Codd
UKWF: 294 (1994); KTSLS: 635 (1994).

Syn.: *Moschosma riparium* Hochst.: FTA 5: 354 (1900). *Iboza riparia* (Hochst.) N.E. Br.: EL AMIN 1990: 445 {Imatong Mountains}.

Imatong Mountains group, Sudan side: without further locality, 2130 m., on rocky outcrop, 2-3.1976, *Howard* IM 82 (EA, K, KHF); Kinyeti valley, above Katire, 1200 m., woodland with *Combretum molle*, *Cussonia arborea*, *Stereospermum kunthianum*, *Erythrina abyssinica*, *Entada abyssinica*, etc., 24.3.1982, *Friis & Vollesen* 1302 (C, K, KHF).

Imatong Mountains group, Uganda side: north of Mt. Madi Opei, no alt., 3.1935, *Eggeling* 1736 (MHU); 4 km. south east of Lomwaga, no alt., on rocks in tall-grass grassland, 18.7.1974, *Katende* 2132 (MHU).

General habitat range: in medium-altitude and montane grassland and woodland, often on rocks.

General distribution: South Sudan and Ethiopia through eastern Africa to South Africa.

Tinnea Hook. f.

Tinnea aethiopica Hook. f.

FTA 5: 497 (1900); FS: 363 (1929); FPNA 2: 154 (1947); FPS 3: 225 (1956); FWTA 2: 473

(1963); VOLLESEN 1975: 16; UKWF: 284 (1994); KTSL: 635 (1994).

subsp. **aethiopica**

VOLLESEN 1975: 19; EL AMIN 1990: 446 {Imatong Mountains}.

Imatong Mountains group, Sudan side: Talanga, 910 m., in scrub, 16.12.1935, *Thomas* 1605 (BM, K); Talanga, 950 m., wooded grassland with *Terminalia laxiflora*, *Combretum collinum*, *C. molle* and *Vitex doniana*, 25.11.1980, *Friis & Vollesen* 451 (C, K, KHF).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, north end of the mountains [4° 14'N, 33° 06'E], no alt., in woodland with *Annona senegalensis*, *Cussonia*, *Bauhinia*, etc., 20.1.1950, *Jackson* 1073 (BM).

Didinga Mountains: Boya Hill, Karauili, 1200 m., rocky outcrop in bushland, 22.12.1982, *Fukui* 82-34 (EA).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and woodland.

General distribution: Mali to South West Ethiopia, south to North Tanzania. Species as a whole to Malawi and Central Mozambique.

Monocotyledons (Class **Liliopsida** Cronquist, Takht. & W. Zimm.; *Monocotyledones* Juss., nom. altern.)

Order 69. **Butomales** Hutch.

Fam. 146. **Hydrocharitaceae** Juss.

Ottelia Pers.

Ottelia ulvifolia (Planch.) Walp.

FS: 372 (1929); FPS 3: 227 (1956); FWTA 3,1: 7

(1968); WICKENS 1976: 153; FC 26: 35 (1984); FTEA, Hydrocharitac.: 15 (1989); UKWF: 301 (1994); FE 6: 2 (1997).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., in stagnant stream, 6.1.1984, *Kielland-Lund* 590 (C, NLH); in the Ayi River (4° 2' N, 32° 25' E), 900 m., in stagnant part of the stream, 3.1.1950, *Jackson* 1029 (BM, KHF); 3

km. south of Torit, in Iyedo River (4° 23' N, 32° 36' E), 650 m., 13.12.1983, *Kielland-Lund* 316 (C, NLH).

Imatong Mountains group, Uganda side: Paranga, 1070 m., pool, 12.12.1935, *Thomas* 1558 (BM).

General habitat range: in running fresh water.

General distribution: Widespread throughout most of tropical Africa and south to South Africa (Transvaal); also in Madagascar.

Fam. 147. **Potamogetonaceae** Dumort.

Potamogeton L.

Potamogeton octandrus Poir.

FPS 3: 235 (1956); FWTA 3,1: 16 (1968); UKWF: 302 (1994); FE 6: 20 (1997).

Syn.: [*Potamogeton javanicus* auct., non Hassk., sensu str.: FTA 8: 202 (1901)].

Imatong Mountains group, Sudan side: 3 km. south of Torit, in the Iyedo River (4° 23' N, 32° 36' E), 650 m., 13.12.1983, *Kielland-Lund* 315 (C, NLH).

General habitat range: in slow running water or permanent pools at low or medium altitudes.

General distribution: Sierra Leone to Ethiopia, through eastern Africa and eastern Congo [previously Zaire] to Angola and South Africa; also in India and tropical South East Asia.

Order 70. **Commelinales** Dumort.

Fam. 148. **Commelinaceae** R. Br.

Aneilema R. Br.

Aneilema aequinoctiale (P. Beauv.) G. Don

FTA 8: 65 (1901); FWTA 3,1: 30 (1968); FADEN 1991: 62; UKWF: 307 (1994); FE 6: 351 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, along small brook between rocks, 2.12.1980, *Friis & Vollesen* 634 (BR, C, EA, K, KHF).

General habitat range: in lowland rain forest.

General distribution: Liberia to South Sudan and South West Ethiopia, south to South Africa (Transvaal, Natal and East Cape Prov.). First record from the Sudan.

Aneilema beniniense (P. Beauv.) Kunth

FTA 8: 68 (1901); FS: 389 (1929); FPS 3: 238 (1956); FWTA 3,1: 31 (1968); FADEN 1991: 145; UKWF: 308 (1994); FE 6: 357 (1997).

Imatong Mountains group, Sudan side: Lotti forest near Palotaka, 1200 m., forest, 31.1.1979, *Shigeta* 160 (EA); Talanga forest, 1000 m., swamp in forest with dense stand of *Maranthochloa*, 8.11.1948, *Jackson* 480 (BM); Talanga, 1000 m., shaded old road in forest, 28.12.1949, *Jackson* 1011 (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 25.11.1980, *Friis & Vollesen* 449 (BR, C, K, KHF); Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, along small brook between rocks, 2.12.1980, *Friis & Vollesen* 635 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude rain forest.

General distribution: Senegal to Ethiopia, south to Angola and Zambia.

Aneilema hirtum A. Rich.

FTA 8: 74 (1901); FADEN 1991: 147; UKWF: 308 (1994); FE 6: 360 (1997).

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, *Friis & Vollesen* 24 (C, K, KHF).

General habitat range: in medium-altitude and montane woodland and bushland, and at forest margins.

General distribution: South Sudan and Ethiopia to North Zambia and North Malawi. First record from the Sudan.

***Aneilema lanceolatum* Benth.**

FTA 8: 72 (1901), pro parte; FPS 3: 239 (1956); FWTA 3,1: (1968); WICKENS 1976: 154; FADEN 1991: 145.

Syn.: *Aneilema schweinfuthii* C.B. Clarke: FTA 8: 71 (1901); FS: 389 (1929). *Aneilema soudanicum* C.B. Clarke: FTA 8: 72 (1901).

Imatong Mountains group, Sudan side: Torit, 650 m., in *Combretum* woodland, 24.6.1949, *Jackson* 829 (BM); Talanga forest, 950 m., on termite mound in *Combretum* woodland, 20.3.1950, *Jackson* 1245 (BM); Kinyeti Valley, Hiliu, in compound (4° 16' N, 32° 48' E), no alt., 28.5.1984, *Kielland-Lund* 777 (C, NLH); 75 m. east of stream east of Hiliu (4° 16' N, 32° 48' E), no alt., in woodland, 25.5.1984, *Kielland-Lund* 704 (C, NLH); south west of Hiliu (4° 16' N, 32° 48' E), no alt., 25.5.1984, *Kielland-Lund* 723 (C, NLH); near Imeila, 850 m., woodland with *Albizia zygia*, *Annona senegalensis*, *Combretum collinum*, *Lonchocarpus laxiflorus*, etc., 24.2.1982, *Friis & Vollesen* 1023 (C).

General habitat range: in lowland and medium-altitude woodland and bushland.

General distribution: Senegal to Sudan, south to Uganda and North West Kenya.

***Aneilema spekei* C.B. Clarke**

FTA 8: 72 (1901); FPS 3: 239 (1956); FADEN 1991: 147; UKWF: 308 (1994); FE 6: 357 (1997).

Imatong Mountains group, Sudan side: Talanga, 1000 m., in shallow turf over gneiss, open vegetation, 11.6.1961, *Jackson* 4225 (K); Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.

1980, *Friis & Vollesen* 563 (C, K, KHF); Kinyeti Valley, Hiliu, between compound and river, 700 m., 28.11.1983, *Kielland-Lund* 74 (C, NLH); hill 3 km. south of Hiliu, 700 m., stony hillside, shallow soil below rocky outcrop, 6.12.1983, *Kielland-Lund* 225 (C, NLH).

General habitat range: in lowland and medium-altitude bushland and woodland, often in shallow soil over rocks.

General distribution: South Sudan through East Congo [previously Zaire], Rwanda, Burundi and eastern Africa to South Tanzania.

***Aneilema umbrosum* (Vahl) Kunth**

FWTA 3,1: 30 (1968); FADEN 1991: 145.

subsp. **ovato-oblongum** (P. Beauv.) J.K. Morton
FWTA 3,1; 39 (1968).

Syn.: *Aneilema ovato-oblongum* P. Beauv.: FTA 8: 69 (1901).

Imatong Mountains group, Sudan side: Talanga to Upper Talanga, 1100 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scrambling herb in forest, 7.12.1980, *Friis & Vollesen* 749 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest and moist places in woodland.

General distribution: Sierra Leone to South Sudan, south to Congo [previously Zaire] and Uganda; also in South America. Species as a whole in the same general area.

***Commelina* L.**

***Commelina africana* L.**

FTA 8: 45 (1901); FS: 388 (1929); FPS 3: 243 (1956); FWTA 3,1: 45 (1968); UKWF: 304 (1994); FS_o 4: 89 (1995); HYF: 317 (1997); FE 6: 362 (1997).

var. **villosior** (C.B. Clarke) Brenan

FWTA 3,1: 45 (1968).

Imatong Mountains group, Sudan side: Mt. Bag-

hanj, 1830-2130 m., 13.6.1939, *Andrews* 1894 (K); lower southern slope of Mt. Konoro, 2100 m., *Loudetia arundinacea* grassland with scattered trees on shallow soil, 2.3.1982, *Friis & Vollesen* 1071 (C, K).

Imatong Mountains group, Uganda side: 4 km. south east of Lomwaga, no alt., shallow soil over rock in grassland, 18.7.1974, *Katende* 2137 (MHU).

General habitat range: in lowland, medium-altitude and montane grassland.

General distribution: Senegal to Ethiopia, south to South Africa; also in Madagascar. Species as a whole in the same general area, but also in tropical Arabia.

***Commelina benghalensis* L.**

FTA 8: 41 (1901); FS: 387 (1929); FPS 3: 241 (1956); FWTA 3,1: 48 (1968); WICKENS 1976: 154; UKWF: 305 (1994); FSo 4: 91 (1995); FE 6: 373 (1997); HYF: 317 (1997).

var. **benghalensis**

FWTA 3,1: 48 (1968); WICKENS 1976: 154.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, rocks c. 200 m. south of compound, 700 m., 2.12.1983, *Kielland-Lund* 146 (C, NLH); Gilo, at bridge on Ngairigi River, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, in secondary growth following cultivations at the river, 20.2.1982, *Friis & Vollesen* 968 (BR, C, K, KHF).

Didinga Mountains: Mt. Lotuke, at river Kuru-mo (4° 7' N, 33° 47' E), 1800 m., edge of gallery forest, 31.3.1950, *Jackson* 1367 (BM).

General habitat range: in lowland, medium-altitude and montane woodland, wooded grassland and also often a weedy species of disturbed ground.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in Madagascar and widespread in tropical Asia, including tropical Arabia.

***Commelina bracteosa* Hassk.**

FTA 8: 55 (1901); FS: 388 (1929); FPS 3: 245 (1956); FWTA 3,1: 48 (1968); WICKENS 1976: 154.

Syn.: *Commelina bainesii* C.B. Clarke: FTA 8: 57 (1901). *Commelina aethiopica* C.B. Clarke: FTA 8: 59 (1901); FS: 388 (1929); FPS 3: 245 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, 700 m., in compound, 21.11.1983, *Kielland-Lund* 4 (C, NLH); south west of Hiliu, small ravine (4° 16' N, 32° 48' E), no alt., 25.5.1984, *Kielland-Lund* 724 (C, NLH).

Imatong Mountains group, Uganda side: 2 km. south east of Lomwaga, no alt., tall-grass grassland with scattered trees, 18.7.1974, *Katende* 2159 (MHU).

General habitat range: in lowland, medium-altitude and montane wooded grassland.

General distribution: Senegal to Sudan, south to Mozambique and Malawi.

***Commelina diffusa* Burm. f.**

FPS 3: 241 (1956); FWTA 3,1: 47 (1968); WICKENS 1976: 154; UKWF: 304 (1994); FE 6: 362 (1997); HYF: 317 (1997).

Syn.: *Commelina nudiflora* L., pro parte, excl. typo: FTA 8: 36 (1901); FS: 387 (1929).

subsp. **montana** J.K. Morton

FWTA 3,1: 47 (1968).

Imatong Mountains group, Sudan side: along path from Bushbuck Hill to Mt. Konoro, 2300 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, in deep shade on forest floor, 5.3.1982, *Friis & Vollesen* 1105 (C, K).

General habitat range: in wet places in forest and montane grassland.

General distribution: North Nigeria to South Sudan. Species as a whole also at lower altitudes from Senegal to Sudan, south to South Africa; generally widespread in the tropics.

Commelina erecta L.

FWTA 3,1: 49 (1968); UKWF: 305 (1994); FSo 4: 93 (1995); FE 6: 372 (1997); HYF: 317 (1997).

subsp. **livingstonii** (C.B. Clarke) J.K. Morton
Syn.: *Commelina livingstonii* C.B. Clarke: FTA 8: 59 (1901).

Imatong Mountains group, Sudan side: Kinyeti Valley, 3 km. east of Hiliu and 2 km. along Imatong River, 700 m., 3.12.1983, *Kielland-Lund* 190 (C, NLH); south east of Torit, near Imatong Junction and Ngarama (4° 21' N, 32° 38' E), no alt., 31.5.1984, *Kielland-Lund* 808 (C, NLH).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2047 (EA, MHU, NLH, UPS).

General habitat range: in lowland and medium-altitude wooded grassland and deciduous bushland.

General distribution: Senegal to Ethiopia, south to South Africa. Species as a whole also in the forest zone and in Somalia and tropical Arabia.

Commelina forsskaolii Vahl

FTA 8: 44 (1901); FS: 387 (1929); FPS 3: 241 (1956); FWTA 3,1: 48 (1968); UKWF: 305 (1994); FSo 4: 92; FE 6: 374 (1997); HYF: 317 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, c. 200 m. from Hiliu towards Torit, 700 m., 21.11.1983, *Kielland-Lund* 8 (C, NLH).

Didinga Mountains: 8 km. south of Kapoeta [33° 34' E, 4° 41' N], on road to Nathilani, no alt., 27.8.1953, *Peers* KM8 (K).

General habitat range: in lowland and medium-altitude wooded grassland and deciduous bushland.

General distribution: Mali to Sudan, Ethiopia and Somalia, south to South Africa; also in Madagascar, tropical Arabia and India.

Commelina imberbis Hassk.

FTA 8: 49 (1901); FS: 388 (1929); FPS 3: 245 (1956); FWTA 3,1: 48 (1968); WICKENS 1976: 154; UKWF: 305 (1994); FE 6: 369 (1997); HYF: 318 (1997).

Imatong Mountains group, Sudan side: Mt. Itibol, 1950 m., forest, 15.6.1939, *Andrews* 2007 (K); Gilo, 1990 m., burnt grassland, 26.6.1947, *MacLeay* 76 (BM).

General habitat range: in medium-altitude and montane grassland, bushland and woodland, at forest margins, in clearings, often in wet or disturbed places and plantations.

General distribution: Nigeria to Ethiopia, south to Zimbabwe; also in tropical Arabia.

Commelina latifolia A. Rich.

FTA 8: 50 (1901); FS: 388 (1929); FPS 3: 245 (1956); UKWF: 305 (1994); FE 6: 368 (1997); HYF: 318 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in small forest clearing, 11.12.1980, *Friis & Vollesen* 806 (C).

General habitat range: in lowland and medium-altitude grassland and bushland.

General distribution: South Sudan to Ethiopia, south to Tanzania; also in tropical Arabia.

Commelina purpurea Rendle

FTA 8: 40 (1901).

Imatong Mountains group, Sudan side: near Torit, [4° 24' N, 32° 34' E], 620 m., open *Combretum* woodland, on termite mound, no date, *Jackson* 821 (BM).

General habitat range: in lowland and medium-altitude grassland and bushland.

General distribution: South Sudan through East Congo [previously Zaire], Rwanda, Burundi and eastern Africa to Tanzania.

Commelina schweinfurthii C.B. Clarke
FTA 8: 41 (1901); FPS 3: 240 (1956); FE 6: 371 (1997).

Imatong Mountains group, Sudan side: Mt. Lotti, 1830 m., in long grass, 8.10.1938, *Myers* 9.605 (K, WM).

General habitat range: in medium-altitude and montane grassland.

General distribution: Cameroon to Sudan.

Commelina subulata Roth

FTA 8: 38 (1901); FS: 387 (1929); FPS 3: 241 (1956); WICKENS 1976: 154; UKWF: 305 (1994); HYF: 318 (1997); FE 6: 364 (1997).

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 23.11.1980, *Friis & Vollesen* 414 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: 4 km. south east of Lomwaga, no alt., in tall-grass grassland, 18.7.1974, *Katende* 2160 (EA, MHU).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and woodland, often in thin soil over rocks.

General distribution: Niger and Ghana to Ethiopia, south to South Africa; also in tropical Arabia and India.

Cyanotis D. Don

Cyanotis arachnoidea C.B. Clarke

FWTA 3,1: 38 (1968); UKWF: 306 (1994).

var. **arachnoidea**

FWTA 3,1: 38 (1968).

Syn.: *Cyanotis lanata* sensu FS & FPS: FS: 390 (1929), pro parte; FPS 3: 247 (1956), pro parte.

Imatong Mountains group, Sudan side: Kinyeti Valley, 8 km. south of Hiliu along Katire road (4° 12' N, 32° 40' E), no alt., in woodland, 30.5.1984, *Kielland-Lund* 788 (C, NLH); Talan-

ga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, *Friis & Vollesen* 579 (BR, C, K, KHF).

General habitat range: in lowland woodland and wooded grassland, mostly on rocky outcrops.

General distribution: Liberia to South Sudan and Kenya, south to North Tanzania; also in India. Species as a whole within the same general area.

Cyanotis barbata D. Don

FWTA 3,1: 38 (1968); WICKENS 1976: 154; UKWF: 306 (1994); FE 6: 341 (1997).

Syn.: *Cyanotis hirsuta* C.A. Mey.: FTA 8: 78 (1901); FS: 390 (1929); FPS 3: 247 (1956) {Imatong Mountains, Mt. Kinyeti}.

Imatong Mountains group, Sudan side: Talanga to Upper Talanga, 1400 m., medium-altitude rain forest with *Diospyros abyssinica*, *Garcinia buchananii*, *Uvariopsis congoensis*, *Turraea floribunda*, *Manilkara butugi*, etc., swamp in clearing in forest, 10.12.1980, *Friis & Vollesen* 803 (BR, C, K, KHF); Gilo, 1650 m., burnt grassland, 28.6.1947, *MacLeay* 104 (BM); Gilo, 1990 m., rock crevices in burnt grassland, 17.7.1947, *MacLeay* 208 (BM); Lomuleng, 2650 m., mountain meadow, 26.7.1939, *Myers* 11,599 (K); Mt. Kinyeti, summit, 3180 m., 27.7.1939, *Myers* 11,657 (K, WM); summit of Mt. Kinyeti, 3187 m., between rocks, 15.11.1949, *Jackson* 914 (BM).

General habitat range: in medium-altitude and montane grassland.

General distribution: Ghana to Ethiopia, south to Zimbabwe and Malawi; also the Himalayas from India to South China.

Cyanotis caespitosa Kotschy & Peyr.

FTA 8: 82 (1901); FS: 390 (1929); FPS 3: 247 (1956); FWTA 3,1: 38 (1968); UKWF: 306 (1994); FE 6: 340 (1997).

Imatong Mountains group, Sudan side: near Torit, 630 m., open *Combretum* woodland, 22.4.1949, Jackson 705 (BM); south east of Torit, between Torit and Ngarama (4° 22' N, 32° 37' E), no alt., 28.5.1984, Kielland-Lund 768 (C, NLH).

Imatong Mountains group, Uganda side: without further locality, 2290 m., grassland, 4.1938, Eggeling 3624 (K); Lomwaga Mountain, 2600 m., burnt *Exothea-Hyparrhenia* grassland, 8.4.1945, Greenway & Hummel 7315 (K).

General habitat range: in lowland, medium-altitude and montane grassland and woodland.

General distribution: Ivory Coast to Sudan and Ethiopia, south to Angola and Zambia.

Cyanotis lanata Benth.

FTA 8: 80 (1901); FS: 390 (1929); FPS 3: 247 (1956); FWTA 3,1: 40 (1968); WICKENS 1976: 155; UKWF: 306 (1994); FE 6: 342 (1997); HYF: 318 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, Friis & Vollesen 558 (BR, C, K, KHF); Kinyeti Valley, Hiliu, near compound, 700 m., shallow soil on rocks, 2.12.1983, Kielland-Lund 165 (C, NLH).

General habitat range: in lowland and medium-altitude woodland and wooded grassland, often on rocky outcrops.

General distribution: Senegal to Ethiopia, south to South Africa (Transvaal); also in tropical Arabia.

Floscopa Lour.

Floscopa africana (P. Beauv.) C.B. Clarke
FTA 8: 85 (1901); FWTA 3,1: 28 (1968).
subsp. **petrophila** J.K. Morton
FWTA 3,1: 28 (1968).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum*

albidum, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in small swamp along brook, 1.12.1980, Friis & Vollesen 607 (BR, C, FT, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Liberia to South Sudan and Uganda, south to Congo [previously Zaire]. Species as a whole also from Senegal to Sudan, south to Tanzania and North Zambia. First record from the Sudan.

Floscopa glomerata (J.A. & J.H. Schult.) Hassk.
FTA 8: 86 (1901); FWTA 3,1: 28 (1968); UKWF: 307 (1994); FE 6: 348 (1997).

subsp. **glomerata**

Syn.: *Floscopa rivularis* (A. Rich.) C.B. Clarke:
FTA 8: 86 (1901); FS: 390 (1929); FPS 3: 248 (1956).

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 1850 m., seepage meadow on edge between upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea* and grassland with *Loudetia arundinacea*, 18.11.1980, Friis & Vollesen 308 (C, K, KHF).

General habitat range: in marshes and swamps of lowland and medium-altitude grassland, woodland and forest clearings.

General distribution: Senegal to Ethiopia, south to South Africa; also in Madagascar. Species as a whole within the same general area.

Murdannia Royle

Murdannia simplex (Vahl) Brenan
FPS 3: 250 (1956); FWTA 3,1: 24 (1968); WICKENS 1976: 155; UKWF: 309 (1994); FSo 4: 83 (1995); FE 6: 346 (1997).
Syn.: *Aneilema sinicum* (Roem. & Schult.) Lindl.
var. *simplex* (Vahl) C.B. Clarke: FTA 8: 64 (1901).

Imatong Mountains group, Sudan side: near Lotti rest house, no alt., 8.6.1939, Andrews 1692 (K);

near Torit, 650 m., at rain-water pool in *Combretum* woodland, 24.6.1949, *Jackson* 828 (BM).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., wooded grassland, 19.4.1939, *Myers* 10,951 (K).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to West Ethiopia and South Somalia, south to Angola and South Africa (Natal); also in Madagascar.

Palisota Reichb. ex Endl.

Palisota schweinfurthii C.B. Clarke

FTA 8: 29 (1901), pro parte; FS: 387 (1929); FPS 3: 250 (1956); FWTA 3,1: 35 (1968).

Syn.: [*Palisota barteri* auct., non Hook. f.: JACKSON 1956: 355 {Lotti}].

Imatong Mountains group, Sudan side: near Isore, 1340 m., dense gallery forest, 3.8.1939, *Myers* 11,786 (K); Lotti forest, 900 m., undergrowth in gallery forest, 24.4.1949, *Jackson* 718 (BM).

General habitat range: in lowland and medium-altitude rain forest.

General distribution: Cameroon to South Sudan and Uganda, south to Angola, Zambia and Tanzania.

Pollia Thunb.

Pollia condensata C.B. Clarke

FTA 8: 27 (1901); FPS 3: 250 (1956); FWTA 3,1: 33 (1968); UKWF: 307 (1994); FE 6: 349 (1997).

Imatong Mountains group, Sudan side: Lotti forest near Palotaka, 1200 m., forest, 23.1.1979, *Shigeta* 87 (EA); Talanga, no alt., at old road through forest, 11.6.1961, *Jackson* 4218 (K); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 29.11.1980, *Friis*

& *Vollesen* 550 (C, K, KHF); Acholi Hills, Upper Talanga Tea project, 2000 m., 18.6.1981, *Fison* in *Lock* 81/283 (K).

General habitat range: in lowland, medium-altitude and montane forest, mostly in clearings.

General distribution: Sierra Leone to Ethiopia, south to Angola and Tanzania.

Pollia mannii C.B. Clarke

FTA 8: 26 (1901); FWTA 3,1: 32 (1968); FE 6: 348 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 27.11.1980, *Friis* & *Vollesen* 511 (BR, C, K, KHF).

General habitat range: in lowland rain forest.

General distribution: Ivory Coast to South Sudan and Uganda, south to North West Tanzania. First record from the Sudan.

Polyspatha Benth.

Polyspatha paniculata Benth.

FTA 8: 61 (1901); FWTA 3,1: 42 (1968).

Imatong Mountains group, Sudan side: Lotti Forest near Palotaka, 1200 m., 1979, *Shigeta* 129 & 148 (EA, identified and listed by M.G. Gilbert, not traced); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 26.11.1980, *Friis* & *Vollesen* 467 (BR, C, K, KHF); Talanga, 1000 m., ground layer in dense *Entandophragma* forest, 28.12.1949, *Jackson* 1005 (BM).

General habitat range: in lowland rain forest.

General distribution: Guinée to South Sudan and Uganda, south to Congo [previously Zaire] and Angola (Cabinda). First record from the Sudan.

Stanfieldiella Brenan

Stanfieldiella imperforata (C.B. Clarke) Brenan
FWTA 3,1: 23 (1968); FE 6: 346 (1997).

Syn.: *Buforrestia imperforata* C.B. Clarke: FTA 8: 76 (1901); JACKSON 1956: 355 [Lotti].

var. **glabrisepala** (De Wild.) Brenan
FWTA 3,1: 24 (1968); FE 6: 348 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 26.11.1980, Friis & Vollesen 469 (BR, C, K, KHF).

General habitat range: in lowland rain forest.

General distribution: Ghana to South West Ethiopia, south through Uganda to North West Tanzania. Species as a whole from Sierra Leone to South Sudan and Uganda, south to Angola and Tanzania.

Syn.: *Xyris* sp. sensu FPS 3: 251 (1956) {Imatong Mountains, Kimisu}.

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, Friis & Vollesen 566 (BR, C, K, KHF); Kimisu (= Dumuso), 2070 m., on damp rock, 20.12.1935, Thomas 1724 (BM, K); Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 23.11.1980, Friis & Vollesen 417 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude and montane woodland, wooded grassland and grassland, almost always in wet flushes over rocky outcrops.

General distribution: Mali to Ethiopia, south to South Africa.

Order 71. **Xyridales** Lindl.Order 72. **Eriocaulales** NakaiFam. 149. **Xyridaceae** C. AgardhFam. 150. **Eriocaulaceae** Desv.**Xyris** L.**Eriocaulon** L.

Xyris capensis Thunb.

FTA 8: 13 (1901); FWTA 3,1: 54 (1968); UKWF: 325 (1994); FE 6: 375 (1997).

Imatong Mountains group, Sudan side: between Kinyeti and Kipia, 2700 m., swampy ground, 1.6.1950, Jackson 1537 (K).

General habitat range: in lowland, medium-altitude and montane woodland, wooded grassland and grassland, always in damp places.

General distribution: Senegal to Ethiopia, south to South Africa. First record from the Sudan.

Xyris straminea Nilss.

FTA 8: 19 (1901); FWTA 3,1: 54 (1968); UKWF: 325 (1994); FE 6: 375 (1997).

Eriocaulon schimperii Koern. ex Ruhl.

FTA 8: 243 (1901); UKWF: 303 (1994); FE 6: 379 (1997); FTEA, Eriocaulac.: 15 (1997).

Imatong Mountains group, Sudan side: Kipia, 2590 m., mountain moor, 3.7.1947, MacLeay 125 (BM); Kipia, 2650 m., mountain moor, 28.7.1939, Myers 11,702 (K); Mt. Kinyeti to Kipia, 2700 m., common in mountain bog, 1.6.1950, Jackson 1534 (K).

General habitat range: in wet montane grassland and swamps.

General distribution: South Sudan and Ethiopia through East Congo [previously Zaire], Rwanda, Burundi and eastern Africa to North Malawi (Nyika Plateau). First record from the Sudan.

Order 73. **Zingiberales** Griseb.Fam. 151. **Musaceae** Juss.**Ensete** Horan.

Ensete ventricosum (Welw.) Cheesman
FPS 3: 252 (1956); SOMMERLATTE 1990: 340, in damp places, ravines and along streams in forest between 1000 and 2400 m.; FTEA, Musac.: 3 (1993); FE 6: 317 (1997).

Syn.: *Ensete edule* Horan.: JACKSON 1956: 354 {Lotti} & 367; KTSL: 636 (1994). *Musa ensete* J.F. Gmel.: FTA 7: 329 (1898); FS: 396 (1929).

Imatong Mountains group, Sudan side: above Katire, no alt., wooded hillside above riverine forest, 15.7.1947, *MacLeay* 242 (KHU); Gilo, 1800 m., disturbed places in upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 1980 & 1982, *Friis & Vollesen* (sight records).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; specimen no. 16 documents this record).

General habitat range: in medium-altitude and montane forest, usually in disturbed places, in ravines or on steep slopes.

General distribution: Cameroon to South Sudan, Ethiopia and Kenya, south to Angola and South Africa (Transvaal).

Fam. 152. **Zingiberaceae** Lindl.**Aframomum** K. Schum.

Aframomum alboviolaceum (Ridl.) K. Schum.
FTEA, Zingiberac.: 34 (1985); FE 6: 325 (1997).

Syn.: *Amomum alboviolaceum* Ridl.: FTA 7: 304 (1898).

Imatong Mountains group, Sudan side: Katire to Gilo, at road to Itibol, 1400 m., wooded grass-

land with *Combretum molle*, *C. collinum*, *Entada abyssinica* and *Erythrina abyssinica*, the grasses *Pennisetum purpureum* and *Hyparrhenia rufa* dominant, 12.11.1980, *Friis & Vollesen* 168 (BR, C, K, KHF); Upper Talanga Tea project, 1500 m., grassland, 18.6.1981, *Fison* in *Lock* 81/280 (K).

General habitat range: in lowland and medium-altitude grassland.

General distribution: Senegal to Sudan, Uganda and Kenya, south to Angola, Zambia and Mozambique.

Aframomum angustifolium (Sonn.) K. Schum.
FTEA, Zingiberac.: 27 (1985); UKWF: 309 (1994).

Syn.: *Amomum angustifolium* Sonn.: FTA 7: 308 (1898).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 8.1.1979, *Shigeta* 61 (EA).

General habitat range: in lowland and medium-altitude forest, often ground water forest or gallery forest.

General distribution: Ivory Coast to South Sudan, south to Mozambique; also in Madagascar and Mascarene Islands.

Aframomum luteoalbum (K. Schum.) K. Schum.

FS: 395 (1929); FPS 3: 253 (1953); FTEA, Zingiberac.: 30 (1985).

Syn.: *Amomum luteoalbum* K. Schum.: FTA 7: 310 (1898).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., forest, 1979, *Shigeta* 159 (EA, identified and listed by M.G. Gilbert, not traced).

General habitat range: in lowland and medium-altitude ground water and gallery forest.

General distribution: East Congo [previously Zaire] to Sudan, Uganda and Tanzania.

Aframomum sp.

JACKSON 1956: 350, moist woodland, as '*Amomum sp.*'.

Costus L.**Costus afer** Ker-Gawl.

FTA 7: 299 (1898); FPS 3: 253 (1956); JACKSON 1956: 355 [as *Costus sp.* aff. *C. afer*] {Talanga, Lotti, Laboni}; FG 9: 84 (1964); FC 4: 92 (1965); FWTA 3,1: 78 (1968); FTEA, Zingiberac.: 9 (1985); FE 6: 330 (1997).

Imatong Mountains group, Sudan side: Talanga, 900 m., swampy places in closed forest, with dense stands of *Maranthochloa*, 21.3.1950, Jackson 1259 (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, forming large stands along small river, 5.12.1980, Friis & Vollesen 717 (C, K, KHF).

General habitat range: in lowland and medium-altitude forest, usually in moist and open places.

General distribution: Sierra Leone to Ethiopia, south to Tanzania.

Costus dubius (Afzel.) K. Schum.

FWTA 3,1: 78 (1968); FTEA, Zingiberac.: 6 (1985).

Syn.: *Costus trachyphyllus* K. Schum.: FTA 7: 300 (1898); FS: 394 (1929); FPS 3: 254 (1956).

Imatong Mountains group, Sudan side: Talanga, 900 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in swampy area in the forest, 1.3.1982, Friis & Vollesen 1062 (C, K); Talanga, 1000 m., damp ridge in forest, 14.7.1947, MacLeay 236 (BM).

General habitat range: in lowland and medium-altitude forest, usually in open, moist places.

General distribution: Sierra Leone to South Sudan, south to Tanzania.

Renealmia L. f.**Renealmia sp.**

FPS 3: 255 (1956) {Lotti}.

Imatong Mountains group, Sudan side: Lotti, no alt., forest, in swampy part with *Raphia* palms, 11.10.1938, Myers 9660 (K).

Note: The material is inadequate for identification.

Siphonochilus Wood & Franks**Siphonochilus aethiopicus** (Schweinf.) B.L. Burt

FTEA, Zingiberac.: 20 (1985); UKWF: 309 (1994); FSo 4: 78 (1995); FE 6: 329 (1997).

Syn.: *Kaempferia aethiopica* (Schweinf.) Ridl.: FTA 7: 294 (1898); FS: 393 (1929); FPS 3: 255 (1956); FC 4: 24 (1965); FWTA 3,1: 71 (1968).

Imatong Mountains group, Sudan side: near Torit, 630 m., in *Combretum* woodland with scattered evergreen tangle, 22.4.1949, Jackson 702 (BM); Kinyeti Valley, 75 m. east of stream east of Hiliu (4° 16' N, 32° 48' E), no alt., in woodland, 24.5.1984, Kielland-Lund 700 (C, NLH).

General habitat range: in lowland and medium-altitude deciduous woodland, wooded grassland and bushland.

General distribution: Senegal to Ethiopia and South Somalia, south to Zimbabwe.

Siphonochilus brachystemon (K. Schum.) B.L. Burt

FTEA, Zingiberac.: 19 (1985).

Syn.: *Kaempferia macrosiphon* Bak.: FTA 7: 296 (1898); FPS 3: 255 (1956) {Azza Forest, Laboni}.

Imatong Mountains group, Sudan side: Laboni, no alt., on forest floor in shade of *Coffea canephora*, 19.4.1930, Snowden 1684 (BM, K).

General habitat range: in lowland dry evergreen forest.

General distribution: Sudan, Uganda, Burundi, Kenya and Tanzania.

Siphonochilus kirkii (Hook. f.) B.L. Burt
FTEA, Zingiberac.: 15 (1985).

Syn.: *Kaempferia rosea* Bak.: FTA 7: 295 (1898); FS: 394 (1929); FPS 3: 255 (1956); WICKENS 1976: 155.

Imatong Mountains group, Sudan side: Kinyeti Valley, 12 km. south of Hiliu along Katire road (4° 09' N, 32° 41' E), no alt., 1.6.1984, *Kielland-Lund* 822 (C, NLH).

Imatong Mountains group, Uganda side: below Lututuru, 1220 m., grassland, 4.1938, *Eggeling* 3588 (K); north of Okato, south of Mingaro, no alt., shallow soil over rock, 10.6.1973, *Katende* 1880 (EA, MHU).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Sudan to Uganda and Kenya, south to Zambia, Malawi and Mozambique.

Fam. 153. **Marantaceae** Petersen

Marantochloa Brogn. ex Gris.

Marantochloa leucantha (K. Schum.) Milne-Redh.

FTEA, Marantac.: 6 (1952); FPS 3: 257 (1956); JACKSON 1956: 355 {Talanga, Lotti, Laboni}; FG 9: 124 (1964); FC 4: 127 (1965); FWTA 3,1: 83 (1968); FE 6: 335 (1997).

Syn.: *Donax leucantha* K. Schum.: FTA 7: 317 (1898). *Donax ugandensis* K. Schum.: FTA 7: 317 (1898). *Clinogyne ugandensis* K. Schum.: FS: 395 (1929).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., forest, 1979, *Shigeta* 126 (EA, identified and listed by M.G. Gilbert, not traced); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and

Milicia excelsa, in swampy clearings and along trails, 3.12.1980, *Friis & Vollesen* 655 (C, K); Talanga forest, 970 m., undergrowth in closed forest under *Coffea*, 16.12.1935, *Thomas* 1587 (BM, K); Talanga forest, 1000 m., in forest, 16.3.1950, *Jackson* 1218 (BM, WM).

General habitat range: in lowland and medium-altitude forest, often in moist places.

General distribution: Guinée and Sierra Leone to Ethiopia, south to Angola, Congo [previously Zaire] and Tanzania.

Trachyprynium Benth.

Trachyprynium braunianum (K. Schum.) Bak. FTA 7: 319 (1898); FS: 396 (1929); FTEA, Marantac.: 2 (1952); FPS 3: 257 (1956); JACKSON 1956: 355, swamp forest; FG 9: 98 (1964); FC 4: 106 (1965); FWTA 3,1: 89 (1968).

Imatong Mountains group, Sudan side: No specimen seen; recorded by JACKSON 1956 from moist places in lowland forest.

General habitat range: in lowland and medium-altitude forest, often in moist places.

General distribution: Guinée and Sierra Leone to Ethiopia, south to Congo [previously Zaire] and Uganda.

Fam. 154. **Cannaceae** Juss.

Canna L.

Canna sp. (a garden hybrid)
FE 6: 333.

Imatong Mountains group, Sudan side: Loa, Molitokoro village north of Kerepi (3° 55' N, 31° 55' E), no alt., 5.6.1984, *Kielland-Lund* 860 (C, NLH).

General habitat range: cultivated in gardens and occasionally escaped in a wide range of habitats in lowlands and at medium altitudes.

General distribution: the cultivated and escaped

plants of *Canna* have been produced from four American species, *Canna iridiflora* Ruiz & Pavon, *Canna indica* L., *Canna glauca* L. and *Canna flaccida* Salisb. The garden hybrids are now cultivated and occasionally escaped throughout the tropics and the warm temperate regions.

Order 74. Liliales Perleb

Fam. 155. Hyacinthaceae Batch

Albuca L.

Albuca abyssinica Jacq.

FTA 7: 533 (1898); FPS 3: 260 (1956); FWTA 3,1: 103 (1968); UKWF: 319 (1994); FSo 4: 50 (1995); FTEA, Hyacinthac.: 22 (1996); FE 6: 145 (1997); HYF: 404 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, plain between Torit and Ngarama, Iyedo (4° 22' N, 32° 37' E), no alt., 29.5.1984, *Kielland-Lund* 786 (NLH); Imatong Junction, between Torit and Hiliu, near Ngarama (4° 20' N, 32° 38' E), no alt., 14.1.1984, *Kielland-Lund* 627 (C, NLH) & no alt., in dry *Combretum* woodland, 24.5.1984, *Kielland-Lund* 719 (C, NLH); Gilo, at bridge on Ngairigi River, 1800 m., burnt *Loudetia arundinacea* grassland with scattered trees, 3.3.1982, *Friis & Vollesen* 1083 (C).

General habitat range: in medium-altitude and montane woodland and wooded grassland.

General distribution: Nigeria to Ethiopia and Somalia, south to Angola and Botswana; also in tropical Arabia.

Dipcadi Medik.

Dipcadi viride (L.) Moench

FTA 7: 523 (1898); UKWF: 319 (1994); FSo 4:

51 (1995); FTEA, Hyacinthac.: 3 (1996); FE 6: 139 (1997).

Syn.: *Dipcadi unifolium* Bak.: FPS 3: 269 (1956). *Dipcadi filifolium* Bak.: FPS 3: 269 (1956). *Dipcadi tacazezanum* (A. Rich.) Bak.: FPS 3: 269 (1956); FWTA 3(1): 106 (1968). *Dipcadi lanceolatum* Bak.: FPS 3: 269 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, near junction Imatong village-Torit plain near Ngarama (4° 21' N, 32° 38' E), no alt., in dry *Combretum* woodland, 24.5.1984, *Kielland-Lund* 714 (C, NLH).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and woodland, often in shallow soil.

General distribution: Senegal to Ethiopia and Somalia, through eastern Africa to South Africa; also in tropical Arabia.

Drimia Jacq.

Syn.: *Urginea* Steinh.

Drimia altissima (L. f.) Ker Gawl.

UKWF: 319 (1994); FSo 4: 52 (1995); FTEA, Hyacinthac.: 19 (1996); FE 6: 144 (1997).

Syn.: *Urginea altissima* (L. f.) Bak.: FTA 7: 538 (1898); FPS 3: 274 (1956); FWTA 3,1: 102 (1968); WICKENS 1976: 156. *Urginea micrantha* Solms.: FTA 7: 537 (1898); FS: 382 (1929); CHIPP 1929: 193; JACKSON 1956: 350, moist savannah.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, across Kalikoi stream, no alt., 13.3.1984, *Kielland-Lund* 1012 (C, NLH); Is-sore, 1680 m., in fire-swept grassland, appears soon after grass fires, 9.2.1929, *Chipp* 59 (K).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2049 (EA, MHU, NLH).

General habitat range: in lowland and medium-altitude wooded grassland.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa (Cape Prov.).

***Drimia elata* Jacq.**

FTEA, Hyacinthac.: 17 (1996).

Syn.: *Drimia zombensis* Bak.: FTA 7: 525 (1898); FWTA 3,1: 106 (1968); UKWF: 319 (1994).

Imatong Mountains group, Sudan side: Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, recently burnt, also in crevices in rocky outcrops, 16.2.1982, Friis & Vollesen 918 (BR, C, KHF).

Imatong Mountains group, Uganda side: above Agoro, 2130 m., in burnt grassland, 2.1938, Eggeling 3506 (K).

General habitat range: in medium-altitude and montane woodland, wooded grassland and grassland, often in rocky places.

General distribution: Guinée and Sierra Leone to South Sudan and Uganda, south to Mozambique, Malawi, Zambia and Zimbabwe.

***Drimia indica* (Roxb.) Jessop**

UKWF: 319 (1994); FTEA, Hyacinthac.: 18 (1996); FE 6: 143 (1997).

Syn.: *Scilla indica* Roxb. *Urginea indica* (Roxb.) Kunth: FTA 7: 540 (1898); FS: 382 (1929); FWTA 3,1: 102 (1968); UKWF: 693 (1974); WICKENS 1976: 157.

Imatong Mountains group, Uganda side: 4 km. south east of Mt. Lomwaga, 1500 m., shallow soil over rock in tall-grass grassland, 18.7.1974, Katende 2161 (MHU).

General habitat range: in medium-altitude and montane woodland and wooded grassland, often in sandy soil or shallow soil over rocks.

General distribution: Mauritania to Ethiopia and Somalia, south to South Africa (Natal); also in India.

***Drimia sudanica* Friis & Vollesen**

FRIIS & VOLLESEN 1999: 210.

Syn.: *Urginea pauciflora* Bak.: FTA 7: 539 (1898); FWTA 3,1: 103 (1968).

Imatong Mountains group, Sudan side: slope of Mt. Lohocho (Ilungi), above the Katire-Gilo road, 2000 m., *Loudetia arundinacea* grassland

with scattered trees, burnt c. two weeks previously, 7.3.1982, Friis & Vollesen 1126 (BR, C, K).

General habitat range: in frequently burnt medium-altitude and montane grassland and wooded grassland (a rarely collected plant).

General distribution: Sierra Leone, Guinée, South Sudan.

Ledebouria* Roth**Ledebouria revoluta* (L. f.) Jessop**

FSO 4: 55 (1995); FTEA, Hyacinthac.: 15 (1996); FE 6: 142 (1997).

Syn.: *Scilla hyacinthina* (Roth) Macbr.: FPS 3: 273 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, 100 m. east of stream E of Hiliu Farm, (4° 16' N, 32° 48' E), no alt., 24.5.1984, *Kieland-Lund* 707 (C, NLH).

Imatong Mountains group, Uganda side: Imatong Mountains, without further loc., 2500 m., grassland, 4.1938, Eggeling 3623 (K).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and woodland.

General distribution: South Sudan and Ethiopia, through eastern Africa to South Africa (Cape Prov.).

Ornithogalum* L.**Ornithogalum tenuifolium* F. Delaroche**

UKWF: 320 (1994); FSO 4: 53 (1995); FTEA, Hyacinthac.: 27 (1996); FE 6: 147 (1997).

Syn.: *Ornithogalum ecklonii* Schlechtend.: FTA 7: 546 (1898); FS: 384 (1929); FPS 3: 271 (1956); UKWF: 697 (1974); *Ornithogalum sordidum* Bak.: FTA 7: 546 (1898).

Imatong Mountains group, Sudan side: south east of Torit, between Torit and Ngarama (4° 22' N, 32° 37' E), no alt., 28.5.1984, *Kieland-Lund* 770 (C, NLH); Kinyeti Valley, near junction Ima-

tong village-Torit plain near Ngarama (4° 21' N, 32° 38' E), no alt., in wet *Combretum* woodland, 24.5.1984, *Kielland-Lund* 716 (C, NLH); lower southern slope of Mt. Konoro, 2300 m., *Loudetia arundinacea* grassland on shallow soil, recently burnt, 18.2.1982, *Friis & Vollesen* 945 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2048 (MHU).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and wooded grassland.

General distribution: Sudan to Ethiopia and Somalia, south to South Africa (Cape Prov.).

Fam. 156. **Colchicaceae** DC.

Gloriosa L.

Gloriosa superba L.

FTA 7: 563 (1898); FWTA 3,1: 106 (1968); WICKENS 1976: 156; UKWF: 322 (1994); FSo 4: 67 (1995); FE 6: 184 (1997).

Syn.: *Gloriosa simplex* L.: FPS 3: 271 (1956); FWTA 3,1: 106 (1968). *Gloriosa virescens* Lindl.: FTA 7: 563 (1898). *Gloriosa abyssinica* A. Rich.: FTA 7: 565 (1898). *Gloriosa carsoni* Bak.: FTA 7: 565 (1898).

Imatong Mountains group, Sudan side: without further locality, 1400 m., 10.4.1933, *Smith* 15 (K, KHF); west of Acholi Mountains, west of junction to Palotaka, near Magwe (4° 07' N, 32° 17' E), no alt., 4.6.1984, *Kielland-Lund* 837 (C, NLH); Gilo, 1900 m., weed in garden, 10.5.1954, *Jackson* 3156 (K).

General habitat range: in lowland, intermediate and montane woodland, wooded grassland and forest clearings.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa (Transvaal, Natal); also in tropical Asia.

Wurmbea Thunb.

Wurmbea tenuis (Hook. f.) Bak.

FTA 7: 560 (1868); FWTA 3,1: 107 (1968). NORDENSTAM 1978: 221; UKWF: 322 (1994). subsp. **hamiltonii** (Wendelbo) B. Nord. NORDENSTAM 1978: 224.

Imatong Mountains group, Uganda side: Lomwaga, 2590 m., 6.1942, *Eggeling* 5075 (EA); Langia, 2830 m., grassland, 4.1943, *Purseglove* 1429 (EA, K).

General habitat range: in montane grassland.

General distribution: Uganda, Kenya and Tanzania. Species as a whole from Nigeria to Ethiopia, south to Zambia.

Fam. 157. **Asphodelaceae** Juss.

Bulbine Willd.

Bulbine abyssinica A. Rich.

UKWF: 313 (1994); FSo 4: 34 (1995); FE 6: 111 (1997); HYF: 402 (1997).

Syn.: [*Bulbine asphodeloides* auct., non (L.) Schult. f.: FTA 7: 475 (1898); FPS 3: 266 (1956)].

Imatong Mountains group, Uganda side: north of Madi Opei, 910 m., open woodland, 4.1943, *Purseglove* 1368 (EA).

Didinga Mountains: 18 km. north of Chukudum, 1060 m., wooded grassland, 29.4.1939, *Myers* 11,228 (K, WM).

General habitat range: in lowland and medium-altitude woodland and grassland.

General distribution: South Sudan, Ethiopia and North Somalia south to South Africa; also in tropical Arabia.

Kniphofia Moench**Kniphofia pumila** (Ait.) Kunth

FE 6: 107 (1997).

Syn.: *Kniphofia leichtlinii* Bak.: FTA 7: 452 (1898).**Imatong Mountains group, Sudan side:** Kipia, 2680 m., in open spaces in *Podocarpus latifolius* forest, 28.7.1939, Myers 11,680 (K).**Imatong Mountains group, Uganda side:** Lomwaga, 2590 m., flowers red (no yellow), 6.1942, Eggeling 5071 (EA, K).**General habitat range:** in montane grassland.**General distribution:** South Sudan, Ethiopia, North East Congo [previously Zaire] and North Uganda.Fam. 158. **Aloaceae** J. Agardh**Aloe** L.**Aloe labworana** (Reynolds) S. Holmes

FTEA, Aloac.: 28 (1994).

Syn.: *Aloe schweinfurthii* Bak., pro parte: FPS 3: 261 (1956). *Aloe schweinfurthii* Bak. var. *labworana* Reynolds: REYNOLDS 1966: 292.**Imatong Mountains group, Sudan side:** Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeolanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, Friis & Vollesen 553 (BR, C, K, KHF); Kinyeti Valley, half way between Torit and Hiliu, near Imatong junction (4° 21' N, 32° 38' E), no alt., 31.5.1984, Kielland-Lund 813 (C, NLH).**Didinga Mountains:** rocks north-east of Chukudum (4° 15' N, 33° 27' E), 1100 m., 21.12.1983, Kielland-Lund 436 (C, NLH).**General habitat range:** on rocky outcrops in woodland and grassland.**General distribution:** Only known from a few places in Northern Uganda and the Imatong Mountains in South Sudan.**Note:** The related species, *Aloe schweinfurthii* Bak., occurs in similar habitats from Ghana to South Sudan.**Aloe macleayi** Reynolds

MACLEAY 1963: 142; REYNOLDS 1966: 298.

Imatong Mountains group, Sudan side: without further locality, 1530-1830 m., 1939, Andrews 1843 (K); Gilo, 1650 m., grassland above bridge across Ngairigi River, no date, MacLeay in Reynolds 6773 (EA, K, isotypes, KHU, photo); cultivated in the botanical garden of Khartoum from the type locality in Imatong Mountains, 29.10.1956, MacLeay s.n. (KHU); ridge leading to summit of Mt. Kinyeti, 3000 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, Friis & Vollesen 1289 (C, K); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m., above timberline, 10.6.1984, Kielland-Lund 923 (C, NLH).**General habitat range:** in montane grassland.**General distribution:** Not known elsewhere.**Aloe schweinfurthii** Bak.

FTA 7: 467 (1898); REYNOLDS 1966: 288; FTEA, Aloac.: 27 (1994).

Imatong Mountains group, Sudan side: Kinyeti Valley, 10 km. north of Hiliu towards Torit, 650 m., 8.12.1983, Kielland-Lund 262 (C, NLH).**Didinga Mountains:** Kiduri, north of Chukudum (4° 17' N, 33° 26' E), 1100 m., 20.12.1983, Kielland-Lund 389 (C, NLH); between Keiala and Chukudum (4° 15' N, 33° 27' E), 1100 m., 22.12.1983, Kielland-Lund 446 (C, NLH).**General habitat range:** on granite outcrops in lowland and medium-altitude grassland.**General distribution:** Ghana eastwards to northern Congo [previously Zaire], northern Uganda and Southern Sudan.**Aloe** sp.**Imatong Mountains group, Uganda side:** Record-

ed from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; as "*Aloe volkensii*"; no specimen documents this record).

Note: According to FTEA, Aloac.: 54 (1994) *Aloe volkensii* Engl. is only represented in Uganda by *Aloe volkensii* subsp. *multicaulis* S. Carter & L.E. Newton, known from U2 and U4. We find it difficult to accept the record of *Aloe volkensii* from the study area on this basis.

Fam. 159. **Asparagaceae** Juss.

Asparagus L.

Asparagus africanus Lam.

FTA 7: 433 (1898); FS: 374 (1929); FWTA 3,1: 94 (1968); WICKENS 1976: 155; UKWF: 311 (1994); FSo 4: 25 (1995); FE 6: 68 (1997); HYF: 399 (1997).

Syn.: *Asparagus scaberulus* A. Rich.: FPS 3: 264 (1956); FSo 4: 25 (1995). *Asparagus asiaticus* L. var. *scaberulus* (A. Rich.) Engl.: CHIPP 1929: 193; JACKSON 1956: 369 & 370.

Imatong Mountains group, Sudan side: summit of Mt. Kinyeti, 3170 m., a dwarf plant sheltering under rocks, 11.2.1929, *Chipp* 62 (K); Kinyeti, 2810 m., mountain cloud forest, 4.7.1947, *MacLeay* 162 (BM); near summit of Mt. Kinyeti, 3100 m., in ericaceous bushland, 15.11.1949, *Jackson* 973 (BM, KHF).

General habitat range: in lowland and medium-altitude deciduous bushland and montane dry evergreen bushland and forest.

General distribution: Sudan, Ethiopia and Somalia south to South Africa; also in tropical Arabia.

Asparagus buchananii Bak.

FTA 7: 434 (1898); FSo 4: 27 (1995).

Imatong Mountains group, Sudan side: Kinyeti Valley, 75 m. east of stream east of Hiliu (4° 16' N, 32° 48' E), no alt., in woodland, 24.5.1984, *Kielland-Lund* 701 (C, NLH).

General habitat range: in lowland and medium-altitude bushland and woodland.

General distribution: South East Sudan to Uganda, Kenya and South Somalia, through eastern Africa and East Congo [previously Zaire] and Rwanda to Angola, Namibia and South Africa (Transvaal, Natal). First record from the Sudan.

Asparagus flagellaris (Kunth) Bak.

FTA 7: 430 (1898); FPS 3: 263 (1956); FWTA 3,1: 93 (1968); WICKENS 1976: 155; UKWF: 311 (1994); FSo 4: 26 (1995); FE 6: 70 (1997).

Syn.: *Asparagus paulo-guelmi* Solms-Laub.: FTA 7: 428 (1898); FS: 374 (1929).

Imatong Mountains group, Sudan side: Kinyeti Valley, Imatong Junction, between Torit and Hiliu, near Ngarama (4° 20' N, 32° 38' E), no alt., 14.1.1984, *Kielland-Lund* 628 (C, NLH); Kinyeti Valley, 16 km. north of Katire, 900 m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, 22.2.1982, *Friis & Vollesen* 1002 (C, K, KHF); near Logoforok, 700 m., woodland with *Acacia mellifera* and *A. tortilis*, 2.2.1949, *Jackson* 626 (FHO, KHF).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2045 (MHU).

General habitat range: in lowland and medium-altitude woodland, wooded grassland and deciduous bushland.

General distribution: Senegal to Ethiopia and South Somalia, south to South Africa.

Asparagus racemosus Willd.

FTA 7: 434 (1898); FS: 374 (1929); FPS 3: 264 (1956); FWTA 3,1: 93 (1968); UKWF: 311 (1994); FSo 4: 26 (1995); FE 6: 71 (1997); HYF: 399 (1997).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 23.1.1979, *Shigeta* 90 (EA); Kinyeti Valley, c. 5 km. south of Hiliu on the road to Imeila, 750 m., rocky slope with many boulders, *Combretum molle* dominant, and

much *Xerophyta simulans* growing on the bare rocks, 10.3.1982, *Friis & Vollesen* 1165 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: Agoro, 1990 m., grassland, 12.1932, *Eggeling* 781 (MHU).

General habitat range: in lowland and medium-altitude woodland and at forest edges.

General distribution: Guinea Bissau to Ethiopia and South Somalia, south to South Africa; also in tropical Asia, including tropical Arabia.

Fam. 160. **Anthericaceae** J. Agardh

Chlorophytum Ker-Gawl.

Syn.: *Anthericum* L., pro parte.

Chlorophytum andongense Bak.

FTA 7: 506 (1898); FS: 378 (1929); FPS 3: 267 (1956); FWTA 3,1: 102 (1968); FTEA, Anthericac.: 10 (1997).

Imatong Mountains group, Sudan side: Torit to Imurok (4° 22' N, 32° 28' E), 700 m., 22.6.1961, *Jackson* 4264 (K); Kinyeti Valley, 12 km. south of Hiliu along Katire road (4° 09' N, 32° 41' E), no alt., in teak plantation, 1.6.1984, *Kielland-Lund* 826.

General habitat range: in lowland and medium-altitude woodland and wooded grassland, at forest margins, often on termite mounds.

General distribution: Guinée and Sierra Leone to Sudan, south to Angola, Zimbabwe and Mozambique.

Chlorophytum blepharophyllum Schweinf. ex Bak.

FTA 7: 507 (1898); FS: 378 (1929); FPS 3: 264 (1956); FWTA 3,1: 100 (1968); WICKENS 1976: 156; NORDAL & THULIN 1993: 262; UKWF: 317 (1994); FE 6: 105 (1997); FTEA, Anthericac.: 51 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, 12 km. south of Hiliu along Katire road

(4° 09' N, 32° 41' E), no alt., 1.6.1984, *Kielland-Lund* 820 (C, NLH); 18 km. north of Katire, 750 m., woodland with *Combretum collinum*, *C. molle*, *Annona senegalensis*, etc., 18.3.1982, *Friis & Vollesen* 1248 (C, K).

Imatong Mountains group, Uganda side: without further locality, 2290 m., grassland, 4.1938, *Eggeling* 3582 (K); Langia, 1220 m., grassland, 4.1943, *Purseglove* 1440 (EA, K); 2 km. east of Lututuru, near a rivulet, 1400 m., in open woodland, 17.2.1969, *Lye* 2112 (MHU).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1830 m., grassland, 4.1960, *Wilson* 930 (EA).

General habitat range: in lowland and medium-altitude grassland and open bushland.

General distribution: Senegal to West Ethiopia, south to Angola, Zimbabwe and Mozambique.

Chlorophytum cameronii (Bak.) Kativu

KATIVU & NORDAL 1993: 62; NORDAL & THULIN 1993: 262; UKWF: 317 (1994); FE 6: 102 (1997); FTEA, Anthericac.: 30 (1997).

var. **cameronii**

FTEA, Anthericac.: 31 (1997).

Syn.: *Anthericum cameronii* Bak. [*Anthericum triflorum* auct., non Ait.: FTA 7: 493 (1898)].

Imatong Mountains group, Uganda side: without further locality, 2140 m., grassland, 4.1938, *Eggeling* 3590 (K).

General habitat range: in lowland and medium-altitude grassland and bushland.

General distribution: East Congo [previously Zaire] to South Ethiopia, south to Zambia and Malawi.

var. **pteroaulon** (Bak.) Nordal

FTEA, Anthericac.: 32 (1997).

Syn.: *Anthericum pterocaulon* Bak.: FTA 7: 481 (1898); FWTA 3,1: 96 (1968); *Chlorophytum pterocaulon* (Bak.) Kativu: KATIVU & NORDAL 1993: 63; *Anthericum zanguibaricum* Bak.: FTA 7: 481 (1898); *Anthericum rubellum* Bak.: FTA 7: 482 (1898); *Anthericum speciosum* Bak.: FTA 7: 486 (1898); *Anthericum giryamae* Rendle: FTA 7: 487

(1898); *Anthericum purpuratum* Rendle: FTA 7: (1898); *Anthericum buchananii* Bak.: FTA 7: 486 (1898).

Imatong Mountains group, Uganda side: 4 km. south east of Mt. Lomwaga, 1900 m., area with shallow soil in tall-grass grassland, 18.7.1974, *Katende* 2136 (EA, MHU).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Benin to Sudan, south to Angola, Zimbabwe and Mozambique. Species as a whole within the same general range as the two varieties recorded here.

Chlorophytum comosum (Thunb.) Jacq.

NORDAL & THULIN 1993: 262; UKWF: 318 (1994); FE 6: 6: 102 (1997); FTEA, Anthericac.: 55 (1997).

Syn.: *Chlorophytum sparsiflorum* Bak.: FTA 7: 498 (1898); FWTA 3,1: 100 (1968); *Chlorophytum miserum* Rendle: FTA 7: 496 (1898); *Chlorophytum ramiferum* Rendle: FTA 7: 496 (1898); *Chlorophytum bukobense* Engl.: FTA 7: 504 (1898).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near compound, 700 m., 28.11.1983, *Kielland-Lund* 80 (C, NLH); Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 9.11.1980, *Friis & Vollesen* 83 (C, K, KHF).

General habitat range: in lowland and medium-altitude forest and riverine habitats.

General distribution: Sierra Leone to Ethiopia, south to South Africa (Cape Prov.).

Chlorophytum gallabatense Schweinf. ex Bak.

FTA 7: 504 (1898); FS: 378 (1929); FPS 3: 267 (1956); FWTA 3,1: 99 (1968); WICKENS 1976: 156; NORDAL & THULIN 1993: 265; UKWF: 318 (1994); FS_o 4: 48 (1995); FE 6: 99 (1997); FTEA, Anthericac.: 45 (1997).

Didinga Mountains: Iwowa, 1620 m., occasional in damp khor, 22.4.1939, *Myers* 11,031 (K).

General habitat range: in lowland and intermediate grassland and open bushland.

General distribution: Senegal to Ethiopia and South Somalia, south to Zimbabwe.

Chlorophytum lancifolium Welw. ex Bak.

FTA 7: 498 (1898); FTEA, Anthericac.: 60 (1997).

Syn.: *Chlorophytum cordatum* Bak. & Engl.: FPS 3: 267 (1956).

Imatong Mountains group, Sudan side: Lotti, near rest house, no alt., forest, 9.6.1939, *Andrews* 1754 (K); Talanga to Upper Talanga, 1100 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 10.12.1980, *Friis & Vollesen* 787 (C, K).

General habitat range: in closed lowland forest and at forest margins.

General distribution: Sudan south to Angola and Congo [previously Zaire].

Chlorophytum longifolium Bak.

FTA 7: 507 (1898); FPS 3: 268 (1956); NORDAL & THULIN 1993: 269; FE 6: 94 (1997); FTEA, Anthericac.: 17 (1997).

Syn.: *Anthericum longifolium* A. Rich. (1850), nom. illeg., non Jacq.; *Dasystachys falcata* Bak.: FTA 7: 512 (1898); *Dasystachys drimiopsis* (Bak.) Benth.: FTA 7: 510 (1898); *Dasystachys papillosa* Bak.: FTA 7: 514 (1898).

Imatong Mountains group, Uganda side: north of Okako, south of Mingaro (3° 55' N, 32° 55' E), no alt., montane grassland, 9.6.1973, *Katende* 1863 (MHU).

General habitat range: in lowland, medium-altitude and montane grassland, often on slopes with shallow, rocky soil.

General distribution: Uganda to Ethiopia, south to Namibia and Botswana.

Chlorophytum micranthum Bak.

FTA 7: 507 (1898); FS: 379 (1929); FPS 3: 268 (1956); NORDAL & THULIN 1993: 269; UKWF:

318 (1994); FE 6: 99 (1997); FTEA, Anthericac.: 46 (1997).

Imatong Mountains group, Sudan side: Kinyeti valley, 10 km. north of Katire, 700 m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, 11.3.1982, Friis & Vollesen 1168 (C, K, KHf).

Imatong Mountains group, Uganda side: north of Madi Opei, 910 m., woodland, 4.1943, *Purse-glove* 1370 (EA); 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2041 (EA, MHU, NLH).

General habitat range: in lowland and medium-altitude grassland and open woodland.

General distribution: Sudan, South West Ethiopia and Kenya.

Chlorophytum stenopetalum Bak.

FTA 7: 502 (1898); FWTA 3,1: 100 (1968); FTEA, Anthericac.: 54 (1997).

Syn.: *Chlorophytum menyharthii* Bak.: FTA 7: 503 (1898). *Chlorophytum schweinfurthii* Bak.: FTA 7: 503 (1898); FPS 3: 267 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, south west of Hiliu, small ravine (4° 16' N, 32° 48' E), no alt., 25.5.1984, *Kielland-Lund* 725 (C, NLH); south east of Torit, 2 km. from junction along Imatong road and 500 m. east of road east of Ngarama (4° 21' N, 32° 39' E), no alt., 26.5.1984, *Kielland-Lund* 763 (NLH).

General habitat range: in lowland and medium-altitude open forest and riverine fringes, often on termite mounds.

General distribution: Sierra Leone to Sudan and Ethiopia, south to Angola, Zambia, Malawi and Mozambique.

Chlorophytum subpetiolatum (Bak.) Kativu

KATIVU & NORDAL 1993: 64; NORDAL & THULIN 1993: 276; FSo 4: 48 (1995); FE 6: 100 (1996); FTEA, Anthericac.: 36 (1997).

var. **subpetiolatum**

Syn.: *Anthericum subpetiolatum* Bak.: FTA 7: 481 (1898); FWTA 3,1: 96 (1968). *Anthericum mono-*

phyllum Bak.: FTA 7: 485 (1898); FS: 376 (1929); FPS 3: 261 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, plain between Torit and Ngarama, Iyedo (4° 22' N, 32° 37' E), no alt., 29.5.1984, *Kielland-Lund* 784 (C, NLH); 100 m. east of stream east of Hiliu (4° 16' N, 32° 48' E), no alt., 24.5.1984, *Kielland-Lund* 709 (NLH); south west of Hiliu (4° 16' N, 32° 48' E), no alt., at big stone in flat area, 25.5.1984, *Kielland-Lund* 731 (C, NLH); Kinyeti Valley, 12 km. south of Hiliu along Katire road (4° 09' N, 32° 41' E), no alt., 1.6.1984, *Kielland-Lund* 823 (NLH); slope of Mt. Lohocho (Ilungi), above the Katire-Gilo road, 2000 m., *Loudetia arundinacea* grassland with scattered trees, burnt about two weeks previously, 7.3.1982, Friis & Vollesen 1127 (BR, C, EA, K).

Imatong Mountains group, Uganda side: 3-5 km. south east of Lututuru, 1400 m., shallow grassland over rocks, 17.2.1969, *Lye* 2111 (EA, K, MHU, NLH, UPS).

General habitat range: in lowland woodland and wooded grassland.

General distribution: Nigeria to South Somalia, south to Angola, Zimbabwe and Mozambique.

Chlorophytum tuberosum (Roxb.) Bak.

FTA 7: 508 (1898); FS: 379 (1929); FPS 3: 269 (1956); FWTA 3,1: 102 (1968); WICKENS 1976: 156; NORDAL & THULIN 1993: 277; UKWF: 318 (1994); FSo 4: 47 (1995); FE 6: 97 (1997); FTEA, Anthericac.: 28 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, plain between Torit and Ngarama, Iyedo (4° 22' N, 32° 37' E), no alt., 29.5.1984, *Kielland-Lund* 782 (C, NLH) & 783 (NLH); near junction Imatong village-Torit plain near Ngarama (4° 21' N, 32° 38' E), no alt., drainage valleys in *Combretum* woodland, 24.5.1984, *Kielland-Lund* 715 (C, NLH).

General habitat range: in lowland and medium-altitude grassland, bushland and woodland, often in seasonally flooded areas on badly

drained, heavy black cotton soil, or sometimes on lighter, sandy, and lateritic soils; often in degraded vegetation.

General distribution: Nigeria to Ethiopia and Somalia, south to Tanzania; also in India.

Fam. 161. **Eriospermaceae** Endl.

Eriospermum Jacq.

Eriospermum abyssinicum Bak.

FTA 7: 471 (1898); FS: 376 (1929); FPS 3: 271 (1956); FWTA 3,1: 94 (1968); UKWF: 313 (1994); FTEA, Eriospermac.: 4 (1996); FE 6: 136 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, Imatong Junction, between Torit and Hiliu, near Ngarama (4° 20' N, 32° 38' E), no alt., 14.1.1984, *Kielland-Lund* 624 (C, NLH); south west of Hiliu (4° 16' N, 32° 48' E), no alt., near big stone in flat area, 25.5.1984, *Kielland-Lund* 737 (C, NLH); Upper Kinyeti Valley, Ngairigi Basin, no alt., rocky area near stream, 9.4.1978, *Howard* s.n. (K); near Gilo Swimming Pool, 1750 m., 26.12.1983, *Kielland-Lund* 472 (C, NLH); Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 23.11.1980, *Friis & Vollesen* 419 (C, K, KHF); lower southern slope of Mt. Konoro, 2300 m., *Loudetia arundinacea* grassland on shallow soil, recently burnt, 18.2.1982, *Friis & Vollesen* 944 (C, K, KHF).

Imatong Mountains group, Uganda side: 4 km. south east of Mt. Lomwaga, 1500 m., rocky outcrop in grassland, 18.7.1974, *Katende* 2189 B (MHU).

General habitat range: in lowland, medium-altitude and montane wooded grassland, often in damp areas among rocks.

General distribution: Senegal to Ethiopia, south to South Africa (Transvaal).

Eriospermum triphyllum Bak.

FTA 7: 473 (1898); UKWF: 313 (1994); FTEA, Eriospermac.: 3 (1996).

Imatong Mountains group, Sudan side: Kinyeti Valley, near junction Imatong village-Torit plain (near Ngarama), (4° 21' N, 32° 38' E), no alt., in *Combretum* woodland, 24.5.1984, *Kielland-Lund* 717 (C, NLH).

General habitat range: in lowland, medium-altitude and montane grassland and bushland, often in damp areas among rocks.

General distribution: South East Sudan and North East Uganda to Ethiopia and Kenya, through eastern Africa to Zambia, Zimbabwe and Mozambique. First record from the Sudan.

Fam. 162. **Smilacaceae** Vent.

Smilax L.

Smilax anceps Willd.

FTEA, Smilacac.: 2 (1989); UKWF: 310 (1994); KTSL: 640 (1994); FE 6: 65 (1997).

Syn.: *Smilax kraussiana* Meisn.: FTA 7: 424 (1898); FS: 373 (2929); FPS 3: 279 (1956); FWTA 3,1: 112 (1968); EL AMIN 1990: 455, in annually burnt deciduous woodland.

Imatong Mountains group, Sudan side: above Gilo Pool (4° 02' N, 32° 50' E), no alt., 15.1.1984, *Kielland-Lund* 647 (C, NLH); Mt. Angargi, 1830-2140 m., 14.6.1939, *Andrews* 1953 (K); Gilo to Mt. Konoro, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 23.11.1980, *Friis & Vollesen* 422 (C).

Imatong Mountains group, Uganda side: Langia, 1520 m., bamboo forest, 4.1943, *Purseglove* 1385 (EA, K); 3 km. south east of Lomwaga, 1900 m., in tall-grass grassland, 18.7.1974, *Katende* 2121 (EA, MHU).

General habitat range: in lowland, medium-altitude and montane forest and bushland, often along rivers and lakesides and in swamps.

General distribution: Senegal to Ethiopia and

Kenya, south to South Africa (Transvaal, Natal, Cape Prov.); also in Madagascar.

Order 75. **Arales** Dumort.

Fam. 163. **Araceae** Juss.

Alocasia (Schott) G. Don

Alocasia macrorrhiza (L.) G. Don

FTEA, Arac.: 4 (1985); FC 31: 122 (1988).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., 1979, *Shigeta* 58 (EA, identified and listed by M.G. Gilbert, not traced).

General habitat range: Cultivated, frequently persisting in abandoned cultivations or naturalised.

General distribution: Throughout the humid tropics.

Amorphophallus Decne.

Amorphophallus abyssinicus (A. Rich.) N.E. Br.

FTA 8: 160 (1901); FPS 3: 280 (1956); FWTA 3,1: 118 (1968); WICKENS 1976: 157; FTEA, Arac.: 29 (1985).

Syn.: *Amorphophallus schweinfurthii* (Engl.) N.E. Brown: FTA 8: 149 (1901); FS: 370 (1929). *Amorphophallus barteri* N.E. Brown: FTA 8: 151 (1901).

Imatong Mountains group, Sudan side: Kinyeti Valley, 3 km. south of Hiliu along Katire road (4° 14' N, 32° 40' E), no alt., 1.6.1984, *Kielland-Lund* 816 (C, NLH).

General habitat range: in lowland, medium-altitude and montane grassland, wooded grassland and woodland, often in seasonally flooded or swampy places.

General distribution: Ghana to Ethiopia, south to Zimbabwe.

Anchomanes Schott

Anchomanes difformis (Blume.) Engl.

FPS 3: 280 (1956); FWTA 3,1: 121 (1968); FTEA, Arac.: 25 (1985); FC 31: 23 (1988).

Syn.: *Anchomanes dubius* Schott: FTA 8: 163 (1901). *Anchomanes hookeri* (Kunth) Schott: FTA 8: 162 (1901).

Imatong Mountains group, Sudan side: Talanga, 900 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 1.3.1982, *Friis & Vollesen* 1064 (BR, C, K, KHf).

General habitat range: in lowland and medium-altitude forest.

General distribution: Sierra Leone to Sudan, south to Angola, Zambia and Tanzania.

Arisaema Mart.

Arisaema enneaphyllum Hochst. ex A. Rich.

FTA 8: 144 (1901); FTEA, Arac.: 61 (1985); UKWF: 298 (1994); FE 6: 46 (1997).

Imatong Mountains group, Sudan side: Kipia to Mt. Kinyeti, 2930 m., in closed forest, 4.7.1947, *MacLeay* 175 (BM); slope of Mt. Kinyeti, 2900 m. in open *Rapanea-Hagenia-Dombeya torrida* forest with abundant *Cyperus* sp., 24.4.1950, *Jackson* 1413 A (K).

General habitat range: in montane forest.

General distribution: South Sudan, Ethiopia, Uganda and Kenya.

Arisaema schimperanum Schott

FTA 8: 143 (1901); FTEA, Arac.: 63 (1985); FE 6: 46 (1997).

Syn.: *Arisaema* sp.: FPS 3: 280 (1956) {Didinga Mountains, Mt. Lotuke}.

Imatong Mountains group, Sudan side: Itibol, 1950 m., in forest, 1939, *Andrews* 1996 (K); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 59' N, 32° 53' E), 2400

m., 9.6.1984, *Kielland-Lund* 898 (C, NLH); Kipia, 2680 m., *Podocarpus latifolius* forest, 26.7.1939, *Myers* 11,620 (K).

Imatong Mountains group, Uganda side: Langia, 2830 m., rocky outcrop, 4.1943, *Purseglove* 1434 (EA, K).

Didinga Mountains: summit of Mt. Lotuke, 2590 m., in *Podocarpus latifolius* forest, 18.4.1939, *Myers* 10,891 (K); Mt. Lotuke, 2450 m., on floor in *Podocarpus latifolius* forest, 30.3.1950, *Jackson* 1339 (BM).

General habitat range: in montane forest and clearings.

General distribution: South Sudan, Ethiopia, Uganda and East Congo [previously Zaire].

Culcasia P. Beauv.

Culcasia falcifolia Engl.

FTA 8: 175 (1901); FTEA, Arac.: 18 (1985); UKWF: 299 (1994); FE 6: 35 (1997).

Syn.: [*Culcasia scandens* auct., non (Willd.) P. Beauv.: FTA 8: 174 (1901), pro parte; FS: 371 (1929); FPS 3: 281 (1956); JACKSON 1956: 355 {Talanga, Lotti, Laboni}; UKWF: 701, 704 (1974)].

Imatong Mountains group, Sudan side: forest near Lotti rest house, 10.6.1939, *Andrews* 1785 (K); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, climber in forest, 29.11.1980, *Friis & Vollesen* 548 (C, K, KHF); Katire, 900 m., trailing on rocks in stream, 10.1948, *Jackson* 392 (BM); Gilo to Mt. Konoro, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 24.11.1980, *Friis & Vollesen* 437 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: Lututuru, 2.1938, *Eggeling* 3522 (K).

General habitat range: in lowland, medium-altitude and montane forest, often riverine.

General distribution: Sudan and Ethiopia south

to Zambia, Malawi, Zimbabwe and Mozambique.

Stylochaeton Lepr.

Stylochaeton lancifolius Kotschy & Peyr.

FTA 8: 193 (1901); FS: 370 (1929); FPS 3: 283 (1956); FWTA 3,1: 114 (1968); FC 31: 44 (1988).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2051 (MHU).

General habitat range: in lowland and medium-altitude dry wooded grassland and woodland.

General distribution: Senegal to Sudan and North Uganda.

Order 76. **Amaryllidales** Bromhead

Fam. 164. **Amaryllidaceae** Jaume St-Hill.

Boophone Herb.

Boophone disticha (L. f.) Herb.

FTA 7: 392 (1898); FPS 3: 286 (1956); FAC, Amaryllidac.: 6 (1973); UKWF: 708 (1974); FTEA, Amaryllidac.: 21 (1982); UKWF: 321 (1994).

Imatong Mountains group, Uganda side: without further locality, 2290 m., grassland, 4.1938, *Eggeling* 3594 (K).

General habitat range: in lowland, medium-altitude and upland grasslands and woodlands.

General distribution: Congo [previously Zaire] and Sudan to Kenya, south to Namibia and South Africa (Transvaal, Cape Prov.).

Crinum L.**Crinum distichum** Herb.

FTA 7: 400 (1898); FWTA 3(1): 136 (1968).

Syn.: *Crinum pauciflorum* Bak.: FTA 7: 399 (1898); FPS 3: 287 (1956).

Imatong Mountains group, Sudan side: south east of Torit, between Torit and Ngarama (4° 22' N, 32° 37' E), no alt., 28.5.1984, *Kielland-Lund* 769 (NLH); Kinyeti Valley, near junction Imatong village-Torit plain near Ngarama (4° 21' N, 32° 38' E), no alt., in drainage in *Combretum* woodland, 24.5.1984, *Kielland-Lund* 720 (C, NLH).

General habitat range: in lowland and medium-altitude grassland, often in heavy clay.

General distribution: Senegal to South Sudan.

Crinum macowanii Bak.

FTEA, Amaryllidac.: 11 (1982); UKWF: 321 (1994); FSo 4: 60 (1995); HYF: 160 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, 1 km. south of Hiliu along Katire road (4° 16' N, 32° 48' E), no alt., in woodland, 30.5.1984, *Kielland-Lund* 795 (C, NLH); 5 km. south of Hiliu, 700 m., woodland with *Combretum*, *Acacia*, etc., on clay soil, 13.3.1982, *Friis & Vollesen* 1183 (BR, C, K); 15 km. north of Katire, 800 m., wooded grassland with *Combretum colinum*, *C. molle*, *Annona senegalensis*, etc., 18.3.1982, *Friis & Vollesen* 1245 (C, K); above Katire, 1400 m., in recently burnt wooded grassland with *Combretum molle*, *Cussonia arborea*, *Stereospermum kunthianum*, *Erythrina abyssinica* and *Entada abyssinica*, 24.2.1982, *Friis & Vollesen* 1026 (C, K, KHF).

General habitat range: in lowland, medium-altitude and montane grassland, often on heavy clay soils.

General distribution: Congo [previously Zaire] and Sudan to Ethiopia and Somalia, through eastern Africa to Angola, Zambia and South Africa. First record from the Sudan.

Crinum ornatum (Ait.) Bury

FPS 3: 287 (1966); FWTA 3,1: 134 (1968); FAC,

Amaryllidac.: 10 (1973); WICKENS 1976: 158; FE 6: 160 (1997).

Syn.: [*Crinum zeylanicum* auct., non (L.) L.: FTA 7: 401 (1898); FTEA, Amaryllidac.: 15 (1982); FG 28: 38 (1986); FC 30: 20 (1987); UKWF: 321 (1994)].

Imatong Mountains group, Sudan side: near Torit, 650 m., on termite mounds in flooded area, 6.1949, *Jackson* 779 (BM).

General habitat range: in lowland and medium-altitude grasslands.

General distribution: Guinée to Ethiopia, south to Namibia. This is replaced by the morphologically very similar species *Crinum zeylanicum* (L.) L. in tropical Asia.

Cyrtanthus Ait.**Cyrtanthus sanguineus** (Lindl.) Walp.

FTA 7: 385 (1898); UKWF: 712 (1974); FTEA, Amaryllidac.: 23 (1982); UKWF: 321 (1994).

subsp. **minor** Nordal

NORDAL 1979: 190; FTEA, Amaryllidac.: 25 (1982).

Syn.: *Cyrtanthus* sp. (Sect. *Gastronema*) sensu Chipp: CHIPP 1929: 194; FPS 3: 287 (1956) {Imatong Mountains, Ras Logoforok}.

Imatong Mountains group, Sudan side: Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, recently burnt, 16.2.1982, *Friis & Vollesen* 912 (C, K, KHF); Ras Logoforok, 2450 m., in mountain meadow, 11.2.1929, *Hamilton Leigh* in *Chipp* 106 (K).

General habitat range: in montane grassland.

General distribution: South Sudan, Kenya and Tanzania. Species as a whole south to South Africa (Natal, East Cape Prov.).

Pancratium L.**Pancratium tenuifolium** A. Rich.

FAC, Amaryllidac.: 20 (1973); FTEA, Amaryllidac.: 26 (1982); FC 30: 26 (1987); UKWF: 322 (1994); FSo 4: 62 (1995); FE 6: 161 (1997).

Syn.: *Pancratium hirtum* A. Chev.: FWTA 3,1: 136 (1968). [*Pancratium trianthum* auct., non Herbert: FTA 7: 407 (1898), pro parte; FS: 393 (1929); FPS 3: 289 (1956)].

Imatong Mountains group, Sudan side: south of Torit, 650 m., common in burnt grassland, 15.4.1950, *Jackson* 1393 bis (BM, KHF); Kinyeti Valley, 100 m. east of stream east of Hiliu (4° 16' N, 32° 48' E), no alt., in woodland, 24.5.1984, *Kielland-Lund* 705 (C, NLH).

General habitat range: in lowland and medium-altitude deciduous bushland and semi-desert.

General distribution: Guinée to South Sudan, Ethiopia and Somalia, south to Namibia and South Africa.

Scadoxus Raf.

Syn.: *Haemanthus* L., pro parte.

Scadoxus multiflorus (Martyn) Raf.

FTEA, Amaryllidac.: 4 (1982); FG 28: 28 (1986); FC 30: 8 (1987); UKWF: 321 (1994); FSo 4: 57 (1995); FE 6: 158 (1997); HYF: 405 (1997).

subsp. **multiflorus**

FTEA, Amaryllidac.: 5 (1982); FG 28: 28 (1986); FC 30: 8 (1987).

Syn.: *Haemanthus multiflorus* Martyn: FTA 7: 388 (1898); FS: 392 (1929); FPNA 3: 385 (1955); FPS 3: 287 (1956); FWTA 3,1: 132 (1968); FAC, Amaryllidac.: 18 (1973); WICKENS 1976: 158. *Haemanthus rupestris* Bak.: FTA 7: 388 (1898); FS: 394 (1929); FPS 3: 289 (1956); FWTA 3,1: 132 (1968). *Haemanthus filiflorus* Hiern: JACKSON 1956: 350.

Imatong Mountains group, Sudan side: Talanga forest, 900 m., in woodland, 21.3.1950, *Jackson* 1255 (BM); Kinyeti Valley, 3 km. south of Hiliu along Katire road (4° 14' N, 32° 40' E), no alt., 24.5.1984, *Kielland-Lund* 722 (C, NLH); Itibol to Issore, west of Kinyeti River, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 9.3.1982, *Friis & Vollesen* 1141 (C).

Imatong Mountains group, Uganda side: Lututuru, 1680 m., streamside, 2.1938, *Eggeling* 3529 (K); north of Okako, South of Mingaro, no alt., shallow soil over rock, 9.6.1973, *Katende* 1872 (EA, MHU).

Didinga Mountains: Mt. Lotuke, 1520 m., in forest glade, 3.1939, *MacDonald* 97 (BM).

General habitat range: in lowland, medium-altitude and montane grassland, woodland and open forest.

General distribution: Senegal to Ethiopia and Somalia, south to Namibia and South Africa (Transvaal, Natal); also in tropical Arabia.

Scadoxus puniceus (L.) Nordal & Friis

FTEA, Amaryllidac.: 5 (1982); FE 6: 158 (1997).

Imatong Mountains group, Sudan side: Bushbuck Hill, 2300 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, recently cleared area, 14.3.1982, *Friis & Vollesen* 1209 (C).

General habitat range: in montane forest.

General distribution: South Sudan and Ethiopia, and from Tanzania to South Africa.

Note: The identity of this record, the first from South Sudan, is not absolutely certain due to the state of the inflorescence, the bracts of which are diagnostic of the species.

Fam. 165. **Iridaceae** Juss.

Aristea Ait.

Aristea alata Bak.

FTA 7: 347 (1898); FPS 3: 291 (1956) {Imatong Mountains, Mt. Kinyeti}; UKWF: 323 (1994); FTEA, Iridac.: 9 (1996).

subsp. **abyssinica** (Pax) Weim.

FWTA 3,1: 139 (1968).

Syn.: *Aristea abyssinica* Pax: FZ 12,4: 7 (1993); FTEA, Iridac.: 10 (1996); FE 6: 165 (1997).

Aristea cognata N.E. Br. ex Weim. subsp. *abyssini-*

ca (Pax) Marais, nom illeg.

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, edge of forest, 8.11.1980, *Friis & Vollesen* 14 (C, K); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m, above timberline, 10.6.1984, *Kielland-Lund* 919 (C, NLH).

General habitat range: in medium-altitude and montane grassland, bushland and at forest edges.

General distribution: Nigeria and Cameroon to Ethiopia, south to South Africa (East Cape Province).

Note: The basis for the record from Mt. Kinyeti, at 3050 m., in FPS 3 has not been traced, but the presence of the plant at high altitudes is confirmed by the *Kielland-Lund* collection.

Freesia Klatt

Syn.: *Anomatheca* Ker Gawl., *Lapeirousia* subgen. *Anomatheca* (Ker Gawl.) Bak.

Freesia laxa (Thunb.) Goldblatt & J.C. Manning

FTEA, Iridac.: 38 (1996).

subsp. **laxa**

FTEA, Iridac.: 38 (1996).

Syn.: *Lapeirousia laxa* (Thunb.) N.E. Br.: UKWF: 324 (1994). *Anomatheca laxa* (Thunb.) Goldbl.: FZ 12,4: 52 (1993).

Imatong Mountains group, Uganda side: above Agoro, no alt., among bamboo, shallow soil over rock, no date, *Eggeling* 5107 (MHU).

General habitat range: in montane grassland and bushland, usually on rocky outcrops.

General distribution: Congo [previously Zaire] to Uganda, Kenya and Tanzania, south to South Africa (Natal, East Cape Prov.). Species as a whole within the same area.

Gladiolus L.

Gladiolus dalenii Van Geel

FZ 12, 4: 89 (1993); FTEA, Iridac.: 68 (1996); FE 6: 176 (1997); HYF: 406 (1997).

subsp. **dalenii**

FTEA, Iridac.: 70 (1996).

Syn: *Gladiolus psittacinus* Hook.: FCap 6: 158 (1896); FPS 3: 293 (1956); FWTA 3,1: 141 (1968). *Gladiolus natalensis* Hook., nom. illeg., non (Ecklon) Hook.: WICKENS 1976: 158. *Gladiolus quartinianus* A. Rich.: FTA 7: 371 (1898); FS: 393 (1929). *Gladiolus luteolus* Klatt: FTA 7: 368 (1898). *Gladiolus corneus* Oliv.: FTA 7:365 (1898). *Gladiolus newii* Bak.: UKWF: 324 (1994).

Imatong Mountains group, Sudan side: south east of Torit, near Imatong Junction and Ngarama (4° 21' N, 32° 38' E), no alt., 31.5.1984, *Kielland-Lund* 809 (NLH); Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, recently burnt, also in crevices of rocky outcrops, 16.2.1982, *Friis & Vollesen* 917 (C, K, KHF).

Imatong Mountains group, Uganda side: Langia, 1830-2740 m., 4.1943, *Purseglove* 1398 (K).

General habitat range: in lowland, medium-altitude and montane grassland, wooded grassland, woodland and in glades in forests, usually flowering a few weeks after the beginning of the rainy season.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in Madagascar.

subsp. **andongensis** (Bak.) Goldbl.

FZ 12, 4: 93 (1993); FTEA, Iridac.: 71 (1996); FE 6: 177 (1997).

Syn.: *Gladiolus goetzei* Harms; UKWF: 324 (1994).

Imatong Mountains group, Sudan side: without further locality, 3050 m., 1927, *Maffey* s.n. (K); Loa, Molitokoro village north of Kerepi (3° 55' N, 31° 55' E), no alt., 5.6.1984, *Kielland-Lund* 853 (NLH); Itibol, 1900 m., in *Acacia abyssinica*

woodland, 20.4.1950, *Jackson* 1402 (BM); Gilo, 1980 m., in burnt grassland, 26.6.1947, *MacLeay* 75 (BM).

Imatong Mountains group, Uganda side: Lututuru, no alt., tall-grass grassland, 5.6.1963, *Kertland* s.n. (MHU).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., wooded grassland, 19.4.1939, *Myers* 10,932 (K).

General habitat range: in lowland, medium-altitude and montane grassland and open woodland, often in damp sites.

General distribution: Sierra Leone to South Sudan, Kenya and Tanzania, south to Angola, Zimbabwe, Malawi and Mozambique; also in tropical Arabia. The species as a whole has the combined distribution of the two subspecies included here.

Note: It is not certain that all the material cited here as belonging to subsp. *andongensis* has been correctly identified, as the material is mostly incomplete.

Gladiolus dichrous (Bullock) Goldbl.

FTEA, Iridac.: 79 (1996).

Syn.: *Oenostachys dichroa* Bullock: UKWF: 324 (1994).

Imatong Mountains group, Sudan side: Kipia, 2600 m., grassy clearing in *Podocarpus* forest, 4.7.1947, *MacLeay* 127 (BM); near Kipia, 2740 m., mountain meadow, 26.7.1939, *Myers* 11,605 (K); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m., above timberline, 10.6.1984, *Kielland-Lund* 917 (C, NLH).

General habitat range: in montane grassland, usually on rocky outcrops.

General distribution: South Sudan, North Uganda and North West Kenya.

Gladiolus sp.

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2440 m., 28.10.1941, *Myers* 14,186 (?K, not traced).

Hesperantha Ker-Gawl.

Hesperantha petitiiana (A. Rich.) Bak.

FTA 7: 348 (1898); HEDBERG 1957: 68; FZ 12,4: 59 (1993); UKWF: 323 (1994); FTEA, Iridac.: 33 (1996); FE 6: 171 (1997).

Syn.: *Hesperantha volkensis* Harms. *Hesperantha petitiiana* (A. Rich.) Bak. var. *volkensis* (Harms) R.C. Forster: HEDBERG 1957: 68.

Imatong Mountains group, Sudan side: Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m., in upper elfin forest belt, 10.6.1984, *Kielland-Lund* 916 (C, NLH); summit of Mt. Kinyeti, 3180 m., 27.3.1939, *Myers* 11,640 (K); summit of Mt. Kinyeti, 3180 m., *Erica arborea* scrub, 1.6.1950, *Jackson* 1540 (K).

Imatong Mountains group, Uganda side: Mt. Lomwaga, 2510 m., 6.1942, *Eggeling* 5063 (EA, K, MHU).

General habitat range: in montane and Afroalpine grassland and bushland.

General distribution: Cameroon, and from South Sudan to Ethiopia, south to Tanzania, Malawi and Zimbabwe.

Moraea L.

Moraea afro-orientalis Goldbl.

GOLDBLATT 1977: 255; UKWF: 323 (1994); FTEA, Iridac.: 16 (1996).

Syn.: [*Moraea carsonii* auct., non Bak.: FTA 7: 341 (1898); FPS 3: 293 (1956) {Didinga Mountains, Mt. Lotuke}].

Didinga Mountains: Mt. Lotuke, 1830 m., in forest glades, 3.1939, *MacDonald* 91 (BM); Mt. Lotuke, Char, 1830 m., wooded grassland, 19.4.1939, *Myers* 10,952 (K); slope of Mt. Lotuke, 2000 m., in *Protea* grassland, 30.3.1950, *Jackson* 1333 (BM).

General habitat range: in medium-altitude and montane grassland and bushland.

General distribution: South Sudan, North and

East Uganda, West Kenya and Central and South West Tanzania.

Moraea schimperii (Hochst.) Pic. Serm.

FPS 3: 293 (1956) {Imatong Mountains, Kipia}; FWTA 3,1: 138 (1968); GOLDBLATT 1977: 268; FZ 12,4: 24 (1993); FTEA, Iridac.: 18 (1996); FE 6: 168 (1997).

Syn.: *Moraea diversifolia* Bak.: FTA 7: 339 (1898); CHIPP 1929: 194. *Moraea welwitschii* Bak.: FTA 7: 339 (1898). *Moraea zambeziaca* Bak.: FTA 7: 340 (1898).

Imatong Mountains group, Sudan side: without further locality, 1980-2130 m., on treeless rocky slopes, 13.4.1933, *Smith* 24 (K, KHF); Mt. Baghanj, 1830-2130 m., 13.6.1939, *Andrews* 1895 (K); Gilo to Issore, 1900 m., *Loudetia* grassland in shallow soil over rocks, 2.1951, *Jackson* 1758 (K); lower southern slope of Mt. Konoro, 2100 m., *Loudetia arundinacea* grassland with scattered trees on shallow soil, 2.3.1982, *Friis & Vollesen* 1068 (C); summit of Mt. Konoro, 2500 m., *Loudetia arundinacea* grassland on very shallow soil, 16.3.1982, *Friis & Vollesen* 1222 (C, K); Kipia, 2130 m., rocky places, 10.2.1936, *Johnston* 1492 (K); Kipia, 2670 m., in fire-swept mountain meadow, 11.2.1929, *Chipp* 89 (K, WM); Kipia, 2680 m., in rocky places, 1.1939, *MacDonald* 80 (BM).

General habitat range: in montane grassland, often in permanently or seasonally damp places.

General distribution: Nigeria to Ethiopia, south to Angola, Zambia, Malawi, Zimbabwe and Mozambique.

Moraea stricta Bak.

FZ 12,4: 17 (1993); FTEA, Iridac.: 17 (1996); FE 6: 1997 (1997).

Syn.: [*Moraea thomsonii* auct., non Bak.: GOLDBLATT 1977: 262, pro parte; FZ 12,4: 17 (1993); UKWF: 323 (1994)].

Imatong Mountains group, Uganda side: without further locality, 2440 m., grassland, 4.1938, *Eggeling* 3558 (K).

General habitat range: in montane grassland.

General distribution: South Sudan, Uganda and Ethiopia, south to South Africa (East Cape Prov.).

Oenostachys Bullock

See **Gladiolus** L.

Romulea Maratti

Romulea fischeri Pax

FTA 7: 345 (1898); HEDBERG 1957: 65; UKWF: 323 (1994); FSo 4: 63 (1995); FTEA, Iridac.: 36 (1996); FE 6: 171 (1997); HYF: 406 (1997).

Imatong Mountains group, Sudan side: summit of Mt. Kinyeti, 3180 m., 27.7.1939, *Myers* 11,643 (K, WM).

General habitat range: in montane and Afroalpine grassland, especially on rocky outcrops.

General distribution: South Sudan, Uganda, Ethiopia, Eritrea, Kenya and Somalia; also in Saudi Arabia.

Note: Closely related to and difficult to distinguish from *Romulea camerooniana* Bak. (FZ 12,4: 63 (1993); FTEA, Iridac.: 36 (1996)), which is more widespread, and occurs in montane and Afroalpine grassland from Cameroon to Ethiopia and North Somalia, and south to South Africa (East Cape Prov.); also in tropical Arabia.

Order 77. **Dioscoreales** Hook. f.

Fam. 166. **Dioscoreaceae** R. Br.

Dioscorea L.

Dioscorea dumetorum (Kunth) Pax

FTA 7: 419 (1898); FS: 386 (1929); FPS 3: 297 (1956); FWTA 3,1: 151 (1968); FTEA, Dioscoreac.: 21 (1975); FE 6: 58 (1997).

Imatong Mountains group, Sudan side: Torit district, no alt., 9.6.1939, *Andrews* 1719 (K).

General habitat range: in lowland and medium-altitude forest, woodland and wooded grassland.

General distribution: Senegal to Ethiopia, south to South Africa (Transvaal).

***Dioscorea preussii* Pax**

FTA 7: 417 (1898); FPS 3: 295 (1956); FWTA 3,1: 152 (1968); FTEA, *Dioscoreac.*: 20 (1975).

Imatong Mountains group, Sudan side: Katire, 950 m., *Albizia zygia* woodland, 21.6.1961, *Jackson* 4253 (K); Katire to Gilo, at road to Itibol, 1500 m., secondary transitional forest with *Harungana madagascariensis*, forest edge, 12.11.1980, *Friis & Vollesen* 179 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest, evergreen bushland and woodland.

General distribution: Senegal to South Sudan, south to Angola, Congo [previously Zaire] and Tanzania.

***Dioscorea quartiniana* A. Rich.**

FPS 3: 297 (1956); FWTA 3,1: 151 (1968); FTEA, *Dioscoreac.*: 23 (1975); WICKENS 1976: 159; UKWF: 310 (1994); FE 6: 56 (1997).

var. **quartiniana**

FTEA, *Dioscoreac.*: 24 (1975).

Imatong Mountains group, Sudan side: without further locality, no alt., 1947, *Maxwell Forbes* 89 (?K, not traced); Mt. Ingaragi, no alt., 14.6.1939, *Andrews* 1946 (?K, not traced, WM); Kipia to Logoforok, 1370 m., in open forest, 6.7.1947, *MacLeay* 188 (BM).

General habitat range: in clearings and along edges of lowland and medium-altitude forest, evergreen bushland and grassland.

General distribution: Sierra Leone to Ethiopia, south to Angola, Zimbabwe and South Africa (Transvaal); also in Madagascar. Species as a whole within the same general area.

***Dioscorea schimperana* Kunth**

FTA 7: 419 (1898); FS: 386 (1929); FPS 3: 297 (1956); FWTA 3,1: 152 (1968); FTEA, *Dioscoreac.*: 14 (1975); UKWF: 310 (1994); FE 6: 60 (1997).

Imatong Mountains group, Sudan side: without further locality, 1530-1830 m., 12.6.1939, *Andrews* 1853 (K); Katire to Gilo, at road to Itibol, 1400 m., wooded grassland with *Combretum molle*, *C. collinum*, *Entada abyssinica* and *Erythrina abyssinica*, the grasses *Pennisetum purpureum* and *Hyparrhenia rufa* dominant, 12.11.1980, *Friis & Vollesen* 167 (C, K, KHF).

Imatong Mountains group, Uganda side: 4 km. south east of Lomwaga, no alt., tall-grass grassland, 18.7.1974, *Katende* 2151 (EA, MHU).

General habitat range: in clearings and along edges of medium-altitude and montane forest, evergreen bushland and grassland.

General distribution: Nigeria to Ethiopia, south to Zimbabwe and Mozambique.

Order 78. **Agavales** Hutch.

Fam. 167. **Dracaenaceae** Salisb.

Dracaena L.

***Dracaena afromontana* Engl.**

ITU: 2 (1952); KTSL: 639 (1994); FE 6: 76 (1997).

Imatong Mountains group, Sudan side: Lomuleng, 2450 m., forest, 31.12.1935, *Thomas* 1890 (K); Bushbuck Hill, east of Itibol, 2100 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, 21.11.1980, *Friis & Vollesen* 396 (C, K, KHF).

Imatong Mountains group, Uganda side: Lututuru, no alt., 1992, *Katende* (sight record). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 13 documents this record).

Didinga Mountains: Mt. Lotuke, 2350-2590 m., common understorey shrub in *Podocarpus latifolius* forest, 18.4.1939, *Myers* 10,901 (K).

General habitat range: in montane forest.

General distribution: South Sudan and Ethiopia through East Congo [previously Zaire], Rwanda, Burundi and eastern Africa to North Malawi.

Dracaena fragrans (L.) Ker-Gawl.

FTA 7: 440 (1898); FWTA 3,1: 157 (1968); KTSLS: 639 (1994); FE 6: 77 (1997).

Imatong Mountains group, Sudan side: Talanga forest, 950 m., marshy places in closed forest, 5.4.1950, *Jackson* 1348bis (BM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophloeum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 17.3.1982, *Friis & Vollesen* 1227 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: Lututuru, 1680 m., 2.1938, *Eggeling* 3532 (K). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 14 documents this record).

General habitat range: in lowland and medium-altitude forest.

General distribution: Ghana to Ethiopia, south to Angola and Zimbabwe.

Dracaena laxissima Engl.

FTA 7: 446 (1898); FPS 3: 300 (1956); FWTA 3,1: 157 (1968); EL AMIN 1990: 447 {montane forests of Equatoria}; KTSLS: 640 (1994).

Imatong Mountains group, Sudan side: Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 15.11.1980, *Friis & Vollesen* 221 (C, K, KHF); Mt. Itibol, 1950 m., 14.6.1939, *Andrews* 1978 (K, WM).

General habitat range: in lowland and medium-altitude forest.

General distribution: Nigeria to South Sudan, Uganda and Kenya, south to Zambia and Malawi.

Dracaena steudneri Engl.

FTA 4: 441 (1898); ITU: 3 (1952); JACKSON 1956: 354 {Laboni}; FPS 3: 298 (1956) {Imatong Mountains}; EL AMIN 1990: 449 {Imatong Mountains, Gilo}; SOMMERLATTE 1990: 316, in forest between 1000 and 2400 m.; KTSLS: 640 (1994); FE 6: 79 (1997).

Syn.: [*Dracaena fragrans* auct., non (L.) Ker-Gawl.: CHIPP 1929: 193; EL AMIN 1990: 447 {Issore}].

Imatong Mountains group, Sudan side: Issore, no alt., in fringing forests and ravines, 9.2.1929, *Chipp* 53 (K, KHF, WM); Gilo, 1890 m., in damp woodland and edge of forest, 28.6.1947, *MacLeay* 110 (KHU); Gilo, 1800 m., edge of forest, no date, *Jackson* 430 (KHF).

Imatong Mountains group, Uganda side: Lututuru, no alt., 1992, *Katende* (sight record).

General habitat range: in montane forest.

General distribution: South Sudan and Ethiopia through eastern Africa to Zimbabwe.

Sansevieria Thunb.

Sansevieria ehrenbergii Schweinf.

FTA 7: 334 (1898); FS: 374 (1929); FPS 3: 300 (1956); FSo 4: 28 (1995); HYF: 407 (1997); FE 6: 80 (1997).

Border between the Lafit, Dongotona and Nangeya Mountains and the Didinga Mountains: Torit-Kapoeta road, at Kidepo River, no alt., *Acacia* bushland, 25.2.1939, *Myers* 10,544 (K); near Kidepo Village, 800 m., on termite mound in *Acacia* bushland, 27.1.1950, *Jackson* 1123 (BM).

Didinga Mountains: 2 km south of Keiala at Chukudum (4° 15' N, 33° 27' E), 1100 m., 22.12.1983, *Kielland-Lund* 438 (C, NLH).

General habitat range: in lowland and medium-altitude dry deciduous bushland.

General distribution: Sudan, Ethiopia and Somalia to Tanzania; also in tropical Arabia.

Sansevieria nilotica Bak.

FTA 7: 332 (1898); FS: 375 (1929); FPS 3: 300 (1956); FE 6: 82 (1997).

Imatong Mountains group, Sudan side: Talanga Forest, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, at forest edges, along trails and in clearings, 17.3.1982, Friis & Vollesen 1232 (C, K).

General habitat range: in lowland woodland, bushland and riverine forest, often in shade, or in forest clearings.

General distribution: Sudan and West Ethiopia south to Tanzania.

Order 79. **Arecales** Bromhead

Fam. 168. **Arecaceae** Schultz-Schultzenst.
(*Palmae* Juss., nom. altern.)

Borassus L.**Borassus aethiopum** Mart.

ITU: 291 (1952); FPS 3: 302 (1956); FWTA 3,1: 168 (1968); FTEA, *Palmae*: 19 (1986); KTSL: 642 (1994).

Imatong Mountains group, Uganda side: recorded from the Lokung Forest Reserve by LWANGA (1996: 27, specimen no. 10 documents this record).

General habitat range: in lowland and medium altitude open habitats; usually in dense stands along water courses and, in drier areas, where high water table exists locally.

General distribution: Senegal to Ethiopia and Kenya, south to Mozambique and South Africa (Transvaal).

Note: A rather easily recognisable species known from all floristic districts of Uganda and widespread in the Sudan and western Ethiopia.

Hyphaene Gaertn.**Hyphaene thebaica** (L.) Mart.

FTA 8: 120 (1901); FS: 402 (1929); FPS 3: 304 (1956); FWTA 3,1: 169 (1968); WICKENS 1976: 159; EL AMIN 1990: 451 {on silty soil of stream banks throughout the Sudan and in drier parts of Equatoria (Dongotona Mountains, Didinga Mountains, Kapoeta); FSo 4: 273 (1995); FE 6: 522 (1997); HYF: 314 (1997).

Dongotona Mountains and Didinga Mountains: No specimen seen, recorded by EL AMIN from the plains at Dongotona Mountains, Didinga Mountains, and at Kapoeta.

General habitat range: in lowland woodland, wooded grassland and at forest edges, usually in riverine habitats or where the water table is high for other reasons.

General distribution: Senegal to Sudan, Egypt, Ethiopia and Somalia; also in tropical Arabia.

Note: The identity of this taxon is not certain without good material. *Hyphaene thebaica* has been observed by us in the Illubabor, Kefa and Gamu-Gofa Provinces of South West Ethiopia, an area adjacent to South Sudan. However, according to FTEA, *Palmae*: 23 (1986), *Hyphaene thebaica* has only erroneously been recorded from East Africa (including the part of Kenya adjacent to Didinga Mountains and Kapoeta); these records refer to *Hyphaene compressa* H. Wendl., a species which occurs in Somalia, Kenya, Tanzania and Mozambique.

Phoenix L.**Phoenix reclinata** Jacq.

FTA 8: 103 (1901); FS: 401 (1929); CHIPP 1929: 194; ITU: 293 (1952); FPS 3: 304 (1956); FWTA 3,1: 169 (1968); WICKENS 1976: 159; FTEA, *Palmae*: 15 (1986); EL AMIN 1990: 453; SOMMERLATTE 1990: 224, at edges of swamps and rivers, in damp places in lowland and intermediate

forest; KTS: 644 (1994); FSo 4: 271 (1995); FE 6: 515 (1997); HYF: 314 (1997).

Imatong Mountains group, Sudan side: near Laboni, 1280 m., fringing forest, 8.2.1929, *Chipp* 50 (K, KHF, WM); slope of Mt. Konoro, 2100 m., mountain grassland, in crevices at the foot of rocky outcrops, 18.2.1982, *Friis & Vollesen* (sight record).

Imatong Mountains group, Uganda side: Lututuru, no alt., 1992, *Katende* (sight record). Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 8 documents this record).

Didinga Mountains: Mt. Buthi [4° 16' N, 33° 21' E], 1700 m., riverine forest, no date, *Jackson* 691 (FHO).

General habitat range: in a wide range of lowland, medium-altitude and montane habitats, but chiefly associated with wells and springs, rivers and other moist places.

General distribution: Senegal to Ethiopia and Somalia, south to Namibia and South Africa (Cape Prov.); probably also in tropical Arabia.

Raphia P. Beauv.

Raphia farinifera (Gaertn.) Hylander
FWTA 3,1: 166 (1968); FTEA, *Palmae*: 38 (1986); KTS: 645 (1994).

Syn.: *Raphia monbuttorum* auct., non Drude: FS: 402 (1929); FPS 3: 305 (1956); EL AMIN 1990: 453. *Raphia* sp.: JACKSON 1956: 356 {Ateppi Valley above Issore and Iyedo Valley}.

Imatong Mountains group, Sudan side: No specimen traced; recorded by JACKSON 1956 from the Ateppi Valley above Issore and Iyedo Valley, in both cases in fringing forest, mostly between 1200 and 1800 m. Also recorded on a label of *Renealmia* sp. collected 11.10.1938 in Lotti forest by Myers (no. 9660).

General habitat range: in lowland and medium-altitude riverine forest or swamp forest.

General distribution: Nigeria, Cameroon and Congo [previously Zaire] to Uganda, Kenya and Tanzania, south to Angola, Zambia, Zimbabwe and Mozambique; also in Madagascar.

Note: In absence of adequate material it is impossible to say whether the species of *Raphia* seen in the study area is true *Raphia farinifera*, a widespread species often erroneously referred to as *Raphia monbuttorum*, or represent the true, poorly known *Raphia monbuttorum*, which from the Sudan is only known from the type specimen, *Schweinfurth* 1738, collected west of the Nile.

Order 80. **Pandanales** Lindl.

Fam. 169. **Pandanaceae** R. Br.

Pandanus L. f.

Pandanus chiliocarpus Stapf

ITU: 294 (1952); FTEA, *Pandanac.*: 6 (1993).

Syn.: *Pandanus* sp. near *Pandanus ugandensis*: EL AMIN 1990: 453 {gregarious in swamps and stream beds in Equatorial}; *Pandanus* sp.: JACKSON 1956: 355 {Talanga}; FPS 3: 305 (1956).

Imatong Mountains group, Sudan side: No specimen seen; reported by JACKSON 1956 from swampy places at Talanga.

General habitat range: in lowland and medium-altitude swamps and stream beds.

General distribution: The general distribution of this taxon is not clear; it has been recorded with certainty from Uganda, East Congo [previously Zaire] and West Tanzania.

Order 81. **Haemodorales** Hutch.Fam. 170. **Hypoxidaceae** R. Br.**Curculigo** Gaertner

Curculigo pilosa (Schumach. & Thonn.) Engl. FPNA 3: 387 (1955); FPS 3: 306 (1956); FWTA 3,1: 174 (1968); FAC, Hypoxidac.: 2 (1971); WICKENS 1976: 159; FE 6: 89 (1997).

Syn.: *Curculigo gallabatensis* Schweinf. ex Bak.: FTA 7: 383 (1898); FS: 391 (1929).

Imatong Mountains group, Sudan side: Kinyeti Valley, near junction Imatong village-Torit plain near Ngarama (4° 21' N, 32° 38' E), no alt., in drainage in *Combretum* woodland, 24.5.1984, *Kielland-Lund* 718 (C, NLH); Kinyeti Valley, plain between Torit and Ngarama, Iyedo (4° 22' N, 32° 37' E), no alt., 29.5.1984, *Kielland-Lund* 780 (C, NLH).

General habitat range: in lowland, medium-altitude and montane seasonally swampy woodland and riverine forest, both on black alluvial soil and in cracks of rocks; seems to be favoured by frequent burning.

General distribution: Gambia and Senegal to Ethiopia and Somalia, south to Zambia; also in Madagascar.

Hypoxis L.

Hypoxis angustifolia Lam.

FTA 7: 378 (1898); FS: 391 (1929); FPS 3: 306 (1956); FWTA 3,1: 172 (1968); FAC, Hypoxidac.: 5 (1971); WICKENS 1976: 160; FG 28: 48 (1986); FC 30: 34 (1987); UKWF: 313 (1994); FSo 4: 31 (1995); FE 6: 87 (1997); HYF: 405 (1997).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, *Kielland-Lund* 578 (C, NLH); Kinyeti Valley, 100 m. east of stream east of

Hiliu (4° 16' N, 32° 48' E), no alt., 24.5.1984, *Kielland-Lund* 706 (C, NLH); hill above Gilo, 1890 m., grassy pasture, 13.6.1953, *Prowse* 245 (KHU) & 251 (KHU); Gilo, 1850 m., *Loudetia* grassland at edge of upland rain forest with *Albizia*, *Macaranga* and *Croton* 8.11.1980, *Friis & Vollesen* 11 (C); Kipia, 2690 m., rocky places, 1.1939, *MacDonald* 62 (BM).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., wooded grassland, 19.4.1939, *Myers* 10,923 (K).

General habitat range: in lowland, medium-altitude and montane woodland, wooded grassland and grassland.

General distribution: Senegal to Ethiopia and North Somalia, south to Tanzania; also in Madagascar and tropical Arabia.

Hypoxis villosa L. f.

FTA 7: 379 (1898); UKWF: 313 (1994); FE 6: 86 (1997); HYF: 405 (1997).

Syn.: *Hypoxis multiflora* Nel.: FPS 3: 306 (1956) {Imatong Mountains}. *Hypoxis urceolata* Nel.: CHIPP 1929: 194; FPS 3: 306 (1956) {Imatong Mountains}; FWTA 3,1: 179 (1968).

Imatong Mountains group, Sudan side: Mt. Baghanj, near rest house, 1830-2130 m., 13.6.1939, *Andrews* 1909 (K); Itibol to Ibahin, at Itibol, 1950-1980 m., on rocky outcrops, frequent, 18.12.1935, *Thomas* 1653 A (not traced) & B (K); Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, recently burnt, 16.2.1982, *Friis & Vollesen* 911 (BR, C, EA, K, KHF); Ras Logoforok (33° 00' E, 3° 80' N), no alt., mountain meadow shortly after burning, 12.2.1929, *Chipp* 103 (K, WM); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m., in upper elfin forest belt, 10.6.1984, *Kielland-Lund* 914 (C, NLH).

Imatong Mountains group, Uganda side: without further locality, 2290 m., grassland, 4.1938, *Eggeling* 3597 (K); Langia, 2440 m., grassland, 4.1943, *Purseglove* 1383 (EA, K); Lomwaga, 2590 m., in *Hyparrhenia-Exothea* grassland, 5.4.

1945, *Greenway & Hummel* 7279 (EA, K); Langia, 2830 m., montane grassland, 4.1943, *Purse-glove* 1428 (EA, K); 2 km. north-east of Lututuru, 1800 m., recently burnt woodland grassland, 17.2.1969, *Lye* 2078 (MHU) & 2079 (K, MHU, NLH); 4 km. south east of Lomwaga, 1900 m., shallow soil in tall-grass woodland, 18.7.1974, *Katende* 2125 (EA, MHU).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1830 m., grassland, 2.1960, *Wilson* 812 (EA).

Didinga Mountains: Mt. Lotuke, 1830 m., forest grassland, 3.1939, *MacDonald* 89 (BM).

General habitat range: in medium-altitude and montane grassland.

General distribution: North Nigeria to Ethiopia, south to South Africa; also in tropical Arabia.

Note: Andrews (in FPS 3: 306) considered *Thomas* 1653 A to represent *Hypoxis multiflora* Nel.

Hypoxis sp. (*Andrews* 1892)

Imatong Mountains group, Sudan side: Mt. Baghanj, 1830-2130 m., 13.6.1939, *Andrews* 1892 (K, WM); Gilo, 1890 m., montane woodland, 24.6.1947, *MacLeay* 36 (BM, KHU); Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 24.11.1980, *Friis & Vollesen* 434 (C, K, KHF); summit of Mt. Kinyeti, 3180 m., 27.7.1939, *Myers* 11,648 (K).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., 19.4.1939, *Myers* 10,939 (?K, not traced), as "Asphodel" in *Myers'* note book, could also be Liliaceous.

Fam. 171. **Velloziaceae** Endl.

Xerophyta Juss.

Xerophyta simulans L.B. Smith & Ayensu
SMITH & AYENSU 1974: 189; FTEA, *Velloziac.*: 6 (1975).

Syn.: *Vellozia sp.*: FPS 3: 308 (1956) {summit of Mt. Oro, Opari-Torit road; Itaba Hill, Lomolongori}.

Imatong Mountains group, Sudan side: summit of Mt. Oro, Opari-Torit road, no alt., on rocks, 5.10.1938, *Myers* 9518 (K); Kinyeti Valley, hill 3 km. south of Hiliu, 700 m., stony hillside, 6.12.1983, *Kielland-Lund* 226 (NLH); Molongori, on rocky outcrop, 750 m., 1939, *Andrews* 1807 (K); Itaba Hill, Lomolongori (4° 07' N, 32° 52' E), 1300 m., 13.11.1948, *Jackson* 532 (K); foothills of Imatong Mountains, near Molongori rest house (4° 10' N, 32° 51' E), 750 m., on round gneiss rocks, following *Selaginella njamnjamensis* in succession from bare rock, common in drier parts of the Imatong Mountains, 3.4.1951, *Jackson* 1807 (K, WM); north-east side of the mountains, just north of Molongori, 750 m., almost bare rocky slope with *Boswellia papyrifera*, *Terminalia brownii*, *Lannea fulva*, *Euphorbia magnicapsula*, *Xerophyta simulans*, etc., 10.3.1982, *Friis & Vollesen* 1150 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude wooded grassland and deciduous bushland, always associated with rocky outcrops.

General distribution: Sudan, Uganda and Tanzania south to Zambia and Zimbabwe.

Fam. 172. **Taccaceae** Dumort.

Tacca Forst.

Tacca leontopetaloides (L.) O. Kuntze
FPS 3: 308 (1956); FTEA, *Taccac.*: 1 (1962); FWTA 3,1: 379 (1968); WICKENS 1976: 160; FE 6: 63 (1997).

Syn.: *Tacca pinnatifida* J.R. & G. Forst.: FTA 7: 413 (1898); FS: 385 (1928).

Imatong Mountains group, Sudan side: west of Acholi Mountains, west of junction to Palotaka, near Magwe (4° 07' N, 32° 17' E), no alt.,

4.6.1984, *Kielland-Lund* 836 (C, NLH); Kinyeti Valley, 8 km. south of Hiliu along Katire road (4° 12' N, 32° 40' E), no alt., in woodland, 30.5.1984, *Kielland-Lund* 794 (C, NLH).

General habitat range: in lowland and medium-altitude grassland and woodland.

General distribution: Sierra Leone to Ethiopia, south to Malawi; also in Madagascar, tropical South East Asia and Australia.

Order 82. Orchidales Raf.

Fam. 173. Orchidaceae Juss.

Aerangis Rchb. f.

Aerangis brachycarpa (A. Rich.) Dur. & Schinz FTEA, Orchidac. 3: 556 (1989); UKWF: 343 (1994); FE 6: 298 (1997).

Syn.: *Angraecum brachycarpum* (A. Rich.) Rchb. f.: FTA 7: 135 (1898).

Imatong Mountains group, Uganda side: Lututuru, 2130 m., common on trees at streamside, 6.1942, *Eggeling* 5061 (EA, MHU).

General habitat range: in montane forest.

General distribution: Ethiopia, Uganda, Kenya, Tanzania, Malawi, Zambia and Angola.

Angraecum Bory

Angraecum humile Summerh.

FTEA, Orchidac. 3: 494 (1989); UKWF: 341 (1994).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, epiphytic on trunk of *Olea* near the river, 20.11.1980, *Friis & Vollesen* 348 (C).

General habitat range: along rivers in montane forest, or in open, mossy forest.

General distribution: South Sudan, Kenya and Tanzania. First record from the Sudan.

Brachycorythis Lindl.

Brachycorythis ovata Lindl.

FCap. 5,3: 85 (1912); FTEA, Orchidac. 1: 23 (1968); FWTA 3,1: 187 (1968); FAC, Orchidac. 1: 35 (1984); UKWF: 327 (1994); FZ 11,1: 22 (1995); FE 6: 205 (1997).

subsp. ***schweinfurthii*** (Rchb. f.) Summerh.

FTEA, Orchidac. 1: 23 (1968); FWTA 3,1: 187 (1968); FE 6: 205 (1997).

Syn.: *Brachycorythis schweinfurthii* Rchb. f.: FTA 7: 201 (1898).

Imatong Mountains group, Sudan side: Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 53' E), 2200 m., in low montane grassland, 10.6.1984, *Kielland-Lund* 903 (C, NLH).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1600 m., grassland, 15.5.1972, *Synnott* 1053 (EA, MHU).

General habitat range: in medium-altitude and montane grassland.

General distribution: Senegal to Sudan, south to Uganda and Kenya. Species as a whole also in South Africa.

Brachycorythis pleistophylla Rchb. f.

FTA 7: 202 (1898); FTEA, Orchidac. 1: 22 (1968); FAC, Orchidac. 1: 36 (1984); UKWF: 327 (1994); FZ 11,1: 21 (1995).

subsp. ***pleistophylla***

FTEA, Orchidac. 1: 22 (1968); FZ 11,1: 21 (1995).

Imatong Mountains group, Sudan side: Gilo, 1900 m., *Eucalyptus* plantation on former grassland, 11.5.1954, *Jackson* 3183 (K); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 59' N, 32° 53' E), 2200 m., in grassland, 9.6.1984, *Kielland-Lund* 887 (C, NLH).

Imatong Mountains group, Uganda side: without further locality, no alt., 4.1938, *Eggeling* 3607 (K); Langia, 2130 m., montane grassland, 4.1943, *Purseglove* 1400 (EA, K).

General habitat range: in medium-altitude and montane grassland.

General distribution: Nigeria to South Sudan, south to Zambia, Zimbabwe, Malawi and Mozambique; also in Madagascar. Species as a whole also in Congo [previously Zaire] and Gabon.

Brachycorythis pubescens Harv.

FTA 7: 201 (1898); FPS 3: 312 (1956); FWTA 3,1: 187 (1968); FTEA, Orchidac. 1: 25 (1968); FAC, Orchidac. 1: 44 (1984); UKWF: 327 (1994); FZ 11,1: 23 (1995); FE 6: 202 (1997).

Imatong Mountains group, Uganda side: North of Okako, south of Mingaro, no alt., woodland and grassland, 9.6.1973, *Katende* 1856 (MHU); Awach, Gulu, no alt., 5.1936, *Eggeling* 3027 (K).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Mali to Ethiopia, south to South Africa (Transvaal, Natal).

Bulbophyllum Thou.

Bulbophyllum cochleatum Lindl.

FTA 7: 28 (1897); FPS 3: 313 (1956) {Imatong Mountains}; FWTA 3,1: 236 (1968); FTEA, Orchidac. 2: 315 (1984); FAC, Orchidac. 2: 320 (1992); UKWF: 335 (1994); FZ 11,1: 294 (1995).

Imatong Mountains group, Sudan side: above Gilo Pool (4° 02' N, 32° 50' E), no alt., 15.1.1984, *Kielland-Lund* 645 (C, NLH); Gilo, at bridge on Ngairigi River, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, epiphytic on trunk at river, 20.2.1982, *Friis & Vollesen* 972 (C, K, KHF); Itibol to Ibahin, 1890 m., common epiphyte on *Acacia abyssinica*, 18.12.1935, *Thomas* 1663 (BM, K); forest near Mt. Kinyeti, 1830-2130 m., 15.6.1939, *Andrews* 2033 (K, WM).

General habitat range: in montane forest.

General distribution: Guinée and Sierra Leone to South Sudan, south to Tanzania, Malawi and Zambia.

Corymborkis Thou.

Corymborkis corymbis Thou.

FAC, Orchidac. 1: 12 (1984); FTEA, Orchidac. 2: 243 (1984); FZ 11,1: 6 (1995); FE 6: 198 (1997).

Syn.: *Corymborkis welwitschii* (Rchb. f.) O. Kuntze: FTA 7: 180 (1898); FPS 3: 313 (1956). *Corymborkis corymbosa* Thou.: FTA 7: 180 (1898); FWTA 3,1: 211 (1968).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 3.12.1980, *Friis & Vollesen* 654 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Guinée and Sierra Leone to South Sudan and South West Ethiopia, south to South Africa (East Cape Prov.); also in Madagascar and Mascarene Islands.

Diaphananthe Schltr.

Diaphananthe adoxa Rasm.

FTEA, Orchidac. 3: 536 (1989); UKWF: 342 (1994); FE 6: 290 (1997).

Imatong Mountains group, Sudan side: in valley between Gilo and Mt. Konoro, 1700 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, epiphytic, 16.3.1982, *Friis & Vollesen* 1223 (C, K).

General habitat range: in montane forest.

General distribution: Ethiopia, South Sudan, Uganda and Kenya. First record from the Sudan.

Diaphananthe lorifolia Summerh.

FTEA, Orchidac. 3: 526 (1989); UKWF: 342 (1994).

Imatong Mountains group, Sudan side: in ravine of Kinyeti River, 1520-1830 m., on trees overhanging river, 15.6.1939, *Andrews* 2022 (K); Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 9.11.1080, *Friis & Vollesen* 75 (C, K).

General habitat range: in montane forest.

General distribution: South Sudan, Uganda, Kenya and Tanzania.

Diaphananthe schimperiana (A. Rich.) Summerh.

FTEA, Orchidac. 3: 531 (1989); FE 6: 293 (1997).

Syn.: *Angraecum schimperianum* (A. Rich.) Rchb. f.: FTA 7: 146 (1897).

Imatong Mountains group, Sudan side: Mt. Kinyeti, 3050 m., on rocky outcrop, 27.7.1939, *Myers* 11,671 (K, WM).

Imatong Mountains group, Uganda side: Mt. Lomwaga, 2510 m., *Podocarpus latifolius* forest, 6.1942, *Eggeling* 5068 (EA, K, fragment, MHU).

General habitat range: in montane forest.

General distribution: South Sudan, Ethiopia and Uganda.

Disa Berg.**Disa aconitoides** Sond.

FCap. 5,3: 223 (1913); FAC, Orchidac. 1: 202 (1984); FZ 11,1: 175 (1995); FE 6: 240 (1997).

subsp. **concinna** (N.E.Br.)

FZ 11,1: 175 (1995).

Syn.: *Disa concinna* N.E. Br.: FTA 7: 284 (1898); FTEA, Orchidac. 1: 173 (1968).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1900 m., grassland, 17.5.1972, *Synnott* 1030 (EA); Nangeya Mountains, Mt. Lonyili, 2000 m., grassland, 17.5.1972, *Synnott* 1038 (EA).

General habitat range: in medium-altitude and montane grassland.

General distribution: South Sudan to Kenya, south to Zimbabwe, Malawi and Mozambique. Species as a whole also in South Africa and Ethiopia.

Disa erubens Rendle

FTA 7: 277 (1898); FPS 3: 314 (1956) {Imatong Mountains}; FTEA, Orchidac. 1: 157 (1968); FWTA 3,1: 200 (1968); FAC, Orchidac. 1: 175 (1984); UKWF: 331 (1994); FZ 11,1: 172 (1995).

subsp. **erubens**

FTEA, Orchidac. 1: 157 (1968); FZ 11,1: 172 (1995).

Imatong Mountains group, Sudan side: without further locality, 2130 m., 2.1936, *Johnston* 1430 (K); without further locality, 3050 m., 1927, *Maffey* s.n. (K); Mt. Itibol, 1830 m., forest, 14.6.1939, *Andrews* 1976 (K); on Mt. Baghanj, 1830-2130 m., 13.7.1939, *Andrews* 1900 (K); Lomuleng, mountain meadow, 2350 m., 25.7.1939, *Myers* 11,574 (K); Gilo, 1980 m., in regularly burnt mountain grassland, 26.6.1947, *MacLeay* 73 (BM); Dumuso, 2400 m., grassland, 31.5.1950, *Jackson* 1513 (K); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 59' N, 32° 53' E), 2200 m., in grassland, 9.6.1984, *Kielland-Lund* 884 (NLH).

Imatong Mountains group, Uganda side: Lomwaga, 2500 m., ground orchid with scarlet and orange flowers, hood leopard-spotted, yellow and red, no date, *Eggeling* 5065 (EA, MHU); Lomwaga, 2500 m., at same place as *Eggeling* 5065, with flowers all yellow except for orange spots on outside of hood, 6.1942, *Eggeling* 5066 (EA); Lomwaga, 2440 m., 1963, *Morrison* 2004 (EA, MHU).

General habitat range: in montane grassland.

General distribution: Nigeria and Cameroon to South Sudan, south to Angola, Zambia and Malawi. Species as a whole within the same general distribution.

Disa fragrans Schltr.

UKWF: 332 (1994); FZ 11,1: 163 (1995).

subsp. **deckenii** (Rchb. f.) H.P. Linder

UKWF: 332 (1994).

Syn.: *Disa deckenii* Rchb. f.: FPS 3: 314 (1956) {Imatong Mountains, summit of Mt. Kinyeti}; FTEA, Orchidac. 1: 165 (1968); FAC, Orchidac. 1: 192 (1984).

Imatong Mountains group, Sudan side: summit of Mt. Kinyeti, 3180 m., 27.7.1939, *Myers* 11,636 (K, WM).

General habitat range: in montane grassland.

General distribution: South Sudan, Congo [previously Zaire], Uganda, Kenya and Tanzania. Species as a whole also in South Africa.

Disa hircicornis Rchb. f.

FTA 7: 283 (1898); FPS 3: 316 (1956) {Imatong Mountains, Mt. Kinyeti}; FTEA, Orchidac. 1: 171 (1968); FWTA 3,1: 200 (1968); FAC, Orchidac. 1: 193 (1984); UKWF: 332 (1994); FZ 11,1: 180 (1995).

Imatong Mountains group, Sudan side: Mt. Kinyeti, 3110 m., 27.7.1939, *Myers* 11,664 (K, WM).

Imatong Mountains group, Uganda side: in grass bog near Aringa River in hills above Agoro, 1830 m., 6.1942, *Eggeling* 5085 (EA, ?K, not traced).

General habitat range: in medium-altitude and montane grassland.

General distribution: Nigeria and Cameroon to South Sudan, south to Angola, Zambia, Malawi, Zimbabwe and Mozambique.

Disa ochrostachya Rchb. f.

FTA 7: 279 (1898); FTEA, Orchidac. 1: 164 (1968); FWTA 3,1: 200 (1968); FAC, Orchidac. 1: 186 (1984); UKWF: 332 (1994); FZ 11,1: (1995).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2000 m., among rocks, 17.5.1972, *Synnott* 1037 (EA).

General habitat range: in montane grassland.

General distribution: Cameroon to South Sudan

and Uganda, south to Angola, Zambia, Zimbabwe, Malawi and Mozambique.

Disa scutellifera A. Rich.

FTA 7: 278 (1898); FTEA, Orchidac. 1: 159 (1968); UKWF: 332 (1994); FE 6: 241 (1997).

Syn.: *Disa schimperi* N.E. Br.: FPS 3: 314 (1956) {Imatong Mountains, above Lomuleng}.

Imatong Mountains group, Sudan side: above Lomuleng, 2650 m., mountain meadow, 26.7.1939, *Myers* 11,596 (K).

Imatong Mountains group, Uganda side: Lomwaga, 2500 m., 6.1942, *Eggeling* 5064 (EA, MHU).

General habitat range: in montane grassland.

General distribution: South Sudan, Ethiopia, Uganda and Kenya.

Disa welwitschii Rchb. f.

FTA 7: 279 (1898); FTEA, Orchidac. 1: 160 (1968); FWTA 3,1: 200 (1968); FAC, Orchidac. 1: 183 (1984); UKWF: 332 (1994); FZ 11,1: 164 (1995).

subsp. **welwitschii**

FZ 11,1: 164 (1995).

Imatong Mountains group, Sudan side: Mt. Kinyeti, summit, 3170 m., in grassy patches on the rocky summit plateau, 17.6.1953, *Prowse* 315 (KHU).

General habitat range: in medium-altitude and montane grassland.

General distribution: Guinée (Nimba Mountains) to South Sudan, south to South Africa (Transvaal.). The species as a whole within the same general area.

Epipogium R. Br.**Epipogium roseum** (Don) Lindl.

FAC, Orchidac. 1: 262 (1984); FTEA, Orchidac. 2: 238 (1984); UKWF: 334 (1994); FZ 11,1: 271 (1995).

Syn.: *Epipogium nutans* (Bl.) Rchb. f.: FTA 7: 188 (1898).

Imatong Mountains group, Sudan side: at trail from Itibol towards Issore, c. 2 km. beyond Kinyeti River, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on forest floor, 9.3.1982, *Friis & Vollesen* 1139 (BR, C, K, KHF).

General habitat range: this is a saprophytic herb without chlorophyll usually growing under shade in medium-altitude and montane forest.

General distribution: Widespread, but with scattered distribution, found in Ghana, Nigeria, Cameroon, Congo [previously Zaire], South Sudan, Uganda, Kenya, Angola and Malawi; also in tropical Asia, Australia and Oceania to Vanuatu. First record from the Sudan.

Eulophia R. Br.

Eulophia abyssinica Rchb. f.

FAC, Orchidac. 2: 675 (1992); FE 6: 281 (1997).

Syn.: *Eulophia zeyheri* Hook. f.: FTA 7: 63 (1897); FWTA 3,1: 247 (1968); UKWF: 339 (1994).

Imatong Mountains group, Sudan side: Gilo, 1900 m., *Acacia* wooded grassland with bracken, 20.4.1950, *Jackson* 1400 (BM).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Nigeria to Ethiopia, south to South Africa (Transvaal, Natal, East Cape Province).

Eulophia calantha Schltr.

FWTA 3,1: 249 (1968); FAC, Orchidac. 2: 649 (1992); UKWF: 339 (1994).

Imatong Mountains group, Uganda side: North of Okako, south of Mingaro, no alt., montane grassland and woodland, 9.6.1973, *Katende* 1855 (MHU); Gulu, no alt., seasonal swamp, 4.1938, *Eggeling* 3547 (K).

General habitat range: in medium-altitude and montane grassland.

General distribution: Guinée to Uganda, Kenya and Tanzania, south to Angola and Zambia.

Eulophia clitellifera (Rchb. f.) Bolus

FTEA, Orchidac. 3: 476 (1989); FAC, Orchidac. 2: 636 (1992); UKWF: 339 (1994).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2042 (MHU).

General habitat range: in medium-altitude and upland grassland, often regularly burnt.

General distribution: Ghana to South Sudan, south to South Africa (Transvaal, Natal, Cape Prov.); also in Madagascar.

Eulophia cristata (Sw.) Steud.

FPS 3: 318 (1956); FWTA 3,1: 249 (1968); FTEA, Orchidac. 3: 439 (1989); FAC, Orchidac. 2: 671 (1992); UKWF: 339 (1994); FE 6: 280 (1997).

Syn.: *Lissochilus purpuratus* Lindl.: FTA 7: 79 (1897); FS: 398 (1929).

Imatong Mountains group, Sudan side: Torit district., near Palotaka, 1000 m., woodland after burning, 26.3.1950, *Jackson* 1269 (BM); Palotaka, 1200 m., edge of forest, 25.1.1979, *Shigeta* 103 A (EA); Kinyeti Valley, 16 km. north of Kaitire, 900 m., woodland with *Combretum collinum*, *C. molle* and *Annona senegalensis*, 22.2.1982, *Friis & Vollesen* 986 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: 3 km. south west of Lututuru, near Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2044 (MHU).

General habitat range: in lowland and medium-altitude grassland and woodland.

General distribution: Senegal to Ethiopia, south to Uganda and Congo [previously Zaire].

Eulophia cuculata (Sw.) Steud.

FPS 3: 319 (1956); FWTA 3,1: 249 (1968); FTEA, Orchidac. 3: 437 (1989); FAC, Orchidac. 2: 662 (1992); UKWF: 339 (1994); FE 6: 279 (1997).

Syn.: *Lissochilus arenarius* Lindl.: FTA 7: 82 (1897); FS: 398 (1929).

Imatong Mountains group, Sudan side: Loa, west of Kerepi Tobacco Factory (3° 54' N, 31° 54' E), no alt., 5.6.1984, *Kielland-Lund* 838 (C, NLH); Acholi Mountains, near Lomariti, 1400 m., in medium to tall grassland, 18.4.1930, *Snowden* 1679 (BM, K); Lotti, no alt., in *Combretum* woodland, 24.4.1949, *Jackson* 717 (BM); Upper Kinyeti Valley, near Ngairigi River, 1600 m., in montane grassland on shallow soil over rock, 22.4.1950, *Jackson* 1407 (BM); hill between Mt. Konoro and Mt. Garia, 1800 m., *Loudetia arundinacea* grassland with scattered trees on shallow soil, 12.3.1982, *Friis & Vollesen* 1181 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: north of Okako, south of Mingaro, no alt., montane grassland and woodland, 9.6.1973, *Katende* 1857 (MHU).

General habitat range: in lowland and medium-altitude grassland and woodland.

General distribution: Senegal and Gambia to Ethiopia, south to South Africa (Natal); also in Madagascar.

***Eulophia galeoloides* Kraenzl.**

FTA 7: 569 (1898); FWTA 3,1: 249 (1968); FTEA, Orchidac. 3: 459 (1989); FAC, Orchidac. 2: 686 (1992); UKWF: 339 (1994).

Imatong Mountains group, Sudan side: Gilo, 1800 m., ground layer in *Cupressus lusitanica* plantation, 28.2.1951, *Jackson* 1757 (WH); Itibol to Isore, near bridge on Kinyeti River, 2000 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, saprophyte growing among leaf-litter on forest floor, 22.11.1980, *Friis & Vollesen* 400 (BR, C, K, KHF).

General habitat range: this is a saprophytic herb without chlorophyll usually growing under shade in medium-altitude and montane forest or plantations.

General distribution: Ghana to South Sudan, south to Congo [previously Zaire] and Tanzania. First record from the Sudan.

***Eulophia guineensis* Lindl.**

FTA 7: 69 (1897), pro parte; FS: 397 (1929); FWTA 3,1: 246 (1968); FTEA, Orchidac. 3: 428 (1989); FAC, Orchidac. 2: 664 (1992); UKWF: 339 (1994); FE 6: 277 (1997); HYF: 411 (1997). Syn.: *Eulophia quartiniana* A. Rich.: FPS 3: 319 (1956).

Imatong Mountains group, Sudan side: Lotti, 1250 m., woodland after fire, 15.4.1930, *Snowden* 1675 (BM, K); Kinyeti Valley, 400 m. east of Imatong junction near Ngarama (4° 21' N, 32° 38' E), no alt., at border of evergreen thicket on termite mound, 24.5.1984, *Kielland-Lund* 711 (NLH); rocks between Hiliu and river (4° 16' N, 32° 48' E), no alt., 30.5.1984, *Kielland-Lund* 805 (C, NLH); Katire, 1000 m., woodland with *Clerodendrum umbellatum*, 10.4.1950, *Jackson* 1391 (BM); Upper Kinyeti Valley, near Lofoha forest ranger post, 1400 m., wooded grassland with *Combretum molle*, *Cussonia arborea*, *Stereospermum kunthianum*, *Erythrina abyssinica*, *Entada abyssinica*, etc., at road verge, 20.3.1982, *Friis & Vollesen* 1265 (BR, C, K, KHF).

Didinga Mountains: slope of Tok Valley (4° 17' N, 33° 39' E), 1800 m., in *Terminalia brownii* woodland, 8.4.1949, *Jackson* 663 (BM).

General habitat range: in lowland, medium-altitude and montane woodland or bushland.

General distribution: Guinée and Sierra Leone to Ethiopia, south to Malawi and Zambia; also in tropical Arabia.

***Eulophia latilabris* Summerh.**

FPS 3: 321 (1956); FWTA 3: 250 (1968); UKWF: 780 (1974); FTEA, Orchidac. 3: 430 (1989); FAC, Orchidac. 2: 656 (1992); UKWF: 339 (1994).

Imatong Mountains group, Uganda side: Gulu, no alt., swamp, 4.1938, *Eggeling* 3540 (K).

General habitat range: in medium-altitude wet grassland and swamps.

General distribution: Nigeria to Sudan, south to Angola, Zambia, Zimbabwe, Malawi and Mozambique.

Eulophia livingstoniana (Rchb. f.) Summerh.
FPS 3: 319 (1956) [Laboni]; FTEA, Orchidac. 3: 439 (1989); FAC, Orchidac. 2: 651 (1992); UKWF: 339 (1994).

Syn.: *Lissochilus mediocris* Rendle: FTA 7: 82 (1897); CHIPP 1929: 194.

Imatong Mountains group, Sudan side: Laboni Forest, 1220 m., grassland, 7.2.1929, *Chipp* 31 (K); hill between Mt. Konoro and Mt. Garia, 1800 m., *Loudetia arundinacea* grassland with scattered trees on shallow soil, 12.3.1982, *Friis & Vollesen* 1182 (BR, C, K, KHf).

Imatong Mountains group, Uganda side: Gulu, no alt., seasonal swamp, 4.1938, *Eggeling* 3548 (K); Paloga, 980 m., woodland, 4.1943, *Purseglove* 1364 (K); 2 km. north of Lututuru, near end of road, 1800 m., in scrub, 17.2.1969, *Lye* 2080 (MHU).

General habitat range: in lowland and medium-altitude grassland and woodland.

General distribution: Congo [previously Zaire] to South Sudan, south to Botswana, Zimbabwe and Mozambique.

Eulophia montis-elgonis Summerh.

FPS 3: 319 (1956) [Imatong Mountains]; FTEA, Orchidac. 3: 456 (1989); UKWF: 339 (1994).

Imatong Mountains group, Sudan side: without further locality, 3050 m., 1927, *Maffey* s.n. (K); Dumuso, 2290 m., grassy clearing in montane forest, 3.7.1947, *MacLeay* 123 (BM); Dumuso, 2330 m., *Hagenia* grassland, 31.5.1950, *Jackson* 1506 (K); Dumuso, 2590 m., in grass, 16.6.1953, *Prowse* 212 (KHU); Mt. Kinyeti, 3050 m., 27.7.1939, *Myers* 11,667 (K, WM).

Imatong Mountains group, Uganda side: without further locality, 2320 m., grassland, 4.1938, *Eggeling* 3562 (K, MHU); Lomwaga, 2590 m., 6.1942, *Eggeling* 5072 (EA); Langia, 1830 m., mountain grassland, 4.1943, *Purseglove* 1402 (EA, K); Langia, 2830 m., mountain grassland, 4.1943, *Purseglove* 1416 (EA, K).

General habitat range: in moist medium-altitude and montane grassland.

General distribution: Sierra Leone to South Sudan, south to Angola, Zimbabwe and South Africa (Transvaal).

Eulophia odontoglossa Rchb. f.

FTEA, Orchidac. 3: 458 (1989); FAC, Orchidac. 2: 680 (1992); UKWF: 340 (1994); FE 6: 283 (1997).

Syn.: *Eulophia shupangae* (Rchb. f.) Kraenzl.: FTA 7: 66 (1897); FPNA 3: 509 (1955); FPS 3: 318 (1956) [Imatong Mountains]; FWTA 3,1: 247 (1968).

Imatong Mountains group, Sudan side: without further locality, no alt., 1947, *Maxwell Forbes* 108 (K); Mt. Baghanj, 1830-2130 m., 13.6.1939, *Andrews* 1904 (K); Gilo, 2200 m., *Loudetia* grassland, 10.5.1954, *Jackson* 3131 (K); Itibol, 1900 m., *Acacia abyssinica* wooded grassland, 20.4.1950, *Jackson* 1401 (K).

Imatong Mountains group, Uganda side: without further locality, 2130 m., 4.1938, *Eggeling* 3613 (K); Mt. Lomwaga, 2290 m., 6.1942, *Eggeling* 5062 (EA, MHU); Langia, mountain grassland, 1830 m., 4.1943, *Purseglove* 1386 (EA, K).

General habitat range: in medium-altitude and montane grassland and bushland.

General distribution: Guinée to Ethiopia, south to South Africa (Transvaal, Natal).

Eulophia orthoplectra (Rchb. f.) Summerh.

FPS 3: 321 (1956); FWTA 3,1: 250 (1968); FTEA, Orchidac. 3: 474 (1989); FAC, Orchidac. 2: 622 (1992); UKWF: 338 (1994); FE 6: 281 (1997).

Syn.: *Lissochilus orthoplectrus* Rchb. f.: FTA 7: 95 (1897); FS: 399 (1929). *Eulophia bella* N.E. Br.

Imatong Mountains group, Sudan side: Palotaka, 1200 m., edge of forest, 25.9.1979, *Shigeta* 103 B (EA); near Lomaru, 1920 m., in grassland, flowering without leaves, 28.12.1935, *Thomas* 1765 (BM, K).

Imatong Mountains group, Uganda side: Agoro, 1830 m., bamboo thicket, 12.1932, *Eggeling* 780 (K, MHU); 3 km. south west of Lututuru, near

Patika, 1600 m., in scrub, 17.2.1969, *Lye* 2043 (MHU).

General habitat range: in medium-altitude woodland and grassland.

General distribution: Nigeria and Cameroon to South Sudan, south Congo [previously Zaire], Zambia, Malawi, Zimbabwe and Mozambique.

***Eulophia petersii* (Rchb. f.) Rchb. f.**

FTA 7: 55 (1897); FTEA, Orchidac. 3: 440 (1989); FAC, Orchidac. 2: 673 (1992); UKWF: 338 (1994); FE 6: 278 (1997).

Imatong Mountains group, Uganda side: Agoro, 1380 m., rocky hillside, 12.11.1945, *Thomas* 4360 (EA, K).

Didinga Mountains: Nathilani, 1200 m., in clump of large succulents (*Euphorbia candelabrum*, *Aloe*, etc.), 9.4.1949, *Jackson* 671 (BM).

General habitat range: in lowland and medium-altitude deciduous and semi-evergreen bushland.

General distribution: Congo [previously Zaire] to Ethiopia and Somalia, south to South Africa; also in tropical Arabia.

***Eulophia speciosa* (Lindl.) Bolus**

FTEA, Orchidac. 3: 473 (1989); FAC, Orchidac. 2: 638 (1992); UKWF: 338 (1994); FE 6: 280 (1997).

Imatong Mountains group, Sudan side: Khor de Leb plain north west of Acholi Mountains (4° 22' N, 32° 37' E), no alt., 27.5.1984, *Kielland-Lund* 767 (NLH); near Torit [4° 24' N, 32° 34' E], 620 m., *Acacia-Lannea* woodland, 24.6.1949, *Jackson* 818 (BM); Kinyeti Valley, plain between Torit and Ngarama, Iyedo (4° 22' N, 32° 37' E), no alt., 29.5.1984, *Kielland-Lund* 781 (C, NLH).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and woodland.

General distribution: South Sudan and Ethiopia to South Africa, also in tropical Arabia.

***Eulophia stachyodes* Rchb. f.**

FTA 7: 58 (1897); FS: 397 (1929); FPS 3: 319 (1956); FWTA 3,1: 247 (1968); FTEA, Orchidac. 3: 444 (1989); FAC, Orchidac. 2: 648 (1992); UKWF: 339 (1994); FE 6: 279 (1997).

Imatong Mountains group, Sudan side: Gilo, 1900 m., *Loudetia* grassland, 20.5.1950, *Jackson* 1503 (BM).

Imatong Mountains group, Uganda side: no further locality, 2130 m., 4.1938, *Eggeling* 3614 (K).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2000 m., grassland, 17.5.1972, *Synnott* 1025 (EA).

General habitat range: in medium-altitude and montane grassland and woodland.

General distribution: Nigeria and Cameroon to Ethiopia, south to Zimbabwe.

***Eulophia streptopetala* Lindl.**

FTEA, Orchidac. 3: 469 (1989); FAC, Orchidac. 2: 620 (1992); UKWF: 339 (1994); FE 6: 278 (1997); HYF: 411 (1997).

var. **streptopetala**

FTEA, Orchidac. 3: 470 (1989); FE 6: 278 (1997).

Syn.: *Eulophia paivaeana* (Rchb. f.) Summerh. subsp. *borealis* Summerh. *Lissochilus oliverianus* Rchb. f.: FTA 7: 92 (1897).

Imatong Mountains group, Sudan side: Gilo, no alt., 6.1953, *Jackson* 2999 (K); Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 15.11.1980, *Friis & Vollesen* 252 (C, K, KHF); Gilo, 1830 m., in montane woodland, 7.1.1950, *MacLeay* 451 (BM); Ibahin, 1930 m., rocks, 19.12.1935, *Thomas* 1677 (K); Loyaru, 2320 m., in grassland, 29.12.1935, *Thomas* 1779 (BM, K).

General habitat range: in medium-altitude and montane grassland and at forest margins.

General distribution: Sudan and Ethiopia to South Africa.

var. **stenophylla** (Summerh.) Cribb

FTEA, Orchidac. 3: 471 (1989).

Imatong Mountains group, Uganda side: without

further locality, no alt., no date, *Eggeling* 2405 (K).

General habitat range: in medium-altitude and montane grassland and bushland, often on rocky hills.

General distribution: Uganda and Kenya. Species as a whole as the two varieties recorded, but also in tropical Arabia.

Habenaria Willd.

Habenaria bracteosa A. Rich.

FTA 7: 217 (1898); FTEA, Orchidac. 1: 53 (1968); FWTA 3,1: 193 (1968); UKWF: 328 (1994); FE 6: 208 (1997).

Syn.: [*Habenaria filicornis* auct., non Lindl.: FPS 3: 322 (1956) {Imatong Mountains, Mt. Kinyeti}].

Imatong Mountains group, Sudan side: slope of Mt. Kinyeti, 2900 m., cloud forest, 4.7.1947, *MacLeay* 174 (BM); Mt. Kinyeti, 3050 m., 27.7.1939, *Myers* 11,668 (K).

General habitat range: in montane grassland and forest glades.

General distribution: Cameroon to Ethiopia, south to Tanzania.

Habenaria chirensis Rchb. f.

FTA 7: 238 (1898); FTEA, Orchidac. 1: 88 (1968); FAC, Orchidac. 1: 107 (1984); UKWF: 330 (1994); FE 6: 219 (1997).

Imatong Mountains group, Sudan side: Gilo, 1990 m., burnt grassland, 26.6.1947, *MacLeay* 73A (BM) & *MacLeay* 74 (BM); Gilo, 1990 m., burnt grassland, 30.6.1947, *MacLeay* 122 (BM).

General habitat range: in medium-altitude and montane grassland.

General distribution: Nigeria to Ethiopia, south to North Tanzania. First record from the Sudan.

Habenaria humilior Rchb. f.

FTA 7: 236 (1898); FTEA, Orchidac. 1: 91

(1968); WICKENS 1976: 160; UKWF: 330 (1994); FZ 11,1: 96 (1995); FE 6: 220 (1997).

Syn.: *Habenaria hochstetterana* Kraenzl. ex Engl.: FTA 7: 243 (1898); FPS 3: 323 (1956) {Imatong Mountains}.

Imatong Mountains group, Sudan side: without further locality, 1520-1830 m., 12.6.1939, *Andrews* 1838 (K).

Imatong Mountains group, Uganda side: Lomwaga, 2590 m., 6.1942, *Eggeling* 5076 (EA); in grass bog near Aringa River in hills above Ago-ro, 1830 m., 6.1942, *Eggeling* 5084 (EA).

General habitat range: in montane grassland.

General distribution: Congo [previously Zaire] to Ethiopia, south to Zambia, Malawi and Zimbabwe.

Habenaria malacophylla Rchb. f.

FTA 7: 230 (1898); FTEA, Orchidac. 1: 73 (1968); FWTA 3,1: 198 (1968); FAC, Orchidac. 1: 135 (1984); UKWF: 329 (1994); FZ 11,1: (1995); FE 6: 219 (1997).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 9.11.1980, *Friis & Vollesen* 82 (C, K, KHf).

General habitat range: in montane forest and grassland.

General distribution: Sierra Leone to Ethiopia, south to South Africa (Transvaal). First record from the Sudan.

Habenaria papyracea Schltr.

FTEA, Orchidac. 1: 79 (1968); FWTA 3,1: 194 (1968); FAC, Orchidac. 1: 129 (1984); FZ 11,1: 83 (1995).

Imatong Mountains group, Sudan side: Bushbuck Hill, east of Itibol, 2100 m., *Hagenia abyssinica*-*Gnidia glauca* woodland in ecotone between upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum* and *Loudetia arundinacea* grassland, 21.11.1980, *Friis & Vollesen* 393 (C, K).

General habitat range: in medium-altitude and montane grassland.

General distribution: Nigeria to South Sudan, and from Tanzania to Zambia and Zimbabwe. First record from the Sudan.

Habenaria peristyloides A. Rich.

FTA 7: 214 (1898); FTEA, Orchidac. 1: 61 (1968); FWTA 3,1: 194 (1968); FAC, Orchidac. 1: 90 (1984); UKWF: 329 (1994); HYF: 409 (1997); FE 6: 211 (1997).

Imatong Mountains group, Sudan side: near Kipia, 2740 m., mountain meadow, 26.7.1939, Myers 11,606 (K, WM).

General habitat range: in montane grassland and bushland.

General distribution: Nigeria to Ethiopia, south to Tanzania; also in tropical Arabia.

Habenaria petitiana (A. Rich.) T. Durand & Schinz

FTEA, Orchidac. 1: 56 (1968); FAC, Orchidac. 1: 82 (1984); UKWF: 329 (1994); FZ 11,1: 69 (1995); FE 6: 209 (1997).

Syn.: *Peristylus petitianus* A. Rich.: FTA 7: 199 (1898).

Imatong Mountains group, Sudan side: Mt. Kinyeti, 2740 m., by path under trees, 17.6.1953, Prowse 335 (KHU).

General habitat range: in montane grassland and woodland.

General distribution: Congo [previously Zaire] to Ethiopia, south to Tanzania. First record from the Sudan.

Habenaria quartiniana A. Rich.

FTA 7: 223 (1898); FTEA, Orchidac. 1: 66 (1968); UKWF: 329 (1994); FE 6: 216 (1997).

Imatong Mountains group, Sudan side: near Gilo, 1890 m., in damp grassland, 13.6.1953, Prowse 245 (KHU); Dumuso, 2590 m., in grassland, 16.6.1953, Prowse 313 (KHU); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 53' E), 2200 m., in Hage-

nia forest, 10.6.1984, Kielland-Lund 904 (C, NLH).

Imatong Mountains group, Uganda side: Mt. Lomwaga, 2500 m., 6.1942, Eggeling 5069 (EA, K).

General habitat range: in montane grassland.

General distribution: Ethiopia, South Sudan, Uganda and Kenya. First record from the Sudan.

Habenaria schimperiana Hochst. ex A. Rich.

FTA 7: 241 (1898); FPS 3: 323 (1956) {Imatong Mountains, Ras Logoforok}; FTEA, Orchidac. 1: 89 (1968); FAC, Orchidac. 1: 104 (1984); UKWF: 330 (1994); FZ 11,1: 105 (1995); FE 6: 220 (1997); HYF: 410 (1997).

Imatong Mountains group, Sudan side: Ras Logoforok, 1970 m., 24.7.1939, Myers 11,558 (K); Gilo, 1830 m., burnt grassland, 28.6.1947, MacLeay 103 (BM).

General habitat range: in montane grassland.

General distribution: Congo [previously Zaire] to Ethiopia, south to Zambia, Malawi, Zimbabwe and South Africa (Transvaal); also in tropical Arabia.

Holothrix Lindl.

Holothrix brongniartiana Rchb. f.

FE 6: 200 (1997).

Syn.: *Holothrix puberula* Rendle: FTA 7: 191 (1897); FTEA, Orchidac. 1: 6 (1968); UKWF: 327 (1994); FZ 11,1: 35 (1995).

Imatong Mountains group, Uganda side: Lomwaga, 2590 m., flowers violet, 6.1942, Eggeling 5078 (K, MHU).

General habitat range: in montane grassland.

General distribution: Ethiopia, Uganda, Kenya, Tanzania, Zambia and Malawi (Nyika Plateau).

Holothrix squamata (A. Rich.) Rchb. f.

FTEA, Orchidac. 1: 8 (1968); FE 6: 200 (1997).

Syn.: *Deroemeria squamata* (A. Rich.) Reichb. f.: FTA 7: 196 (1898).

Imatong Mountains group, Sudan side: ridge leading to summit of Mt. Kinyeti, 3000 m., fissures in rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, *Friis & Vollesen* 1279 (C, K, KHF); summit of Mt. Kinyeti, 3100 m., grassland, 28.3.1947, *Jackson* 647 (BM).

General habitat range: in montane grassland.

General distribution: only found in South Sudan, Ethiopia and Uganda. First record for the Sudan.

Malaxis Solander ex Sw.

Malaxis maclaudii (Finet) Summerh.

FPS 3: 324 (1956); FWTA 3,1: 211 (1968); FAC, Orchidac. 1: 272 (1984); FZ 11,1: 283 (1995).

Imatong Mountains group, Sudan side: Lotti, near rest house, no alt., forest, 10.6.1939, *Andrews* 1779 (K); Lotti, no alt., on rocks in deep shade near stream in forest, 24.6.1953, *Prowse* 382 (KHU); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on large boulders on forest floor, 1.12.1980, *Friis & Vollesen* 608 (C, K, KHF).

General habitat range: in lowland and medium-altitude rain forest.

General distribution: Guinée, Sierra Leone, Ghana, Nigeria, Cameroon and Central African Republic to South Sudan.

Nervilia Commers. ex Gaud.

Nervilia adolphi Schltr.

FWTA 3,1: 206 (1968); FAC, Orchidac. 1: 257 (1984); FTEA, Orchidac. 2: 269 (1984); PETERSSON 1991: 51; FZ 11,1: 256 (1995).

var. **seposita** N. Hallé & Toilliez

HALLÉ & TOILLIEZ 1971: 460; FTEA, Orchidac.

2: 271 (1984); PETERSON 1991: 53; FZ 11,1: 257 (1995).

Imatong Mountains group, Uganda side: 1 km. south of Aringa River, along road [3° 44' N, 32° 55' E], 1750 m., on wet, slimy soil, 11.6.1973, *Katende* 1893 (MHU).

General habitat range: in lowland and medium-altitude moist forest and swamps, damp places in grassland and woodland.

General distribution: Ivory Coast, Nigeria, Uganda. Species as a whole also in South Tanzania, Malawi, Zambia, Zimbabwe and South Africa.

Nervilia kotschyi (Rchb. f.) Schltr.

FS: 399 (1929); FPS 3: 324 (1956); FWTA 3,1: 207 (1968); WICKENS 1976: 161; FAC, Orchidac. 1: 253 (1984); FTEA, Orchidac. 2: 273 (1984); PETERSSON 1991: 60; FE 6: 253 (1997).

var. **kotschyi**

FZ 11,1: 262 (1995).

Syn.: *Nervilia abyssinica* (Chiov.) Schltr.: WICKENS 1976: 191.

Imatong Mountains group, Uganda side: Lomwaga, Agoro slope, 1980 m., *Protea* woodland, 8.4.1944, *Greenway & Hummel* 7316 (EA, K).

General habitat range: in lowland and medium-altitude woodland.

General distribution: Senegal to Ethiopia and Eritrea, south to Zambia and Zimbabwe; also in Madagascar. Species as a whole within the same general area.

Nervilia subintegra Summerh.

PETERSON 1991: 50.

Syn.: *Nervilia toillieziae* Hallé: HALLÉ & TOILLIEZ 1971: 455.

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 1.12.1980, *Friis & Vollesen* 592 (C, K, KHF).

General habitat range: in dense and humid lowland forest or gallery forest.

General distribution: Guinée to South Sudan, south to Congo [previously Zaire].

Platycoryne Rchb. f.

Platycoryne crocea (Schweinf.) Rolfe

FTA 7: 257 (1898); FS: 401 (1929); FPS 3: 324 (1956); FTEA, Orchidac. 1: 146 (1968); FWTA 3,1: 200 (1968); FAC, Orchidac. 1: 162 (1984); UKWF: 331 (1994); FZ 11,1: 151 (1995); FE 6: 234 (1997).

subsp. **montis-elgon** (Schltr.) Summerh.

FTEA, Orchidac.: 1: 148 (1968); FE 6: 234 (1997).

Imatong Mountains group, Sudan side: Ngairigi River, 1700 m., grassland, 22.4.1950, *Jackson* 1403 (BM); between Gilo and Ngairigi River, 1500 m., rocky forest clearing, 9.7.1978, *Howard* s.n. (K); Gilo, 1700 m., between gneiss boulders, 11.5.1954, *Jackson* 3190 (K, KHf).

General habitat range: in medium-altitude and montane grassland.

General distribution: South Sudan, Ethiopia, Uganda and Kenya. Species as a whole from Cameroon to Ethiopia, south to Tanzania and Zambia.

Polystachya Hook.

Polystachya benettiana Rchb. f.

FTA 7: 116 (1897); FTEA, Orchidac. 2: 357 (1984); FAC, Orchidac. 2: 440 (1992); UKWF: 337 (1994); FE 6: 262 (1997).

Syn.: *Polystachya stricta* Rolfe: FPS 3: 325 (1956); FWTA 3,1: 221 (1968).

Imatong Mountains group, Uganda side: Lututuru, 1830 m., 2.1938, *Eggeling* 3497 (K).

General habitat range: in medium-altitude woodland and forest.

General distribution: Nigeria and Cameroon to Ethiopia, south to Congo [previously Zaire], Zambia and Tanzania.

Polystachya cultriformis (Thou.) Spreng.

FWTA 3,1: 225 (1968); FTEA, Orchidac. 2: 341 (1984); FAC, Orchidac. 2: 383 (1992); UKWF: 337 (1994); FE 6: 266 (1997).

Imatong Mountains group, Sudan side: below Gilo, at bridge on Ngairigi River, 1580 m., epiphytic, 15.6.1953, *Prowse* 296 (KHU); Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 9.11.1980, *Friis & Vollesen* 74 (C).

General habitat range: in medium-altitude and montane forest.

General distribution: Cameroon to Ethiopia, south to Zimbabwe and South Africa; also in Madagascar, Mascarene Islands and Seychelles. First record for the Sudan.

Polystachya eurychila Summerh.

FTEA, Orchidac. 2: 373 (1984); UKWF: 337 (1994); FE 6: 265 (1997).

Imatong Mountains group, Uganda side: without further locality, 12.1935, *Eggeling* 2404 (K).

General habitat range: in medium-altitude riverine forest.

General distribution: Uganda, Kenya and Ethiopia.

Polystachya steudneri Rchb. f.

FTA 7: 117 (1897); FTEA, Orchidac. 2: 375 (1984); UKWF: 337 (1994); FE 6: 265 (1997).

Imatong Mountains group, Sudan side: without further locality, no alt., 1939, *Andrews* 1858 (K).

General habitat range: in medium-altitude woodland and dry forest.

General distribution: Nigeria to Ethiopia, south to Uganda and Kenya.

Polystachya transvaalensis Schltr.

FTEA, Orchidac. 2: 357 (1984); UKWF: 337 (1994).

Syn.: *Polystachya nigrescens* Rendle: FTA 7: 111 (1897). *Polystachya rendlei* Rolfe: FTA 7: 112 (1897).

Imatong Mountains group, Sudan side: Lolibai

Mountain, south of Gilo towards Ingwok (Kinyeti) peak, (3° 58' N, 32° 54' E), 3100 m., on rocks above timberline, 10.6.1984, *Kielland-Lund* 913 (NLH).

General habitat range: in montane forest and grassland.

General distribution: East Congo [previously Zaire] to South East Sudan, Uganda and Kenya, south to Zimbabwe and South Africa (Transvaal, Natal). First record from the Sudan.

Polystachya sp.

Imatong Mountains group, Sudan side: without further locality, no alt., 1939, *Andrews* 1959 (?K, not traced).

Satyrium Sw.

Satyrium carsonii Rolfe

FTA 7: 265 (1898); FTEA, *Orchidac.* 1: 186 (1968); FWTA 3,1: 201 (1968); FAC, *Orchidac.* 1: 214 (1984); UKWF: 332 (1994); FZ 11,1: 201 (1995).

Imatong Mountains group, Uganda side: 4 km. south east of Mt. Lomwaga [3° 47'N, 32° 55' E], 1900 m., tall-grass grassland with scattered trees, 18.7.1974, *Katende* 2123 (EA, MHU).

General habitat range: in lowland, medium-altitude and montane grassland and woodland.

General distribution: Nigeria to Uganda and Kenya, south to Zambia and Malawi.

Satyrium fimbriatum Summerh.

FPS 3: 325 (1956) {Imatong Mountains, Mt. Kinyeti}; FTEA, *Orchidac.* 1: 187 (1968); UKWF: 332 (1994).

Imatong Mountains group, Sudan side: Mt. Kinyeti, 3110 m., 27.7.1939, *Myers* 11,665 (K, WM).

General habitat range: in montane grassland.

General distribution: South Sudan, Uganda, Kenya and Tanzania.

Satyrium sacculatum (Rendle) Rolfe

FTA 7: 266 (1898); UKWF: 333 (1994); FE 6: 245 (1997).

Syn.: [*Satyrium coriophoroides* auct., non A. Rich.: FPS 3: 325 (1956) {Imatong Mountains}; FTEA, *Orchidac.* 1: 200 (1968); WICKENS 1976: 161; FWTA 3,1: 201 (1968); FZ 11,1: 215 (1995)].

Imatong Mountains group, Sudan side: Mt. Baghanj, 1830-2130 m., 13.6.1939, *Andrews* 1887 (K); Gilo, 1650 m., burnt grassland, 24.6.1947, *MacLeay* 40 (BM); Gilo, 1900 m., *Loudetia* grassland, 20.5.1950, *Jackson* 1502 (BM); hill behind Gilo, 1890 m., in humid grassland, 13.6.1953, *Prowse* 244 (KHU); Gilo, no alt., in *Pinus* plantation (formerly *Loudetia* grassland), 20.6.1961, *Jackson* 4251 (K); Ras Logoforok, 1950 m., 24.7.1939, *Myers* 11,555 (K).

Imatong Mountains group, Uganda side: Mt. Lomwaga, 2500 m., ground orchid, flowers salmon-red to scarlet, 6.1942, *Eggeling* 5067 (EA, MHU); 2 km. south east of Mt. Lomwaga, 1900 m., tall-grass grassland with scattered trees, 18.7.1974, *Katende* 2122 (EA, MHU).

General habitat range: in montane grassland and woodland.

General distribution: Cameroon to Ethiopia, south to Zambia and Malawi.

Satyrium sceptrum Schltr.

FTEA, *Orchidac.* 1: 197 (1968); FAC, *Orchidac.* 1: 225 (1984); FZ 11,1: 209 (1995).

Syn.: *Satyrium acutirostrum* Summerh.: FPNA 3: 447 (1955).

Imatong Mountains group, Sudan side: above Lomuleng, 2440 m., mountain meadow, 25.7.1939, *Myers* 11,577 (K).

Imatong Mountains group, Uganda side: Lomwaga, 2500 m., 6.1942, *Eggeling* 5070 (EA, K, MHU).

General habitat range: in montane grassland and bushland.

General distribution: Congo [previously Zaire] and South Sudan, south to Zambia, Zimbabwe and Malawi.

Satyrium trinerve Lindl.

FZ 11,1: 220 (1995).

Syn.: *Satyrium altherstonii* Rchb. f.: FCap. 5,3: 154 (1912); FTEA, Orchidac. 1: 209 (1968); FWTA 3,1: 201 (1968). *Satyrium occultum* Rolfe: FTA 7: 273 (1898).

Imatong Mountains group, Sudan side: Gilo, 1980 m., in regularly burnt mountain grassland, 30.6.1947, *MacLeay* 121 (BM).

General habitat range: in medium-altitude and montane moist grassland.

General distribution: Guinée and Sierra Leone to South Sudan and Uganda, south to South Africa (Transvaal, East Cape Prov.); also in Madagascar.

Satyrium volkensii Schltr.

FTA 7: 267 (1898); FAC, Orchidac. 1: 228 (1984); FTEA, Orchidac. 1: 202 (1968); UKWF: 332 (1994); FZ 11,1: 216 (1995).

Imatong Mountains group, Sudan side: Gilo, 1990 m., burnt grassland, 26.6.1947, *MacLeay* 70 (BM).

General habitat range: in intermediate and montane grassland, bushland and woodland.

General distribution: Nigeria to South Sudan, south to Zimbabwe and Malawi. First record for the Sudan.

Satyrium sp.

Imatong Mountains group, Sudan side: Mt. Kinyeti, 3050 m., 27.7.1939, *Myers* 11,669 (?K, not traced).

Stolzia Schltr.**Stolzia repens** (Rolfe) Summerh.

FWTA 3,1: 226 (1968); FTEA, Orchidac. 2: 330 (1984); FAC, Orchidac. 2: 375 (1992); UKWF: 338 (1994); FZ 11,1: 290 (1995); FE 6: 268 (1997).

Imatong Mountains group, Sudan side: along path from Bushbuck Hill to Mt. Konoro, 2300 m.,

upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, common epiphyte, 5.3.1982, *Friis & Vollesen* 1107 (BR, C, EA, K, KHF); below summit of Mt. Kinyeti, on north-western side of the peak, 2600 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, with open glades and patches of mountain bamboo and *Hagenia abyssinica* and *Hypericum revolutum* woodland, 23.3.1982, *Friis & Vollesen* 1291 (C, K).

General habitat range: in medium-altitude and montane forest.

General distribution: Ghana, Nigeria and Cameroon to Ethiopia, south to Zambia, Malawi and Zimbabwe. First record from the Sudan.

Unidentified epiphytic orchid

Didinga Mountains: Naligede, 1770 m., 21.4.1939, *Myers* 10,979 (?K, not traced).

Order 83. **Juncales** Dumort.Fam. 174. **Juncaceae** Juss.**Juncus** L.**Juncus dregeanus** Kunth

FPS 3: 326 (1956); HEDBERG 1957: 61; FTEA, Juncac.: 4 (1966); FAC, Juncac.: 7 (1973); WICKENS 1976: 161; FE 6: 389 (1997).

subsp. **bachitii** (Steud.) Hedb.

HEDBERG 1957: 61; FTEA, Juncac.: 4 (1966); FAC, Juncac.: 7 (1973); WICKENS 1976: 161; FE 6: 389 (1997).

Syn.: *Juncus bachitii* Steud.: FTA 8: 94 (1901).

Imatong Mountains group, Sudan side: Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, in seepage area, 14.3.1982, *Friis & Vollesen* 1207 (C, K); between Kinyeti

and Kipia, 2700 m., in swamp, 1.6.1950, *Jackson* 1534bis (K).

General habitat range: in montane forest, evergreen bushland and grassland.

General distribution: East Congo [previously Zaire] to Ethiopia, south to Zambia, Zimbabwe and Malawi. Species as a whole also in South Africa.

Juncus oxycarpus Kunth

FTA 8: 93 (1901); FTEA, Juncac.: 3 (1966); FAC, Juncac.: 6 (1973); FSo 4: 97 (1995); FE 6: 387 (1997).

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 1850 m., seepage meadow on edge between upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea* and grassland with *Loudetia arundinacea*, 18.11.1980, *Friis & Vollesen* 311 (BR, C, K, KHF); Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, in seepage area, 14.3.1982, *Friis & Vollesen* 1208 (BR, C, EA, K).

General habitat range: in medium-altitude and montane forest and grassland.

General distribution: East Congo [previously Zaire] to Ethiopia and North Somalia, south to Angola, Zambia, Malawi, Zimbabwe and South Africa (Transvaal, Natal). First record from the Sudan.

Order 84. Cyperales Hutch.

Fam. 175. Cyperaceae Juss.

Ascolepis Nees

Ascolepis protea Welw.

FTA 8: 474 (1902); FS: 426 (1929); NAPPER 1964: 37; FWTA 3,2: 327 (1972); HAINES & LYE 1983: 304; FE 6: 491 (1997).

subsp. **bellidiflora** (Welw.) Lye

HAINES & LYE 1983: 305; FE 6: 491 (1997).

Syn.: *Ascolepis protea* Welw. var. *bellidiflora* Welw.: FTA 8: 475 (1902); FS: 426 (1929). [*Ascolepis elata* auct., non Welw.: FPS 3: 328 (1956)].

Imatong Mountains group, Sudan side: without further locality, 1520-1830 m., 12.6.1939, *Andrews* 1841 (K); Gilo, 1960 m., burnt grassland, 28.6.1947, *MacLeay* 105 (BM); Gilo, 1980 m., on damp flat rocks in burnt grassland above rest house, 12.7.1947, *MacLeay* 214 (KHU).

General habitat range: in lowland, medium-altitude and montane wet grassland.

General distribution: Nigeria to Ethiopia, south to Angola and Zimbabwe. Species as a whole from Senegal to Ethiopia, south to South Africa.

Bulbostylis Kunth

Bulbostylis abortiva (Steud.) C.B. Clarke

FTA 8: 441 (1902); FPS 3: 329 (1956); NAPPER 1965: 5; HAINES & LYE 1983: 117; FE 6: 420 (1997).

Syn.: *Abildgaardia abortiva* (Steud.) K. Lye: HAINES & LYE 1983: 117.

Imatong Mountains group, Sudan side: 3 km. south of Torit (4° 23' N, 32° 36' E), 650 m., 13.12.1983, *Kielland-Lund* 323 (C, NLH).

General habitat range: in lowland, medium-altitude and montane bushland or dry grassland, usually in shallow, sandy soil or in cracks in rocky outcrops.

General distribution: Guinée to Ethiopia, south to Angola, Zambia and Malawi; also in Madagascar.

Bulbostylis coleotricha (A. Rich.) C.B. Clarke

FTA 8: 442 (1902); FPS 3: 329 (1956); NAPPER 1965: 6; HAINES & LYE 1983: 118.

Syn.: *Abildgaardia coleotricha* (Steud.) K. Lye: HAINES & LYE 1983: 118.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, c. 100 m. north of compound, 700 m., 26.11.1983, *Kielland-Lund* 50 (C, NLH);

Kinyeti Valley, Hiliu, near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund* 125 (C, NLH); c. 3 km. east of Hiliu, 2 km. along Imatong River, 700 m., 3.12.1983, *Kielland-Lund* 191 (C, NLH); hill c. 2 km. south of Hiliu, 700 m., rocky hillside, 28.11.1983, *Kielland-Lund* 84 (C, NLH).

General habitat range: in open lowland and medium-altitude habitats with shallow soil on damp rocks or on hard-pans.

General distribution: Senegal to Ethiopia, Uganda and Kenya.

Bulbostylis densa (Wall.) Hand.-Mazz.

NAPPER 1965: 5; FWTA 3,2: 318 (1972); WICKENS 1976: 161; FE 6: 419 (1997).

Syn.: *Bulbostylis capillaris* (L.) C.B. Clarke var. *trifida* (Nees) C.B. Clarke: FTA 8: 438 (1902).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 21.11.1980, *Friis & Vollesen* 382 (BR, C, EA, K, KHF); Mt. Kinyeti, 3060 m., rocky places, 19.8.1951, *Babiker Beshir* 31 (K, WM).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2260 m., shallow soil over rock, 26.8.1966, *Lock* K 11 (EA); Nangeya Mountains, Mt. Lonyili, 2290 m., bare soil in rock crevices at summit, 26.8.1966, *Lock* K 21 (MHU).

General habitat range: in medium-altitude and montane grassland.

General distribution: Senegal to Ethiopia, south to South Africa; widespread in the tropics of the Old World.

Bulbostylis hispidula (Vahl) R. Haines

HAINES & LYE 1983: 104; FSo 4: 111 (1995); FE 6: 416 (1997).

subsp. **hispidula**

FE 6: 417 (1997).

Syn.: *Fimbristylis hispidula* (Vahl) Kunth: FWTA 3,2: 324 (1972); WICKENS 1976: 163. *Abilgaardia hispidula* (Vahl) K. Lye: HAINES & LYE 1983: 104. *Fimbristylis exilis* (Kunth) Roem. & Schult.: FTA 8: 418 (1902); FS: 421 (1929); FPS 3: 360 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, hills near the junction of roads to Ngarama and Katire north of Hiliu, 650 m., 11.12.1983, *Kielland-Lund* 298 (C, NLH); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 8.11.1980, *Friis & Vollesen* 41 (BR, C, K, KHF); Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 23.11.1980, *Friis & Vollesen* 415 (BR, C, K, KHF).

Didinga Mountains: 35 km. south west of Kapoeta towards Torit (33° 27' E, 4° 34' N), no alt., sandy gravel, 29.8.1953, *Peers* TO11 (K, WM).

General habitat range: in lowland, medium-altitude and montane dry grassland, bushland and woodland.

General distribution: Senegal to Somalia, south to Namibia and South Africa.

subsp. **oligostachys** (A. Rich.) Lye

FE 6: 417 (1997).

Syn.: *Bulbostylis oligostachys* (A. Rich.) Lye: HAINES & LYE 1983: 108. *Abildgaardia oligostachys* (A. Rich.) K. Lye: HAINES & LYE 1983: 108. *Fimbristylis oligostachys* A. Rich.: FTA 8: 423 (1902).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2260 m., shallow soil over rock, 26.8.1966, *Lock* K 12 (EA, MHU).

General habitat range: in medium-altitude and montane wooded grassland, usually in seasonally wet soil over rocks.

General distribution: Ethiopia, Uganda, Kenya and Tanzania. Species as a whole widespread in tropical Africa.

Bulbostylis oritrephes (Ridl.) C.B. Clarke
FTA 8: 445 (1902); FWTA 3,2: 317 (1972);
HAINES & LYE 1983: 101.

Syn.: *Abildgaardia oritrephes* (Ridl.) K. Lye:
HAINES & LYE 1983: 101.

Imatong Mountains group, Sudan side: without further locality, 1890 m., hill meadow, 12.4.1933, *Smith* 21 (K); lower southern slope of Mt. Konoro, 2300 m., *Loudetia arundinacea* grassland on shallow soil, recently burnt, 18.2.1982, *Friis & Vollesen* 942 (BR, C, K, KHF).

Didinga Mountains: Mt. Lotuke, 1900 m., in *Protea* grassland, 29.3.1950, *Jackson* 1310 (K, WM).

General habitat range: in medium-altitude and montane grassland, often on rocky outcrops.

General distribution: Guinée to South Sudan, south to South Africa.

Bulbostylis pusilla (A. Rich.) C.B. Clarke
FTA 8: 440 (1902); FS: 422 (1929); FPS 3: 329 (1956); HAINES & LYE 1983: 115; FE 6: 418 (1997).

subsp. **yalingensis** (Cherm.) R. Haines
HAINES & LYE 1983: 115; FE 6: 418 (1997).

Syn.: *Bulbostylis yalingensis* Cherm.: CHERMEZON 1931: 40. *Abildgaardia pusilla* (A. Rich.) K. Lye subsp. *yalingensis* (Cherm.) K. Lye: HAINES & LYE 1983: 115.

Imatong Mountains group, Sudan side: without further locality, 1530-1830 m., 12.6.1939, *Andrews* 1852 (K).

General habitat range: in lowland, medium-altitude and montane grassland and bushland on sandy soil.

General distribution: Cameroon to South Sudan, south to Tanzania. Species as a whole south to Zambia.

Bulbostylis setifolia (A. Rich.) Bodard
FE 6: 415 (1997).

Syn.: *Abildgaardia setifolia* (A. Rich.) K. Lye: HAINES & LYE 1983: 100. *Bulbostylis atrosan-*

guinea (Boeck.) C.B. Clarke: FTA 8: 435 (1902); FPS 3: 329 (1956) {Mt. Lotuke}; HAINES & LYE 1983: 100; HYF: 331 (1997).

Imatong Mountains group, Sudan side: Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, recently burnt, 16.2.1982, *Friis & Vollesen* 914 (BR, C, K, KHF); along path from Bushbuck Hill to Mt. Konoro, 2400 m., *Hagenia abyssinica* woodland with recently burnt ground cover, 23.2.1982, *Friis & Vollesen* 1005 (BR, C, EA, K, KHF); Dumuso, no alt., in *Loudetia* grassland among rocks, in tufts, 31.5.1950, *Jackson* 1521 (K, WM); Mt. Kinyeti, 3000 m., mountain grassland, dominant over large areas, 1.6.1950, *Jackson* 1542 (K, WM); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m., above timberline, 10.6.1984, *Kielland-Lund* 924 (C, NLH); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 840 (C, K).

Imatong Mountains group, Uganda side: Langia, no alt., 4.1943, *Purseglove* 1423 (K).

General habitat range: in damp places in medium-altitude and montane grassland.

General distribution: South Sudan and Ethiopia to Angola and Tanzania.

Carex L.

Carex chlorosaccus C.B. Clarke
FTA 8: 519 (1902); FPS 3: 330 (1956) {Imatong Mountains, summit of Mt. Kinyeti}; NAPPER 1963: 10; FWTA 3,2: 349 (1972); HAINES & LYE 1983: 375; FE 6: 505 (1997).

Syn.: *Carex echinoclhoe* Kunze var. *chlorosaccus* (C.B. Clarke) Kük.: KÜKENTHAL 1909: 271.

Imatong Mountains group, Sudan side: Mt. Kinyeti, 3050 m., 15.8.1951, *Babiker Beshir* 29 (K, WM).

General habitat range: in medium-altitude and montane forest, often along paths and in clearings.

General distribution: Bioko to Ethiopia, south to Tanzania.

Carex conferta Hochst. ex A. Rich.

FTA 8: 516 (1902); KÜKENTHAL 1909: 171; HEDBERG 1957: 58; LYE 1986: 372; FE 6: 503 (1997).

var. **conferta**

LYE 1986: 372.

Imatong Mountains group, Sudan side: below summit of Mt. Kinyeti, on north-western side of the peak, 2600 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, with open glades and patches of mountain bamboo and *Hagenia abyssinica* and *Hypericum revolutum* woodland, in open, recently burnt glade, 23.3.1982, Friis & Vollesen 1296 (BR, C, K, KHF).

General habitat range: in montane grassland.

General distribution: South Sudan and Ethiopia south to East Congo [previously Zaire], Rwanda and Kenya. Species as a whole also in Tanzania. First record from the Sudan.

Carex echinochloe Kunze

FTA 8: 518 (1902); KÜKENTHAL 1909: 270; FPS 3: 330 (1956) {Imatong Mountains, Mt. Angargi}; NAPPER 1963: 10; FWTA 3,2: 349 (1972); HAINES & LYE 1983: 374; FE 6: 505 (1997).

subsp. **echinochloe**

HAINES & LYE 1983: 374.

Imatong Mountains group, Sudan side: above Gilo Pool (4° 02' N, 32° 50' E), no alt., 15.1.1984, Kielland-Lund 656 (NLH); Gilo, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, at forest edge, 11.12.1980, Friis & Vollesen 814 (C, K, KHF); Mt. Angargi, 1830-2130 m., 14.6.1939, Andrews 1948 (K).

Imatong Mountains group, Uganda side: without further loc., 2450 m., grassland, 4.1938, Eggeling 3533 (K); Lomwaga, 2410 m., 6.1963, Morrison s.n. (EA, MHU); Lututuru, no alt., no

date, Kertland s.n. (MHU); 4 km. south east of Lomwaga, 18.7.1974, Katende 2169 (EA).

General habitat range: in montane forest and evergreen bushland.

General distribution: Cameroon to Ethiopia, south to North Tanzania. Species as a whole south to Zimbabwe.

Carex johnstonii Boeck.

FTA 8: 521 (1902); KÜKENTHAL 1909: 593; NAPPER 1963: 10; HAINES & LYE 1983: 377; FE 6: 507 (1997).

Imatong Mountains group, Sudan side: Mt. Kinyeti, 2500 m., upland rain forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri*, *Syzygium guineense* subsp. *afromontanum* and *Dombeya torrida*, 13.12.1980, Friis & Vollesen 855 (C).

General habitat range: in montane forest.

General distribution: South Sudan and Ethiopia south to Malawi. First record for the Sudan.

Carex mannii E.A. Bruce

FPS 3: 330 (1956) {Didinga Mountains, Mt. Lotuke}; NAPPER 1963: 11; FWTA 3,1: 349 (1972); HAINES & LYE 1983: 380.

Imatong Mountains group, Sudan side: between Kinyeti and Kipia, 2700 m., swamp, 1.6.1950, Jackson 1532 (K).

Didinga Mountains: Mt. Lotuke, 2600 m., undergrowth in *Podocarpus latifolius* forest, 30.3.1950, Jackson 1356 (K, WM).

General habitat range: in montane forest.

General distribution: Cameroon to South Sudan, south to Congo [previously Zaire] and Uganda.

Carex petitiiana A. Rich.

FTA 8: 522 (1902); KÜKENTHAL 1909: 424; HAINES & LYE 1983: 382; FE 6: 510 (1997).

Syn: *Carex fischeri*

JACKSON 1956: 368.

Imatong Mountains group, Sudan side: Dumuso, 2400 m., mountain grassland, 1.6.1950, Jackson 1550 (K, WM); Lolibai Mountain, south of Gilo

towards Ingwok (Kinyeti) peak, (3° 58' N, 32° 53' E), 2600 m., in upper montane forest, 9.6.1984, *Kielland-Lund* 897 (C, NLH).

General habitat range: in montane and afro-alpine forest glades and grassland.

General distribution: North Nigeria and Cameroon to Ethiopia, south to South Africa. First record for the Sudan.

Carex steudneri Boeck.

FTA 8: 520 (1902); KÜKENTHAL 1909: 280; FPS 3: 330 (1956) {Imatong Mountains, summit of Mt. Kinyeti}; HAINES & LYE 1983: 376; FE 6: 506 (1997).

Imatong Mountains group, Sudan side: east of Kipia, 2700 m., mountain grassland, 2.6.1950, *Jackson* 1528 B (K, WM); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m., above timberline, 10.6.1984, *Kielland-Lund* 920 (C, NLH); summit of Mt. Kinyeti, 3180 m., 27.7.1939, *Myers* 11,638 (K, WM).

General habitat range: in montane grassland, often in rocky areas.

General distribution: South Sudan, Ethiopia, Kenya and Tanzania.

Carex thomasii Nelmes

FPS 3: 330 (1956) {Imatong Mountains}; HAINES & LYE 1983: 381; FE 6: 508 (1997).

Syn.: [*Carex cyrtosaccus* auct., non C.B. Clarke: JACKSON 1956: 369].

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1408 (K); Lomuleng, 2440 m., forest, 29.12.1935, *Thomas* 1794 (K, holotype of *C. thomasii*); Bushbuck Hill, 2200 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, along brook, 16.2.1982, *Friis & Vollesen* 908 (C, K); Mt. Kinyeti, 2800 m., upland rain forest with *Hagenia abyssinica*, *Rapanea melanophloeos* and *Dombeya torrida*, 13.12.1980, *Friis & Vollesen* 853 (C, K).

General habitat range: in montane forest.

General distribution: Not known with certainty elsewhere, but rather similar specimens have been collected from South West Ethiopia.

Note: The identity of the material of *Carex* from the upper montane forest zone of the Imatong Mountains referred to as *Carex cyrtosaccus* by JACKSON 1956 is not absolutely certain; the East African complex of montane forest species, which includes *Carex mannii* E.A. Bruce, *Carex thomasii* Nelmes, *Carex elgonensis* Nelmes, *Carex vallis-rosetto* K. Schum. and *Carex cyrtosaccus* C.B. Clarke, consists of mutually very similar species and is in need of further taxonomic studies. An identification of Jackson's record with the taxon here called *Carex thomasii* is therefore highly probable.

Carex sp. cf. C. cuprea (Kük.) Nelmes

Imatong Mountains group, Sudan side: Ngairigi basin, in stream alluvium, 13.2.1976, *Howard* IM 32 (EA, K, KHF).

Note: HAINES & LYE 1983: 382 have united *C. cuprea* and a number of other taxa under the name of *C. petitiiana* A. Rich., a species also accepted here. However, the material *Howard* IM 32 approaches *Carex thomasii* Nelmes.

Carex sp. cf. C. petitiiana A. Rich.

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 1850 m., seepage meadow on edge between upland rain forest with *Albizia*, *Marcara*, *Croton* and *Ocotea* and grassland with *Loudetia arundinacea*, 18.11.1980, *Friis & Vollesen* 309 (C, K, KHF).

Note: Not matched with material of any species from North East or East Africa.

Coleochloa Gilly

Coleochloa abyssinica (A. Rich.) Gilly

FWTA 3,2: 346 (1972); HAINES & LYE 1983: 361; FE 6: 500 (1997).

Syn.: *Eriospora abyssinica* A. Rich.: FTA 8: 512 (1902). [*Coleochloa schweinfurthiana* auct., non (Boeck.) Nelmes, pro parte: FPS 3: 331 (1956). *Eriospora schweinfurthiana* auct., non (Boeck.) C.B. Clarke: JACKSON 1956: 362].

var. **castanea** (C.B. Clarke) Pic. Serm.

NAPPER 1964: 34; HAINES & LYE 1983: 361.

Imatong Mountains group, Sudan side: Tipo, no alt., on gneiss rocks, 7.5.1954, Jackson 3147 (K, KHF); Gilo to Mt. Konoro, 2000 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 16.11.1980, Friis & Vollesen 264 (BR, C, K, KHF); Dumuso, 2400 m., on rocks, 31.5.1950, Jackson 1522 (K, WM).

Imatong Mountains group, Uganda side: Lomwaga Mountains, 2630 m., with *Tripogon*, *Aeollanthus*, *Plectranthus*, *Selaginella*, *Hypericum*, *Aloe*, and *Crassula schimperi* subsp. *phyturus*, 5.4.1945, Greenway & Hummel 7290 (EA, K).

General habitat range: in medium-altitude and montane woodland, where always restricted to rocky outcrops, and in montane forest, where sometimes epiphytic on large tree trunks.

General distribution: North Nigeria and Cameroon to Ethiopia, south to Angola and Tanzania. Species as a whole within the same area. *Coleochloa schweinfurthiana* in the true sense is only known from the Yambio district west of the Nile.

Cyperus L.

Cyperus aethiops Welw. ex Ridl.

KÜKENTHAL 1936: 366; FPS 3: 350 (1956) {Didinga Mountains, Nagichot}; HAINES & LYE 1983: 276; FE 6: 482 (1997).

Syn.: *Pycrus aethiops* (Welw. ex Ridl.) C.B. Clarke: FTA 8: 297 (1901); NAPPER 1971: 5.

Didinga Mountains: upland pasture near Nagichot, 2040 m., 24.4.1939, Myers 11,106 (K?, not traced).

General habitat range: in montane swampy grassland.

General distribution: Ivory Coast to Ethiopia, south to South Africa (Natal).

Cyperus ajax C.B. Clarke

FTA 8: 343 (1901); KÜKENTHAL 1936: 198; NAPPER 1966: 12. HAINES & LYE 1983: 155.

Imatong Mountains group, Sudan side: Mt. Baghanj, 1830-2140 m., 13.6.1939, Andrews 1906 (K); Itibol to Issore, near bridge on Kinyeti River, 1850 m., in spray zone below waterfall on the river, 22.11.1980, Friis & Vollesen 404 (C, K).

General habitat range: in open places in medium-altitude and montane forest.

General distribution: Cameroon to South Sudan, south to Malawi and Zambia.

Cyperus albo-sanguineus Kük.

KÜKENTHAL 1936: 555; HAINES & LYE 1983: 215. Syn.: *Mariscus albo-sanguineus* (Kük.) Napper: NAPPER 1971: 16.

Imatong Mountains group, Sudan side: Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland, forming very tough tussocks on otherwise bare rocky outcrops, 21.2.1982, Friis & Vollesen 981 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: 2380 m., grassland, 4.1938, Eggeling 3541 (K); 2290 m., grassland, 4.1938, Eggeling 3584 (K); Mt. Langia, 2830 m., mountain grassland, 4.1943, Purseglove 1417 (EA, K).

General habitat range: in montane grassland.

General distribution: South Sudan to Tanzania.

Cyperus amabilis Vahl

FTA 8: 327 (1901); KÜKENTHAL 1936: 265; FPS 3: 342 (1956); NAPPER 1966: 15; FWTA 3,2: 291 (1972); HAINES & LYE 1983: 266.

Imatong Mountains group, Sudan side: 3 km. south of Torit (4° 23' N, 32° 36' E), 650 m., in *Hyparrhenia*-woodland, 13.12.1983, Kielland-Lund 322 (C, NLH).

General habitat range: in lowland and medium-altitude open habitats, usually seasonally wet, often in sandy soil along roads, lakes or swamps.

General distribution: Senegal to Ethiopia, south to South Africa; also tropical Asia and America.

Note: Lye in FE 6: 460 (1997) considers *Cyperus amabilis* a subspecies of *Cyperus castaneus* Willd., widespread in tropical Asia and America, but a formal combination has not yet been validly published for the taxon.

***Cyperus anemodorus* K. Schum.**

KÜKENTHAL 1936: 557; HAINES & LYE 1983: 218. Syn.: *Mariscus mollipes* C.B. Clarke, nom. inval.: FTA 8: 387 (1902); FS: 418 (1929); NAPPER 1971: 17. *Cyperus mollipes* (C.B. Clarke) K. Schum.: KÜKENTHAL 1936: 557; FPS 3: 353 (1956).

Imatong Mountains group, Sudan side: between Hiliu and Ngarama, on the Katire-Torit road, 600-700 m., in open *Acacia* bushland, 12.6.1961, Jackson 4232 (K).

Didinga Mountains: rocks north-east of Chukudum (4° 15' N, 33° 27' E), 1100 m. 21.12.1983, Kielland-Lund 434 (C, NLH); Mt. Lotuke, 1900 m., *Protea* grassland, 29.3.1950, Jackson 1313 (K, WM).

General habitat range: in dry lowland and medium-altitude grassland and bushland.

General distribution: South Sudan through eastern Africa (west to Rwanda and Burundi) to Zimbabwe.

Note: We have followed LYE 1983 in accepting that *Mariscus mollipes* C.B. Clarke (1895) is invalid, and that *Cyperus anemodorus* K. Schum. is the correct name for this species.

***Cyperus angolensis* Boeck.**

FTA 8: 321 (1902); KÜKENTHAL 1936: 281; NAPPER 1966: 16; FWTA 3,1: 292 (1972); HAINES & LYE 1983: 255.

Imatong Mountains group, Sudan side: above Gilo Pool (4° 02' N, 32° 50' E), no alt., 15.1.1984,

Kielland-Lund 655 (C, NLH); Itibol to Ibahin, Itibol, 1980 m., clefts in rocks, 18.12.1935, Thomas 1651 (K); lower southern slope of Mt. Konoro, 2300 m., *Loudetia arundinacea* grassland on shallow soil, recently burnt, 18.2.1982, Friis & Vollesen 946 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: without further locality, 2650 m., grassland, 4.1938, Eggeling 3549 (K); Langia, 2440 m., grassland, 4.1943, Purselglove 1404 (EA, K); Lomwaga, 2530 m., *Hyparrhenia-Exothea* grassland, 5.4.1945, Greenway & Hummel 7280 (EA); 2 km. north-east of Lututuru, near end of road, 1800 m., savanna-grassland, 17.2.1969, Lye 2082 (K, MHU, NLH).

General habitat range: in medium-altitude and montane grassland and wooded grassland.

General distribution: Sierra Leone to South Sudan, south to South Africa (Transvaal).

***Cyperus boreochrysocephalus* K. Lye**

HAINES & LYE 1983: 219.

Lafit, Dongotona and Nangeya Mountains: Torit-Kapoeta road, Boja junction (4° 31' N, 33° 18' E), no alt., *Acacia* savanna, 12.6.1984, Kielland-Lund 927 (C, NLH).

General habitat range: in lowland, medium-altitude and montane dry grassland and open woodland.

General distribution: Sudan, Uganda, Kenya, Tanzania.

***Cyperus bracheilema* (Steud.) Matf. & Kük.**

KÜKENTHAL 1936: 576; FE 6: 472 (1997).

Syn.: *Kyllinga bracheilema* Steud.: FTA 8: 279 (1902). *Cyperus teneristolon* Matf. & Kük.: KÜKENTHAL 1936: 574; HAINES & LYE 1983: 233. *Kyllinga pulchella* Kunth: FTA 8: 284 (1902); NAPPER 1971: 23.

Imatong Mountains group, Sudan side: Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m., above timberline, 10.6.1984, Kielland-Lund 918 (C, NLH).

General habitat range: in medium-altitude and montane wet grassland or in thin soil over rocks.

General distribution: South Sudan to Ethiopia, Kenya and Tanzania, South Africa. First record from the Sudan.

Cyperus capillifolius A. Rich.

KÜKENTHAL 1936: 357; FPS 3: 349 (1956); HAINES & LYE 1983: 287; FE 6: 484 (1997).

Syn.: *Pycrus capillifolius* (A. Rich.) C.B. Clarke: FTA 8: 300 (1901); FS: 407 (1929); NAPPER 1971: 4; FWTA 3,2: 301 (1972); WICKENS 1976: 164.

Imatong Mountains group, Sudan side: Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, Friis & Vollesen 569 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: 5-6 km. east of Lututuru Rest House, 1500 m., shallow wet soil on rock, 19.7.1974, Katende 2194 (EA, MHU).

General habitat range: in lowland and medium-altitude seasonally wet grassland.

General distribution: Senegal to West Ethiopia, south to Angola and Zambia.

Cyperus comosipes Mattf. & Kük.

KÜKENTHAL 1936: 568; HAINES & LYE 1983: 228; FSo 4: 139 (1995); FE 6: 470 (1997).

subsp. **decolorans** (Kük.) Lye

HAINES & LYE 1983: 228.

Syn.: *Kyllinga chrysantha* K. Schum. subsp. *decolorans* Kük.: KÜKENTHAL 1936: 574.

Imatong Mountains group, Uganda side: 4 km. south east of Lomwaga, 1500 m., shallow soil over rock, 18.7.1974, Katende 2164 (MHU) & 2170 (MHU).

General habitat range: in medium-altitude and montane seasonally wet grassland, often in shallow soil over rocks.

General distribution: Uganda to South Tanzania.

Species as a whole east to Somalia and south to Angola and Zambia.

Cyperus cuspidatus HBK.

KÜKENTHAL 1936: 261; NAPPER 1966: 15; FWTA 3,2: 291 (1972); HAINES & LYE 1983: 252; FE 6: 461 (1997).

Syn.: [*Cyperus uncinatus* auct., non Poir.: FTA 8: 328 (1901); FS: 409 (1929)].

Imatong Mountains group, Sudan side: Kinyeti Valley, hills near junction of roads to Ngarama and Katire north of Hiliu, 650 m., 11.12.1983, Kielland-Lund 299 (C, NLH).

General habitat range: in lowland and medium-altitude open habitats, usually in shallow seasonally wet soil, often near pools on rocky outcrops.

General distribution: Senegal to Ethiopia, south to South Africa; a pantropical species.

Cyperus cyperoides (L.) O. Kuntze

KÜKENTHAL 1936: 514; FPNA 3: 248 (1955); FPS 3: 352 (1956); HAINES & LYE 1983: 204; FE 6: 456 (1997).

subsp. **cyperoides**

HAINES & LYE 1983: 294.

Syn.: *Mariscus sumatrensis* Retz. *Mariscus procerus* A. Rich.: FTA 8: 395 (1902). *Mariscus sieberianus* Nees ex C.B. Clarke: FTA 8: 388 (1902); NAPPER 1971: 13. *Mariscus sublimis* C.B. Clarke: FTA 8: 390 (1902).

Imatong Mountains group, Sudan side: Kinyeti Valley, 12 km. south of Hiliu along Katire road (4° 09' N, 32° 41' E), no alt., 1.6.1984, Kielland-Lund 819 (C, NLH); along path from Bushbuck Hill to Mt. Konoro, 2400 m., *Hagenia abyssinica* woodland, 23.2.1982, Friis & Vollesen 1009 (BR, C, K, KHF).

General habitat range: in medium-altitude and montane grassland and woodland.

General distribution: Guinée to Ethiopia, south to South Africa; also in tropical Asia.

subsp. **flavus** Lye

HAINES & LYE 1983: 206.

Syn.: *Mariscus alternifolius* Vahl: FWTA 3,2: 296 (1972); WICKENS 1976: 164. *Mariscus umbellatus* Vahl, nom. illeg.: FTA 8: 390 (1901); NAPPER 1971: 13. *Cyperus subumbellatus* Kük.: KÜKENTHAL 1936: 523.

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 8.12.1980, Friis & Vollesen 763 (C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and grassland, also a weed in cultivations.

General distribution: Senegal and Guinée to Ethiopia, south to North Tanzania. Species as a whole widespread in the tropics.

Cyperus denudatus L.f.

FTA 8: 338 (1902); KÜKENTHAL 1936: 254; NAPPER 1966: 14; FWTA 3,2: 291 (1972); HAINES & LYE 1983: 169; FE 6: 439 (1997).

var. **denudatus**

HAINES & LYE 1983: 169.

Syn.: *Cyperus phaeorhizus* K. Schum.: FTA 8: 331 (1901); KÜKENTHAL 1936: 252; NAPPER 1966: 14.

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, Friis & Vollesen 35 (C, K, KHF); Bushbuck Hill, 2300 m., small seepage area in *Hagenia abyssinica* grassland, 25.3.1982, Friis & Vollesen 1312 (C, K, KHF).

General habitat range: in medium-altitude and montane wet grassland and swamps.

General distribution: Senegal to Ethiopia, south to South Africa; also in tropical Asia. First record from the Sudan.

var. **lucenti-nigricans** (K. Schum.) Kük.

HAINES & LYE 1983: 170.

Syn.: *Cyperus lucenti-nigricans* K. Schum.: FTA 8: 339 (1901). *Cyperus platycaulis* Bak. *Cyperus platycaulis* Bak. var. *lucenti-nigricans* (K. Schum.)

Kük.: KÜKENTHAL 1936: 254; NAPPER 1966: 14.

Imatong Mountains group, Sudan side: Kipia, 2600 m., in swamp, 30.12.1935, Thomas 1879 (K); above Lomuleng, 2410 m., swampy ravine in *Podocarpus latifolius* forest, 26.7.1939, Myers 11,593 (K).

General habitat range: in medium-altitude and montane wet grassland and swamps.

General distribution: Niger to Ethiopia, south to South Africa (Transvaal). Species as a whole within the same range as var. *denudatus*.

Cyperus dereilema Steud.

FTA 8: 343 (1901); CHIPP 1929: 194; KÜKENTHAL 1936: 199; FPNA 3: 232 (1955); FPS 3: 340 (1956) {Imatong Mountains}; NAPPER 1966: 12; HAINES & LYE 1983: 155; FE 6: 435 (1997).

Imatong Mountains group, Sudan side: without further locality, 1830 m., elfin forest, 2.1936, Johnston 1434 (K); without further locality, 2440-3050 m., in *Podocarpus latifolius-Dombeya* open forest, 21.2.1976, Howard IM 57 (K, KHF); Lomuleng, 2440 m., forest, 29.2.1935, Thomas 1795 (K); Mt. Kinyeti, 3170 m., in mountain forest ravines and in scrub, 11.2.1929, Chipp 75 (K, WM).

General habitat range: in medium-altitude and montane forest, often along streams.

General distribution: East Congo [previously Zaire] to South Sudan and Ethiopia, south to Malawi.

Cyperus dichroostachyus Hochst. ex A. Rich.

FTA 8: 331 (1908); FS: 410 (1929); KÜKENTHAL 1936: 233; FPNA 3: 234 (1955); NAPPER 1966: 13; FWTA 3,2: 290 (1972); HAINES & LYE 1983: 165; FE 6: 436 (1997).

Syn.: [*Cyperus fresenii* auct., non Steud.: FPS 3: 340 (1956) {Didinga Mountains, Nagichot}].

Imatong Mountains group, Sudan side: Gilo, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 19.2.1982, Friis & Vollesen 965 (C, K); between Gilo and Itibol, 1900 m., secondary growth in

upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope, 26.2.1982, Friis & Vollesen 1031 (BR, C, K, KHF).

Didinga Mountains: Nagichot, 1980 m., in moist khor, 27.4.1939, Myers 11,161 (K, WM).

General habitat range: in medium-altitude and montane swamp grassland.

General distribution: Cameroon to Ethiopia, south to South Africa (Transvaal); also in Madagascar and tropical Asia as far as southern China.

Cyperus difformis L.

FTA 8: 330 (1901); FS: 410 (1929); KÜKENTHAL 1936: 237; FPNA 3: 235 (1955); FPS 3: 341 (1956); NAPPER 1966: 13; FWTA 3,2: 290 (1972); HAINES & LYE 1983: 165; FSo 4: 117 (1995); FE 6: 436 (1997); HYF: 324 (1997).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 2.1.1984, *Kielland-Lund* 534 (C, NLH) & 541 (C, NLH); near Molongori, Khodo River, 700 m., moist places, 17.1.1950, *Jackson* 1053 (K).

General habitat range: in lowland and medium-altitude swamps.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in tropical and subtropical Asia and America.

Cyperus diffusus Vahl

FTA 8: 343 (1902); KÜKENTHAL 1936: 208; NAPPER 1966: 13; FWTA 3,2: 289 (1972).

subsp. **buchholzii** (Boeck.) Kük.

KÜKENTHAL 1936: 210; FPNA 3: 234 (1955); NAPPER 1966: 13; FWTA 3,2: 289 (1972).

Syn.: *Cyperus laxus* Lam. subsp. *buccholzii* (Boeck.) Kük.: HAINES & LYE 1983: 163.

Imatong Mountains group, Sudan side: Kinyeti Valley, 10 km. north of Hiliu, near Torit, c. 650 m., 8.12.1983, *Kielland-Lund* 263 (NLH).

General habitat range: in lowland and medium-altitude grassland and swamps, often along streams.

General distribution: Guinée to Sudan, south to Angola, Zambia and Tanzania. Species as a whole also in tropical Asia.

Cyperus distans L. f.

FTA 8: 349 (1902); FS: 412 (1929); KÜKENTHAL 1935: 137; FPNA 3: 230 (1955); FPS 3: 346 (1956); NAPPER 1966: 11; FWTA 3,2: 287 (1972); HAINES & LYE 1983: 200; FSo 4: 132 (1995); FE 6: 455 (1997).

subsp. **distans**

HAINES & LYE 1983: 201.

Imatong Mountains group, Sudan side: near Kinyeti River 7 km. south of Hiliu along road to Katire, 700 m., 7.12.1983, *Kielland-Lund* 241 (C, NLH); Katire, Assistant Conservator's garden, 950 m., 9.4.1961, *Jackson* 4208 (K); Katire, no alt., teak plantation, 10.6.1961, *Jackson* 4213 (K).

Didinga Mountains: Longumu River north of Chukudum, 900 m., 20.12.1983, *Kielland-Lund* 400 (NLH).

General habitat range: in lowland, medium-altitude and montane swampy grassland, roadsides, forest margins and cultivations.

General distribution: Guinée to Ethiopia, south to South Africa; also in Madagascar, tropical Asia and America.

subsp. **longibracteatus** (Cherm.) Lye

HAINES & LYE 1983: 201.

Syn.: *Cyperus longibracteatus* (Cherm.) Kük.: KÜKENTHAL 1936: 413; FPS 3: 351 (1956). *Mariscus longibracteatus* Cherm.: NAPPER 1971: 11; FWTA 3,2: 295 (1972). [*Cyperus distans* auct., non L.f., sensu stricto: FS: 412 (1929)].

Imatong Mountains group, Sudan side: lower southern slope of Mt. Konoro, 2100 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, at small brook in forest, 2.3.1982, *Friis & Vollesen* 1081 (C).

General habitat range: in damp places in lowland, medium-altitude and montane woodland and forest.

General distribution: Senegal to Ethiopia, south to Tanzania; also in Madagascar.

var. **rubrotinctus** (Cherm.) Lye

HAINES & LYE 1983: 201.

Syn.: *Mariscus rubrotinctus* Cherm.: NAPPER 1971: 11. *Cyperus longibracteatus* (Cherm.) Kük. var. *rubrotinctus* (Cherm.) Kük.: KÜKENTHAL 1936: 413.

Imatong Mountains group, Sudan side: Palotaka, 1200 m., 1979, *Shigeta* 9 (EA, identified and listed by M.G. Gilbert, not traced); Mt. Baghanj, 1830-2130 m., 13.6.1939, *Andrews* 1905 (K).

General habitat range: in similar habitats to subsp. *distans*.

General distribution: Guinée to Ethiopia, south to Zambia and North Malawi. Species as a whole with the same range of distribution as subsp. *distans*.

Cyperus diurensis Boeck.

KÜKENTHAL 1936: 560; FPS 3: 353 (1956); HAINES & LYE 1983: 223; FE 6: 467 (1997).

Syn.: *Mariscus diurensis* (Boeck.) C.B. Clarke: FTA 8: 381 (1902); FS: 417 (1929); NAPPER 1971: 16.

Imatong Mountains group, Uganda side: north of Okako, south of Mingaro, no alt., grassland, 9.6.1973, *Katende* 1859 (EA, MHU).

General habitat range: in lowland and medium-altitude dry grassland and bushland.

General distribution: South Sudan and South Ethiopia through East Congo [previously Zaire], Rwanda, Burundi and eastern Africa to Zimbabwe.

Cyperus dives Del.

KÜKENTHAL 1935: 68; FPNA 3: 224 (1955); FPS 3: 343 (1956); NAPPER 1966: 7; FWTA 3,2: 284 (1984); HAINES & LYE 1983: 180; FE 6: 444 (1997).

Syn.: *Cyperus exaltatus* Retz. var. *dives* (Del.) C.B. Clarke: FTA 8: 370 (1902). *Cyperus immensus* C.B. Clarke: FTA 8: 371 (1901); KÜKENTHAL 1935: 67.

Didinga Mountains: Longumu River north of Chukudum, 900 m., 20.12.1983, *Kielland-Lund* 401 (NLH).

General habitat range: in lowland, medium-altitude and montane swamps, on river banks and in open water.

General distribution: Senegal to Ethiopia, north to Egypt, south to Botswana and Zimbabwe, also in Madagascar, the Middle East, and in tropical Asia.

Cyperus dubius Rottb.

KÜKENTHAL 1936: 563; FPNA 3: 251 (1955); FPS 3: 354 (1956); HAINES & LYE 1983: 221; FSo 4: 139 (1995); FE 6: 468 (1997).

subsp. **dubius**

HAINES & LYE 1983: 221.

Syn.: *Mariscus dubius* (Rottb.) Hutch.: NAPPER 1971: 17; FWTA 3,2: 295 (1972); HYF: 328 (1997). *Mariscus dregeanus* Kunth: FTA 8: 380 (1902).

Imatong Mountains group, Sudan side: south east of Torit, 2 km from junction along Imatong road, and 500 m. east of road east of Ngarama (4° 21' N, 32° 39' E), no alt., 26.5.1984, *Kielland-Lund* 757 (C, NLH); Kinyeti Valley, 3 km. south of Hiliu along Katire road, north face of slope (4° 14' N, 32° 40' E), no alt., 26.5.1984, *Kielland-Lund* 741 (C, NLH); Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 3.12.1980, *Friis & Vollesen* 659 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and wooded grassland, often on rocky outcrops.

General distribution: Senegal to South Sudan, south to South Africa; also in tropical Arabia and Asia. First record from the Sudan.

subsp. **coloratus** (Vahl) K. Lye

HAINES & LYE 1983: 223.

Syn.: *Mariscus coloratus* (Vahl) Nees: FTA 8: 381 (1902). *Cyperus dubius* Rottb. var. *coloratus*

(Vahl) Kük.: KÜKENTHAL 1936: 565; FPNA 3: 252 (1955); FPS 3: 354 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, hill c. 2 km. south of Hiliu, 700 m., 28.11.1983, *Kielland-Lund* 85 (C, NLH); Hiliu, rocks near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund* 126 (C, NLH).

General habitat range: in lowland and medium-altitude woodland and bushland, often on rocky outcrops.

General distribution: Guinée and Sierra Leone to South East Sudan, south to Angola and Zimbabwe.

subsp. **macrocephalus** (C.B. Clarke) Lye HAINES & LYE 1983: 222; FE 6: 468 (1997).

Syn.: *Cyperus dubius* Rottb. var. *macrocephalus* (C.B. Clarke) Kük.: KÜKENTHAL 1936: 564; FPNA 3: 251 (1955); FPS 3: 354 (1956). *Marriscus dubius* (Rottb.) Hutch. var. *macrocephalus* (C.B. Clarke) Chiov.: NAPPER 1971: 17.

Imatong Mountains group, Sudan side: near Mologori, 750 m., 11.6.1939, *Andrews* 1803 (K, WM); Kinyeti Valley, Hiliu, in compound, 700 m., 26.11.1983, *Kielland-Lund* 43 (C, NLH); 75 m. east of stream east of Hiliu (4° 16' N, 32° 48' E), no alt., in savanna, 24.5.1984, *Kielland-Lund* 702 (C, NLH).

General habitat range: in lowland and medium-altitude seasonally swampy areas or on rocky outcrops in bushland and grassland.

General distribution: South Sudan to Ethiopia, south to Tanzania. Species as a whole distributed as subsp. *dubius*, with the addition of Ethiopia.

Cyperus elegantulus Steud.

KÜKENTHAL 1936: 342; FPNA 3: 242 (1955); FPS 3: 350 (1956); FE 6: 480 (1997).

Syn.: *Pycrus elegantulus* (Steud.) C.B. Clarke: FTA 8: 302 (1901); FS: 407 (1929); FWTA 3,2: 300 (1968); NAPPER 1971: 4; WICKENS 1976: 164; HYF: 327 (1997). *Cyperus niger* Ruiz & Pav. subsp. *elegantulus* (Steud.) Lye: HAINES & LYE 1983: 271.

Imatong Mountains group, Sudan side: Gilo, 1800 m., roadside, 15.6.1953, *Jackson* 3007 (K); Gilo, 1850 m., edge of upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 7 (C, K); between Gilo and Itibol, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope, 26.2.1982, *Friis & Vollesen* 1032 (BR, C, EA, K, KHF); Bushbuck Hill, 2300 m., small seepage area in *Hagenia abyssinica* woodland, 25.3.1982, *Friis & Vollesen* 1311 (BR, C, EA, K, KHF).

General habitat range: in medium-altitude and montane swamp grassland.

General distribution: Nigeria and Cameroon to Ethiopia, south to Zambia and Malawi; also in tropical Arabia and America.

Cyperus exaltatus Retz.

FTA 8: 370 (1902); KÜKENTHAL 1935: 64; FPS 3: 344 (1956); NAPPER 1966: 7; FWTA 3,2: 284 (1972); WICKENS 1976: 162; HAINES & LYE 1983: 179; FE 6: 444 (1997).

Imatong Mountains group, Sudan side: south east of Torit, 2 km. from junction along Imatong road and 500 m. east of road east of Ngarama (4° 21' N, 32° 39' E), no alt., 26.5.1984, *Kielland-Lund* 761 (C, NLH).

General habitat range: in lowland and medium-altitude swamps or in open water in ponds or lakes.

General distribution: Senegal to Ethiopia and Somalia, south to Angola and Zambia; pan-tropical.

Cyperus fibrillosus Kük.

KÜKENTHAL 1936: 347; HAINES & LYE 1983: 278.

Imatong Mountains group, Sudan side: Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, recently burnt, 16.2.1982, *Friis & Vollesen* 913 (C, K, KHF); Bushbuck Hill, 2300 m., *Loudetia arundinacea* grassland with scattered trees, recently burnt, in small depressions, 14.3.1982, *Friis & Vollesen* 1204 (BR, C, EA, K, KHF).

General habitat range: in medium-altitude and montane woodland and bushland.

General distribution: Ghana to South Sudan, also in Tanzania and Zambia. First record from the Sudan.

Cyperus fischerianus A. Rich.

FTA 8: 342 (1902); KÜKENTHAL 1936: 203; FPNA 3: 233 (1955); NAPPER 1966: 13; HAINES & LYE 1983: 155; FE 6: 435 (1997).

Imatong Mountains group, Sudan side: above Gilo Pool (4° 02' N, 32° 50' E), no alt., 15.1.1984, *Kielland-Lund* 638 (C, NLH).

General habitat range: in open places or along streams in medium-altitude and montane forest, sometimes in shaded places on rocky outcrops in woodland.

General distribution: East Congo [previously Zaire] to Ethiopia and Eritrea, south to Malawi.

Cyperus flavescens L.

KÜKENTHAL 1936: 398; FPNA 3: 246 (1955); FPS 3: 351 (1956); HAINES & LYE 1983: 281; FE 6: 485 (1997).

subsp. **flavescens**

Syn.: *Pycreus flavescens* (L.) Rchb.: FTA 8: 290 (1902); FS: 406 (1929); NAPPER 1971: 3; FWTA 3,2: 302 (1972); WICKENS 1976: 164; HYF: 327 (1997).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre, (3° 48' N, 31° 59' E), 800 m., 2.1.1984, *Kielland-Lund* 538 (C, NLH).

General habitat range: in lowland, medium-altitude and montane open habitats, usually in swamp-margins, seasonally wet grassland, and on bare soil between taller plants.

General distribution: Senegal to Ethiopia, south to Angola and South Africa (Natal).

Cyperus foliaceus C.B. Clarke

KÜKENTHAL 1936: 247; NAPPER 1966: 14; HAINES & LYE 1983: 167; FE 6: 437 (1997).

Imatong Mountains group, Sudan side: near Ki-

nyeti River 7 km. south of Hiliu along road to Katire, 700 m., 7.12.1983, *Kielland-Lund* 240 (C, NLH).

General habitat range: in lowland and medium-altitude seasonally wet habitats, usually in temporary swamps on at stream-banks.

General distribution: Senegal to Ethiopia, south to Malawi.

Cyperus impubes Steud.

KÜKENTHAL 1936: 492; FPS 3: 351 (1956) {Didinga Mountains, slope of Mt. Lotuke}; HAINES & LYE 1983: 209; FE 6: 457 (1997).

Syn.: *Mariscus impubes* (Steud.) Napper: NAPPER 1971: 12.

Didinga Mountains: Mt. Lotuke, at the River Kurumo, 1800 m., forest edge, 31.3.1950, *Jackson* 1366 (K); Mt. Lotuke, 1900 m., *Protea* grassland, 29.3.1950, *Jackson* 1309 (K, WM).

General habitat range: in wet medium-altitude and montane grassland.

General distribution: South Sudan and Ethiopia south to Tanzania.

Cyperus involucratus Rottb.

HAINES & LYE 1983: 154.

Syn.: *Cyperus alternifolius* L.: FTA 8: 337 (1902); KÜKENTHAL 1936: 193; FWTA 3,2: 289 (1972); FE 6: 434 (1997); HYF: 323 (1997). *Cyperus alternifolius* L. subsp. *flabelliformis* (Rottb.) Kük.: KÜKENTHAL 1936: 193; FPS 3: 338 (1956) {Didinga Mountains, Iwowa}; NAPPER 1966: 13; FE 6: 434 (1997); HYF: 323 (1997). *Cyperus flabelliformis* Rottb.: FTA 8: 336 (1901); FS: 411 (1929).

Imatong Mountains group, Uganda side: Agoro, no alt., stream edge, no date, *Eggeling* 839 (K); 2 km. east of Lututuru, near a rivulet, 1400 m., in open woodland, 17.2.1969, *Lye* 2110 (MHU).

Didinga Mountains: near Longumu River north of Chukudum, 900 m., near river-bed, 20.12.1983, *Kielland-Lund* 418 (NLH); Iwowa, 1620 m., at stream, 22.4.1939, *Myers* 11,028 (K).

General habitat range: in lowland and medium-altitude swampy grassland and swamps.

General distribution: Senegal to Ethiopia, south to South Africa (Natal); also in tropical Asia.

Cyperus iria L.

FTA 8: 346 (1902); KÜKENTHAL 1936: 150; FPS 3: 347 (1956); NAPPER 1966: 12; HAINES & LYE 1983: 198; FE 6: 453 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, between compound and river, 700 m., 28.11.1983, *Kielland-Lund* 79 (C, NLH).

General habitat range: in lowland and medium-altitude seasonally wet habitats, usually in temporary pools and swamps.

General distribution: Mauritania and Senegal to Ethiopia, south to Namibia and South Africa (Transvaal); also in Asia and America.

Cyperus kerstenii Boeck.

KÜKENTHAL 1936: 554; HAINES & LYE 1983: 215. Syn.: *Mariscus kerstenii* (Boeckl.) C.B. Clarke: FTA 8: 392 (1902); NAPPER 1971: 15.

Imatong Mountains group, Sudan side: summit of Mt. Kinyeti, 3180 m., mountain top grassland, 1.6.1950, *Jackson* 1541 (K); ridge leading to the summit of Mt. Kinyeti, 3000 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, *Friis & Vollesen* 1274 (C, K).

General habitat range: in montane grassland and bushland.

General distribution: South Sudan to North Tanzania.

Cyperus lanceolatus Poir.

KÜKENTHAL 1936: 349; FPS 3: 348 (1956); HAINES & LYE 1983: 276; FE 6: 482 (1997).

Syn.: *Pycrus lanceolatus* (Poir.) C.B. Clarke: NAPPER 1971: 6; FWTA 3,2: 300 (1972); WICKENS 1976: 164. *Pycrus propinquus* Nees: FTA 8: 300 (1902); FS: 406 (1929).

Didinga Mountains: between Nagichot and

Duguru village (4° 16' N, 33° 35' E), 2000 m., 17.12.1983, *Kielland-Lund* 353 (C, NLH).

General habitat range: in lowland, medium-altitude and montane seasonally wet habitats, usually in wet grassland, at the edge of swamps or along streams.

General distribution: Senegal to Ethiopia, south to Angola and Zimbabwe; also in Madagascar, tropical and subtropical America.

Cyperus macrostachyos Lam.

FE 6: 483 (1997).

subsp. **tremulus** (Poir.) K. Lye

HAINES & LYE 1983: 289.

Syn.: *Cyperus tremulus* Poir.: KÜKENTHAL 1936: 361; FPS 3: 350 (1956). *Pycrus tremulus* (Poir.) C.B. Clarke: FTA 8: 306 (1902); NAPPER 1971: 3. *Pycrus macrostachyos* (Lam.) J. Rayn. subsp. *tremulus* (Poir.) K. Lye: LYE 1981: 622.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund* 130 (C, NLH).

General habitat range: in lowland and medium-altitude open, seasonally wet habitats, often in rock-pools, wet grassland and wet places along roads.

General distribution: pantropical.

Cyperus nigricans Steud.

KÜKENTHAL 1936: 336; HAINES & LYE 1983: 272; FE 6: 481 (1997).

Syn.: *Pycrus nigricans* (Steud.) C.B. Clarke: FTA 8: 292 (1902); NAPPER 1971: 6.

Imatong Mountains group, Sudan side: between Mt. Kinyeti and Kipia, 2500 m., bog, 1.6.1950, *Jackson* 1527 (K).

General habitat range: in wet montane grassland and swamps.

General distribution: South Sudan and Ethiopia through East Congo [previously Zaire], Rwanda, Burundi and eastern Africa to Zambia and North Malawi.

Cyperus niveus Retz.

KÜKENTHAL 1936: 288; HAINES & LYE 1983: 256; FSo 4: 130 (1995); FE 6: 464 (1997).

var. **leucocephalus** (Kunth) Fosberg

HAINES & LYE 1983: 256; FSo 4: 130 (1995); FE 6: 464 (1997).

Syn.: *Cyperus sphaerocephalus* Vahl var. *leucocephalus* Kunth. *Cyperus obtusiflorus* Vahl: KÜKENTHAL 1936: 285; FPS 3: 342 (1956); NAPPER 1966: 16; HYF: 326 (1997). *Cyperus compactus* Lam.: FTA 8: 319 (1902).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees of *Combretum*, *Faurea*, etc., 26.3.1982, Friis & Vollesen 1317 (BR, C, FT, K, KHF).

General habitat range: in lowland, medium-altitude and montane dry grassland, bushland and woodland.

General distribution: Cameroon to Somalia, south to South Africa; also in tropical Arabia.

var. **tisserantii** (Cherm.) Lye

FE 6: 464 (1997).

Syn.: *Cyperus tisserantii* Cherm.: FWTA 3,2: 293 (1902). *Cyperus margaritaceus* Vahl var. *tisserantii* (Cherm.) Kük.: KÜKENTHAL 1936: 285; NAPPER 1966: 16; HAINES & LYE 1983: 257. *Cyperus compactus* Lam. var. *tenerior* C.B. Clarke: FTA 8: 321 (1901), pro parte.

Didinga Mountains: Mt. Lotuke, Char, 1830 m., *Protea* grassland, 19.4.1939, Myers 10,944 (K); Mt. Lotuke, 1900 m., grassland, 29.3.1950, Jackson 1314 (K).

General habitat range: in medium-altitude and montane woodland and wooded grassland.

General distribution: Senegal to Ethiopia, south to Tanzania. Species as a whole as the combined distribution of these two varieties.

Cyperus pinguis (C.B. Clarke) Mattf. & Kük.

KÜKENTHAL 1936: 583; HAINES & LYE 1983: 239; FE 6: 475 (1997).

Syn.: *Kyllinga elatior* Kunth: FTA 8: 275 (1901); NAPPER 1971: 21; FWTA 3,2: 305 (1972). *Cyper-*

us aromaticus (Ridl.) Mattf. & Kük. var. *elatior* (Steud.) Kük.: KÜKENTHAL 1936: 582.

Imatong Mountains group, Sudan side: Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 21.11.1980, Friis & Vollesen 385 (BR, C, KHF).

General habitat range: in medium-altitude and montane damp grassland, also along trails and in clearings in forest.

General distribution: Cameroon to Ethiopia, south to South Africa.

Cyperus plateilema (Steud.) Kük.

KÜKENTHAL 1936: 558; FE 6: 467 (1997).

Syn.: *Mariscus plateilema* Steud.: FTA 8: 386 (1902); NAPPER 1971: 15; HYF: 328 (1997).

Cyperus circumclusus (C.B. Clarke) Kük.: KÜKENTHAL 1936: 558; HAINES & LYE 1983: 217. *Mariscus circumclusus* C.B. Clarke: FTA 8: 387 (1902); NAPPER 1971: 17. *Mariscus macropus* (Boeck.) C.B. Clarke: FTA 8: 383 (1902); FS: 418 (1929); NAPPER 1971: 17. *Cyperus submacropus* Kük.: KÜKENTHAL 1936: 561; FPS 3: 353 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, near junction Imatong village-Torit plain near Ngarama (4° 21' N, 32° 38' E), no alt., in *Combretum* savanna, mostly in shade, 24.5.1984, Kielland-Lund 713 (C, NLH); at Ngairigi River on path from Gilo to Mt. Garia, 2000 m., on bare rocky outcrop in *Loudetia arundinacea* grassland with scattered trees, growing near the river, 28.2.1982, Friis & Vollesen 1054 (BR, C, K, KHF).

General habitat range: in medium altitude and montane dry or seasonally wet grassland and bushland, often on rocky outcrops.

General distribution: South Sudan and Ethiopia south to Tanzania.

Cyperus pustulatus Vahl

KÜKENTHAL 1936: 161; FPS 3: 347 (1956); NAPPER 1966: 12; FWTA 3,2: 288 (1972); HAINES & LYE 1983: 265; FE 6: 460 (1997).

Syn.: *Juncellus pustulatus* (Vahl) C.B. Clarke: FTA 8: 307 (1902).

Imatong Mountains group, Sudan side: Kinyeti valley, Hiliu, rocks near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund* 127 (C, NLH) & 132 (C, NLH).

General habitat range: in lowland and medium-altitude open, seasonally wet habitats, in edges of temporary pools and swamps or in damp places on rocky outcrops.

General distribution: Senegal and Gambia to West Ethiopia, south to Angola, Zambia and Mozambique.

Cyperus reduncus Boeckl.

FTA 8: 329 (1902); FS: 410 (1929); KÜKENTHAL 1936: 240; FPS 3: 341 (1956); NAPPER 1966: 13; FWTA 3: 290 (1972); WICKENS 1976: 162; HAINES & LYE 1983: 160; FE 6: 437 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund* 129 (C, NLH).

General habitat range: in lowland and medium-altitude open, seasonally wet habitats, in seasonally wet grassland and temporary pools and swamps.

General distribution: Senegal to Ethiopia, south to Uganda.

Cyperus remotus (C.B. Clarke) Kük.

KÜKENTHAL 1936: 561.

Syn.: *Mariscus remotus* C.B. Clarke: FTA 8: 382 (1901); NAPPER 1971: 16.

Didinga Mountains: Mt. Lotuke, 1500 m., wooded grassland with *Acacia* and *Terminalia* on eroded, stony soil, 31.3.1950, *Jackson* 1360 (K, WM); Iwowa, 1620 m., wooded grassland, 22.4.1939, *Myers* 11,025 (K).

General habitat range: in medium-altitude dry grassland, bushland and woodland.

General distribution: East Congo [previously Zaire] to South Sudan, south to North Zambia.

Cyperus renschii Boeckl.

FTA 8: 345 (1902); FS: 411 (1929); KÜKENTHAL 1936: 206; FPS 3: 340 (1956) [Laboni]; NAPPER 1966: 13; FWTA 3,2: 289 (1972); HAINES & LYE 1983: 161.

Imatong Mountains group, Sudan side: Laboni, no alt., gallery forest, 16.10.1938, *Myers* 9768 (K); Palotaka, 1200 m., 1979, *Shigeta* 81 & 114 (EA, identified and listed by M.G. Gilbert, not traced).

General habitat range: in lowland and medium-altitude forest, sometimes riverine forest, usually in wetter areas and along paths.

General distribution: Senegal to South Sudan, south to Zimbabwe.

Cyperus rotundus L.

FTA 8: 364 (1901); FS: 415 (1929); KÜKENTHAL 1935: 107; FPS 3: 344 (1956); NAPPER 1966: 9; FWTA 3,2: 285 (1972); WICKENS 1976: 162; HAINES & LYE 1983: 186; FSo 4: 121 (1995); FE 6: 449 (1997); HYF: 326 (1997).

subsp. **rotundus**

HAINES & LYE 1983: 186; FSo 4: 121 (1995).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near compound, 700 m., wet area near water pump in agricultural land, 3.12.1983, *Kielland-Lund* 199 (C, NLH); Hiliu, near Kinyeti River, c. 700 m., 10.12.1983, *Kielland-Lund* 296 (NLH); near Kinyeti River 5 km. south of Hiliu, c. 700 m., 6.12.1983, *Kielland-Lund* 231 (NLH); Katire, Assistant Conservator's garden, 950 m., 21.6.1961, *Jackson* 4262 (K).

General habitat range: in lowland and medium-altitude wet grassland and swamp.

General distribution: Cape Verde Islands to Somalia, south to South Africa; also in tropical Asia, including tropical Arabia, and in tropical America.

subsp. **merkeri** (C.B. Clarke) Kük.

KÜKENTHAL 1935: 115; HAINES & LYE 1983: 187.
Syn.: *Cyperus merkeri* C.B. Clarke: NAPPER 1966:

9. *Cyperus rotundus* L. var. *spadiceus* Boeck.: FTA 8: 366 (1902).

Imatong Mountains group, Uganda side: Langia Mt., 2840 m., montane grassland, 4.1943, *Purse-glove* 1420 (EA, K).

General habitat range: in lowland, medium-altitude and montane grassland and bushland.

General distribution: Cameroon to North Uganda, south to Tanzania. Species as a whole within the same general range as subsp. *rotundus*.

Cyperus rubicundus Vahl

HAINES & LYE 1983: 258; FSo 4: 133 (1995); FE 6: 464 (1997); HYF: 326 (1997).

Syn.: *Cyperus teneriffae* Poir.: FTA 8: 317 (1901); KÜKENTHAL 1936: 306; FPNA 3: 239 (1955); NAPPER 1966: 17.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, c. 200 m. north of compound, 700 m., 26.11.1983, *Kielland-Lund* 51 (C, NLH).

General habitat range: in lowland and medium-altitude open, seasonally wet habitats, often in shallow soil over rocks or near temporary pools or swamps.

General distribution: Eritrea, Ethiopia and Somalia, South East Sudan and East Congo [previously Zaire], through eastern Africa to Namibia and South Africa; also in tropical Arabia, Canary Islands, Madagascar, India and South East Asia.

Cyperus sesquiflorus (Torr.) Mattf. & Kük.

KÜKENTHAL 1936: 591; FPS 3: 357 (1956); HAINES & LYE 1983: 241; FE 6: 475 (1997).

subsp. **appendiculata** (K. Schum.) Lye
HAINES & LYE 1983: 242; FSo 4: 140 (1995); FE 6: 475 (1997).

Syn.: *Kyllinga appendiculata* K. Schum.: FWTA 3,2: 307 (1972). *Kyllinga cylindrica* Nees var. *appendiculata* C.B. Clarke: FTA 8: 283 (1902). *Kyllinga odorata* Vahl: NAPPER 1971: 23; WICKENS 1976: 164; HYF: 322 (1997). *Kyllinga cylindrica* Nees var. *major* C.B. Clarke: FTA 8: 283 (1902). *Kyllinga sesquiflorus* (Torr.) Mattf. Kük. var. *ma-*

jor (C.B. Clarke) Kük.: KÜKENTHAL 1936: 594. *Kyllinga odorata* Vahl var. *major* (C.B. Clarke) Chiov.: NAPPER 1971: 23.

Imatong Mountains group, Sudan side: without further locality, no alt., 1939, *Andrews* 1999 (K); above Lomuleng, 2650 m., mountain meadow, 26.7.1939, *Myers* 11,602 (K); above Gilo Pool (4° 02' N, 32° 50' E), no alt., 15.1.1984, *Kielland-Lund* 646 (C, NLH); Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 21.11.1980, *Friis & Vollesen* 386 (BR, C, K, KHF).

General habitat range: in montane grassland.

General distribution: Cameroon to Ethiopia and South Somalia, south to Malawi; also in tropical Arabia. Species as a whole pantropical.

Cyperus squarrosus L.

KÜKENTHAL 1936: 505; FPS 3: 352 (1956); HAINES & LYE 1983: 253; FSo 4: 125 (1995); FE 6: 461 (1997).

Syn.: *Mariscus squarrosus* (L.) C.B. Clarke: FTA 8: 400 (1902); NAPPER 1971: 10; FWTA 3,2: 294 (1972); WICKENS 1976: 164; HYF: 328 (1997). *Cyperus aristatus* Rottb.: FTA 8: 348 (1902); KÜKENTHAL 1936: 502.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, in compound, 700 m., 26.11.1983, *Kielland-Lund* 42 (C, NLH); Hiliu, near compound, 700 m., wet soil near water pump in agricultural land, 3.12.1983, *Kielland-Lund* 200 (C, NLH).

Imatong Mountains group, Uganda side: 5-6 km. south east of Lututuru Rest House, 1500 m., shallow soil over rock, 19.7.1974, *Katende* 2195 (EA, MHU).

General habitat range: in lowland, medium-altitude and montane wet grassland.

General distribution: Senegal to Ethiopia and South Somalia, south to south Africa; also widespread in Asia and America.

Cyperus triceps Endl.

KÜKENTHAL 1936: 578; FPS 3: 354 (1956); HAINES & LYE 1983: 231; FE 6: 471 (1997).

Syn.: *Kyllinga triceps* Rottb., nom. illeg.: FTA 8: 280 (1902); JACKSON 1956: 368; NAPPER 1971: 22.

Imatong Mountains group, Sudan side: no specimens seen; recorded with doubt from the upper zone of Mt. Kinyeti by JACKSON 1956: 368.

General habitat range: in medium-altitude and montane swamps and seasonally moist grassland.

General distribution: Senegal to Ethiopia, south to Namibia, Angola; also in India, tropical South East Asia, South China and Australia.

Cyperus unioides R. Br.

KÜENTHAL 1936: 338; FPS 3: 350 (1956); HAINES & LYE 1983: 273; FE 6: 481 (1997).

Syn.: *Pycrus unioides* (R. Br.) Urban: NAPPER 1971: 7; FWTA 3,2: 300 (1972); WICKENS 1976: 165. *Pycrus angulatus* Nees: FTA 8: 305 (1902).

Imatong Mountains group, Sudan side: Talanga, 950 m., small grass swamp in *Albizia zygia-Combretum* woodland near Kinyeti river, 17.3.1982, Friis & Vollesen 1241 (C).

General habitat range: in swamps in lowland and medium-altitude woodland and wooded grassland.

General distribution: Gambia and Senegal to Ethiopia, south to South Africa; also in tropical Asia and tropical America.

Cyperus sp.

Imatong Mountains group, Sudan side: Logoforok, 850 m., along dry stream, no date, Jackson 797 (KHF).

A big coarse sedge; scape c. 1 m. tall with 12-15 bracts c. 25 cm. long surrounding a small inflorescence.). This is probably *C. involucratus*.

Cyperus (*Mariscus*) sp.

Imatong Mountains group, Sudan side: ridge leading to the summit of Mt. Kinyeti, 3000 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, Friis & Vollesen 1276 (C).

Cyperus (*Pycrus*) sp.

Imatong Mountains group, Sudan side: Dumuso, 2450 m., 31.5.1950, Jackson 1523 (K, WM).

Note: on the specimen in WM this taxon has been named *Pycrus globosus* Rchb. var. *nilagiri-ca* C.B. Clarke. This name has according to FWTA 3,2: 301 (1972) been used in two different senses, for material of *Pycrus nuereensis* (Boeck.) Hooper (*Cyperus nuereensis* Boeck.) and *P. testui* Cherm., and the identity is therefore not certain.

Cyperus sp. (infected by insects).

Imatong Mountains group, Sudan side: between Gilo and Itibol, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, at forest edge, 26.2.1982, Friis & Vollesen 1029 (BR, C, K, KHF).

Diplacrum R. Br.

Diplacrum africanum C.B. Clarke

FTA 8: 510 (1902); FS: 428 (1929); FPS 3: 358 (1956); NAPPER 1964: 33; HAINES & LYE 1983: 360.

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 2.12.1980, Friis & Vollesen 631 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude seasonally wet grassland, often in shallow soil over rocks.

General distribution: Guinée to South Sudan, also in Tanzania and Zambia.

Fimbristylis Vahl

Fimbristylis dichotoma (L.) Vahl

FTA 8: 414 (1902); FS: 420 (1929); FPS 3: 360 (1956); NAPPER 1965: 10; FWTA 3,2: 320 (1972); WICKENS 1976: 163; HAINES & LYE 1983: 85; FE 6: 412 (1997); HYF: 330 (1997).

Syn.: *Fimbristylis diphyllus* (Retz.) Vahl: FTA 8: 415 (1902); FS: 420 (1929).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 2.1.1984, *Kielland-Lund* 532 (C, NLH); at Khodo River, near Molongori, 700 m., meander plain of stream, 17.1.1050, *Jackson* 1055 (K, WM); Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees of *Terminalia laxiflora*, *T. brownii*, *Pterocarpus lucens*, *Combretum collinum* and *Vitex doniana*, in rock crevices, 2.12.1980, *Friis & Vollesen* 662 (C); Talanga, 950 m., small grass swamp in *Albizia zygia-Combretum* woodland near Kinyeti River, 17.3.1982, *Friis & Vollesen* 1240 (BR, C, EA, K).

General habitat range: in damp places in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to Ethiopia, south to South Africa; also widespread in tropical Asia, including tropical Arabia, and in tropical America.

Fuirena Rottb.

Fuirena leptostachya Oliv.

FPS 3: 363 (1956); NAPPER 1965: 21; HAINES & LYE 1983: 44; FE 6: 395 (1997).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 2.1.1984, *Kielland-Lund* 539 (C, NLH); Kinyeti Valley, Hiliu, near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund* 131 (C, NLH).

General habitat range: in lowland and medium-altitude seasonally swampy grassland, bogs and on river-banks.

General distribution: Mali and Nigeria to Ethiopia, south through eastern Africa and East Congo [previously Zaire] to Botswana.

Fuirena stricta Steud.

FTA 8: 465 (1902); FPS 3: 362 (1956); NAPPER 1965: 20; FWTA 3,2: 325 (1972); HAINES & LYE 1983: 42; FE 6: 394 (1997).

Imatong Mountains group, Sudan side: Bushbuck Hill, 2300 m., seepage area in *Hagenia abyssinica* woodland, 25.3.1982, *Friis & Vollesen* 1313 (BR, C, EA, K, KHF).

General habitat range: in swamps and damp depressions in woodland and wooded grassland.

General distribution: Senegal to Ethiopia, south to South Africa; also in Madagascar.

Fuirena umbellata Rottb.

FTA 8: 466 (1902); FS: 425 (1929); FPS 3: 363 (1956); NAPPER 1965: 21; FWTA 3,2: 325 (1972); HAINES & LYE 1983: 49; FE 6: 396 (1997).

Imatong Mountains group, Sudan side: Torit, floodplain between rivers south of town (4° 24' N, 32° 34' E), no alt., 12.1.1984, *Kielland-Lund* 614 (C, NLH); Talanga, 950 m., small grass swamp in *Albizia zygia-Combretum* woodland near Kinyeti River, 17.3.1982, *Friis & Vollesen* 1243 (C, K, KHF).

General habitat range: in swamps and along river banks in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to Ethiopia, south to South Africa; also in tropical Asia and America.

Isolepis R. Br.

Syn.: *Scirpus* L., pro parte.

Isolepis costata A. Rich.

HAINES & LYE 1983: 135; FE 6: 423 (1997).

Syn.: *Scirpus costatus* (A. Rich.) Boeck.: FTA 8: 451 (1902); NAPPER 1965: 14.

Imatong Mountains group, Sudan side: along path from Bushbuck Hill to Mt. Konoro, 2400 m., upland forest with *Podocarpus latifolius*, *Olea*

capensis subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, at small brook in forest, 23.2.1982, Friis & Vollesen 1012 (BR, C, K, KHF); below summit of Mt. Kinyeti, on the north-western side of the peak, 2600 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, with open glades and patches of mountain bamboo and *Hagenia abyssinica* and *Hypericum revolutum* woodland, at small stream, 23.3.1982, Friis & Vollesen 1297 (C, K, KHF).

General habitat range: in montane swamps and along stream.

General distribution: South Sudan and Ethiopia south to South Africa. First record from the Sudan.

Isolepis fluitans (L.) R. Br.

HAINES & LYE 1983: 138; FE 6: 424 (1997).

Syn.: *Scirpus fluitans* L.: FTA 8: 449 (1902); NAPPER 1965: 13.

Imatong Mountains group, Sudan side: Mt. Kinyeti, 2500 m., upland rain forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri*, *Syzygium guineense* subsp. *afromontanum* and *Dombeya torrida*, 12.12.1980, Friis & Vollesen 854 (BR, C, K, KHF); along path from Bushbuck Hill to Mt. Konoro, 2400, upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, at small brook in forest, 23.2.1982, Friis & Vollesen 1016 (C, K, KHF).

General habitat range: in medium-altitude and montane woodland, grassland and forest, usually near or in water.

General distribution: Nigeria and Mali to Ethiopia, south to South Africa; also widespread in Europe and Asia. First record from the Sudan.

Kyllinga Rottb.

See *Cyperus* L.

Kyllingiella R. Haines & Lye

Kyllingiella ugandensis R. Haines & Lye

HAINES & LYE 1983: 142.

Imatong Mountains group, Uganda side: Lututuru, 1200 m., glen, 6.1963, Kertland 111 (MHU, holotype).

General habitat range: in medium-altitude grassland.

General distribution: Not known elsewhere; known only from the type collection.

Lipocarpha R. Br.

Lipocarpha hemisphaerica (Roth) Goetghebeur

GOETGHEBEUR & VAN DEN BORRE 1989: 37; FE 6: 490 (1997).

Syn.: *Lipocarpha isolepis* (Nees) Haines: HAINES & LYE 1983: 300. *Scirpus isolepis* (Nees) Boeck.: FTA 8: 459 (1902); FPS 3: 366 (1956); NAPPER 1965: 14; FWTA 3,2: 310 (1972).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, Kielland-Lund 563 (C, NLH).

General habitat range: in lowland, medium-altitude and montane open habitats, usually in shallow soil over damp rocky outcrops or in sandy soil at the edge of pools.

General distribution: Senegal to Ethiopia, south to Namibia, Botswana and Zimbabwe; also in India and tropical South East Asia.

Lipocarpha nana (A. Rich.) Cherm.

FWTA 3,2: 328 (1972); HAINES & LYE 1983: 299; GOETGHEBEUR & VAN DEN BORRE 1989: 55; FE 6: 489 (1997).

Syn.: *Lipocarpha pulcherrima* Ridl.: FTA 8: 473 (1902); NAPPER 1965: 23.

Imatong Mountains group, Sudan side: Gilo, at

bridge on Ngairigi River, 1800 m., on rocky outcrop with wet flushes and thin soil with *Se-laginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 21.11.1980, Friis & Vollesen 381 (C); Gilo to Mt. Konoro, 1800 m., on rocky outcrop with wet flushes and thin soil with *Se-laginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 23.11.1980, Friis & Vollesen 416 (BR, C, K, KHF).

General habitat range: in medium-altitude and montane woodland and wooded grassland, usually in thin soil over rocky outcrops.

General distribution: Guinée to Ethiopia, south to South Africa (Transvaal); also in Madagascar.

Mariscus Vahl
See **Cyperus** L.

Pycreus P. Beauv.
See **Cyperus** L.

Rhynchospora Vahl

Rhynchospora corymbosa (L.) Britt.
FTA 8: 480 (1902); FPS 3: 364 (1956); NAPPER 1964: 40; FWTA 3,2: 331 (1972); HAINES & LYE 1983: 313; FE 6: 493 (1997).

Syn.: *Scirpus corymbosus* L.

Imatong Mountains group, Sudan side: Talanga, 1000 m., in marshy depression in woodland, 8.3.1950, Jackson 1209 (K); Talanga, 950 m., small grass swamp in *Albizia zygia-Combretum* woodland near Kinyeti River, 17.3.1982, Friis & Vollesen 1244 (C, K).

General habitat range: in lowland and medium-altitude woodland, always in swamps or damp depressions.

General distribution: Senegal to West Ethiopia, south to South Africa (Natal); also in Madagascar, tropical Asia, Australia and America.

Schoenoplectus Palla

Syn.: *Scirpus* L., pro parte.

Schoenoplectus corymbosus (Roem. & Schult.)

J. Raynal

FSO 4: 103 (1995); FE 6: 399 (1997).

Syn.: *Scirpus corymbosus* (Roem. & Schult.) Heyne ex Roth, non L.: FTA 8: 455 (1902); FS: 423 (1929); JACKSON 1956: 368, high altitude montane grassland of the Imatong Mountains. var. **brachyceras** (Hochst. ex A. Rich.) Lye FSO 4: 103 (1995).

Syn.: *Scirpus brachyceras* Hochst. ex A. Rich.: FPS 3: 368 (1956); FWTA 3,2: 311 (1972). *Scirpus inclinatus* (Del.) Aschers. & Schweinf.: NAPPER 1965: 15.

Imatong Mountains group, Uganda side: 2 km. east of Lututuru, near a rivulet, 1400 m., in open woodland, 17.2.1969, Lye 2095 (EA, MHU, NLH).

Didinga Mountains: Nagichot, 1980 m., in pure stand in khor, 27.4.1939, Myers 11,162 (K, WM).

General habitat range: in medium-altitude and montane grassland, always in or near standing water.

General distribution: Mali to Ethiopia and Somalia, south to Namibia and South Africa; also in Madagascar.

Note: No material has been traced to document the high altitude record of Jackson (l.c.); however, the species is elsewhere known up to an altitude of ca. 2600 m.

Schoenoplectus senegalensis (Steud.) J. Raynal
HAINES & LYE 1983: 58; FSO 4: 104 (1995); FE 6: 400 (1997).

Syn.: *Lipocarpha argentea* (Vahl) R. Br.: FTA 8: 469 (1902). *Lipocarpha chinensis* (Osborn) Kern: NAPPER 1965: 22; FWTA 3,2: 328 (1972). *Lipocarpha senegalensis* (Steud.) Th. & H. Dur.: FPS 3: 363 (1956).

Imatong Mountains group, Sudan side: Loa, Arapi

Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, *Kielland-Lund* 569 (C, NLH).

General habitat range: in open lowland and medium-altitude habitats, usually at seasonally flooded areas and at the edge of shallow permanent pools.

General distribution: Senegal to Ethiopia and Somalia, south to Namibia and South Africa (Transvaal); also in tropical Asia and Australia.

Scleria Berg.

Scleria bulbifera A. Rich.

FTA 8: 500 (1902); FPS 3: 369 (1956); NAPPER 1964: 32; FWTA 3,2: 344 (1972); HAINES & LYE 1983: 331; FE 6: 495 (1997); HYF: 332 (1997).

Imatong Mountains group, Uganda side: 4 km. south east of Mt. Lomwaga, 1900 m., places with shallow soil in tall-grass grassland, 18.7.1974, *Katende* 2129 (EA, MHU).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to Ethiopia, south to South Africa; also in Madagascar and tropical Arabia.

Scleria distans Poir.

HAINES & LYE 1983: 330; FE 6: 495 (1997).

Syn.: *Scleria nutans* Willd. ex Kunth: NAPPER 1964: 33; FWTA 3,2: 344 (1972). [*Scleria hirtella* auct., non Sw.: FTA 8: 497 (1902); FPS 3: 369 (1956) {Imatong Mountains, Mt. Baghanj}].

Imatong Mountains group, Sudan side: Gilo, near Swimming Pool, 1750 m., 26.12.1983, *Kielland-Lund* 454 (C, NLH); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 8.11.1980, *Friis & Vollesen* 40 (C); Mt. Baghanj, 1830-2130 m., 13.6.1939, *Andrews* 1893 (K).

General habitat range: in swamps in medium-altitude and montane woodland and wooded grassland.

General distribution: Nigeria to Ethiopia, south to South Africa; also in Madagascar and tropical America.

Scleria foliosa Hochst. ex A. Rich.

FTA 8: 503 (1902); FPS 3: 371 (1956); NAPPER 1964: 29; FWTA 3,2: 343 (1972); HAINES & LYE 1983: 344; FE 6: 498 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., *Loudetia arundinacea* grassland with scattered trees, on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 2.12.1980, *Friis & Vollesen* 629 (C, K, KHF).

Imatong Mountains group, Uganda side: 4 km. south east of Lomwaga, 1500 m., tall-grass grassland with scattered trees, 18.7.1974, *Katende* 2169 (MHU).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to Ethiopia, south to South Africa (Transvaal); also in Madagascar and India.

Scleria hispidior (C.B. Clarke) Nelves

NAPPER 1964: 32; HAINES & LYE 1983: 339; FE 6: 496 (1997).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2260 m., shallow soil over rock, 26.8.1966, *Lock* K 13 (MHU).

General habitat range: in medium-altitude and montane grassland, usually in shallow soil over rocks.

General distribution: South Sudan, Ethiopia and Uganda.

Scleria melanotricha Hochst. ex A. Rich.

FTA 8: 495 (1902); FS: 426 (1929); FPS 3: 369 (1956); NAPPER 1964: 33; FWTA 3,2: 346 (1972); HAINES & LYE 1983: 338; FE 6: 496 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollan-*

thus spp., *Aloe sp.* and many annuals, 30.11.1980, Friis & Vollesen 555 (C, K, KHF).

General habitat range: in lowland and medium-altitude woodland, wooded grassland and grassland.

General distribution: Senegal to Ethiopia, south to Zambia.

***Scleria racemosa* Boj.**

FTA 8: 508 (1902); FS: 428 (1929); FPS 3: 369 (1956); NAPPER 1964: 27; HAINES & LYE 1983: 358; FE 6: 499 (1997).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, along small brook between rocks, 2.12.1980, Friis & Vollesen 641 (C).

General habitat range: in lowland and medium-altitude wet grassland, swamps and swamp-forest.

General distribution: South Sudan through eastern Africa to Angola and Zimbabwe; also in Madagascar.

***Scleria tessellata* Willd.**

NAPPER 1964: 29; FWTA 3,2: 343 (1972); HAINES & LYE 1983: 348.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near bridge west of town, 700 m., 30.11.1983, Kielland-Lund 128 (C, NLH).

General habitat range: in lowland and medium-altitude seasonally wet grassland and swamps.

General distribution: Senegal to Sudan, Tanzania, Zambia and Angola; also in India and tropical South East Asia.

Order 85. **Poales** Small

Fam. 176. **Poaceae** Barnh.
(*Gramineae* Juss., nom. altern.)

Acritochaete Pilg.

***Acritochaete volkensis* Pilg.**

FTA 9: 481 (1919); FPS 3: 385 (1956) {Imatong Mountains, Kimisu [Dumuso]}; FWTA 3,2: 448 (1972); FTEA, Gramin. 3: 658 (1982); FE 7: 245 (1995).

Imatong Mountains group, Sudan side: Issore to Itibol, Kimisu [= Dumuso] forest, 2100 m., 20.12.1935, Thomas 1720 (BM, K); Bushbuck Hill, 2150 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, 10.11.1980, Friis & Vollesen 114 (BR, C, K, KHF).

General habitat range: in montane forest and bamboo thickets.

General distribution: Nigeria and Cameroon, Ethiopia, Kenya, Uganda and Tanzania.

Acroceras Stapf

Syn.: *Commelinidium* Stapf

***Acroceras gabunense* (Hack.) W.D. Clayton**
FTEA, Gramin. 3: 567 (1982).

Syn.: *Commelinidium gabunensis* (Hack.) Stapf: FTA 9: 629 (1920); FG 5: 16 (1962); FWTA 3,2: 436 (1972). *Commelinidium mayumbense* (Franch.) Stapf: FTA 9: 628 (1920); JACKSON 1956: 355 {Talanga}.

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 26.11.1980, Friis & Vollesen 473 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Liberia to South Sudan and Uganda, south to Angola.

Acroceras zizanioides (Kunth) Dandy

FPS 3: 385 (1956); FG 5: 22 (1962); FWTA 3,2: 435 (1972); FTEA, Gramin. 3: 565 (1982); FE 7: 210 (1995).

Syn.: *Acroceras oryzoides* Stapf: FTA 9: 622 (1920).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in small clearing, 3.12.1980, *Friis & Vollesen* 652 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest, often in damp places.

General distribution: Guinée to Ethiopia and Uganda, south to Angola, Congo [previously Zaire] and Tanzania; also in India and tropical America.

Agrostis L.

Agrostis kilimandscharica Mez

FTEA, Gramin. 1: 110 (1970).

Syn.: *Agrostis sororia* C.E. Hubb.: FPS 3: 386 (1956) {Imatong Mountains, Mt. Kinyeti}.

Imatong Mountains group, Sudan side: without further locality, 2740 m., 26.2.1976, *Howard* IM 68 (KHF); Mt. Kinyeti, 2960 m., scrub, 30.12.1935, *Thomas* 1856 (K); Mt. Kinyeti, near summit, 3050 m., 12.2.1936, *Johnston* 1515 (K).

General habitat range: in montane forest, especially in clearings, bamboo thicket and montane grassland.

General distribution: East Congo [previously Zaire] to South Sudan, Uganda and Kenya, south to Tanzania. In Ethiopia the closely related *Agrostis diffusa* S.M. Phillips.

Agrostis producta Pilg.

FPS 3: 386 (1956) {Imatong Mountains, near Itibol}; FTEA, Gramin. 1: 108 (1970).

Imatong Mountains group, Sudan side: without further locality, 1830-2440 m., 11.2.1936, *Johnston* 1495 (K); Itibol to Issore, near Itibol, 1950 m., scrub, 20.12.1935, *Thomas* 1719 (BM, K); along path from Bushbuck hill to Mt. Konoro, 2300 m., rocky outcrops in *Loudetia* grassland, 5.3.1982, *Friis & Vollesen* 1096 (C, K, KHF); Kipia, 2440 m., mountain grassland, 29.12.1935, *Thomas* 1825 (BM, K); Kipia, 2650 m., mountain moor, 28.7.1939, *Myers* 11,697 (K); Kipia, 2680 m., dominant grass in mountain meadow, 22.9.1940, *Myers* 13,493 (K); ridge leading to the summit of Mt. Kinyeti, 3000 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 22.3.1982, *Friis & Vollesen* 1284 (C, K); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 845 (C, K, KHF).

Imatong Mountains group, Uganda side: Lomwaga, 2500-2620 m., uncommon, 6.1942, *Eggeling* 5047 (EA).

General habitat range: in montane grassland, sometimes in moist places and swamps.

General distribution: South Sudan, Uganda and Kenya south to Tanzania and Malawi.

Aira L.

Aira caryophyllea L.

FTA 10: 87 (1937); FPS 3: 387 (1956); HEDBERG 1957: 46; FTEA, Gramin. 1: 84 (1970); FWTA 3,2: 372 (1972); WICKENS 1976: 165; FE 7: 37 (1995).

Syn.: *Aira caryophyllea* L. var. *latigluma* (Steud.) C.E. Hubb.: FPS 3: 387 (1956).

Imatong Mountains group, Sudan side: Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 816 (C).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2260 m., bare, shallow soil sheltered by overhanging rock, 26.8.1966, *Lock* K 3 (EA, MHU).

General habitat range: in montane grassland, often in rocky places and on well drained soil.

General distribution: Mountains of Cameroon, Sudan and Ethiopia, and through mountainous regions of eastern Africa, south to South Africa; also widespread in Europe and Asia.

Alloteropsis C. Presl

Alloteropsis cimicina (L.) Stapf

FTA 9: 487 (1919); FPS 3: 388 (1956); FWTA 3,2: 449 (1972); WICKENS 1976: 166; FTEA, Gramin. 3: 617 (1982); FSo 4: 224 (1995); FE 7: 216 (1995).

Imatong Mountains group, Sudan side: 35 km. east of Torit, no alt., bare ground in *Acacia* bushland, 15.9.1941, *Myers* 14,118 (K).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K025 (WM).

General habitat range: in lowland and medium-altitude dry, open grassland, and in abandoned cultivations.

General distribution: Senegal to Somalia, south to South Africa; throughout the tropics of the Old World.

Alloteropsis semialata (R. Br.) Hitchc.

FTA 9: 483 (1919); FS: 454 (1929); FPS 3: 387 (1956); FWTA 3,2: 448 (1972); FTEA, Gramin. 3: 616 (1982); FE 7: 215 (1995).

Imatong Mountains group, Uganda side: Langia, 1830 m., 4.1943, *Purseglove* 1392 (EA, K); East Acholi Mountains, 1830 m., montane grassland, 6.1942, *Eggeling* 5296 (EA).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., 19.4.1939, *Myers* 10,935 (K); slope of Mt. Lotuke, 1900 m., in *Protea* grassland, 29.3.1950, *Jackson* 1323 (K, WM).

General habitat range: in lowland, medium-altitude and montane grassland, dry bushland and seasonal swamps.

General distribution: Senegal to Ethiopia, south to South Africa; also widespread in other tropics of the Old World.

Andropogon L.

Andropogon amethystinus Steud.

FTA 9: 216 (1919); JACKSON 1956: 368; HEDBERG 1957: 32; FWTA 3,2: 485 (1972); FTEA, Gramin. 3: 772 (1982); FE 7: 323 (1995); HYF: 390 (1997).

Imatong Mountains group, Sudan side: No specimens seen; recorded by JACKSON 1956 from high altitude montane grassland.

General habitat range: in montane grassland and open areas in montane forest.

General distribution: Nigeria, and from Ethiopia south to South Africa; also in tropical Arabia and India.

Andropogon gayanus Kunth

FTA 9: 261 (1919); FS: 449 (1929); FPS 3: 389 (1956); FG 5: 172 (1962); FWTA 3,2: 488 (1972); WICKENS 1976: 166; FTEA, Gramin. 3: 777 (1982); FSo 4: 260 (1995); FE 7: 325 (1995).

var. **gayanus**

FWTA 3,2: 488 (1972).

Lafit, Dongotona and Nangeya Mountains: Lafon Regional District Centre, no alt., 29.12.1983, *Kielland-Lund* 523 (C, NLH).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland.

General distribution: Cap Verde Islands and Senegal to South Sudan.

var. **polycladus** (Hack.) Clayton

FTEA, Gramin. 3: 777 (1982); FE 7: 325 (1995).

Imatong Mountains group, Sudan side: Luluba Mountains, Khor Leiforo, 25.9.1938, *Myers*

9468 (K); Kinyeti Valley, Hiliu, between the river east of compound and the hills, 700 m., 31.11.1983, *Kielland-Lund* 137 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, no alt., at ditch in black cotton soil area, 6.1942, *Eggeling* 5135 (EA); Agoro, 1230 m., valley grassland, 12.11.1945, *Thomas* 4351 (EA, K).

Didinga Mountains: 34 km. south west of Kapoeta on road to Torit [4° 35' N, 33° 25' E], no alt., on black cotton soil, 16.9.1953, *Peers* MO10 (K, WM).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland.

General distribution: Senegal to Ethiopia, south to South Africa. Three other varieties are restricted to the distribution area in West Africa.

Andropogon lima (Hack.) Stapf

FTA 9: 217 (1919); FWTA 3,2: 485 (1972); FTEA, Gramin. 3: 771 (1982); FE 7: 322 (1995).

Imatong Mountains group, Sudan side: above Lomuleng, 2650 m., mountain meadow, 26.7.1939, *Myers* 11,600 (K).

General habitat range: in high altitude montane grassland.

General distribution: Cameroon, South Sudan and Ethiopia, south to Tanzania and Malawi.

Andropogon mannii Hook. f.

FTA 9: 226 (1919); FWTA 3,2: 485 (1972); FTEA, Gramin. 3: 774 (1982); FE 7: 324 (1995).

Syn.: *Andropogon thomasii* C.E. Hubb.: JACKSON 1956: 370.

Imatong Mountains group, Sudan side: Mt. Kinyeti, summit, 3050 m., 30.12.1935, *Thomas* 1832 (K, holotype of *Andropogon thomasii*); summit of Mt. Kinyeti, 3180 m., among rocks, 27.7.1939, *Myers* 11,650 (K); summit of Mt. Kinyeti, 3180 m., among rocks in *Erica arborea* scrub, 15.11.1949, *Jackson* 938 (K); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous

scrub, low subshrubs and herbs in rock crevices, 13.12.1980, *Friis & Vollesen* 817 (C).

Imatong Mountains group, Uganda side: Lomwaga Mountains, 2500-2620 m., common in sub-alpine pastures, 6.1942, *Eggeling* 5041 (K, MHU).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2400 m., shallow soil over rocks, 21.1.1950, *Jackson* 1083 (K).

General habitat range: in montane grassland.

General distribution: Sierra Leone and in scattered montane localities to Ethiopia, south to South Africa.

Andropogon schirensis A. Rich.

FTA 9: 246 (1919); FS: 449 (1929); FPS 3: 389 (1956); FG 5: 168 (1962); FWTA 3,2: 486 (1972); WICKENS 1976: 166; FTEA, Gramin. 3: 779 (1982); FE 7: 327 (1995).

Syn.: *Andropogon dummeri* Stapf: FTA 9: 248 (1919); FWTA 3,2: 486 (1972).

Imatong Mountains group, Sudan side: above Nokolong, 1520 m., 2.1936, *Johnston* 1404 (K); Mt. Baghanj, 1830-2130 m., 13.6.1939, *Andrews* 1897 (K); Bushbuck Hill, 2150 m., *Loudetia arundinacea* grassland with scattered trees, 10.11.1980, *Friis & Vollesen* 134 (C, K, KHF); near Dumuso, 2400 m., mountain grassland, 1.6.1950, *Jackson* 1551 (K); Kipia, 2450 m., in scrub, 29.12.1935, *Thomas* 1813 (BM, K).

Imatong Mountains group, Uganda side: above Agoro, 2200 m., 6.1942, *Eggeling* 5081 (EA, MHU); Agoro, no alt. on rocky hillside among bamboo, 6.1942, *Eggeling* 5102 (EA); Agoro, 1830 m., rocky woodland, 14.11.1945, *Thomas* 4374 (EA, K).

General habitat range: in lowland, medium-altitude and montane grassland.

General distribution: Senegal to Ethiopia, south to South Africa.

Aristida L.**Aristida adoensis** Hochst.

FTEA, Gramin 1: 144 (1970); WICKENS 1976: 167; FE 7: 80 (1995).

Didinga Mountains: between Naligede and Iwowa, 1710 m., crest of ridge, 22.4.1939, *Myers* 11,012 (K).

General habitat range: in dry medium-altitude and montane grassland and bushland, often in eroded or overgrazed vegetation.

General distribution: South Sudan and Ethiopia through East Congo [previously Zaire] and eastern Africa to South Tanzania.

Aristida adscensionis L.

FS: 471 (1929); FPS 3: 395 (1956); FTEA, Gramin. 1: 148 (1970); FWTA 3,2: 379 (1972); WICKENS 1976: 167; FSo 4: 162 (1995); FE 7: 78 (1995); HYF: 354 (1997).

Syn.: *Aristida submucronata* Schumach.: FPS 3: 395 (1956).

Imatong Mountains group, Uganda side: Agoro, 1380 m., stony hillside, dominant on gravelly soil, 13.11.1945, *Thomas* 4364 (EA).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., in sandy soil, 27.8.1953, *Peers* K018 (K, WM) & K020 (K).

General habitat range: in lowland and medium-altitude habitats in dry and disturbed places, usually on sandy and stony soil.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also found in similar habitats throughout the tropics.

Aristida hordacea Kunth

FPS 3: 395 (1956); FTEA, Gramin. 1: 150 (1970); FWTA 3,2: 379 (1972); WICKENS 1976: 167; FE 7: 81 (1995).

Imatong Mountains group, Sudan side: near Torit, east of airstrip (4° 25' N, 32° 35' E), 650 m., 9.12.1983, *Kielland-Lund* 274 (C, NLH); Kinyeti Valley, 5 km. north of Hiliu on road to Torit, 650 m., 6.12.1983, *Kielland-Lund* 235 (C, NLH).

Didinga Mountains: 6 km. south of Kapoeta on road to Nathilani, no alt., in sandy soil, 27.8.1953, *Peers* K05 (K, WM).

General habitat range: in lowland and medium-altitude woodland, deciduous bushland and abandoned cultivated land.

General distribution: Senegal to Ethiopia, south to South Africa.

Arthraxon P. Beauv.**Arthraxon micans** (Nees) Hochst.

FTEA, Gramin. 3: 742 (1982); FE 7: 312 (1995).
Syn.: *Arthraxon quartinianus* (A. Rich.) Nash: FTA 9: 166 (1917); FPS 3: 399 (1956) {Imatong Mountains}; FWTA 3,2: 470 (1972); WICKENS 1976: 167.

Imatong Mountains group, Sudan side: Katire, 1430 m., along path, 17.12.1935, *Thomas* 1611 A (K); Katire to Itibol, near Katire, 1520 m., 17.12.1935, *Thomas* 1612 (BM, K); Gilo, 1850 m., edge of upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 6 (BR, C, EA, FT, K, KHF).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2310 m., moist, sheltered soil over rock, 26.8.1966, *Lock* K 17 (EA, MHU).

General habitat range: in lowland, medium-altitude and montane woodland and forest, also in shaded farmland and between rocks.

General distribution: Sierra Leone to Ethiopia and North Somalia, south to South Africa; also widespread in tropical Asia to Thailand, and in central America and the West Indies.

Arundinaria Michx. see **Sinarundinaria** Nakai

Bothriochloa O. Kuntze

Bothriochloa insculpta (Hochst.) A. Camus
FPS 3: 402 (1956) {Torit}; FTEA, Gramin. 3:

720 (1982); FSo 4: 256 (1995); FE 7: 306 (1995); HYF: 388 (1997).

Imatong Mountains group, Sudan side: south of Torit, no alt., 28.10.1938, *Myers* 9921 (K, WM); Kinyeti Valley, Hiliu, near compound, 700 m., near water pump in agricultural land, 3.12.1983, *Kielland-Lund* 194 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, *Eggeling* 5115 (EA); north of Madi Opei, 1100 m., *Acacia* woodland, 16.8.1972, *D. Field* 2100 (EA).

Lafit, Dongotona and Nangeya Mountains: Lafon Regional District Centre, no alt., 29.12.1983, *Kielland-Lund* 525 (C, NLH).

Didinga Mountains: 9 km. south of Kapoeta on Nathilani road, no alt., sandy soil, 27.8.1953, *Peers* K09 (K).

General habitat range: in lowland, medium-altitude and montane grassland, often in stony or rocky soil in heavily grazed or overgrazed sites.

General distribution: Sierra Leone to Ethiopia and Somalia, south to South Africa; also in tropical Arabia.

Bothriochloa radicans (Lehm.) A. Camus

FPS 3: 402 (1956) {east of Kapoeta}; FTEA, Gramin. 3: 721 (1982); FSo 4: 257 (1995); FE 7: 307 (1995); HYF: 388 (1997).

Imatong Mountains group, Sudan side: near Torit, 620 m., *Acacia seyal* woodland, 24.6.1949, *Jackson* 823 (K).

General habitat range: in lowland and medium-altitude grassland and wooded grassland.

General distribution: Sudan to Ethiopia and Somalia, south to South Africa; also in tropical Arabia and introduced to South America.

Brachiaria (Trin.) Griseb.

Brachiaria brizantha (Hochst.) Stapf

FTA 9: 531 (1919); FS: 456 (1929); FPS 3: 407 (1956); FG 5: 32 (1962); FWTA 3,2: 443 (1972); WICKENS 1976: 168; FTEA, Gramin. 3: 587

(1982); FSo 4: 226 (1995); FE 7: 222 (1995); HYF: 378 (1997).

Imatong Mountains group, Sudan side: Laboni forest, 1250 m., in scrub, 21.1.1935, *Thomas* 1734 (K); Torit district, Palowar [3° 56' N, 32° 36' E], no alt., disturbed grassland, 18.6.1949, *Jackson* 724 (K); Kinyeti Valley, 8 km. south of Hiliu along Katire road (4° 12' N, 32° 40' E), no alt., in savanna, 30.5.1984, *Kielland-Lund* 791 (C, NLH); Talanga, 900 m., *Combretum* woodland, 28.5.1949, *Jackson* 804 (K); Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 8.12.1980, *Friis & Vollesen* 767 (C, K, KHf); Logoforok (3° 58' N, 33° 4' E), 800 m., near stream, no date, *Jackson* 794 (K); above Nokolong, 1520 m., *Piliostigma thonningii* grassland, 2.1936, *Johnston* 1411 (EA, K).

Imatong Mountains group, Uganda side: Agoro, 2140 m., woodland, 15.11.1945, *Thomas* 4387 (EA, K); 4-5 km. south east of Lomwaga, no alt., woodland with rocky outcrops, 18.7.1974, *Katende* 2189 (EA, MHU).

Didinga Mountains: Nagichot, 1830 m., 19.8.1951, *Babiker Beshir* 6 (K, WM).

General habitat range: in lowland and medium-altitude woodland, and in montane woodland and grassland.

General distribution: Senegal to Ethiopia, south to South Africa; introduced elsewhere in the tropics.

Brachiaria comata (A. Rich.) Stapf

FTA 9: 561 (1919); FPS 3: 411 (1956); FTEA, Gramin. 3: 593 (1982); FE 7: 227 (1995); HYF: 379 (1997).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., woodland, 1979, *Shigeta* 181 (EA, identified and listed by M.G. Gilbert, not traced); near Torit, 620 m., woodland, 20.10.1949, *Jackson* 868 (K); Kinyeti Valley, Hiliu, in compound, 700 m., 29.11.1983, *Kielland-Lund*

101 (C, NLH); Hiliu, near compound, 700 m., in cultivation, 5.12.1983, *Kielland-Lund* 208 (C, NLH).

Imatong Mountains group, Uganda side: north of Madi Opei, 1100 m., woodland, 16.8.1972, *D. Field* 2096 (EA).

Didinga Mountains: south west of Kapoeta on road to Lokililobar, no alt., 27.8.1953, *Peers* T014 (K, WM) & T015 (K).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland.

General distribution: Nigeria to Ethiopia, south to Congo [previously Zaire] and Tanzania; also in tropical Arabia.

***Brachiaria decumbens* Stapf**

FTA 9: 528 (1919); FTEA, Gramin. 3: 586 (1982).

Imatong Mountains group, Uganda side: Lututuru, no alt., 7.6.1963, *Kertland* s.n. (MHU).

General habitat range: in lowland and medium-altitude bushland and at forest edges.

General distribution: Uganda and West Kenya to North West Tanzania, west to East Congo [previously Zaire], Rwanda and Burundi.

***Brachiaria deflexa* (Schumach.) Robyns**

FPS 3: 410 (1956); FWTA 3,2: 444 (1972); WICKENS 1976: 168; FTEA, Gramin. 3: 598 (1982); FE 7: 228 (1995); HYF: 379 (1997).

Syn: *Brachiaria regularis* (Nees) Stapf: FTA 9: 544 (1919); FS: 456 (1929).

Imatong Mountains group, Sudan side: Molongori, 750 m., 11.6.1939, *Andrews* 1808 (K).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, *Eggeling* 5116 (EA) & 5132 (EA).

Didinga Mountains: south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* KM11 (WM).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland, often along roadsides and in weedy places.

General distribution: Senegal to Ethiopia, south to South Africa; also in tropical Arabia and India.

***Brachiaria jubata* (Fig. & de Not.) Stapf**
FS: 457 (1929); FPS 3: 406 (1956); FWTA 3,2: 168; WICKENS 1976: 168; FTEA, Gramin. 3: 580 (1982); FE 7: 221 (1995).

Syn.: *Brachiaria brevis* Stapf: FTA 9: 519 (1919).

Imatong Mountains group, Sudan side: Abara between Loa and Magwe (4° 05' N, 32° 13' E), no alt., 6.6.1984, *Kielland-Lund* 866 (C, NLH); Laboni, 1280 m., grassland, 19.4.1930, *Snowden* 1690 (K).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2140 m., scattered tree grassland, 29.3.1970, *C.R. Field* 4 (EA); Nangeya Mountains, Mt. Lonyili, 1600 m., grassland, 17.5.1972, *Synnott* 1059 (EA, MHU).

Didinga Mountains: near Nagichot, 2050 m., upland grassland, 24.4.1939, *Myers* 11,099 (K).

General habitat range: in lowland, medium-altitude and montane grassland and bushland, usually in damp or seasonally waterlogged places.

General distribution: Guinée to Ethiopia, south to Angola and Zimbabwe.

***Brachiaria leersioides* (Hochst.) Stapf**

FTA 9: 551 (1919); FS: 456 (1929); FPS 3: 411 (1956); FTEA, Gramin. 3: 591 (1982); FSo 4: 227 (1995); FE 7: 225 (1995); HYF: 379 (1997).

Imatong Mountains group, Sudan side: south east of Torit, 2 km. from junction along Imatong road and 500 m. east of road east of Ngarama (4° 21' N, 32° 39' E), no alt., 26.5.1984, *Kielland-Lund* 760 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, *Eggeling* 5117 (EA).

Didinga Mountains: 56 km. south west of Kapoeta on road to Khor Lokililobar, no alt., 29.8.1953, *Peers* T016 (K, WM).

General habitat range: often in *Acacia* bushland, but also in many other lowland and medium-altitude habitats, usually disturbed.

General distribution: Central African Republic and Chad to Ethiopia and Somalia, south to

Congo [previously Zaire], Tanzania and Mozambique; also in tropical Arabia.

Brachiaria leucacrantha (K. Schum.) Stapf
FTA 9: 540 (1919); FTEA, Gramin. 3: 597 (1982); FSo 4: 228 (1995); FE 7: 229 (1995).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, *Eggeling* 5118 (MHU).

General habitat range: in lowland and medium-altitude dry deciduous bushland, often in disturbed places.

General distribution: Uganda, Ethiopia and South Somalia to Mozambique, west to East Congo [previously Zaire].

Brachiaria ovalis Stapf

FTA 9: 546 (1919); FTEA, Gramin. 3: 599 (1982); FSo 4: 229 (1995); FE 7: 227 (1995); HYF: 381 (1997).

Didinga Mountains: 38 km. north of Kapoeta on road to Karakamuge, no alt., 28.8.1953, *Peers* KAM 30 (K, WM).

General habitat range: in lowland deciduous bushland and subdesert grassland, especially in sandy or rocky soil.

General distribution: Sudan, Ethiopia, Somalia and North Kenya; also through tropical Arabia to Pakistan.

Brachiaria scalaris Pilg.

FTEA, Gramin. 3: 594 (1982); FE 7: 227 (1995); HYF: 381 (1997).

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, *Friis & Vollesen* 39 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: above Agoro, east of Aringa River, 2200 m., 6.1942, *Eggeling* 5090 (EA).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2260 m., shallow soil over rock, 26.8.1966, *Lock* K 14 (EA, MHU).

General habitat range: in lowland, medium-alti-

tude and montane habitats, often in disturbed places.

General distribution: Congo [previously Zaire] to Ethiopia, south to Tanzania and Zimbabwe; also in tropical Arabia. First record from the Sudan.

Brachiaria serrifolia (Hochst.) Stapf

FTA 9: 548 (1919); FPS 3: 410 (1956); FWTA 3,2: 444 (1972); WICKENS 1976: 169; FTEA, Gramin. 3: 596 (1982); FE 7: 225 (1995).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K028 (K, WM).

General habitat range: in lowland and medium-altitude deciduous bushland.

General distribution: Mali to Ethiopia, south to Tanzania and Zimbabwe.

Brachypodium P. Beauv.

Brachypodium flexum Nees

FTEA, Gramin. 1: 71 (1970); FE 7: 57 (1995).

Syn.: *Brachypodium flexum* Nees var. *abyssinicum* Hochst.: FPS 3: 413 (1956) [Imatong Mountains]. *Brachypodium* "simplex" Nees: JACKSON 1956: 369, sphalmate pro *Brachypodium flexum* Nees.

Imatong Mountains group, Sudan side: without further locality, 2130 m., damp forest, 2.1936, *Johnston* 1432 (K), & *Johnston* 1459 (EA, K); without further locality, 2740 m., *Hypericum* scrub, 27.2.1976, *Howard* IM 65 (KHF); without further locality, 2900 m., damp places in forest, 12.2.1936, *Johnston* 1499 (EA, K); Itibol to Isore, near Itibol, 1950 m., scrub, 20.12.1935, *Thomas* 1707 (BM, K); Bushbuck Hill, 2150 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, 10.11.1980, *Friis & Vollesen* 115 (C, K, KHF); Kipia, 2440 m., scrub, 29.12.1935, *Thomas* 1810 (BM, K); Mt. Kinyeti, 2740 m., 15.8.1951, *Babiker Beshir* 30 (K, WM).

Imatong Mountains group, Uganda side: hills above Agoro, 2260 m., in swampy stream bed in *Podocarpus latifolius* forest, 6.1942, *Eggeling* 5055 A (EA, K); above Agoro, 2200 m., 6.1942, *Eggeling* 5083 (EA, MHU).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2600 m., edge of open *Podocarpus latifolius* forest, 21.1.1950, *Jackson* 1086 (K).

General habitat range: in montane forest, especially along edges, in open places and clearings, in bamboo thicket and in ericaceous evergreen bushland.

General distribution: South Sudan to Ethiopia, south to South Africa (Cape Prov.); also in Madagascar.

Note: There is no doubt that the name *Brachypodium simplex* Jackson 1956 (l.c.) refers to this species; the error may have been caused by confusion with *Loudetia simplex* (Nees) C.E. Hubb. which also occurs in the study area.

Bromus L.

Bromus leptoclados Nees

FTEA, Gramin. 1: 68 (1970); FWTA 3,2: 369 (1972); WICKENS 1976: 169; FSo 4: 157 (1995); FE 7: 54 (1995); HYF: 349 (1997).

Syn.: *Bromus runssorensis* K. Schum.: FPS 3: 414 (1956) {Imatong Mountains, Kipia}.

Imatong Mountains group, Sudan side: Bushbuck Hill, 2150 m., edge of *Hagenia* woodland in *Loudetia arundinacea* grassland, much *Agauria* and *Nuxia*, 10.11.1980, *Friis & Vollesen* 135 (C, K, KHF); Kipia, 2440 m., scrub, 29.12.1935, *Thomas* 1808 (BM, K).

Imatong Mountains group, Uganda side: Aringa valley, 2260 m., rare, 6.1942, *Eggeling* 5055 B (MHU).

General habitat range: in montane grassland, bushland and forest clearings, often sheltered between rocks.

General distribution: Cameroon, from Ethiopia

to North Somalia, and through the highlands of eastern Africa south to South Africa (Cape Prov.); also in tropical Arabia.

Cenchrus L.

Cenchrus ciliaris L.

FTA 9: 1072 (1934); FPS 3: 414 (1956); FWTA 3,2: 464 (1972); WICKENS 1976: 170; FTEA, Gramin. 3: 691 (1982); FSo 4: 246 (1995); FE 7: 276 (1995); HYF: 386 (1997).

Imatong Mountains group, Sudan side: Torit district, Logire [4° 01' N, 33° 01' E], 900 m., woodland on rocky hillside, 6.6.1949, *Jackson* 802 (K); Kinyeti Valley, hill 2 km. south of Hiliu, 700 m., 28.11.1983, *Kielland-Lund* 86 (C, NLH); Hiliu, 700 m., at *Eucalyptus* plantation, 30.11.1983, *Kielland-Lund* 108 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, no alt., dry sites, 6.1942, *Eggeling* 5126 (MHU); Agoro, 1380 m., thicket, 12.11.1945, *Thomas* 4356 (K).

Didinga Mountains: south of Kapoeta, no alt., 27.8.1951, *Babiker Beshir* 21 (WM); south of Kapoeta on Nathilani road, no alt., 27.8.1953, *Peers* KM16 (K, WM).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland in dry areas, usually in sandy soil.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa (Cape Prov.); also in the Middle East, tropical Arabia and eastwards to India, introduced to Australia and America.

Cenchrus setigerus Vahl

FTA 9: 1077 (1934); FPS 3: 415 (1956); FTEA, Gramin. 3: 694 (1982); FSo 4: 246 (1995); FE 7: 278 (1995); HYF: 387 (1997).

Didinga Mountains: near Mt. Lotuke, on the Karamoja-Sudan border, 1220 m., alluvial soil near river, 4.1960, *Wilson* s.n. (EA, K).

General habitat range: in lowland subdesert grassland and deciduous bushland.

General distribution: Sudan to Ethiopia and Somalia, south to Kenya and Tanzania; also in tropical Arabia and North West India; introduced to several other tropical countries.

Chloachne Stapf See **Poecilostachys** Hack.

Chloris Sw.

Chloris gayana Kunth

FS: 479 (1929); FPS 3: 418 (1956); FWTA 3,2: 400 (1972); WICKENS 1976: 170; FTEA, Gramin. 2: 346 (1974); FSo 4: 206 (1995); FE 7: 169 (1995).

Imatong Mountains group, Sudan side: without further locality, 1380 m., 2.1936, *Johnston* 1405 (EA, K); Palotaka, 1200 m., woodland, 1979, *Shigeta* 17 (EA, identified and listed by M.G. Gilbert, not traced); Farajok [3° 52' N, 32° 38' E], 800 m., woodland, 1.10.1948, *Jackson* 363 (K); just south of Torit (4° 24' N, 32° 35' E), 650 m., 13.12.1983, *Kielland-Lund* 321 (C, NLH); Talanga forest, 900 m., *Combretum* woodland, 28.5.1949, *Jackson* 808 (K); Kinyeti Valley, Hiliu, near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund* 122 (C, NLH); Hiliu, in compound, 700 m., 31.11.1983, *Kielland-Lund* 143 (C, NLH); 5 km. south of Hiliu along Katire road (4° 13' N, 32° 40' E), no alt., in savanna, 30.5.1984, *Kielland-Lund* 798 (C, NLH); Katire, 1000 m., edge of cultivation, no date, *Jackson* 475 (K).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, *Eggeling* 5111 (MHU).

Didinga Mountains: 10 km. west of Kidepo River, no alt., weed in durra field, 27.8.1940, *Myers* 13,453 (K); south of Kapoeta on road to Torit, no alt., 29.8.1953, *Peers* T02 (WM).

General habitat range: in lowland, medium-altitude and montane woodland, deciduous bushland and grassland.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; widely grown as a fodder grass and introduced to other parts of the tropics and subtropics where it has sometimes become naturalised.

Chloris lamproparia Stapf

FPS 3: 416 (1956); FWTA 3,2: 416 (1972); WICKENS 1976: 170; FTEA, Gramin. 2: 340 (1974); FE 7: 168 (1995).

Didinga Mountains: 21 km. south west of Kapoeta on road to Torit, no alt., 29.8.1953, *Peers* T05 (K, WM).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland, often in sandy or rocky soil.

General distribution: Nigeria and Chad to Sudan and Ethiopia, south to Uganda and Tanzania.

Chloris pilosa Schumach.

FPS 3: 418 (1956); FWTA 3,2: 400 (1972); FTEA, Gramin. 2: 345 (1974); WICKENS 1976: 170; FE 7: 169 (1995).

Syn.: *Chloris breviseta* Benth.: FS: 480 (1929).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, 700 m., in compound, 29.11.1983, *Kielland-Lund* 96 (C, NLH).

General habitat range: in lowland and medium-altitude bushland, often in disturbed places, along roadsides, and in old cultivations.

General distribution: Mauritania and Senegal to West Ethiopia, south to Tanzania and Malawi.

Chloris pycnothrix Trin.

FS: 479 (1929); FPS 3: 418 (1956); FG 5: 269 (1962); FWTA 3,2: 400 (1972); WICKENS 1976: 170; FTEA, Gramin. 2: 340 (1974); FSo 4: 202 (1995); FE 7: 169 (1995); HYF: 368 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, 700 m., waste ground near buildings, 21.11.1983, *Kielland-Lund* 2 (C, NLH).

Didinga Mountains: Nagichot, 1830 m., 18.8.1951, *Babiker Beshir* 1 (WM).

General habitat range: in lowland, medium-alti-

tude and montane woodland, deciduous bushland and grassland, often along roadsides and in disturbed places.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in tropical Arabia and in America.

***Chloris robusta* Stapf**

FPS 3: 416 (1956); FWTA 3,2: 400 (1972).

Imatong Mountains group, Sudan side: Luluba Hills, Khor Leifero, no alt., wet sand banks in stream, 25.9.1938, *Myers* 9471 (K).

General habitat range: in woodland and wooded grassland, almost always in sandy river beds.

General distribution: Sierra Leone to Sudan and North Uganda.

***Chloris roxburghiana* Schult.**

FTEA, Gramin. 2: 339 (1974); FSo 4: 202 (1995); FE 7: 168 (1995); HYF: 368 (1997).

Syn.: *Chloris myriostachya* Hochst.

Didinga Mountains: Torit-Kapoeta road, Kidepo rest house, 760 m., 29.4.1939, *Myers* 11,236 (K); 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K023 (K, WM); Chukudum Regional District Centre (4° 24' N, 33° 29' E), no alt., 13.6.1984, *Kielland-Lund* 953 (NLH).

General habitat range: in lowland and medium-altitude woodland, deciduous bushland and disturbed habitats, often in dry, sandy soil.

General distribution: Congo [previously Zaire] to Ethiopia, Somalia, Uganda and Kenya, south to South Africa (Transvaal); also in tropical Arabia and India.

***Chloris virgata* Sw.**

FS: 479 (1929); FPS 3: 418 (1956); FWTA 3,2: 400 (1972); WICKENS 1976: 170; FTEA, Gramin. 2: 343 (1974); FSo 4: 204 (1995); FE 7: 168 (1995); HYF: 368 (1997).

Imatong Mountains group, Uganda side: Agoro, 1380 m., stony hillside, 13.11.1945, *Thomas* 4365 (EA, K).

Didinga Mountains: 5 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K04 (K, WM).

General habitat range: in lowland and medium-altitude woodland, deciduous bushland and grassland, also as a weed in cultivations.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; widely distributed elsewhere in the tropics.

Chrysopogon Trin.

***Chrysopogon plumulosus* Hochst.**

FTEA, Gramin. 3: 737 (1982); FE 7: 303 (1995); FS 4: 253 (1995).

Syn.: *Chrysopogon aucheri* (Boiss.) Stapf var. *quinqueplumis* (A. Rich.) Stapf: FTA 9: 160 (1917); FS: 447 (1929); FPS 3: 420 (1956).

Didinga Mountains: 39 miles east of Kapoeta, no alt., 2.11.1941, *Myers* 13990 (K); Topotha, no alt., 24.8.1951, *Beshir Eff.* 14 (K); 28 miles north east of Kapoeta, no alt., 31.8.1953, *Peers* L02 (K).

General habitat range: in lowland grassland on black clay soils in semi-desert grassland or open *Acacia* bushland.

General distribution: Niger to Egypt, Sudan, Ethiopia, Uganda and Kenya; also in Yemen.

Crinipes Hochst.

***Crinipes longifolius* C.E. Hubb.**

FPS 3: 421 (1956) {Dongotona Mountains}; FTEA, Gramin. 1: 130 (1970); FE 7: 68 (1995).

Imatong Mountains group, Uganda side: Lomwaga, 2570 m., below boulders or hanging on cliffs in big tufts, 6.1942, *Eggeling* 5039 (EA, MHU).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2440 m., montane grassland, 28.10.1941, *Myers* 14,190 (K); Dongotona Mountains, Mt. Emogadung,

2623 m., montane grassland, 21.1.1950, *Jackson* 1081 (K); Nangeya Mountains, Mt. Lonyili, 2290 m., in rock crevices on side of summit, 26.8.1966, *Lock* K 20 (EA, MHU).

General habitat range: in lowland, medium-altitude and montane grassland, most often growing among shading rocks and in moist places on rocky slopes or cliffs.

General distribution: South Sudan, Central Ethiopia and Uganda; closely related to *C. abyssinica* (Hochst.) Hochst., a species restricted to Northern and Central Ethiopia.

Cymbopogon Spreng.

Cymbopogon caesius (Hook. & Arn.) Stapf
FTA 9: 287 (1919); FPS 3: 423 (1956); WICKENS 1976: 171; FTEA, Gramin. 3: 761 (1982); FSo 4: 262 (1995); FE 7: 328 (1995); HYF: 391 (1997).
Syn.: *Cymbopogon excavatus* (Hochst.) Stapf: FTA 9: 285 (1919); FS: 450 (1929); FPS 3: 423 (1956); WICKENS 1976: 171.

Imatong Mountains group, Uganda side: Lomwaga, 2570 m., common coarse grass, 6.1942, *Eggeling* 5048 (?EA, not traced); north of Madi Opei, 1100 m., *Acacia* woodland, 16.8.1972, *D. Field* 2098 (EA).

General habitat range: in lowland, medium-altitude and montane deciduous bushland, woodland and grassland, often on stony hillsides or on heavy clay.

General distribution: Sudan, Ethiopia and Somalia to South Africa (Cape Prov.); also in tropical Arabia, India and Sri Lanka.

Cymbopogon giganteus Chiov.

FTA 9: 288 (1919); FS: 450 (1929); FPS 3: 425 (1956); FWTA 3,2: 482 (1972); WICKENS 1976: 171; FTEA, Gramin. 3: 763 (1982); FSo 4: 262 (1995); FE 7: 329 (1995).

Imatong Mountains group, Sudan side: Talanga, 950 m., wooded grassland with *Combretum molle*, *C. collinum*, *Stereospermum kunthianum* and *Aca-*

cia hockii, tall grass cover of *Cymbopogon giganteus* and *Hyparrhenia* spp., 4.12.1980, *Friis & Vollesen* 674 (BR, C, K, KHF); Talanga, 890 m., in *Combretum* woodland with long grass, 16.12.1935, *Thomas* 1594 (BM, K); Kinyeti Valley, Hiliu, near the main road, 700 m., in *Eucalyptus* plantation, 30.11.1983, *Kielland-Lund* 107 (C, NLH); Hiliu, between river east of compound and hills, 700 m., 31.11.1983, *Kielland-Lund* 140 (C, NLH); Katire, 1000 m., old cultivations, 8.2.1950, *Jackson* 1139 (K).

Imatong Mountains group, Uganda side: Agoro, 1220 m., valley grassland, 12.11.1945, *Thomas* 4352 (EA, K); 5 km. south east of Lomwaga, no alt., tall-grass grassland, 18.7.1974, *Katende* 2168 (EA, MHU) & 2173 (EA, MHU).

Lafit, Dongotona and Nangeya Mountains: Lafon Regional Distric Centre, no alt., 29.12.1983, *Kielland-Lund* 524 (C, NLH).

Didinga Mountains: south west of Kapoeta on road to Karakamuge, no alt., 28.8.1953, *Peers* KAM28 (K, WM).

General habitat range: in lowland, medium-altitude and montane deciduous bushland and woodland, and in tall-grass grassland, sometimes in disturbed sites.

General distribution: Senegal and Mauritania to Ethiopia and Somalia, south to South Africa (Transvaal).

Cymbopogon nardus (L.) Rendle

FTEA, Gramin. 3: 764 (1982).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2600 m., montane grassland, 21.1.1950, *Jackson* 1088 (K).

General habitat range: in medium-altitude and montane grassland and bushland.

General distribution: Sudan to Uganda and Kenya, south to South Africa; also in India, Sri Lanka and Burma.

Cynodon Rich.**Cynodon dactylon** (L.) Pers.

FS: 477 (1929); FPS 3: 425 (1956); FWTA 3,2: 403 (1972); FTEA, Gramin. 2: 318 (1974); WICKENS 1976: 171; FSo 4: 211 (1995); FE 7: 175 (1995); HYF: 367 (1997).

Imatong Mountains group, Sudan side: without further locality, 1530 m., along path, 2.1936, Johnston 1401 (EA, K); Laboni forest, at rest house, no alt., 16.10.1938, Myers 9775 (K, WM).

General habitat range: in disturbed and heavily grazed lowland and medium-altitude habitats, especially short grassland, often in overgrazed and trodden places and along roadsides.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; in tropical and warm temperate regions throughout the world.

Cynodon nlemfuensis Vanderyst

FWTA 3,2: 403 (1972); FTEA, Gramin. 2: 319 (1974); FSo 4: 211 (1995); FE 7: 175 (1995).

var. **robustus** Clayton & Harlan

FTEA, Gramin. 2: 321 (1974); FSo 4: 212 (1995); FE 7: 176 (1995).

Didinga Mountains: south of Kapoeta on road to Nathilani, no alt., 27.8.1953, Peers KM23 (K, WM).

General habitat range: in lowland, medium-altitude and montane bushland and grassland and in old cultivations, often in seasonally flooded places and disturbed places.

General distribution: South Sudan, Ethiopia and Somalia through eastern Africa to Zimbabwe. Introduced to West Africa. Species as a whole within the same general area.

Cyrtococcum Stapf**Cyrtococcum chaetophorum** (Roem. & Schult.)

Dandy

FPS 3: 427 (1956) {Azza Forest}; FG 5: 76

(1962); FWTA 3,2: 426 (1972); FTEA, Gramin. 3: 500 (1982).

Syn.: *Cyrtococcum setigerum* Stapf: FTA 9: 746 (1920).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, in small swamp along brook, 1.12.1980, Friis & Vollesen 610 (BR, C, EA, K, KHF).

General habitat range: in lowland forest.

General distribution: Senegal to South Sudan and Uganda, south to Angola and Tanzania.

Dactyloctenium Willd.**Dactyloctenium aegyptium** (L.) Willd.

FS: 482 (1929); FPS 3: 427 (1956); FWTA 3,2: 395 (1972); FTEA, Gramin. 2: 252 (1974); WICKENS 1976: 171; FSo 4: 189 (1995); FE 7: 135 (1995); HYF: 363 (1997).

Imatong Mountains group, Sudan side: west of Acholi Mountains, Magwe Police Post (4° 08' N, 32° 17' E), no alt., 6.6.1984, Kielland-Lund 870 (C, NLH); Kinyeti Valley, Hiliu, near compound, 700 m., at track through agricultural land, 3.12.1983, Kielland-Lund 193 (C, NLH).

Didinga Mountains: 8 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, Peers K010 (K).

General habitat range: in lowland and medium-altitude woodland and wooded grassland, often in disturbed places.

General distribution: Mauritania to Egypt, Sudan and Somalia, south to South Africa; throughout tropical Asia, including tropical Arabia, and widespread in tropical America.

Digitaria Haller**Digitaria abyssinica** (A. Rich.) Stapf

FTA 9: 460 (1919); FS: 454 (1929); FWTA 3,2:

452 (1972); WICKENS 1976: 172; FTEA, Gramin. 3: 641 (1982); FSo 4: 241 (1995); FE 7: 252 (1995); HYF: 382 (1997).

Syn.: *Digitaria vestita* Fig. & De Not.: FPS 3: 435 (1956). *Digitaria scalarum* (Schweinf.) Chiov.

Imatong Mountains group, Sudan side: Itibol, 1550 m., along path in scrub, 17.12.1935, Thomas 1615 (BM, K); Atiaro, between Itibol and Ibahin, 1950 m., edge of forest, 18.12.1935, Thomas 1654 (BM, K).

General habitat range: in lowland, medium-altitude and montane grassland, often in disturbed places in forest and bushland or as a weed in cultivations, may form a dense sward when grazed.

General distribution: Nigeria and Cameroon to Ethiopia and Somalia, south to South Africa; also in tropical Arabia, Madagascar and Sri Lanka.

***Digitaria ciliaris* (Retz.) Koel.**

FWTA 3,2: 453 (1972); WICKENS 1976: 172; FTEA, Gramin. 3: 653 (1982); FSo 4: 242 (1995); FE 7: 256 (1995); HYF: 382 (1997).

Syn.: *Digitaria marginata* Link: FTA 9: 439 (1919); FS: 453 (1929). *Digitaria adscendens* (Kunth) Henrad: FPS 3: 438 (1956). *Digitaria adscendens* (Kunth) Henrad subsp. *nubica* (Stapf) Henrad: FPS 3: 439 (1956). *Digitaria adscendens* (Kunth) Henrad subsp. *chrysolephara* (Fig. & De Not.) Henrad: FPS 3: 439 (1956).

Didinga Mountains: Khor Iwochi [4° 35' N, 33° 18' E], no alt., 19.9.1953, Peers M016 (K).

General habitat range: in lowland and medium-altitude woodland, wooded grassland and deciduous bushland, nearly always in disturbed places.

General distribution: Mauritania to Sudan, Ethiopia and Somalia, south to South Africa; throughout the tropics.

***Digitaria diagonalis* (Nees) Stapf**

FWTA 3,2: 450 (1972); WICKENS 1976: 172;

FTEA, Gramin. 3: 624 (1982); FE 7: 247 (1995); HYF: 382 (1997).

var. **hirsuta** (De Wild. & T. Durand) Troupin
FWTA 3,2: 450 (1972); WICKENS 1976: 172; FTEA, Gramin. 3: 626 (1982); FE 7: 247 (1995).

Imatong Mountains group, Sudan side: without further locality, 1520-1830 m., 12.6.1939, Andrews 1832 (K); Kinyeti Valley, 20 km. north of Katire, common in woodland with *Setaria sphacelata* and *Panicum maximum*, 10.6.1961, Jackson 4214 (K); Bushbuck Hill, 2300 m., *Hagenia abyssinica* woodland with some *Nuxia congesta*, 25.3.1982, Friis & Vollesen 1314 (BR, C, EA, FT, K, KHF); near Dumuso, 2400 m., mountain grassland, 1.6.1950, Jackson 1552 (K); Dumuso, 2500 m., grassland, 16.11.1949, Jackson 990 (K).

Imatong Mountains group, Uganda side: Lomwaga, 2500 m., 6.1942, Eggeling 5045 (EA, K); east of Lomwaga, above Aringa valley, 2290 m., ridge top, 6.1942, Eggeling 5053 (MHU); Lututuru, no alt., 5.6.1963, Kertland s.n. (MHU); Lututuru, 2400 m., below summit, 6.1963, Morrison s.n. (MHU); 4 km. south east of Lomwaga, 1900 m., tall-grass grassland with scattered trees, 18.7.1974, Katende 2172 (EA, MHU).

General habitat range: in lowland, medium-altitude and montane grassland, both in dark, swampy soil, in sand and on steep, rocky slopes.

General distribution: Senegal to Sudan and Eritrea, south to Angola, Zambia and Zimbabwe.

var. **uniglumis** (A. Rich.) Pilger

FTEA, Gramin. 3: 626 (1982); FE 7: 247 (1995).

Syn.: *Digitaria uniglumis* (A. Rich.) Stapf: FTA 9: 474 (1919); CHIPP 1929: 194; FPS 3: 433 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, 18 km. north of Katire, 750 m., woodland with *Combretum collinum*, *C. molle*, *Annona senegalensis*, etc., 18.3.1982, Friis & Vollesen 1249 (BR, C, K, KHF); Lomuleng to Logoforok,

1600 m., stony hillside, 2.6.1950, *Jackson* 1528 (K, KHF); near Lomuleng, 2350 m., mountain grassland, 25.7.1939, *Myers* 11,571 (K); Kipia, 2440 m., grassland, 29.12.1935, *Thomas* 1826 (K); east of Kipia, 2740 m., a common constituent in mountain meadow, 12.2.1929, *Chipp* 97 (K, WM).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2140 m., scattered tree grassland, 29.3.1970, *C.R. Field* 3 (EA).

General habitat range: in lowland, medium-altitude and montane grassland in the same range of soil types as var. *hirsuta*.

General distribution: South Sudan and Congo [previously Zaire] to Ethiopia, south to Zimbabwe. Species as a whole also in South Africa and in tropical Arabia.

Digitaria gayana (Kunth) A. Chev.

FTA 9: 449 (1919); FS: 453 (1929); FPS 3: 435 (1956); FWTA 3,2: 453 (1972); WICKENS 1976: 172; FTEA, Gramin. 3: 627 (1982); FE 7: 248 (1995).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, west of bridge on Kinyeti River, 700 m., 12.12.1983, *Kielland-Lund* 308 (C, NLH).

General habitat range: in lowland and medium-altitude bushland and woodland, often in disturbed places and in old cultivations.

General distribution: Mauritania and Senegal to Sudan, south to Angola and Zimbabwe.

Digitaria nuda Schumach.

FTA 9: 479 (1919); FTEA, Gramin. 3: 654 (1982); FE 7: 256 (1995).

Syn.: [*Digitaria horizontalis* auct., non Willd.: FS: 453 (1929); FPS 3: 463; JACKSON 1956: 360].

Imatong Mountains group, Sudan side: Molongori rest house, 800 m., on rocks, 13.11.1948, *Jackson* 530 (K).

General habitat range: in lowland and medium-altitude open ground, most frequently in disturbed sites.

General distribution: Ghana to Sudan, West Ethiopia, Uganda, Kenya and Tanzania, south to South Africa; also in Mauritius, Brazil, and a few other scattered localities.

Digitaria ternata (A. Rich.) Stapf

FTA 9: 452 (1919); FS: 453 (1929); FPS 3: 434 (1956); FWTA 3,2: 452 (1972); WICKENS 1976: 173; FTEA, Gramin. 3: 630 (1982); FSo 4: 240 (1995); FE 7: 248 (1995); HYF: 383 (1997).

Imatong Mountains group, Uganda side: north of Madi Opei, 1100 m., *Acacia* woodland, 16.8.1972, *D. Field* 2099 (EA).

Didinga Mountains: Nagichot, 1830 m., 19.8.1951, *Babiker Beshir* 4 (K, WM).

General habitat range: in lowland, medium-altitude and montane habitats, often in disturbed places or as a weed in cultivations.

General distribution: Guinée to Ethiopia and Somalia, south to South Africa (Cape Prov.); also in tropical Arabia and widespread in tropical Asia to Thailand and South West China.

Digitaria velutina (Forssk.) P. Beauv.

FPS 3: 435 (1956); WICKENS 1976: 173; FTEA, Gramin. 3: 652 (1982); FSo 4: 242 (1995); FE 7: 254 (1995); HYF: 383 (1997).

Imatong Mountains group, Sudan side: Kinyeti Valley, 75 m. east of stream east of Hiliu Farm (4° 16' N, 32° 48' E), no alt., in savanna, 24.5.1984, *Kielland-Lund* 703 (C, NLH); Katire, Assistant Conservator's garden, 950 m., weed, 9.6.1961, *Jackson* 4207 (K); Gilo, 1800 m., on paths and in other disturbed places, 10.5.1954, *Jackson* 3133 (K, KHF); between Gilo and Itibol, 1900 m., secondary growth in upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 26.2.1982, *Friis & Vollesen* 1030 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: at streambed above Agoro, no alt., 6.1942, *Eggeling* 5104 (MHU).

Didinga Mountains: Iwowa, 1620 m., in deep khor, 22.4.1939, *Myers* 11,035 (K); 18 km. south

of Kapoeta on road to Nathilani (33° 35' E, 4° 39' N), no alt., 27.8.1953, *Peers* KO34 (K, WM).

General habitat range: in lowland and medium-altitude habitats, frequently in disturbed places and as weed in cultivations.

General distribution: Egypt south to South Africa (Cape Prov.); also in tropical Arabia.

Echinochloa P. Beauv.

Echinochloa haploclada (Stapf) Stapf

FTA 9: 613 (1920); FTEA, Gramin. 3: 560 (1982); FSo 4: 224 (1995); FE 7: 212 (1995).

Imatong Mountains group, Sudan side: near Torit, 620 m., swampy places in *Acacia-Combretum* woodland, 24.6.1949, *Jackson* 822 (K); south east of Torit, 2 km from junction along Imatong road and 500 m. east of road east of Ngarama (4° 21' N, 32° 39' E), no alt., 26.5.1984, *Kielland-Lund* 759 (C, NLH); Kinyeti Valley, Hiliu, east of compound and stream, 700 m., 5.12.1983, *Kielland-Lund* 213 (C, NLH).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., on sand in khor, 27.8.1953, *Peers* K021 (K, WM); 13 km. north of Kapoeta on road to Karakamuge, no alt., 28.8.1953, *Peers* KM25 (K, WM); Chukudum Regional District Centre (4° 24' N, 33° 29' E), no alt., 13.6.1984, *Kielland-Lund* 952 (C, NLH).

General habitat range: in lowland and medium-altitude deciduous bushland, wet grassland, river beds, muddy stream banks, etc.

General distribution: Sudan, Ethiopia and Somalia to Zimbabwe.

Ehrharta Thunb.

Ehrharta erecta Lam.

FTEA, Gramin. 1: 38 (1970); FSo 4: 151 (1995); FE 7: 12 (1995); HYF: 346 (1997).

var. **abyssinica** (Hochst.) Pilg.

FTEA, Gramin. 1: 38 (1970); FSo 4: 151 (1995); FE 7: 12 (1995); HYF: 346 (1997).

Syn.: *Ehrharta abyssinica* Hochst.: FPNA 3: 204 (1955); FPS 3: 445 (1956) {Imatong Mountains}.

Imatong Mountains group, Sudan side: without further locality, 2740 m., in *Podocarpus latifolius* forest, 26.2.1976, *Howard* IM 67 (KHF); Mt. Kinyeti, 2500 m., upland rain forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochsteteri*, *Syzygium guineense* subsp. *afromontanum* and *Dombeya torrida*, 12.12.1980, *Friis & Vollesen* 856 (BR, C, K, KHF); Mt. Kinyeti, 2740 m., ravine forest, 30.12.1935, *Thomas* 1863 (K); Mt. Kinyeti, 2740 m., 1.6.1950, *Jackson* 1549 (K); Mt. Kinyeti, 2740 m., 18.8.1951, *Babiker Beshir* 27 (K, WM).

Imatong Mountains group, Uganda side: Lomwaga, 2530 m., in *Podocarpus latifolius* forest, 6.1942, *Eggeling* 5050 (MHU).

General habitat range: in medium-altitude and montane forest and evergreen bushland, especially in open places and clearings.

General distribution: South Sudan, Ethiopia and North Somalia through eastern Africa to Zimbabwe; also in tropical Arabia and in South India. Species as a whole to South Africa (Cape Prov.)

Eleusine Gaertn.

Eleusine coracana (L.) Gaertn.

FG 5: 232 (1962); FWTA 3,2: 397 (1972); FTEA, Gramin. 2: 260 (1974); FE 7: 139 (1995).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., cultivated, 1.2.1979, *Shigeta* 170 (EA).

General habitat range: Cultivations at low and medium-altitudes, often on sandy soil, sometimes persisting as a weed.

General distribution: This is the crop "Finger Millet"; cultivated in tropical Africa from Nigeria to Ethiopia and south to South Africa (Na-

tal); used for food and for making beer, and often escaped from cultivation.

Eleusine indica (L.) Gaertn.

FS: 481 (1929); FPS 3: 445 (1956); FG 5: 231 (1962); FWTA 3,2: 395 (1972); FTEA, Gramin. 2: 262 (1974); WICKENS 1976: 173; FSo 4: 202 (1995); FE 7: 141 (1995); HYF: 364 (1997).

subsp. **indica**

FTEA, Gramin. 2: 263 (1974).

Imatong Mountains group, Sudan side: west of Acholi Mountains, Magwe Police Post (4° 08' N, 32° 17' E), no alt., 6.6.1984, *Kielland-Lund* 871 (C, NLH); Lotti, 1000 m., along track in forest, 20.5.1950, *Jackson* 1495 (K, WM); Palotaka, 1200 m., woodland, 1979, *Shigeta* 174 (EA, identified and listed by M.G. Gilbert, not traced); Talanga, 900 m., along road in *Combretum* woodland, 28.5.1949, *Jackson* 805 (K) & 806 (K); near the Kinyeti River c. 5 km. south of Hiliu, 700 m., 6.12.1983, *Kielland-Lund* 229 (C, NLH); Katire, 1000 m., edge of road, no date, *Jackson* 468 (K); Gilo, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, at forest edges and in clearings, 19.2.1982, *Friis & Vollesen* 966 (C, K, KHF).

General habitat range: in disturbed places in lowland, medium-altitude and montane habitats.

General distribution: Widespread in Africa; also in India and throughout tropical Asia to North Australia.

subsp. **africana** (Kenn.-O'Byrne) S.M. Phillips
WICKENS 1976: 173; FSo 4: 188 (1995); HYF: 364 (1997).

Syn.: *Eleusine africana* Kenn.-O'Byrne: FE 7: 139 (1995).

Imatong Mountains group, Sudan side: Gilo, 1900 m., along path, 10.5.1954, *Jackson* 3178 (K, KHF).

Didinga Mountains: 34 km. south of Kapoeta on road to Nathilani (33° 35' E, 4° 35' N), no alt., 27.8.1953, *Peers* KM22 (K, WM).

General habitat range: in disturbed and over-

grazed lowland, medium-altitude and montane habitats, usually as a weed in cultivations.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in tropical Arabia. Species as a whole distributed as the combined range of subsp. *indica* and subsp. *africana*.

Elionurus Humb. & Bonpl. ex Willd.

Elionurus muticus (Spreng.) O. Kuntze

FTEA, Gramin. 3: 837 (1982); FSo 4: 267 (1995); FE 7: 358 (1995); HYF: 395 (1997).

Syn.: *Elionurus argenteus* Nees: FTA 9: 70 (1917); FWTA 3,2: 505 (1958).

Imatong Mountains group, Uganda side: Mt. Lomwaga, 2590 m., *Hyparrhenia-Exothea* grassland, 5.4.1945, *Greenway & Hummel* 7278 (EA, K).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1530 m., grassland, 2.1960, *Wilson* 834 (EA); Nangeya Mountains, Mt. Lonyili, 2140 m., scattered tree grassland, 29.3.1970, *C.R. Field* 2 (EA).

General habitat range: in medium-altitude and montane deciduous bushland and grassland on dry, stony soils.

General distribution: Guinée to Ethiopia and North Somalia, south to South Africa (Cape Prov.); also in tropical Arabia and tropical and subtropical America.

Enteropogon Nees

Enteropogon macrostachyus (Hochst.) Benth.

FS: 479 (1929); FPS 3: 448 (1956); FWTA 3,2: 402 (1972); FTEA, Gramin. 2: 332 (1974); WICKENS 1976: 173; FSo 4: 207 (1995); FE 7: 172 (1995); HYF: 367 (1997).

Imatong Mountains group, Uganda side: Agoro, no alt., dry sites, 6.1942, *Eggeling* 5121 (MHU).

Didinga Mountains: Kapoeta, along seasonal stream, no alt., 28.8.1951, *Babiker Beshir* 18 (K);

18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* KO24 (K, WM).

General habitat range: in a range of lowland and medium-altitude habitats, especially in deciduous bushland.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in tropical Arabia.

Eragrostis P. Beauv.

Eragrostis arenicola C.E. Hubb.

FPS 3: 452 (1956) {Imatong Mountains, Katire}; FWTA 3,2: 386 (1972); FTEA, Gramin. 2.: 207 (1974); WICKENS 1976: 174.

Imatong Mountains group, Sudan side: near Katire, 1100 m., in old cultivation, 8.2.1950, *Jackson* 1138 (K); Katire to Itibol, near Katire, 1100 m., along path, 17.12.1935, *Thomas* 1607 (BM, K).

General habitat range: in lowland and medium-altitude sandy habitats, often disturbed.

General distribution: Nigeria and Cameroon to Sudan, south to Angola and South Africa (Transvaal).

Eragrostis aspera (Jacq.) Nees

FS: 478 (1929); FPS 3: 452 (1952); FWTA 3,2: 387 (1972); FTEA, Gramin. 2.: 209 (1974); WICKENS 1976: 174; FSo 4: 180 (1995); FE 7: 114 (1995); HYF: 359 (1997).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, *Kielland-Lund* 552 (C, NLH); Palotaka, 1200 m., woodland, 1979, *Shigeta* 65 (EA, identified and listed by M.G. Gilbert, not traced); Kinyeti Valley, Hiliu, south east of compound, 700 m., cultivations, 2.12.1983, *Kielland-Lund* 148 (C, NLH); Katire, 1000 m., roadside in *Combretum* woodland, 24.10.1949, *Jackson* 841 (K); Kilubi, no alt., weed in cultivation, 21.12.1935, *Thomas* 1732 (K).

Imatong Mountains group, Uganda side: Agoro,

1380 m., path, 12.11.1945, *Thomas* 4353 (EA, K).

Didinga Mountains: south west of Kapoeta on road to Torit, no alt., 29.8.1953, *Peers* T013 (WM).

General habitat range: in lowland and medium-altitude habitats, usually in disturbed places, in sandy, gravelly and rocky soil.

General distribution: Mali and Gambia to Ethiopia and Somalia, south to South Africa; also in tropical Arabia and India.

Eragrostis cilianensis (All.) Lut.

FPS 3: 456 (1956); FWTA 3,2: 390 (1972); FTEA, Gramin. 2: 232 (1974); WICKENS 1976: 174; FSo 4: 182 (1995); HYF: 361 (1997).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, *Kielland-Lund* 546 (C, NLH) & 560 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, no alt., dry plain, 6.1942, *Eggeling* 5128 (EA, MHU).

Didinga Mountains: 34 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* KM13 (K).

General habitat range: in lowland and medium-altitude woodland, wooded grassland and deciduous bushland.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; generally widespread in tropical and warm temperate regions.

Eragrostis ciliaris (L.) R. Br.

FS: 477 (1929); FPS 3: 450 (1956); FWTA 3,2: 386 (1972); FTEA, Gramin. 2.: 204 (1974); WICKENS 1976: 174; FSo 4: 179 (1995); FE 7: 113 (1995); HYF: 361 (1997).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., woodland, 5.1.1979, *Shigeta* 7 (EA); Kinyeti Valley, Hiliu, in compound, 700 m., 29.11.1983, *Kielland-Lund* 99 (C, NLH).

Didinga Mountains: 35 km. south west of Kapoeta

eta on road to Torit, no alt., 29.8.1953, *Peers* T09 (K, WM).

General habitat range: in lowland and medium-altitude habitats, especially in open and disturbed places.

General distribution: Cape Verde Islands to Ethiopia and Somalia, south to South Africa; also in tropical Arabia, India and in tropical America.

***Eragrostis cylindriflora* Hochst.**

FWTA 3,2: 391 (1972); FTEA, Gramin. 2: 239 (1974); WICKENS 1976: 174; FE 7: 125 (1995).

Syn.: *Eragrostis cylindriflora* Hochst. var. *gymnorhachis* Schweinf.

Imatong Mountains group, Uganda side: Agoro, no alt., dry sites, 6.1942, *Eggeling* 5122 (MHU).

General habitat range: in lowland and medium-altitude woodland, wooded grassland and deciduous bushland, usually in trodden, weedy and overgrazed places, rocky slopes and sandy river beds.

General distribution: Niger to Ethiopia, south to South Africa.

***Eragrostis hispida* K. Schum.**

FPS 3: 452 (1956) {Imatong Mountains, Kipia}; FTEA, Gramin. 2.: 201 (1974); FE 7: 113 (1995).

Imatong Mountains group, Sudan side: Iribo, 1600 m., on granite outcrop, 15.10.1949, *Jackson* 860 (K); Kipia, 2440 m., on rocks, 29.12.1935, *Thomas* 1821 (K); Gilo to Mt. Konoro, 1900 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 18.11.1980, *Friis & Vollesen* 321 (BR, C, K, KHF).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2600 m., on rocky summit, no date, *Jackson* 1079 (K).

General habitat range: in damp medium-altitude and montane grassland with shallow soil, usually in seepage over rocky outcrop.

General distribution: Congo [previously Zaire]

to South Sudan, Ethiopia, Uganda and Kenya, south to Angola and Zimbabwe.

***Eragrostis macilenta* (A. Rich.) Steud.**

FPS 3: 454 (1956) {Imatong Mountains, Katire}; FWTA 3,2: 391 (1972); FTEA, Gramin. 2.: 235 (1974); FE 7: 118 (1995); HYF: 361 (1997).

Imatong Mountains group, Sudan side: Katire, on rocky hillside, no date, *Babiker Beshir* 32 (K); between Gilo and Itibol, 1900 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, along trail in forest, 26.2.1982, *Friis & Vollesen* 1033 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude and montane habitats, often in shaded, disturbed places in dry evergreen bushland.

General distribution: Ivory Coast to Ethiopia, south to Zambia; also in tropical Arabia and India.

***Eragrostis olivacea* K. Schum.**

FTEA, Gramin. 2.: 201 (1974).

Syn.: *Eragrostis blepharoglumis* K. Schum.

Imatong Mountains group, Sudan side: Dumuso, 2400 m., in *Hagenia* woodland with *Loudetia*, 23.4.1950, *Jackson* 1452 (KHF).

General habitat range: in medium-altitude and montane grassland and ericaceous bushland, often in rocky places and in moist montane grassland or woodland.

General distribution: Congo [previously Zaire] to South Sudan, South West Ethiopia and Kenya, south to Zambia and Tanzania. First record from the Sudan.

***Eragrostis racemosa* (Thunb.) Steud.**

FPS 3: 456 (1956); FTEA, Gramin. 2.: 230 (1974).

Syn.: *Eragrostis chalcantha* Trin.: FS: 476 (1929).

Imatong Mountains group, Sudan side: summit of Mt. Konoro, 2500 m., *Loudetia arundinacea* grassland on very shallow soil, 16.3.1982, *Friis & Vollesen* 1219 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: without

further locality, 2630 m., 6.1942, *Eggeling* 5284 (EA) & 5285 (EA); Lomwaga, no alt., in short tufts over granite outcrops, leaves hairy, 6.1942, *Eggeling* 5043 (EA); Langia, 2440 m., mountain grassland, 4.1943, *Purseglove* 1405 (EA, K); Langia, 2830 m., mountain grassland, 4.1943, *Purseglove* 1427 (EA, K).

Didinga Mountains: Mt. Lotuke, 1900 m., *Protea* grassland, 29.3.1950, *Jackson* 1322 (K).

General habitat range: in lowland, medium-altitude and montane habitats, often in disturbed places on sandy soil.

General distribution: Congo [previously Zaire] to Sudan, south to South Africa (Cape Prov.); also in Madagascar.

***Eragrostis schweinfurthii* Chiov.**

FTEA, Gramin. 2.: 231 (1974); FE 7: 117 (1995); HYF: 362 (1997).

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, *Friis & Vollesen* 38 (BR, C, EA, K, KHF); Bushbuck hill, 2300 m., *Hagenia abyssinica* woodland with much *Nuxia congesta*, 25.3.1982, *Friis & Vollesen* 1315 (C, K, KHF); along path from Bushbuck hill to Mt. Konoro, 2400 m., *Hagenia abyssinica* woodland, 23.2.1982, *Friis & Vollesen* 1010 (BR, C, K).

General habitat range: in medium-altitude and montane forest and grassland, often in rocky places.

General distribution: East Congo [previously Zaire] to Ethiopia, south to Tanzania; also in tropical Arabia and Sri Lanka. First record from the Sudan.

***Eragrostis superba* Peyr.**

FS: 477 (1929); FPS 3: 450 (1956); FTEA, Gramin. 2.: 211 (1974); FSo 4: 179 (1995); FE 7: 112 (1995).

Imatong Mountains group, Sudan side: between Lafon and Juba, no alt., 29.12.1983, *Kielland-Lund* 512 (C, NLH); near Molongori, 750 m.,

11.6.1939, *Andrews* 1812 (K); Torit, 620 m., grassland, 5.6.1949, *Jackson* 784 (K); Kinyeti Valley, at junction of roads to Ngarama and Katire north of Hiliu, 650 m., 6.12.1983, *Kielland-Lund* 233 (C, NLH).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K033 (K, WM).

General habitat range: in lowland and medium-altitude deciduous bushland or woodland, usually in sandy soil.

General distribution: Gabon to Sudan and South Somalia, south to Angola and South Africa (Transvaal).

***Eragrostis tenuifolia* (A. Rich.) Steud.**

FS: 476 (1929); FPNA 3: 164 (1955); FPS 3: 456 (1956); FWTA 3,2: 391 (1972); FTEA, Gramin. 2.: 238 (1974); FE 7: 122 (1995); HYF: 362 (1997).

Imatong Mountains group, Sudan side: Talanga, 900 m., roadside, 28.3.1949, *Jackson* 807 (K); Katire, Assistant Conservator's garden, 950 m., on path, 9.6.1961, *Jackson* 4206 (K); Katire, 1000 m., roadside, no date, *Jackson* 464 (K); Gilo, no alt., common along tracks, 10.5.1954, *Jackson* 3180 (K, KHF).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., 19.4.1939, *Myers* 10,936 (K); Nagichot Hill, 1830 m., 18.8.1951, *Babiker Beshir* 2 (K).

General habitat range: in lowland, intermediate and montane woodland and wooded grassland, usually in overgrazed or disturbed sites or along roadsides.

General distribution: Nigeria to Ethiopia, south to South Africa; also in Madagascar, tropical Asia, including tropical Arabia, and in America.

***Eragrostis tremula* Steud.**

FS: 476 (1929); FPS 3: 456 (1956); FG 5: 227 (1962); FWTA 3,2: 391 (1972); FTEA, Gramin. 2.: 236 (1974); WICKENS 1976: 175; FE 7: 118 (1995).

Imatong Mountains group, Sudan side: Torit, 620 m., old cultivations, 5.6.1949, *Jackson* 783 (K); Torit, 630 m., open woodland, 29.10.1949, *Jackson* 867 (K); 5 km. east of Torit, 630 m., thorn scrub, 12.6.1961, *Jackson* 4240 (K); Kinyeti Valley, Hiliu, in compound, 700 m., 29.11.1983, *Kielland-Lund* 98 (C, NLH); Hiliu, near compound, 700 m., at water pump in agricultural land, 3.12.1983, *Kielland-Lund* 195 (C, NLH); Itibol, 1940 m., in scrub, 17.12.1935, *Thomas* 1641 (BM, K).

General habitat range: in lowland and medium-altitude habitats, usually in disturbed places.

General distribution: Senegal to Ethiopia, south to South Africa; also in India.

Eriochloa Kunth

Eriochloa fatmensis (Hochst. & Steud.) W.D. Clayton

WICKENS 1976: 175; FTEA, Gramin. 3: 571 (1982); FSo 4: 231 (1995); FE 7: 218 (1995); HYF: 378 (1997).

Syn.: *Eriochloa nubica* (Steud.) Hack. & Stapf ex Thell.: FPS 3: 460 (1956); FWTA 3,2: 437 (1972). *Eriochloa acrothrica* (Steud.) Hack. ex Thell., nom. illeg., non (Hook. f.) Schinz: FTA 9: 499 (1919); FS: 455 (1929).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near compound, 700 m., 29.11.1983, *Kielland-Lund* 103 (C, NLH); Hiliu, near compound, 700 m., 5.12.1983, *Kielland-Lund* 210 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, *Eggeling* 5119 (EA).

Didinga Mountains: 3 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K01 (K, WM); south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K03 (WM).

General habitat range: in lowland and medium-altitude temporary damp grassland on black cotton soil, sometimes also on well-drained soils during rains.

General distribution: Mauritania and Senegal to Ethiopia and Somalia, south to South Africa; also in tropical Arabia and in India.

Exothea Anderss.

Exothea abyssinica (Hochst. ex A. Rich.) Anderss.

FTA 9: 384 (1919); CHIPP 1929: 195; FPS 3: 460 (1956) [Imatong Mountains]; FTEA, Gramin. 3: 821 (1982); FE 7: 353 (1995).

Imatong Mountains group, Sudan side: without further locality, between the 2440 m. contour and summit [of Mt. Kinyeti], dominant, 10.2.1936, *Johnston* 1494 (EA, K); without further locality, no alt., in *Hypericum* scrub, 26.2.1976, *Howard* IM 70 (KHF); Dumuso, 2500 m., grassland, 16.11.1949, *Jackson* 989 (K); above Lomuleng, 1830 m., 2.1936, *Johnston* 1452 (EA); Lomuleng, 2440 m., montane grassland, 31.12.1935, *Thomas* 1893 (K); above Lomuleng, 2500 m., meadow, 25.6.1939, *Myers* 11,580 (K); east of Kipia, 2740 m., a common constituent of mountain meadow, 12.2.1929, *Chipp* 99 (K); Mt. Kinyeti 3050 m., rocky summit, 30.12.1935, *Thomas* 1833 (BM, K).

Imatong Mountains group, Uganda side: Lomwaga, 2410-2590 m., 6.1942, *Eggeling* 5038 (MHU); near summit of Mt. Lomwaga, 2440 m., 1963, *Morrison* 2008 (EA).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2600 m., rocky summit, no date, *Jackson* 1080 (K); Mt. Emogadung, 2500 m., on rocky shoulder of mountain, 21.1.1950, *Jackson* 1082 (K).

General habitat range: in medium-altitude and montane grassland.

General distribution: South Sudan to Ethiopia, south to Zambia, Malawi and Tanzania; also in Vietnam.

Festuca L.**Festuca africana** (Hack.) W.D. Clayton

Syn.: *Pseudobromus sylvaticus* K. Schum.: FPS 3: 521 (1956) {Didinga Mountains, Mt. Lotuke, Imatong Mountains, Itibol}; FTEA, Gramin. 1: 54 (1970).

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1453 (EA, K); without further locality, 2440 m., forest, 26.2.1976, *Howard* IM 69 (KHF); Ibahin to Itibol, at Itibol, 1860 m., *Podocarpus latifolius* forest, 19.12.1935, *Thomas* 1702 (BM, K); Low-iliwili, 2700 m., broken mountain forest, 14.11.1949, *Jackson* 907 (K); Mt. Kinyeti, 2740 m., 15.8.1951, *Babiker Beshir* 28 (K, WM); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 36 (C, K, KHF).

Imatong Mountains group, Uganda side: Aringa valley, 2260 m., in swampy stream bed in *Podocarpus latifolius* forest, very common, 6.1942, *Eggeling* 5057 (EA, MHU).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, above Moimoi, 2000 m., montane forest, 21.1.1950, *Jackson* 1102 (K, WM).

Didinga Mountains: Mt. Lotuke, 2130-2440 m., *Podocarpus latifolius* forest, 18.4.1939, *Myers* 10,903 (K).

General habitat range: in montane forest.

General distribution: South Sudan to South Africa (Transvaal).

Festuca chodatiana (St. Yves) E.B. Alexeev

ALEXEEV 1986: 1113; FE 7: 27 (1995).

Syn.: *Festuca camusiana* St. Yves subsp. *chodatiana* St. Yves: FTEA, Gramin. 1: 57 (1970).

Imatong Mountains group, Sudan side: Itibol to Isore, near Itibol, 1950 m., in dry scrub, 20.12.1935, *Thomas* 1717 A (K).

General habitat range: in montane forest, bamboo thickets and grassland.

General distribution: Cameroon, South Sudan, Ethiopia, south to North Tanzania.

Festuca elgonensis E.B. Alexeev

ALEXEEV 1987: 1266.

Imatong Mountains group, Sudan side: summit of Mt. Kinyeti, 3180 m., 15.11.1949, *Jackson* 939 (K).

General habitat range: in montane and ericaceous grassland and bushland.

General distribution: South Sudan (Mt. Kinyeti) and Uganda (Mt. Elgon).

Festuca simensis Hochst. ex A. Rich.

FPS 3: 461 (1956) {Imatong Mountains}; FTEA, Gramin. 1: 57 (1974); FE 7: 27 (1995).

Imatong Mountains group, Sudan side: without further locality, 2130 m., 2.1936, *Johnston* s.n. (K).

General habitat range: in montane forest, bamboo thickets and grassland.

General distribution: Cameroon, South Sudan, Ethiopia, East Congo [previously Zaire], Uganda and Kenya.

Festuca sudanensis E.B. Alexeev

ALEXEEV 1987: 1266.

Syn.: [*Festuca rigidula* auct., non Steud.: FPS 3: 461 (1956) {Imatong Mountains, Kipia}; JACKSON 1956: 370. *Festuca griidula* auct., non Steud., orth. mut.: JACKSON 1956: 368].

Imatong Mountains group, Sudan side: Kipia, 2440 m., grassland, common species, 29.12.1935, *Thomas* 1824 A (K); on the Kipia-Itibol track, 2740 m., dominant in some stretches of mountain meadow, 22.9.1935, *Myers* 13,497 (K, holotype of *F. sudanensis*).

General habitat range: in montane grassland.

General distribution: Not found elsewhere; known only from the cited collections.

Harpachne Hochst. ex A. Rich.**Harpachne schimperi** Hochst. ex A. Rich.

FPNA 3: 157 (1955); FPS 3: 463 (1956); FTEA, Gramin. 2: 270 (1974); WICKENS 1976: 176; FSo 4: 185 (1995); FE 7: 129 (1995); HYF: 364 (1997).

Didinga Mountains: north of Duguru village, near Nagichot (4° 17' N, 33° 35' E), 2000 m., 18.12.1983, *Kielland-Lund* 373 (C, NLH).

General habitat range: in lowland, medium-altitude and montane dry grassland and deciduous bushland, often in sandy or stony places, frequently in disturbed areas, especially along roadsides.

General distribution: East Congo [previously Zaire] to Ethiopia and Somalia, south to Zambia; also in tropical Arabia.

Helictotrichon Schult.**Helictotrichon elongatum** (Hochst. ex A. Rich.) C.E. Hubb.

FTA 10: 114 (1937); FPS 3: 463 (1956) {Imatong Mountains, Itibol}; HEDBERG 1957: 43; FTEA, Gramin. 1: 89 (1970); FWTA 3,2: 372 (1972); WICKENS 1976: 176; FE 7: 31 (1995); HYF: 351 (1997).

Syn.: *Helictotrichon maitlandii* C.E. Hubb.: FTA 10: 112 (1937). *Helictotrichon rigidulum* (Pilg.) C.E. Hubb.: FTA 10: 113 (1937).

Imatong Mountains group, Sudan side: without further locality, no alt., *Hagenia-Nuxia* scrub, 13.2.1976, *Howard* IM 49 (KHF); Gilo, 1850 m., edge of upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 4 (BR, C, K, KHF); Gilo to Mt. Konoro, 1850 m., *Loudetia arundinacea* grassland with scattered trees, 18.11.1980, *Friis & Vollesen* 304 (BR, C, K, KHF); Gilo, 1900 m., along road, 26.8.1957, *Jackson* 3810 (K); Itibol to Issore, near Itibol, 1950 m., scrub, 20.12.1935, *Thomas*

1717 (BM, K); Kipia, 2440 m., grassland, 29.12.1935, *Thomas* 1823 (BM, K).

Imatong Mountains group, Uganda side: above Agoro near Aringa River, 1890 m., 6.1942, *Eggeling* 5088 (K).

General habitat range: in montane forest, bushland and grassland.

General distribution: Cameroon, South Sudan, Ethiopia, south to Tanzania and Zimbabwe; also in Madagascar and tropical Arabia.

Helictotrichon umbrosum (Steud.) C.E. Hubb.

FTEA, Gramin. 1: 88 (1970); FE 7: 32 (1995). Syn.: *Helictotrichon thomasi* C.E. Hubb.: FPS 3: 463 (1956) {Imatong Mountains, Mt. Kinyeti}.

Imatong Mountains group, Sudan side: Mt. Kinyeti, 2740 m., ravine forest, 30.12.1935, *Thomas* 1862 (K, holotype; BM, isotype of *Helictotrichon thomasi*); summit of Mt. Kinyeti, 3180 m., *Erica* scrub, 15.11.1949, *Jackson* 929 (K).

General habitat range: in montane grassland, evergreen bushland and bamboo thickets.

General distribution: South Sudan, Ethiopia, south to Tanzania.

Heteropogon Pers.**Heteropogon contortus** (L.) Roem. & Schult.

FTA 9: 411 (1919); FPS 3: 463 (1956); FWTA 3,2: 473 (1972); WICKENS 1976: 176; FTEA, Gramin. 3: 827 (1982); FSo 4: 265 (1995); FE 7: 356 (1995); HYF: 394 (1997).

Imatong Mountains group, Sudan side: near Torit, 620 m., *Acacia* woodland, 26.6.1949, *Jackson* 826 (K); near Torit, east of the airstrip (4° 25' N, 32° 35' E), 650 m., 9.12.1983, *Kielland-Lund* 276 (C, NLH); Hiliu, near compound, 700 m., 31.11.1983, *Kielland-Lund* 144 (C, NLH); Hiliu, near compound, 700 m., in cultivation, 2.12.1983, *Kielland-Lund* 153B (C, NLH); junction of roads to Ngarama and Katire north of Hiliu

(4° 20' N, 32° 38' E), 700 m., 3.12.1983, *Kielland-Lund* 187 (C, NLH).

Imatong Mountains group, Uganda side: Agoro, no alt., on rocky hill, 6.1942, *Eggeling* 5124 (EA); Lututuru, no alt., 6.1963, *Kertland* 275 (MHU).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K027 (K, WM).

General habitat range: in lowland, medium-altitude and montane bushland and woodland, often in stony soil.

General distribution: Sierra Leone to Ethiopia and Somalia, south to South Africa; also widespread in tropical, subtropical and warm temperate Asia, including tropical Arabia, and in tropical America.

Hyparrhenia Anderss. ex Fourn.

Hyparrhenia anthistirioides (A. Rich.) Stapf
FTA 9: 331 (1918); FPS 3: 470 (1956); WICKENS 1976: 176; FTEA, Gramin. 3: 804 (1982); FS0 4: 265 (1995); FE 7: 341 (1995).

Syn.: *Hyparrhenia pseudocymbaria* (Steud.) Stapf: FTA 9: 329 (1918); FS: 451 (1929); FPS 3: 470 (1956).

Imatong Mountains group, Sudan side: Kinyeti valley, Hiliu, 700 m., cultivation west of Kinyeti River, 700 m., 11.12.1983, *Kielland-Lund* 302 (C, NLH).

General habitat range: in lowland and medium-altitude bushland, often in disturbed areas or in areas with open soil.

General distribution: Sudan to Ethiopia and North Somalia, south to Zambia and Malawi.

Hyparrhenia bracteata (Willd.) Stapf
FTA 9: 360 (1919); FWTA 3,2: 494 (1972); FTEA, Gramin. 3: 814 (1982).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees,

13.11.1980, *Friis & Vollesen* 201 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude grassland.

General distribution: Ivory Coast to South Sudan, Uganda and Kenya, south to South Africa; also in tropical America. First record from the Sudan.

Hyparrhenia cymbaria (L.) Stapf
FTA 9: 332 (1919); FS: 451 (1929); CHIPP 1929: 194; FPS 3: 471 (1956); FWTA 3,2: 494 (1972); WICKENS 1976: 177; FTEA, Gramin. 3: 804 (1982); FE 7: 343 (1995).

Imatong Mountains group, Sudan side: without further locality, 2130 m., *Hagenia abyssinica* woodland, 27.1.1976, *Howard* IM 3 (KHF); 30 km. south of Hiliu along Katire road, no alt., 26.12.1983, *Kielland-Lund* 456 (C, NLH); Oketch [3° 50' N, 32° 40' E], 1270 m., common in tall fire-swept grassland, 6.2.1929, *Chipp* 27 (K, WM); above Lomuleng, 2130 m., 10.2.1936, *Johnston* 1488 (K); Kipia, 2670 m., on edges of ravines, but not in meadows, 11.2.1929, *Chipp* 87 (K, WM).

Didinga Mountains: Nagichot, 1970 m., 17.12.1983, *Kielland-Lund* 345 (C, NLH); between Nagichot and Duguru village (4° 16' N, 33° 35' E), 2000 m., 17.12.1983, *Kielland-Lund* 355 (C, NLH).

General habitat range: in lowland, medium-altitude and montane tall-grass grassland.

General distribution: Cameroon, South Sudan and Ethiopia, south to Angola and South Africa (Natal); also in Madagascar and the Comoro Islands.

Hyparrhenia diplandra (Hack.) Stapf
FTA 9: 368 (1919); FS: 452 (1929); FPS 3: 474 (1956); FG 5: 188 (1962); FWTA 3,2: 496 (1972); FTEA, Gramin. 3: 818 (1982); FE 7: 349 (1995).

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1416

(K); without further locality, 1530-1830 m., 1939, *Andrews* 1861 (K); Talanga, 950 m., wooded grassland with *Combretum molle*, *C. collinum*, *Stereospermum kunthianum* and *Acacia hockii*, tall grass cover of *Cymbopogon giganteus* and *Hyparrhenia* spp., 4.12.1980, *Friis & Vollesen* 670 (C, K, KHf).

General habitat range: in lowland and medium-altitude deciduous woodland and bushland, often in clay soils or on stony hillsides.

General distribution: Guinée to Ethiopia, south to Angola, Zambia, Zimbabwe and Mozambique.

Hyparrhenia dregeana (Nees) Stent

WICKENS 1976: 177; FTEA, Gramin. 3: 809 (1982); FE 7: 346 (1995); HYF: 394 (1997).

Syn.: *Hyparrhenia phyllopoda* Stapf: FTA 9: 346 (1919).

Imatong Mountains group, Sudan side: Kipia to Itibol, 2680 m., mountain meadow, 22.9.1940, *Myers* 13,498 (K).

Didinga Mountains: Nagichot, 1920 m., upland grassland, 2.9.1940, *Myers* 13,472 (K); north of Duguru village, near Nagichot (4° 17' N, 33° 35' E), 2000 m., 18.12.1983, *Kielland-Lund* 370 (C, NLH).

General habitat range: in medium-altitude and montane grassland, often in seasonally damp places.

General distribution: South Sudan and Ethiopia, south to South Africa (Natal, East Cape Prov.); also in tropical Arabia.

Hyparrhenia figariana (Chiov.) W.D. Clayton

FTEA, Gramin. 3: 802 (1982).

Imatong Mountains group, Sudan side: Torit, 620 m., open woodland, 29.10.1949, *Jackson* 870 (K).

General habitat range: in lowland and medium-altitude bushland and wooded grassland.

General distribution: Nigeria, South Sudan, Uganda, East Congo [previously Zaire] and Tanzania.

Hyparrhenia filipendula (Hochst.) Stapf

FTA 9: 322 (1919); FPS 3: 469 (1956); FG 5: 184 (1962); FWTA 3,2: 494 (1972); WICKENS 1976: 177; FTEA, Gramin. 3: 803 (1982); FE 7: 341 (1995).

Imatong Mountains group, Sudan side: Torit, no alt., 5.9.1951, *Babiker Beshir* 442 (K); Kinyeti Valley, c. 10 km. north of Hiliu, along the road to Torit, 650 m., 8.12.1983, *Kielland-Lund* 263A (C, NLH); Hiliu, in compound, 700 m., 29.11.1983, *Kielland-Lund* 100 (C, NLH) & 105 (C, NLH); Hiliu, 700 m., in *Eucalyptus* plantation, 30.11.1983, *Kielland-Lund* 106 (C, NLH); Hiliu, between river east of compound and small hills, 700 m., 31.11.1983, *Kielland-Lund* 138 (C, NLH).

Lafit, Dongotona and Nangeya Mountains: Lafon Regional District Centre, no alt., 29.12.1983, *Kielland-Lund* 527 (C, NLH).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K022 (K, WM).

General habitat range: in lowland, medium-altitude and montane open habitats, especially those subjected to disturbance.

General distribution: Guinée to Ethiopia, south to South Africa (Natal); also in Madagascar and in tropical Asia to Australia.

Hyparrhenia gazensis (Rendle) Stapf

FTA 9: 301 (1919); FTEA, Gramin. 3: 797 (1982).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., woodland, 1979, *Shigeta* 97 (EA, identified and listed by M.G. Gilbert, not traced).

General habitat range: in lowland and medium-altitude unstable or ruderal habitats.

General distribution: Congo [previously Zaire] to South Sudan, Uganda and Kenya, south to South Africa.

Hyparrhenia madaropoda W.D. Clayton

FTEA, Gramin. 3: 812 (1982).

Imatong Mountains group, Sudan side: Torit, 620

m., cultivations, 20.10.1949, *Jackson* 871 (K), & *Jackson* 872 (K); Katire, 1100 m., in scrub, 17.12.1935, *Thomas* 1609 (BM, K); Logoforok, 800 m., moist grassland on clay, no date, *Jackson* 790 (K).

General habitat range: in lowland and medium-altitude dry deciduous bushland.

General distribution: South Sudan to Zambia, west to East Congo [previously Zaire].

Hyparrhenia pilgeriana C.E. Hubb.

WICKENS 1976: 178; FTEA, Gramin. 3: 807 (1982); FE 7: 345 (1995).

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 24.11.1980, *Friis & Vollesen* 429 (BR, C, K, KHf).

Imatong Mountains group, Uganda side: Lomwaga, 2320 m., below *Podocarpus latifolius* forest, 6.1942, *Eggeling* 5030 (EA, MHU); hills west of Agoro, 2200 m., common, 6.1942, *Eggeling* 5092 (MHU).

General habitat range: in medium-altitude and montane grassland, evergreen and deciduous bushland and at forest margins, often in damp places.

General distribution: South Sudan and Ethiopia, south to South Africa (Natal).

Hyparrhenia poecilotricha (Hack.) Stapf

FTA 9: 309 (1919); WICKENS 1976: 178; FTEA, Gramin. 3: 796 (1982); FE 7: 338 (1995).

Imatong Mountains group, Sudan side: Acholi Plain, Farajok [3° 52' N, 32° 38' E], 800 m., *Acacia* wooded grassland, 1.10.1948, *Jackson* 362 (K).

General habitat range: in lowland, medium-altitude and montane dry grassland and woodland.

General distribution: Guinée to South Sudan and South West Ethiopia, south to South Africa (Transvaal).

Hyparrhenia rufa (Nees) Stapf

FTA 9: 304 (1919); FS: 450 (1929); FPS 3: 468 (1956); FG 5: 181 (1962); FWTA 3,2: 492 (1972); WICKENS 1976: 178; FTEA, Gramin. 3: 794 (1982); FE 7: 337 (1995).

Syn.: *Hyparrhenia altissima* Stapf: FTA 9: 307 (1918); FPS 3: 468 (1956).

Imatong Mountains group, Sudan side: without further locality, 1380 m., 2.1936, *Johnston* 1413 (K); near Farajok [3° 54' N, 32° 29' E], 800 m., *Lonchocarpus* woodland, 31.10.1949, *Jackson* 877 (K); Torit, 600 m., grassland with *Tamarindus*, 29.10.1949, *Jackson* 874 (K); Kinyeti Valley, Hiliu, near compound, 700 m., 29.11.1983, *Kielland-Lund* 104A (C, NLH); Hiliu, between river east of compound and hills, 700 m., 31.11.1983, *Kielland-Lund* 142 (C, NLH); Katire, 1120 m., in scrub, 17.12.1935, *Thomas* 1608 (BM, K); Katire to Gilo, near road to Itibol, 1400 m., wooded grassland with *Combretum molle*, *C. collinum*, *Entada abyssinica* and *Erythrina abyssinica*, the grasses *Pennisetum purpureum* and *Hyparrhenia rufa* dominant, 12.11.1980, *Friis & Vollesen* 174 (C, K, KHf).

Didinga Mountains: Kapoeta, no alt., roadside, 28.8.51, *Babiker Beshir* 22 (K); 35 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* KM9 (K).

General habitat range: in lowland, medium-altitude and montane deciduous bushland and woodland, where this species is often extremely common.

General distribution: Guinée to Ethiopia, south to South Africa; also in Madagascar.

Hyparrhenia schimperi (A. Rich.) Stapf

FTA 9: 341 (1919); WICKENS 1976: 178; FTEA, Gramin. 3: 808 (1982); FE 7: 345 (1995).

Imatong Mountains group, Uganda side: hills above Agoro, 1830 m., 6.1942, *Eggeling* 5079 (MHU); on rocky hillside above Agoro, no alt., 6.1942, *Eggeling* 5103 (MHU); north of Madi Opei, no alt., 11.1970, *D. Field* 2076 (EA).

General habitat range: in lowland and medium-altitude grassland and woodland.

General distribution: Congo [previously Zaire] to Ethiopia, south to South Africa (Natal); also in Madagascar.

Hyparrhenia tamba (Steud.) Stapf

FTA 9: 336 (1919); WICKENS 1976: 178; FTEA, Gramin. 3: 810 (1982); FE 7: 347 (1995).

Imatong Mountains group, Sudan side: without further locality, 2140 m., grassland, 10.2.1936, *Johnston* 1493 (EA, K).

General habitat range: in medium-altitude and montane grassland.

General distribution: Congo [previously Zaire] to Ethiopia, south to South Africa.

Hyparrhenia umbrosa (Hochst.) W.D. Clayton
FPS 3: 473 (1956); FWTA 3,2: 494 (1972); FTEA, Gramin. 3: 810 (1982).

Imatong Mountains group, Sudan side: Lomuleng, 2440 m., in grassland, 29.12.1935, *Thomas* 1806 (K).

General habitat range: in medium-altitude and montane habitats.

General distribution: Nigeria and Cameroon to South Sudan, south to South Africa.

Hyparrhenia variabilis Stapf

FTA 9: 334 (1919); FS: 451 (1929); FPS 3: 471 (1956); WICKENS 1976: 178; FTEA, Gramin. 3: 805 (1982); FE 7: 344 (1995); HYF: 394 (1997).

Imatong Mountains group, Sudan side: hills near the junction of the roads to Ngarama and Katire north of Hiliu, 650 m., 10.12.1983, *Kieland-Lund* 290 (C, NLH); Kinyeti Valley, Hiliu, between river east of compound and hills, 700 m., 31.11.1983, *Kieland-Lund* 141 (C, NLH); Katire, 1000 m., *Albizia zygia* woodland, no date, *Jackson* 469 (K); Katire, no alt., 11.6.1961, *Jackson* 4216 (K).

General habitat range: in medium-altitude and montane woodland and bushland.

General distribution: South Sudan and Ethiopia,

south to South Africa (Transvaal); also in Madagascar, tropical Arabia and Java.

Hyperthelia W.D. Clayton

Hyperthelia dissoluta (Steud.) W.D. Clayton
FWTA 3,2: 496 (1972); FTEA, Gramin. 3: 786 (1982); FE 7: 333 (1995).

Syn.: *Hyparrhenia dissoluta* (Steud.) C.E. Hubb.: FPS 3: 469 (1956); FG 5: 185 (1962). *Hyparrhenia ruprechtii* Fourn.: FTA 9: 326 (1919).

Imatong Mountains group, Sudan side: Farajok [3° 52' N, 33° 38' E], 800 m., *Acacia-Lonchocarpus* grassland, 1.10.1948, *Jackson* 360 (K); Torit, 620 m., woodland, 29.10.1949, *Jackson* 869 (K); Torit district, Nokolong rest house [3° 57' N, 33° 02' E], 1400 m., *Acacia* bushland, 2.6.1950, *Jackson* 1529 (K); Kinyeti Valley, Hiliu, near compound, 700 m., 29.11.1983, *Kieland-Lund* 102 (C, NLH); Hiliu, between river east of compound and hills, 700 m., 31.11.1983, *Kieland-Lund* 139 (C, NLH); Katire, 910 m., 16.12.1935, *Thomas* 1600 (BM, K).

Imatong Mountains group, Uganda side: foothills of Imatong Mountains above Agoro, no alt., among bamboo, 6.1942, *Eggeling* 5101 (MHU).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1380 m., open *Combretum* woodland, 4.1960, *Wilson* 952 (EA).

Didinga Mountains: South west of Kapoeta on road to Torit, no alt., 29.8.1953, *Peers* T07 (K, WM).

General habitat range: in lowland, medium-altitude and montane deciduous bushland and woodland.

General distribution: Mauritania and Senegal to Sudan and South West Ethiopia, south to South Africa; also in Madagascar, and introduced in tropical America (Mexico, Paraguay and Colombia).

Imperata Cyr.**Imperata cylindrica** (L.) Raeuschel

FTA 9: 87 (1917); FS: 442 (1929); FPS 3: 476 (1956); JACKSON 1956: 350, moist savannah; FG 5: 139 (1962); FWTA 3,2: 464 (1972); WICKENS 1976: 178; FTEA, Gramin. 3: 700 (1982); FE 7: 292 (1995); HYF: 387 (1997).

Imatong Mountains group, Sudan side: lower southern slope of Mt. Konoro, 2100 m., burnt grassland on shallow soil with much *Loudetia*, but this species locally dominating, 18.2.1982, Friis & Vollesen 948 (C, K, KHF).

General habitat range: in lowland and medium-altitude woodland and grassland, usually dominant in frequently burnt sites and in abandoned cultivations, also as a weed.

General distribution: Senegal to Ethiopia, south to South Africa; also in the Mediterranean region, the Middle East and tropical Arabia; recorded from South America (Chile).

Isachne R. Br.**Isachne mauritiana** Kunth

FWTA 3,2: 420 (1972); FTEA, Gramin. 2: 434 (1974); FE 7: 283 (1995).

Syn.: *Isachne aethiopica* Stapf & C.E. Hubb.: FTA 9: 1092 (1934).

Imatong Mountains group, Sudan side: without further locality, 1980 m., stream bed in *Syzygium* forest, 13.2.1976, Howard IM 32 A (K, KHF); Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 15.11.1980, Friis & Vollesen 243 (C, K, KHF).

General habitat range: in medium-altitude and montane forest.

General distribution: Ghana, Nigeria and Cameroon to South Sudan, Ethiopia and Kenya, south to Zimbabwe; also in Madagascar and on Mauritius. First record from the Sudan.

Ischaemum L.**Ischaemum afrum** (J.F. Gmel.) Dandy

FPS 3: 476 (1956); FWTA 3,2: 476 (1972); FTEA, Gramin. 3: 747 (1982); FSo 4: 257 (1995); FE 7: 314 (1995).

Syn.: *Ischaemum brachyantherum* Fenzl ex Hack.: FTA 9: 30 (1917); FS: 440 (1929).

Didinga Mountains: Didinga Mountains near Kapoeta, no alt., 28.8.1951, *Babiker Beshir* 25 (K, WM); 16 km. west of Kapoeta, no alt., flood plain, 25.8.1940, Myers 13,445 (K).

General habitat range: in lowland and medium-altitude grassland and deciduous bushland, especially on black clay soils with impeded drainage.

General distribution: Nigeria to Ethiopia and Somalia, south to South Africa (Cape Prov.); also in India.

Koeleria Pers.**Koeleria capensis** (Steud.) Nees

FTEA, Gramin. 1: 79 (1970); FWTA 3,2: 371 (1972); FE 7: 38 (1995); HYF: 350 (1997).

Syn.: *Koeleria cristata* (L.) Pers. var. *brevifolia* (Nees) C.E. Hubb.: FPS 3: 477 (1956) {Imatong Mountains, Kipia}.

Imatong Mountains group, Sudan side: Kipia, 2440 m., grassland, 29.12.1935, Thomas 1824 (K); summit of Mt. Konoro, 2500 m., *Loudetia arundinacea* grassland on very shallow soil, this species common in shade of big boulder, 16.3.1982, Friis & Vollesen 1220 (BR, C, FT, K, KHF); Lolibai Mountain, south of Gilo towards Ingwok (Kinyeti) peak (3° 58' N, 32° 54' E), 3100 m., above timberline, 10.6.1984, *Kielland-Lund* 925 (C, NLH).

General habitat range: in high altitude mountain grasslands, often in dry or very thin soils and in places with little vegetation.

General distribution: Cameroon, South Sudan,

Ethiopia, south to South Africa (Cape Prov.); also in tropical Arabia.

Leersia Sw.

Leersia angustifolia Prod.

FPS 3: 482 (1956); FTEA, Gramin. 1: 27 (1970).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, near compound, 700 m., in deep soil between rocks, 2.12.1983, *Kielland-Lund* 170 (C, NLH).

General habitat range: in grass swamps at lowland and medium altitudes, often on clay soils at edge of temporary pools.

General distribution: Central African Republic, Sudan, North East Congo [previously Zaire].

Leersia hexandra Sw.

FS: 484 (1929); FPS 3: 479 (1956); FTEA, Gramin. 1: 25 (1970); FWTA 3,2: 367 (1972); WICKENS 1976: 179; FE 7: 9 (1995).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., in stagnant stream, 6.1.1984, *Kielland-Lund* 591 (C, NLH).

General habitat range: in lowland and medium-altitude swamps and floating in stagnant water, often forming large stands.

General distribution: Gambia and Senegal to Ethiopia, south to South Africa (Cape Prov.); widespread in tropical Asia and America.

Leptaspis R. Br.

Leptaspis zeylanica Nees

FE 7: 8 (1995).

Syn.: *Leptaspis cochleata* Thwaites: FPS 3: 482 (1956); JACKSON 1956: 355 {Talanga, Lotti}; FG 5: 273 (1962); FTEA, Gramin. 1: 21 (1970); FWTA 3,2: 362 (1972).

Imatong Mountains group, Sudan side: Lotti, 1000

m., *Chrysophyllum* forest, 26.3.1950, *Jackson* 1279 (K, WM); Talanga forest, 1000 m., in ground layer in forest, 5.4.1950, *Jackson* 1379 (BM, WM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophloeum suaveolens*, *Alstonia boonei*, *Pari-nari excelsa* and *Milicia excelsa*, dominant over large areas of forest floor, 27.11.1980, *Friis & Vollesen* 502 (C, K).

General habitat range: in lowland and medium-altitude forest.

General distribution: Guinée to South West Ethiopia, Uganda and Kenya, south to Zimbabwe and Mozambique; also in Madagascar, Sri Lanka, Malesia, extending to the Solomon Islands.

Leptocarydion Stapf

Leptocarydion vulpiastrum (De Not.) Stapf

FPS 3: 482 (1956); FTEA, Gramin. 2: 294 (1974); FE 7: 104 (1995); HYF: 366 (1997).

Imatong Mountains group, Sudan side: Kinyeti valley, Hiliu, west of the Kinyeti River, 700 m., near the river, 11.12.1983, *Kielland-Lund* 305 (C, NLH).

Didinga Mountains: Khor Iwochi [4° 35' N, 33° 18' E], no alt., 19.9.1953, *Peers* M015 (K).

General habitat range: in lowland and medium-altitude wooded grassland and deciduous bushland, often on dry, sandy soil.

General distribution: Sudan to Ethiopia, south to Namibia and South Africa (Transvaal, Natal); also in tropical Arabia and Madagascar.

Lintonia Stapf

Lintonia nutans Stapf

FPS 3: 484 (1956); FTEA, Gramin. 2: 302 (1974); FSo 4: 200 (1995); FE 7: 159 (1995).

Didinga Mountains: near Kapoeta, Alako-Pay, no alt., 22.8.1951, *Babiker Beshir* 15 (K); 8 km.

south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K08 (K, WM).

General habitat range: in lowland and medium-altitude grassland and deciduous bushland, often on black clay soils with impeded drainage.

General distribution: Uganda to South Ethiopia and Somalia, south to South Africa (Transvaal, Natal).

Loudetia Hochst. ex Steud.

Loudetia arundinacea (A. Rich.) Steud.

FTA 10: 20 (1937); FPS 3: 486 (1956); FG 5: 260 (1962); FWTA 3,2: 417 (1972); FTEA, Gramin. 2: 417 (1974); FE 7: 288 (1995).

Imatong Mountains group, Sudan side: Lerong, at foot of Imatong Mountains (32° 37' E, 4° 05' N), 900 m., on gneiss rock, 6.11.1948, *Jackson* 488 (K); Palotaka, 1200 m., woodland, 1979, *Shigeta* 94 (EA, identified and listed by M.G. Gilbert, not traced); Upper Talanga Tea project, 1800 m., rocky outcrop, 11.1981, *Howard* UTT 11 (BR, C, K); Katire, at Kinyeti River, 1070 m., grassland, 15.12.1935, *Thomas* 1562 (BM, K); Itibol, 1970 m., grassland, 19.12.1935, *Thomas* 1704 (BM, K) & *Thomas* 1705 (BM, K).

Imatong Mountains group, Uganda side: on granite outcrop near Lututuru, 2130 m., 6.1942, *Eggeling* 5031 (EA); Langia, Agoro, 2440 m., rocky hillside, 14.11.1945, *Thomas* 4380 (EA, K); hills above Agoro, 1920 m., 6.1942, *Eggeling* 5095 (EA).

General habitat range: in lowland, medium-altitude and montane grassland, wooded grassland and deciduous bushland, often on poor, thin and stony soil.

General distribution: Senegal to Ethiopia, south to Angola, Zimbabwe and Mozambique.

Loudetia flavida (Stapf) C.E. Hubb.

FTA 10: 34 (1937); FWTA 3,2: 417 (1972); FTEA, Gramin. 2: 416 (1974); FE 7: 286 (1995).

Syn.: *Loudetia pennata* (Chiov.) C.E. Hubb.

Didinga Mountains: foot of Didinga Mountains, 40 km. south west of Kapoeta, on pass between Didinga and Boya Hills, no alt., 25.8.1940, *Myers* 13,447 (K); 34 km. south of Kapoeta on road to Nathilani [33° 35' E, 4° 35' N], no alt., on sandy gravel, 27.8.1953, *Peers* KM17 (K) & *Peers* KM 18 (K).

General habitat range: in lowland and medium-altitude grassland, wooded grassland and deciduous bushland, often on sandy or rocky soils.

General distribution: Ghana to Ethiopia, south to South Africa (Transvaal).

Loudetia simplex (Nees) C.E. Hubb.

FTA 10: 25 (1937); FPS 3: 486 (1956); FG 5: 262 (1962); FWTA 3,2: 419 (1972); FTEA, Gramin. 2: 418 (1974); WICKENS 1976: 179; FE 7: 288 (1995).

Imatong Mountains group, Sudan side: without further locality, 1520-1830 m., 12.6.1939, *Andrews* 1842 (K); Lobeke, 1980 m., on rocky outcrop, 1.8.1939, *Myers* 11,743 (K); along path from Bushbuck Hill to Mt. Konoro, 2300 m., rocky outcrops in *Loudetia* grassland, 5.3.1982, *Friis & Vollesen* 1099 (BR, C, EA, K, KHF); Dumuso, 2400 m., common on shallow soil between 1700 and 2400 m., 23.4.1950, *Jackson* 1448 (KHF).

Imatong Mountains group, Uganda side: Lomwaga, 2440 m., common, in low tufts, 6.1942, *Eggeling* 5033 (EA, MHU); Lomwaga, 2260 m., rocky slope, 6.1942, *Eggeling* 5035 (EA, MHU); hills above Agoro, 1830 m., 6.1942, *Eggeling* 5080 (EA); Langia, Agoro, 2440 m., rocky hillside, 14.11.1945, *Thomas* 4379 (EA, K).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Aripwiwa (33° 07' E, 4° 10' N), 2200 m., grassland near summit, 24.1.1950, *Jackson* 1119 (K).

Didinga Mountains: Nagichot, 1830 m., mountain grassland, 19.8.1951, *Babiker Beshir* 10 (K).

General habitat range: in medium-altitude and

montane grassland, wooded grassland and deciduous bushland, often on rocky hillsides and in thin, stony soils.

General distribution: Senegal to Ethiopia, south to South Africa (Transvaal, Natal); also in Madagascar.

Loxodera Launert

Loxodera ledermannii (Pilg.) Launert

FWTA 3,2: 505 (1972); FTEA, Gramin. 3: 840 (1982).

Imatong Mountains group, Uganda side: dominant over considerable stretches at the base of Imatong Mountains, no alt., 6.1942, *Eggeling* 5287 (EA, MHU).

General habitat range: in lowland and medium-altitude deciduous woodland and bushland.

General distribution: North Nigeria, Niger and Cameroon to Uganda.

Melinis P. Beauv.

Melinis macrochaeta Stapf & C.E. Hubb.

FTA 9: 927 (1930); FPS 3: 487 (1956); FWTA 3,2: 455 (1972); FTEA, Gramin. 3: 508 (1982); ZIZKA 1988: 101; FE 7: 189 (1995).

Imatong Mountains group, Sudan side: Talanga, 950 m., neglected *Cedrela* plantation with regenerating mixed woodland of *Combretum collinum*, *Stereospermum kunthianum*, *Acacia hockii* and *Albizia grandibracteata* on ground with rocky outcrops, 8.12.1980, *Friis & Vollesen* 780 (C, K, KHF).

Imatong Mountains group, Uganda side: on granite outcrops above Lututuru, 2130 m., 6.1942, *Eggeling* 5032 (EA, MHU).

General habitat range: in lowland, medium-altitude and montane grassland, often along streams or in disturbed places.

General distribution: Ivory Coast and North Nigeria to Ethiopia, south to South Africa.

Melinis minutiflora P. Beauv.

FTA 9: 931 (1930); FS: 467 (1929); FPS 3: 488 (1956); FG 5: 107 (1962); FWTA 3,2: 455 (1982); FTEA, Gramin. 3: 506 (1982); ZIZKA 1988: 92; FSo 4: 239 (1995); FE 7: 189 (1995). Syn.: *Melinis tenuinervis* Stapf: FPS 3: 488 (1956) [Imatong Mountains, Ibahin]; FTEA, Gramin. 3: 506 (1982).

Imatong Mountains group, Sudan side: Ibahin to Itibol, at Ibahin, 1860 m., scrub, 19.12.1935, *Thomas* 1690 (BM, K); Gilo, at bridge on Ngairigi River, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 17.11.1980, *Friis & Vollesen* 282 (BR, C, K, KHF), & 19.11.1980, *Friis & Vollesen* 332 (C, K, KHF).

Imatong Mountains group, Uganda side: 2 km. east of Lututuru, near a rivulet, 1400 m., in open woodland, 17.2.1969, *Lye* 2108 (MHU).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 1980 m., at lower edge of forest, 28.10.1941, *Myers* 14,180 (K).

General habitat range: in lowland, medium-altitude and montane grassland or woodland on dry, often regularly burnt hillsides.

General distribution: Cape Verde Islands to Ethiopia and South Somalia, south to South Africa; also in Madagascar and introduced to tropical Asia and America.

Melinis repens (Willd.) Zizka

ZIZKA 1988: 55; FSo 4: 237 (1995); FE 7: 186 (1995).

subsp. **repens**

ZIZKA 1988: 55; FSo 4: 238 (1995); FE 7: 186 (1995).

Syn.: *Rhynchelytrum repens* (Willd.) C.E. Hubb.: FPS 3: 522 (1956); FWTA 3,2: 454 (1972); WICKENS 1976: 183; FTEA, Gramin. 3: 515 (1982); HYF: 375 (1997). *Rhynchelytrum roseum* (Nees) Bews.: FTA 9: 880 (1930). *Tricholaena rosa* Nees: FS: 466 (1929). *Tricholaena sphacelata* Benth.: FS: 466 (1929).

Imatong Mountains group, Sudan side: Kinyeti

Valley, hills near junction of roads to Ngarama and Katire north of Hiliu, 650 m., 11.12.1983, *Kielland-Lund* 300 (C, NLH); Katire, 1000 m., in garden, no date, *Jackson* 463 (K).

Imatong Mountains group, Uganda side: Agoro, no alt. on dry, rocky hillside, 6.1942, *Eggeling* 5133 (MHU); Agoro, 1380 m., stony hillside, 13.11.1945, *Thomas* 4363 (EA, K); 2 km. east of Lututuru, near a rivulet, 1400 m., in open woodland, 17.2.1969, *Lye* 2109 (MHU).

Didinga Mountains: Nagichot hill, 1830 m., 18.8.1951, *Babiker Beshir* 3 (K, WM).

General habitat range: in lowland, medium-altitude and montane habitats, usually in disturbed places.

General distribution: Cape Verde Islands to Ethiopia and North Somalia, south to South Africa (Cape Prov.); also in tropical Arabia.

subsp. **grandiflora** (Hochst.) Zizka
ZIZKA 1988: 60; FE 7: 186 (1995).

Syn.: *Rhynchelytrum villosum* (Parl.) Chiov.: FPS 3: 522 (1956); FWTA 3,2: 454 (1972); WICKENS 1976: 183; *Rhynchelytrum grandiflorum* Hochst.: HYF: 375 (1997).

Didinga Mountains: south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K031 (WM).

General habitat range: in dry lowland, medium-altitude and montane open, sunny places in grassland or woodland, less common in disturbed places than subsp. *repens*.

General distribution: Cape Verde Islands to Ethiopia and Somalia, south to South Africa (Cape Prov.); also in tropical Arabia, and widespread in tropical Asia and America (introduced). Species as a whole with the same general distribution as subsp. *grandiflora*.

Melinis tenuissima Stapf

FTA 9: 926 (1930); FWTA 3,2: 455 (1972); FTEA, Gramin. 3: 508 (1982); ZIZKA 1988: 99; FE 7: 187 (1995).

Imatong Mountains group, Uganda side: above Agoro, no alt., among streamside vegetation, 6.1942, *Eggeling* 5105 (EA).

General habitat range: in medium-altitude and montane grassland, often in disturbed sites.

General distribution: Ivory Coast to Ethiopia, south to Zambia, Malawi and Mozambique.

Microchloa R. Br.

Microchloa caffra Nees

FTEA, Gramin. 2: 316 (1974).

Imatong Mountains group, Uganda side: Lomwaga, 2530 m., 6.1942, *Eggeling* 5049 (EA); Mt. Lomwaga, 2630 m., burnt *Exothea* grassland, 5.4.1945, *Greenway & Hummel* 7291 (EA, K).

General habitat range: in medium-altitude and montane grassland, wooded grassland and bushland on shallow soil.

General distribution: South Sudan and Uganda south to South Africa (Cape Prov.)

Microchloa kunthii Desv.

FWTA 3,2: 403 (1972); FTEA, Gramin. 2: 314 (1974); WICKENS 1976: 179; FSo 4: 211 (1995); FE 7: 174 (1995); HYF: 367 (1997).

Imatong Mountains group, Sudan side: Gilo to Mt. Konoro, 2000 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 16.11.1980, *Friis & Vollesen* 261 (BR, C, K, KHF); Bushbuck Hill, 2300 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis* and many annuals, 14.3.1982, *Friis & Vollesen* 1206 (BR, C, EA, FT, K, KHF).

Imatong Mountains group, Uganda side: Lututuru, 2400 m., 1963, *Morrison* s.n. (MHU); 4 km. south east of Lomwaga, no alt. shallow soil over rock, 18.7.1974, *Katende* 2171 (MHU).

General habitat range: in lowland, medium-altitude and montane grassland, wooded grassland and bushland in shallow soil or among rocks.

General distribution: Ivory Coast to Ethiopia and North Somalia, south to South Africa; widespread throughout the tropics.

Olyra L.**Olyra latifolia L.**

FS: 485 (1929); FPS 3: 491 (1956); JACKSON 1956: 355 {Talanga, Lotti}; FG 5: 278 (1962); FTEA, Gramin. 1: 17 (1970); FWTA 3,2: 362 (1972); FE 7: 6 (1995).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., forest, 1979, *Shigeta* 124 (EA, identified and listed by M.G. Gilbert, not traced); Katire, at Kinyeti River, 900 m., in riverine forest with *Khaya grandifoliola*, 10.1948, *Jackson* 395 (K); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophloeum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, 26.11.1980, *Friis & Vollesen* 461 (C).

General habitat range: in lowland and medium-altitude forest.

General distribution: Senegal to Ethiopia, south to Angola, Zimbabwe and Mozambique.

Oplismenus P. Beauv.**Oplismenus compositus (L.) P. Beauv.**

FTA 9: 634 (1920); FPS 3: 493 (1956) {Imatong Mountains}; FTEA, Gramin. 3: 542 (1982); FE 7: 192 (1995); HYF: 377 (1997).

Imatong Mountains group, Sudan side: Itibol, 1910 m., forest, 19.12.1935, *Thomas* 1688 (BM, K).

General habitat range: in lowland, medium-altitude and montane forest.

General distribution: East Congo [previously Zaire], South Sudan and Ethiopia, south to Zambia, Zimbabwe, Malawi and Mozambique; also in tropical Arabia, India and Sri Lanka, through tropical Asia to Polynesia and in tropical America.

Oplismenus hirtellus (L.) P. Beauv.

FTA 9: 631 (1920); FPS 3: 493 (1956); JACKSON 1956: 355 {Talanga, Lotti}; FG 5: 56 (1962);

FWTA 3,2: 437 (1972); WICKENS 1976: 180; FTEA, Gramin. 3: 542 (1982); FE 7: 192 (1995); HYF: 377 (1997).

Imatong Mountains group, Sudan side: Lotti, no alt., along path in forest clearings, 10.10.1958, *Myers* 9656 (K); Talanga, 1000 m., closed *Khaya-Chrysophyllum* forest, 8.11.1948, *Jackson* 495 (K); Kinyeti Valley, 14 km. south of Hiliu on Katire road, c. 700 m., teak-plantation, 7.12.1983, *Kielland-Lund* 251 (NLH); Gilo, near Swimming Pool, 1750 m., 26.12.1983, *Kielland-Lund* 463 (C, NLH); Gilo, 1800 m., shady places, 5.7.1961, *Jackson* 4287 (K); Gilo, 2100 m., *Podocarpus latifolius* forest, 8.5.1954, *Jackson* 3135 (K).

Imatong Mountains group, Uganda side: hill west of Agoro, 1980 m., 6.1942, *Eggeling* 5094 (MHU).

General habitat range: in lowland, medium-altitude and montane forest.

General distribution: Senegal to Ethiopia, south to South Africa; widespread in the tropics of the Old and New World.

Oryza L.**Oryza barthii A. Chev.**

FPS 3: 493 (1956); FTEA, Gramin. 1: 30 (1970); FWTA 3,2: 367 (1972); FE 7: (1995).

Imatong Mountains group, Sudan side: 3 km. south of Torit, near Iyedo River (4° 23' N, 32° 36' E), 650 m., 13.12.1983, *Kielland-Lund* 318 (C, NLH).

General habitat range: in lowland and medium-altitude wet grassland and swamps, sometimes as a weed in rice fields.

General distribution: Mauritania and Senegal to West Ethiopia, south to Tanzania and Zambia.

Oxytenanthera Munro**Oxytenanthera abyssinica** (A. Rich.) Munro

FS: 485 (1929); CHIPP 1929: 194; ITU: 151 (1952); FPS 3: 494 (1956); JACKSON 1956: 351, 360; FTEA, Gramin. 1: 11 (1970); FWTA 3,2: 360 (1972); WICKENS 1976: 180; EL AMIN 1990: 455; SOMMERLATTE 1990: 134, in pure stands over wide areas between 1200 and 1400 m.; FE 7: 6 (1995).

Imatong Mountains group, Sudan side: near Laboni Forest, 1280 m., covering thousands of acres in fire-swept country, 8.2.1929, *Chipp* 51 (K); at the Katire-Torit road, near the River Kiwa (4° 13' N, 32° 40' E), 800 m., forming clumps in woodland, no date, *Jackson* 4226 (KHF); near Molongori, 1200 m., forming a belt on north-west [east?] slope of mountain, 13.11.1948, *Jackson* 533 (FHO, KHF); Imeila, original data lost, 1960, *Firmin* 892 (KHF).

Imatong Mountains group, Uganda side: 2 km. north-east of Lututuru, near end of road, 1600 m., grassland, 17.2.1969, *Lye* 2086 (MHU). Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

General habitat range: in lowland and medium-altitude woodland and wooded grassland.

General distribution: Senegal to Ethiopia, south to Zimbabwe.

Panicum L.**Panicum atrosanguineum** Hochst. ex A. Rich.

FTA 9: 703 (1920); FS: 462 (1929); FPS 3: 502 (1956); FTEA, Gramin. 3: 488 (1982); FSo 4: 221 (1995); FE 7: 204 (1995); HYF: 374 (1997).

Imatong Mountains group, Uganda side: streambed above Agoro, no alt., not far above plains, 6.1942, *Eggeling* 5109 (EA, MHU).

Didinga Mountains: 34 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* KM14 (K, WM).

General habitat range: in lowland, medium-altitude and montane deciduous bushland, and in abandoned cultivated land.

General distribution: Congo [previously Zaire] to Ethiopia and Somalia, south to Zimbabwe and Tanzania; also in tropical Arabia and northern India.

Panicum bambusiculme Friis & Vollesen

FRIIS & VOLLESEN 1982: 475.

Imatong Mountains group, Sudan side: Talanga to Upper Talanga, 1000 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, scrambling in scrub along trail, 7.12.1980, *Friis & Vollesen* 760 (C, holotype; BR, K, KHF, isotypes).

General habitat range: in lowland forest.

General distribution: Not known elsewhere.

Panicum brevifolium L.

FTA 9: 731 (1920); FPS 3: 507 (1956); FG 5: 62 (1962); FWTA 3,2: 429 (1972); FTEA, Gramin. 3: 496 (1982).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 29.11.1980, *Friis & Vollesen* 542 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Senegal to South Sudan, Uganda and Kenya, south to South Africa; throughout the humid tropics.

Panicum calvum Stapf

FTA 9: 723 (1920); FWTA 3,2: 433 (1972); FTEA, Gramin. 3: 493 (1982); FE 7: 209 (1995).

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 8.11.1980, *Friis & Vollesen* 26 (C, K).

General habitat range: in lowland and medium-altitude forest, forming extensive colonies.

General distribution: Guinée to Ethiopia, south to South Africa. First record from the Sudan.

***Panicum chionachne* Mez**

FTEA, Gramin. 3: 495 (1982).

Imatong Mountains group, Sudan side: Katire to Itibol, at Itibol, 1830 m., scrub, common, 17.12.1935, *Thomas* 1624 (BM, K); Itibol to Issore, near bridge on Kinyeti River, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forest edge, 11.11.1980, *Friis & Vollesen* 147 (BR, C, K, KHF); Gilo to Mt. Konoro, 1850 m., seepage meadow on edge between upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea* and grassland with *Loudetia arundinacea*, 18.11.1980, *Friis & Vollesen* 307 (BR, C, K, KHF).

General habitat range: in lowland, medium-altitude and montane forest.

General distribution: Congo [previously Zaire] to South Sudan, Uganda and Kenya, south to Zambia, Malawi and Tanzania.

***Panicum coloratum* L.**

FTA 9: 713 (1920); FS: 463 (1929); FPS 3: 504 (1956); FWTA 3,2: 434 (1972); FTEA, Gramin. 3: 485 (1982); FSo 4: 221 (1995); FE 7: 201 (1995); HYF: 374 (1997).

var. **minus** Chiov.

FPS 3: 505 (1956); FWTA 3,2: 434 (1972); FTEA, Gramin. 3: 486 (1982); HYF: 374 (1997).

Didinga Mountains: Didinga Mountains, open grassland, no alt., 7.4.1952, *I.H. Davies* E8 (K); 8 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* KM6 (K, WM).

General habitat range: in lowland and medium-altitude dry grassland and deciduous bushland.

General distribution: Uganda, South Sudan and Ethiopia to Somalia and Tanzania. Species as a whole throughout tropical Africa and tropical Arabia.

***Panicum comorense* Mez**

FPS 3: 497 (1956) {Imatong Mountains}; JACKSON 1956: 355 {Talanga, Lotti}; FWTA 3,2: 434 (1972); FTEA, Gramin. 3: 492 (1982).

Imatong Mountains group, Sudan side: Lotti, no alt., along path, 11.10.1938, *Myers* 9658 (K, WM); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 29.11.1980, *Friis & Vollesen* 551 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: Guinée to Ethiopia, south to South Africa; also in Madagascar and Comoro Islands.

***Panicum deustum* Thunb.**

FTA 9: 651 (1920); FPS 3: 497 (1956); FWTA 3,2: 435 (1972); FTEA, Gramin. 3: 468 (1982); FSo 4: 220 (1995); FE 7: 206 (1995).

Imatong Mountains group, Sudan side: Talanga, 1000 m., forest edge between *Combretum* woodland and closed forest, no date, *Jackson* 482 (K); Kinyeti Valley, Hiliu, 700 m., cultivation west of Kinyeti River, 11.12.1983, *Kielland-Lund* 303 (C, NLH); Kinyeti Valley, 12 km. south of Hiliu along Katire road (4° 09' N, 32° 41' E), no alt., 1.6.1984, *Kielland-Lund* 821 (C, NLH); Katire, at Kinyeti River, 1070 m., 15.12.1935, *Thomas* 1561 (BM, K); Kinyeti Valley above Katire, 1200 m., woodland with *Combretum molle*, *Cussonia arborea*, *Stereospermum kunthianum*, *Erythrina abyssinica*, *Entada abyssinica*, etc., 24.3.1982, *Friis & Vollesen* 1307 (C).

Imatong Mountains group, Uganda side: Agoro, no alt., in dry gullies on hillsides among thicket growth below bamboo zone, 6.1942, *Eggeling* 5130 (EA).

General habitat range: in lowland and medium-altitude forest and evergreen bushland.

General distribution: Uganda, South Sudan, Ethiopia and North Somalia, south to South Africa.

***Panicum griffonii* Franch.**

FTA 9: 691 (1920); FG 5: 71 (1962); FWTA 3,2: 433 (1972); FTEA, Gramin. 3: 479 (1982).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, Friis & Vollesen 585 (C, K, KHF).

General habitat range: in lowland woodland associated with rocky outcrops.

General distribution: Senegal to South Sudan, south to Angola and Tanzania. First record from the Sudan.

***Panicum hymenochilum* Nees**

FWTA 3,2: 429 (1972); FTEA, Gramin. 3: 470 (1982); FE 7: 358 (1995).

Syn.: *Panicum snowdenii* C.E. Hubb.

Imatong Mountains group, Uganda side: in grass bog near Aringa River in hills above Agoro, 1830 m., 6.1942, Eggeling 5086 (MHU).

General habitat range: in lowland, medium-altitude and montane moist grassland and along rivers.

General distribution: Guinée to Ethiopia, south to South Africa; also in Madagascar.

Note: Not cited from North Uganda in FTEA; the specimen at MHU is the only documentation of the record.

***Panicum infestum* Peters**

FTA 9: 658 (1920); WICKENS 1976: 180; FTEA, Gramin. 3: 472 (1982); FSo 4: 220 (1995); FE 7: 198 (1995).

Imatong Mountains group, Uganda side: north of Okako, south of Mingaro, no alt., montane grassland, 9.6.1973, Katende 1866 (MHU).

General habitat range: in lowland and medium-altitude grassland, bushland and deciduous woodland.

General distribution: Congo [previously Zaire] and Uganda to South Ethiopia and Somalia, south to South Africa.

***Panicum issongense* Pilg.**

FTEA, Gramin. 3: 495 (1982).

Imatong Mountains group, Sudan side: Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, swamp along brook in forest, 6.12.1980, Friis & Vollesen 729 (BR, C, K, KHF).

General habitat range: in lowland and medium-altitude forest.

General distribution: South Sudan and Uganda to Kenya and Tanzania. First record from the Sudan.

***Panicum maximum* Jacq.**

FTA 9: 655 (1920); FPS 3: 497 (1956); FG 5: 64 (1962); FWTA 3,2: 429 (1972); WICKENS 1976: 180; FTEA, Gramin. 3: 471 (1982); FE 7: 198 (1995); HYF: 374 (1997).

Imatong Mountains group, Sudan side: without further locality, 1830 m., 2.1936, Johnston 1414 (EA); Palotaka, 1200 m., 1979, Shigeta 59 (EA, identified and listed by M.G. Gilbert, not traced); Kinyeti Valley, Hiliu, at compound, 700 m., open grassy area or among grass under trees, 2.12.1983, Kielland-Lund 174 (C, NLH) & 175 (C, NLH); Katire, 1000 m., in *Grewia mollis* wooded grassland, no date, Jackson 465 (K); Katire, on rocky slope, no date, Babiker Beshir 33 (K).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt. 27.8.1953, Peers K029 (K, WM); Kapoeta-Torit road, no alt., *Acacia-Combretum* woodland, 8.4.1952, J.H. Davies E18 (K).

General habitat range: in lowland, medium-altitude and montane deciduous woodland, often regularly burnt, and in deciduous bushland.

General distribution: Senegal to Ethiopia, south to South Africa; also in Madagascar and tropical Arabia, and now widely introduced throughout the tropics.

Panicum monticola Hook. f.

FTA 9: 722 (1920); FWTA 3,2: 433 (1972); FTEA, Gramin. 3: 494 (1982); FE 7: 209 (1995).

Imatong Mountains group, Sudan side: Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 15.11.1980, *Friis & Vollesen* 236 (C, K, KHF).

Imatong Mountains group, Uganda side: Agoro, 2140 m., montane forest, 14.11.1945, *Thomas* 4377 (K).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, near Moimoi, 1960 m., edge of forest, 21.1.1950, *Jackson* 1101 (K, WM).

General habitat range: in medium-altitude and montane forest and evergreen bushland.

General distribution: Guinée to Ethiopia, south to South Africa. First record from the Sudan.

Panicum nervatum (Franch.) Stapf

FTA 9: 669 (1920); FG 5: 68 (1962); FTEA, Gramin. 3: 475 (1982); FE 7: 206 (1995).

Syn.: *Panicum baumannii* K. Schum.: FWTA 3,2: 431 (1972). *Panicum fulgens* Stapf: FTA 9: 668 (1920); FPNA 3: 103 (1955); FPS 3: 499 (1956).

Imatong Mountains group, Uganda side: Agoro, 2140 m., grassland, 14.11.1945, *Thomas* 4382 (EA, K).

General habitat range: in lowland, medium-altitude and montane woodland and grassland.

General distribution: Guinée to Sudan and South West Ethiopia, south to Angola and Zimbabwe.

Panicum pusillum Hook. f.

FTA 9: 725 (1920); FPS 3: 505 (1956) {Imatong Mountains, Itibol}; FWTA 3,2: 433 (1972); WICKENS 1976: 181; FTEA, Gramin. 3: 490 (1982); FE 7: 204 (1995).

Imatong Mountains group, Sudan side: Upper Talanga Tea project, 1800 m., upland grassland, 11.1981, *Howard* UTT 12 (C, K); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Cro-*

ton and *Ocotea*, on moist slope along trail, 8.11.1980, *Friis & Vollesen* 25 (C, K, KHF); Itibol, 1950 m., in dry scrub, 20.12.1935, *Thomas* 1715 A (BM, K).

General habitat range: in medium-altitude and montane grassland and evergreen bushland, often in wet flushes on rocky outcrops, sometimes also in open forest.

General distribution: Sierra Leone to Ethiopia, south to Malawi and Tanzania.

Panicum subalbidum Kunth

FWTA 3,2: 434 (1972); WICKENS 1976: 181; FTEA, Gramin. 3: 484 (1982); FSo 4: 222 (1995); FE 7: 201 (1995).

Syn.: *Panicum longijubatum* Stapf: FTA 9: 718 (1920). *Panicum glabrescens* Steud.: FTA 9: 736 (1920); FPS 3: 505 (1956).

Imatong Mountains group, Sudan side: along Ngairigi River, 1600 m., alluvial land near the stream, 8.1.1950, *Jackson* 1034 (K, WM); Gilo to Mt. Konoro, 1850 m., seepage meadow on edge between upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea* and grassland with *Loudetia arundinacea*, 18.11.1980, *Friis & Vollesen* 318 (C, K, KHF).

General habitat range: in lowland, medium-altitude and montane swamps, at lakes and along rivers.

General distribution: Mauritania and Senegal to Ethiopia, south to South Africa.

Panicum tenellum Lam.

Syn.: *Panicum lindleyanum* Steud.: FTA 9: 673 (1920); FWTA 3,2: 431 (1972); FTEA, Gramin. 3: 475 (1982).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 30.11.1980, *Friis & Vollesen* 584 (C, K, KHF).

General habitat range: in shallow pools and wet flushes over rocky outcrops and ironstone pans in woodland.

General distribution: Senegal to South Sudan, also in Zambia. First record from the Sudan.

***Panicum trichocladum* K. Schum.**

FTA 9: 659 (1920); FPS 3: 499 (1956); FTEA, Gramin. 3: 473 (1982); FE 7: 207 (1995).

Imatong Mountains group, Uganda side: Lututuru, at streamside, no alt., rambling over bushes, 6.1942, *Eggeling* 5029 (MHU).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, no alt., scrambling at forest edge, 6.12.1970, *C.R. Field* 20 (EA).

General habitat range: in lowland, medium-altitude and montane forest.

General distribution: Congo [previously Zaire] to Ethiopia, south to Tanzania and Mozambique.

***Panicum weihei* Renv.**

FTEA, Gramin. 3: 499 (1982); FE 7: 207 (1995).

Imatong Mountains group, Sudan side: Gilo, 1850 m., edge of upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 8 (BR, C, K, KHf); Katire to Itibol, near Itibol, 2000 m., edge of forest, 17.12.1935, *Thomas* 1645 (BM, K).

Imatong Mountains group, Uganda side: streambed above Agoro, no alt., scrambling on edge of stream-side bushes, 6.1942, *Eggeling* 5110 (K).

Didinga Mountains: Nagichot, 1980 m., at forest edge, 26.4.1939, *Myers* 11,142 (K).

General habitat range: at margins and in clearings of medium-altitude and montane forest and riverine woodland.

General distribution: South Sudan, Uganda and Malawi.

***Paspalum* L.**

***Paspalum scrobiculatum* L.**

FS: 457 (1929); FG 5: 43 (1962); WICKENS 1976: 181; FTEA, Gramin. 3: 610 (1982); FE 7: 233 (1995); HYF: 382 (1997).

Syn.: *Paspalum commersonii* Lam.: FPS 3: 509 (1956). *Paspalum scrobiculatum* L. var. *commersonii* (Lam.) Stapf: FTA 9: 573 (1920); FS: 457 (1929); FG 5: 43 (1962). *Paspalum polystachyum* R. Br.: FPS 3: 509 (1956); FWTA 3,2: 446 (1972). *Paspalum orbiculare* G. Forster: FWTA 3,2: 446 (1972).

Imatong Mountains group, Sudan side: 3 km. south of Torit, near Iyedo River, 650 m., 13.12.1983, *Kielland-Lund* 319 (NLH); Katire, along Kinyeti River, 1070 m., 15.12.1935, *Thomas* 1566 (BM, K).

Didinga Mountains: between Iwowa and Nagichot, 1960 m., wooded grassland, 24.4.1939, *Myers* 11093 (K).

General habitat range: in lowland, medium-altitude and montane open habitats, usually associated with disturbance, trampling or cultivation.

General distribution: Mauritania and Senegal to Ethiopia, south to South Africa; throughout the Old World tropics.

***Pennisetum* Rich.**

(Syn.: *Beckeropsis* Fig. & De Not.)

***Pennisetum macrourum* Trin.**

FTA 9: 1068 (1934); FTEA, Gramin. 3: 689 (1982); FSo 4: 245 (1995); FE 7: 271 (1995); HYF: 385 (1997).

Syn.: *Pennisetum giganteum* A. Rich.: FTA 9: 979 (1934); FPS 3: 512 (1956) {Imatong Mountains}; FWTA 3,2: 461 (1972); WICKENS 1976: 181.

Imatong Mountains group, Sudan side: Luluba Hills, Khor Leiforo, no alt., 25.9.1938, *Myers* 9473 (K); Katire, Kinyeti River, 1070 m.,

15.12.1935, *Thomas* 1560 (K); Gilo, 1800 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, forming large stands at small tributary to Ngairigi River, 20.11.1980, *Friis & Vollesen* 361 (BR, C, K, KHF).

Imatong Mountains group, Uganda side: foothills of Imatong Mountains, near Lututuru, no alt., at stream edge on sand, 12.1943, *Eggeling* 5479 (EA); Agoro, 1380 m., river-bed, 13.11.1945, *Thomas* 4370 (EA, K).

General habitat range: in lowland, medium-altitude and montane reed swamps along rivers and streams.

General distribution: Guinée to Ethiopia and North Somalia, south to South Africa (Cape Prov.); also in tropical Arabia.

***Pennisetum polystachion* (L.) Schult.**

FTA 9: 1057 (1934); FS: 467 (1929); FPS 3: 517 (1956); FG 5: 97 (1962); FWTA 3,2: 460 (1972); WICKENS 1976: 181; FTEA, Gramin. 3: 679 (1982); FE 7: 262 (1995).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., woodland, 1979, *Shigeta* 48 (EA, identified and listed by M.G. Gilbert, not traced); Torit, 620 m., open places, 29.1949, *Jackson* 873 (K); Kinyeti valley, Hiliu, in compound, 700 m., 30.11.1983, *Kielland-Lund* 114 (C, NLH); Katire, 1000 m., paths in cultivation, 5.11.1948, *Jackson* 477 (K).

Lafit, Dongotona and Nangeya Mountains: above Murikuren [4° 15' N, 33° 07' E], 1350 m., woodland, 20.1.1950, *Jackson* 1068 (K).

General habitat range: in lowland, medium-altitude and montane swamp grassland, roadsides, and disturbed places.

General distribution: Senegal to Ethiopia, south to South Africa; throughout the tropics.

***Pennisetum procerum* (Stapf) W.D. Clayton**
FTEA, Gramin. 3: 682 (1982).

Syn.: *Beckeropsis procerum* Stapf: FTA 9: 951 (1034).

Lafit, Dongotona and Nangeya Mountains: Nan-

geya Mountains, Mt. Lonyili, 2290 m., crevices between rocks on mountain summit, 26.8.1966, *Lock* K 19 (EA, MHU).

General habitat range: in clefts in rocky outcrop at medium and high altitudes.

General distribution: Uganda and Kenya.

***Pennisetum purpureum* Schumach.**

FTA 9: 1016 (1934); FS: 468 (1929); CHIPP 1929: 194; FPS 3: 514 (1956); JACKSON 1956: 352, forest margins; FG 5: 94 (1962); FWTA 3,2: 461 (1972); FTEA, Gramin. 3: 677 (1982); FE 7: 263 (1995).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., 3.1.1984, *Kielland-Lund* 543 (C, NLH); Mongalla, Odouro, Cromvarilo (3° 50' N, 32° 40' E), 1390 m., one of the common constituents of the tall, fire-swept grassland, 7.2.1929, *Chipp* 29 (K); Acholi Plain near Ateppi, Farajok, 800 m., 1.10.1948, *Jackson* 358 (K); Kinyeti Valley, Hiliu, below compound, 700 m., tall, regenerating grass near river, 2.12.1983, *Kielland-Lund* 172 (C, NLH) & 173 (C, NLH); Katire to Gilo, at road to Itibol, 1400 m., wooded grassland with *Combretum molle*, *C. collinum*, *Entada abyssinica* and *Erythrina abyssinica*, the grasses *Pennisetum purpureum* and *Hyparrhenia rufa* dominant, 12.11.1980, *Friis & Vollesen* 170 (BR, C, K).

General habitat range: in lowland, medium-altitude and montane tall-grass grassland, often in riverine habitats and at forest margins, invading forest clearings.

General distribution: Guinée to Ethiopia, south to South Africa; introduced throughout the tropics.

***Pennisetum ramosum* (Hochst.) Schweinf.**

FTA 9: 976 (1934); FPS 3: 512 (1956); FWTA 3,2: 460 (1972); WICKENS 1976: 182; FTEA, Gramin. 3: 684 (1982); FE 7: 267 (1995).

Imatong Mountains group, Uganda side: north of Madi Opei, no alt., 11.1970, *D. Field* 2075 A (EA).

Lafit, Dongotona and Nangeya Mountains: 800 m. south east of Lafon (5° 02' N, 32° 27-28' E), 28.12.1983, *Kielland-Lund* 497 (C, NLH).

Didinga Mountains: 8 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K06 (K, WM).

General habitat range: in lowland and medium-altitude grassland, often along roadsides and a weed in cultivations.

General distribution: Nigeria to Ethiopia, south to Tanzania.

***Pennisetum thunbergii* Kunth**

FTA 9: 997 (1934); FTEA, Gramin. 3: 687 (1982); FE 7: 269 (1995); HYF: 385 (1997).

Syn.: *Pennisetum adoense* Steud.: FTA 9: 998 (1934); FPS 3: 513 (1956) {Didinga Mountains, Nagichot}. *Pennisetum glabrum* Steud.: FTA 9: 995 (1934); FPS 3: 512 (1956); FWTA 3,2: 463 (1972).

Imatong Mountains group, Uganda side: above Agoro, near Aringa River, 1890 m., grass glade in *Podocarpus latifolius* forest, 6.1942, *Eggeling* 5087 (EA).

Didinga Mountains: Nagichot, 1830 m., along path, 28.10.1941, *Myers* 14,201 (K).

General habitat range: in medium-altitude and montane grassland, and in disturbed areas.

General distribution: Nigeria to Ethiopia, south to South Africa (Cape Prov.); also in tropical Arabia and Sri Lanka.

***Pennisetum trachyphyllum* Pilg.**

FTA 9: 967 (1934); FPS 3: 511 (1956) {Imatong Mountains}; FWTA 3,2: 461 (1972); FTEA, Gramin. 3: 682 (1982); FE 7: 272 (1995).

Imatong Mountains group, Sudan side: Issore to Laboni, at Issore, 1430 m., riverine forest, 21.12.1935, *Thomas* 1729 (BM, K); near Issore, 1340 m., in gallery forest, 3.8.1939, *Myers* 11,779 (K).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, peak of Mt. Lonyili, 1800 m.,

forest understorey, 4.12.1971, *Katende* 1396 (EA, MHU).

General habitat range: in medium-altitude and montane forest, especially in clearings and at margins.

General distribution: Cameroon to Ethiopia, south to Congo [previously Zaire] and Tanzania.

***Pennisetum unisetum* (Nees) Benth.**

FS: 468 (1929); FTEA, Gramin. 3: 681 (1982); FE 7: 273 (1995); HYF: 385 (1997).

Syn.: *Beckeropsis uniseta* (Nees) K. Schum.: FTA 9: 949 (1934); FPS 3: 401 (1956); FG 5: 100 (1962); FWTA 3,2: 457 (1972); WICKENS 1976: 168.

Imatong Mountains group, Sudan side: without further locality, no alt., 2.1936, *Johnston* 1460 (EA, K); Acholi Plains, Farajok (3° 52' N, 32° 38' E), 800 m., *Acacia* grassland, 1.10.1948, *Jackson* 359 (K); Talanga, 1000 m., woodland with *Combretum*, *Vitex*, *Annona*, etc., 8.11.1948, *Jackson* 484 (K); Kinyeti Valley, Hiliu, near compound, 700 m., near small stream, 3.12.1983, *Kielland-Lund* 203 (C, NLH); Bushbuck Hill, 2150 m., edge of *Hagenia abyssinica* woodland in *Loudetia arundinacea* grassland with scattered trees, much *Agauria* and *Nuxia*, 10.11.1980, *Friis & Vollesen* 129 (C, K, KHF).

Imatong Mountains group, Uganda side: Lomwaga, 2350 m., below *Podocarpus latifolius* forest, 6.1942, *Eggeling* 5036 (MHU).

Lafit, Dongotona and Nangeya Mountains: River Inowu, 1300 m., in gallery forest, 20.1.1950, *Jackson* 1069 (K).

Didinga Mountains: Chukudum Regional District Centre (4° 14' N, 33° 29' E), 1100 m., 16.12.1983, *Kielland-Lund* 327 (C, NLH).

General habitat range: in lowland, medium-altitude and montane grassland, bushland and woodland, often at forest edges or among bushes in light shade.

General distribution: Senegal to Ethiopia, south to South Africa (Natal); also in tropical Arabia.

Pentaschistis (Nees) Stapf**Pentaschistis pictigluma** (Steud.) Pilg.

WICKENS 1976: 182; FE 7: 70 (1995); HYF: 353 (1997).

Syn.: *Pentaschistis imatongensis* C.E. Hubb.: FPS 3: 519 (1956) {Imatong Mountains, Mt. Kinyeti}; FTEA, Gramin. 1: 128 (1970).

Imatong Mountains group, Sudan side: Mt. Kinyeti, 3050 m., rocky summit, 30.12.1935, Thomas 1834 (K, holotype of *P. imatongensis*; BM, isotype); Mt., Kinyeti, summit, 3180 m., no date, Jackson 918 (K); Mt. Kinyeti, summit area, 3150 m., rocky area with montane grassland and scattered, low ericaceous scrub, low shrubs and herbs in rock crevices, 13.12.1980, Friis & Vollesen 835 (C, K).

General habitat range: in high altitude grassland.

General distribution: Cameroon, Sudan (Jebel Marra, Imatong Mountains), Ethiopia, Uganda, Kenya, Tanzania; also in tropical Arabia.

Perotis Aiton**Perotis patens** Gand.

FPS 3: 519 (1956); FWTA 3,2: 411 (1972); FTEA, Gramin. 2: 394 (1974); FSo 4: 217 (1995); FE 7: 182 (1995).

Imatong Mountains group, Sudan side: without further locality, 1380 m., stony paths, 2.1936, Johnston 1412 (EA, K); Torit district, Opari rest house, no alt., 8.6.1939, Andrews 1689 (K); Kinyeti Valley, Hiliu, below compound, 700 m., along path in fertile soil near river, 2.12.1983, Kielland-Lund 171 (C, NLH).

Didinga Mountains: 35 km. south west of Kapoeta on road to Torit, no alt., 29.8.1953, Peers T010 (K, WM).

General habitat range: in lowland and medium-altitude habitats, often in disturbed places in sandy or stony soil.

General distribution: Ivory Coast to Ethiopia and North Somalia, south to South Africa (Transvaal, Natal); also in Madagascar.

Phragmites Adans.**Phragmites karka** (Retz.) Steud.

FTEA, Gramin. 1: 118 (1970); FWTA 3,2: 374 (1972); WICKENS 1976: 182; FSo 4: 158 (1995); FE 7: 65 (1995); HYF: 353 (1997).

Syn.: [*Phragmites mauritianus* auct., non Kunth, pro parte: FTA 10: 155 (1937); FPS 3: 519 (1956).

Imatong Mountains group, Sudan side: near bridge south of Torit (4° 23' N, 32° 36' E), 650 m., 13.12.1983, Kielland-Lund 320 (C, NLH); Katire, at Kinyeti River, 910 m., on river bank, 16.12.1935, Thomas 1598 (BM, K).

General habitat range: in lowland and medium-altitude habitats on banks of streams and rivers and at lake shores.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in Madagascar, Mauritius and tropical Arabia.

Poa L.**Poa schimperiana** A. Rich.

HEDBERG 1957: 41; FWTA 3,2: 369 (1972); FTEA, Gramin. 1: 48 (1970); FE 7: 21 (1995); HYF: 347 (1997).

Syn.: [*Poa leptoclada* auct., non Hochst. ex A. Rich.: FPS 3: 521 (1956) {Imatong Mountains, Itibol}; WICKENS 1976: 182, pro parte].

Imatong Mountains group, Sudan side: Itibol to Isore, at Itibol, 1950 m., scrub, 20.12.1935, Thomas 1706 (BM, K); Gilo, at bridge across Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, on moist slope along trail, 9.11.1980, Friis & Vollesen 103 (BR, C, K, KHF).

General habitat range: in montane grassland

and at forest edges, usually in damp and shady places.

General distribution: North Nigeria and Cameroon to Ethiopia, south to Zimbabwe; also in tropical Arabia.

Poecilostachys Hack.

Syn.: *Chloachne* Stapf

Poecilostachys oplismenoides (Hack.) W.D. Clayton

CLAYTON 1987: 403; FE 7: 194 (1995).

Syn.: *Chloachne oplismenoides* (Hack.) Robyns: FWTA 3,2: 436 (1972); FTEA, Gramin. 3: 545 (1982). *Chloachne secunda* Stapf: FTA 9: 489 (1919).

Imatong Mountains group, Sudan side: Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 59 (BR, C, K, KHF); Gilo, 2000 m., in *Podocarpus latifolius* forest, 6.5.1954, *Jackson* 3144 (KHF); between Gilo and Dumuso, 2100 m., *Podocarpus latifolius* forest, 8.5.1954, *Jackson* 3137 (K); Bushbuck Hill, 2150 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochsteteri* and *Syzygium guineense* subsp. *afromontanum*, 10.11.1980, *Friis & Vollesen* 121 (BR, C, KHF).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2200 m., *Podocarpus latifolius* forest with *Dracaena afromontana*, 21.1.1950, *Jackson* 1085 (K).

General habitat range: in medium-altitude and montane forest, damp places in deep shade.

General distribution: Nigeria to Ethiopia, south to Zimbabwe, Malawi and Mozambique. First record from the Sudan.

Pseudechinolaena Stapf

Pseudechinolaena polystachya (Kunth) Stapf
FTA 9: 495 (1919); FG 5: 25 (1962); FWTA 3,2:

436 (1972); FTEA, Gramin. 3: 547 (1982); FE 7: 194 (1995).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1750 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 9.11.1980, *Friis & Vollesen* 91 (C, K, KHF); Gilo, 2000 m., *Podocarpus latifolius* forest, 6.5.1954, *Jackson* 3144 (K).

Imatong Mountains group, Uganda side: hills west of Agoro, 1980 m., in *Podocarpus latifolius* forest, 6.1942, *Eggeling* 5093 (EA).

General habitat range: in lowland, medium-altitude and montane forest, in shade.

General distribution: Guinée to Ethiopia, south to South Africa (Natal); widespread in the tropics of the Old and New World. First record from the Sudan.

Pseudobromus K. Schum. See **Festuca** L.

Rhynchelytrum Nees See **Melinis** P. Beauv.

Rottboellia L. f.

Rottboellia cochinchinensis (Lour.) W.D. Clayton

FTEA, Gramin. 3: 853 (1982); FSo 4: 270 (1995); FE 7: 365 (1995); FE 7: 365 (1995); HYF: 395 (1997).

Syn.: *Rottboellia exaltata* L.f. (1781), non (L.) L.f. (1779): FTA 9: 73 (1917); FS: 441 (1929); FPNA 3: 42 (1955); FPS 3: 523 (1956); FG 5: 134 (1962); FWTA 3,2: 506 (1972); WICKENS 1976: 183.

Imatong Mountains group, Sudan side: Acholi Plains, Farajok [3° 52' N, 32° 38' E], 800 m., *Acacia* woodland, 1.10.1948, *Jackson* 361 (K); Kinyeti Valley, Hiliu, near compound, 700 m., in cultivation, *Kielland-Lund* 202 (C, NLH); Katire, 1000 m., *Albizia zygia* woodland, no date, *Jackson* 417 (K).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, *Eggeling* 5120 (EA).

Didinga Mountains: 16 km. south west of Kapoeta, on road to Torit, no alt., 29.8.1953, *Peers* T04 (K).

General habitat range: in disturbed places in open grassland, in abandoned farmland and as a weed in cultivations at lowland and medium-altitudes.

General distribution: Throughout the Old World tropics; introduced to the Caribbean.

{Imatong Mountains, Katire}; FWTA 3,2: 479 (1972).

Imatong Mountains group, Sudan side: Katire to Itibol, at Katire, 1430 m., 17.12.1935, *Thomas* 1611 (K).

General habitat range: in lowland, medium-altitude and montane grassland, moist woodland and in forest clearings.

General distribution: Guinée to Ethiopia, south to South Africa (Transvaal, Natal); also in tropical Asia and America.

Sacciolepis Nash

Sacciolepis indica (L.) Chase

FTEA, Gramin. 3: 458 (1982); FE 7: 195 (1995); FE 7: 195 (1995).

Syn.: *Sacciolepis auriculata* Stapf: FTA 9: 762 (1920); FPS 3: 526 (1956); FWTA 3,2: 425 (1972).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, *Friis & Vollesen* 571 (C, K, KHF).

General habitat range: in lowland and medium-altitude swamps, moist grassland and along streams.

General distribution: Guinée to Ethiopia, south to South Africa (Natal); widespread in the Old World tropics.

Schizachyrium Nees

Schizachyrium brevifolium (Sw.) Büse

FTA 9: 187 (1917); FPS 3: 527 (1956); FG 5: 156 (1962); FWTA 3,2: 478 (1972); WICKENS 1976: 183; FTEA, Gramin. 3: 754 (1982); FE 7: 317 (1995).

Syn.: *Schizachyrium brevifolium* (Sw.) Büse var. *flaccidum* (A. Rich.) Stapf: FPS 3: 527 (1956)

Sehima Forssk.

Sehima nervosum (Rottler) Stapf

FTA 9: 36 (1917); FPS 3: 531 (1956) {Kapoeta}; FTEA, Gramin. 3: 750 (1982); FSo 4: 258 (1995); FE 7: 316 (1995); HYF: 390 (1997).

Imatong Mountains group, Uganda side: Agoro, no alt., dry hillsides and between *Setaria* on black cotton soil, 6.1942, *Eggeling* 5131 (EA, MHU).

Didinga Mountains: 22 km. west of Kapoeta, no alt., stony grassland, 25.8.1940, *Myers* 13,446 (K); south of Kapoeta, no alt., 28.8.1951, *Babiker Beshir* 23 (K, WM); south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* KM15 (WM); Torit-Kapoeta road, no alt., 8.4.1952, *J.H. Davies* E2 (K).

General habitat range: in lowland and medium-altitude deciduous bushland and subdesert grassland.

General distribution: Sudan to Ethiopia and North Somalia, south to Zambia, Zimbabwe and Malawi; also in tropical Arabia.

Setaria P. Beauv.

Syn: *Cymbosetaria* Schweick.

Setaria atrata Hack.

FTA 9: 812 (1930); FPS 3: 534 (1956); JACKSON

1956: 369, as "*Setaria strata*"; FTEA, Gramin. 3: 524 (1982); FE 7: 236 (1995).

Imatong Mountains group, Sudan side: below Kipia, no alt., mountain moor, no date, Myers 11,696 (K).

Imatong Mountains group, Uganda side: near Aringa River in hills above Agoro, 1830 m., in grass bog, 6.1942, Eggeling 5082 (EA, K).

General habitat range: in medium-altitude and montane swamp grassland.

General distribution: Sudan to Ethiopia, south to Malawi.

***Setaria barbata* (Lam.) Kunth**

FTA 9: 854 (1930); FPS 3: 537 (1956); FWTA 3,2: 424 (1972); WICKENS 1976: 184; FTEA, Gramin. 3: 536 (1982); FE 7: 241 (1995); HYF: 375 (1997).

Didinga Mountains: near Kapoeta, no alt., *Acacia* woodland, 30.8.1941, Myers 13,977 (K); 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, Peers K032 (K, WM).

General habitat range: in lowland and medium-altitude bushland and grassland, usually in seasonally damp places.

General distribution: Senegal to Sudan, south to Angola and Tanzania; also in Mauritius and in tropical Asia, including tropical Arabia.

***Setaria homonyma* (Steud.) Chiov.**

FTEA, Gramin. 3: 536 (1982); FE 7: 241 (1995).

Syn.: *Setaria kialaensis* Vanderyst: FPNA 3: 118 (1955). *Setaria lancea* Massey: FTA 9: 857 (1930); FPS 3: 538 (1956).

Imatong Mountains group, Uganda side: north of Madi Opei, no alt., 11.1970, D. Field 2078 (EA).

General habitat range: in disturbed places and as a weed in cultivations at lowland, medium and montane altitudes.

General distribution: Cameroon to Ethiopia, south to South Africa; also in India.

***Setaria incrassata* (Hochst.) Hack.**

FTA 9: 790 (1930); WICKENS 1976: 184; FTEA, Gramin. 3: 525 (1982); FSo 4: 233 (1995); FE 7: 237 (1995).

Syn.: *Setaria ciliolata* Stapf & C.E. Hubb.: FTA 9: 807 (1930); FWTA 3,2: 423 (1972). *Setaria lyne-sii* Stapf & C.E. Hubb.: FTA 9: 786 (1930); FPS 3: 533 (1956).

Imatong Mountains group, Uganda side: Agoro, no alt., 6.1942, Eggeling 5134 (EA); north of Madi Opei, 1100 m., *Acacia* woodland, 16.8.1972, D. Field 2103 (EA).

Lafit, Dongotona and Nangeya Mountains: Lafon Regional District Centre, no alt., 29.12.1983, Kielland-Lund 521 (C, NLH).

Didinga Mountains: 16 km. south west of Kapoeta, flood plain, no alt., 25.8.1940, Myers 13,444 (K); near Kapoeta, Alokapay, no alt., 22.8.1951, Babiker Beshir 19 (K).

General habitat range: in lowland, medium-altitude and montane grassland, often on black cotton soil, and in forest.

General distribution: Nigeria to Ethiopia and South Somalia, south to South Africa.

***Setaria kagerensis* Mez**

FTA 9: 852 (1930); FPNA 3: 118 (1955); FTEA, Gramin. 3: 538 (1982).

Imatong Mountains group, Sudan side: Katire, 900 m., swamp area along stream, 17.6.1958, Jackson 3887 (EA, K).

General habitat range: in riverine forest and riparian wooded grassland and bushland at lowland, medium-altitude and montane altitudes.

General distribution: East Congo [previously Zaire] and Sudan to Uganda and Kenya, south to Tanzania.

***Setaria longiseta* P. Beauv.**

FTA 836 (1930); FPS 3: 536 (1956); FWTA 3,2: 423 (1972); FTEA, Gramin. 3: 535 (1982); FE 7: 241 (1995).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., 1979, Shigeta 165 (EA, identified and

listed by M.G. Gilbert, not traced); Imeila forest, 750 m., forest edge, 27.5.1949, *Jackson* 771 (K).

General habitat range: in medium-altitude and montane deciduous bushland and woodland.

General distribution: Guinée to Sudan, south to Angola and Zimbabwe.

Setaria megaphylla (Steud.) T. Durand & Schinz

FTA 9: 840 (1930); FPS 3: 536 (1956); FG 5: 81 (1962); FWTA 3,2: 424 (1972); FTEA, Gramin. 3: 539 (1982); FSo 4: 234 (1995); FE 7: 242 (1995).

Syn.: *Setaria chevalieri* Stapf: FPNA 3: 115 (1955); FPS 3: 537 (1956). *Setaria plicatilis* (Hochst.) Engl.: WICKENS 1976: 184; FTEA, Gramin. 3: 538 (1982); HYF: 376 (1997).

Imatong Mountains group, Sudan side: Talanga, 1000 m., along old road in forest, 28.12.1949, *Jackson* 1013 (K); Kinyeti Valley, 14 km. south of Hiliu on Katire road, 700 m., roadside in wet savanna, 7.12.1983, *Kielland-Lund* 257B (C, NLH); Gilo, along path in forest, 1900 m., 10.5.1954, *Jackson* 3179 (K, KHF).

Imatong Mountains group, Uganda side: Agoro, 2130 m., forest edge, 14.11.1945, *Thomas* 4028 (EA, K).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1800 m., edge of forest, 17.5.1972, *Synnott* 988 (EA, MHU).

General habitat range: in lowland and medium-altitude forest, especially along edges and trails, in clearings and in damp places.

General distribution: Senegal to Ethiopia and North Somalia, south to South Africa; also in tropical Arabia and India.

Note: As pointed out in the notes of the FTEA, “*S. plicatilis* differs [only] from *S. megaphylla* in its smaller size and limited geographical distribution [!] ... the two species intergrade to such an extent that they are often difficult to identify, and their claim to separate recognition is

questionable.” For these reasons, the two taxa have not been kept separate here.

Setaria poiretiana (Schult.) Kunth

FTEA, Gramin. 3: 540 (1982); FE 7: 243 (1995).

Syn.: *Setaria candula* Stapf: FTA 9: 845 (1930); FPS 3: 337 (1956); FWTA 3,2: 424 (1972).

Imatong Mountains group, Sudan side: Mt. Nargi, 1830-2130 m., 14.6.1939, *Andrews* 1958 (K); Gilo, no alt., in plantation (originally *Podocarpus latifolius-Olea capensis* subsp. *hochstetteri* forest), 2.3.1950, *Jackson* 1176 (K); Gilo, 1850 m., upland rain forest with *Albizia*, *Macaranga*, *Croton* and *Ocotea*, 8.11.1980, *Friis & Vollesen* 65 (C, K).

General habitat range: in lowland, medium-altitude and montane forest, especially along edges and trails, in clearings and in damp places.

General distribution: Cameroon to Ethiopia, south to Tanzania.

Setaria pumila (Poir.) Roem. & Schult.

FTEA, Gramin. 3: 530 (1982); FSo 4: 234 (1995); FE 7: 238 (1995); HYF: 376 (1997).

Syn.: *Setaria pallide-fusca* (Schumach.) Stapf & C.E. Hubb.: FTA 9: 815 (1930); FPNA 3: 114 (1955); FPS 3: 535 (1956); FWTA 3,2: 423 (1972); WICKENS 1976: 184.

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, in compound, 700 m., 29.11.1983, *Kielland-Lund* 97 (C, NLH).

Imatong Mountains group, Uganda side: above Agoro, no alt., 6.1942, *Eggeling* 5108 (EA); Agoro, no alt., old cultivations, 6.1942, *Eggeling* 5127 (EA); Agoro, 1370 m., old farmland, 13.11.1945, *Thomas* 4371 (EA, K).

Lafit, Dongotona and Nangeya Mountains: Lafon Regional District Centre (5° 02' N, 32° 27-28' E), no alt., 29.12.1983, *Kielland-Lund* 520 (C, NLH); Nangeya Mountains, Mt. Lonyili, 2260 m., shallow soil over rock, 26.8.1966, *Lock* K 18 (MHU).

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K035 (K).

General habitat range: in disturbed and grazed places and as weed in cultivations at lowland, medium and montane altitudes.

General distribution: Throughout the tropical and warm temperate regions of the Old World.

Setaria sagittifolia (A. Rich.) Walp.

FTA 9: 862 (1930); FTEA, Gramin. 3: 533 (1982); FSo 4: 234 (1995); FE 7: 235 (1995); HYF: 376 (1997).

Syn.: *Cymbosetaria sagittifolia* (A. Rich.) Schweick.

Didinga Mountains: 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K030 (K, WM).

General habitat range: in lowland and medium-altitude deciduous bushland and woodland, often in sandy soil.

General distribution: Sudan to Ethiopia and South Somalia, south to South Africa; also in tropical Arabia.

Setaria sphacelata (Schumach.) Moss

FTA 9: 795 (1930); CHIPP 1929: 195; FPNA 3: 113 (1955); FPS 3: 533 (1956); FG 5: 86 (1962); FWTA 3,2: 423 (1972); WICKENS 1976: 184; FTEA, Gramin. 3: 527 (1982); FE 7: 238 (1995); HYF: 376 (1997).

var. **sericea** (Stapf) W.D. Clayton

FTEA, Gramin. 3: 529 (1982); FE 7: 238 (1995).

Imatong Mountains group, Sudan side: without further locality, 2130 m., 10.2.1936, *Johnston* 1502 (EA, K); Torit, Palwar rest house, 1000 m., disturbed grassland, 18.5.1949, *Jackson* 725 (EA, K); Upper Talanga Tea project, 1800 m., rocky outcrop, 11.1981, *Howard* UTT 10 (BR, C, K); Kinyeti Valley, 8 km. south of Hiliu along Katire road (4° 12' N, 32° 40' E), no alt., in savanna, 30.5.1984, *Kielland-Lund* 790 (C, NLH); Katire, no alt., hillside, 4.9.1951, *Babiker Beshir*

34 (K, WM); Katire, 1000 m., edge of cultivation, 5.11.1948, *Jackson* 476 (K); Gilo to Mt. Konoro, 1800 m., *Loudetia arundinacea* grassland with scattered trees, 24.11.1980, *Friis & Vollesen* 432 (BR, C, K, KHF); Dumuso, 2450 m., in shallow soil over rock, 31.5.1950, *Jackson* 1524 (K, KHF); above Lomuleng, 2650 m., mountain meadow, 26.7.1939, *Myers* 11,595 (K); east of Kipia, 2740 m., mountain meadow, one of the commonest constituents of the mountain meadows, 12.2.1929, *Chipp* 98 (K, WM).

Imatong Mountains group, Uganda side: Mt. Lomwaga, 2600 m., in crevices in rocks, 6.1942, *Eggeling* 5044 (EA, MHU).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2500 m., grassland, 21.1.1950, *Jackson* 1087 (K).

Didinga Mountains: Chukudum Regional District Centre (4° 14' N, 33° 29' E), 1100 m., 16.12.1983, *Kielland-Lund* 333 (C, NLH); Nagichot, 2040 m., upland grassland, 24.4.1939, *Myers* 11,098 (K); Nagichot Hill, 1830 m., 18.8.1951, *Babiker Beshir* 5 (K, WM); slope of Mt. Lotuke, 2150 m., grassland, 30.3.1950, *Jackson* 1346 (K).

General habitat range: in medium-altitude and montane grassland, robust and able to persist under grazing pressure.

General distribution: Guinée to Ethiopia, south to South Africa.

var. **aurea** (A. Br.) W.D. Clayton

FTEA, Gramin. 3: 528 (1982); FE 7: 238 (1995); HYF: 376 (1997).

Syn.: *Setaria aurea* A. Br.: FS: 465 (1929); FWTA 3,2: 423 (1972). *Setaria trinervia* Retz.: FTA 9:791 (1930); FPS 3: 533 (1956).

Imatong Mountains group, Sudan side: Abara between Loa and Magwe (4° 05' N, 32° 13' E), no alt., 6.6.1984, *Kielland-Lund* 867 (C, NLH); Talanga, 900 m., *Combretum* woodland, 28.5.1949, *Jackson* 809 (K).

Imatong Mountains group, Uganda side: Lomwaga, 2260 m., not common, 6.1942, *Eggeling*

5034 (EA); east of Lomwaga, above Agoro, west of Aringa valley, 2290 m., on ridge top, 6.1942, *Eggeling* 5052 (EA, MHU); north of Madi Opei, 1100 m., *Acacia* woodland, 16.8.1972, *Kertland* s.n. (MHU).

Didinga Mountains: slope of Mt. Lotuke, 1900 m., *Protea* grassland, 29.3.1950, *Jackson* 1315 (K).

General habitat range: As for var. *sericea*.

General distribution: Ivory Coast to Sudan, south to Zambia; also in tropical Arabia.

var. **splendida** (Stapf) W.D. Clayton

FTEA, Gramin. 3: 530 (1982).

Syn.: *Setaria splendida* Stapf: FTA 9: 799 (1930); FPS 3: 533 (1956).

Lafit, Dongotona and Nangeya Mountains: 10 km. west of Kidepo River, on alluvial apron of Dongotona Mountains, no alt., 27.8.1940, *Myers* 13,452 (K).

Didinga Mountains: south of Kapoeta on road to Torit, no alt., 29.8.1953, *Peers* T08 (WM).

General habitat range: As for var. *sericea*.

General distribution: South Sudan to South Africa. The species as a whole occurs in lowland, medium-altitude and montane grassland, bushland and woodland. The total distribution of the species agrees with the sum of the distribution areas of the varieties indicated here.

Setaria verticillata (L.) P. Beauv.

FTA 9: 824 (1930); FPS 3: 535 (1956); FWTA 3,2: 421 (1972); WICKENS 1976: 184; FTEA, Gramin. 3: 522 (1982); FSo 4: 233 (1995); FE 7: 236 (1995); HYF: 376 (1997).

Imatong Mountains group, Uganda side: Agoro, no alt., old cultivations, 6.1942, *Eggeling* 5123 (MHU).

Didinga Mountains: south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* KM21 (WM).

General habitat range: in lowland, medium-altitude and montane habitats disturbed by human activity.

General distribution: Mauritania to Ethiopia and

Somalia, south to South Africa; also throughout the tropical and warm temperate parts of other continents.

Sinarundinaria Nakai

Sinarundinaria alpina (K. Schum.) Nakai

Syn.: *Arundinaria alpina* K. Schum.: ITU: 151 (1952); FPS 3: 400 (1956) {Imatong Mountains, Kipia}; FTEA, Gramin. 1: 9 (1970); EL AMIN 1990: 455, Kipia; SOMMERLATTE 1990: 346, in mixed *Podocarpus latifolius* forest or in pure stands at around 2700 m., especially to the east and north of Mt. Kinyeti; KTSL: 646 (1994); FE 7: 3 (1995). *Arundinaria* sp. near *A. alpina* K. Schum.: CHIPP 1929: 194.

Imatong Mountains group, Sudan side: Kipia, 2670 m., common in ravines from 2600 to 3050 m., 11.2.1929, *Chipp* 94 (K, WM); Kipia, ravine forest, widely distributed, but not in large quantities, 2740 m., 30.12.1935, *Thomas* 1884 (BM, K); below summit of Mt. Kinyeti, on the north-western side of the peak, 2600 m., upland forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*, with patches of *Hagenia abyssinica* and *Hypericum revolutum* woodland, in small clumps at stream, 22.3.1982, *Friis & Vollesen* 1286 (C, KHF).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as "*Arundinaria alpina*"; specimen no. 17 documents this record).

General habitat range: in montane forest, often scattered in clumps, or forming dense thickets at the upper limit of montane forest.

General distribution: Cameroon to Ethiopia and Kenya, south to Tanzania and Malawi.

Sorghum Moench.**Sorghum arundinaceum** (Desv.) Stapf

FTA 9: 114 (1917); FS: 443 (1929); FG 5: 144 (1962); FWTA 3,2: 467 (1972); FTEA, Gramin. 3: 727 (1982); FSo 4: 252 (1995); FE 7: 299 (1995).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., open woodland, 5.1.1979, *Shigeta* 20 A (EA); Kinyeti Valley, Hiliu, bank by compound, 700 m., 30.11.1983, *Kielland-Lund* 111 (C, NLH); Hiliu, west of bridge on the Kinyeti River, 700 m., 12.12.1983, *Kielland-Lund* 307 (C, NLH).

Lafit, Dongotona and Nangeya Mountains: Lafon Regional Distric Centre, no alt., 29.12.1983, *Kielland-Lund* 522 (C, NLH).

Didinga Mountains: Longumu River north of Chukudum (4° 21' N, 33° 21' E), 900 m., 20.12.1983, *Kielland-Lund* 403 (C, NLH).

General habitat range: in lowland and medium-altitude rough grassland and woodland, especially on swampy soil and black cotton soil, also invading abandoned cultivations.

General distribution: Senegal to Ethiopia and Somalia, south to South Africa; also in South East Asia and tropical Australia.

Sorghum purpureo-sericeum (A. Rich.) Asch. & Schweinf.

FTA 9: 139 (1917); FS: 446 (1929); FPS 3: 543 (1956); FWTA 3,2: 467 (1972); FTEA, Gramin. 3: 730 (1982); FSo 4: 253 (1995); FE 7: 301 (1995).

Imatong Mountains group, Sudan side: Palotaka, 1200 m., 1200 m., open woodland, 5.1.1979, *Shigeta* 20 B (EA).

Didinga Mountains: 8 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K07 (K, WM).

General habitat range: in lowland and medium-altitude grassland on black cotton soil and on lakesides.

General distribution: Nigeria to Ethiopia and

South Somalia, south to Tanzania; also in India.

Sporobolus R. Br.**Sporobolus africanus** (Poir.) Robyns & Tour-
nay

FPNA 3: 143 (1955); FWTA 3,2: 410 (1972); FTEA, Gramin. 2: 375 (1974); FE 7: 149 (1995); HYF: 371 (1997).

Imatong Mountains group, Uganda side: Lututuru, 1470 m., dry roadside at *Pinus* plantation, and in dry sand pit, 7.6.1963, *Kertland* s.n. (MHU).

General habitat range: in medium-altitude and montane woodland and forest, always in disturbed sites, at road- and path-sides or in places subject to grazing.

General distribution: Cameroon to Ethiopia, south to South Africa; also in tropical Arabia, Sri Lanka, Hawaii and Easter Island.

Sporobolus angustifolius A. Rich.

FTEA, Gramin. 2: 377 (1974); WICKENS 1976: 185; FSo 4: 195 (1995); FE 7: 153 (1995); HYF: 371 (1997).

Didinga Mountains: Mt. Lotuke, Char, 1830 m., 19.4.1939, *Myers* 10,937 (K).

General habitat range: in medium-altitude and montane woodland and deciduous bushland, often in seasonally damp places.

General distribution: Sudan to Ethiopia and South Somalia, south to Zambia and Malawi.

Sporobolus centrifugus (Trin.) Nees

FPS 3: 548 (1956); FTEA, Gramin. 2: 365 (1974).

Imatong Mountains group, Sudan side: Gilo, at bridge on Ngairigi River, 1800 m., on rocky outcrop with wet flushes and thin soil with *Se-laginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 26.3.1982, *Friis & Vollesen* 1318 (C, K); Itibol to Ibahin, at Itibol, 1980 m.,

in rocky clefts, 18.12.1935, *Thomas* 1650 (BM, K).

General habitat range: in medium-altitude and montane grassland and wooded grassland, often on sandy or thin soil over rocky outcrops.

General distribution: South Sudan to South Africa (Cape Prov.).

Sporobolus consimilis Fresen.

FTEA, Gramin. 2: 371 (1974); FSo 4: 194 (1995); FE 7: 151 (1995); HYF: 371 (1997).

Syn.: [*Sporobolus robustus* auct., non Kunth: FPNA 3: 142 (1955); FPS 3: 548 (1956)].

Imatong Mountains group, Sudan side: Palotaka, 1200 m., woodland, 1979, *Shigeta* 16 (EA, identified and listed by M.G. Gilbert, not traced).

General habitat range: in lowland and medium-altitude seasonally flooded grassland and on lake shores.

General distribution: Chad to Ethiopia and North Somalia, south to Namibia and South Africa (Transvaal).

Sporobolus cordofanus (Steud.) Coss.

FWTA 3,2: 407 (1972); FTEA, Gramin. 2: 362 (1974); FE 7: 147 (1995).

Syn.: *Sporobolus humifusus* (Kunth) Kunth var. *cordofanus* (Steud.) Massey: FS: 475 (1929); FPS 3: 547 (1956).

Imatong Mountains group, Sudan side: Kinyeti Valley, Hiliu, east of compound and stream, 700 m., 5.12.1983, *Kieland-Lund* 211A (C, NLH).

General habitat range: in lowland and medium-altitude deciduous bushland, often in disturbed places.

General distribution: Senegal to Eritrea and Ethiopia, south to Zimbabwe.

Sporobolus festivus A. Rich.

FS: 474 (1929); FPNA 3: 146 (1955); FPS 3: 549 (1956); FWTA 3,2: 410 (1972); FTEA, Gramin. 2: 384 (1974); WICKENS 1976: 185; FSo 4: 197 (1995); FE 7: 155 (1995); HYF: 371 (1997).

Imatong Mountains group, Sudan side: Torit, 620 m., grassland, 5.6.1949, *Jackson* 782 (K); 5 km. south east of Torit, 630 m., thorn thicket on sandy soil, 12.6.1961, *Jackson* 4239 (K); Kinyeti Valley, near junction Imatong village-Torit plain near Ngarama (4° 21' N, 32° 38' E), no alt., in dry *Combretum* savanna, 24.5.1984, *Kieland-Lund* 712 (C, NLH); Hiliu, in compound (4° 16' N, 32° 48' E), no alt., 30.5.1984, *Kieland-Lund* 801 (C, NLH); Gilo to Mt. Konoro, 2000 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus* spp., *Aloe* sp. and many annuals, 16.11.1980, *Friis & Vollesen* 262 (BR, C, EA, K, KHF).

Imatong Mountains group, Uganda side: above Agoro, no alt., on hard pans of shallow soil over rocks, 6.1942, *Eggeling* 5106 (EA); Lututuru, 1530 m., 7.6.1963, *Kertland* s.n. (MHU); Lututuru, no alt., 7.6.1963, *Kertland* 414 (MHU); north of Madi Opei, 1100 m., woodland, 16.8.1972, *D. Field* 2093 (EA); 4 km. south east of Lomwaga, 1800 m., shallow soil over rocks, 18.7.1974, *Katende* 2162 (EA, MHU).

General habitat range: in lowland and medium-altitude grassland and wooded grassland, especially on shallow and sandy soils, often on rocky outcrops.

General distribution: Senegal and Mauritania to Ethiopia and North Somalia, south to Namibia and South Africa (Transvaal); also in tropical Arabia.

Sporobolus fimbriatus (Trin.) Nees

FTEA, Gramin. 2: 377 (1974); FE 7: 155 (1995).

Didinga Mountains: 34 km. south of Kapoeta on road to Nathilani, no alt., 27.8.53, *Peers* KM20 (K).

General habitat range: in lowland and medium-altitude deciduous bushland.

General distribution: Sudan to Ethiopia and Somalia, south to South Africa.

Sporobolus helvolus (Trin.) T. Durand & Schinz

FPS 3: 548 (1956); FWTA 3,2: 408 (1972); FTEA, Gramin. 2: 371 (1974); FSo 4: 194 (1995); FE 7: 151 (1995); HYF: 372 (1997).

Didinga Mountains: 18 km. north-east of Loelli, no alt., 11.9.1953, Peers M06 (K, WM).

General habitat range: in lowland and medium-altitude deciduous bushland.

General distribution: Senegal and Mauritania to Ethiopia and Somalia, south to Tanzania; also in tropical Arabia and India.

Sporobolus ioclados (Trin.) Nees

FWTA 3,2: 367 (1974); FWTA 3,2: 407 (1972); FTEA, Gramin. 2: 367 (1974); WICKENS 1976: 185; FSo 4: 193 (1995); FE 7: 148 (1995); HYF: 372 (1997).

Syn.: *Sporobolus marginatus* Hochst.: FPS 3: 547 (1956).

Didinga Mountains: Kapoeta, no alt., sandy soil in bushland, 29.8.1941, Myers 13,974 (K); south of Kapoeta on road to Nathilani, no alt., 27.8.1953, Peers K02 (WM).

General habitat range: in lowland and medium-altitude deciduous bushland, often on hardpan or saline soils.

General distribution: Mauritania and Mali to Ethiopia and Somalia, south to South Africa; also in tropical Arabia and India.

Sporobolus microprotus Stapf

FWTA 3,2: 407 (1972); FTEA, Gramin. 2: 363 (1974); WICKENS 1976: 185; FE 7: 147 (1995).

Syn.: *Sporobolus scabriflorus* Massey: FPS 3: 547 (1956).

Imatong Mountains group, Uganda side: Agoro, no alt. dry sites, 6.1942, Eggeling 5125 (EA).

General habitat range: in lowland deciduous bushland.

General distribution: Senegal to Ethiopia, south to Uganda and Kenya.

Sporobolus olivaceus Napper

FTEA, Gramin. 2: 376 (1974); FE 7: 150 (1995).

Imatong Mountains group, Uganda side: Lomwaga, 2590 m., in short turf over granite boulders, 6.1942, Eggeling 5046 (EA, K).

General habitat range: in high altitude montane grassland.

General distribution: Ethiopia and Uganda through eastern Africa to Zambia.

Sporobolus panicoides A. Rich.

FPS 3: 548 (1956); FTEA, Gramin. 2: 359 (1974); WICKENS 1976: 185; FE 7: 145 (1995); HYF: 372 (1997).

Imatong Mountains group, Uganda side: Agoro, no alt., dry sites, 6.1942, Eggeling 5129 (EA, MHU).

General habitat range: in lowland and medium-altitude deciduous bushland, on sandy soils or on black cotton soils.

General distribution: Sudan to Somalia, south to South Africa; also in tropical Arabia.

Sporobolus pectinellus Mez

FPS 3: 549 (1956); FWTA 3,2: 410 (1972); FTEA, Gramin. 2: 385 (1974); FE 7: 156 (1995).

Imatong Mountains group, Sudan side: Talanga, 950 m., on rocky outcrop with wet flushes and thin soil with *Selaginella njamnjamensis*, *Aeollanthus spp.*, *Aloe sp.* and many annuals, 30.11.1980, Friis & Vollesen 567 (BR, C, EA, K, KHF).

General habitat range: in lowland and medium-altitude grassland on thin, stony soil and on rocky outcrops.

General distribution: Senegal to South Sudan, south to Congo [previously Zaire] and Tanzania.

Sporobolus piliferus Kunth

FPNA 3: 143 (1955); FWTA 3,2: 407 (1972); FTEA, Gramin. 2: 361 (1974); FE 7: 145 (1995).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 2260 m., in small pockets of soil in rock crevices, 26.8.1966, *Lock K 15* (MHU).

General habitat range: in lowland, medium-altitude and montane deciduous bushland, always on rocky outcrops or in shallow, stony soil.

General distribution: Guinée to Ethiopia, south to South Africa; also in tropical Asia and America.

Sporobolus pyramidalis P. Beauv.

FS: 474 (1929); FPS 3: 548 (1956); FWTA 3,2: 408 (1972); FTEA, Gramin. 2: 373 (1974); WICKENS 1976: 186; FE 7: 148 (1995); HYF: 372 (1997).

Imatong Mountains group, Sudan side: Torit district, Palwar rest house, 1000 m., disturbed grassland, 18.5.1949, *Jackson 728* (K); Kinyeti Valley, Hiliu, near bridge west of town, 700 m., 30.11.1983, *Kielland-Lund 121* (C, NLH).

Didinga Mountains: Nagichot, 1830 m., 19.8.1951, *Babiker Beshir 9* (K, WM); 18 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers K019* (K, WM).

General habitat range: in lowland, medium-altitude and montane grassland and bushland, often in disturbed places.

General distribution: Mali to Ethiopia, south to South Africa; also in Madagascar, Mauritius, and tropical Arabia, and introduced to tropical America.

Sporobolus scitulus W.D. Clayton

FTEA, Gramin. 2: 383 (1974).

Imatong Mountains group, Uganda side: Lomwaga, 2500-2620 m., in short tufts over granite outcrops, heads very dark red, 6.1942, *Eggeling 5042* (EA, K).

General habitat range: in montane grassland, in thin soil over rocky outcrops.

General distribution: North East and East Uganda, West Kenya and one locality in South Tanzania.

Sporobolus stapfianus Gand.

PPNA 3: 146 (1955); FPS 3: 548 (1956); FWTA 3,2: 384 (1972); FTEA, Gramin. 2: 384 (1974); WICKENS 1976: 186; FE 7: 156 (1995).

Imatong Mountains group, Sudan side: without further locality, no alt., 1530-1830 m., 12.6.1939, *Andrews 1851* (K).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Aripwiwa, 2200 m., rocky hill, 24.1.1950, *Jackson 1118* (K).

General habitat range: in lowland, medium-altitude and montane wooded grassland and deciduous bushland, almost always on rocky outcrops.

General distribution: Nigeria to Ethiopia, south to South Africa (Transvaal, Natal); also in Madagascar.

Streblochaete Hochst. ex A. Rich.

Streblochaete longiarista (A. Rich.) Pilg.

FTA 10: 102 (1937); FWTA 3,2: 371 (1972); FTEA, Gramin. 1: 74 (1970); FE 7: 29 (1995).

Imatong Mountains group, Sudan side: without further locality, 2740 m., common in *Podocarpus latifolius* forest and in *Hypericum revolutum-Gnidia glauca* thicket, 26.2.1976, *Howard IM 66* (K); Lowiliwili, 1830 m., open forest, 14.11.1949, *Jackson 905* (K).

Imatong Mountains group, Uganda side: Aringa valley, 2260 m., in swampy stream bed in *Podocarpus latifolius* forest, 6.1942, *Eggeling 5054* (EA).

Lafit, Dongotona and Nangeya Mountains: Nangeya Mountains, Mt. Lonyili, 1830 m., riparian forest, 4.1960, *Wilson 1015* (EA); Nangeya Mountains, Mt. Lonyili, no alt., forest floor, 6.12.1970, *C.R. Field 22* (EA); Nangeya Mountains, Mt. Lonyili, 1800 m., montane forest understorey, 4.12.1971, *Katende 1398* (EA, MHU).

General habitat range: in medium-altitude and montane forest, also in ericaceous bushland.

General distribution: Cameroon to Ethiopia,

south to Malawi and South Africa (Natal); also in Réunion, Indonesia and the Philippines. First record from the Sudan.

Streptogyna P. Beauv.

Streptogyna crinita P. Beauv.

FPS 3: 549 (1956); FTEA, Gramin. 1: 23 (1970). FWTA 3,2: 365 (1972); FE 7: 8 (1995).

Syn.: *Streptogyna gerontogea* Hook. f.: JACKSON 1956: 355 {Talanga, Lotti}; FG 5: 217 (1962).

Imatong Mountains group, Sudan side: Lotti, no alt., along path in forest, 11.10.1938, *Myers* 9655 (K, WM); Lotti forest, 1000 m., ground layer of closed forest, 26.3.1950, *Jackson* 1282 (K); Talanga, 1000 m., dense forest, 28.12.1949, *Jackson* 1004 (K); Talanga, 950 m., lowland rain forest with *Chrysophyllum albidum*, *Cola gigantea*, *Erythrophleum suaveolens*, *Alstonia boonei*, *Parinari excelsa* and *Milicia excelsa*, on forest floor, 26.11.1980, *Friis & Vollesen* 484 (BR, C, EA, K, KHF).

General habitat range: in lowland forest.

General distribution: Senegal to Ethiopia, south to Tanzania; also in India and Sri Lanka.

Tetrapogon Desf.

Tetrapogon cenchriformis (A. Rich.) W.D. Clayton

FWTA 3,2: 399 (1972); FTEA, Gramin. 2: 348 (1974); WICKENS 1976: 186; FSo 4: 202 (1995); FE 7: 159 (1995); HYF: 368 (1997).

Syn.: *Tetrapogon spathaceus* (Steud.) T. Durand & Schinz: FPS 3: 549 (1956).

Didinga Mountains: Kapoeta, no alt., hillside, 28.8.1951, *Babiker Beschir* 24 (K).

General habitat range: in lowland and medium-altitude deciduous bushland, often in sandy soil.

General distribution: Cape Verde Islands, Mauri-

tania and Senegal to Somalia, south to Tanzania; also in tropical Arabia.

Thelepogon Roem. & Schult.

Thelepogon elegans Roem. & Schult.

FTA 9: 34 (1917); FS: 440 (1929); FPS 3: 551 (1956); FWTA 3,2: 473 (1972); FTEA, Gramin. 3: 744 (1982); FE 7: 313 (1995).

Imatong Mountains group, Uganda side: north of Madi Opei, no alt., 11.1970, *D. Field* 2077 (EA).

General habitat range: in lowland and medium-altitude grassland, usually on black cotton soils.

General distribution: Senegal to Ethiopia, south to Zimbabwe; also in South East Asia.

Themeda Forssk.

Themeda triandra Forssk.

FTA 9: 415 (1919); FS: 453 (1929); FWTA 3,2: 471 (1972); WICKENS 1976: 186; FTEA, Gramin. 3: 829 (1982); FSo 4: 266 (1995); FE 7: 353 (1995); HYF: 394 (1997).

Syn.: *Themeda triandra* Forssk. var. *hispidula* Stapf: FTA 9: 418 (1919); FPS 3: 551 (1956).

Imatong Mountains group, Sudan side: Abara between Loa and Magwe (4° 05' N, 32° 13' E), no alt., 6.6.1984, *Kielland-Lund* 868 (C, NLH).

Imatong Mountains group, Uganda side: Lututuru, 1530 m., 7.6.1963, *Kertland* s.n. (MHU).

Didinga Mountains: 38 km. south west of Kapoeta on road to Torit, no alt., 29.8.1953, *Peers* T012 (K, WM); Chukudum Regional District Centre (4° 14' N, 33° 29' E), 1100 m., 16.12.1983, *Kielland-Lund* 332 (C, NLH) & at roadside, 13.6.1984, *Kielland-Lund* 948 (C, NLH); Nagichot, 1830 m., 19.8.1951, *Babiker Beshir* 8 (K, WM).

General habitat range: in lowland, medium-altitude and montane grassland, deciduous bushland and woodland.

General distribution: Senegal to Ethiopia and North Somalia, south to South Africa (Cape Prov.); also in tropical Arabia and widespread in tropical and subtropical parts of Asia.

Trachypogon Nees

Trachypogon spicatus (L. f.) O. Kuntze
FWTA 3,2: 473 (1972); FTEA, Gramin. 3: 709 (1982); FE 7: 297 (1995).

Syn.: *Trachypogon plumosus* Nees: FTA 9: 403 (1934).

Imatong Mountains group, Sudan side: at path from Gilo to Mt. Garia, 2000 m., *Loudetia arundinacea* grassland with scattered trees on very shallow soil, 19.3.1982, *Friis & Vollesen* 1261 (BR, C, EA, K).

Imatong Mountains group, Uganda side: common above Agoro, east of Aringa River, 2200 m., 6.1942, *Eggeling* 5089 (EA, MHU); Agoro, 1830 m., rocky woodland, 14.11.1945, *Thomas* 4373 (EA, K).

Lafit, Dongotona and Nangeya Mountains: Dongotona Mountains, Mt. Emogadung, 2500 m., rocky shoulder of mountain, 21.1.1950, *Jackson* 1082A (K).

General habitat range: in lowland, medium-altitude and montane grassland, deciduous bushland and woodland, often on rocky hillsides.

General distribution: Ivory Coast to Ethiopia, south to South Africa (Cape Prov.); also in tropical America. First record from the Sudan.

Tragus Haller

Tragus berteronianus Schult.

FPS 3: 553 (1956); FWTA 3,2: 413 (1972); FTEA, Gramin. 2: 400 (1974); FSo 4: 214 (1995); FE 7: 178 (1995); HYF: 373 (1997).

Didinga Mountains: 16 km. west of Kapoeta, 2 km. west of Kidepo River, no alt., open thorn country, 27.8.1940, *Myers* 13,450 (K); 18 km.

south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K026 (K, WM).

General habitat range: in lowland and medium-altitude grassland, wooded grassland and deciduous bushland, often in disturbed and overgrazed places.

General distribution: Mauritania and Mali to Ethiopia and Somalia, south to South Africa (Transvaal, Natal); also in tropical Arabia, Afghanistan, China and tropical America.

Tripogon Roem. & Schult.

Tripogon major Hook. f.

FWTA 3,2: 393 (1972); FTEA, Gramin. 2: 291 (1974); FE 7: 97 (1995).

Syn.: *Tripogon snowdenii* C.E. Hubb.: FPS 3: 554 (1956) {Imatong Mountains}.

Imatong Mountains group, Sudan side: Mt. Kinyeti, 2870 m., on flat rocks, 30.12.1935, *Thomas* 1861 (BM, K); summit of Mt. Kinyeti, 3180 m., among rocks, 27.7.1939, *Myers* 11,651 (K); summit of Mt. Kinyeti, 3180 m., growing in tufts in cracks in rock, 15.11.1949, *Jackson* 940 (K).

Imatong Mountains group, Uganda side: Lomwaga, 2500-2620 m., tufted grass all over sub-alpine pastures, 6.1942, *Eggeling* 5040 (EA, MHU); Lomwaga Mountains, 2630 m., rock pavement, 5.4.1945, *Greenway & Hummel* 7289 (EA, K).

General habitat range: in medium-altitude and montane grassland among rocks, often towards mountain summits.

General distribution: Sierra Leone to Ethiopia, south to Malawi.

Urochloa P. Beauv.

Urochloa panicoides P. Beauv.

FPS 3: 555 (1956) {Kapoeta}; FTEA, Gramin. 3: 602 (1982); FSo 4: 229 (1995); FE 7: 230 (1995); HYF: 381 (1997).

Syn.: *Urochloa helopus* (Trin.) Stapf: FTA 9: 595 (1920); FS: 459 (1929).

Imatong Mountains group, Sudan side: Kinyeti Valley, 14 km. south of Hiliu on Katire road, 700 m., roadside in wet savanna, 7.12.1983, *Kielland-Lund* 257A (C, NLH).

Imatong Mountains group, Uganda side: north of Madi Opei, 1100 m., *Acacia* woodland, 16.8.-1972, *D. Field* 2101 (EA).

Didinga Mountains: Kapoeta, no alt., dominant

grass on clay soil, 29.8.1940, *Myers* 13,973 (K); 8 km. south of Kapoeta on road to Nathilani, no alt., 27.8.1953, *Peers* K011 (K, WM).

General habitat range: in lowland and medium-altitude bushland, often also in abandoned cultivated land.

General distribution: Sudan to Ethiopia and Somalia, south to South Africa; also in tropical Arabia and India.

Appendix A. Additional collections and corrections to Vol. 1

Since the text of Vol. 1 of this work was drafted The Uganda Forest Department published in collaboration with UNDP(GEF), FAO and EU Natural Forest Management and Conservation Project a number of reports on the biodiversity of the Forest Reserves of Uganda. These reports contain lists of a number of key groups of organisms, including trees and shrubs, from all the Forest Reserves. For the subject of the present work the most relevant report is No. 14 dealing with the Agoro-Agu and Lokung Forest Reserves which are actually part of or immediately adjacent to the Uganda side of the Study area (*Imatong Mountains group, Sudan side*).

We have disregarded the name "*Abutilon africana*" (Lwanga 1996, p. 27; no specimen documents this record); from the information available, we can not identify this with the name of any formally described species. We have also disregarded the name "*Maytenus ovata*" (Lwanga 1996, p. 29; no specimen documents this record); this is a name which cannot be referred with certainty to any taxon under the taxonomic concept of the genus *Maytenus* used in this work. Unfortunately, it has not been possible to study the voucher specimens from the field work, and our interpretation therefore rests entirely on a comparison of Lwanga's published material.

The list from the Agoro-Agu and Lokung (Lwanga 1996, p. 27-31) contains 254 and 85 species respectively. The importance of these in relation to Vol. 1 of the present work is discussed in detail in the following. Page references "Add ... record to p. ..." refer to the place in Vol. 1 where additional records should be inserted. Records which we consider unconfirmed have not been included in the further analysis of the flora.

One addition from the *Kjelland-Lund* collections has also been added, and a few corrections have been made.

Fam. 6. **Cyatheaceae** Rchb.

Cyathea manniana Hook.

Add a Ugandan record to p. 36:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 1 documents this record).

Add a new order, family, genus and species record to p. 60:

Order 6A. **Marsileales** J.H. Schaffn.

Fam. 17A. **Marsileaceae** Mirbel

Marsilea L.

Marsilea minuta L.

FZ, Pteridoph.: 60 (1970); WICKENS 1976: 188; JOHNS 1991: 101; UKWF: 37 (1994).

Imatong Mountains group, Sudan side: Loa, Arapi Regional District Centre (3° 48' N, 31° 59' E), 800 m., in a pond in nursery, 3.1.1984, *Kjelland-Lund* 577B (C, NLH).

General habitat range: in lowland and medium-altitude temporarily flooded areas on mud; terrestrial plants with small, tufted leaves from short rhizomes; aquatic plants with longer rhizomes which when young float and raise the leaves above the surface of the water; older

aquatic plants with sunken rhizomes so that leaves float.

General distribution: Gambia and Senegal to Sudan, south to Angola and Zambia, north to Algeria; also in Madagascar, India and tropical South East Asia and Indonesia.

Fam. 18. **Cycadaceae** Pers.

Encephalartos septentrionalis Schweinf.

Add another Ugandan record to p. 61:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Fam. 19. **Podocarpaceae** Endl.

Podocarpus falcatus (Thunb.) Mirb.

Add a Ugandan record to p. 61:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as *Podocarpus gracilior*; specimen no 1 documents this record).

Note: Previously in the region only known from Mt. Moroto and Debasien in Uganda, Kenya, Eastern Congo [previously Zaire], Tanzania and Ethiopia; previous South Sudanian records are based on misidentifications of *Podocarpus latifolius*, and also this record from the Ugandan side of the border needs confirmation.

Podocarpus latifolius (Thunb.) Mirb.

Add another Ugandan record to p. 62:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as "*Podocarpus milanjanus*"; specimen no. 4 documents this record).

Fam. 20. **Cupressaceae** Rich. ex Barthl.

Juniperus procera Hochst. ex Endl.

Add a Ugandan record to p. 62:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 7 documents this record).

Note: on the Sudan side of the study area this species only occurs on Mt. Lotuke; confirmed Ugandan records are from Mt. Moroto and Mt. Elgon; the record from Agoro-Agu needs confirmation.

Fam. 21. **Annonaceae** Juss.

Annona senegalensis Pers.

Add a Ugandan record to p. 63:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; no specimen documents this record).

Hexalobus monopetalus (A. Rich.) Engl. & Diels

var. **monopetalus**

Add a Ugandan record to p. 64:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve and the Lokung Forest Reserve by LWANGA (1996: 29; no specimen cited as documentation).

Add to p. 65:

Monanthotaxis littoralis (Bagshawe & Bak. f.) Verdc.

FTEA, Annonac.: 99 (1971).

Syn.: *Popowia littoralis* Bagshawe & Bak. f.: FCB 2: 347 (1951); FWTA 1,1: 44 (1954).

Imatong Mountains group, Uganda side: Recorded from the Lokung Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

General habitat range: in lowland and medium altitude forest.

General distribution: Cameroon, Gabon, Congo [previously Zaire], Uganda.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4); the record of this typical Guineo-Congolian species from the drier forests of the study area needs confirmation. There is no new material at K from U1, and the record most likely represents misidentified *Monanthotaxis buchananii* (Engl.) Verdc. (see Vol. 1, p. 64).

Uvaria angolensis Oliv.
var. **angolensis**

Add a Ugandan record to p. 66:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 222 documents this record).

Add a new species record to p. 66:

Uvaria welwitschii (Hiern) Engl. & Diels
FCB 2: 289 (1951); ITU: 22 (1952); FZ 1,1: 110 (1960); FTEA, Annonac.: 24 (1971); KTS: 53 (1994).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 223 documents this record)

General habitat range: in lowland and medium altitude forest.

General distribution: Eastern Congo [previously Zaire], Uganda, Kenya, Tanzania, Zambia, Angola.

Note: Fairly widespread in East Africa, but in Uganda it has previously only been recorded from the western and southern parts (FTEA-regions U2, U3 and U4); there is no material at K from U1, and the record needs confirmation.

Fam. 22. **Monimiaceae** Juss.

Xymalos monospora (Harv.) Baill. ex Warb.
Add another Ugandan record to p. 67:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 328 documents this record).

Fam. 23. **Lauraceae** Juss.

Ocotea kenyensis (Chiov.) Robyns & Wilczek
Add another Ugandan record to p. 67:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 206 documents this record).

Fam. 32. **Capparaceae** Juss.

Boscia salicifolia Oliv.

Add another Ugandan record to p. 76:

Imatong Mountains group, Uganda side: Also recorded from the Lokung Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Capparis tomentosa Lam.

Add another Ugandan record to p. 78:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; no specimen documents this record).

Ritchiea albersii Gilg

Add another Ugandan record to p. 81:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 355 documents this record).

Fam. 36. **Polygalaceae** R. Br.**Securidaca longipedunculata** Fresen.

Add another Ugandan record to p. 85:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; as "*Carpobolia* [sphalm. pro *Carpobolia*] *alba*"; no specimen documents this record).

Fam. 40. **Caryophyllaceae** Juss.

Add a new genus and species record to p. 91:

Spergula L.**Spergula arvensis** L.

FTA 1: 143 (1868); FS: 70 (1929); FCB 2: 138 (1951); FTEA, Caryophyllac.: 11 (1956); FEE 2,1: 207 (2000).

Syn.: *Spergula fallax* sensu Andrews in FPS, non (Lowe) E.H.L. Krause *sensu stricto*: FPS 1: 90 (1950).

Imatong Mountains Group (Sudan Side): in the higher parts of Mt. Kinyeti; no specimen seen, recorded by Jackson (1956).

General habitat range: disturbed habitats throughout the temperate region and in the mountains of the tropics.

General distribution: almost cosmopolitan.

Note: In the absence of a specimen, it is not absolutely certain that the record from the study area is *S. arvensis* and not *S. fallax*, which has been recorded from an altitude of ca. 1100 m in N. Somalia.

Fam. 44. **Phytolaccaceae** R. Br.**Phytolacca dodecandra** L'Hér.

Add another Ugandan record to p. 95:

Imatong Mountains group, Uganda side: Also re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Fam. 54. **Oliniaceae** Harv. & Sond.**Olinia rochetiana** A. Juss.

Add a Ugandan record to p. 108:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 338 documents this record).

Fam. 58. **Thymelaeaceae** Juss.**Gnidia glauca** (Fresen.) Gilg

Add another Ugandan record to p. 110:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Fam. 60. **Proteaceae** Juss.**Faurea rochetiana** (A. Rich.) Pic. Serm.

Add another Ugandan record to p. 113:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Faurea speciosa*"; no specimen documents this record).

Protea madiensis Oliv.

Add another Ugandan record to p. 114:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Fam. 62. **Pittosporaceae** R. Br.**Pittosporum viridiflorum** Sims

Add another Ugandan record to p. 115:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as "*Pittosporum spathicalyx*"; specimen no. 254 documents this record).

Fam. 63. **Flacourtiaceae** Rich. ex DC.

Add a new species record to p. 115:

Casearia battiscombei R.E. Fries

ITU: 372 (1952); FZ 1,2: 294 (1960); FTEA, Flacourtiac.: 49 (1975); KTSL: 104 (1994).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 208 documents this record).

General habitat range: in medium altitude and montane forest.

General distribution: Uganda, Kenya, Tanzania, Zimbabwe, Malawi.

Note: The possible presence in the study area of this species has been mentioned on p. 116; in Uganda it has only been known from the western and southern parts (FTEA-regions U2 & U4), including Mt. Elgon, but it is known from the northern part of Kenya and is generally widespread in East Africa.

Dovyalis macrocalyx (Oliv.) Warb.

Add another Ugandan record to p. 116:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 144 documents this record).

Flacourtia indica (Burm. f.) Merr.

Add a Ugandan record to p. 116:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by

LWANGA (1996: 29; specimen no. 141 documents this record).

Add a new species record to p. 117:

Oncoba routledgei Sprague

ITU: 149 (1952); FCB, Flacourtiac.: 18 (1968); FTEA, Flacourtiac.: 18 (1975); KTSL: 109 (1994).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 143 documents this record).

General habitat range: in medium altitude and montane forest.

General distribution: East Congo [previously Zaire], Uganda, Ethiopia, Kenya, Tanzania.

Note: This species is quite common and widespread in medium altitude and montane forest in Ethiopia and East Africa; there is no material at K from U1. Due to the wide distribution of the species we find the record probable; however, it should be confirmed.

Oncoba spinosa Forssk.

Add a Ugandan record to p. 117:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; specimen no. 142 documents this record).

Rawsonia lucida Harv. & Sond.

Add a Ugandan record to p. 117:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 139 documents this record).

Add a new species record to p. 117:

Scolopia rhamniphylla Gilg

FPNA 1: 636 (1948); ITU: 150 (1952); FCB, Flacourtiac.: 42 (1968); FTEA, Flacourtiac.: 35 (1975); KTSL: 110 (1994).

Imatong Mountains group, Uganda side: Re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 140 documents this record).

General habitat range: in medium altitude and montane humid and dry evergreen forest and associated bushland.

General distribution: Cameroon, Eastern Congo [previously Zaire], Rwanda, Uganda, Kenya, Tanzania, south to Angola.

Note: This is a montane forest species which is known from all parts of Uganda except FTEA-region U1; its occurrence in the study area is possible, but should be confirmed.

Add a new genus and species record to p. 117:

Trimeria Harvey

Trimeria grandifolia (Hochst.) Warb.

FTEA, Flacourtiac.: 40 (1975); FRIIS 1993b: 123; KTSL: 111 (1994).

subsp. **tropica** (Burkill) Sleumer

FTEA, Flacourtiac.: 40 (1975); FRIIS 1993b: 123; KTSL: 111 (1994).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 147 documents this record).

General habitat range: in medium altitude and montane dry evergreen forest or riverine forest, sometimes also in wooded grassland and bushland.

General distribution: Cameroon, Eastern Congo [previously Zaire] to Ethiopia, Uganda and Kenya, south to Zimbabwe. Species as a whole also from South Africa (Cape Province, Natal, Transvaal) to Mozambique and South Tanzania.

Note: This is a medium altitude and montane forest and woodland species known from all parts of Uganda. There are several collections at K from both Western Nile and Karamoja, and the occurrence of this species in the study

area is therefore very likely, but should be confirmed.

Fam. 64. **Passifloraceae** Juss. ex Kunth

Add a new genus and species record to p. 118:

Paropsia Thouars

Paropsia guineensis Oliv.

FTA: 2: 505 (1871); ITU: 313 (1952); FWTA 1,1: 201 (1966); FTEA, Passiflorac.: 6 (1975).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen No 186 cited as documentation).

General habitat range: in lowland and medium altitude forest.

General distribution: Ghana to Uganda, south to Angola.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4); there is no material at K from U1, and the record of this typical Guineo-Congolian species from the drier forests of the study area is unlikely.

Fam. 67. **Ochnaceae** DC.

Campylopermum densiflorum (De Wild. & T. Durand) Farron

Add a Ugandan record to p. 124:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as "*Ouratea densiflora*"; specimen no. 153 documents this record).

Ochna bracteosa Robyns & Lawalree

Add a Ugandan record to p. 125:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by

LWANGA (1996: 30; specimen no. 156 documents this record).

Ochna holstii Engl.

Add a Ugandan record to p. 126:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 158 documents this record).

Add a new species record to p. 126:

Ochna membranacea Oliv.

FTA 1: 316 (1868); ITU: 280 (1952); FWTA 1,1: 222 (1954); FCB, Ochnac.: 16 (1967).

Syn.: *Ochna gilgiana* Engl.: FPNA 1: 613 (1948).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 155 documents this record).

General habitat range: in lowland and medium altitude forest.

General distribution: Sierra Leone to Uganda, south to Angola.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material at K from U1; the record of this typical Guineo-Congolian species from the drier forests of the study area needs confirmation. It most probably represents a misidentification of *Ochna holstii* Engl. (see Vol. 1, p. 125).

Fam. 69. **Myrtaceae** Juss.

Add a new species record to p. 126:

Syzygium cordatum Hochst. ex Sond.

FCap. 2: 521 (1862); ITU: 273 (1952); FCB, Myrtac.: 4 (1968); FZ 4: 194 (1978); KTSL: 126 (1994).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 340 documents this record).

General habitat range: in lowland and medium altitude forest, usually in swamp forest or riverine forest, sometimes also in waterlogged wooded grassland and bushland.

General distribution: Congo [previously Zaire] to Uganda and Western Kenya, south to Angola and South Africa (Transvaal, Natal, Eastern Cape Province).

Note: In Uganda this species is said to be fairly widespread, but particularly common in the Lake Victoria region; also in Kenya the species is most common near Lake Victoria. At K there is one collection from Mt. Debasien in Karamoja, the record of this species from the drier forests of the study area is therefore likely, but needs confirmation.

Syzygium guineense (Willd.) DC.

Add another Ugandan record to p. 127:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 339 documents this record).

Note: The exact infraspecific identity of this is uncertain; it can be either subsp. **afromontanum** F. White or subsp. **guineense**.

Add a new species record to p. 127:

Syzygium owariense Benth.

ITU: 275 (1952); FWTA 1,1: 240 (1954); FG 11: 13 (1966); FCB, Myrtac.: 9 (1968); FZ 4: 197 (1978).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; no specimen documents this record).

General habitat range: in lowland and medium altitude forest, usually in swamp forest or riverine forest.

General distribution: Sierra Leone to Congo [previously Zaire], Uganda and Tanzania, south to Angola, Zambia, Zimbabwe, Malawi and Mozambique.

Note: The interpretation of *Syzygium owariense* in

ITU does not agree with that of more modern treatments, and it is quite probable that some of the specimens from Uganda are in fact woodland forms of *Syzygium guineense*; the record of this species from the drier forests of the study area needs confirmation. There is no material of *Syzygium owariense* in the modern sense at K from U1, and we find the record very unlikely.

Fam. 71. **Combretaceae** R. Br.

Combretum collinum Fresen.

Add a Ugandan record to p. 131:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

Note: In the absence of material it is impossible to identify this record to subspecies; it can be either subsp. *binderianum* (Kotschy) Okafor or subsp. *elgonense* (Exell) Okafor.

Combretum molle G. Don

Add another Ugandan record to p. 132:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; no specimen documents this record).

Combretum paniculatum Vent.

subsp. **paniculatum**

Add a Ugandan record to p. 132:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Terminalia brownii Fresen.

Add another Ugandan record to p. 133:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; no specimen documents this record).

Terminalia laxiflora Engl. & Diels

Add a Ugandan record to p. 134:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

Add a new species record to p. 134:

Terminalia macroptera Guill. & Perr.

FTA 2: 416 (1871); FPS 1: 208 (1950); ITU: 90 (1952); FWTA 1,1: 279 (1954); FCB, Combretac.: 97 (1968); FTEA, Combretac.: 87 (1973); FE 2,2: 127 (1995).

Imatong Mountains group, Uganda side: Recorded from the Lokung Forest Reserve by LWANGA (1996: 31; no specimen cited as documentation). *General habitat range:* in lowland and medium altitude woodland.

General distribution: Gambia to Sudan and Uganda, south to Congo [previously Zaire].

Note: In Uganda this species is well documented from the northern part of the country (FTEA-region U1); it is also widespread in the Sudan and in western Ethiopia. There are several collections at K of this species from the Western Nile and Acholi districts of U1; we find that the occurrence of this species in the study area is highly probable.

Terminalia schimperiana Hochst.

Add another Ugandan record to p. 134:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; as "*Terminalia glaucescens*"; no specimen documents this record).

Fam. 72. **Rhizophoraceae** R. Br.

Add a new species record to p. 135:

Cassipourea gummiflua Tul.

FTEA, Rhizophorac.: 15 (1956); FZ 4: 90 (1978); KTSL: 143 (1994).

var. **ugandensis** (Stapf) J. Lewis

FTEA, Rhizophorac.: 15 (1956); FZ 4: 90 (1978); KTSL: 143 (1994).

Syn.: *Cassipourea ugandensis* (Stapf) Alston: ITU: 331 (1952).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 301 documents this record).

General habitat range: in lowland, medium altitude and montane forest.

General distribution: Cameroon, Congo [previously Zaire] and Angola to Uganda, Kenya and Tanzania, south to Zambia. Species as a whole also in Zimbabwe, Mozambique, South Africa (Natal), and also in Madagascar.

Note: In Uganda the species has only been recorded from the western and southern parts (FTEA-regions U2 & U4), and the record from the drier forests of the study area therefore needs confirmation.

Cassipourea malosana (Bak.) Alston

Add another Ugandan record to p. 135:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 298 documents this record).

Cassipourea ruwenzoriensis (Engl.) Alston

Add to p. 135: Add a Ugandan record:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 299 documents this record).

Fam. 73. Clusiaceae Lindl.

Add new genus and species record to p. 136:

Allanblackia Oliv.

Allanblackia kimbiliensis Spirlet

FCB, Guttiferae: 47 (1970); FTEA, Guttiferac.: (1978).

Syn.: [*Allanblackia floribunda* auct., non Oliv.: ITU: 152 (1952)].

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 282 documents this record).

General habitat range: in medium altitude forest.

General distribution: Eastern Congo [previously Zaire], Uganda.

Note: This species has a very restricted distribution in submontane moist forests in Congo and Uganda; in the latter it has previously only been known from Bwindi forest in western Uganda (FTEA-region U2). There are no material at Kew from outside Bwindi, and we find the record from the drier forests of the study area highly unlikely.

Harungana madagascariensis Lam.

Add a Ugandan record to p. 136:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 281 documents this record).

Hypericum revolutum Vahl

subsp. **revolutum**

Add another Ugandan record to p. 137:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; as "*Hypericum lanceolatum*", no specimen documents this record, and as "*Hypericum revolutum*"; specimens no. 284 & 286 document this latter record).

Add new genus and species record to p. 138:

Symphonia L. f.

Symphonia globulifera L. f.

FTA 1: 163 (1868); ITU: 155 (1952); FWTA 1,1: 292 (1954); FZ 1,1: 394 (1961); FCB, Guttiferae: 36 (1970); FTEA, Guttiferae: 5 (1978).

Syn.: *Symphonia gabonensis* (Vesque)Pierre: FPNA 1: 626 (1948).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 279 documents this record).

General habitat range: in lowland and medium altitude rain forest.

General distribution: Sierra Leone to Uganda and Tanzania, south to Angola and Zaire; possibly Madagascar; also in tropical America.

Note: This widespread lowland rain forest species has hitherto from Uganda only been known from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at K from U1, and we find the record from the drier forests in the study area unlikely.

Fam. 74. **Tiliaceae** Juss.

Add a new species record to p. 139:

Grewia mildbraedii Burret

ITU: 428 (1952); FCB 10: 22 (1963).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 131 documents this record).

General habitat range: in lowland and medium altitude forest, often in swamp forest.

General distribution: Congo [previously Zaire], Uganda.

Note: This species is widespread in the rain forests of Congo; in Uganda it is only previously recorded from the southwestern part (FTEA-region U2). There is no material of this species at K from U1, and we find the record of this species from the drier forests of the study area unlikely.

Grewia mollis Juss.

Add a Ugandan record to p. 139:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung

Forest Reserves by LWANGA (1996: 29; no specimen documents this record).

Add a new species record to p. 139:

Grewia similis K. Schum.

FPNA 1: 566 (1948); FCB 10: 32 (1963); KTSL: 157 (1994); FE 2,2: 150 (1995).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

General habitat range: in medium altitude and montane dry evergreen forest and evergreen bushland.

General distribution: Eastern Congo [previously Zaire], Ethiopia, Uganda, Kenya, Tanzania.

Note: This species is not mentioned in the ITU and does not appear to have been recorded from the Sudan. There is no material of this species at K from U1; however, the species is widespread in the countries around the study area, and we assume that it could occur, but the record needs confirmation.

Grewia trichocarpa Hochst. ex A. Rich.

Add another Ugandan record to p. 140:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Grewia villosa Willd.

Add another Ugandan record to p. 141:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Triumfetta brachyceras K. Schum.

Add a Ugandan record to p. 142:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; as "*Triumfetta macrophylla*"; no specimen documents this record).

Triumfetta cordifolia Guill., Perr. & A. Rich.

Add a Ugandan record to p. 142:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Fam. 75. **Sterculiaceae** (DC.) Bartl.

Cola gigantea A. Chev.

Add a Ugandan record to p. 143:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 116 documents this record).

Dombeya burgessiae Harv.

Add a Ugandan record to p. 144:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Dombeya dawei*" and as "*Dombeya nairobiensis*"; no specimen documents either record).

Add a new species record to p. 145:

Dombeya rotundifolia (Hochst.) Planch.

FCap 1: 221 (1860); FZ 1,2: 525 (1961); FCB 10: 248 (1963); SEYANI 1991: 96; FE 2,2: 170 (1995).

Syn.: [*Dombeya spectabilis* auct., non Bojer: FTA 1: 228 (1868), pro parte].

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

General habitat range: in lowland, medium altitude and montane woodland.

General distribution: Eastern Congo [previously Zaire] to Ethiopia, south to Angola, Namibia and South Africa (Transvaal, Natal).

Note: In Uganda this species is known from the eastern part, especially the area around Mt. Elgon and Mt. Moroto; further to the west it is replaced by *Dombeya quinqueseta*, well docu-

mented from the study area on both sides of the border (Vol. 1, p. 144-145); we find that the record is not likely and needs confirmation.

Dombeya torrida (J.F. Gmel.) Bamps
subsp. **torrida**

Add another Ugandan record to p. 145:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; as "*Dombeya goetzenii*"; specimen no. 120 documents this record).

Add a new genus and species record to p. 146:

Pterygota Schott & Endl.

Pterygota mildbraedii Engl.

FZ 1,2: 561 (1961); FCB 10: 261 (1963).

Syn.: *Pterygota* sp. nov. sensu ITU: ITU: 422 (1952). [*Pterygota macrocarpa* auct., non K. Schum.: FPNA 1: 612 (1948)].

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; specimen no. 115 documents this record).

General habitat range: in lowland and medium altitude forest, also in gallery forest.

General distribution: Congo [previously Zaire], Uganda, Tanzania, (?) Zambia.

Note: This species is known from the forests of eastern Congo, Rwanda and Burundi; in Uganda it is only previously recorded from forests in the western and southern part (FTEA-region U2, U4 & western part of U1). There is one record of this species at K from Western Nile region of U1; we find the record from the drier forests of the study area possible, but in need confirmation. It could also be a misidentified specimen of *Cola gigantea* A. Chev.

Sterculia setigera Del.

Add another Ugandan record to p. 146:

Imatong Mountains group, Uganda side: Also re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Fam. 80. **Euphorbiaceae** Juss.

Acalypha acrogyna Pax

Add a Ugandan record to p. 154:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Acalypha bipartita Muell. Arg.

Add a Ugandan record to p. 154:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Acalypha neptunica Muell. Arg.

Add a Ugandan record to p. 156:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; specimen no. 104 documents this record).

Acalypha ornata Hochst. ex A. Rich.

Add another Ugandan record to p. 156:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 105 documents this record).

Acalypha racemosa Baill.

Add a Ugandan record to p. 157:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Add a new species record to p. 158:

Alchornea floribunda Muell. Arg.

FTA 6,1: 916 (1912); ITU: 115 (1952); FPS 2: 54 (1952); FWTA 1,2: 403 (1958); FTEA Euphorbiac. 1: 253 (1987).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 172 documents this record).

General habitat range: in lowland and medium altitude rainforest, especially in damp or swampy places.

General distribution: Sierra Leone to Congo [previously Zaire] and Uganda.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at K from U1; we find the record of this typical Guineo-Congolian species from the drier forests of the study area unlikely, and it is in need of confirmation.

Alchornea laxiflora (Benth.) Pax & K. Hoffm.

Add a Ugandan record to p. 158:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 103 documents this record).

Argomuellera macrophylla Pax

Add another Ugandan record to p. 158:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 174 documents this record).

Bridelia atroviridis Muell. Arg.

Add a Ugandan record to p. 159:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Bridelia brideliifolia (Pax) Fedde

Add a Ugandan record to p. 159:

Imatong Mountains group, Uganda side: Re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 244 documents this record).

Add a new species record to p. 159:

Bridelia micrantha (Hochst.) Baill.

FTA 6,1: 620 (1912); FPNA 1: 447 (1948); ITU: 117 (1952); FPS 2: 56 (1952); FWTA 1,2: 370 (1958); FCB 8,1: 46 (1962); FTEA Euphorbiac. 1: 127 (1987).

Syn.: *Bridelia abyssinica* Pax: FTA 6,1: 621 (1912). *Bridelia mildbraedii* Gehrm.: FTA 6,1: 621 (1912).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 243 documents this record).

General habitat range: in lowland, medium altitude and montane forest, often in riverine or swamp forest, along forest edges and in evergreen bushland.

General distribution: Senegal to Ethiopia, south to Abgola and South Africa (Transvaal); also in Reunion.

Note: This very widespread species has not previously been reported from the study area; although its occurrence seems probable, it should be confirmed by authentic material, as careful identification of the several and superficially similar species in the region is necessary.

Bridelia ndellensis Beille

Add another Ugandan record to p. 159:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Bridelia scleroneura Muell. Arg.

Add a Ugandan record to p. 160:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; no specimen documents this record).

Clutia abyssinica Jaub. & Spach

Add a Ugandan record to p. 161:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Croton macrostachyus Hochst. ex Del.

Add another Ugandan record to p. 161:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; specimen no. 106 documents this record).

Croton sylvaticus Krauss

Add a Ugandan record to p. 161:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimens no. 107 & 108 document this record).

Drypetes ugandensis (Rendle) Hutch.

Add a Ugandan record to p. 163:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 183 & 184 document this record).

Add a new species record to p. 163:

Erythrococca bongensis Pax

FTA 6,1: 854 (1912); FPS 2: 63 (1952); FTEA Euphorbiac. 1: 267 (1987); KTSL: 196 (1994); FE 2,2: 298 (1995).

Syn.: *Erythrococca paxii* Rendle: FTA 6,1: 855 (1912). *Erythrococca rigidifolia* Pax: FTA 6,1: 854 (1912). *Erythrococca olacifolia* Prain: FTA 6,1: 855 (1912).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

General habitat range: in lowland, medium altitude and montane forest and riverine forest,

especially along forest edges and in clearings, also in bushland.

General distribution: Congo [previously Zaire] to South Sudan and South Ethiopia, south to Tanzania.

Note: This species is widespread in Eastern Africa in areas around the study area; at K there are a number of specimens from the Western Nile and Karamoja regions of U1; although we think the occurrence of the species in the study area is probable, it should be confirmed by authentic material.

Euphorbia candelabrum Kotschy

Add a Ugandan record to p. 164:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; no specimen documents this record).

Flueggea virosa (Roxb. ex Willd.) Voigt

Add a Ugandan record to p. 167:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; no specimen documents this record).

Hymenocardia acida Tul.

Add a Ugandan record: o p. 168:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Macaranga capensis (Baill.) Sim

var. **kilimandscharica** (Pax) Friis & M.G. Gilbert

Add another Ugandan record to p. 164:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; as "*Macaranga kilimandscharica*"; specimen no. 99 documents this record).

Mallotus oppositifolius (Geisler) Muell. Arg.

Add a Ugandan record to p. 169:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 297 documents this record).

Margaritaria discoidea (Baill.) Webster

Add a Ugandan record to p. 170:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; as "*Margaritaria discoideus*"; specimen no. 247 documents this record).

Neoboutonia melleri (Muell. Arg.) Prain

Add a Ugandan record to p. 170:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 101 documents this record).

Phyllanthus nummularifolius Poir.

Add a Ugandan record to p. 172:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Phyllanthus ovalifolius Forssk.

Add a Ugandan record to p. 172:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Ricinodendron heudelotii (Baill.) Heckel

Add a Ugandan record to p. 172:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 326 documents this record).

Sapium ellipticum (Hochst. ex Krauss) Pax
Add a Ugandan record to p. 173:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 179 documents this record).

Suregada procera (Prain) Croizat
Add a Ugandan record to p. 173:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 181 documents this record).

Fam. 81. **Rosaceae** Juss.

Hagenia abyssinica (Bruce) J.F. Gmel.
Add another Ugandan record to p. 176:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 381 documents this record).

Prunus africana (Hook. f.) Kalkm.
Add another Ugandan record to p. 176:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 199 documents this record).

Rubus steudneri Schweinf.
Add a Ugandan record to p. 177:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Fam. 83. **Chrysobalanaceae** R. Br.

Parinari excelsa Sabine
Add a Ugandan record to p. 178:

Imatong Mountains group, Uganda side: Re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 200 documents this record).

Fam. 83. **Dichapetalaceae** Baill.

Tapura fischeri Engl.
Add another Ugandan record to p. 178:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 234 documents this record).

Fam. 84. **Fabaceae** Lindl.

Subfam. **Caesalpinioideae** DC.

Add a new genus and species record to p. 179:

Baikiaea Benth.

Baikiaea insignis Benth.
FCB 3: 298 (1952); FWTA 1,2: 456 (1958); FTEA, Legum.-Caesalp.: 109 (1967).
subsp. **minor** (Oliv.) J. Léon.
FCB 3: 301 (1952); FTEA, Legum.-Caesalp.: 109 (1967).
Syn.: *Baikiaea minor* Oliv.: FTA 2: 309 (1871); ITU: 57 (1952). *Baikiaea eminii* Taub.: FCB 3: 302 (1952).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 427 documents this record).

General habitat range: in lowland and medium altitude forest.

General distribution: Cameroon, Gabon, Congo [previously Zaire], Uganda, south to Angola. Species also in Nigeria and Bioko [previously Fernando Po].

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material at K of this species from U1; we therefore think the record of this typical Guineo-Congolian species from the drier forests of the study area is unlikely.

Cassia mannii Oliv.

Add a Ugandan record to p. 179:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; specimen no. 424 documents this record).

Add a new species record to p. 179:

Cassia sieberiana DC.

FTA 2: 270 (1871); FWTA 1,2: 452 (1958); FCB 3: 500 (1952); ITU: 60 (1952); FTEA, Leg. Caesalpin.: 61 (1967).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

General habitat range: in lowland and medium altitude woodland.

General distribution: Senegal to Sudan and Uganda, south to Congo [previously Zaire].

Note: In Uganda this species has previously been recorded from the western and northern parts (FTEA-regions U1). There is much material of this species from the regions around the study area at K; we therefore think that the record of this typical Sudanian species from the study area is very probable.

Erythrophleum suaveolens (Guill. & Perr.) Brenan

Add a Ugandan record to p. 181:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 433 documents this record).

Mildbraedi dendron excelsum Harms

Add a Ugandan record to p. 181:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 423 documents this record).

Piliostigma thonningii (Schumach.) Milne-Redh.

Add a Ugandan record to p. 181:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

Senna didymobotria (Fresen.) Irwin & Barneby

Add another Ugandan record to p. 182:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Cassia didymobotria*"; no specimen documents this record).

Senna singueana (Del.) Lock

Add a Ugandan record to p. 183:

Imatong Mountains group, Uganda side: Recorded from the Lokung Forest Reserve by LWANGA (1996: 28; as "*Cassia singueana*"; no specimen documents this record).

Tamarindus indica L.

Add a Ugandan record to p. 184:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; no specimen documents this record).

Subfam. **Mimosoideae** DC.

Acacia abyssinica Hochst. ex Benth.

Add another Ugandan record to p. 184:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by

LWANGA (1996: 27; no specimen documents this record).

Acacia amythetophylla A. Rich.

Add another Ugandan record to p. 185:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as *Acacia macrothyrsa*; no specimen documents this record).

Acacia brevispica Harms

Add a Ugandan record to p. 185:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; specimen no. 437 documents this record).

Acacia gerrardii Benth.

Add a Ugandan record to p. 186:

Imatong Mountains group, Uganda side: Recorded from the Lokung Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Acacia hockii De Wild.

Add another Ugandan record to p. 187:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; no specimen documents this record).

Acacia persiciflora Pax

Add another Ugandan record to p. 189:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Acacia senegal (L.) Willd.

Add another Ugandan record to p. 190:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Acacia seyal Del.

Add another Ugandan record to p. 190:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Acacia sieberiana DC.

Add another Ugandan record to p. 191:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; no specimen documents this record).

Acacia tortilis (Forssk.) Hayne

Add another Ugandan record to p. 191:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Add a new species record to p. 192:

Albizia adianthifolia (Schumach.) W.F Wright
ITU: 217 (1952); FCB 3: 178 (1952); FWTA 1,2: 502 (1958); FTEA, Leg.-Mimosoid.: 160 (1959); FZ 3,1: 131 (1970); KTSL: 269 (1994).
Syn.: *Albizia fastigiata* (E. Mey.) Oliv.: FTA 2: 361 (1871).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 445 documents this record).

General habitat range: in lowland and medium altitude forest and woodland.

General distribution: Gambia to Uganda and Kenya, south to Angola and South Africa (Natal).

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at Kew from U1; the species has a typical Guineo-Congolian-East African coastal distribution. We therefore think that the record of this species from the

drier forests of the study area is possible, but needs confirmation.

Albizia coriaria Welw.

Add a Ugandan record to p. 193:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; specimen no. 442 documents this record).

Albizia glaberrima (Schumach. & Thonn.) Benth.

Add another Ugandan record to p. 193:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 443 documents this record).

Albizia grandibracteata Taub.

Add another Ugandan record to p. 193:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 446 documents this record).

Albizia gummifera (J.F. Gmel.) C.A. Sm.

Add another Ugandan record to p. 194:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 444 documents this record).

Add a new species record to p. 194:

Albizia malacophylla (A. Rich.) Walp.

ITU: 221 (1952); FWTA 1,2: 502 (1958); FTEA, Leg.-Mimosoid.: 145 (1959); FE 3: 93 (1989).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; no specimen documents this record).

General habitat range: in lowland and medium altitude woodland.

General distribution: Senegal to Sudan, Uganda and Ethiopia.

Note: In Uganda this species has previously been recorded from the northern, central and eastern parts (FTEA-regions U1, U3 & U4). There is material of this species at K from the Western Nile region of U1; we therefore think that the record of this typical Sudanian species from the study area is likely, but needs confirmation.

Albizia schimperiana Oliv.

Add another Ugandan record to p. 194:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Albizia zygia (DC.) Macbr.

Add a Ugandan record to p. 195:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; specimen no. 447 documents this record).

Dichrostachys cinerea (L.) Wight. & Arn.

Add a Ugandan record to p. 196:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; specimen no. 438 documents this record).

Entada abyssinica Steud ex A. Rich.

Add another Ugandan record to p. 196:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; no specimen documents this record).

Add a new genus and species record to p. 197:

Newtonia Baill.

Newtonia buchananii (Bak.) Gilb. & Bout.

FCB 3: 213 (1952); FTEA, Leg.-Mimos.: 23

(1959); FZ 3,1: 28 (1970); KTS: 276 (1994).
Syn.: *Piptadenia buchananii* Bak.: ITU: 230 (1952).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 435 documents this record).

General habitat range: in lowland and medium altitude forest, sometimes in riverine forest, swamp or groundwater forests.

General distribution: Cameroon, Congo [previously Zaire] to Uganda, Kenya and Tanzania, south to Angola, Zambia, Zimbabwe, Malawi and Mozambique.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at Kew from U1. However, the species is widespread, and we therefore think that the record of this species with a Guineo-Congolian-East African coastal distribution from the drier forests of the study area is possible.

Parkia filicoidea Welw.

Add a Ugandan record to p. 197:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 440 documents this record).

Tetrapleura tetraptera (Schumach. & Thonn.) Taub.

Add a Ugandan record to p. 198:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 439 documents this record).

Subfam. **Faboideae**

Craibia brownii Dunn.

Add a Ugandan record to p. 203:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; specimen no. 429 documents this record).

Dalbergia lactea Vatke

Add another Ugandan record to p. 210:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Dalbergia melanoxyloides Guill. & Perr.

Add another Ugandan record to p. 210:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Erythrina abyssinica DC.

subsp. **abyssinica**

Add another Ugandan record to p. 216:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; no specimen documents this record).

Indigofera arrecta A. Rich.

Add a Ugandan record to p. 217:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; no specimen documents this record).

Lonchocarpus laxiflorus Guill. & Perr.

Add a Ugandan record to p. 222:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; no specimen documents this record).

Add a new genus and species record to p. 223:

Millettia Wight & Arn.**Millettia dura** Dunn

ITU: 307 (1952); FCB 5: 24 (1954); FTEA, Leg.-Pap. 1: 144 (1971); KTS: 302 (1994).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 430 documents this record).

General habitat range: in medium altitude forest, especially in clearings and along margins.

General distribution: Eastern Congo [previously Zaire], Uganda, Kenya, Tanzania.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at K from U1. However, the species is widespread, and we therefore think that the record of this species from the drier forests of the study area is possible.

Ormocarpum trichocarpum (Taub.) Engl.

Add another Ugandan record to p. 224:

Imatong Mountains group, Uganda side: Also recorded from the Lokung Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Pterocarpus lucens Guill. & Perr.

Add a Ugandan record to p. 225:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Sesbania sesban (L.) Merr.

Add a Ugandan record to p. 228:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Tephrosia interrupta Engl.

Add another Ugandan record to p. 230:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

Fam. 87. **Myricaceae** Blume**Myrica humilis** Cham. & Schlecht.

Add a Ugandan record to p. 238:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as "*Myrica salicifolia*"; specimen no. 258 documents this record).

Fam. 88. **Ulmaceae** Mirb.**Celtis africana** Burm. f.

Add another Ugandan record to p. 238:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 89 documents this record).

Celtis mildbraedii Engl.

Add a Ugandan record to p. 239:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 86 documents this record).

Celtis philippensis Blanco

Add a Ugandan record to p. 239:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Celtis wightii*"; specimen no. 90 documents this record).

Celtis zenkeri Engl.

Add a Ugandan record to p. 240:

Imatong Mountains group, Uganda side: Re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 87 documents this record).

Chaetachme aristata Planch.

Add another Ugandan record to p. 240:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 252 documents this record).

Trema orientalis (L.) Blume

Add a Ugandan record to p. 241:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 92 documents this record).

Fam. 89. **Moraceae** Link

Antiaris toxicaria Lesch.

subsp. **welwitschii** (Engl.) C.C. Berg

Add a Ugandan record to p. 241:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; specimen no. 56 documents this record).

Ficus amadiensis De Wild.

Add another Ugandan record to p. 243:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Ficus asperifolia Miq.

Add another Ugandan record to p. 243:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 68 documents this record).

Ficus cyathistipula Warb.

Add another Ugandan record to p. 244:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 77 documents this record).

Ficus dicranostyla Mildbr.

Add another Ugandan record to p. 244:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; no specimen documents this record).

Ficus exasperata Vahl

Add a Ugandan record to p. 244:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 63 documents this record).

Ficus glumosa Del.

Add a Ugandan record to p. 245:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Ficus ingens (Miq.) Miq.

Add a Ugandan record to p. 245:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 73 documents this record).

Ficus mucoso Welw. ex Ficalho

Add a Ugandan record to p. 246:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; specimen no. 66 documents this record).

Add a new species record to p. 246:

Ficus natalensis Hochst.

FTA 6,2: 208 (1917); ITU: 253 (1952); FC 28: 184 (1985); FTEA, Morac.: 71 (1989).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 82 documents this record).

General habitat range: in lowland and medium altitude forest; often planted for the production of bark-cloth.

General distribution: Senegal to South Sudan Uganda and Kenya, south to Angola and South Africa (Transvaal, Natal).

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at K from U1. We think the record of this species with a Guineo-Congolian-East African coastal distribution from the drier forests of the study area needs confirmation. The species is easily confused with *Ficus thonningii*, a common species in the study area, and a confusion with this species is therefore possible.

Ficus platyphylla Del.

Add another Ugandan record to p. 246:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Add a new species record to p. 246:

Ficus sansibarica Warb.

FTA 6,2: 130 (1916); FTEA, Morac.: 79 (1989); KTSL: 328 (1994).

subsp. **macrosperma** (Mildbr. & Burret) C.C. Berg

FTEA, Morac.: 80 (1989).

Syn.: *Ficus brachylepis* Welw. ex Hiern: FTA 6,2: 124 (1916); ITU: 242 (1952). *Ficus macrosperma* Mildbr. & Burret: FTA 6,2: 130 (1916); FWTA

1,2: 611 (1958); FC 28: 220 (1985). *Ficus ugandensis* Hutch.: FTA 6,2: 129 (1916).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 72 documents this record).

General habitat range: in lowland and medium altitude rain forest, ground water forest and on lake shores.

General distribution: Sierra Leone to Uganda, south to Angola and northern Zambia.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at K from U1; we therefore think that a record of this subspecies with a typical Guineo-Congolian distribution from the drier forests of the study area is unlikely. The other subspecies, subsp. *sansibarica*, has a typical East African coastal distribution, supplementing the distribution of subsp. *macrosperma*.

Ficus saussureana DC.

Add a Ugandan record to p. 246:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; no specimen documents this record).

Ficus sur Forssk.

Add a Ugandan record to p. 247:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; specimen no. 69 documents this record).

Ficus sycomorus L.

Add another Ugandan record to p. 247:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; specimen no. 64 documents this record).

Ficus thonningii Blume

Add another Ugandan record to p. 248:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; specimen no. 83 documents this record).

Ficus vallis-choudae Del.

Add another Ugandan record to p. 247:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; specimen no. 65 documents this record).

Add a new species record to p. 249:

Ficus verruculosa Warb.

FTA 6,2: 114 (1916); FCB 1: 120 (1948); FWTA 1,2: 607 (1958); FC 28: 154 (1985); FTEA, Morac.: 63 (1989); KTSL: 330 (1994).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 80 documents this record).

General habitat range: in lowland and medium altitude moist grassland and woodland, usually at streams, lakes, swamps or in the open water in lakes.

General distribution: Niger to Uganda and Kenya, south to Angola and South Africa.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at K from U1, and it does not occur further north. We therefore think the record of this species from the drier forests of the study area is unlikely; it could possibly represent a confusion with **Ficus thonningii** Bl.

Milicia excelsa (Welw.) C.C. Berg

Add a Ugandan record to p. 249:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung

Forest Reserves by LWANGA (1996: 29; specimen no. 59 documents this record).

Morus mesozygia Stapf

Add a Ugandan record to p. 250:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 58 documents this record).

Trilepisium madagascariense DC.

Add a Ugandan record to p. 250:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 61 documents this record).

Fam. 90. **Cecropiaceae** C.C. Berg**Myrianthus arboreus** P. Beauv.

Add a Ugandan record to p. 250:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 364 documents this record).

Fam. 93. **Aquifoliaceae** Bartl.**Ilex mitis** (L.) Radlk.

Add a Ugandan record to p. 254:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 165 documents this record).

Fam. 94. **Celastraceae** R. Br.**Catha edulis** (Vahl) Endl.

Add a Ugandan record to p. 255:

Imatong Mountains group, Uganda side: Re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 330 documents this record).

Maytenus heterophylla (Eckl. & Zeyh.) N. Robson

Add another Ugandan record to p. 257:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 162 documents this record).

Maytenus senegalensis (Lam.) Exell

Add another Ugandan record to p. 258:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; no specimen documents this record).

Add a new species record to p. 258:

Maytenus serrata (Hochst. ex A. Rich.) Wilczek FCB 9: 119 (1960); SEBSEBE 1985: 57.

Syn.: *Celastrus serratus* Hochst. ex A. Rich.: FTA 1: 362 (1868).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

General habitat range: in montane evergreen bushland.

General distribution: Ethiopia, Eritrea.

Note: According to SEBSEBE 1985: 57 *Maytenus serrata* is endemic to northern Ethiopia and Eritrea; we therefore find that this record most probably represents a misidentification of *Maytenus gracilipes* subsp. *arguta*, a taxon sometimes referred to as *Maytenus serratus* var. *arguta*. A record of true *Maytenus serrata* is very unlikely.

Maytenus undata (Thunb.) Blakelock

Add another Ugandan record to p. 258:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by

LWANGA (1996: 29; specimen no. 161 documents this record).

Fam. 95. **Icacinaceae** (Benth.) Miers

Leptaulus daphnoides Benth.

Add a Ugandan record to p. 260:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 238 documents this record).

Fam. 96. **Olacaceae** Mirb. ex DC.

Strombosia scheffleri Engl.

Add another Ugandan record to p. 262:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 123 documents this record).

Ximenia americana L.

Add another Ugandan record to p. 262:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; no specimen documents this record).

Fam. 102. **Rhamnaceae** Juss.

Lasiodiscus mildbraedii Engl.

Add a Ugandan record to p. 267:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 302 documents this record).

Maesopsis eminii Engl.

Add a Ugandan record to p. 268:

Imatong Mountains group, Uganda side: Re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 189 documents this record).

Rhamnus prinoides L'Hér.

Add a Ugandan record to p. 268:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 168 documents this record).

Ziziphus abyssinica Hochst. ex A. Rich.

Add a Ugandan record to p. 269:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

Add a new species record to p. 269:

Ziziphus mucronata Willd.

FTA 1: 380 (1868); ITU: 328 (1952); FWTA 1,2: 669 (1958); FCB 9: 441 (1960); FZ 2,2: 422 (1966); FTEA, Rhamnac.: 25 (1972); FE 3: 393 (1989); KTSL: 360 (1994).

subsp. **mucronata**

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; no specimen documents this record).

General habitat range: in lowland, medium altitude and montane open woodland or wooded grassland; also in dry riverine forest or thicket in grassland.

General distribution: Senegal to Ethiopia, south to South Africa (Cape Province); also in tropical Arabia and Madagascar. In Southern Africa also subsp. *rhodesica* R.B. Drummond.

Note: In Uganda this species has previously only been recorded from the northern and western parts (FTEA-regions U1 and U2). There are several collections at K of this species from Karamija region, U1. We therefore think that the record of this species from the drier forests of the study area is very probable.

Fam. 105. **Rutaceae** Juss.

Clausena anisata (Willd.) Hook. f.

Add another Ugandan record to p. 275:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 377 documents this record).

Fagaropsis angolensis (Engl.) Gardner

Add a Ugandan record to p. 276:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 372 documents this record).

Toddalia asiatica (L.) Lam.

Add a Ugandan record to p. 276:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Vepris nobilis (Del.) Mziray

Add a Ugandan record to p. 278:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; as "*Teclea nobilis*"; specimen no. 347 documents this record).

Zanthoxylum gillettii (De Wild.) Waterm.

Add a Ugandan record to p. 277:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 373 documents this record).

Fam. 106. **Simaroubaceae** DC.

Harrisonia abyssinica Oliv.

Add another Ugandan record to p. 279:

Imatong Mountains group, Uganda side: Also re-

corded from the Lokung Forest Reserve by LWANGA (1996: 29; as "*Harrisonia occidentalis*"; no specimen documents this record).

Note: *Harrisonia occidentalis* Engl.: ITU: 409 (1952) is a synonym of *Harrisonia abyssinica* Oliv.; it was overlooked in our account on p. 279 of Vol. 1.

Fam. 107. **Irvingiaceae** (Engl.)
Exell & Mendonça

Irvingia gabonensis Baill.

Add a Ugandan record to p. 279:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 210 documents this record).

Klainedoxa gabonensis Pierre ex Engl.

Add a Ugandan record to p. 279:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 209 documents this record).

Fam. 108. **Burseraceae** Kunth

Boswellia papyrifera (Del.) Hochst.

Add another Ugandan record to p. 280:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

Commiphora africana (A. Rich.) Engl.

Add another Ugandan record to p. 280:

Imatong Mountains group, Uganda side: Also recorded from the Lokung Forest Reserve by LWANGA (1996: 28; no specimen documents this record).

Fam. 109. **Meliaceae** Juss.

Ekebergia capensis Sparrm.

Add another Ugandan record to p. 281:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Ekebergia capensis*" and "*Ekebergia senegalensis*"; specimens no. 390 & 391 document these records).

Entandophragma angolense (Welw.) C. DC.

Add a Ugandan record to p. 282:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 401 documents this record).

Add a new species record to p. 282:

Khaya anthotheca (Welw.) C. DC.

ITU: 185 (1952); FCB 7: 176 (1958); FWTA 1,2: 699 (1958); FTEA, Meliac.: 47 (1991).

Syn.: *Khaya nyasica* Bak. f.: FCB 7: 178 (1958); FZ 2,1: 287 (1963).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 403 documents this record).

General habitat range: in lowland and medium altitude rain forest.

General distribution: Sierra Leone to Uganda, south to Angola, Zambia, Malawi and Mozambique.

Note: In Uganda this species has previously only been recorded from the western part (FTEA-regions U2). There is no material of this species at K from U1; we therefore think that the record of this species with a peripheral Guineo-Congolian distribution from the drier forests of the study area is unlikely.

Khaya grandifoliola C. DC.

Add a Ugandan record to p. 282:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by

LWANGA (1996: 28; specimen no. 404 documents this record).

Lepidotrichilia volkensii (Guerke) Leroy

Add a Ugandan record to p. 282:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 396 documents this record).

Trichilia dregeana Sond.

Add a Ugandan record to p. 283:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 392 documents this record).

Add a new species record to p. 283:

Trichilia rubescens Oliv.

FTA 1: 336 (1868); ITU: 197 (1952); FCB 7: 169 (1958); FTEA, Meliac.: 32 (1991).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; specimen no. 395 documents this record).

General habitat range: in lowland and medium altitude rain forest.

General distribution: Nigeria and Cameroon to Uganda, south to Congo [previously Zaire] and Tanzania.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at K from U1; we therefore think that the record of this species with a partial Guineo-Congolian distribution from the drier forests of the study area is unlikely.

Turraea holstii Guerke

Add another Ugandan record to p. 284:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

Add a new species record to p. 284:

Turraea vogelii Benth. in Hook. f.

FTA 1: 330 (1868); ITU: 201 (1952); FCB 7: 155 (1958); FWTA 1,2: 708 (1958); FTEA, Meliac.: 14 (1991).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 228 documents this record).

General habitat range: in lowland and medium altitude moist forest.

General distribution: Ghana to Uganda and Sudan, south to Angola.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at Kew from U1, and it does not occur further north. We therefore think the record of this species from the drier forests of the study area is unlikely.

Fam. 110. **Sapindaceae** Juss.

Allophylus abyssinicus (Hochst.) Radlk.

Add another Ugandan record to p. 285:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 351 documents this record).

Add a new species record to p. 285:

Allophylus dummeri Bak. f.

ITU: 376 (1952); FTEA, Sapindac.: 80 (1998).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 353 documents this record).

General habitat range: in lowland and medium altitude moist forest.

General distribution: Congo [previously Zaire] to Uganda, south to Angola.

Note: In Uganda this species has previously only been recorded from the western and southern

parts (FTEA-regions U2 and U4). There is no material of this species at Kew from U1, and it does not occur further north. We therefore think the record of this species with a partial Guineo-Congolian distribution from the drier forests of the study area is unlikely.

Replace the entry for *Allophylus macrobotrys* Gilg on p. 285 with the following and add a Ugandan record:

***Allophylus ferrugineus* Taub.**

ITU: 376 (1952); FCB 9: 307 (1960); KTS: 412 (1994); FTEA, Sapindac.: 85 (1998).

var. ***ferrugineus***

FTEA, Sapindac.: 86 (1998).

Syn.: *Allophylus macrobotrys* Gilg: FPNA 1: 517 (1948); ITU: 376 (1952); FCB 9: 305 (1960); FE 3: 499 (1989); EL AMIN 1990: 325 [Lotti]. *Allophylus oreophilus* Gilg: FPNA 1: 516 (1948); FCB 9: 307 (1960). *Allophylus welwitschii* Gilg: FPS 2: 335 (1952); FWTA 1,2: 714 (1958); FCB 9: 310 (1960); FC 16: 34 (1973); FG 23: 34 (1973).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; no specimen documents this record).

General habitat range: in lowland, medium altitude and montane forest and bushland, sometimes in patches of evergreen bushland on termite mounds in woodland.

General distribution: Nigeria and Cameroon to Ethiopia and Kenya, south to Angola, Congo [previously Zaire] and Tanzania.

Note: Taxonomic concept here is adapted to the concept proposed in the recent account in FTEA, Sapindac.; the species has been widely known in Eastern Africa as *Allophylus macrobotrys*, while the name in western Africa has often been *Allophylus welwitschii* Gilg.

***Blighia unijugata* Bak.**

Add a Ugandan record to p. 285:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 419 documents this record).

***Blighia welwitschii* (Hiern) Radlk.**

Add a Ugandan record to p. 286:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 415 documents this record).

***Glenniea africana* (Radlk.) Leenh.**

Add a Ugandan record to p. 286:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as *Crossonephelum* (spalm pro *Crossonephelis*) *africanus*; no specimen documents this record).

***Lepisanthes senegalensis* (Juss.) Leenh.**

Add another Ugandan record to p. 287:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as "*Aphania senegalensis*"; specimen no. 429 documents this record; and 1996: 29; as *Lepisanthe senegalensis*; no specimen documents this record).

***Lychnodiscus cerospermus* Radlk.**

Add to p. 287: Add a Ugandan record:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 412 documents this record).

***Zanha golungensis* Hiern**

Add another Ugandan record to p. 288:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; specimen no. 416 documents this record).

Fam. 111. **Melianthaceae** Link**Bersama abyssinica** Fresen.

Add another Ugandan record to p. 289:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 380 documents this record).

Fam. 112. **Anacardiaceae** Link**Lannea barteri** (Oliv.) Engl.

Add another Ugandan record to p. 289:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; no specimen documents this record).

Lannea schimperi (A. Rich.) Engl.

Add a Ugandan record to p. 290:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Ozoroa insignis Del.

Add a Ugandan record to p. 291:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Pseudospondias microcarpa (A. Rich.) Engl.

Add another Ugandan record to p. 291:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 385 documents this record).

Rhus natalensis Krauss

Add a Ugandan record to p. 292:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung

Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

Rhus vulgaris Meikle

Add another Ugandan record to p. 292:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

Sclerocarya birrea (A. Rich.) Hochst.

Add another Ugandan record to p. 293:

Imatong Mountains group, Uganda side: Also recorded from the Lokung Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Fam. 114. **Cornaceae** (Dumort.) Dumort.**Afrocrania volkensii** (Harms) Hutch.

Add a Ugandan record to p. 294:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 293 documents this record).

Fam. 116. **Araliaceae** Juss.**Cussonia arborea** Hochst. ex A. Rich.

Add another Ugandan record to p. 295:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; no specimen documents this record).

Cussonia spicata Thunb.

Add another Ugandan record to p. 296:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 357 documents this record).

Polyscias fulva (Hiern) Harms

Add another Ugandan record to p. 296:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 384 documents this record).

Schefflera abyssinica (Hochst. ex A. Rich.) Harms

Add another Ugandan record to p. 296:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 358 documents this record).

Fam. 117. **Apiaceae** Lindl.**Steganotaenia araliacea** Hochst.

Add a Ugandan record to p. 301:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Fam. 118. **Ericaceae** Juss.**Agauria salicifolia** (Lam.) Oliv.

Add a Ugandan record to p. 302:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; specimen no. 261 documents this record).

Erica arborea L.

Add a Ugandan record to p. 303:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 25 documents this record).

Fam. 119. **Ebenaceae** Guerke**Diospyros abyssinica** (Hiern) F. White

Add another Ugandan record to p. 303:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; specimen no. 211 documents this record).

Euclea divinorum Hiern

Add a Ugandan record to p. 304:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 28; no specimen documents this record).

Euclea racemosa Murray

subsp. **schimperi** (A. DC.) F. White

Add a Ugandan record to p. 304:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Euclea schimperi*"; no specimen documents this record).

Fam. 120. **Sapotaceae** Juss.

Replace the entry for *Chrysophyllum natalense* Sonder with the following and add new record for Uganda on p. 305:

Englerophytum Krause**Englerophytum oblanceolatum** (S. Moore)

Pennington

PENNINGTON 1991: 252.

Syn.: *Bequaertiendendron oblanceolatum* (S. Moore) Heine & Hemsley: FWTA 2: 25 (1963); FTEA, Sapotac.: 23 (1968). [*Chrysophyllum natalense* auct., non Sond.: ITU: 392 (1952); JACKSON 1956: 353 {Talanga, Lotti}].

Imatong Mountains group, Sudan side: Recorded by JACKSON 1956 from Talanga and Lotti (as *Chrysophyllum natalense*).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as “*Bequaertiodendron oblanceolatum* (*Chrysophyllum natalense*)”); specimen no. 37 documents this record).

General habitat range: in lowland and medium altitude forest.

General distribution: Sierra Leone to Uganda and Kenya.

Note: We have still not seen material from the study area.

Chrysophyllum albidum G. Don

Add a Ugandan record to p. 305:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 40 documents this record).

Chrysophyllum muerense Engl.

Add a Ugandan record to p. 305:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 39 documents this record).

Manilkara butugi Chiov.

Add a Ugandan record to p. 306:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 30 documents this record).

Note: *Manilkara multinervis* is not a synonym of *Manilkara butugi*, as suggested by LWANGA 1996: 29.

Add a new species record to p. 306:

Manilkara dawei (Stapf) Chiov.

ITU: 399 (1952); FTEA, Sapotac.: 65 (1968); PENNINGTON 1991: 133.

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 52 documents this record).

General habitat range: in lowland and medium altitude forest.

General distribution: Sierra Leone to Uganda and Kenya.

Note: In Uganda this species is widespread and has been recorded from all parts (FTEA-regions U1-4) and at Kew there are specimens from the West Nile region; the record of this species from the drier forests of the study area is therefore probable.

Mimusops bagshawei S. Moore

Add a Ugandan record to p. 306:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 47 documents this record).

Mimusops kummel A. DC.

Add another Ugandan record to p. 307:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 48 documents this record).

Pouteria adolfi-friederici (Engl.) A. Meeuse

Add another Ugandan record to p. 307:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as “*Aningeria adolfi-friederici*”; specimen no. 36 documents this record).

Pouteria altissima (A. Chev.) Baehni

Add a Ugandan record to p. 308:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as “*Aningeria altissima*”; specimen no. 35 documents this record).

Synsepalum brevipes (Bak.) Pennington

Add a Ugandan record to p. 308:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by

LWANGA (1996: 27; as "*Pachystela brevipes*"; specimen no. 53 documents this record).

Vitellaria paradoxa C.F. Gaertn.

Add a Ugandan record to p. 309:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 27; as "*Butyrospermum paradoxum*"; no specimen documents this record).

Fam. 121. **Myrsinaceae** R. Br.

Maesa lanceolata Forssk.

Add another Ugandan record to p. 309:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 164 documents this record).

Rapanea melanophloeos (L.) Mez

Add another Ugandan record to p. 310:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 262 documents this record).

Fam. 122. **Loganiaceae** R. Br. ex Mart.

Anthocleista grandiflora Gilg

Add another Ugandan record to p. 311:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as "*Anthocleista zambesiaca*"; specimen no. 289 documents this record).

Nuxia congesta R. Br. ex Fresen.

Add another Ugandan record to p. 311:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; specimen no. 265 documents this record).

Note: We have rejected the identification by LWANGA (1996: 30) of specimen no. 265 as *Nuxia floribunda* Benth. The distinction between the two species is critical; in his monograph of the genus *Nuxia* LEEUWENBERG (1975: 41) quoted and mapped numerous specimens as far north as Teita Hills in Kenya and U2 in Uganda, but did not cite records further north. We therefore believe that specimen no. 265 has been misidentified.

Strychnos innocua Del.

Add another Ugandan record to p. 312:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

Strychnos mitis S. Moore

Add a Ugandan record to p. 310:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 292 documents this record).

Strychnos spinosa Lam.

Add another Ugandan record to p. 312:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; no specimen documents this record).

Fam. 123. **Oleaceae** Hoffmanns. & Link

Add a new species record to p. 310:

Chionanthus africanus (Knobl.) Stearn

STEARNS 1980: 197.

Syn.: *Maypea africana* Knobl. *Linociera africana* (Knobl.) Knobl.: FWT 2: 48 (1963); FCB, Oleac.: 29 (1973). *Linociera angolensis* Bak.: FTA 2: 20 (1902). *Linociera johnsonii* Bak.: FTA 4: 20 (1902); ITU: 285 (1952); FTEA, Oleac.: 12 (1952). *Linociera mildbraedii* Gilg & Schellenb.

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 336 documents this record).

General habitat range: in lowland and medium altitude forest, often in swamp forest.

General distribution: Sierra Leone to Uganda, south to Angola.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at Kew from U1, and it does not occur further north. We therefore think the record of this species from the drier forests of the study area is unlikely.

Chionanthus mildbraedii (Gilg & Schellenb.) Stearn

Add a Ugandan record to p. 313:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as "*Olea mildbraedii*"; specimen no. 337 documents this record).

Jasminum streptopus E. Mey.

Add a Ugandan record to p. 314:

Imatong Mountains group, Uganda side: Recorded from the Lokung Forest Reserve by LWANGA (1996: 29; as "*Jasminum bussei*"; no specimen documents this record).

Olea capensis L.

subsp. **hochstetteri** (Bak.) Friis & P.S. Green

Add another Ugandan record to p. 315:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as *Olea hochstetteri*; specimen no. 334 documents this record).

Olea capensis L.

subsp. **welwitschii** (Knobl.) Friis & P.S. Green

Add a Ugandan record to p. 315:

Imatong Mountains group, Uganda side: Re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as *Olea welwitschii*; specimen no. 334 documents this record).

Add a new species record to p. 315:

Schrebera alata (Hochst.) Welw.

FTA 4: 15 (1902); FPNA 2: 50 (1947); ITU: 287 (1952); FTEA, Oleac.: 4 (1952); FCB, Oleac.: 2 (1973); FZ 7,1: 304 (1983); KTSL: 473 (1994).

Imatong Mountains group, Uganda side: Recorded from the Lokung Forest Reserve by LWANGA (1996: 30; specimen no. 379 documents this record).

General habitat range: in medium altitude and montane dry forest, evergreen bushland and woodland, often on termite mounds.

General distribution: East Congo [previously Zaire] to Ethiopia, south to Angola, Zimbabwe and South Africa (Transvaal, Natal).

Note: In Uganda this species has previously only been recorded from the northern and eastern parts (FTEA-regions U1 and U4); the record of this species with an Afromontane distribution from the drier forests of the study area is probable, but needs confirmation.

Schrebera golungensis Welw.

Add a Ugandan record to p. 315:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as "*Schrebera arborea*"; specimen no. 332 documents this record).

Fam. 124. **Apocynaceae** Juss.

Alstonia boonei De Wild.

Add a Ugandan record to p. 317:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 332 documents this record).

Carissa edulis (Forssk.) Vahl

Add another Ugandan record to p. 317:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; specimen no. 332 documents this record).

Rauvolfia caffra Sond.

Add another Ugandan record to p. 318:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as "*Rauvolfia caffra*"; no specimen documents this record; also as "*Rauvolfia oxyphylla*"; specimen no. 268 documents this record).

Rauvolfia vomitoria Afzel.

Add a Ugandan record to p. 318:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 269 documents this record).

Correct on p. 319:

Saba comorensis (Bojer) Pichon

var. **florida** (Benth.) K. Schum.

Replace the two synonyms *Saba florida* Benth. and *Landolphia florida* Benth. (and their literature references) with the following: *Landolphia florida* Benth.: FTA 4,1: 38 (1902); FS: 244 (1929); FPNA 2: 74 (1947); JACKSON 1956: 354 [Talanga].

Fam. 126. **Rubiaceae** Juss.**Coffea arabica** L.

Add a Ugandan record to p. 328:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Coffea eugeniooides (arabica)*"; specimen no. 327 documents this record).

Note: The identity of this record is not certain;

in spite of the incorrect synonymy, with *Coffea arabica* as a synonym of *Coffea eugeniooides*, we assume that this represents a record of true *Coffea arabica*.

Coffea canephora Pierre ex Froehner

Add a Ugandan record to p. 328:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 314 documents this record).

Coffea liberica Hiern

Add a Ugandan record to p. 329:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; specimen no. 309 documents this record).

Galiniera saxifraga (Hochst.) Bridson

Add a Ugandan record to p. 331:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 320 documents this record).

Add a new species record to p. 332:

Gardenia erubescens Stapf & Hutch.

FPS 2: 437 (1952); ITU: 343 (1952); FWTA 2: 123 (1963); FTEA, Rubiac. 2: 505 (1988).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

General habitat range: in lowland and medium altitude woodland.

General distribution: Senegal to Sudan and Uganda.

Note: In Uganda this species has previously only been recorded from the northern part (FTEA-regions U1); the record of this species with a Sudanian distribution from the drier forests of the study area is probable.

Gardenia ternifolia Schumach. & Thonn.

Add a Ugandan record to p. 332:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 29; no specimen documents this record).

Heinsenya diervilleoides K. Schum.

Add another Ugandan record to p. 333:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; specimen no. 324 documents this record).

Hymenodictyon floribundum (Hochst. & Steud.) B.L. Robinson

Add another Ugandan record to p. 333:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Oxyanthus speciosus DC.

Add another Ugandan record to p. 338:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 317 documents this record).

Pavetta molundensis K. Krause

Add a Ugandan record to p. 339:

Imatong Mountains group, Uganda side: Recorded from the Lokung Forest Reserve by LWANGA (1996: 30; specimen no. 318 documents this record).

Pavetta oliveriana Hiern

Add a Ugandan record to p. 340:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 30; no specimen documents this record).

Psychotria mahonii C.H. Wright

Add a Ugandan record to p. 343:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 321 documents this record).

Psychotria orophila Petit

Add a Ugandan record to p. 343:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

Psydrax parviflora (Afzel.) Bridson
subsp. *parviflora*

Add a Ugandan record to p. 345:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 27; as "*Canthium vulgare*"; specimen no. 325 documents this record).

Rothmannia urcelliformis (Hiern) Bullock ex Robyns

Add a Ugandan record to p. 346:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; specimen no. 322 documents this record).

Add a new species record to p. 346:

Rytigynia beniensis (De Wild.) Robyns
FPNA 2: 349 (1947); FTEA, Rubiac. 3: 808 (1991).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

General habitat range: at the edge of lowland and medium altitude forest, in thickets in woodland or grassland, often in swampy places or on termite mounds.

General distribution: Congo [previously Zaire], Rwanda, Uganda.

Note: In Uganda this species has previously only been recorded from the western and southern parts (FTEA-regions U2 and U4). There is no material of this species at Kew from U1, and it does not occur further north. We therefore think the record of this species from the drier forests of the study area is unlikely.

Add a new species record to p. 346:

Rytigynia bugoiensis (K. Krause) Verdc.
FTEA, Rubiac. 3: 833 (1991).

Syn.: *Rytigynia butaguensis* (De Wild.) Robyns:
FPNA 2: 347 (1947).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; as "*Rytigynia butanguensis*"; no specimen documents this record).

General habitat range: in medium altitude and montane forest and evergreen bushland.

General distribution: Congo [previously Zaire], Rwanda, Uganda, Kenya, Tanzania.

Note: In Uganda this species has previously only been recorded from the western and eastern parts (FTEA-regions U2 and U3), it is also known from records from northern Kenya. The record of this species seems possible.

Add a new species record to p. 347:

Rytigynia ruwenzoriensis (De Wild.) Robyns
FPNA 2: 348 (1947); FTEA, Rubiac. 3: 814 (1991).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 30; no specimen documents this record).

General habitat range: in medium altitude and montane forest and evergreen bushland.

General distribution: Congo [previously Zaire], Uganda.

Note: In Uganda this species has previously only been recorded from the southwestern part (FTEA-regions U2). There is no material of

this species at Kew from U1, and it does not occur further north. We therefore think the record of this species with a partial Guineo-Congolian distribution from the drier forests of the study area is unlikely.

Tarenna graveolens (S. Moore) Bremek.

Add a Ugandan record to p. 349:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

Tarenna pavettoides (Harv.) Sim

Add a Ugandan record to p. 349:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; specimen no. 319 documents this record).

Vangueria apiculata S. Schum.

Add a Ugandan record to p. 350:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu and the Lokung Forest Reserve by LWANGA (1996: 31; specimen no. 311 documents this record).

Vangueria madagascariensis Gmel.

Add another Ugandan record to p. 350:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; as "*Vangueria acutiloba*"; no specimen documents this record).

Fam. 128. Asteraceae Dumort.

Crassocephalum montuosum (S. Moore) Milne-Redh.

Add a Ugandan record to p. 362:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Crassocephalum afromon-*

tanum"; specimen no. 171 documents this record).

Add to synonymy of *Crassocephalum montuosum*: JEFFREY 1986: 906.

Syn.: *Crassocephalum afromontanum* R.E. Fr.

Helichrysum schimperi (Sch. Bip. ex A. Rich.) Moeser

Add a Ugandan record to p. 372:

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 29; no specimen documents this record).

Solanecio mannii (Hook. f.) C. Jeffrey

Add another Ugandan record to p. 378:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 28; as "*Crassocephalum mannii*"; specimen no. 171 documents this record).

Vernonia adoensis Sch. Bip. ex Walp.

Add another Ugandan record to p. 381:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

Vernonia amygdalina Del.

Add another Ugandan record to p. 381:

Imatong Mountains group, Uganda side: Also recorded from the Agoro-Agu and the Lokung Forest Reserves by LWANGA (1996: 31; no specimen documents this record).

Add a new species record to p. 381-382:

Vernonia auriculifera Hiern

JEFFREY 1988: 220.

ITU: 99 (1952); FWTA 2: 277 (1963).

Imatong Mountains group, Uganda side: Re-

corded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

General habitat range: in medium altitude and montane forest and evergreen bushland.

General distribution: Nigeria, Cameroon and Congo [previously Zaire] to Ethiopia, Uganda, Kenya, Tanzania, south to Angola.

Note: In Uganda this species has previously only been recorded from the southern part (FTEA-regions U2-U4); the record of this species with a partial Afromontane distribution from the drier forests of the study area needs confirmation.

Add a new species record to p. 382:

Vernonia infundibularis Oliv. & Hiern

FTA 3: 285 (1877); JEFFREY 1988: 234 (as "*Vernonia infundibulariformis* Oliv. & Hiern").

Syn.: *Vernonia sassureoides* Hutch.: FWTA 2: 281 (1963).

Imatong Mountains group, Uganda side: Recorded from the Agoro-Agu Forest Reserve by LWANGA (1996: 31; no specimen documents this record).

General habitat range: in medium altitude and montane forest, and in evergreen bushland.

General distribution: Nigeria, Cameroon, eastern Congo [previously Zaire], Sudan, Uganda, Tanzania.

Note: In Uganda this species has previously only been recorded from the southwestern part (FTEA-regions U2), but there are also records from south-west Sudan (near Yambio); the record of this species from the drier forests of the study area is therefore possible.

Appendix B. Botanical collectors and collections

The botanical material from the Imatong, the Dongotona and the Didinga Mountains is preserved in a number of institutions in Africa and in Europe. The most complete material is kept at the Herbarium, Royal Botanic Gardens, Kew. Early collections (up to ca. 1950) of trees from both the Sudan and the Uganda side were deposited in the Daubeny Herbarium (previously the Forest Herbarium), Oxford, U.K., while herbs from the Sudanese side in the same collectors' series were frequently placed in the Herbarium of the Natural History Museum (previously British Museum (Natural History)), London.

Many specimens from the Sudan side have been deposited in institutions in the Sudan, frequently with duplicates elsewhere: The Herbarium of the Botany Department, University of Khartoum, the Herbarium of the Forest Research and Education institute in Soba near Khartoum, or in the Herbarium of the Gezira Research Station, Agricultural Research Division, Wad Medani, Gezira.

Collections made by botanists from or based in Uganda, including specimens from the Uganda side and specimens collected during excursions into the Sudan. These specimens were previously mostly deposited in the Forest Herbarium in Entebbe. The Entebbe herbarium has now been transferred to the Herbarium of the Botany Department, Makerere University, Kampala, where later collections from the Uganda side have also been deposited, usually with duplicates elsewhere. Previously, duplicates were often given to the herbarium of the Kenya National Museums (the EA Herbarium), Nairobi, to Kew or to the Forest Herbarium, Oxford. Collections made by botanists

from Kenya are in the EA Herbarium, Nairobi, where a number of visiting anthropologists and conservationists have also deposited their material. A complete set of collections made by the two authors of this book is at the Botanical Museum, University of Copenhagen, Denmark, with duplicates elsewhere, including a set at the Herbarium of the Forest Research and Education institute in Soba, Khartoum.

Abbreviated designations of herbaria consulted.

- BM The Herbarium of the Natural History Museum (previously British Museum (Natural History)), London, U.K.
- C The General Herbarium, Botanical Museum and Library, University of Copenhagen, Denmark.
- EA The East African Herbarium, Kenya National Museums, Nairobi, Kenya.
- FHO The Daubeny Herbarium (previously the Forest Herbarium), Oxford, U.K.
- K The Herbarium, Royal Botanic Gardens, Kew, U.K.
- KHU The Herbarium of the Botany Department, University of Khartoum, Sudan.
- KHF The Herbarium of the Forest Research and Education institute in Soba near Khartoum, Sudan.
- MHU The Herbarium of the Botany Department, Makerere University, Kampala, Uganda.
- NLH The Herbarium of the Agricultural University of Norway, Ås, Norway.
- WM The Herbarium of the Gezira Research Station, Agricultural Research Division, Wad Medani, Gezira, Sudan.

Collectors

Ali, Khalid Mohammed. – Sudanese forester and botanist, conservator of forests. Ali collected 1950 in the Imatong Mountains. Collection, consisting (mainly or entirely) of ferns, at KHU.

Andrews, F.W. – British economic botanist, Chief Economic Botanist to the Government of the Sudan; collected from c. 8.6. to c. 15.6.1939 in the Imatong Mountains. Collection numbers are c. 1690 (“Opari to Lotti”, 8.6.1929)-c.2024 (15.6.1939). Collections at K, with list of determinations. Publication: F.W. Andrews, 1950-1956, *Flowering Plants of the (Anglo-Egyptian) Sudan*, 1-3 (the word “Anglo-Egyptian” was removed from the title of the third volume), Arbroath. Note that many specimens referred to as collected by Andrews, and in his series of collecting numbers, are in fact collected by his assistant Mohammed Ismael. At least this seems to be the case with the specimens from the Imatong Mountains. All the field notes relating to Andrew’s collections at WM are in Arabic script, with place names and vernacular names in the local African language. These notes are subsequently translated into English on the labels at WM, while some have not been translated. The labels of the duplicates sent to BM and K represent further modifications of the original notes. The modified locality names are often difficult or impossible to localise; this does also apply to the localities in and around the Imatong Mountains.

Babiker Beshir [on labels usually “Beshir Eff.”, or “Beshir El Nayer”] – Sudanese civil servant [“Eff.” stands for Effendi, Turkish title applied to a civil servant]; collected from c. 18.8.1951 to c. 4.9.1951 in the Imatong Mountains (Katiye; Mt. Kinyeti) and the Didinga Mountains (Nagichot). His collection numbers are 1-35.

Collections at K and WM, with list of determinations.

Beshir Agwatta. – Noth identified; presumably Sudanese civil servant; a few (perhaps only two) collections from 1964 at KHF.

Bodoegaard, T. – Agronomist (?) of Norwegian extraction. A few collections from near Kapoeta made in 1985. A few collections made in 1986 from the region between Torit and Hiliu. Some collections with Norbert Francis (*q.v.*). All collections at EA.

Chipp, Thomas Ford – Assistant Director at Kew 1922-1931 (born at Gloucester, England, 1886; died at Kew, England, 1931, obituary with portrait in *Bull. Misc. Inf. Kew* 1931 (9): 433-440); collected in the Imatong Mountains in February 1929. Collection numbers 1-107; collections at K, KHF, and WM. Publications relating to the Imatong Mountains: Chipp, T.F.: 1930. Forest and plants of the Anglo-Egyptian Sudan. *Geogr. Journ.* **75**: 123-143. Chipp, 1929. The Imatong Mountains, South Sudan. *Bull. Misc. Inf. Kew* **1929**: 177-197 (determinations of collections by Miss M.B. Moss). The Chipp-collections contains a few specimens in fact collected by Hamilton Leigh.

Dale, I.R. – British forest botanist stationed at Entebbe, Uganda; a few collections from the Imatong regions, at Lorienton, and at Lututuru on the Uganda side of the Imatong Mountains. Collections at EA and MHU.

Davies, J.H. – British ecologist, agricultural botanist, collected in the early part of April 1952 in the lowlands around Kapoeta. Collections at K.

Dawkins, H.C. – British forest botanist, stationed in Uganda; collected on the Uganda side of the Imatong Mountains in 1947. Collec-

tions (from c. no. 220 to 275) in FHO and MHU.

du Bois, R. – Not further identified. A few collections from 1952 at the herbarium of the University of Khartoum (KHU).

Eggeling, W.J. – British forest botanist stationed at Entebbe, Uganda; collected on the Uganda side of the Imatong Mountains on several occasions, *e.g.* in 1938, and 1942. Collection numbers include 1182-1193, 3541-3584, 5050-5150. Collections partly at FHO, K, partly at EA and MHU.

Field, C.R. – Not further identified; collected on Nangeya Mountains, Mt. Lonyili, in December 1970. A few collections at EA, all with low numbers.

Field, D. – British botanist; collected around Madi Opei and towards the Imatong Mountains (Uganda) in 1970 and 1972. Collections, with numbers above 2000, at EA.

Firlin [*?*Firmin], G. R. – British forester. One or a few collections at KHF, collected 1960.

Forbes, Mrs. Maxwell – British (*?*amateur) botanist, who collected in the Imatong Mountains in 1947. Collection of less than 140 specimens at K.

Francis, Norbert – Agronomist? of unknown nationality; a few collections from the area between Torit and Hiliu made in 1986 with T. Bodoegaard. Collections at EA.

Friis, I. & K. Vollesen – Danish botanists associated with the Botanical Museum, Copenhagen, and the Royal Botanic Gardens, Kew, respectively; collected in the Imatong Mountains in November and December 1980 and in February and March 1982. 1283 collections made,

with the collection numbers 1-860 and 900-1322. Collections at C, with duplicates at EA, K, KHF, and the herbarium of the Jardin Botanique Nationale de Belgique, Meise (BR); lists of determinations at Copenhagen.

Fukui, K. & M. – Japanese anthropologists associated with the National Museum of Ethnology, Osaka, Japan. Collected in South East Sudan and the Omo Valley of Ethiopia in 1974, 1982-1985. Collections at EA, with some duplicates at K.

Greenway, P.E. & F. C. Hummel – For both, see separate entries below; collected on the Uganda side of the Imatong Mountains from c. 4.4. to c. 5.4.1945. Collection numbers from c. 7268 to c. 7295. Collection at EA, FHO and K.

Greenway, P.E. – British botanist, “Botanist-in-charge” at EA, Nairobi; collected on the Uganda side of the Imatong Mountains. Collection numbers c. 3578. Collections at EA, FHO, and K.

Howard, W.J. – British forester, member of staff at the Land Resources Division, Overseas Development Administration, Tolworth Tower; project leader of the Imatong Mountains Forestry Project 1977 (or 1978) to 1980; collected in the Imatong Mountains in January to February 1976. Collection numbers “IM 1”-c. “IM 100” (localities mostly not indicated, but many from near Gilo and along the most used track to Mt. Kinyeti). Collections at K, KHF, and at EA, with partial list of determinations at K.

Hummel, F.C. – “Lieut.” Some collections from a trip made with P. E. Greenway to the Uganda side of the Imatong Mountains also with independent numbering. Collections at EA, FHO, K, MHU. Made collections during a trip to Harar in Ethiopia in 1943.

Hunter, R.D. – British of unknown occupation; collected in 1929 a few numbers from the Imatong Mountains, some marked: “High upon the Imatong Hills.” 1929. Collection numbers in the series of N. Douglas Simpson. Collections at K.

Jackson, J.K. – British silviculturist at the Forest Department, Government of the Sudan, from the 1940es to the 1960es; collected in the Imatong Mountains and adjacent hills in 1948-1951, 1953-1954, 1957, and 1961. Collections at BM (mainly herbs), K (mainly high numbers of both herbs and trees), FHO (mainly trees), KHF (mainly trees), and WM, neither of which possess a complete set. Collection numbers from c. 120 to c. 4262, but many collections from other places in between those from Imatong Mountains are included in this series. Publications: J. K. Jackson, 1950, The Dongotona Hills, Sudan, *Empire Forestry Review* **29(2)**: 139-142. J. K. Jackson, 1951, Mount Lotuke, Didinga Hills, *Sudan Notes and Records* **32(2)**: 339-341. J. K. Jackson, 1956, The vegetation of the Imatong Mountains, Sudan, *Journ. Ecology* **44**: 341-374.

Jackson, T.H.E. – British of unknown occupation; a few collections from the Imatong Mountains at BM and EA. T.H.E. Jackson was mainly a butterfly collector, but had also a garden at Mt. Elgon (Kenya side) with many rare or interesting plants brought home from his butterfly collecting trips, including a number of species from Lotti on the western slopes of the Imatong Mountains. Symes (*q.v.*) made a number of specimens (at K) from plants cultivated in T. Jackson’s garden at Mt. Elgon.

Johnston, H.B. – British, of unknown occupation; collected in the Imatong Mountains in February 1936. Collection numbers c. 1404 to c. 1528, mainly without localities. Collections at K.

Katende, A.B. – Ugandan botanist at the Makerere University, Kampala, Uganda. Collected at Nangeya Mountains, Mt. Lonyili, on 4.12.1971 (Nos. 1386-1399). Collected in the Imatong Mountains (Uganda) 9.6.-11.6.1973 (Nos. 1850-1897) and 18.7.-19.7.1974 (Nos. 2121-2203). Specimens at EA and MHU. Katende’s “sight records” are from a trip made on 12.12.1992; only a selection of these records have been included here.

Kertland, M.P.M. – British botanist, associated with the Queens University, Belfast. Stationed in Uganda and collected in the Imatong Mountains (Uganda) in June 1963. Some collections at MHU, fewer at K.

Kielland-Lund, J. – Norwegian agronomist who collected at various places in the study area in 1983. Collection numbers 1-c. 1014 (some of these numbers collected from outside the study area). Main set of collections at NLH; duplicates at C, and a few at EA and K.

Kosper, Phyllis. – British or American anthropologist (?); a few collections from the Imatong Mountains from late 1982 to early 1983. She also collected west of the Nile. Collections at EA (most) and K (a few). Most collections from the lowlands are stated to be from “South Sudan” without further locality; such collections have not been included here.

Leigh, Mrs. Hamilton – British amateur (?) botanist; collected in the Imatong Mountains in 1929. One specimen is incorporated in the series of Chipp as no. 106. I have traced no other specimens. Collection at K.

Lock, J.M. – British botanist who was based in Uganda and mostly associated with the Uganda Institute of Ecology at Mweya. Made collections from the Nangeya Mountains, Mt. Lonyili

(Uganda), on 28.8.1966. Collections at MHU and EA.

Loehr, Mrs. – German development worker (?); a few specimens at EA and K collected in 1980 in association with the Upper Talanga Tea Planting Project.

Lowden, A. – British of unknown occupation; one collection at KHF from the Imatong Mountains, made in 1936.

Lye, K.A. – Norwegian botanist at Makerere University, Kampala, Uganda, now at the Norwegian Agricultural University at Ås (near Oslo). Collected in 1969 in the Imatong Mountains (Uganda). Specimens at MHU and NLH, some at EA and K.

Lynes, H. Rear Admiral. – British amateur botanist; collected in the Imatong Mountains. Small collection at K.

MacDonald, J.D. – British of unknown occupation (?amateur botanist); collected in 1938-39 in the Imatong and Didinga Mountains. Collection numbers 1-c. 91. Collection at BM.

MacLeay, K.N.G. – British professor of botany at the University of Khartoum; collected in the Imatong Mountains in 1947 to 1951. Collection numbers ?. Collections at BM (manly ferns), K and KHU. Published K. N. G. MacLeay 1953 (or 1954), Ferns and fern allies of the Sudan, *Sudan Notes and Records* **34(2)**: 286-298. K. N. G. MacLeay 1955, Geographical relationships of the Pteridophyte flora of the Sudan, *Bull. Jard. Bot. État, Brux.* **25(3)**: 213-220. K. N. G. MacLeay, 1955, A preliminary list of Pteridophyta of the Anglo-Egyptian Sudan, *Webbia* **11**: 587-606.

Maffey, Sir John Loader – British of unknown occupation (?amateur botanist); collected in

the Imatong Mountains in 1927. No collection numbers were used and no localities were indicated. Two collections, both of orchids from c 3050 m., at K.

Morrison, M.E.S. – British botanist; employed at the Makerere University, Kampala, Uganda. Collected in the Imatong Mountains (Uganda) in 1963. Collections at MHU, a few at EA.

Muratori, ...? Japanese, probably anthropologist associated with the National Museum of Ethnology, Osaka, Japan. One collection at WM from the area south of Torit, collected in 1984.

Mwanga, E. K. B. – Ugandan botanist or forester; one collection at MHU, collected in 1964.

Myers, J. G. – British forest botanist (born in Rugby, England, 1897; died (car accident) at Amadi, Sudan, 1942); was employed as Economic Botanist to the Government of the Anglo-Egyptian Sudan, 1937-1942, collected in the Imatong Mountains and surrounding areas from 1938 to 1941. On a trip to the Imatong Mountains in July-August 1939 he was accompanied by the Harvard entomologist N. A. Weber who published an account of the trip (Weber 1943). Myers' collection numbers c. 9500 to 14,275, interrupted by various breaks and collections made at other localities. It appears from his note books that his number sequence also included rock and soil samples, molluscs and insects. Botanical collections at K and WM, presumably also a collections kept at Kagelu near Yei, Southern Sudan. Notebooks (covering the numbers 10,890 to 14,275) and partial lists of determinations at K. His journals, entitled "Plant Ecological Survey of Equatoria Province I-VII" have been typed and are kept at KHU.

Omar, Khalid el Kheir. – Sudanese botanist or forester. Some collections of ferns at KHU, collected between 1950 and 1955

Osman, Mohammed & Abdel Aziz. – Sudanese botanists or foresters. Some collections at KHU. All the specimens from the Imatong Mountains have been collected in 1953; Osman has used the same series of numbers as G. A. Prowse.

Osmaston, H.A. – British agricultural and rangeland botanist stationed in Uganda. A few collections from the Uganda side of the Imatong Mountains made in 1956 at EA, KHU and K.

Peers, A.W. – British ecologist, collected in the plains, chiefly around the Didinga Mountains, in 1953. Collections represented at K and WM.

Prowse, G. A. – British botanist, collected in the Imatong Mountains in 1953. Collections at KHU.

Purseglove, J. W. – British botanist, professor at College of Agriculture, Trinidad, at one time Agricultural Officer in Uganda; collected one day in April 1943 on the Uganda side of the Imatong Mountains to a height of about 2850 m. Collection numbers 1374 to 1440. Collections at K and EA. Prof. Purseglove has kindly provided a list of identifications of his collection for this work.

Rubridge, A. B. (-1957). – British forester; collections, mainly ferns from 1952 at KHU. (Sometimes as Rubidge).

Sanderson, P. J. – Presumably British of unknown occupation; one collections from Dec. 1937 at KHF.

Sangster, R. G. – British forester, associated

with Forestry Department of Uganda in the colonial period. Collections from 1937 to 1957 at EA, MHU, K.

Shigeta, M. – Japanese anthropologist, presumably associated with the National Museum of Ethnology, Osaka, Japan; collected in the Imatong Mountains in 1979. Collections at EA.

Smith, J. – British forester associated with Forestry Department of the Sudan; Chief conservator of forests to 1950. Collected c. 3.4.1933 in the Imatong Mountains. Small collection at K and KHF. Publication: J. Smith, Distribution of tree species in the Sudan in relation to rainfall and soil texture. *Bull. Ministry of Agriculture, Sudan, No. 4* (1949).

Snowden, J. D. – British agricultural botanist, collected in the Acholi Hills of the Imatong Mountains (one number, no. 1693, was from Opari, Acholi Mountains, 20.4.1930). Collections at K and BM. Wrote on the *Sorghum* species of the Sudan.

Sommerlatte, M. & H.C. – German agronomists who resided frequently near Upper Talanga in the Imatong Mountains from 1980 to 1984. C. 100 collections, chiefly trees, made in 1984 and kept at EA. M. & H.C. Sommerlatte used the same numbering system and are not distinguished here.

Symes, Y. E. – Presumably British, of unknown occupation; a few plants from the Imatong Mountains at BM, EA and K. See also under Jackson, T. H. E.

Synnott, A. – British botanist, associated with the Commonwealth Forestry Institute, Oxford, UK.

Thomas, A. S. – British economic botanist, stationed in Uganda; collected from c. 15.12. to c.

31.12.1935 in the Imatong Mountains on the Sudan side. Collection numbers from c. 1559 to c. 1897. (A few examples show itinerary: No. 1559, 15.12.1935, Katire. No. 1586 & 1595, Talanga. No. 1644, Itibol. No. 1760, 26.12.1935, Laboni. No. 1798, Lomuleng. No. 1811, 29.12.1935, Kipia. No. 1859, Mt. Kinyeti. No. 1895, 31.12.1935, Loyaru). Dr. Thomas also collected on the Uganda side of the Imatong Mountains. Collections from the Sudan side at BM and K, with list of determinations. The itinerary of A. Thomas appears from a letter from R. Tothill to J. Smith (now at KHU), dated 14.4.1941: "Drove from Torit to Katire and then to Talanga forest (his "River Loboli is the Locholi River which runs through the forest), back to Katire and then up the hills through mountain savannah to the Itibol rest house (now in ruins, one mile across the valley from Gilo), from there across the hills to Ibahin on the escarpment below Mt. Garia, and west of Logoforok, back to Itibol from where he climbed to the rest house at Dumuso (which he calls Kimiso). Across the hills to Issore and down to the Laboni forest, along the southern edge of the Acholi Hills to Lomariti, Lerwa (Lerua), and to Lotti forest. Thence by car back to Torit and on to Logoforok. he then climbed the hills via the Loyaro rest house (which is the next rest house below the top) and on to the Kipia rest house. Thence to the top of Mt. Kinyeti and back to Logoforok via Kipia, Lomuleng and Loyaru. Hence the sequence of the localities which appears on Thomas' labels is: Kinyeti River-River Loboli [= R. Locholi]-Talanga-Katire-Kinyeti River-Katire-Itibol-Atiaro-River Narije [= R. Ngairigi]-Ibahin [near Garia]-Itibol-Timalaram-River Imisu-Kimiso [= Dumuso]-Issore-Kulubi-Labo-

ni-Lorima-Ludibo-Lomariti-River Lerua-Parajob [?= Rajob]-Lotti-River Kimoru-Lomaru-Loyaru-Lomuleng-Kipia-Mt. Kinyeti-Kipia-Lomuleng-Loyaru."

Tothill, J. D. (-1957). – British agricultural botanist, editor of "Agriculture in the Sudan". Collected in 1940 in the Imatong Mountains, chiefly around the summit of Mt. Kinyeti. Collection numbers from Mt. Kinyeti are 13,506 to 13,524 in the series of J. G. Myers. A few other collections from elsewhere in the study area have low numbers and are collected in 1953. Collection at KHU and K.

Trought, T. – British forester or forest botanist; a few collections, made between the 31.12.1932 and 2.1.1933 in the Imatong Mountains, seen at BM and K; more collections are at KHF. Many collections are quoted in Aylmer's unpublished manuscript 'Check List of the Trees and shrubs of the Anglo-Egyptian Sudan', including a number from the Imatong Mountains, but most of these collections have not been traced.

Turner, L. – British of unknown occupation; a few specimens collected in 1940 from the Imatong Mountains at KHF.

Williams, G.H.D. (-1957) – British forester; collected in 1948 in the Imatong Mountains. Collections, consisting (mainly or entirely) of ferns, at KHU; a few duplicates at K.

Wilson, J. G. – British rangeland officer, based in Uganda. Collected on Nangeya Mountains, Mt. Lonyili, in 1960. Specimens at EA.

Appendix C. Collecting localities

The collecting localities, which have been mentioned in the Catalogue, are recorded in the following list. For practical reasons, all localities have been related to one of the three major mountain massifs:

(1) The Imatong Mountains group, a continuous horse shoe-shaped block which in agreement with earlier topographical tradition is divided into the following: the Acholi Mountains, forming the north west chain, the Lolibai Mountains and the Lomariti Mountains, forming the central mountain blocks, the Imatong Mountains in the strict sense, forming the north east chain, and the Imatong Langia Mountains which towards the south east reach the border with Uganda, and, entirely on the Uganda side of the border, the Agoro Mountains as a southwards continuation of the Lolibai Mountains and the Lomariti Mountains. A few detached peaks, the Ifoto Mountains, continue the Acholi Mountains towards the north west, as do a number of smaller inselbergs west of Torit.

(2) The Dongotona Mountains, which to the north west have outliers in the chain of peaks known as the Lafit Mountains and, to the south east, on the border with Uganda, the Dongotona Langia Mountains. The account of the flora in this volume does not include the long and rather low continuation of the Langia Mountains into Uganda where the spur is often known as the Nangia Mountains.

(3) The Didinga Mountains are here taken to include the north-western outliers, the Boya Hills, but flora of the chain of partly isolated mountain peaks, which in Karamoja province,

along the eastern border of Uganda, forms a continuation of the Didinga Mountains to the south, is not included in this volume either.

Four sets of maps, as well as the collectors' own information, have been consulted in order to localise the collecting localities listed in the following: The map of the Imatong Mountains group and part of the Dongotona Mountains published with Whitehouse's account of his journey (Whitehouse 1931); the maps in the Anglo-Egyptian Survey Department's series "Anglo-Egyptian Sudan 1:250,000" (1927-1958); the maps in the British series "East Africa in 1:500,000 (G.S.G.S. 4355)", and the maps of the Imatong Mountains prepared by the Land Resources Department of the British Overseas Development Agency. References are made to alternative spellings of place names on these maps.

The general topography of the study area has been outlined in Vol. 1, Chapter (1a). Here, a GIS generated map has been added (Fig. 4), showing the general topography of the study area with colouring indicating altitudinal zones of 305 m. The map has been derived from an altitudinal model of the Earth (GLOBE team 1999), which records the average altitude for each square kilometre of the surface of the Earth. The localized collecting localities have been marked on this map with red dots. There is a particularly high concentration of collecting sites in the mountain massifs and in the immediately surrounding lowlands. This is also the areas where, due to the environmental complexity, the species diversity must be assumed to be highest.

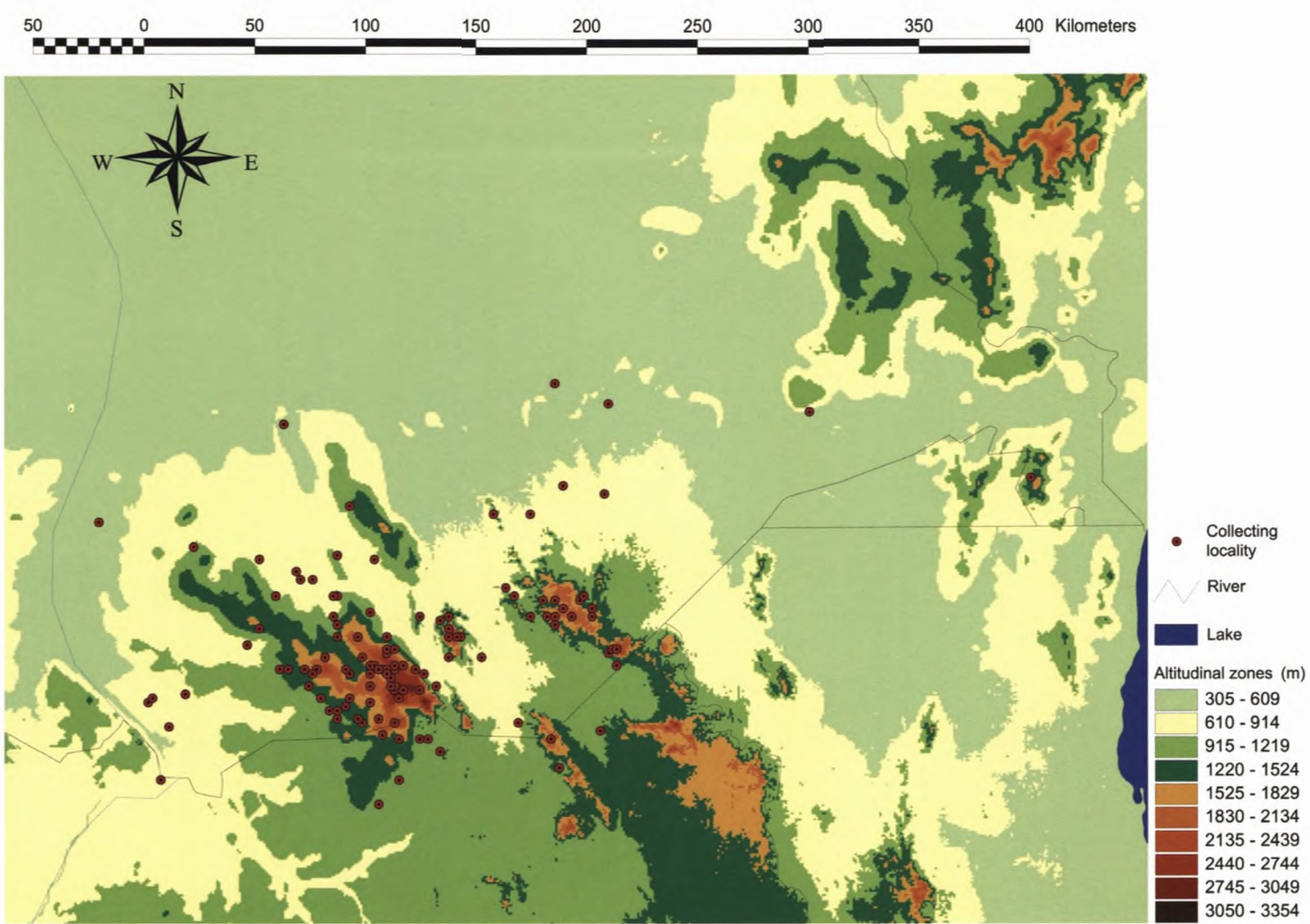


Fig. 4. Topographical map covering the study area as shown in Fig. 1 (vol. 1) but extending further to the west to cover the western banks of the Nile, further into Uganda in the south, further to the border with Ethiopia and the western shores of Lake Turkana in the east, and further to the north to cover the Boma Plateau and the regularly flooded Nile plains north of the study area. This GIS generated map shows the general topography with colouring indicating altitudinal zones of 305 m. The localized collecting localities have been marked with red dots. The map is based on the Global Land One-kilometre Base Elevation (GLOBE Team 1999) and has been produced using the software package ArcView for Windows Vers. 3.3.

Acholi Mountains – Mountains in the Imatong Mountains group, west of Kinyeti Valley.

Agnargi – Peak in the Imatong Mountains group, exact location not traced [Andrews]. The same as ‘Angargi’ (*q.v.*).

Agoro – Populated place (3° 45’ N, 33° 02’ E), on the lower slopes of the Agoro Mountains, on the Uganda side of the Imatong Mountains group [Eggeling, Purseglove, Greenway & Hummel, Hummel, Thomas].

Aguagi – Peak in the Imatong Mountains group, exact location not traced. [Andrews]. The same as ‘Angargi’ (*q.v.*)

Ameila – Forest near Gilo, Imatong Mountains group [Omar]. The same as ‘Imeila’ (*q.v.*).

Anar – Peak in the Imatong Mountains group, exact location not traced [Andrews].

Angargi – Peak near Itibol, in the central part of the Imatong Mountains group, exact location not traced [Andrews]. Sometimes spelt ‘Agnargi’ on labels (e.g. on Andrews 1954 at K).

Aniar – Locality on the Uganda side of the Imatong Mountains group, exact location not traced [Eggeling].

Antin – Khor and Jebel in or at the Imatong Mountains group, exact location not traced [Andrews].

Arapi – Populated place, also Arapi Regional District Centre (3° 48’ N, 31° 59’ E) [Kielland-Lund]

Aringa – Stream on the Uganda side of the Imatong Mountains, originating from the Lolibai Mountains on the Sudan side [Eggeling,

Osmaston, Katende, Greenway & Hummel] c. 3° 45’ N, 33° 00’ E.

Aripiwa – Peak and populated place in the Dongotona Mountains (33° 07 – 08’ E, 4° 10 – 12’ N) [Jackson].

Atbal – Peak in the Imatong Mountains group, exact location not traced [Andrews].

Ateppi – Stream (c. 3° 45’-55’ N, 32° 55-40’ E), originating in the Lomariti Mountains in the Imatong Mountains group and running west [Jackson]

Atiaro – Locality in the central part of the Imatong Mountains group, between Itibol and Ibahin, exact location not traced [Thomas]

Ayi – Stream originating in the Acholi Mountains in the Imatong Mountains group, and running north west [Jackson].

Bafagh – Peak in the Imatong Mountains group, exact location not traced [Andrews].

Baghanj – Peak in the central part of the Imatong Mountains group, probably not far from Itibol, exact location not traced. On some labels also said to be near the River Radko. [Andrews]. Sometimes spelt Baghanij on Andrews’ labels.

Bira – Peak (3° 50’ N, 32° 50’ E), near Laboni in the Acholi Mountains in the Imatong Mountains group [Myers]. The name is spelt Bera on Whitehouse’s map.

Boya Hills – Hills (4° 35 – 45’ N, 33° 15 – 20’ E), north-western outliers of the Didinga Mountains [Myers].

Bugung – Peak in or near the Imatong Mountains group, exact location not traced [Andrews].

Bushbuck Hill – Mountain ridge (c. 4° 02' N, 32° 52' E) in the main part of the Imatong Mountains group, between Gilo and Mt. Kinyeti [Friis & Vollesen].

Buthi – Populated place and peak (4° 15' N, 33° 31' E), in the Didinga Mountains [Jackson].

Chabenni – Locality (probably village) near Lafit Mountains, north-western outliers of the Dongotona Mountains, exact location not traced [Myers].

Chua – Name of former administrative district on the Uganda side of the Imatong Mountains group, extending further south [Eggeling, Thomas].

Chukudum – Populated place (4° 15' N, 33° 27' E), on the west slope of the Didinga Mountains [Myers, Jackson, “Chukudum Regional District Centre”, c. 4°14'N, c. 33° 29' E, has been used as the name of a collecting locality by Kielland-Lund].

Cromvarilo – Locality (3° 50' N, 32° 40' E) in the Ateppi valley, south west of the Imatong Mountains group. Not traced on any map, but co-ordinates given by collector [Chipp].

Didinga Mountains – Eastern group of mountains in the study area.

Doleib – Khor – Temporary stream (c. 4° 26' N, 32° 30' E), near the Ifoto Mountains, north west outliers of the Imatong Mountains group [Jackson]. Name spelt “Loleir” on Whitehouse’s map.

Dongotona Mountains – Central group of mountains in the study area.

Dufile – Populated place (3° 35' N, 31° 57' E), in the plains below the Imatong Mountains group (Uganda) [Greenway & Hummel]. Outside study area!

Duguru – Populated place (c. 4° 17' N, c. 33° 35' E), near Nagichot in Didinga Mountains [Kielland-Lund].

Dumuso – Ridge – Mountain ridge (4° 00' N, 32° 53' E), in central part of the Imatong Mountains group, between Gilo and Mt. Kinyeti [Thomas (who called the locality Kimisu), MacLeay, Prowse, Williams, Rubridge, Osman, Jackson, Friis & Vollesen].

Emogadung, Mt. – Peak (4° 12' N, 33° 07' E), the highest in the Dongotona Mountains [Myers, Jackson].

Equatoria – Southernmost province of the Sudan; the Sudanese part of study area is entirely located in this province.

Ero – Stream (4° 06' N, 33° 46' E), in the Didinga Mountains near the base of Mt. Lotuke [Myers, Jackson].

Farajok – Populated place (3° 52' N, 32° 38' E), in the plains below the south west escarpment of the Acholi Mountains in the Imatong Mountains group. The site of the village was at one point moved to near the River Ateppi in the plains [Jackson].

Garia, Mt. – Peak (4° 06' N, 32° 52' E), in central part of the Imatong Mountains group [Andrews, Friis & Vollesen].

Gilo – Populated place (village, forest headquarters, project headquarters; 4° 02' N, 32°

51' E), in the central part of the Imatong Mountains group, with centre for various forestry projects [Andrews, MacDonald, MacLeay, Prowse, Ali, Tohill, Williams, Osman, Osman & Aziz, Rubridge, du Bois, Beshir Agwatta, Jackson, Friis & Vollesen, Kielland-Lund].

Gomia, Mt. – Peak (4° 02' N, 32° 35' E), in the Acholi Mountains of the Imatong Mountains group, near the origin of the River Iyedo [Jackson]. Occasionally the name is spelt “Gomeia” on herbarium labels.

Hiliu – Populated place (c. 4° 15' N, c. 32° 39' E) and large compound of the mission established by the Norwegian Church Aid, located in the broad part of Kinyeti Valley between the Acholi Mountains and the Imatong Mountains in the strict sense [Jackson, Friis & Vollesen, Bodoegaard & Francis, Kielland-Lund]. On maps often spelt “Kiliu”, on some collectors labels sometimes spelt “Hilieu” or “Hilio”, but here always transcribed as Hiliu.

Ibahin – Locality (probably populated place) in the central part of the Imatong Mountains group, exact location not traced, in the area between Itibol, Garia and Logoforok [Thomas].

Ibuken – Locality (probably populated place) in the Imatong Mountains group, exact location not traced [Myers].

Ikoto – Populated place (4° 05' N, 33° 07' E), on the west slope of the Dongotona Mountains towards the Koss valley [Jackson]. Sometimes spelt “Ikok” or “Ikotos”.

Ileri – Locality in the plains of the River Kidepo between the Dongotona and the Didinga Mountains, exact location not traced [Jackson].

Ilungi – Peak (4° 03' N, 32° 49' E), in the Imatong Mountains group near Mt. Lohocho, above the road from Katire to Gilo [Friis & Vollesen].

Imatong Mountains – Western group of mountains in the study area.

Imeila – Populated place (4° 10' N, 32° 40' E), formerly with rest-house, and relic patch of riverine forest, in the broad part of Kinyeti Valley between the Acholi Mountains and the Imatong Mountains in the strict sense [Omar, Jackson, Firmin, Friis & Vollesen]. On maps often spelt “Imela”.

Imisu – River in the Imatong Mountains group, between Itibol and Issore, exact location not traced [Thomas].

Imurok – Populated place (4° 20' N, 32° 25' E) and peak, in the plains north west of the Acholi Mountains in the Imatong Mountains group, near Magwe [Jackson].

Ingaragi, Mt. – Peak in the Imatong Mountains group, exact location not traced [Andrews]. Probably the same as “Angargi” (*q.v.*)

Ingawi – River (c. 4° 2' N, 32° 59' E), originating in the Imatong Mountains group, near Mt. Konoro and running to the River Koss [Jackson].

Ingoma – River in the Imatong Mountains group, probably the same as the River Ingama (c. 4° 10' N, 32° 45 – 50' E) [Thomas].

Ingwok, Mt. – Peak, the same as the peak of Mount Kinyeti (*q.v.*) [Kielland-Lund].

Inowi – River in the Dongotona Mountains, exact location not traced [Jackson].

Iribo – Locality (probably populated place) in the Imatong Mountains group (4° 2' N, 32° 50' E) [Jackson].

Iro, Mt. – Isolated peak (inselberg; 4° 12' N, 32° 21' E), in the plains west of the Acholi Mountains of the Imatong Mountains group, along the road between Opari and Torit [Myers].

Isoke – Populated place (c. 4° 14' N, 33° 5' E), in the Dongotona Mountains [Jackson].

Issore – Populated place (3° 54' N, 32° 48' E), formerly with rest-house, on the western slopes of the Lolibai Mountains in the Imatong Mountains group [Chipp, Thomas, Snowden, Myers, Jackson, Friis & Vollesen].

Itaba Hill – Inselberg in the plains north-east of the Imatong Mountains group, near Molongori (4° 07' N, 32° 52' E) [Jackson].

Itibo – Locality (apparently populated place; 4° 02' N, 32° 50' E) in the Imatong Mountains group [Jackson]. Not traced on maps; this must be a variant spelling of the name Itibol, a populated place situated c. 5' to the east of Jackson's locality.

Itibol – Populated place (4° 02' N, 32° 54' E), after 1974 with saw-mill, in the central part of the Imatong Mountains group [Thomas, Andrews, Myers, MacLeay, Turner, Jackson, Prowse, Friis & Vollesen].

Iwowa – Populated place (4° 17' N, 33° 42' E) in the Didinga Mountains [Myers, Jackson].

Iyedo – River (c. 4° 24' N, 32° 31' E), originating in the Acholi Mountains of the Imatong Mountains group, running to the north of the massif [Jackson, Kielland-Lund]. The river is fairly easily accessible c. 3 km. south of Torit on

the road to Katire, where Kielland-Lund collected (c. 4° 23' N, c. 32° 36' E).

Kakowk, Mt. – Peak in or near the Imatong Mountains group, exact location not traced [Andrews]

Kalamulinga – Populated place (?) with rest-house (5° 07' N, 33° 46' E), north of the Didinga Mountains and north of Kapoeta [Myers]. The locality itself is outside study area, but has sometimes been used in indication of distances and directions on labels of specimens, which are inside the study area.

Kapoeta – Populated place (4° 47' N, 33° 35' E), in the plains north of the Didinga Mountains [Myers, Jackson, Peers, Kielland-Lund].

Karakamuge – Populated place (5° 12' N, 33° 33' E), in the plains north of the Didinga Mountains [Peers]. The locality itself is outside study area, but used in indication of distances and directions.

Karauili – Populated place, near or at Boya Hill (4° 35' – 45' N, 33° 15' – 20' E) [Fukui]. Sometimes spelt “Karanli” or “Karauli”.

Katire – Populated place (4° 03' N, 32° 48' E), from c. 1950 with saw-mill, formerly with rest-house, in Kinyeti Valley between the Acholi Mountains and the Imatong Mountains in the strict sense [Thomas, Jackson, Friis & Vollesen, Kielland-Lund].

Keiala – Populated place (c. 4° 15' N, c. 33° 27' E) near Chukudum in the Didinga Mountains [Kielland-Lund].

Kerifi – Peak and populated place (4° 01' N, 32° 34' N), formerly with rest-house, near Lotti in the Acholi Mountains of the Imatong Mountains group [Myers].

Khodo – Stream ($4^{\circ} 10' N$, $32^{\circ} 52' E$), near Molongori north east of the Imatong Mountains group [Jackson]

Kidepo – Populated place ($4^{\circ} 05' N$, $33^{\circ} 15' E$) on east slope of Dongotona Mountains and river running into the plains north of both the Dongotona and the Didinga Mountains, between Torit and Kapoeta [Myers, Jackson].

Kiduru – Populated place (?) north of Chukudum (c. $4^{\circ} 20' N$, c. $33^{\circ} 23' E$) in the Didinga Mountains [Kielland-Lund].

Kikwo – Locality on the Uganda side of the Imatong Mountains group, near the rivers Lakure and Aringa [Osmaston]

Kilui – See Hiliu.

Kimisu – Mountain ridge in the central part of the Imatong Mountains group, between Gilo and Mt. Kinyeti, same locality named Dumuso (*q.u.*) by later collectors [Thomas].

Kimoru – River in the western part of the Imatong Mountains group, exact location not traced [Thomas].

Kinyeti – River (c. $4^{\circ} 01' - 45' N$, $32^{\circ} 45' - 28' E$), originating in the central part of the Imatong Mountains group and running north west, and highest peak ($3^{\circ} 57' N$, $32^{\circ} 54' E$) in the Imatong Mountains group [Chipp, Thomas, Johnston, MacDonald, Andrews, Osman, MacLeay, Omar, Tothill, Rubridge, Myers, Prowse, Beshir, Jackson, Howard, Friis & Vollesen, Kielland-Lund].

Kipia – Plateau ($3^{\circ} 57' - 58' N$, $32^{\circ} 55' - 58' E$), formerly with rest-house, in the north-eastern part of the Langia Mountains in the Imatong Mountains group, between Mt. Kinyeti and the north east escarpment [Chipp, Thomas, Mac-

Donald, Johnston, Myers, MacLeay, Williams, Jackson].

Kit – Populated place near Magwe ($4^{\circ} 08' N$, $32^{\circ} 18' E$), in the plains north west of the Acholi Mountains (Imatong Mountains group) [Sommerlatte].

Kiwa – River in the plains north of the Imatong Mountains group (one collecting locality is at $4^{\circ} 13' N$, $32^{\circ} 40' E$) [Jackson].

Kiyeli – Locality ($4^{\circ} 20' N$, $32^{\circ} 40' E$) in the plains north of the Imatong Mountains group, between Katire and Torit [Jackson].

Konoro – Peak ($4^{\circ} 03' N$, $32^{\circ} 54' E$) in the north-eastern central part of the Imatong Mountains group [Friis & Vollesen].

Koss – River ($4^{\circ} 00' - 5^{\circ} 00' N$, $33^{\circ} 00' - 32^{\circ} 30' E$), originating from the Imatong Langia Mountains and running north west through the valley between the Imatong Mountains group and the Dongotona Mountains [Myers, Jackson].

Kowda – Populated place ($4^{\circ} 19' N$, $33^{\circ} 39' E$), in the plains near the Didinga Mountains [Jackson].

Kulubi – Locality on the western slope of the Imatong Mountains group, near Issore and Laboni, exact location not traced [Thomas].

Kurumo – River (c. $4^{\circ} 07' N$, $33^{\circ} 47' E$) on Mt. Lotuke, Didinga Mountains [Jackson].

Laboni – Populated place ($3^{\circ} 49' N$, $32^{\circ} 46' E$) and lowland relic forest patch at base of the western slope of the Lolibai Mountains in the Imatong Mountains group [Chipp, Snowden, Thomas, Andrews, Myers, Ali, Jackson].

Labuki – Peak in the Imatong Mountains group, exact location not known [Andrews].

Lafit – group of mountains (inselbergs, including Mt. Loba; 4° 42' N, 32° 43' E), near Chabenni, forming the north west outliers of the Dongotona Mountains [Myers].

Lafon – Populated place and isolated peak (5° 02' N, 32° 27' E), near the River Koss in the Lafit Mountains. Records from the area south west, south and south east of Lafon are considered to have been made inside the study area [Myers, Kielland-Lund].

Lakure – River on the Uganda side of the Imatong Mountains group [Osmaston].

Laneka – River (3° 47' N, 33° 47 – 42' E) originating in the Lolibai Mountains near the Laboni forest at base of the western slope of the Imatong Mountains group [Myers]. Spelt “Laniga” on Whitehouse’s map.

Langia – Group of mountain peaks (c. 3° 39' N, 33° 34' E), striding the border, but chiefly on the Uganda side of the Imatong Mountains group [Thomas, Purseglove]. There is also an isolated group of mountains south east of the Dongotona Mountains named Langia, but it is doubtful if any of the plants referred to in this work have been collected there. According to Whitehouse (1931) the name is a Latuke word for “group of mountains.”

Laru – Populated place (2° 27' N, 33° 40' E) in the plains at the foot of the Didinga Mountains, towards Kapoeta [Myers].

Latoki, Mt. – Peak in the Imatong Mountains group, exact location not traced [Andrews].

Lawurong – Peak and populated place (4° 05' N, 32° 37' E) in the Acholi Mountains in the Imatong Mountains group [Jackson].

Lawurot – Peak (3° 58' N, 32° 48' E) in the Imatong Mountains group [Jackson]. Spelt “Lauorot” on Whitehouse’s map.

Leiforo – Temporary stream (khor; 4° 38' N, 31° 42' E) at the Luluba Mountains [Myers].

Lerong – Locality, probably a peak (32° 37' E, 4° 05' N), at the foot of Imatong Mountains group, not traced on maps [Jackson].

Lerua – River, mission and populated place (3° 58' N, 32° 33' E) in the western part of the Acholi Mountains in the Imatong Mountains group near Lotti [Thomas, MacLeay, Jackson]. Often spelt Lerwa, *e.g.* on the labels of MacLeay.

Leya – River (c. 3° 35' N, 31° 35' E), on the Uganda side of the Sudan-Uganda border [Greenway & Hummel]. Outside study area

Liria – Peak (inselberg; 4° 32' N, 32° 05' E), at the road west of Torit, forming part of the north west outliers of the Acholi Mountains in Imatong Mountains group [Andrews].

Loa – Populated place (3° 48' N, 31° 57' E), south west of Opari (*q.u.*) [Kielland-Lund].

Loba – Peak (c. 4° 42' N, 32° 43' E), in the Lafit Mountains [Myers].

Lobeke – Locality (village ?, peak ?) in the Imatong Mountains group, exact location not traced [Myers].

Loboli – River in the eastern part of the Acholi Mountains (Imatong Mountains group), exact

location not traced [Thomas], probably the stream usually referred to as the Locholi River.

Loboya – Locality (32° 59' E, 4° 2' N) in the vicinity of the Imatong Mountains group, near the River Ingawi [Jackson]. Sometimes spelt 'Loboyo'.

Locholi – River running through the Talanga forest (4° 02' N, 32° 42' E) in the western part of Kinyeti valley (Imatong Mountains group) [MacLeay, Osman].

Loelli – Populated place and pool (5° 05' N, 34° 35' E), in the plains near Kapoeta and the Didinga Mountains [Jackson, Peers]. Strictly, the locality of Loelli is outside the study area.

Lofoha – Forest ranger post in the middle part of Kinyeti valley, Imatong Mountains group [Friis & Vollesen].

Lofulong – Locality (4° 7' N, 32° 54' E) on the north east slope of the Imatong Mountains group below Mt. Garia [Jackson]. On maps sometimes spelt "Lopulong."

Loghak – River (4° 15 – 10' N, 33° 31 – 35' E), running south east in the Didinga Mountains near Nagichot [Jackson].

Logire – Locality (4° 01' N, 33° 01' E) near Torit [Jackson].

Logoforok – Peak (and below that a village previously with a rest-house; 3° 58' N, 33° 04' E) in the east part of the Imatong Langia Mountains (Imatong Mountains group) [Chipp, Hamilton Lee, MacLeay, Myers, Jackson].

Lohocho – Peak (4° 02' N, 32° 50' E) in the central part of the Imatong Mountains group above Kinyeti valley almost due west of Gilo [Friis & Vollesen].

Loka – Populated place (4° 16' N, 31° 01' E), near Mt. Konyi [Myers]. Outside study area.

Lokalyan – River and populated place (4° 45' N, 33° 45' E), formerly with rest-house, north east of the Didinga Mountains, near Kapoeta [Myers].

Lokedeng – Locality in the Imatong Mountains group, exact location not certain [Prowse].

Lokililobar – Temporary stream (khor) in the plains between Kapoeta and the Didinga Mountains, exact location not traced [Peers].

Lokwara – Stream (khor; c. 33° 27' E, 4° 40' N) in the plains north of the Didinga Mountains [Peers].

Lolibai Mountains – Group of mountain peaks (c. 3° 58' N, 32° 54' E) in the Imatong Mountains Group between Gilo and Ingwok (Kinyeti) Peak [Kielland-Lund].

Lomariti – Populated place (3° 55' N, 32° 43' E), formerly with rest-house, in the Lomariti Mountains (Imatong Mountains group), west of Issore [Snowden, Thomas, Myers].

Lomaru – Locality in the central part of Imatong Mountains group, exact location not traced [Thomas].

Loming – Locality (populated place ?) north of Nagichot (c. 4° 19' N, c. 33° 33' E), in Didinga Mountains [Kielland-Lund].

Lomolongori – Variant of the place name Mologori (*q.v.*) [Jackson].

Lomuleng – Locality, formerly with rest-house (3° 57' N, 33° 00' E), in the Imatong Langia

Mountains (Imatong Mountains group) [Myers, Thomas].

Lomwaga – Peaks (3° 49' N, 32° 54' E), partly on the Uganda side of the Imatong Mountains group; the highest peak (2640 m.) marks a point on the Sudan-Uganda border [Greenway & Hummel, Katende, Eggeling, Morrison].

Longairu – Populated place and peak (inselberg; 4° 29' N, 32° 21' E), north west outlier of the Acholi Mountains (Imatong Mountains group) [Jackson].

Longumu – River (and/or populated place) north of Chukudum (c. 4° 22' N, c. 33° 21' E) in the Didinga Mountains [Kielland-Lund].

Lonyili – Peak in the Nangeya Mountains, at the border between Sudan and Uganda (3° 45' N, 33° 32' E). [Lock, Synnott, Katende].

Lonyori – Populated place and river (c. 3° 49' N, 33° 24' E), in the Dongotona Langia Mountains, south east outlier of the Dongotona Mountains [Jackson].

Lora – Locality in the Imatong Mountains group, location not traced [Jackson].

Lorienaton – Peak (4° 49' N, 35° 29' E); isolated mountain in the plains. There is a relic forest patch of *Juniperus-Olea* forest on the mountain. This place-name occurs in a number of variant spellings on labels and maps, e.g. 'Lorienatom', 'Lorienentom', etc. It is inside the southeastern triangle of Sudan administered by Kenya; hence it is outside study area. [Dale; see Dale 1961].

Lorima – Locality (? village, – peak) in the central part of the Imatong Mountains group, between Laboni and Lomariti, exact location not traced [Thomas].

Lotelele – Valley and village in the plains near the Imatong Mountains group, presumably in Kinyeti valley west of Katire, exact location not traced [Jackson].

Lotti – Populated place, formerly with rest-house (4° 02' N, 32° 32' E), and relic patch of lowland forest, below the western slope of the Acholi Mountains (Imatong Mountains group) [Chipp, Trought, Thomas, Smith, Snowden, Andrews, Sanderson, Myers, MacLeay, Ali, Prowse, Osman, Jackson, Symes].

Lotuke – Main peak (4° 07' N, 33° 48' E) of the Didinga Mountains [MacDonald, Myers, Jackson].

Lowiliwili – Locality, formerly with rest-house (3° 58' N, 32° 53' E), in the central part of the Imatong Mountains group [Jackson].

Loyaru – Locality (c. 3° 55' N, 32° 55' E), in the eastern part of the Imatong Mountains group [Thomas].

Ludibo – River in the western part of the Imatong Mountains group, exact location not traced [Thomas].

Lulir – Peak in or at the Imatong Mountains group, exact location not traced [Andrews].

Luluba – Populated place (4° 35' N, 31° 54' E) and hills near Khor Leiforo [Myers]. Outside study area.

Lututuru – Populated place (3° 45' N, 32° 55' E), formerly with rest-house, on the Uganda side of the Imatong Mountains group [Maxwell Forbes, Greenway & Hummel, Eggeling, Lye]. Sometimes spelt "Lototuru".

Madi Opei – Populated place and peak (3° 42' N, 33° 05' E), in the southernmost part of the

Agoro Mountains, southernmost part of the Imatong Mountains group, on the Uganda side [Eggeling, Greenway & Hummel, Purseglove]. Only areas to the north of Madi Opei are inside study area.

Magwe – Populated place (4° 08' N, 32° 18' E), in the plains north west of the Acholi Mountains (Imatong Mountains group), near Imurok [Jackson].

Malala – Locality (4° 15' N, 32° 37' E) in the Didinga Mountains, near Nagichot [Jackson].

Mingaro – Peak (3° 46' N, 32° 51' E) in the Imatong Mountains (Uganda) [Katende].

Moimoi – Locality (c. 4° 10' N, 33° 10' E) just south of the Dongotona Mountains [Myers, Jackson]. There is also a populated place with rest-house (3° 48' N, 33° 26' E) on the northern slope of the Dongotona Langia Mountains. It can not be excluded that some collections labelled “Moimoi” are from the latter location.

Moliandro – Populated place near Kerepi (3° 55' N, 31° 55' E) [Kielland-Lund].

Molitokoro – Populated place north of Kerepi (3° 55' N, 31° 55' E) [Kielland-Lund].

Molongori – Populated place (4° 10' N, 32° 52' E), formerly with rest-house, at base of the north east slope of the Imatong Mountains group [Andrews, Jackson, Friis & Vollesen].

Murikuren – Locality (probably populated place) [4° 15' N, 33° 07' E] in the Lafit, Dongotona and Nangeya Mountains [Jackson].

Nagichot – Populated place (4° 15' N, 33° 33' E), in the central part of the Didinga Mountains [Myers, Jackson, Beshir Eff., Kielland-Lund]. There is also on the maps a populated

place referred as “Nagichot” (4° 10' N, 33° 10' E) on the east slope of the Dongotona Mountains, but it seems that all collections come from the Didinga Nagichot.

Nalala – Locality in Didinga Mountains, probably the same as Malala (4° 15' N, 33° 37' E), near Nagichot [Jackson].

Naligede – Locality (c. 4° 10' – 17' N, 33° 42' E), in Didinga Mountains [Myers].

Naperatang – Valley (c. 4° 19' N, 33° 30' E), in Didinga Mountains [Kielland-Lund].

Nargi – Locality (peak ?) in the Imatong Mountains group, exact location not traced [Andrews].

Narije – A variant spelling of Ngairigi (*q.u.*) [Thomas].

Nathilani – Populated place (4° 20' N, 33° 40' E), formerly with rest-house, in the north east part of the Didinga Mountains [Myers, Jackson, Peers].

Ngairigi – River (4° 02' N, 32° 55' – 48' E), running west, originating in the Imatong Mountains group, below Mt. Konoro, and joining Kinyeti River [MacLeay, Osman, Jackson, Prowse, Firman, Howard, Friis & Vollesen],

Ngarama – Populated place (4° 20' N, c. 32° 39' E), formerly with rest-house, in the plains just north of the Imatong Mountains group, reached by a road branching off from the main road between Torit and Katire not far north of Hiliu [Jackson, Friis & Vollesen, Kielland-Lund].

Ngnolobot – River in the Imatong Mountains group at c. 3° 53' N, 32° 42' E, in the lower part

of Upper Talanga plantation area [Sommerlatte].

Nokolong – Locality in the Imatong Mountains group, exact location not traced, perhaps not far from Logoforok (*q.v.*) [Thomas, Johnston].

Obbo – Populated place (4° 02' N, 32° 28' E), near River Ayi, in the plains west of the Acholi Mountains (Imatong Mountains group) [Jackson].

Observation Hill – Mountain ridge in the central part of the Imatong Mountains group, above Gilo [Prowse, Friis & Vollesen]

Odouro – Locality in or near the Imatong Mountains group, exact location not traced, probably near Cromvarilo (3° 50' N, 32° 40' E) [Chipp].

Okako – Peak south of Mingaro in the Imatong Mountains (Uganda) [Katende].

Oketc – Locality (3° 52' N, 32° 40' E), in the plains west of the Acholi Mountains (Imatong Mountains group) [Chipp].

Opari – Populated place (3° 56' N, 32° 03' E), in the plains west of the Imatong Mountains group [Snowden, Trought, Andrews, Myers].

Oro – Peak (inselberg), in the plains north west of the Acholi Mountains (Imatong Mountains group), along the road between Opari and Torit, exact location not traced [Myers]. Is this the same as Mt. Iro (*q.v.*)?

Oronyo – Locality south of Torit in the plain north of the Imatong Mountains group, exact location not traced [Muratori].

Otzi – Peak in the mountains of Madi in the plains south of the Imatong Mountains group

on the Uganda side, exact location not traced [Greenway & Eggeling].

Padibe – Populated place (3° 29' N, 32° 50' E), in the plains south west of the Acholi Mountains (Imatong Mountains group), on the Uganda side [Dawkins].

Paloga – Populated place (3° 35' N, 32° 55' E), in the plains south of the Agoro Mountains (Imatong Mountains group), on the Uganda side of the border [Eggeling].

Palotaka – Populated place (4° 02' N, 32° 26' E), formerly with Italian Roman Catholic mission, in the plains south west of the Acholi Mountains (Imatong Mountains group) [Jackson, Shigeta].

Palwar – Populated place (3° 55' N, 32° 36' E), formerly with rest-house, in the western part of the Acholi Mountains (Imatong Mountains group) [Snowden]. Occasionally spelt “Paliwar”.

Parajob – Locality (? = Rajob) in the Imatong Mountains group, between River Lerua and Lotti, exact location not traced [Thomas].

Payito – Locality (3° 52' N, 32° 40' E), in the plains west of the Acholi Mountains (Imatong Mountains group) [Chipp].

Pojok – Locality in the western part of the Imatong Mountains group, near Palwar, exact location not traced [Snowden].

Poko Kweromon – Locality (river ?) on the western slopes of the Acholi Mountains, in the Imatong Mountains group, near Lotti [Jackson].

Radko – River near Mt. Baghanj; not localised with certainty, probably near Itibol [Andrews].

Sadit – Populated place (4° 10' N, 33° 09' E), on the east slope of the Dongotona Mountains [Jackson].

Sahue – Mountain ridge (c. 4° 01' N, 32° 52' E) between Dumuso and Itibol in central part of the Imatong Mountains group [Friis & Vollesen].

Talanga – Relic patch of lowland and transitional forest (c. 4° 01' N, 32° 40 – 45' E), in the west part of the Kinyeti Valley, Imatong Mountains group [Thomas, MacLeay, Ali, Omar, Osman, Jackson, Prowse, Fison, Loehr, Friis & Vollesen].

Topotha – Probably a populated place (4° 50' N, 33° 49' E), perhaps related to the tribal name “Toposa”. [Beshir Eff.].

Thuguru – Region around the Boya Hill (*q.v.*) [Kielland-Lund].

Timalarem – Locality in the Imatong Mountains group, between Itibol and Issore, exact location not traced [Thomas].

Tipo – Peak near Gilo in the Imatong Mountains group [Prowse, Jackson].

Tirangole – Populated place (4° 29' N, 32° 49' E), in the plains south west of the Lafit Mountains near the Dongotona Mountains [Jackson].

Tok – River (c. 4° 18' N, 33° 42' E), in the Didinga Mountains [Jackson].

Torit – Populated place (4° 24' N, 32° 34' E), in the plains north of the Imatong Mountains group [Snowden, MacDonald, Myers, Muratori, Jackson, Peers, Kielland-Lund].

Also indicated as a stream in the Imatong Mountains group, exact location not traced [Thomas].

Uratsi – Peak in the Agoro Mountains (Imatong Mountains group), on the Uganda side of the border, exact location not traced [Greenway & Eggeling, Greenway & Hummel].

Urungu – Peak (4° 03' N, 33° 48' E), near the Didinga Mountains and south of Mt. Lotuke, on the border with Uganda [Jackson].

II. Environmental conditions and biotic factors influencing vegetation

The following review of the environmental conditions and the biotic factors influencing the vegetation of the study area represents a synthesis of information from the existing literature, for the study area in general mainly Harrison & Jackson (1958), for the Imatong Mountains and the area around them primarily Jackson (1956, p. 343-349), Jenkin *et al.* (1977) and Sommerlatte & Sommerlatte (1990). To this synthesis have been added the observations made by the two current authors during their four months stay in the Imatong Mountains and during their work with the preparation of the catalogue of species in this publication. For the sequence of the subjects, we have chosen for the most part to follow the arrangement used by Jackson (1956, p. 343-349).

(1) Climate

(A) Rainfall

In the study area, there is a general rainfall gradient with average yearly precipitation-figures declining from west to east (Langdale-Brown *et al.* 1964, see especially the folded rainfall map). This general gradient is further modified by the rain-shadows, which are formed to the east of each of the mountain groups, so that all mountains, apart from getting overall drier when one moves from the west to the east, also have a wetter western side and a drier eastern side.

The variation in mean annual rainfall is best documented to the south of the Sudan-Uganda border (Langdale-Brown *et al.* 1964, p. 10-13

and the folded rainfall map). Generally, the rainfall in Uganda and southern Sudan declines both in a direction from west to east and in a direction from south to north. According to the data from Langdale-Brown *et al.* the area between the Nile River and the Imatong Mountains has an average annual rainfall, which declines from c. 900-1000 mm. near the Nile to 750 mm. south of the Imatong Mountains, while the average annual rainfall further declines to c. 650 mm. at the Nangeya Mountains to the south-east of the Dongotona Mountains, and even further, as low as near 600 mm., in the plains south of the Didinga Mountains.

The rainfall patterns have not been equally well documented to the north of the Sudan-Uganda border, but the same trends must exist there. Detailed data from only four meteorological stations in the study area, all near the Imatong Mountains, have been available, reproduced from Jackson (1956, p. 344) and Jenkin *et al.* (1977, p. 16): Katire at c. 1000 m. a.s.l. in the Kinyeti Valley, Gilo at c. 1900 m. a.s.l. in the upper part of the same valley, Lerua at c. 1000 m. a.s.l. in the west foothills, and Torit at c. 800 m. a.s.l., just north of the Imatong Mountains. The data are summarised here in Table 1, 2 and 3. Jackson (1956, p. 343) has estimated that the plains to the west of the Imatong Mountains might reach an average annual total rainfall of about 1000 mm., which is a slightly higher estimate than that of Langdale-Brown *et al.* (1964) for localities at the same longitude south of the border. At Katire and Lerua, where there is oreographic rain, the average rainfall is c. 1500 mm., see Table 2 and 3. At Torit, the average annual rainfall is just under 1000 mm. (Table 3). The rain shad-

Table 1. Mean, minimal and maximal monthly and yearly rainfall at Gilo (1946-55). Mean number of days with more than 0.1 mm. rain (1946-55) and with more than 10 mm. rain (1951-55). All data from Jackson (1956, p. 344).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean	4	21	114	231	288	307	376	337	309	190	58	28	2261
Min	0	13	7	110	203	87	136	41	6	100	0	0	1514
Max	18	59	320	347	482	428	875	432	472	413	160	146	2777
Mean number of days with > 0.1 mm. rain	1.2	2.4	9.9	15.5	18.1	20.5	25.1	24.9	17.2	16.4	6.5	2.1	160.9
Mean number of days with > 10 mm. rain	0.4	1.6	4.6	10.0	9.6	13.8	14.4	10.5	6.5	3.7	1.8	2.0	78.9

ow effect of the relatively high and extensive Imatong Mountains group is apparently prominent. We observed a very distinctive shift in the vegetation between the plains on the two sides of the mountains: the plains to the east and north-east of the Imatong Mountains group are considerably drier than the plains to the west of the mountains. This feature is very prominent on vegetation maps, such as the one by Harrison & Jackson (1958), but not very noticeable on the Ugandan side in the map of the ecological zones of Langdale-Brown *et al.* (1964). As mentioned, no rainfall data are available from the areas to the east of the Imatong Mountains, but from the nature of the vegetation, the average annual rainfall would appear to be considerably less than that of Katire, probably below an average of 800 mm. per year (Jackson 1956, p. 343). Although Talanga is only a few km. to the west of Katire, it is in a position, which catches a maximum of the rainfall, and the precipitation at Talanga is believed to be substantially higher than at Katire (Jenkin *et al.* 1977, p. 13).

There is very little information about the average annual rainfall in and around the Dongotona and the Didinga Mountains on the Sudan side of the border, but the plains around Kapoeta are considered dry, and may be esti-

mated to have as little as 500 mm. per year. The rainfall of the Kidepo area is estimated to vary between 630 and 750 mm. per year (Langdale-Brown *et al.* 1964, the folded rainfall map).

The rainy season generally starts in March or early in April (Table 1, 2 and 3), though Jackson (1956, p. 343) reports on observations of occasional, sometimes heavy showers as early as January and February. According to Jackson, the rains usually continue uninterrupted through the whole of May, while in June there is usually an interval in the showers with a duration of two or three weeks. This interval matches the dry period between the "small" or "short" and the "great" or "long" rainy seasons of regions further to the east and south. This interval is not very marked in Table 1, while Table 2 and 3 indicate a slight, but clearly marked drop in June in the rainfall of the Kinyeti Valley and the plains to the west and north of the mountains. After the interval, the heavier long rains begin, usually in July, and they normally continue until September or October. However, Jackson (1956) also reports of frequent days of heavy rain in November or December after a spell of some weeks of dry weather. During the stay of the current two authors in October-November 1980, the heavy rains of the main rainy season continued with-

Table 2. Mean, minimal and maximal monthly and yearly rainfall at Katire (1941-75). Data from Jenkin *et al.* 1977, p. 16. Mean number of days with more than 0.1 mm. rain (1942-55) and with more than 10 mm. rain (1951-55). Data from Jackson (1956, p. 344).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean	8	17	72	134	192	167	208	247	201	152	72	24	1494
Min	0	0	7	49	36	77	74	151	44	15	0	0	975
Max	90	80	254	245	579	372	427	406	470	365	404	94	2201
Mean number of days with > 0.1 mm. rain	0.7	2.4	7.2	11.2	14.6	16.8	18.3	21.1	18.8	11.4	5.5	2.1	130.0
Mean number of days with > 10 mm. rain	0.2	0.8	2.6	4.8	2.6	6.6	8.4	9.8	8.8	4.0	2.6	0.4	53.6

out any sign of decreasing right to the end of November, and we therefore have to conclude that the long rains may end at any date in September, October or November, or even later, and with or without intervals without rain near the end.

The dry season may also vary considerably in length and severity. In wet years the really dry season may last for only two months, while in dry years it may extend to nearly five months. Jackson (1956) has reported that in 1942-1943 only 6.1 mm. fell at Katire between October 4th and February 24th, and no rain at all was recorded at Gilo between December 1945 and March 20th, 1946. During the stay of the current two authors in February-March 1982, we observed no or very little rain in spite of the approaching rainy season.

In dry years grass fires are, not surprisingly, more frequent and fierce and continue for a longer period than in wet years. During the

stay of the current two authors in February-March 1982, there were fierce grass-fires right to the end of March; these fires caused much damage to the vegetation.

Jackson (1956, p. 344) has recorded the number of days with more than 0.1 mm. and more than 10 mm. rain for respectively Gilo (Table 1) and Katire (Table 2). It can be seen that at Katire it is only for days with heavy rainfall that there is a break between the "short" and the "long" rains; at Gilo the break is minimal for all categories.

Jackson (1956, p. 343) has also made observations on the vertical distribution of rainfall on the Imatong Mountains. The average annual rainfall increases with altitude from the figures indicated above (750-1000 mm.) in the lowland plains at 600 m. a.s.l. or slightly more, via 1533 mm. (1494 mm. according to Jenkin *et al.* 1977) at Katire (c. 1000 m. a.s.l.) to 2261 mm. at Gilo (c. 1800 m. a.s.l.). The rainfall

Table 3. Mean monthly and average annual rainfall in mm. at Lerua to the west and Torit to the north of the Imatong Mountains. Data from Jackson (1956, p. 344).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Lerua	3	19	96	168	189	157	191	217	203	193	61	17	1516
Torit	4	21	45	101	131	123	157	142	111	98	40	15	989

Table 4. Mean daily maximum and minimum temperatures ($^{\circ}\text{C}$) at Katire. Data from Jackson (1956, p. 344).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	33.9	34.2	33.5	32.3	30.4	29.5	28.6	28.3	28.8	30.6	31.7	32.9
Min	16.9	16.8	17.4	17.7	17.1	16.6	16.5	15.9	16.6	15.7	14.9	14.9

reaches a maximum at c. 2600 m. a.s.l., approximately the altitude where the mountains reach through the base of the daily cumulus clouds, where a maximum average annual rainfall of c. 2500 mm. has been recorded (Sommerlatte & Sommerlatte 1990, p. 6), presumably the highest recorded rainfall in the Sudan. The rainfall at the altitudes of the daily cloud cover is well distributed over the year, and periods of drought are very short. Above c. 2600 m. a.s.l. the rainfall decreases again and becomes more erratic. The rainfall must exhibit a similar altitudinal variation on the other mountain groups, but nothing certain is known.

Several authors, *e.g.* Jackson (1956, p. 343), have noted the importance of dew, which may be abundant at all altitudes, but particularly above c. 1000 m. a.s.l. Dew is of particular ecological importance in the dry season, when it undoubtedly reduces the effect of the drought. During their stay, the current authors observed nearly daily a rather heavy dew in exposed areas around Gilo. Mist is also very frequent, particularly at altitudes above the base of the daily cumulus cloud at c. 2600 m. a.s.l. As elsewhere in Eastern Africa, the mist zone is characterised by dense growth of *Usnea* on trees and rocks. Epiphytic ferns and mosses are also particularly frequent at these altitudes.

(B) Temperature

In the study area there is only one meteorological station from which temperatures have

been recorded. This is the station at Katire, which is located at an altitude of c. 1000 m. a.s.l. The temperature data from Katire, first presented by Jackson (1956, p. 344) and reproduced by Jenkin *et al* (1977, p. 16), are shown in Table 4. Whitehouse (1931) recorded a temperature of 7°C at noon in the dry season, near the summit of Mount Kinyeti, while we in the same place observed 12°C on December 15th at 11 a.m. At 2500 m., in the forest zone below the summit of Mount Kinyeti, we observed during 24 hours a maximum of 20°C and a minimum of 12°C .

Jackson (1956, p. 343) indicated that frosts have been observed occasionally at altitudes of over 2500 m.; they generally occur on clear, still nights in the dry season, usually in frost hollows. The current authors observed fine hail, which resembled snow, at Gilo in December 1980, but it very soon melted.

(C) Wind

According to the predominant wind systems blowing over Africa the wind-direction in the plains of the study area should be mainly north-easterly trade winds. However, in and around the mountain massifs and towards the Ethiopian Highlands the general wind systems are greatly affected by local topography. Jackson (1956, p. 345) has reported on records from Torit in the plains to the north of the Imatong Mountains group, where south-easterly winds predominate all the year round, with occasional northerly winds in the dry season.

In other places, for example at the Talanga forest and on the western slopes of the Imatong Mountains group the current authors have frequently observed south-westerly winds, and it seemed that this was the main rain-bearing wind. However, Jackson (1956, p. 345) observed that although in general the western or south-western slopes of the Imatong Mountains group, like the south-western slopes of other mountains in the south-east Sudan, are wetter than the east and north-east slopes, there was no evidence in the records from Torit that rain was associated with westerly surface winds, rather than with wind from other directions. Also in the mountains of nearby Ethiopia, the western and south-western escarpments have the highest rainfall (Friis 1992).

Jackson (1956, p. 345) has also called attention to the fact that during night in the dry season strong katabatic winds blow down the valleys of the Imatong Mountains group; these katabatic winds begin about an hour after sunset. These down-valley winds have an important cooling effect and result in plants occurring in valleys below the altitude they normally occur at on adjacent hill-slopes. Strong and gusty winds may also occur in association with heavy thunderstorms, and strong wind may occasionally uproot old trees. However, according to the observations in the Imatong Mountains by the current authors, uprooting of old trees occurs at all altitudes and positions, not only in the valleys where katabatic winds blow. Generally, the current authors experienced very little strong wind during their approximately four months stay.

(2) Geology and soil

The rocks that form the three main mountain massifs of the study area consist of granitic crystalline rocks of the African basement complex. Most of these rocks are folded and foliated.

Biotite gneisses are common, and at least in the main complex, the Imatong Mountains group, there are local outcrops of charnockite (Jackson 1956, p. 345). A variety of acidic gneisses such as (1) leucocratic, (2) augen gneiss and (3) quartz-rich leucocratic gneiss form conspicuous ridges all around the Imatong and Acholi Mountains (Jenkin *et al.* 1977, p. 17; Sommerlatte & Sommerlatte 1990, p. 7). The leucocratic gneisses are weakly foliated rocks with a mosaic of quartzite and perthite that makes up c. 90% of the rock. The quartz-rich leucocratic gneiss is a variation of the leucocratic gneiss with greater abundance of quartz. The augen gneiss is a medium-grained quartz-feldspar-hornblende gneiss (Jenkin *et al.* 1977, p. 17). Thus both the main types of rock in the mountain massifs are rich in quartz or quartzite. Apart from the three main massifs, there are many smaller rocky outcrops in the study area; these outcrops are either small, isolated mountains or stand out as small, rocky domes in the plains.

In the plains and on the lower mountain slopes the soil cover is generally thick, except in the steeper or steepest places, which in the Imatong Mountains is the north-eastern side. In the higher parts of the mountains, mainly above 2000 m., rocky outcrops are numerous. Certain peaks of the Imatong Mountains group, *e.g.* Mt. Garia and large parts of the Dongotona Mountains, are steep, rocky domes completely without soil.

The soils of the study area have mostly been studied in the Sudan, where they, according to Harrison & Jackson (1958, p. 2), can be classified under four broad categories: (1) *Dark Cracking Clays, including Flood-Plain Region*, (2) *Non-cracking Clays*, and (3) *Red Loam and Ironstone Soils*, and (4) *Hill or Mountain Soils*.

The first category, the dark cracking soils, often referred to as black cotton soils because of the suitability for the cultivation of cotton, occur in the extensive, monotonous flat plains in

the eastern Sudan; these soils are mostly alluvial in origin, deposited from the tributaries of the Nile, and have impeded drainage. They have high clay content and are alkaline, and they shrink considerably when drying out, for which reason they form a network of cracks at the surface. During the rainy season these soils support a luxuriant growth of mostly annual grasses, but during the dry season they quickly dry out.

The second category, the non-cracking clays, appear scattered as smooth clay flats, often characterised by a hard and impermeable surface which causes most of the rainfall to run off; they support a rather scarce vegetation. This category has not been much mentioned in the literature, they seem to occupy rather small areas, mainly to the north-east of the Imatong Mountains group and around the Dongotona Mountains.

The third category, the red loam and ironstone soils, occur away from the flood plains in areas where the average annual rainfall exceeds 800 mm., which, as mentioned in the part about rainfall, is the case in the part of the study area to the west of the Imatong Mountains group. These soils are typically sandy loams, or they are part of soil catenas from the small rocky outcrops to the surrounding plains. There are also areas with catena-soils to the north and east of the Imatong Mountains group.

The fourth category, the hill or mountain soils, are associated with the three main mountain massifs of the study area; these soils are very complex and will be described in more detail in the following.

Jackson (1956, p. 345) has described how, from the plains around the Imatong Mountains group up to about 2300 m. (above which very little data is available), there are two main groups of soils: those from the wetter south-western parts of the mountain massifs, and those from the drier north-eastern slopes.

These two groups are in general analogous with the black cotton soils and the red loams of the plains, but vary considerably according to their position on the mountain or hill slopes. The hill- or mountain-soils have been described in more detail by Jackson (1956, p. 345) who followed the distinction by H. Green into (1) *Alkaline Soil Catenas* and (2) *Red Loam Catenas* (Greene 1939, 1945, 1948).

(1) The hill soils of the alkaline soil catenas, according to Jackson "the upper soils of the alkaline catena are represented in the Imatongs by skeletal soils with numerous rock fragments, passing through a sandy detritus apron at the foot of the hills to grey alkaline cracking clays in the plains."

(2) ... "the red loam soils are very uniform throughout their range. They generally have a black or dark brown friable surface layer varying in depth from a few centimetres to over a metre, with below it a bright red clay or clay-loam which is very sticky when wet. The clay usually grades through eroding rock to the parent gneiss, but sometimes the soil overlies white kaolinite. These soils are generally somewhat acid, with a pH between 4.6 and 6. Though very fertile when first cleared for cultivation, they lose this fertility rapidly, and the top black layer is soon eroded to leave the red clay subsoil exposed." This leads, according to the observation by the current authors, frequently to deep gully erosion where this type of soil is exposed.

Jenkin *et al.* (1977, p. 51) do not distinguish between two major soil types in the Imatong Mountains group, but maintain that the soils of the Imatong Mountains show a general uniformity throughout the massif, which can be attributed to three factors: (1) the narrow range of parent materials, (2) the high stability of the soils and (3) the uniform animal activity. Regarding (1), Jenkin *et al.* point out that two of the three kinds of parent rocks, the leucocratic and the augen gneisses are mineralogically

similar and their weathering products give rise to soils, which are indistinguishable. Regarding (2), Jenkin *et al.* note the absence of landslide-scars and other evidence of mass downward movement; this means that the processes which are responsible for soil formation vary very little from site to site. Regarding (3), Jenkin *et al.* observe that there is a very high level of termite activity in all the mountain forest soils they have studied; the upper horizons of the forest soils are thick, dark coloured, humus-rich, very porous and friable and are rather deep, extending to below 1 m. below surface. The major variation in the soils of the Imatong Mountains is along altitudinal gradients, with rocky summits, boulder-strewn shallow soils on the steep upper slopes, increasing depth of soils lower down on the slopes, until the slope detritus at the bottom of the slopes is reached.

In Jenkin *et al.* (1977, p. 52-57) the mountain soils of the Imatong Mountains have been classified in detail on properties and parent material. The soil units include:

Dystric Histosols – soils derived from peat in the Kipia Uplands, above c. 2700 m. in the Imatong Mountains. Peat derived from grass- and sedge-dominated vegetation has accumulated in the high altitude mountain valleys around Kipia.

Lithosols – very shallow soils derived from organic matter over solid rock, mainly at the rocky crests. The soil, which exists adjacent to all areas of exposed rocks throughout the Imatong Mountains, is rich in organic carbon.

Fluvisols – soils adjacent to larger stream courses, subject to periodic flash-flooding. The soils consist of a relatively thin, dark surface horizon over sandy or bouldery deposits along water courses; they are associated with various kinds of riparian vegetation. These soils are usually acid.

Humic Cambisols – these soils are shallow to moderately shallow, often associated with boul-

ders or gravel, usually with the bedrock within 1.5 m. below the surface. They seem to be associated with open montane vegetation, for example woodlands. A well-developed, dark, humus-rich horizon is found. The soils may be dark brown or red, deepening on the humus contents. The nutrients are usually accumulated in the surface horizon.

Humic Nitosols – these are the deep, friable, strongly coloured soils that are so conspicuous in the Imatong Mountains. They are red or reddish brown and associated with forest vegetation in the mountains. Many series have been recognised from the different forest areas of the mountains.

Humic Acrisols – these are high-altitude soils from the Uplands, above c. 2700 m. in the Imatong Mountains. They are presumably associated with high altitude grasslands and bushland.

(3) Biotic influence on the vegetation

(A) Animals

(a) Wild mammals

The African elephant (*Loxodonta africana*) is – apart from man – undoubtedly the animal, which has most strongly influenced the vegetation in the study area. The population of African elephant was up to the civil disturbances in the 1970s very large in some parts of the mountain massifs and in associated parts of the plains. However, during the visit of the current authors in 1980-82 elephants were hardly noticeable, and hardly any fresh elephant dung was observed, let alone the animals themselves. As pointed out by Jackson (1956, p. 346), elephants can uproot trees up to 12 m. high and 30 cm. in diameter, and they may also strip the bark from standing trees and destroy the undergrowth of forests and woodlands over wide areas. In immature forest this damage

may retard the forest succession considerably, or even reverse it. This is especially the case if the zone of more or less fire-resistant shrubs separating forest from grassland is destroyed; the grassland will then sooner or later be burnt and the damage will result in fire entering the forest and thus extends the area of grassland.

Jackson (1956, l.c.) has particularly called attention to the damage which elephants could do in the belt of *Sinarundinaria alpina* bamboo, which is found at about 2500 m. altitude or more in the Imatong Mountains group. Elephants are known to form tracks through the bamboo thickets and to eat large quantities of young shoot. In the process they break large numbers of shoots.

Also Jenkin *et al.* (1977, p. 24) have reported on the presence of elephant populations in the Imatong Mountains Forest Reserve, but mentioned that no severe elephant damage to the forest was seen by any of the team members. However, due to hunting and poaching the number of elephants has declined very considerably during the late 1970es and early 1980es, and by 1982 only very few still existed in the study area. Sommerlatte & Sommerlatte (1990) reported on the existence of about 15-20 elephants in the Imatong Mountains Forest Reserve in the early 1980es. Little is known about the change of number of elephants since the outbreak of the current civil war, but it seems likely that their number has decreased.

Jackson (1956, p. 346) reported on the presence of the following other large mammals in the Imatong Mountains: Bushbuck (*Tragelaphus scriptus dodingae*), two species of Forest Duikers, the Blue Duiker (*Cephalophus monticola aequatorialis*) and Harvey's Duiker (*Cephalophus weynsi*) (taxonomy updated according to Wilson & Reeder 1993). These species were still rather common in 1980-82, as evident from the hunting by the local population, which the current authors witnessed during almost every weekend.

Jackson (1956, l.c.) also reported that the forest antelopes could do considerable damage by browsing young *Podocarpus latifolius* trees in plantations, and it was probable that they took their toll of natural seedlings in the same way. According to Jenkin *et al.* (1977, p. 24) Bushbuck was frequently observed browsing the *Hypoestes forskalii* ground layer of the open montane *Podocarpus latifolius*-*Syzygium* forest and eating the bark of *Olea capensis* subsp. *hochsteteri* and *Allophylus abyssinicus*, as well as the bark of *Eucalyptus saligna* in plantations, while Colobus Monkeys were common in trees of *Olea*, where they eat the fruits. We also noted considerable effect of foraging monkeys in the canopy of Talanga Forest and in the forests between Gilo and Mt. Kinyeti. Traces of their feeding could be seen on the forest floor in the shape of broken twigs, inflorescences and fruits.

Sommerlatte & Sommerlatte (1990) reported on good populations of Blue Duiker and Harvey's Duiker in the forests of the Imatong Mountains, as well as African Buffalo (*Syncerus caffer*), Bushpig (*Potamochoerus larvatus hassama*). These latter remained as important game in 1982, when local hunters near Gilo offered us large pieces of meat of Bushpig with almost black fur of shaggy, coarse hairs still attached.

From the lowland woodlands and grassland Sommerlatte & Sommerlatte (1990) reported common duiker (presumably the very widespread Bush Duiker, *Sylvicapra grimmia*), Oribi (*Ourebia ourebi*), Bohor Reedbuck (*Redunca redunca*) and Defassa Waterbuck (*Kobus ellipsiprymnus defassa*). Common warthog (*Phacochoerus africanus*) was not mentioned by Jackson (1956), Jenkin *et al.* (1977) or Sommerlatte & Sommerlatte (1990), and was not seen by us either, but it must occur in the open plains of the study area.

Black rhinoceros (*Diceros bicornis*) has become extinct around the Imatong Mountains

group in recent years (Sommerlatte & Sommerlatte 1990, p. 8). The large herds of the Common Zebra (*Equus quagga boehmi*), Northern Savannah Giraffe (*Giraffa camelopardis cottoni*), Common Eland (*Taurotragus oryx*), Roan Antelope (*Hippotragus equinus bakeri*) and Lewel Hartebeest (*Alcelaphus buselaphus leuel*) previously seen in the plains to the north of the study area had been greatly reduced in number by 1980 (Sommerlatte & Sommerlatte 1990, p. 9). This is due to hunting, poaching, general human encroachment and civil war, and these animals must now be assumed to be very scarce.

Bongo (*Tragelaphus euryceros*), white rhinoceros (*Ceratotherium simum*), Giant Forest Hog (*Hylochoerus meinertzhagenii*), Yellow-backed Duiker (*Cephalophus silvicultor*) and Red-flanked Duiker (*Cephalophus rufilatus*) have never occurred in the study area, and are confined to the forests and woodlands of Equatoria province to the west of the Nile (Sommerlatte & Sommerlatte 1990, p. 8).

Monkeys were well represented in the Imatong Mountains around 1980-82. In the lowland woodlands there were substantial populations of Vervet Monkey (*Cercopithecus aethiops*), Olive Baboon (*Papio hamadryas anubis*) and Patas Monkey (*Cercopithecus patas*). In the montane forests there were large populations of Olive Baboon, Guereza Colobus (*Colobus guereza* subsp. not recorded) and Gentle [blue] Monkey (*Cercopithecus mitis stuhlmannii* or *elgonis*).

It is probable that the fruit eating mammals play an important part as seed dispersers. This applies to forest antelopes, especially the duikers and possibly also the bushbucks, which play a significant role in dispersing large seeds because of their habit to eat large fruits and later spit out the seed (J. Fjeldså, pers. comm.).

Lion (*Panthera leo*) and Cheetah (*Acinonyx jubatus*) were by 1980 very rare carnivores of the lowlands, but Leopard (*Panthera pardus*)

and Spotted Hyena (*Crocuta crocuta*) were rather common in the forest. Sommerlatte & Sommerlatte (1990: 9) also recorded Serval (*Leptailurus serval*) and Caracal (*Caracal caracal*) from the Imatong Mountains Forest Reserve. According to lists from the IUCN's bovid specialist group Kob (*Kobus kob*) and Thomson's Gazelle (*Gazella thomsonii*) are recorded from the lowlands of the study area to the north of the Imatong Mountains group.

Rock Hyrax (*Procavia capensis*) was reported to be common in the Imatong Mountains Forest Reserve by Jenkin *et al.* (1977, p. 24); another hyrax species recorded from the region is *Heterohyrax brucei* and the tree hyrax *Dendrohyrax arboreus*. Jenkin *et al.* (1977, p. 24) noted that the largest remaining concentration of game animals appeared to be in the Kipia Uplands of the Imatong Mountains group, with Elephant, Buffalo, Bushbuck, Bushpig, Hyena and Leopard as the most notable. The Kipia Uplands were regularly visited by hunting parties from Issore.

Bush-pig (*Potamochoerus porcus*) was also still comparatively abundant in the forest in 1980-82; they dig up large areas in their search for roots. The disturbance of the soil helps in regeneration of tree seedlings, especially *Podocarpus latifolius* and *Albizia gummifera*.

No published list of small nocturnal mammals has been seen, but those recorded in the African distributional databases at the Zoological Museum, University of Copenhagen, are included in the listings in the chapter on Zoogeography (chapter V).

Jackson (1956, p. 346) noted that rats of various species and porcupines made an impact on the vegetation by eating the bark of various trees, even when the trees were large.

This section on mammals and their influence on vegetation will be concluded by a review of what is known about the traditional hunting in the Imatong Mountains group and its surroundings. This has been described espe-

cially by Sommerlatte & Sommerlatte (1990, p. 9) and also seen on many occasions by the two current authors. For the indigenous people living in or around the Imatong Mountains group hunting has been a traditional occupation, and game meat has been an important source of protein and income. Hunting has traditionally taken place in the lowland woodlands or at the higher altitudes of the Imatong Mountains group. In the mountains, hunting has taken place in the areas dominated by Afromontane forest and grasslands and has been carried out by people from the surrounding lowland plains and from the mountain villages of Gilo, Issore, etc. Hunting has traditionally been carried out in large parties of 50-150 people, in groups of 5-10 or by small groups of individuals, and large hunts might take up to 3-4 days to complete. The traditional arms have been bow and arrows, clubs and pangas. Snares, traps and game pits have frequently been used in the forest, and presumably they still are under the current strained conditions.

The larger hunting parties were most frequent in the dry season, when large areas of grassland, both at lower altitudes or in the mountains, are set alight. Individual hunting or hunting in small parties with bow and arrow take place throughout the year and normally in the mountains. The animals hunted are mainly duikers, Bushbuck, Bushpig, and monkeys. (Sommerlatte & Sommerlatte 1990, l.c.). According to Jenkin *et al.* (1977, p. 24) large hunting parties armed with bows, arrows and spears used to leave Katire at the weekend in the early 1980s to hunt in the Imatong Mountains Forest Reserve. These parties stayed in large hunting camps in the Forest Reserve.

During their longer trips in the Imatong Mountains, the two current authors often experienced that their guides and porters supplemented their food supplies by hunting, especially Bushbuck and monkeys (Colobus and Vervet monkeys).

(b) Wild birds

More than 500 species of birds have been recorded from the study area, and the Imatong Mountain group and the surroundings are among the "hot spots" for diversity of bird species. See further about the discussion of bird diversity in the Chapter V, which deals with zoogeography of the study area.

Birds are not generally known to deplete the vegetation, but they are important dispersers of berries and seeds. The birds may disperse seeds in two ways: some birds are seed predators, which normally digest the seeds, but occasionally accidentally disperse them (in the study area several species of pigeons which do not always eat up their stores of fruits and nuts), others are true frugivores, which digest the fleshy parts of fruits and void the seeds intact.

Important in the latter category are the turacos (*e.g.* the black-billed Turaco, *Tauraco schuetti*, which is common in the *Podocarpus* forest), barbets (the lemon-rumped tinkerbird *Pogonius bilineatus*, the yellow-billed barbet, *Trachylaemus purpuratus*, which especially eats and disperse species of Lorantaceae). Also hornbills are very important seed dispersers, for example black and white casqued hornbill, *Bucanistes subcylindricus*, which is almost omnivorous, but at least periodically eats much fruit, especially synconia of *Ficus*, but also a wide variety of husked, capsular, and drupaceous fruits, 5-60 mm in diameter but most pea- to olive-size. Kalina (1988) mentions 67 species in 26 families, of which the following genera are recorded in the study area: *Antiaris*, *Beilschmiedia*, *Bersama*, *Blighia*, *Bridelia*, *Canarium*, *Celtis*, *Milica*, *Cola*, *Cordia*, *Diospyros*, *Dracaena*, *Eugenia*, *Fagaropsis*, *Ficus*, *Harrisonia*, *Lychnodiscus*, *Maesopsis*, *Mimusops*, *Monodora*, *Morus*, *Musanga*, *Olea*, *Phytolacca*, *Premna*, *Pseudospondias*, *Pycnanthus*, *Rauwolfia*, *Sapium*, *Sterculia*, *Teclea*, *Trichilia*, *Trilepisium*, *Uvariopsis*, *Vangueria* and *Voacanga*. Greenbuls (Pycnonotidae) are also important

but unspecialised seed dispersers, dispersing seeds of various smaller fruits and berries. Relevant species are especially *Andropodus curvirostris* and *A. gracilirostris*, *Baeopogon indicator* and *Chlorocichla laeissima*, while orioles (*Oriolus rufipennis*) and starlings (*Poeyoptera stuhlmanni*, *Onychognathus walleri*) which to a larger extent eat small to medium-sized fruits of large forest trees. Starlings, orioles and Green Pigeons (*Treron australis*) are also important dispersers of fig seeds. The review above is based on Jackson (1956), but the current authors are also grateful to J. Fjeldså (pers. com.) for information about the interaction between birds and vegetation in the study area.

(c) Cattle grazing

The current authors have not observed cattle grazing in the study area. Cattle grazing was strongly discouraged inside the Imatong Mountains Forest Reserve, where most studies were carried out in 1980, while there was very little grass in the samples of lowland vegetation to the north of the Imatong Mountains, which were studied during the dry season on the second field trip. Jackson (1956, p. 348) has explained that cattle was kept only in the dry areas to the north and the north-east of the mountains and in a few pockets in the Kinyeti valley. The occurrence of tsetse fly has generally prevented cattle from being kept in the woodlands of the plains to the west of the Imatong Mountains group, and cattle was deliberately kept out of the forest reserve during the late colonial period, a policy which was reintroduced during the time of the plantation project. The presence of tsetse flies has been known in the region for many years; Baker, in the 19th century, lost most of his transport animals from disease transmitted by tsetse bites (Baker 1861). Cattle are frequently kept by the ethnic groups further to the east of the Imatong Mountains group, and some, for example the Toposa, are mainly dependent on cattle.

The lower slopes and the eastern foothills of the Imatong Mountains group and some areas in the Dongotona Mountains have been severely overgrazed (Jackson 1956; Harrison & Jackson 1958). There are also reported cases of overgrazing in some of the plains to the east of the Dongotona Mountains.

Jackson (1956, p. 348) has pointed out that the effect of overgrazing in the Imatong Mountains group is that the grassland is replaced by an open scrub of *Acalypha ornata*, *Pseudomussaenda flava*, *Hoslundia opposita*, etc. Under this rather open vegetation, the soil is eroded until it becomes confined to crevices in the rock and contains large quantities of stones and boulders. In the small pockets of soil left in cracks in the rocky outcrops and between boulders, trees and shrubs can grow because their roots can extract moisture and nutrients from deep crevices in the rocks that do not support the tall grass species. However, the low amount of grass biomass reduces the effect of fire, and, paradoxically, the woody vegetation of the over-grazed and heavily eroded areas is therefore often better developed than that of the less grazed and eroded sites at the same altitudes, where the shrub- and the tree-strata are destroyed by fierce grass fires.

(B) Man-made fires

Over large areas of the tropical African woodlands, wooded grasslands and grasslands, grass fires are an annual incidence and an important ecological factor (see review in Jensen & Friis 2001, relating to observations from Gambella in the western lowlands of Ethiopia, ca. 300 km northeast of the study area).

In the study area, where the lowland woodlands and the grasslands burn regularly, the grass fires seem almost invariably to have been started by people to clear old vegetation for cultivation, to provide new green grass for graz-

ing and to facilitate hunting (Jackson 1956, p. 347), or simply to make it easier to walk around than if one has to force one's way through dry grass, which is 2 m. high or more. Indications of the importance of man as a starter of grass fires are the observations that the origin and frequency of fires correspond rather accurately to the location of villages and roads (Jensen & Friis 2001), or to the location of labour camps and routes taken by hunting parties. In the study area particularly many fires have been noted to originate near the populated places of Katire and Issore (Sommerlatte & Sommerlatte 1990, p. 7). The grass becomes dry enough to burn soon after the end of the rainy season, usually in November or December, and fires may continue to occur until March or April. The early fires, when the grass is still somewhat green, do relatively little damage, but a late fire, involving the dry biomass of up to 3 m tall grasses, can be very fierce. Sometimes single fires burn the grass vegetation for several hundred square kilometres (Jackson 1956, p. 347). See also about the coverage of fire scars in Chapter III, Satellite-image analysis of the vegetation, especially in the section 3.a. Burnt areas. The satellite image analysed in Chapter III represents an aspect from the middle of the dry season.

In the late colonial time it was government policy to encourage early burning. The policy was to have as much grass as possible burnt before January, and to prohibit burning after that date. Jackson (1956, p. 347) described how, when he wrote his paper, this policy had just begun to be enforced and serious late fires still occurred in the 1950s. Within the forest reserve the policy was to burn areas of grassland near the boundary early, to prevent fires from entering from outside, and to attempt to protect the rest of the grasslands from fire completely. As the result of the decolonisation, the policy of early burning was not enforced long enough to show noticeable results over larger

areas. However, an example of an area which had been successfully protected from fires was the Observation Hill near Gilo. Late fires in this area had been prevented for approximately 40 years, and the vegetation had reverted from grassland to woodland (Sommerlatte & Sommerlatte 1990, p. 8).

In the plains fire is undoubtedly one of the chief factors which transform closed dry forest into savannah woodland (Jackson 1956, p. 347; see Jensen & Friis 2001 for a study of these process in the western lowlands of Ethiopia), the other major factor is shifting cultivation. Which of the two that is the more important has been a question open to discussion (see for example Vidal-Hall 1952), but considering the relatively low population density over large areas in the lowlands of the study area, and the frequency of fires, it would seem probable that grass fires play the more important role in converting woodland to grassland.

Jackson (1956, p. 347) is of the opinion that it is the particularly late and fierce fires that have really degraded the forest, once clearings have been established:

... grass fires cannot occur in the heart of unbroken rain-forest, but once an area of grassland has been established – perhaps as the result of cultivation – fires arising in this will tend to invade the edge of the forest and may penetrate it a few metres each year, so that in the course of decades or centuries considerable areas of forest will be destroyed. It appears more likely, however, that such a recession of the forest is due less to the small cumulative effect of normal annual fires than to the occasional exceptionally fierce fire occurring late in an abnormally long or severely dry season; such an event might occur perhaps once in ten or twenty years.

Against this, there are numerous localities near the foot of the Imatongs group where

forest is advancing quite rapidly into the savannah despite annual fires; a similar state of affairs has been recorded at the edges of the Budongo Forest in Uganda (Eggeling 1947). The balance between forest and savannah appears to be a sensitive one; a series of dry years will cause the savannah to spread at the expense of the forest, and vice versa. [In the late colonial period, when Jackson observed the forests of the Imatong Mountains group], fire tend[ed] to maintain existing woodlands as such, and to retard its colonisation by forest species, rather than creating new areas of savannah woodland from closed forest.

The topography is extremely important for the effect of fires. Fires destroy woody vegetation more fiercely when they burn up a mountain slope than when they burn on flat ground. This happens because the biomass on sloping ground is heated and dried by the rising heat from the fire below (Jackson 1956, p. 347; Jensen & Friis 2001). A mountain ridge or the sharp edge of a depression may therefore act as a firebreak and can separate regularly burning grassland from woodland or forest. In southern Sudan, remnants of closed forest are often found in "bowls" separated from the surrounding woodland by mountain edges or ridges (Jackson 1956; Wickens 1976). Jackson has pointed out that fires burning uphill from the plains tend to destroy the forests on the lower hill slopes, and that this is probably one of the chief reasons why so little closed forest exists on the steep lower slopes of the Imatong Mountains group. The fires may even burn very high up into the mountains if they get access through open grassland. The open, non-mature montane forest-types, where light can easily penetrate the canopy and in which more biomass can therefore develop in the lower strata than in forest types with closed canopy, are rather more inflammable than both the

lowland forests and the mature mountain forests. In 1946 Jackson (1956, p. 348) observed a large area covered by the forest pioneer species *Albizia schimperiana* being destroyed in this manner.

Areas of shorter grassland exist in the higher parts of all the three mountain groups; these areas are often associated with wide high-altitude valleys and are rich in grasses, sedges and herbaceous plants, for which reason they are sometimes called "mountain meadows." Also these grasslands appear mainly to be maintained as open grassland by fire, and fires occur regularly in most of these areas. Possible exceptions are the very steep, rocky areas along the northern side of the Imatong Mountains group and the steep, exposed summit of Mount Konoro, Mount Kinyeti, and other high peaks (Jackson 1956, p. 348), as well as a few areas in Kipia, which may be too waterlogged for fires to develop, at least in years with abundant rainfall and a short dry season (see below in this section about fire in mountain swamps).

Jackson (1956, p. 348) observed how extensive areas of fire-climax "mountain meadows" in the Imatong Mountains group were encouraged and actively maintained by members of the Lotuko tribe, who wanted to use the areas for hunting during the dry season, chiefly in February and March. A large circular grass fire was ignited, and nets were placed at openings in the ring-shaped fire. During the last period of the colonial time this type of hunting was made illegal and at least partly stopped, which caused a rapid colonisation of the grassland by forest species.

There are several kinds of swamps in the study area, both lowland and mountain swamps, and both are rich in species of sedges, etc. Lowland swamps occur along rivers and in depressions (see Chapter IV.1.B), and moist depressions or waterlogged areas in the "mountain meadows" may also be considered as swamps (see Chapter IV.3.B.b). The current

authors have observed grass fire enter both types of swamps, burning the drier vegetable matter that raise above the moist basal parts of the vegetation. This kind of fire that does not burn the vegetation at the level of the ground would tend to discourage the invasion of shrubs and trees into swamps, but would not destroy or seriously damage the low sedges and herbs. However, generally very little is known about the effect of fire in swamps.

(C) Shifting cultivation

As mentioned previously under (B), the relative importance of fire and shifting cultivation in producing grassland and open woodland from closed forest or dense woodland has been a much debated question. Where the plains to the north and west of the Imatong Mountains group are concerned, Jackson (1956, p. 348) thought it probable that most of the extensive woodlands in these areas were originally produced through the destruction of the forest for cultivation, while fires maintained it in its present state:

Shifting cultivation is also important in preventing the succession from woodland to forest in that it is just those areas of woodland where the trees have closed canopy and the grasses are beginning to be killed out that are most preferred by the local inhabitants for cultivation; such areas being very fertile.

In the mountains the members of the Imatong and the Lango tribes used to cultivate up to an altitude of about 2100 m., chiefly in an area between Mount Garia, Mount Konoro, Gilo and Katire. While they lived at the high hills they used to practice a rudimentary form of terracing, which though not completely effective in reducing soil erosion, was at any rate better than nothing.

Nowadays [in the late colonial time and later], however, they do not bother to do even this but cultivate very steep slopes without any attempt at terracing. Soil erosion is thus very serious and indeed some slopes are only cultivated for two or three years before reduced to a mass of rubble. Such effects are to be seen particularly on the north-east face of the [Imatong] mountains.

There has been much shifting cultivation on the southern and south-eastern slopes of the Dongotona Mountains, whereas the comparatively steep north-western and north-eastern slopes of Mt. Emogadung have retained their forest and woodland cover. The Lafit Mountains have had shifting cultivation for a long time, and the same seems to have been the case with the Nangeya Mountains, which are now covered with an open vegetation with patchy forest.

The lower northern parts of the Didinga Mountains group has long been rather densely populated and subject to shifting cultivation; the peak of Mt. Lotuke has largely retained its forest cover.

In all the mountain massifs where old areas with shifting cultivation are reasonably protected from grass fires the old farmland will generally first be invaded by *Vernonia* scrub and later by *Acacia abyssinica* woodland over a tangle of shrubs and lianas. This succession leads ultimately to mountain forest with *Podocarpus latifolius*, passing through seral stages of *Albizia schimperiana* woodland and forest. See Chapter IV for descriptions of these stages.

(D) Felling of trees for timber

Jackson (1956, p. 349) has summarised the history of tree felling in the area in and around the Imatong Mountains group up to ca. 1955. Later information has been gathered from

Sommerlatte & Sommerlatte (1990), Jenkin *et al.* (1977) and information gathered locally by the two current authors.

In Lotti forest, the lowland forest to the west of the mountains, the Verona Fathers Mission was allowed to fell timber, chiefly *Khaya grandifoliola* and *Milicia excelsa*, until 1937, when the forest was proclaimed an International Flora and Fauna Reserve. The scarcity of these two species near the roads through the forest, and the occurrence of a number of secondary species, is due to the long-term effect of this tree felling. The Verona Fathers Mission continued the felling, under permit, of a few specimens of *Khaya* and *Milicia* in the Imeila forest each year into the late colonial period. In the 1970es some selective felling of timber at Lotti took place under the authority of the Forest Department (Sommerlatte & Sommerlatte 1990, p. 11).

In the Imatong Mountains on the Sudan side, the only trees cut until 1940 were specimens of *Podocarpus latifolius*. Of this species young trees were cut to provide roofing poles for government and military quarters in Torit. As a result of this, Jackson (1956, p. 349) noted a marked absence of middle-aged *Podocarpus latifolius* within a distance of 3 or 4 km. from Gilo. In 1940, during the first year of the Second World War, the Sudan was cut off from its normal sources of softwood timber, and a sawmill was opened in Katire to exploit the *Podocarpus latifolius* forests in the Imatong Mountains, and the current road from Katire to Gilo was constructed (Jenkin *et al.* 1977, p. 27). Since 1940, about 300 hectares of mountain forest have been felled and replaced by plantations of exotic softwoods, chiefly *Cupressus lusitanica* and species of *Pinus*. Some felling in Talanga forest also took place during the war (Jackson 1956, p. 349). Little information has been gathered about the cutting in the forests on the Uganda side of the Imatong Mountains, but in colonial time these forests

were demarcated as the Agoro-Agu Forest Reserve, and cutting was controlled and supplemented with plantations of exotics. Further to the east, the Nangeya-Napore Forest Reserve (also called the Nyangea-Napore Forest Reserve) that covers the Nangeya Mts. was established.

The Imatong Mountains Forest Reserve was legally gazetted by the Sudan Government in 1952 (Jenkin *et al.* 1977, p. 28). This protected to some extent the remaining natural forest from being transformed into woodland or grassland, but the natural forest was not protected from being actively transformed into plantations. In the late 1970es the British Imatong Forestry Project started an extensive felling of the natural *Podocarpus* forest, followed by a replanting with a number of exotic species. See further below under development projects.

(E) The development projects in the study area

The attempts at development of natural resources on the Sudan side of the Imatong Mountains fall into four periods, determined by the general political situation of the region. The small-scale development at the old Missions is not accounted for here because information has been difficult to obtain. Nor has any information been available about the development projects in connection with establishment of plantations on the Ugandan side of the Imatong Mountains group during the colonial time or after.

In 1941-54 organised tree felling took place in the Imatong Mountains due to wartime shortage of timber, and saw mills were established at Itibol and Katire. The Sudanese government established trial plantings of *Cupressus lusitanica* around Gilo. Also trial plots of *Eucalyptus grandis*, *Juniperus procera*, *Podocarpus falca-*

tus, *Calitris calcarata* and *Olea* spp. were established (Jenkin *et al.* 1977, p. 28); some of these trial plots were still to be seen during out visits in 1980-82. After independence of the Sudan in 1955, the establishment of plantations of *Cupressus lusitanica* was intensified and the establishment of plantations with species of *Pinus* began in the Dumuso and the Itibol areas. The following species were tried: *Pinus patula*, *P. kesiya*, and *P. radiata*. During the first period of civil war, 1965-72, the plantations were neglected; no organised thinning, pruning, felling or cleaning of young regrowth took place. After 1972, when peace was restored, clearing of natural forest and planting of new plantations to the north and west of Gilo took place, and by 1976 a total of 491 ha. of plantations had been established (Jenkin *et al.* 1977, p. 28-29). Plantations of *Cedrela* and *Tectona* were established in the lowlands.

In 1978-79 the Imatong Forestry Project was established with support from the British Overseas Development Agency with the aim of converting 10,000 ha. of indigenous forest in the Upper Kinyeti and the Ngairigi Basins into *Pinus* and *Cupressus* plantations. By 1982 a total of 1,553 ha. had been felled and replanted, mainly with *Pinus* and *Cupressus* plantations in the area around Gilo and *Tectona* in the lowlands around Katire (Sommerlatte & Sommerlatte 1990, p. 11).

Another development project, the Upper Talanga Tea Project, was concessioned 16,400 ha. in the north-western foothills of the Acholi Mountains and aimed to convert approximately 1,000 ha. of forest, mainly *Albizia* forest and *Hagenia* woodland, into tea plantations (Sommerlatte & Sommerlatte 1990, p. 11).

The Norwegian Church Aid sponsored and operated a very large scale rural development project 1974 to 1986 which has had impacts on both the environment of the study area and our knowledge of the flora. The project was operating in most of Eastern Equatoria province

of South Sudan, but it had most of its development activities within the study area of this work. Very soon after the Addis-Ababa agreement in 1972 the Norwegian Church Relief (NCR) started relief operations in Southern Sudan. Based on an agreement between the government of the Democratic Republic of Sudan and NCR of November 6th 1974 a rural development project, Norwegian Church Aid Sudan Programme (NCA SP) for Eastern Equatoria followed. A temporary headquarters was established in Torit while a more permanent headquarters in Hilieu, 10 kilometres south-east of Torit, in the Kinyeti valley of the Imatong Mountains group, was being built. The objective of the programme was to improve the living conditions for the population of the region through long term development of agriculture, forestry, road and communication building and health and water services. The following sub-projects were established: 1. Building project; 2. Road Project; 3. Water boring project; 4. Agriculture Project; 5. Education Project; 6. Health project; 7. Printing Press Project (in Juba); 8. Co-operatives Project; 9. Technical Support project (with offices also in Juba and Nairobi); 10. Socio-economic project. The expatriate staff, consisting of specialists of many nationalities, increased from 28 in 1975 to 56 in 1982, and a number of these staff members, especially agronomists, have collected plants, which are cited in this work. Many hundred Sudanese were engaged, c. 500 already in 1975. A permanent chartered air service between Nairobi, Juba and Torit was also established.

The Agriculture project was quite extensive, with a research farm and a research centre at Hilieu and farms and trial sites at the six Regional Development Centres in Torit, Lafon (Lafit), Arapi (Nile valley), Palutaka (Acholi Mountains), Chukudum (Didinga Mountains) and Kapoeta (Boya). These centres were administered by a farm manager, expatriate or

Sudanese Diploma holders. The agriculture research section was given the responsibility for agronomy research in the East Bank Area of Eastern Equatoria in 1982. The main objective was to assist the small holder farmers related to food security by introducing new methods, new crops and improved and more disease-resistant varieties.

In January 1985 the situation changed dramatically when the SPLA (Sudan Peoples Liberation Army) started to infiltrate the NCA

area. Expatriate staff families were evacuated and expatriate staff was when possible replaced by competent Sudanese. The Hilieu Centre was taken by SPLA forces in March-April 1986. At that time only few expatriates remained, of whom one Norwegian was taken hostage for a period. The development project was then abandoned. However, NCA has continued the activities in Southern Sudan as a relief organisation, and is still active there.

III. Satellite-image analysis of the vegetation

by Erik Prins & Ib Friis

(1) Introduction

The application of multi-spectral satellite sensors for monitoring vegetation has been used since the beginning of the 1970es. Over the last 20 years, there has been considerable progress in the development of hardware and data analysis techniques for monitoring vegetation using space born multi-spectral sensors (Crist & Cicone 1984; Curran 1980, 1983; Jackson 1983; Sellers 1985, 1987; Tucker 1978; Tucker *et al.* 1985; Tucker & Sellers 1986). The result of this development of technology has been an operational application, to be used for mapping and assessing different types of land cover which again can be correlated to the floristicaly and physiognomically defined vegetation types.

(2) Materials and method

The basis for this vegetation analysis of the study area is digital data from the American satellite Landsat 2, recorded at Landsat reference scene grid, Path/Row 184/57, on the 23 of December 1975, which was the only cloud-free image of the area available in the entire Landsat series searched. The original image covers approximately 185 \times 170 km. The data used here are from the Multi-spectral Scanner System (MSS), this system records light reflection from the Earth surface in four spectral bands: two in visible light (green 0.5-0.6 μ m, and red 0.6-0.7 μ m), and two in the near infrared (0.7-0.8 μ m, and 0.8-1.1 μ m). The reflectance is stored digitally in the form of pixels, which each correspond to the recording

from an area of approximately 80 \times 60 m. Each pixel area is therefore, represented by four different digital numbers, each representing one spectral band, and the total data set of the image is stored in four separate files.

(A) Image processing

The digital image data was analysed using the CHIPS 3.0 satellite-image processing software (Andersen *et al.* 1992), and the routines referred to below are therefore those of the CHIPS package.

(a) Rectification of the image

Due to perspective and view angle and irregular object plane (topography) the satellite image is delivered in a form without cartographic reference. Therefore, a geometrical rectification to the UTM map system has taken place. Due to the rather small scale maps (maximum scale 1:500,000), which are the only ones available for Southern Sudan, a first order polynomial has been used with a residual error of approximately 2 pixels. The image has been re-sampled with cubic convolution into 80 \times 80 m. pixels. A sub-image has been taken out covering 185.2 \times 149.6 km. with an upper left corner latitude and longitude of 5° 0' 5" N and 32° 10' 7" E. This rectangular shape is an approximation of the study area, which is completely covered by this sub-image with the exception of a narrow triangle along the lower part of the eastern side; due to the rotation in the geometric map transformation an area, which was lacking in the original satellite data is left blank here. This triangle unfortunately cuts off the

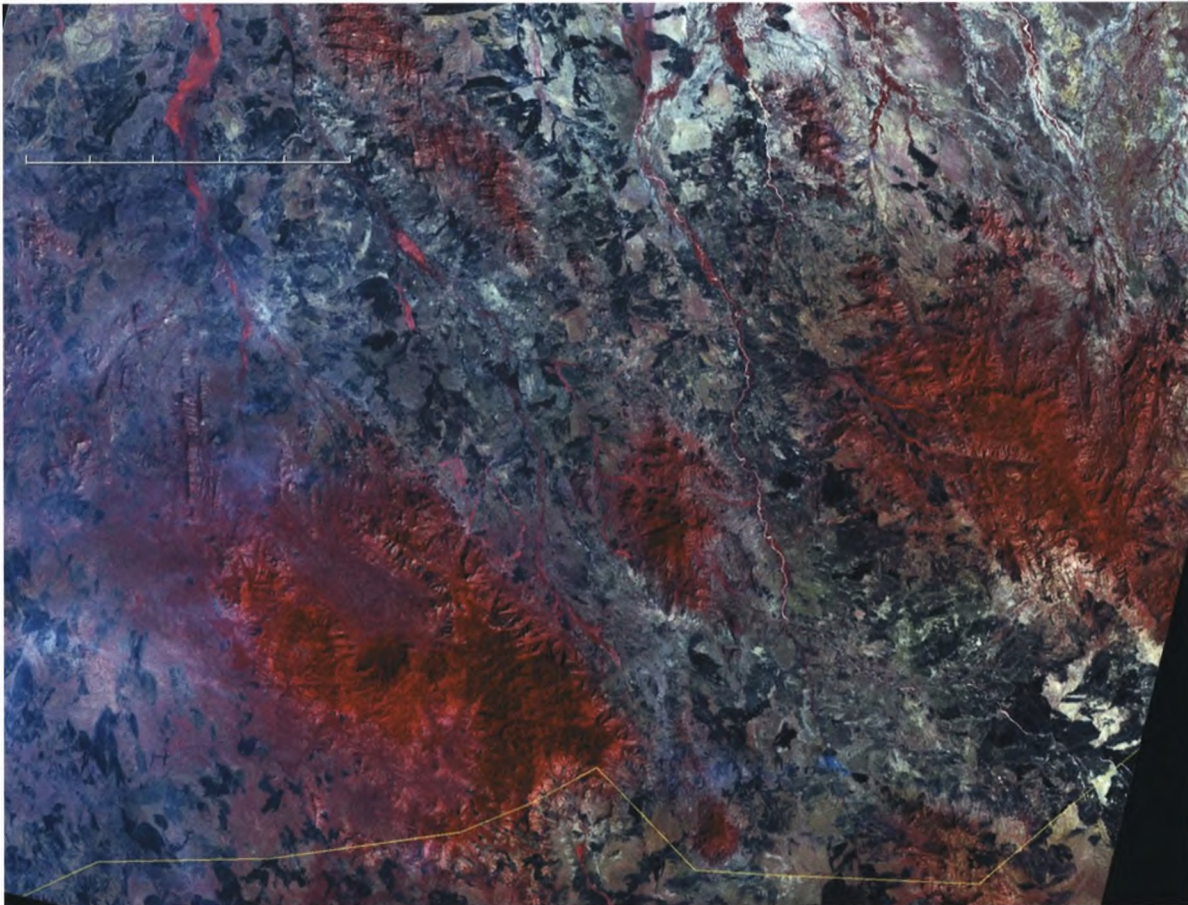


Fig. 5. Satellite image of the study area from the American satellite Landsat 2, recorded on the 23 of December 1975 at Landsat reference scene grid Path/Row 184/57. The data for the image are from the Multi-spectral Scanner System (MSS) which records light reflection from the Earth surface in the four spectral bands: 0.5-0.6 μm , 0.6-0.7 μm , 0.7-0.8 μm , and 0.8-1.1 μm . A geometrical rectification to the UTM map system has taken place. The image has been reassembled with cubic convolution into 80×80 m pixels, and a sub-image has been taken out covering 185.2×149.6 km. with an upper left corner latitude and longitude of $5^\circ 0' 5''$ N and $32^\circ 10' 7''$ E. The study area is almost completely covered by this sub-image, with the exception of a narrow triangle along the lower part of the eastern side which was lacking in the original satellite data and the southernmost part of the study area in Uganda. The blank triangle in the lower right hand side of the image unfortunately cuts off the extreme south-eastern part of the Didinga Mountains, with Mt. Lotuke. A standard Landsat MSS false colour composite image is reproduced, following a linear adjustment of the contrast in each channel. This image shows clearly the mountainous terrain, but the differences in land cover are not very clear. The yellow line in the lower part of the image shows the approximate position of the Sudan-Uganda border. The scale in the upper left hand part of the image is approximately 5×10 km. long.

extreme south-eastern part of the Didinga Mountains, and Mt. Lotuke is therefore not covered by this analysis.

The rectified satellite sub-image is shown in

Fig. 5 as a standard Landsat MSS false colour composite image, following a linear adjustment of the contrast in each channel. This image shows clearly the mountainous terrain, but

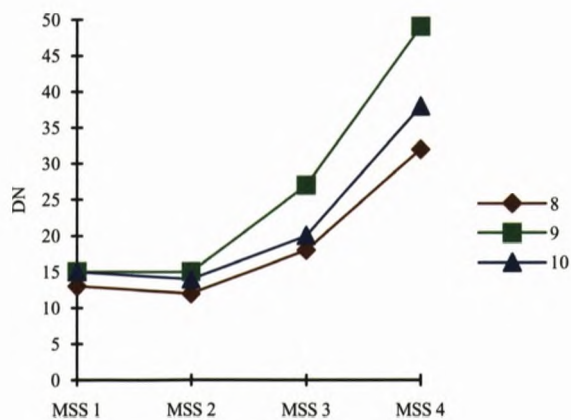
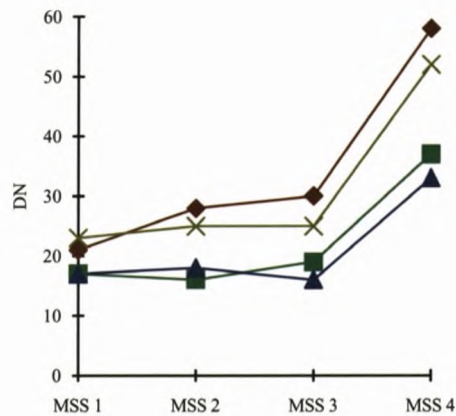
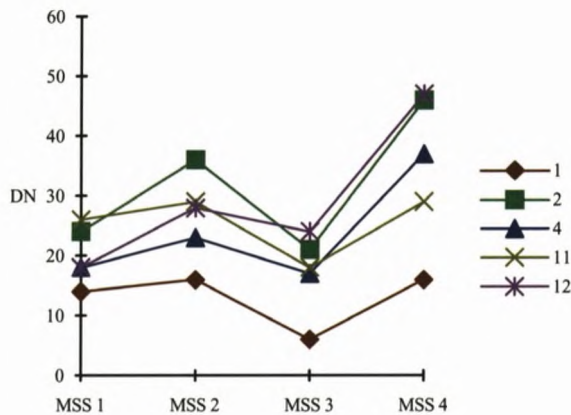


Fig. 6. Spectral behaviour of classes in the raw data of the satellite image in Fig. 5. The spectral distribution in the raw data of the land cover classes 3, 5, 6 and 7 and 8, 9, and 10 is shown on two graphs in order to illustrate their similarity in spectral properties. These land cover classes represent the majority of the vegetation. The classes 3-7 represent vegetation types in which the lower strata dominates (grassland, swamps, open bushland, light or dense woodland). The classes 8-10 represent various types of forest. As a general feature it can be seen that vegetation classes with increasing 'greenness' (i.e. photosynthetic activity) have higher differences between visible light (MSS 1-2) and infra-red (MSS3-4); this is due to the fact that vegetation absorbs solar radiation in the visible part of the spectrum for photosynthesis, and therefore has low reflectance in this area. DN: Digital number in the 8 bit data. MSS 1-4: Channel number.

differences in land cover, reflecting differences in the vegetation, are not very clear.

(b) Image analysis

For feature enhancement, the data has prior to classification undergone a Principal Component (PC) transformation using a co-variance matrix produced from the raw data. The application of Principal Component Analysis (PCA) is well known in satellite remote sensing (Jackson 1983). This is a multivariate statistical technique where the PCs represent linear transformations, using images data statistics to define a rotation of original image data in such a way that the new axes are orthogonal to each other and point in the direction of decreasing order of the variances. Compared to non-transformed multi-spectral data, which is inter-correlated, the transformed components are totally uncorrelated. Raw multi-spectral data possess a high degree of interrelation due to natural spectral correlation, topographic slope, and overlap of spectral sensitivities between adjacent spectral bands (Schowengerdt 1983).

The application of PCA produces output files (Principal Components; PCs) equivalent to the number of input files, which each represented one spectral band. However, the first PC will

represent the maximum contrast and variance, also known as the albedo or brightness. The second PC will normally represent greenness of vegetation (Kauth *et al.* 1979), while the rest are normally not directly related to specific land cover features. The PCs are totally uncorrelated, and hereby redundancy in the original data sets has been removed, while differences have been enhanced. Further, each PC will produce a maximum spread of the 8 bit (0-255 digital counts or digital numbers (DNs)) data range, which generally is not the case in the single spectral bands of the original data set. Fig. 6 shows the distribution of digital counts of the classes on the four bands (MSS1-4), and Fig. 7 shows the distribution of digital counts of the classes on the three first PCs. The result of a PCA analysis will produce a transformed data set, which statistically will have much higher potential for separability than the raw data. This can, however, in certain cases be a disadvantage in statistical terms, since too many classes may be produced (Belward *et al.* 1990). Thus, a smoothing filter has been applied to each of the PCs in order to decrease intervariance of classes. The filter used here is the median filter, which is known to have good edge preserving capability (Niblack 1985). The low-pass filtering-approach on raw data has been used successfully in a tropical forest study (Hill & Foody 1994), in order to enhance the separability of classes in the classification procedure, while in this case the relative more 'hard' median filter has been chosen due to the higher variance in this image, which apparently requires a 'harder' filter in the forest segment enhancement.

(c) Image classification

The image analysis and classification has been carried out as an interactive process (supervised classification of the land cover classes), where ground truth observations made by Friis & Vollesen (the observations on which this entire study is based) have been recognised in the im-

age as image-segments of known vegetation composition. These identified image-segments have then been used as the statistical training areas, for testing separability on the raw data-image and on the PCA-transformed image, and finally as statistical input to the classification-algorithm.

On the basis of the ground-truth information twelve land cover classes have been selected (Table 5). The numerical separation of the classes has been measured by the use of the Jeffries-Matusita separability measure (Niblack 1985). This is used to assess how well pairs of classes may be separated on the basis of their signatures (spectral band-values, or PCA-transformed band-values). The Jeffries-Matusita distance has an upper bound of 1.41, and a lower bound of 0. When the calculated distance is of maximum value the signatures can be characterised as totally separable. As indicated in Table 6, the classes in the PCA-transformed image are for the largest part totally separable with an overall separability of 1.40. Compared to this, the overall separability of the classes in the raw-data image was only 1.38 (Table 7), and separability problems are identified between the classes 8 and 10, representing types of woodland and forest.

The classification method has been the minimum distance algorithm, which is a well established classification method for satellite remote sensing data (Barrett & Curtis 1980; Schowengerdt 1983; Swain & Davis 1978). This method implies that a pixel is allocated to the class among those represented by the defined training areas to which it has the smallest distance in the feature-space, calculated by the Euclidean distance measure.

(3) Results and discussion

The results of the PCA and the image classification is shown in Fig. 8, on which the land cover

Table 5. Numbers and names of classes and their relation to observed vegetation types.

Class no.	Name	Comments and references to vegetation descriptions in Chapter IV
1	Fire-affected areas.	The class is not restricted to a specific vegetation type, but only visible in lowland areas. See discussions in IV.1.A and F.
2	Very open areas with (sandy?) soil exposed.	The class is not restricted to a specific vegetation type, but only visible in lowland areas; see discussions in IV.1.A, F and G.
3	Open areas with grass and cover of other low, green plants.	Seems to agree with several vegetation types dominated by low grass or herbal cover, e.g. fringes of IV.1.B and IV.1.I and N.
4	Light woodland or bushland.	Areas classified as this class is part of one of the most extensive areas of lowland vegetation; see discussions in IV.1.A, F and G.
5	Mosaic of dense woodland and closed lowland forest.	A seral stage in transition from woodland to closed lowland forest. See discussions in IV.1.A-E.
6	Other dense woodland.	Areas classified as this class is part of one of the most extensive areas of lowland vegetation;; see discussion in IV.1.A.
7	Swamp or other dense low green vegetation with much moisture, also including patches of montane grassland.	See discussion in IV.1.B. This class must represent the core areas of this vegetation type.
8	Conifer-dominated mountain forest.	This is part of one of the most extensive areas of montane vegetation, the montane forest dominated by <i>Podocarpus</i> ; see discussion in IV.3.A.e-g.
9	Evergreen montane forest.	This class surrounds the core areas of the montane forest and may represent more open stages than class no. 8; see discussion in IV.3.A.a-d & IV.3.B.a-d.
10	Dense montane forest.	Like class no. 9, this is part of the montane vegetation; see discussion in IV.3.A.
11	Areas with no or little vegetation.	See discussion in IV.1.A and IV.1.F.
12	Open scrub or lowland bamboo thicket, mixed with areas of bare rocks.	See discussion in IV.1.I-O.

Table 6. JM distance matrix for textural filtered PCA

	1	2	3	4	5	6	7	8	9	10	11	12
1	0.00											
2	1.41	0.00										
3	1.41	1.41	0.00									
4	1.41	1.41	1.41	0.00								
5	1.41	1.41	1.41	1.41	0.00							
6	1.41	1.41	1.34	1.41	1.41	0.00						
7	1.41	1.41	1.34	1.41	1.41	1.41	0.00					
8	1.41	1.41	1.41	1.41	1.39	1.41	1.41	0.00				
9	1.41	1.41	1.40	1.41	1.41	1.41	1.41	1.41	0.00			
10	1.41	1.41	1.41	1.41	1.29	1.40	1.41	1.15	1.40	0.00		
11	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	0.00	
12	1.41	1.41	1.35	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	0.00

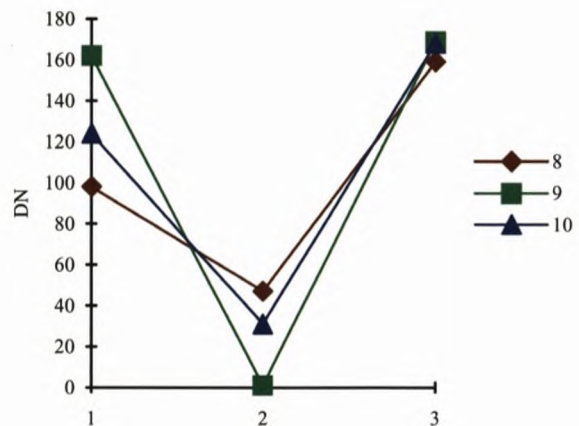
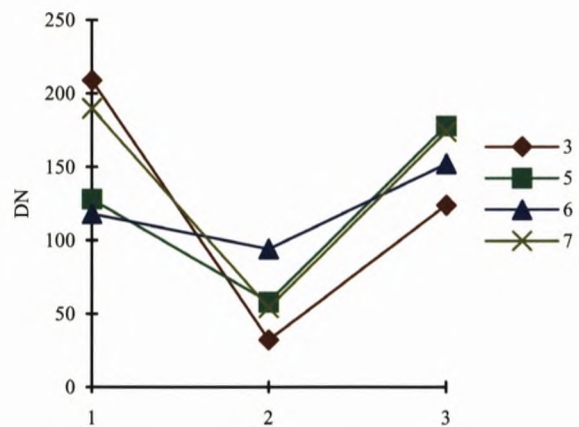
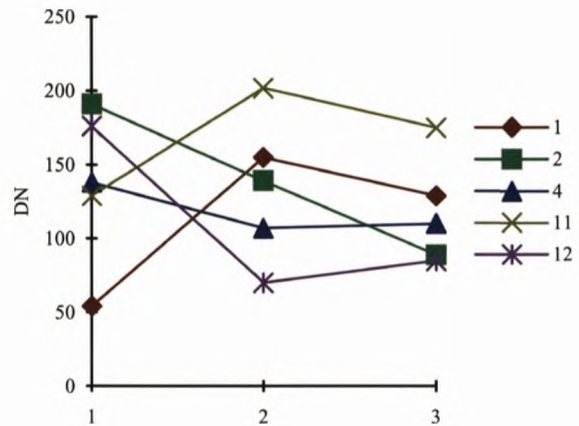
Overall class separability based on textural filtered PCA: 1.40

Fig. 7. Distribution of digital values for land cover classes in the three first PCs (PC 1, 2, and 3). These together contain 98% of the variance of the raw data. The first PC approximately represents the maximum contrast and variance, also known as the albedo or brightness. The second PC will normally represent greenness of vegetation, while the rest are normally not directly related to specific land cover features. Further, when compared with Fig. 6, this figure shows that separation between certain classes has been increased. DN: Digital number in the 8 bit data. 1, 2, and 3 on the X-axis represent PC 1, 2, and 3.

classes 1-12, defined as in Table 5, can be seen. Based on the distribution of digital values for the land cover classes it is possible to divide these 12 classes into three groups. The groups are the same for a classification based on the raw data (Fig. 5) and the data of the first three PCs (Fig. 6), although separation between certain classes has considerably increased in the latter.

The reflectance classes (from raw data) no. 1, 2, 4, 11 and 12 all represent open areas with none or only sparse occurrence of growing vegetation. They share a similar reflectance pattern with a relative high value in the visible band 2 compared to the infrared band 4, which indicates a general absence of growing vegetation. Classes no. 3 and 5-7 represent areas with moderate cover of growing vegetation; they have a reflectance pattern which can be subdivided as follows: classes no. 3 and 7 have higher reflectance compared to the more woody and shade-producing ground cover of classes no. 5 and 6. The spectral reflectance of classes no. 8-10 represents the most closed and tallest types of vegetation, such as forests and plantations, associated with a relative high primary production, and characterised by low reflectance in the visible area and high reflectance in the near infrared.

The absolute and relative areas of the 12 classes are indicated in Table 8. The largest class is no. 4, *Light woodland and bushland*, the smallest is no. 3, *Open areas with grass and cover*



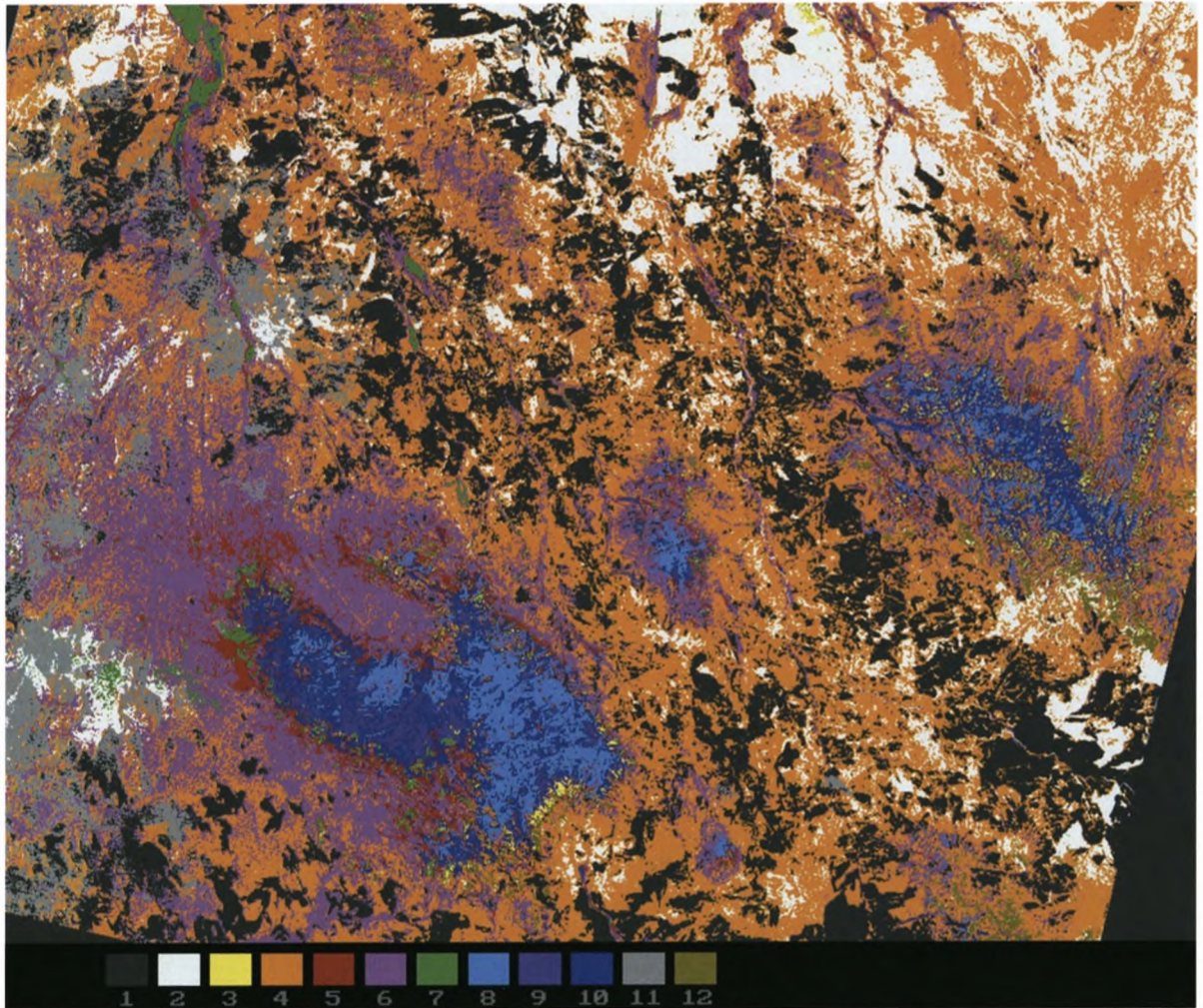


Fig. 8. Result of the analysis of the raw satellite image after Principal Component (PC) transformation, application of a smoothing filter to each of the PCs, and image analysis and classification (supervised classification of the land cover classes), as described in the text. The resulting classes have been interpreted as follows: (1) Fire-affected areas. (2) Very open areas with (sandy?) soil exposed. (3) Open areas with grass and cover of other low, green plants (very small areas, chiefly located on the south-eastern side of the Imatong Mountains in Uganda). (4) Light woodland or bushland. (5) Mosaic of dense woodland and closed lowland forest ("Transition from woodland to closed lowland forest."). (6) Other dense woodland. (7) Swamp or other dense low green vegetation with much moisture, also including patches of montane grassland. (8) Conifer-dominated mountain forest. (9) Evergreen montane forest. (10) Dense montane forest. (11) Areas with no or little vegetation. (12) Open scrub or lowland bamboo thicket, with a mixture of bare rocks.

of other low, green plants. Table 8 also indicates the fragmentation index of the 12 classes. The most coherent class is no. 9, *Evergreen montane forest*, restricted to the higher parts of the

mountain groups only; the most fragmented class is no. 4, *Light woodland and bushland*.

A few comments to the classes and some references to Chapter IV have been given in Table 5.

Table 7. JM distance matrix for raw images:

	1	2	3	4	5	6	7	8	9	10	11	12
1	0.00											
2	1.41	0.00										
3	1.41	1.40	0.00									
4	1.40	1.41	1.41	0.00								
5	1.41	1.41	1.41	1.39	0.00							
6	1.41	1.41	1.41	1.23	1.22	0.00						
7	1.41	1.41	1.24	1.39	1.41	1.41	0.00					
8	1.41	1.41	1.41	1.41	1.32	1.38	1.41	0.00				
9	1.41	1.41	1.41	1.41	1.41	1.41	1.37	1.39	0.00			
10	1.41	1.41	1.41	1.40	0.99	1.25	1.41	1.03	1.37	0.00		
11	1.40	1.39	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	0.00	
12	1.41	1.39	1.29	1.35	1.41	1.41	1.33	1.41	1.38	1.41	1.41	0.00

Overall class separability based on raw images classes: 1.38

(a) The burnt areas

The spectral properties of the landscape of southern Sudan and northern Uganda, which have been recorded by this sole cloud free Landsat MSS path/row 184/57 scene, is an expression of the conditions in the middle of the dry season, after numerous fires have occurred leaving a pattern of fire-scars. This means that the image will show distinctions between burnt and not-burnt areas, a distinction that does not necessarily reflect differences in vegetation during other seasons because of the accidental nature of the distribution of the fire-scars.

Areas in the image dominated by bush-fire residuals occur largely in zones in the lowland between the areas in the north-eastern part of the image and the denser woodlands further to the south-west; these areas are normally dominated by open grassland, open wooded grassland and bushland, and they are therefore likely to contain larger proportions of burnt grass in relation to other elements of the vegetation in comparison with areas, where the grass cover is only moderately dominant. The burnt areas are strongly absorbing the incoming radiation, producing a low emitting image-segment (class no. 1). Most likely some open lowland woodlands may also fall under this class, but

that particular variant of the class is mainly found to the south and west of the Imatong Mountains, and usually not very far from the massif. The fire-affected areas classified as class no. 1 make up 20.16% of the total study area.

(b) The areas with open vegetation cover

In contrast to these low emitting areas, high reflectance from the dry and presumably sandy areas are fairly dominant in the north eastern corner of the image (class no. 2); this class covers both open, semi desert-like grassland dominated by annual grasses, as well as very open wooded grassland. This class falls within the area covered by open bushland and dry thorn woodland. Its total area makes up 12.21% of the study area.

In the part of the image to the west and north of the Imatong Mountains are fairly extensive and scattered areas with high reflectance (class no. 11); these have here been interpreted as a mosaic of vegetation-less areas and woodland, probably often with exposed, flat rock faces. Such exposed, flat rocks are a much more common feature of the landscape in the region to the west of the Imatong Mountains than in the region to the and north east

Table 8. Absolute and relative size of the classes and their fragmentation index. For reasons of space, the names of the classes have in some cases been simplified in relation to Table 5.

Class no.	Class name	Area (sq.km.)	% of total area	Fragmentation index
1	Fire-affected areas	5584.43	20.16	0.21324
2	Very open areas with (sandy?) soil exposed	3382.32	12.21	0.19932
3	Open areas with grass and green low cover	91.99	0.33	0.10647
4	Light woodland and bushland	9812.19	35.42	0.39568
5	Mosaic of dense woodland and closed lowland forest	679.92	2.45	0.23261
6	Other dense woodland	4364.91	15.75	0.38464
7	Swamp or other dense low cover (grassland)	321.23	1.16	0.10655
8	Conifer-dominated mountain forest	685.45	2.47	0.13665
9	Evergreen mountain forest	303.71	1.10	0.09411
10	Dense montane forest	669.76	2.42	0.16425
11	Areas with little or no vegetation	1418.94	5.12	0.22952
12	Open scrub, woodland or bamboo with bare rocks	391.05	1.41	0.15929
Total		27705.92	100.00	

of the mountains. Class no. 11 makes up 5.12% of the study area.

Class no. 12 represents another open vegetation type, especially associated with the lower north-eastern slopes of the Imatong Mountains and the south-western slopes of the Didinga Mountains, and with a reflectance similar to that of light, open woodland or bushland (class no. 4; see further below), which is extremely widespread on the plains. Class no. 12 is here interpreted as representing an open scrub, probably with a mixture of bare rocks, and possibly also involving the *Oxytenanthera* bamboo belt, which does not otherwise show in this analysis. Class no. 12 makes up 1.41% of the study area.

(c) The areas with medium-dense vegetation cover

Classes no. 4 and no. 11 (dealt with above) form a transition from the open vegetation types to the next group, comprising classes no. 3 and 5-7. Certain small areas along the periphery of the three mountain groups with high reflectance (class no. 3; only 0.33% of the study area) are probably best interpreted as the rocky

slopes with thin grass cover, a vegetation characteristic of the steep middle slopes of the mountain massifs of the study area. These comparatively small areas are adjacent to class no. 12, interpreted above as open scrub with bare rocks.

Very extensive areas (classes no. 4, 35.42% of the study area, and class no. 6, 15.75% of the study area) have a reflectance which makes it possible to interpret the vegetation types as respectively open woodland or bushland (class no. 4) or various types of wooded grassland and moderately dense woodland (class no. 6), interpretations which agree with the known distribution of these vegetation types from the ground truths.

The distinction between class no. 4. (termed *Light woodland or bushland*) and class no. 6 (termed *Dense woodland*) probably agrees fairly well with the floristic distinction between the *Acacia*- and *Acacia-Commiphora*-dominated open vegetation types, most commonly distributed to the north east of the Imatong Mountains, and the more closed Sudanian woodland types occurring immediately around the mountain massifs and to the west of the Imatong Mountains. The woodland on bouldery soil so char-

acteristic of the lower slopes of the north east side of the Imatong Mountains would seem to fall under this class.

During the dry period most grasses have dried out in the dry lowlands, at least the parts of the grasses above ground. In statistical terms this facilitates the clear separation at the height of the dry season of photosynthetically inactive vegetation (woodland, wooded grassland, grassland and open deciduous bushland) on one hand and on the other hand photosynthetic active vegetation, which in most places will be swamps and moist valley-bottom grassland (class no. 7), or various types of forest (classes no. 8-10, to be discussed in the following section).

(d) Areas with dense vegetation cover

Generally, the separability of the various dense woody vegetation classes decreases when moisture is available, whereas separation is more clearly marked during the dry season. Yet, in the present case there are, even at the height of the dry season, problems with the separability between various forms of dense woodland covers and various forms of forest. The major problem has been to identify the small patches of closed moist lowland forest at the base of the Acholi Mountains (the Talanga, Lotti and Laboni Forests). Although these forests are up to 5 km. from one end to the other, the outline is much indented, and they integrate in our analyses with the surrounding woodlands.

The class no. 5 (2,45% of the study area) contains the areas where these forest patches are located, but the class covers a much more extensive area than what is actually occupied by closed lowland forest. Not surprisingly, also the dense fringing forests along the rivers running to the north from the mountain massifs can be separated as class no. 5. But it is surprising to note how extensive this class is to the north west and west of especially the Imatong Mountains.

It seems likely that many of the pixels recorded as class no. 5 represent areas with small patches of lowland forest surrounded by or mixed with woodland. Such areas have in the floristic and descriptive sections referred to as "Transition from woodland to closed lowland forest."

Also the forested habitats in the mountains have been very difficult to separate into classes with a result, which is easily comparable with the results of the direct observation. It appears that class no. 8 (2.47% of the study area) contains a large element of coniferous forests, which would both answer to the *Podocarpus* forest, the *Albizia* forests, the *Hagenia-Hypericum* forests in the descriptive section, and the plantations of exotic conifers.

Classes no. 9 (1.10% of the study area) and 10 (2.42% of the study area) are separable in their reflectance pattern, but difficult to interpret meaningfully with regard to floristically defined vegetation types, and may represent fairly open and fairly closed forested mountain vegetation. The extensive and regularly burnt mountain grasslands with *Loudetia*, and the rather small mountain meadows at high altitudes in the Kipia area, show up very little or not at all in this analysis, but are most likely mainly found within class no. 9. The same must apply to the cultivated areas in the mountains, chiefly in the Didinga Mountains.

(e) Limitations

As appears from the above, the old Landsat MSS has its limitations. The combination of 80 x 60 m. resolution and the low radiometric and spectral resolution within the four bands, limits the number of vegetation classes, which can be separated. Attempts at separation of more than the 12 classes recognised in this study were linked with rapidly increasing uncertainties. Significantly more detailed satellite remote sensing analysis of the vegetation communities in this area can, however, be obtained

by an accurate geo-referenced fieldwork combined with a more sophisticated scanner system such as Landsat Thematic Mapper which has a ground resolution of 30 x 30 m. and additional infrared bands which facilitates vegeta-

tion separation. But this has to wait for ground truth observations, which will only be possible when the civil war of the region has been brought to an end.

IV. The Habitats and their Vegetation

The following review of the vegetation of the study area is a synthesis of information from the existing literature with observations made by the current authors. For the entire study area the published sources are mainly Harrison & Jackson (1958) and Langdale-Brown *et al.* (1964). For the Imatong Mountains group the published sources are chiefly Jackson (1956, p. 349-370), Jenkin *et al.* (1977) and Sommerlatte & Sommerlatte (1990). For the Dongotona and the Didinga Mountains information has been gathered from Jackson (1959 & 1951). Wherever relevant and possible, new observations made by the current authors during their four months of field work in and around the Imatong Mountains have been amalgamated with the information from the literature. Information from the herbarium material studied for the production of the catalogue that forms the main part of this publication, and from a few unpublished sources has also been incorporated. Every effort has been made to update the nomenclature of the floristic data, also in the cases where information has originated from previously published sources. It has nearly always been possible to locate the original herbarium material used for the floristic information given in the previously sources, for example Chipp (1929), Jackson (1956), Jenkin *et al.* (1977) and Sommerlatte & Sommerlatte (1990). The herbarium material used by the previous authors has been studied and the identification updated in the current text. A few examples will illustrate this: Jackson (1956, p. 350) referred to a species of ginger in the description of his vegetation type *lowland savannah woodland* using a preliminary name, *Amomum sp.*, but we have been able to identify this plants as *Aframomum alboviolaceum*, and we

therefore refer to it by the latter name when we present our compiled floristic description of the *lowland woodlands to the north west, west and south of the Imatong Mountains group*. Similar corrections have been made in connection with the numerous taxonomic or nomenclatural changes that have occurred in the flora. Another example will illustrate this: Jackson (1956, p. 350) has for an amaryllidaceous plant in the same habitat used a name based on a taxonomy that is no longer current, *Haemanthus filiflorus*, and we have therefore corrected it to *Scadoxus multiflorus* subsp. *multiflorus*. There is no direct reference system to these changes, but they can be documented with reference to the catalogue, and the detailed taxonomic index that covers both this chapter and the catalogue should be a help if one wants to identify earlier named with the ones used here. Authorities are not indicated; because of the agreement between the plant names in the catalogue and in the floristic description of the vegetation types, authorities have been omitted from all scientific names mentioned in the vegetation descriptions.

African vegetation, including the vegetation of the extratropical parts in South and North Africa, has usually been classified on physiognomy. There has in the past been wide disagreement concerning which characteristics of the plant cover to use for this classification, especially about the extent to which physiognomy should be combined with data from floristics and the environment, and finally how regional versus how continental an approach to take (White 1983, p. 39). Most authors writing qualitative descriptions of tropical African vegetation have accepted the ideas and terminology proposed by Greenway (1933) for East

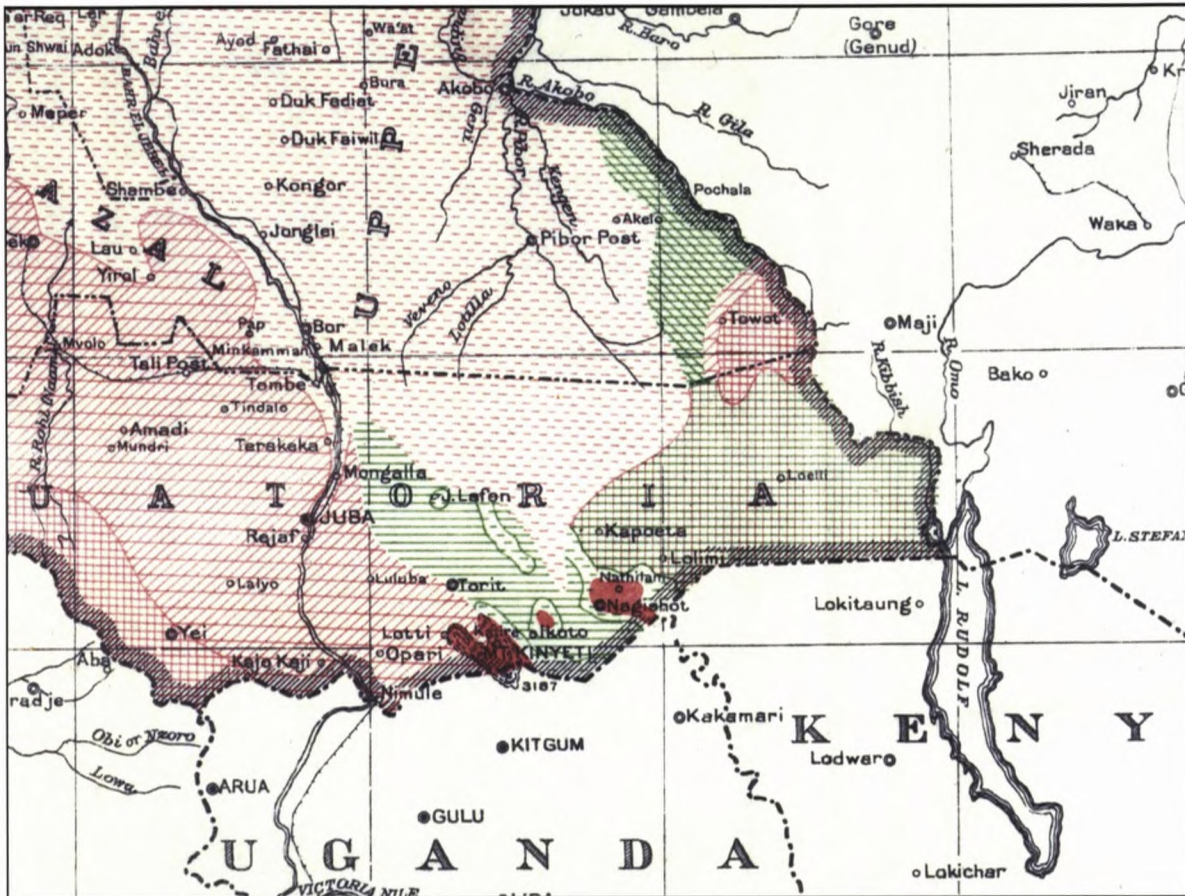
African vegetation types, although for many years this scheme circulated only in manuscript form and was only officially published much later (Greenway 1973). Greenway's system was accepted for the review of East African vegetation by Lind & Morrison (1974), and modified and extended to the whole of Africa by White (1983, p. 44-66). The system is simple and based on physiognomy of the vegetation; it has also the advantage that it agrees well with regional phytogeography based on floristics (White 1976, 1983, 1993). However, Greenway's system has not been much used for descriptions of the vegetation of the Sudan before relatively recently. One of the main reasons for this is the vegetation-map of the Sudan, using another non-hierarchical system, which was put forward by Harrison & Jackson (1958). The 1958-classification of Harrison & Jackson was the one accepted in the survey of the vegetation of the Sudan by Wickens (1976, p. 16-34). In a number of details regarding the study area, there are contradictions between the vegetation maps produced by Harrison & Jackson (1958), here reproduced as Fig. 9, and the vegetation map by White (1983), here reproduced as Fig. 10. For a detailed review of the differences, see the legend to Fig. 10. As appear from the descriptions of the vegetation types of the study area in this chapter, the current authors tend to agree with Harrison & Jackson (1958) where the major vegetation types immediately surrounding the Imatong Mountains are concerned. We do not see notable conflicts in the slightly varying terminology for the low plains in the northern part of the study area. However, one difference needs further attention: we have not personally studied the area, which Harrison & Jackson refer to as the *Toposa Area* of grassland and wooded grassland in the north-eastern and eastern part of the study area. White has referred to the vegetation of this area as *Acacia-Commiphora bushland* of So-

mali-Masai type. Due to lack of personal familiarity with the area, we are not able to decide which opinion is the correct one. We have from that part of the study area noticed a component of species shared with the Somalia-Masai floristic region (see further in chapter VI), but from the detailed description of the grasslands and wooded grasslands by Harrison & Jackson (1958) we are inclined to think that they have given a correct description of the physiognomy of the vegetation. From field work north of Lake Turkana and the Omo Valley in Ethiopia one of the authors (Ib Friis) has personal experience of extensive areas of grassland of considerable element of Somalia-Masai species.





The qualitative description of the vegetation in the study-area will in the following be classified mainly according to the system of Greenway (1973) and White (1983). The data have been extracted from the fundamental observations made by the early travellers, the detailed studies by Jackson (1950, 1951, 1956), Harrison & Jackson (1958), Jenkin *et al.* (1977) and Sommerlatte & Sommerlatte (1990) and supplemented with data from the catalogue of vascular plants in this work and the field observations of the current authors. Wherever possible, we have tried to compare the synthesis with the interpretation of the satellite image discussed in the previous chapter.

The main physiognomic vegetation types in the study-area are outlined in this classification, chiefly according to Sommerlatte & Sommerlatte (1990), but with observations by the current authors added:

- (1) Forests, with several tree strata in the closed canopy; lianas and epiphytes are fairly frequent; the ground cover consists mainly of forest herbs, while grasses are relatively rare, and if they exist, are specialised, broad-leaved forest species. This physiognomic type occurs from the low-



Woodland Savannah (high rainfall, laterite catena soils)

-  *Anogeissus-Khaya-Isobertinia* Deciduous Woodland
-  Woodland recently derived from rain forest
-  Flood Region
-  Montane vegetation

Woodland Savannah (low rainfall, on clay soils)



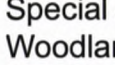

-  *Acacia seyal-Balanites* Savannah, alternating with grass areas
-  *Anogeissus-Combretum hartmannianum* Savannah Woodland
- Special area of Low Rainfall Woodland Savannah**
-  Toposa Area
-  Hill Catena

Fig. 9. Part of the map *Vegetation of Sudan*, accompanying Harrison & Jackson (1958), showing the section covering the study area. Reproduced with permission.

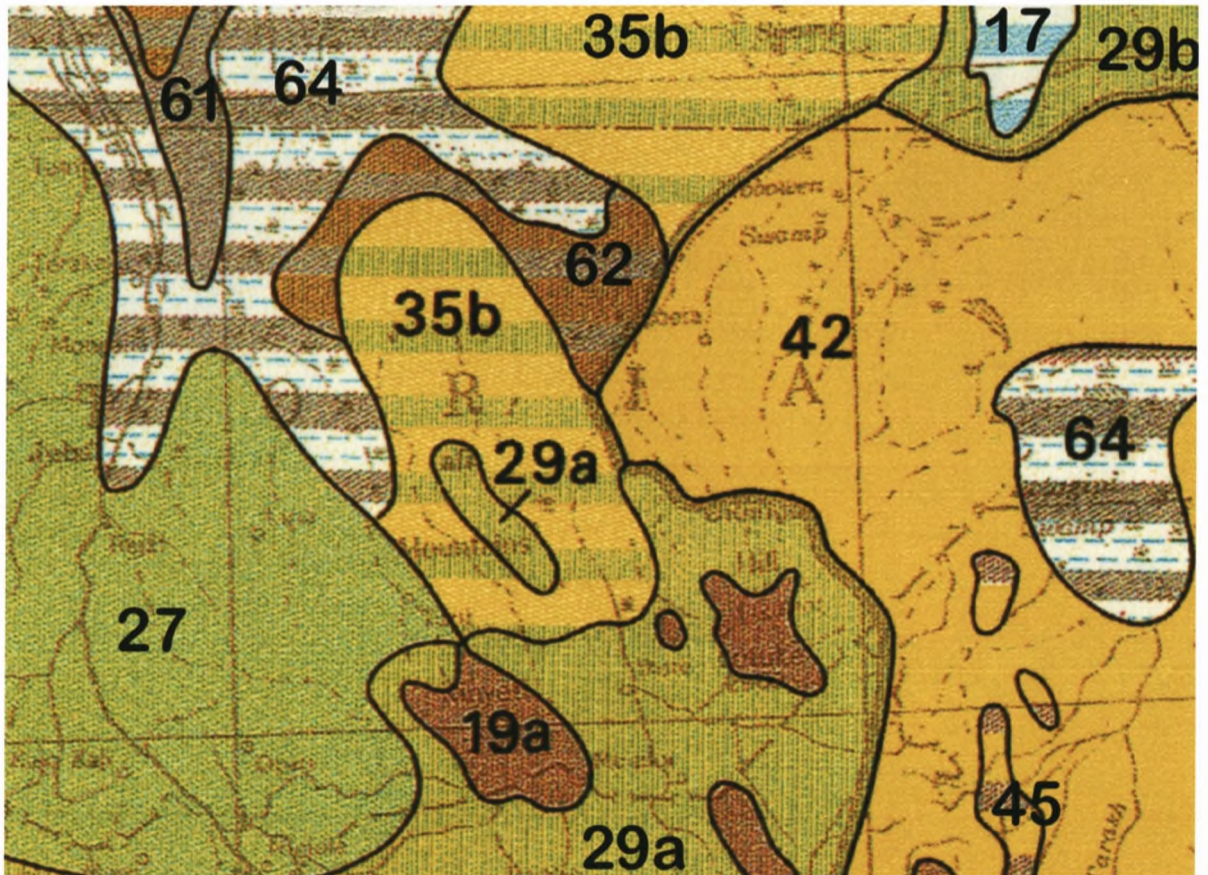


Fig. 10. Part of the map *Vegetation map of Africa* accompanying White (1983), showing the section covering the study area. Legend: 17. Cultivation and secondary grassland replacing upland and montane forest (African). 19a. Undifferentiated Afromontane vegetation. 27. Sudanian woodland with abundant *Isoberlinia*. 29a. Undifferentiated woodland, Sudanian type. 29b. Undifferentiated woodland, Ethiopian type. 35b. Transition from undifferentiated woodland to *Acacia deciduous* bushland and wooded grassland. 42. Somalia-Masai *Acacia-Commiphora deciduous* bushland and thicket. 45. Mosaic of East African evergreen bushland and secondary *Acacia* wooded grassland. 61. Edaphic grassland of the Upper Nile Basin. 62. Edaphic grassland mosaic with *Acacia* wooded grassland. 64. Edaphic grassland mosaic with semi-aquatic vegetation. A comparison of this vegetation map with that of Harrison and Jackson show a number of differences. The area between the Nile and the Imatong Mountains group which Harrison & Jackson refer to as *Anogeissus-Khaya-Isoberlinia Deciduous Woodland*, is by White classified as *Sudanian woodland with abundant Isoberlinia*. Neither term is fully appropriate, since no specimen of *Isoberlinia* has been documented to occur in the study area. White's *Undifferentiated woodland, Sudanian type* has no counterpart with Harrison & Jackson, but partly covers their *Acacia seyal-Balanites Savannah, alternating with grass areas*. Harrison & Jackson's mosaic of grasslands and wooded grasslands referred to as the *Toposa Area* is by White classified as *Acacia-Commiphora deciduous bushland and thicket* and referred to the Somalia-Masai region. Finally, White has subdivided Harrison & Jackson's *Flood Region* into a number of types or mosaics of grassland and wooded grassland. Reproduced with permission (UPO/D/A/2000-088).

land to just below the highest peaks of the mountains.

(2) Woodlands or wooded grasslands, usual-

ly with a single, open canopy of trees, sometimes also with a stratum of shrubs, and a ground cover dominated by

grasses. Lianas and epiphytes are not infrequent. Also this physiognomic type occurs from the lowland almost to the highest peaks of the mountains.

- (3) Bushland, with an open or closed stratum of shrubs, sometimes also interspaced with occasional trees, and with an open or closed herbaceous stratum on the ground. Grasses are frequent, and may be perennial or annual. Sommerlatte & Sommerlatte (1990) have distinguished between (1) bushland, which is normally deciduous, often dominated by species of the genera *Acacia* and *Commiphora*, and which occurs in the lowlands below the montane forests, and (2) scrubland, which is normally evergreen, dominated by Ericaceous shrubs, and which occurs above the montane forest. This distinction is not followed here, where the two types are referred to as (1) deciduous bushland in the lowlands and (2) evergreen bushland in the highest zones of the mountains. The secondary evergreen bushland, which is common in all three mountain massifs at altitudes between c. 1800 and 2200 m. a.s.l., could also formally be placed here. This vegetation type is, in agreement with the views of Jenkin *et al.* (1977) and Sommerlatte & Sommerlatte (1990), termed *Vernonia*-thicket.
- (4) Grasslands, with a closed ground cover dominated by perennial grasses or Cyperaceae, interspaced with usually very few trees or shrubs. This physiognomic type occurs also in the form of temporary or permanent wetlands or swamps, or in the form of dry grassland. This physiognomic type occurs in nearly all altitudinal zones, and, within each zone, in a range of habitats, varying from the driest to the most humid.

These physiognomic vegetation types are categorised in altitudinal zones according to their floristic distinctiveness. The zonation used in the current presentation has been slightly simplified from the zonation of the Imatong Mountains proposed by Jackson in his various publications, mainly Jackson (1956, p. 349), and the almost identical classification of the vegetation zones adopted by Jenkin *et al.* (1977) and Sommerlatte & Sommerlatte (1990):

- (1) Lowland vegetation.
This normally includes vegetation types up to an altitude of c. 1400 m., where transitional vegetation types may occur, and elsewhere up to c. 1800 m. a.s.l.
- (2) Transitional vegetation.
This includes the special vegetation types, which sporadically occur in the altitudinal transition zone between lowland and montane vegetation at altitudes between c. 1400 and c. 1800 m. a.s.l.
- (3) Montane vegetation.
 - (A) Lower montane vegetation (c. 1800-c. 2600 m. a.s.l.)
 - (B) Higher montane vegetation (c. 2600-c. 3000 m. a.s.l.)
- (4) Ericaceous vegetation (above c. 3000 m. a.s.l., but frequently descending to lower altitudes in places with stony or rocky soil).

Thus, the structure of the following account follows basically the zonation and successions outlined by Jackson (1956) and the physiognomic vegetation types of Sommerlatte & Sommerlatte (1990). Floristic details and comments based on the observations of the current authors have been added wherever it has been relevant or new information has become available.

Where additional floristic data based on the catalogue in this work has been added to the vegetation descriptions, emphasis has been giv-

en to information about the conditions in the Imatong Mountains group and the areas around it, with which the current authors have personal experience. Additional species records in the catalogue from the two other mountain groups, and particularly from the lowland areas to the east of the Didinga Mountains, have only rarely been added to the vegetation descriptions; they have normally been based on the published literature only.

(1) Lowland vegetation

This zone, reaching up to altitudes of between c. 1400 m. and c. 1800 m. a.s.l., includes the physiognomic types lowland forest, lowland woodland, lowland wooded grassland, lowland bushland, lowland grassland and a fairly large number of other vegetation types of limited extent, e.g. vegetation on almost bare rocks and swamp, riparian or riverine vegetation. It is followed upwards by transitional and montane vegetation types, chiefly transitional and montane forest, transitional and montane woodland, montane evergreen bushland and montane grassland.

(A) Lowland woodlands dominant to the north-west, west and south of the Imatong Mountains group

To the north-west, west and south of the Imatong Mountains group and in the Kinyeti valley there are various types of woodland and a few remaining patches of closed forest. Fig. 11-13 show examples of lowlands woodland from the north-west of the Imatong Mountains.

Jackson (1956, p. 349-352) has simply referred to the woodlands north-west, west and south of the Imatong Mountains as *Savannah woodland* and described the dynamic balance between the woodland and the forests in this

area in a separate section on *Succession from savannah woodland to forest*.

Harrison & Jackson (1958) have classified the woodlands to the west and north-west of the Imatong Mountains and beyond the Nile as *Deciduous woodland savannah with high rainfall and laterite catena soils: Anogeissus-Khaya-Isobertia deciduous woodland*. The floristic characterisation is surprising, since there are no records of either *Anogeissus* or *Isobertia* in the area of this vegetation to the east of the Nile. In the classification of Greenway (1973) the vegetation would best be classified simply as woodland. Wickens (1976), who followed the general mapping of Harrison & Jackson, has chosen to simplify the name and refer to the vegetation as *Deciduous savannah woodlands on latosol*.

On the vegetation map of Africa by White (1981; 1983) the area between the Nile and a narrow zone surrounding the Lafit and Imatong Mountains has been classified as his mapping unit no. 27, *Sudanian woodland with abundant Isobertia*. As suggested above, this is an unfortunate characterisation of this vegetation type, since no species of *Isobertia* has been observed from the Equatoria Province to the east of the Nile, and we have added no record of *Isobertia* in the catalogue of species in this work. Further to the east of the area classified as *Sudanian woodland with abundant Isobertia*, White (1981; 1983) has classified the lowland vegetation around the Imatong Mountains group and as far east as just to the east of the Didinga Mountains as his mapping unit no. 29a, *Sudanian undifferentiated woodland*, which also has an isolated occurrence on and around the Lafit Mountains. From the description of the mapping units it would, however, seem more reasonable to classify the entire vegetation of this part of the study area as far as the Nile as White's mapping unit no. 29a, *Sudanian undifferentiated woodland*. According to White (1983, p. 106) the unit no. 29a in south-eastern Sudan is "probably a floristically rich woodland

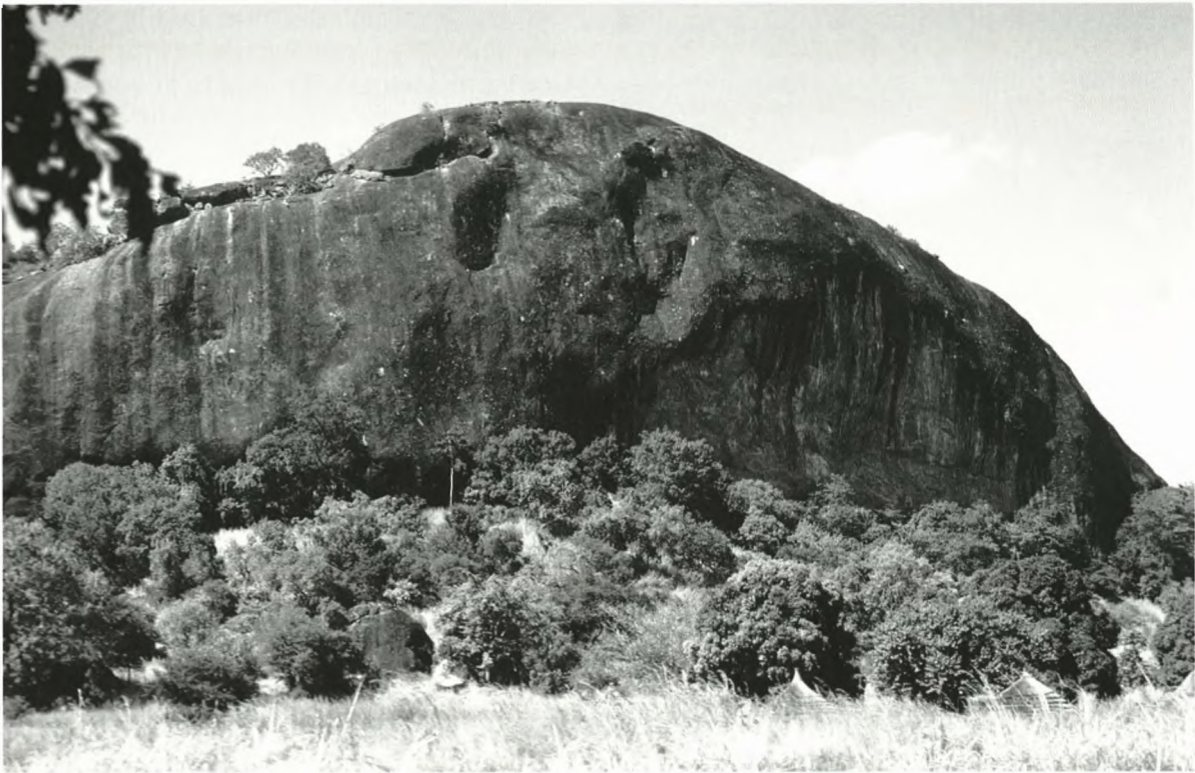


Fig. 11. Granite outcrop between Torit and Juba in the woodlands north-west of the Imatong Mountains group. On the scree slope below the rock there is woodland associated with catena formation, as described in the text under (1.A) *Lowland woodlands dominant to the north-west, west and south of the Imatong Mountains group*. Among the tall grass in the foreground a few thatched huts. Late rainy season aspect. Photograph: I. Friis. November 1980. Scanned from 24 × 36 colour diapositive.

in which *Isobertinia* was either absent, or, in the wetter part, was of local occurrence and confined there to rocky hills. Nearly everywhere, however, the land is heavily cultivated or has been in the past.”

Sommerlatte & Sommerlatte (1990) have specified the floristic characterisation of the association as simply *Albizia-Terminalia* woodlands, and indeed *Albizia zygia* and *Terminalia glaucescens* are among the most frequent trees in the woodlands.

The woodland areas dealt with here have in our satellite-image analyses been identified as belonging to class no. 5, *Mosaic of dense woodland and closed lowland forest ...*, no. 6, *Other*

dense woodland, and no. 4, *Light woodland or bushland* (see below for a more detailed discussion). In the area between the Nile and the Imatong Mountains group, there are within the woodland burnt areas and areas with little or no vegetation. The burnt areas (class no. 1) are probably woodland areas where, due to the late time of the year – the image was recorded in December – the ground biomass has been burnt, leaving fire scars. (Surprisingly enough, there are more extensive areas with burnt vegetation in the eastern part of the image, where the easily inflammable biomass per area unit should be less than in (A)). The areas with little vegetation traced in the image (class no.



Fig. 12. Clump of the lowland bamboo, *Oxytenanthera abyssinica*, in the woodland north-west of the Imatong Mountains. Vegetation with lowland bamboo is described in the text under (1.A) *Lowland woodland ...* and (1.N) *Oxytenanthera bamboo belt*. Dry season aspect. Photograph: I. Friis. March 1982. Scanned from 24 × 36 colour diapositive.

2) may be due to the fact that the woodland here is interrupted by rocky outcrops and flat exposed rocks. According to our field observations, there seems to be no sharp floristic boundary in the woodlands from the Nile to the Imatong Mountains group, and most of the woodland, which surrounds the other mountain massifs, is also closely related to this with regard to floristic composition.

It would, according to our satellite-image analyses and the fact that no species of *Isob-*

linia has been found in the study area, seem most sensible to refer the whole area from the Nile to the Imatong Mountains group, and also zones around the other mountains, to White's mapping unit no. 29a, *Sudanian undifferentiated woodland*, rather than the western part of it to his mapping unit no. 27.

However, other areas further away from the mountain massifs are dominated by a lower and more open vegetation (see below under (F) *The dry plains with Acacia- and Acacia-Commiphora bushland to the north-east of the Imatong Mountains group and towards the Dongotona Mountains group*), and such areas are probably incorrectly referred to as woodland by White. They would rather seem to belong to western outposts of White's mapping unit no. 42, *Somalia-Masai Acacia-Commiphora deciduous bushland and thicket*, or as a transition zone between units no. 29a and 42. In fact, to the north of the Imatong and the Dongotona Mountains, to the north-west of the Didinga Mountains, and in a broad belt surrounding the Lafit Mountains, White has classified the vegetation as a transition zone, which equals his mapping unit no. 35b, *The transition from undifferentiated Ethiopian woodland to Acacia deciduous bushland and wooded grassland*. If we accept the concept of a transition zone between Sudanian woodland and the Somalia-Masai *Acacia-Commiphora* deciduous bushland, we are, however, left with the problem that we cannot distinguish between the transition zone and the Somalia-Masai *Acacia-Commiphora* deciduous bushland in our satellite-image analyses; all areas to the east of the Imatong Mountains, except for the woodlands surrounding the mountain massifs, would appear to be basically one mapping unit.

Considerable areas of the woodlands to the west of the Imatong Mountains are by Jackson (1956, p. 347, 349, 351-352) believed to have been derived from closed forest, the assumed climax vegetation of the area, and Jackson has even stated:



Fig. 13. Dense woodland in the wide lowermost part of the Kinyeti Vally, seen from the rocky slopes above Talanga Forest, Imatong Mountains group. Vegetation like the one shown in the illustration is described in the text under (1.A) *Lowland woodlands dominant to the north-west, west and south of the Imatong Mountains group*. Late rainy season aspect. Photograph: I. Friis. December 1980. Scanned from 24 × 36 colour diapositive.

Apart from this area [the Zoka Forest in Uganda] there is little closed forest today between Budongo [forest in western Uganda, 250 km. to the south of the lowland forests patches near the Imatong Mountains group] and the Imatongs but there are considerable areas of savannah woodland which appear to have been derived from rain forest at a comparatively recent date, and it appears quite probable that all these forest areas are remnants of a great belt of forest which joined up with the Ituri forest of the Congo (Jackson 1956, p. 371).

The chief reason for this view is (Jackson 1956, p. 349) that if protected from the regular fires,

the woodlands are colonised by pioneer species of the forest flora. Jackson (1956, p. 355) has also argued against the theory of some authors (*e.g.* Smith 1949) that the isolated patches of lowland forest (*e.g.* Talanga, Lotti and Laboni) in the woodlands do not represent the climatic climax, but owe their existence to additional supplies of water produced by the topography of their sites. Jackson presents the argument that lowland forest occurs on flat land several hundred meters away from the nearest stream.

In his hypothetical reconstruction of the vegetation of the Sudan approximately 10,000 years BP, Wickens (1976, p. 59, Fig. 24) has shown this entire area as lowland forest, a view

that agrees with and is partly based on the above mentioned observations and views of Jackson. Wickens assumed that the precipitation at the time of his reconstruction was slightly higher than now.

The current authors would like to suggest that an even more probable alternative might be a combination of the views of Smith (1949) and Jackson (1956), this would involve that a mosaic of closed forest and woodland might represent the climax vegetation, at least when the large areas to the west and south-west of the Imatong Mountains group are considered. Within our class no. 5, *Mosaic of dense woodland and closed lowland forest ...*, which forms a fringe rather narrowly surrounding the entire western part of the Imatong Mountains, it seems likely that the balance can easily be shifted between woodland and forest, but it seems unlikely that this process would progress equally far from woodland towards forest in all topographical positions.

A list of species found in the woodlands has been compiled, partly from Jackson (1956, p. 349-351), Jenkin *et al.* (1977, p. 61) and Sommerlatte & Sommerlatte (1990), partly based the field observations of the current authors and on the information in the catalogue of vascular plants in this work. This list includes the following larger trees, up to approximately 15 m. in height:

Acacia sieberiana var. *sieberiana* (local), *Azelia africana* (occasional), *Albizia zygia* (frequent), *Entada africana* (local), *Ficus glumosa* (local), *Lannea barteri* (occasional), *Lonchocarpus laxiflorus* (occasional, but more frequent as a small tree in the next size-category), *Terminalia schimperiana* (frequent), *Terminalia spinosa* (occasional) and *Vitex doniana* (frequent).

Smaller trees, generally 2-5 m. high: *Acacia gerrardii* var. *gerrardii* (local and rare), *Acacia hecatophylla*, *Acacia seyal* (common), *Andira inermis* (local), *Annona senegalensis* subsp. *senegalensis* (frequent), *Bridelia scleroneura* (common),

Combretum collinum subsp. *binderianum* (common), *Dombeya quinqueseta* (frequent), *Grewia mollis* (common), *Hymenocardia acida* (occasional), *Manilkara multinervis* subsp. *schweinfurthii*, *Maytenus senegalensis* (occasional), *Ozoroa insignis* subsp. *reticulata*, *Piliostigma thonningii* (frequent), *Psorospermum febrifugum* (occasional), *Sarcocephalus latifolius* (frequent), *Securidaca longipedunculata*, *Steganotaenia araliacea* (common), *Stereospermum kunthianum* (common), *Strychnos spinosa*, *Vangueria madagascariensis*, *Vernonia amygdalina* (occasional, locally frequent), *Vitellaria paradoxa* subsp. *nilotica* (rare) and *Ziziphus abyssinica* (occasional).

Shrubs: *Acalypha ornata* (occasional), *Catunaregam nilotica*, *Crossopteryx febrifuga*, *Euphorbia bongensis*, *Flueggea virosa* (frequent), *Gardenia ternifolia* subsp. *ternifolia* (occasional), *Oncoba spinosa* (rare), *Pavetta gardeniifolia* var. *gardeniifolia*, *Pseudomussaenda flava* (occasional), *Tinnea aethiopica* subsp. *aethiopica* and *Senna didymobotria*.

Climbers occur not infrequently in this woodland but most of the species seem to be rather local or relatively rare, e.g.: *Abrus canescens*, *Abrus schimperii* subsp. *schimperii*, *Ampelocissus africana*, *Ampelocissus bombycina*, *Aristolochia bracteolata*, *Asparagus flagellaris*, *Asparagus racemosus*, *Chasmanthera dependens*, *Cyphostemma adenocaulis* subsp. *adenocaulis*, *Cyphostemma cyphopetalum* subsp. *cyphopetalum*, *Momordica foetida*, *Neorautanenia mitis*, *Opilia amentacea*, *Tinospora caffra* and *Zehneria thwaitesii*.

In areas with impeded drainage, there may be thickets of *Dichrostachys cinerea* (locally common).

In sheltered places, the large trees in the woodland may have the epiphyte *Platyserium elephantotis* growing on the larger branches.

As already pointed out by Jackson (1956, p. 350) the Sudanian woodlands and wooded grasslands are usually rather uniform floristically, only varying quantitatively with regard to the density of the trees and with some floristic

variation associated with rocky outcrops and rivers and swamps. Catena formation, as described from localities west of the Nile by Morrison *et al.* (1948), and in a general survey of East Africa by Lind & Morrison (1974, p. 166-187), occurs here and there in connection with the rocky outcrops and along the lower slopes of the Imatong Mountains group, but is not prominent (Jackson 1956, p. 350). With regard to species elsewhere associated with catena-formation, Jackson has observed that *Terminalia schimperiana* on the whole tends to grow on the lower part of the slopes between ridge-tops and in valley-bottoms, but it is far from confined to such sites. Pockets of soil in rocky sites at the upper, rocky and stony end of catenas or completely bare rocks of rocky outcrops have a characteristic vegetation with *Combretum molle* (frequent), *Pterocarpus lucens* (frequent) and *Strychnos innocua* (occasional). See also (I) *Bare rock faces of the lower dry hill-slopes ...*

On sandy soil in the Kinyeti Valley, *e.g.* south of Torit, the woodlands contain an element of the *Acacia-Commiphora* bushland that is dominating further to the east of the Imatong Mountains group. Some of the dry-habitat species from this area are: *Acacia nilotica* subsp. *subalata*, *Acacia schweinfurthii* var. *schweinfurthii*, *Balanites aegyptiaca*, *Commiphora africana* var. *africana*, *Capparis sepiaria* var. *fischeri*, *Capparis tomentosa*, *Dalbergia melanoxyton*, *Ficus dicranostyla*, *Grewia spp.*, *Maerua angolensis*, *Maerua oblongifolia*, *Maerua pseudopetalosa*, *Ormocarpum trichocarpum*, *Pseudocedrela kotschyi*, *Talinum cafrum* and *Talinum portulacifolium*, *Terminalia mollis*, *Vepris glomerata* var. *glabra*, *Zanthoxylum chalybeum* and *Ziziphus pubescens*. *Kalanchoe lanceolata* var. *lanceolata*, *Eulophia speciosa* and *Cyperus anemodorus* have been recorded from here.

This floristic similarity between the Kinyeti Valley and the dry deciduous wooded grasslands and bushland described later from the Koss Valley and the dry north-eastern hillsides

of the Imatong Mountains group, may be an argument in favour of recognising some kind of transition zone between the two vegetation types. See further about *Acacia-Commiphora* bushland below under (F) *The dry plains with Acacia- and Acacia-Commiphora bushland to the north-east of the Imatong Mountains group and towards the Dongotona Mountains group.*

Areas dominated by the bamboo *Oxytenanthera abyssinica* has by Jackson (1956, p. 351) been included with the Sudanian woodland type, but here this vegetation type is treated separately elsewhere as (N), *Oxytenanthera abyssinica bamboo belt*. It is the dominant vegetation type on the lower slopes of the Imatong Mountains group. The stands of bamboo are almost pure and cover quite wide areas, especially on the slopes of rocky hills, though the bamboo is not confined to such sites but occurs also in clumps in the plains and therefore a short mentioning of it is also made here. Jackson (1956, p. 351) has pointed out that analyses of soil from these extensive stands of *Oxytenanthera abyssinica* in the lowland differ little from the soil of the adjacent woodland, and he finds that the reasons why the bamboo occurs where it does are obscure. However, once the plants are established in a dense stand, a population of *Oxytenanthera abyssinica* seems highly competitive.

From near the Dongotona Mountains Jackson (1950) has reported various types of woodland up to an altitude of c. 1750 m. On deeper soil in the plains and in the foothills around the massif the woodland is dominated by species of *Combretum*, especially *Combretum collinum* subsp. *binderianum*, but also with *Annona senegalensis*, *Bridelia scleroneura*, *Dombeya quinqueseta*, *Psorospermum febrifugum*, *Stereospermum kunthianum*, *Strychnos innocua* and *Vitex doniana*. *Oxytenanthera abyssinica* is also frequent. The cycad *Encephalartos septentrionalis* is reported from rocks, and *Cussonia arborea* occurs, as on the Imatong Mountains, in transitional



Fig. 14. Middle part of the Kinyeti Valley, Imatong Mountains group, with sprouting tufts of grass after fire. The vegetation in the foreground of this illustration is described in the text under (2.B) *Transitional woodland and grassland (Combretum-Entada wooded grassland) of the Imatong Mountains* and in (3.A.a) *Rocky outcrops, Loudetia grassland and scattered woody vegetation of Protea*. Dry season aspect. Photograph: I. Friis. February 1982. Scanned from 24 × 36 colour diapositive.

woodland at altitudes above c. 1750 m. In places north-west of the mountains, near the town of Isoke, there is a moister type of woodland dominated by *Combretum collinum* subsp. *binderianum* and *Albizia zygia*. In drier places, particularly to the east of the Dongotona Mountains, the woodland may be dominated by *Albizia amara* subsp. *sericocephala* or by species of *Acacia* (see also (F) *The dry plains with Acacia- and Acacia-Commiphora bushland to the north-east of the Imatong Mountains group and towards the Dongotona Mountains group*). Still according to Jackson (1950), the lower slopes of the Dongotona Mountains with very thin layer

of soil has a woodland dominated by *Terminalia brownii*.

Seasonality

The appearance of the herbaceous stratum of the Sudanian undifferentiated woodlands in the study area is entirely dependent on the season. There are two completely different seasonal aspects, the differences between which do not entirely depend on the change between the dry and the rainy season, but also on the timing of the first grass fires after the begin-

ning of the dry season. The dry season aspect can in principle be subdivided into two phases, the first phase consisting of the time when the tall grasses are completely dry but before the first grass fire, the second phase after the grass has been burnt for the first time. According to Jackson (1956, p. 350), nearly all areas with grass have been burnt by December or January. The first phase of the dry season is therefore relatively short. The beginning of the rainy season aspect is basically dependent on the first rains, which according to Jackson (1956, p. 350) fall in March or April and is dividable into the early and the late rains, with the tall grasses developing during the late rains. Provided that the grass fires take place relatively early and that enough amounts of rain falls, the development of the two seasons will be fairly predictable.

Depending on the the species composition, the development of the vegetation may vary during the early rains. Certain frequently burnt areas are dominated by *Imperata cylindrica*, which comes into flower soon after the first burning of the grass. Jackson (1956, p. 350) points out that this species is especially common in places where cultivation has been practiced for many years. However, where *Imperata cylindrica* does not dominate it happens more frequently that there is no immediate new growth after a grass fire except for a few scattered sprouting herbs. In this case, most of the bare ground between the burnt tussock-bases of grass is covered with dark or white ashes, the plants themselves blackened, or only the lower parts of apparently dead, half burnt plant remain. As elsewhere in the Sudanian woodlands, the herbs that sprout through the ashes are nearly all geophytes with large storage organs in the shape of bulbs, corms or woody rhizomes, which may sometimes develop into massive root-stocks. The water stored in these underground parts enables the geophytes to produce leaves and flowers during the dry period.

None of the geophytic species that flowers during the dry period are dominant.

A list of the dry-season flowering geophytes, partly quoted from Jackson (1956, p. 350), partly based on the observations by the current authors, includes: *Amorphophallus abyssinicus*, *Clerodendrum umbellatum*, *Crinum distichum*, *Crinum macowanii*, *Crinum ornatum*, *Crotalaria chrysochlora*, *Crotalaria stenorhampha*, *Cyrtanthus sanguineus* subsp. *minor*, *Dicliptera pumila*, *Dipcadi viride*, *Drimia altissima*, *Eriospermum triphyllum*, *Eulophia cristata*, *Eulophia cuculata*, *Eulophia livingstoniana*, *Eulophia streptopetala* var. *streptopetala*, *Launaea nana*, *Pancratium tenuifolium*, *Scadoxus multiflorus* subsp. *multiflorus*, *Scutellaria schweinfurthii*, *Siphonochilus aethiopicus*, *Siphonochilus kirkii*, *Thunbergia battiscombei*, *Trichodesma physaloides* and *Vernonia pumila*. A number of other species that are less specialised geophytes may also flower after the fires: *Becium obovatum* subsp. *obovatum*, *Dyschoriste clinopodioides*, *Polygala erioptera* and *Ruellia prostrata*.

The plants that represent the main biomass of the vegetation are the tall grasses. A number of medium-sized species begin to sprout again after the early rains in March or April. Jackson (1956, p. 350) has reported that *Panicum maximum* and *Setaria sphacelata* (several varieties) are usually the most dominant of the early species, and they reach their maximum height of 1.5-2.5 m. in June and July. *Chloris gayana* occurs during the early rains on poorer soils. Jackson (1956, p. 350) has also reported on leaves of species of *Aframomum* developing between the sprouting grasses. Our studies have shown that it is mainly the leaves of the species *Aframomum alboviolaceum*, which may be prominent at this season. Other species than *Aframomum alboviolaceum* have also been observed to show different seasonal aspects for foliage and flowers, e.g. *Cissus cornifolia*, the flowers of which develop well before the leaves.

The very tall grass species of the late rainy season are according to Jackson (1956, p. 350)

Hyparrhenia cymbaria and *Pennisetum unisetum*, both of which may reach a height of up to 3 m., occasionally more. However, according to the observations of the current authors and the catalogue in this work there are quite a few other species of *Hyparrhenia* that are important in the lowland woodlands at the height of or late in the rainy season, e.g. *Hyparrhenia filipendula*, *Hyparrhenia diplandra* and *Hyparrhenia rufa*. According to Jackson (1956, p. 350), the latter species is mainly important on soil with a high clay content. Other grasses recorded at the height of the rainy season are *Cymbopogon giganteus* and, not so commonly, *Pennisetum purpureum*.

The herbaceous species that occur in the tall-grass grassland at this time of the year either have semi-woody stems with leaves clustered near the top, or are climbers with mainly herbaceous stem. We have supplemented the list of Jackson (1956, p. 350) of the herbs associated with the tall grasses with additional species: *Aneilema lanceolatum*, *Astripomoea malvacea*, *Bidens buchneri*, *Bulbine abyssinica*, *Chlorophytum andongense*, *Chlorophytum blepharophyllum*, *Chlorophytum gallabatense*, *Chlorophytum lancifolium*, *Chlorophytum micranthum*, *Chlorophytum subpetiolatum* var. *subpetiolatum*, *Chlorophytum tuberosum*, *Commelina forsskaolii*, *Commelina schweinfurthii*, *Crossandra subcaulis*, *Crotalaria comosa*, *Crotalaria goreensis*, *Crotalaria hyssopifolia*, *Crotalaria ochroleuca*, *Cyanotis caespitosa*, *Cyperus cuspidatus*, *Cyperus cyperoides* subsp. *cyperoides*, *Cyperus cyperoides* subsp. *flavus*, *Cyperus diffusus* subsp. *buchholzii*, *Cyphostemma junceum* subsp. *junceum*, *Desmodium velutinum*, *Diplolophium africanum*, *Dyschoriste nagchana*, *Echinops giganteus*, *Echinops longifolius*, *Eriosema flemingoides*, *Guizotia scabra*, *Indigofera garckeana*, *Kosteletzkyia grantii*, *Lantana viburnoides*, *Lantana trifolia*, *Plectranthus caninus*, *Pseudarthria hookeri*, *Psilotrichum elliotii*, *Scleria foliosa*, *Scleria racemosa*, *Tacca leontopetaloides*, *Tricliceras lobatum*, *Vernonia hochstetteri*, *Vernonia karaguensis*, *Vernonia purpurea*, *Vernonia smithi-*

ana, *Vernonia theophrastifolia*, *Wahlenbergia flexuosa* and *Wahlenbergia hirsuta*.

Climbers among the grass and in the trees are comparatively few and insignificant during the rainy season. The most frequent climbers are species of *Vigna*, e.g. *Vigna frutescens* subsp. *frutescens* var. *frutescens* and *Ipomoea*, e.g. *Ipomoea blepharophylla*, *Ipomoea ochracea*. They often also have tubers and represent the geophytic life-form. *Gloriosa superba* and *Jasminum streptopus* have been reported from this vegetation.

Locally, in somewhat shaded and damp, often disturbed places, there may be a thin grass-layer, often less than 20 cm. high. *Digitaria velutina* is a common grass in such places.

The most common grasses that develop into a dense grass cover on the rocky outcrops are *Hyparrhenia filipendula* or, on very stony or gravelly sites, *Loudetia arundinacea*. Other grasses are, according to Jackson (1956, p. 350-351) and our observations: *Brachiaria brizantha*, *Brachiaria comata*, *Brachiaria jubata*, *Chloris gayana*, *Chloris pilosa*, *Chloris pycnothrix*, *Panicum deustum*, etc.

(B) Lowland swamps, valley-bottom grassland and semi-aquatic vegetation

Jackson (1956, p. 351) has described how the streams in the lowlands of the study area are generally bordered by gallery forests (the fully developed gallery forests are to be described in the following section), but where the trees have been cut or where the moist conditions extend further away from the stream banks *Pennisetum purpureum* may be dominant, as it is around or in clearings in lowland forest. Often, there is a riparian fringe of *Acacia polyacantha* subsp. *campylacantha*, which develops a little above the level of the stream bed. In a few places in the southern part of the study area, *Acacia albida* has been recorded from similar habitats. A reed swamp along the stream bed

may be locally dominated by *Phragmites kar-ka*.

Grass swamps with stagnant water, often dominated by *Leersia hexandra*, *Oryza barthii* and *Setaria kagerensis*, may also be present in habitats referred to this vegetation type.

In some places, especially to the west and to the north west of the Imatong Mountains group, the lower part of the stream valleys become wide and flat, and the stream spread out to a swamp. An initial list by Jackson (1956, p. 351) has here been supplemented with our observations: *Mimosa pigra* is common or dominant on the stream banks in these habitats, while species of *Persicaria*, e.g. *Persicaria decipiens* and *P. setosula*, *Ludwigia octovalvis*, *Nymphaea lotus*, *Ottelia ulvifolia* and *Potamogeton octandrus* are found in the pools and swamps, and *Curculigo pilosa*, *Cyperus macrostachyos* subsp. *tremulus*, *Fuirena leptostachya*, *Fuirena umbellata*, *Hypophila auriculata*, *Murdannia simplex*, *Neohyptis paniculata* and *Rhynchospora corymbosa* are found in the surrounding moist grassland.

In some places there is a low woody riparian vegetation dominated by the tree *Cordia sinensis*.

Swamps and frequently flooded plains of these types are particularly characteristic of an area near the northern limit of the study area to the west of the Lafit Mountains. This area is physiognomically and floristically related to, or even part of what Harrison & Jackson (1958) have termed the *Flood region*, and it would fall under the two mapping units no. 62, *Edaphic grassland mosaic with Acacia wooded grassland*, or 64, *Edaphic grassland mosaics with semi-aquatic vegetation*, of White (1981, 1983). Large areas west of the Lafit Mountains are also very clearly discernible in the satellite-image analysis as class no. 7, *Swamp or other dense low green cover ...*

The swampy vegetation is not extensive enough in the Imatong Mountains group to have been discussed by Jenkin *et al.* (1977) or Sommerlatte & Sommerlatte (1990).

As mentioned above under (A), there is in the eastern part of the study area an area which stretches from the Didinga Mountains to beyond the northern edge of the study area. This is the main part of what Harrison & Jackson (1958) have indicated as the *Flood region*, and White (1981; 1983) as a combination of mapping unit no. 62, *Edaphic grassland mosaics with Acacia wooded grassland*, no. 64, *Edaphic grassland mosaics with semi-aquatic vegetation*, and no. 35b, *The transition from undifferentiated Ethiopian woodland to Acacia deciduous bushland and wooded grassland*. Our satellite-image analyses show these areas as dominated by class no. 7, *Swamp or other low green cover ...*, frequently supplemented with large areas of class no. 2, *Very open areas with (sandy?) soil exposed*, and no. 4, *Light woodland or bushland*. This agrees reasonably well with a broad interpretation of Harrison & Jackson's *Flood region* and White's units no. 62, no. 64 and no. 35b.

(C) Gallery forests of the lowland woodlands to the west of the Imatong Mountains group

Generally, the permanent or even some of the larger temporary streams in the lowlands are bordered with gallery forests, except where the trees have been cut for timber or for converting the land to cultivations. Near the Imatong Mountains group the gallery forests may be regarded as isolated and narrow patches of species-poor rain forest (Jackson 1956, p. 355). Apart from the three surviving patches of closed lowland forest the stream beds and their vicinity are the only places with sufficient moisture to preserve forest vegetation from drought and fire. The surviving gallery forests are now generally found in U-shaped valleys, which are not easy to cultivate. Jackson (1956, p. 356) has pointed out that, in addition to the extra supplies of ground water produced by the streams, the protection from fire afforded

by the steep slopes of the U-shaped valleys is an important factor in preserving these forests. The characteristic dominant species of the upper canopy stratum of the gallery forests are:

Cola gigantea, *Erythrophleum suaveolens*, *Khaya grandifoliola*, *Milicia excelsa*, *Phoenix reclinata* and *Syzygium guineense* subsp. *guineense*.

Species occurring in the lower strata include: *Erythrina excelsa*, *Ficus vallis-choudae*, *Lepisanthes senegalensis*, *Markhamia lutea*, *Pseudospondias microcarpa*, *Psydrax parviflora* subsp. *parviflora*, *Rauvolfia caffra*, *Senna petersiana*, *Trichilia prieuriana*, *Xylopia parviflora* and *Zanha golungensis*. Along the edge of gallery forest the small tree *Albizia coriaria* has been observed.

There is usually a dense shrub layer including: *Acalypha bipartita*, *Acalypha ornata*, *Clerodendrum capitatum*, *Leea guineensis* and *Capparis erythrocarpos*. From the forest floor of these riverine forests *Aframomum angustifolium*, *Aframomum luteoalbum* and *Cyperus renschii* have been recorded.

Among the lianas *Saba comorensis* var. *florida* is the most common, but a few other climbers have been observed, e.g.: *Adenia cissampeloides*, *Combretum capituliflorum* and *Entada wahlbergii*.

At the edge of gallery forest the shrub *Caloncoba crepiniana* is very common. Other shrubby species characteristic of forest edges are: *Byttneria catalpifolia*, *Glyphaea brevis* and *Harungana madagascariensis*.

Along the edge of the stream, the floating fern *Ceratopteris thalictroides* has been recorded.

Jackson (1950) has reported on gallery forest near the Dongotona Mountains, particularly to the north-west of the mountains, near Isoke, where a species from the closed lowland forest, *Milicia excelsa*, occurs along the streams.

In the Kinyeti Valley *Celtis toka* has been recorded along a temporary stream; it is an important species in the canopy of gallery forest in the dry parts of East and Northeast Tropical Africa. It is often associated with the small, shrubby *Ficus capraeifolia*, which has also been

recorded from riverine vegetation in the same general area.

The gallery forests of the lowland woodlands to the west of the Imatong Mountains group do not cover large enough areas to have been mapped separately by Harrison & Jackson (1958) or by White (1983). The vegetation is not discussed by Jenkin *et al.* (1977) or Sommerlatte & Sommerlatte (1990). No area with gallery forest seems to be prominent enough to appear in our satellite-image analyses, although some areas with class no. 5, *Mosaic of dense woodland and closed lowland forest*, may belong here.

(D) Transition from lowland woodland to lowland forest

The dynamic balance between lowland woodland and lowland forest can be seen in the areas around and to the west of the Imatong Mountains group; further to the east the climate is too dry to allow the development of closed forest, at least away from streams or permanent ground water. Jackson (1956, p. 347-348, 351-352) has described in detail how this balance can be pushed in the direction of woodland by man through regular burning and by shifting cultivation, and has proposed a succession through which the woodland can revert to forest. Sommerlatte & Sommerlatte (1990) have added observations of stages in this process. Jenkin *et al.* (1977, p. 63) have only a few notes about this succession under the title *Khaya-Cola* low forest. Jackson (1956, p. 351) has described in detail how the regeneration may take place by a gradual shading out of the woodland species:

There are generally numbers of stumps remaining among the cultivation, and the coppice growth from these begins the succession; however, when the land has been very

intensively cultivated, or when cultivation has gone on for too long, these stumps are also killed and subsequent recolonization [by forest trees] is slow. This can be observed in the area where the Acholi [tribes] were settled [on the slopes of the Imatong Mountains group] to avoid sleeping sickness. The first trees to return are characteristically [the woodland species] *Acacia hockii* [Jackson has *Acacia seyal* var. *multijuga*], *Lonchocarpus laxiflorus* and *Combretum collinum* subsp. *binderianum* [Jackson has *Combretum binderianum*], followed by the two main species involved in the succession to closed forest, *Terminalia schimperiana* and *Albizia zygia*. Both of these species, which are relatively fire resistant but grow to a height of 10 to 15 m. and have fairly dense, widespreading crowns. Groups of these trees will, despite annual fires, gradually close up until the crowns of the trees touch and their shade begins to weaken the growth of the tall savannah grasses. Clumps of broad-leaved *Setaria* sp. [and other shade-tolerant grasses] begin to appear, and as the savannah grasses are weakened the effect of fire is also gradually reduced until these groups of trees become practically fire-resistant, except to unusually late, fierce fires. The savannah grasses are then finally shaded out and replaced by *Setaria* sp. and *Oplismenus hirtellus*, associated with slender shrubs such as *Acalypha ornata*, *Pseudomussaenda flava*, and *Psychotria* spp. Numerous lianas (*Paullinia pinnata*, *Cardiospermum halicacabum* [probably *Cardiospermum grandiflorum*], *Culcasia falcifolia* [Jackson has it as *Culcasia scandens*], *Saba comorensis* var. *florida* [Jackson has it as *Landophia comorensis* var. *florida*] and *Phyllanthus muellerianus* appear, and also the seedlings of the forest pioneers.

The most important pioneers of the lowland forest are *Bridelia ndellensis*, *Caloncoba crepiniana*, *Cola gigantea*, *Ficus exasperata*, and *Ficus sur*,

Khaya grandifoliola, *Margaritaria discoidea* var. *fagifolia*, *Milicia excelsa* and *Spathodea campanulata*. *Milicia* is, however, often protected and may persist as a large tree in farmland and is occasionally found as a coppice shoot from stumps in old cultivations. *Milicia* may thus persist through the whole cycle from forest through cultivations, woodland and back to closed forest again. The forest pioneers grow taller and stronger, and gradually their shade and the effect of the tangle of lianas kill off most of the woodland species. Some species, for example *Albizia zygia*, may continue to grow and persist in the forest as a tree up to 20 m. high, though it is usually restricted to a zone near the forest edge or in or around clearings and canopy gaps.

Jackson (1956, p. 352) has described how, according to his interpretation of the succession, *Khaya*, *Cola*, *Margaritaria* and *Milicia* become dominant in the upper canopy strata in the next stage of the forest regrowth. Some of the other pioneer species die out fairly soon but *Khaya* and *Milicia* may continue to grow for decades, and are reported to live for more than hundred years. These pioneers may grow to giant trees up to 50 m. high and 2 m. in diameter that can be found in the heart of the forest. However, they do not regenerate under such conditions. These rather persistent pioneer species are, in turn, followed by *Celtis zenkeri* and *Chrysophyllum albidum*, which, according to the opinion of Jackson (1956, p. 352), are the climax species in the lowland forests in this region.

Jackson (1956, p. 352) has also described how colonisation of woodland at the edge of existing forest follows a slightly different course. The tangle of shrubs and climbers at the forest edge advances into the woodland, and in addition to the species mentioned above *Harungana madagascariensis* and *Maesopsis eminii* appear as important forest pioneers. Jackson pointed out that the fruits of these

species are large and heavy, and hence less easily dispersed than those of the other species. This may be the reason why *Harungana* and *Maesopsis* do not normally occur far from existing primary or secondary forest. According to several observations by the current authors a dispersal by hornbills, at least for *Maesopsis*, seems likely. Although the species of hornbills involved in the dispersal are likely to fly quite some distance, they are likely to fly from forest patch to forest patch, rather than into the open woodland. Apart from these details, the succession is similar to that described above for woodland and old cultivation.

Jackson (1956, p. 352) has finally pointed out how, in open areas dominated by *Pennisetum purpureum*, *Acanthus pubescens* is the first forest pioneer species, followed by *Dombeya burgesiae*, but *Pennisetum* persists for many years, and in areas dominated by *Pennisetum* colonisation by the pioneer tree species of the forest is slow.

In our satellite-image analysis, we assume that transition from woodland to forest can take place in class no. 4 and particularly no. 5-6, but it is not possible to locate any specific areas, where this process is particularly in progress.

(E) Closed lowland forest (*Khaya* forest)

In the study area there are a few areas in which closed forest has survived. These areas are small, but have probably not been significantly larger during the time which has passed since the arrival of European observers about hundred years ago. The early pioneers make no mention of extensive lowland forests in the study area. The closed lowland forests were already reduced to their current size when Jackson (1956) made his studies in the Imatong Mountains. Their size was approximately unaltered when Jenkin *et al.* (1977, p. 63-64) made

their reviews for the Imatong Forestry Project, and when the current authors carried out their studies in 1980-1983, a period overlapping with the period when Sommerlatte & Sommerlatte (1990) prepared their book.

Jackson (1956, p. 352) argued in favour of a theory that the area of the closed lowland forests might be increasing, but this assumption seems not sufficiently to have taken the development in population pressure in the study area into account. The protected forests, *i.e.* the Talanga forest in the Kinyeti valley, and the Lotti and Laboni forests on the west side of the mountains, are the only areas with surviving extensive lowland forest in the study area.

The Talanga, Lotti and Laboni forests are very similar in floristic composition, as can be seen from the following list showing the distribution of the tree species. It should be noted that the Talanga forest is probably the best known floristically. The list does not include the species of the forest edges and species confined to swamps and swampy places. It includes the species from Dawkins's unpublished list (Dawkins 1954) and Jackson's list (Jackson 1956, p. 353-355, in which data from Dawkin's list have been incorporated), as well as additional data provided by Jenkin *et al.* (1977), the observations made by the current authors both in the field and from the work with the production of the catalogue in this work, as well as the records published by Sommerlatte & Sommerlatte (1990). The latter have termed this forest type *Khaya* forest after the tree *Khaya grandifoliola*, the most valuable timber tree in this kind of forest.

In agreement with the survey by Jackson (1956, p. 352), four main storeys can be distinguished in these forests as follows:

(i) The trees of the top canopy stratum, usually 30 to 50 m. high, generally with straight, relatively slender boles, often without branches for 20 to 25 m. Buttresses occur frequently on the trunks of the larger trees. This stratum is

often rather continuous and forms a canopy, but it may be discontinuous with the species appearing as emergents above stratum (ii). Sometimes specimens in this stratum have been disturbed by felling or windfall.

(ii) The trees of the second storey, from 15 to 30 m. high, are usually not as straight as the top canopy trees and are more copiously branched and have less tendency to form buttresses. This layer is usually not continuous, but may be so if the upper stratum is discontinuous.

(iii) A layer of evergreen shrubs, 4 to 6 m. high, mixed with a few small trees up to 8 or 10 m. high. This layer is usually rather dense and has numerous lianas and semi-scandent shrubs among it.

(iv) A usually sparse ground layer, which frequently may be completely absent. It consists of grasses and herbs, together with a few low shrubs, which rarely exceeds 1 m. in height.

The 30-50 m. tall canopy trees include: *Alstonia boonei* (Ta, Lo), *Antiaris toxicaria* subsp. *welwitschii* (Ta, Lo, La), *Canarium schweinfurthii* (Ta, Lo), *Casearia runssorica* (Lo), *Celtis mildbraedii* (Ta, Lo), *Celtis zenkeri* (Ta, Lo, La), *Chrysophyllum albidum* (Ta, Lo, La), *Chrysophyllum muerense* [Syn. *C. sp. nov.* of Jackson (1956)] (Ta, Lo, La), *Cola gigantea* (Ta, Lo, La), *Cordia africana* (Ta, Lo, La), *Cordia millenii* (Ta), *Dialium excelsum* (Lo), *Ekebergia capensis* (Ta, Lo), *Entandophragma angolense* (Ta, Lo), *Erythrophloeum suaveolens* (Ta, Lo, La), *Fagaropsis angolensis* (Lo), *Ficus mucuso* (Ta, Lo), *Khaya grandifoliola* (Ta, Lo, La), *Klainedoxa gabonensis* (Ta, Lo), *Majidea fosteri* (Ta, Lo, La), *Manilkara butugi* (Ta), *Mildbraediodendron excelsum* (Ta, Lo, La), *Milicia excelsa* (Ta, Lo, La), *Mimusops bagshawei* (Ta), *Parinari excelsa* (Ta, Lo), *Pouteria altissima* (Ta, Lo, La), *Pycnanthus angolensis* (Ta, Lo, La), *Ricinodendron heudelotii* subsp. *africanum* (Ta, Lo), *Schrebera golungensis* (Ta, Lo, La), *Trilepisium madagascariense* (Ta, Lo), and *Mimusops sp.* (Lo).

Medium sized trees of the second storey, ca.

15-30 m. tall: *Albizia glaberrima* (Lo), *Albizia grandibracteata* (Ta, Lo), *Antidesma membranaceum* (Ta), *Bersama abyssinica* (Ta, La), *Blighia unijugata* (Ta, Lo, La), *Blighia welwitschii* (Lo), *Cassia mannii* (La), *Cassipourea ruwenzoriensis* (Ta, Lo), *Celtis philippensis* (Ta, Lo, La), (Ta, Lo), *Craibia laurentii* (Ta, Lo), *Dracaena steudneri* (La), *Drypetes ugandensis* [in Jackson (1956) as *Drypetes sp. cfr. D. ugandensis*] (Ta, Lo), *Englerophytum oblanceolatum* (Ta, Lo), *Ficus cyathistipula* (Ta), *Ficus exasperata* (Ta), *Ficus saussureana* (Ta), *Ficus sur* (Ta, Lo), *Ficus thonningii* (Ta [La planted]), *Funtumia elastica* (Ta, Lo, La), *Garcinia buchananii* (Ta), *Glenniea africana* (Ta, Lo, La), *Irvingia gabonensis* (Ta, Lo), *Irvingia wombolu* (Ta), *Kigelia moosa* (Lo), *Lepisanthes senegalensis* (Ta, Lo, La), *Lychnodiscus cerospermus* (Ta, Lo), *Maesopsis eminii* (Ta), *Mimusops kummel* (Ta), *Morus mesozygia* (Ta, Lo, La), *Tetrapleura tetraptera* (Ta, Lo, La), *Myrianthus arboreus* (Ta, Lo), *Parkia filicoidea* (Ta, Lo), *Premna angolensis* (Ta, Lo), *Rauvolfia caffra* (Ta), *Strombosia grandifolia* (Ta, Lo, La), *Strychnos mitis* (Lo), *Suregada procera* (Ta), *Synsepalum brevipes* (Ta, Lo), *Tabernaemontana pachysiphon* (La), *Trichilia dregeana* (Ta, Lo), *Trichilia prieuriana* (Ta), *Vepris grandifolia* (Ta, Lo), *Vepris nobilis* (Ta, Lo), *Vitex ferruginea* subsp. *ferruginea* (Ta, Lo), *Vitex fischeri* (the most likely interpretation of Jackson's record from Ta and Lo, see systematic part), *Zanha golungensis* (Ta) and *Zanthoxylum sp.* (Ta, Lo).

Small trees under 15 m., shrubs and woody lianas include the following species: *Acacia kamerunensis* (Ta, Lo), *Acalypha acrogyna* (Ta, Lo), *Acalypha neptunica* (Ta, La, Lo), *Acalypha racemosa* (Ta, Lo), *Acanthus eminens* (Ta, Lo, La), *Agelaea pentagyna* (Ta, Lo), *Alchornea laxiflora* (Ta, Lo), *Allophylus macrobotrys* (Ta, Lo), *Argomuelleria macrophylla* (Ta, Lo, La), *Artabotrys monteiroae* (Ta), *Belonophora hypoglauca* (Lo, La), *Bridelia atroviridis* (Ta, Lo), *Byttneria catalpifolia* subsp. *africana* (Ta), *Caloncoba crepiniana* (Ta, Lo), *Calycosiphonia spathicalyx* (Lo, La),

Campylospermum bukobense (Ta, Lo), *Campylospermum densiflorum* (Ta, Lo, La), *Carpolobia goetzei* (Lo, La), *Chaetachme aristata* (Ta, Lo), *Clerodendrum capitatum* (Ta), *Clerodendrum schweinfurthii* (Ta), *Cnestis mildbraedii* (Lo), *Coffea canephora* (Ta, Lo, La), *Coffea liberica* (Ta), *Combretum* sp. cf. *C. tanaense* (Ta), *Connarus longistipitatus* (Ta, Lo), *Croton sylvaticus* (Ta, Lo), *Dichapetalum ugandense* (Ta), *Dovyalis macrocalyx* (Ta, Lo), *Dracaena fragrans* (Ta), *Ensete ventricosum* (Ta, Lo), *Entada rheedii* (Ta), *Ficus asperifolia* (Ta, Lo), *Ficus variifolia* (Ta), *Hippocratea* sp. (Ta, Lo), *Glyphaea brevis* (Ta), *Hugonia platysepala* (Ta, Lo), *Keetia gueinzii* (Ta), *Keetia zanzibarica* (Ta, La), *Lasiodiscus mildbraedii* (Ta, Lo), *Leptaulus daphnoides* (Lo), *Lindackeria schweinfurthii* (Lo), *Maerua duchesnei* (Ta, Lo), *Maesa welwitschii* (Ta), *Mallotus oppositifolius* (Lo), *Mendoncia gilgiana* (Ta), *Monanthotaxis ferruginea* (Lo), *Monodora angolensis* (Ta, Lo, La), *Mussaenda arcuata* (Ta), *Mussaenda erythrophylla* (Lo), *Ochna bracteosa* (Ta, Lo), *Olox gambecola* (Ta), *Oncinotis pontyi* (Lo), *Oxyanthus unilocularis* (Lo), *Pavetta incana* (Ta), *Pavetta molundensis* (Ta, La), *Peddiea fischeri* (Ta, Lo, La), *Phyllanthus limmuensis* (Ta), *Pisonia aculeata* (Ta), *Pyrenacantha sylvestris* (Ta, Lo), *Rinorea brachypetala* (Ta, Lo, La), *Rinorea ilicifolia* (Ta, Lo), *Rinorea oblongifolia* (Lo), *Ritchiea albersii* (Lo), *Rothmannia longiflora* (Ta, Lo, La), *Rothmannia urcelliformis* (Ta, Lo, La), *Rothmannia whitfieldii* (Ta), *Rourea thomsonii* (Lo, La), *Rytigynia umbellulata* (Ta), *Saba comorensis* var. *florida* (Ta), *Salacia cerasifera* (Ta), *Scutia myrtina* (Ta), *Tapura fischeri* (Ta), *Tetracera stuhlmanniana* (Ta, Lo), *Thunbergia vogeliana* (Lo, La), *Urera trinervis* (Lo), *Uvariopsis congoensis* (Ta, Lo), *Warneckea jasminoides* (Ta, Lo) and *Whitfieldia elongata* (Ta, Lo, La).

Tall herbs in the ground layer include: *Acalypha ornata* (Ta, Lo), *Asystasia gangetica* (Ta, Lo), *Mellera lobulata* (Ta, Lo), *Siphonochilus brachystemon* (La) and *Triumfetta cordifolia* (Ta, Lo).

The high-altitude epiphytes of the canopy are poorly known and may be few. The most prominent species is: *Platynerium elephantotis* (Ta). *Asplenium blastophorum* (Lo), *Asplenium dregeanum* (Ta, Lo), *Asplenium macrophlebium* (Lo) and *Davallia chaerophylloides* (Lo) have also been recorded.

Herbs on the forest-floor and herbaceous lianas and low-altitude epiphytes include: *Achyrospermum axillare* (Ta), *Achyrospermum parviflorum* (Ta), *Achyrospermum schimperii* (La), *Acroceras gabunense* (Ta), *Acroceras zizanoides* (Ta), *Adiantum patens* subsp. *oatesii* (Ta, Lo), *Adiantum philippense* (Ta), *Anchomanes difformis* (Ta), *Aneilema aequinoctiale* (Ta), *Aneilema beniniense* (Ta, Lo), *Asplenium inaequilaterale*, *Asplenium pumilum* (Ta), *Asystasia vogeliana* (Ta, Lo), *Barleria brownii* (Ta), *Basananthe hanningtoniana* (Ta), *Begonia eminii* (Ta, Lo), *Bolbitis acrostichoides* (Ta, Lo, La), *Brillantaisia lamium* (Ta), *Brillantaisia owariensis* (Ta, Lo), *Brillantaisia madagascariensis* (Ta, Lo), *Brillantaisia vogeliana* (Ta, La), *Cayratia debilis* (Lo), *Cayratia gracilis* (Ta, Lo), *Celosia trigyna* (Ta), *Centella asiatica* (Ta), *Chlorophytum lancifolium* (Ta, Lo), *Coccinia subsessiliflora* (Lo), *Commelina latifolia* (Ta), *Corymborkis corymbis* (Ta), *Cremaspora triflora* (Ta), *Cyathula prostrata* (Ta), *Cyclosorus tottus* (La), *Cyrtococcum chaetophorum* (Ta), *Desmodium adscendens* var. *robustum* (Ta), *Dicliptera maculata* (Ta), *Diplazium proliferum* (Ta, Lo), *Dissotis decumbens* (Ta), *Dolichos trilobus* subsp. *occidentalis* (Ta), *Dorstenia brownii* (Ta), *Dorstenia psilurus* (Ta), *Doryopteris concolor* (Ta, Lo), *Elytraria marginata* (Ta), *Epithema tenue* (Ta), *Floscopa africana* subsp. *petrophila* (Ta), *Geophila repens* (Ta), *Hillieria latifolia* (Ta, Lo), *Hymenocoleus hirsutus* (Ta), *Hymenocoleus neurodictyon* var. *orientalis* (Ta), *Jasminum pauciflorum* (Ta), *Jasminum schimperii* (Ta), *Justicia extensa* (Ta), *Justicia scandens* (Ta), *Lankesteria elegans* (Lo, La), *Laportea aestuans* (Ta), *Leptactina platyphylla* (Ta), *Lep-taspis zeylanica* (Ta, Lo), *Malaxis maclaudii* (Ta, Lo), *Melastomastrum capitatum* (Ta), *Menisorus*

pauciflorus (Ta), *Microlepia speluncae* (Ta, Lo, La), *Momordica cissoides* (Ta), *Monothecium aristatum* (Ta), *Nelsonia smithii* (Ta), *Nephrolepis undulata* (Ta, Lo, La), *Nervilia subintegra* (Ta), *Olyra latifolia* (Ta), *Oreacanthus sudanicus* (Ta), *Panicum brevifolium* (Ta), *Panicum comorense* (Ta, Lo), *Panicum issongense* (Ta), *Pellaea doniana* (Ta), *Piper guineense* (Ta), *Piper umbellatum* (Ta, Lo), *Peperomia molleri* (Ta), *Peponium vogelii* (Ta), *Pergularia daemia* (Ta), *Pneumatopteris afra* (Lo), *Pollia condensata* (Ta, Lo), *Pollia mannii* (Ta), *Polyspatha paniculata* (Ta, Lo), *Pseuderanthemum ludovicianum* (Ta, Lo), *Pseuderanthemum tunicatum* (Ta), *Psychotria peduncularis* var. *ciliato-stipulata* (Ta), *Psychotria schweinfurthii* (Ta, Lo, La), *Pteris atrovirens* (Ta, Lo), *Pteris catoptera* (Ta, Lo), *Pycnostachys batesii* (Ta), *Rhynchosia densiflora* subsp. *debilis* (Ta), *Rungia buettneri* (Ta), *Rungia grandis* (Ta, Lo), *Selaginella mittenii* (Ta), *Selaginella molliceps* (Ta), *Sida javensis* (Ta), *Stanfieldiella imperforata* var. *glabrisepala* (Ta), *Stellaria mannii* (Ta), *Stenandrium guineense* (Ta, Lo), *Streptocarpus elongatus* (Ta), *Streptogyna crinita* (Ta, Lo), *Tectaria gemmifera* (Ta, Lo, La), *Thonningia sanguinea* (Ta), *Tragia brevipes* (Ta), *Tragia tenuifolia* (Ta), *Tragia volubilis* (Ta), *Wissadula rostrata* (Ta).

Near streams the vegetation usually has a different composition. Certain species, which also occur away from streams, are rather more common near them: these include species which also occur as forest pioneers such as *Cola gigantea*, *Erythrophleum suaveolens*, *Khaya grandifoliola*, *Mimusops kummel* and *Myrianthus arboreus*.

Species found only near streams or in swampy places include: *Pseudospondias microcarpa*, *Syzygium guineense* subsp. *guineense*, *Erythrina excelsa*, *Cleistopholis patens*, *Macaranga schweinfurthii*, and *Euphorbia teke*.

In damp places in the forest *Marantochloa leucantha* is abundant in the ground layer; in places the stands of *Marantochloa* are mixed with *Trachypodium braunianum* and species of *Costus*, e.g. *Costus afer* (Ta) and *Costus dubius*

(Ta). Also in Talanga in swampy places there are locally pure stands of *Pandanus chiliocarpus*.

If the canopy of the closed forest becomes discontinuous, for instance by felling or because of windfalls, *Trema orientalis* is usually the first forest pioneer. It is mostly followed by a succession similar to the one described for colonisation at the forest margins and with succession from woodland to forest. Jackson (1956, p. 355) reports that areas in the forest where the trees have been felled over a larger area often have a very dense growth of herbaceous climbers and semi-woody herbs (*Momordica* sp., *Mucuna pruriens*, *Hibiscus calyphyllus*, *Plectranthus glandulosus*, *Triumfetta* spp.). Tree seedlings have difficulty in growing through this mass of creepers and herbs and the succession to forest is slow. Also Jenkin *et al.* (1977, p. 63) reports on dense thickets of climbers (*Paullinia pinnata*, *Cardiospermum halicacabum*, *Culcasia falcifolia*, *Saba comorense* var. *florida*), tangled shrubby herbs (*Phyllanthus muellerianus*) and forest grasses, through which the forest pioneer species (*Khaya grandifoliola*, *Cola gigantea*, *Bridelia ndellensis*, *Margaritaria discoidea* and *Spathodea campanulata*) grow (Jenkin *et al.* 1977, p. 63).

Along the edge of the forests or in clearings there are ground-living species that require light and tolerate dry periods, but cannot stand the regular grass fires in the surrounding woodlands; an example of this is *Sansevieria nilotica* (Ta).

Ceiba pentandra occurs as a tall tree in the canopy around clearings and swampy places (Ta). Nearly all the species in the genus *Ceiba* are indigenous in the New World; only *Ceiba pentandra* occurs widespread in the equatorial forest of the Old World, where it may have become naturalized. Also *Coffea arabica*, a species normally associated with higher altitudes, has become naturalized in the lowland forest (Ta). At the edge of the forest, *Gardenia vogelii* was recorded; this species is normally a woodland

plant. Elsewhere in the study area, *Gardenia vogelii* seems largely to be replaced by the more widespread *Gardenia ternifolia* subsp. *ternifolia*.

In the above, only the lowland forests on the Sudan side of the border has been dealt with. However, the records from the lower zones of the Agoro-Agu Forest Reserve by LWANGA (1996) have a species composition that shows resemblance with that of the Talanga, Lotti and Laboni forest, and it is therefore likely that lowland forests similar to those of the Sudan side have previously existed on the Uganda side of the Imatong Mountains.

Jackson (1956, p. 355) points out that the lowland forests of the Imatong Mountains group are in general similar to seral stages of Budongo forest, Uganda (Eggeling 1947). Dawkins (1954) regards Talanga forest in particular as being very immature, and Jackson agrees that much of that forest must have been colonised relatively recently. As mentioned above under (A), some writers do not agree with Jackson on this point and have argued that these forests do not represent the climatic climax of a succession from woodland but exist due to local additional supplies of water; this discussion has already been described above with the description of the woodlands under (A).

The Talanga, Lotti and Laboni closed lowland forests do not cover large enough areas to have been mapped as distinct unites by Harrison & Jackson (1958) or by White (1983). As mentioned above under (A), the three examples of closed lowland forest, Talanga, Lotti and Laboni, are not prominent enough to appear in our satellite-image analyses, but they are undoubtedly included in class no. 5, *Mosaic of dense woodland and closed forest ...*, which also covers woodland and regeneration stages of the closed forest described above under (D).

(F) The dry plains with *Acacia*- and *Acacia-Commiphora* bushland to the north-east of the Imatong Mountains group and towards the Dongotona and the Didinga Mountains groups

The plains north-east of the Imatong Mountains group, stretching around the Dongotona Mountains and towards the Didinga Mountains, have soils that consist of heavy clays soils (but close to the mountains covered by sand derived from the rocks at the foothills of the mountains, by Jackson 1956, p. 358, referred to as the detritus slope). The plains also have a lower rainfall than the other sides of the Imatong Mountains group (Jackson 1956, p. 358, and discussion of rainfall in II.1.A). The lower rainfall to the east of the Imatong Mountains is due to the general rainfall gradient with decreasing rainfall from west to east, but probably also due to a rain shadow effect caused by the mountains. The most extensive vegetation type on these soils is a dry thorn woodland with extensive areas of *Acacia* and *Acacia-Commiphora* open bushland. In places where there are temporary streams or in association with catenas around the rocky outcrops and at the foot of the mountains, this heavy soil is occasionally replaced with gravelly or sandy soils. Jackson (1956, p. 348 & 358) also points out that the cattle grazing of this area is more intense due to less tsetse fly attacks than in the woodlands to the west of the Imatongs. Fig. 15-16 show examples of the vegetation in the plains to the north-east and east of the Imatong Mountains.

This open vegetation is rich in species of *Acacia* and was studied near the Imatong Mountains by the two current authors. According to Harrison & Jackson (1958), who refer to it as *Woodland savannah (low rainfall on clay soils): Acacia seyal-Balanites savannah, alternating with grass areas* (this applies to the area away from the mountains; the areas near to the mountains are mapped as *Hill catena: Special areas of low rainfall woodland savannah*), and White

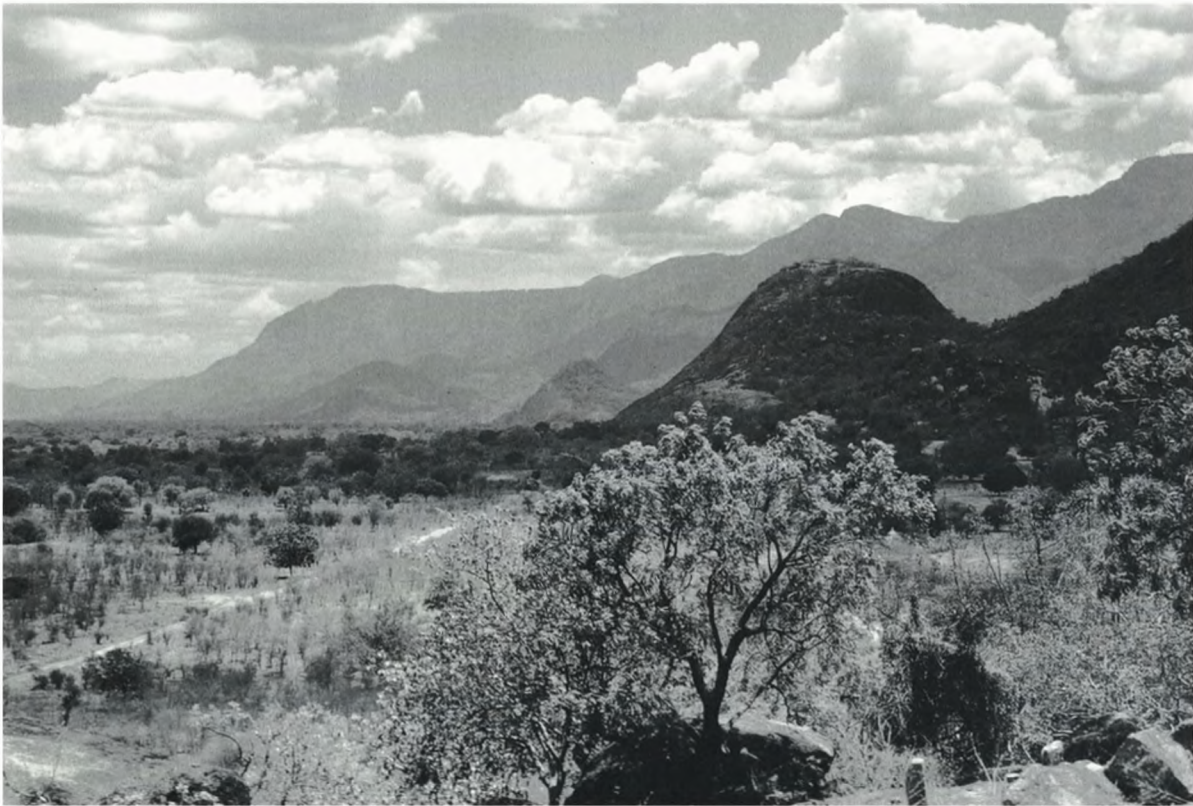


Fig. 15. The north-east facing side of the Imatong Mountains (in the strict sense), seen from the dry plains between the Imatong and the Dongotona Mountains. The woodland and bushland is described in the text under (1.F) *The dry plains with Acacia- and Acacia-Commiphora bushland to the north-east of the Imatong Mountains group and towards the Dongotona and Didinga Mountains groups*. Dry season aspect. Photograph: I. Friis. March 1982. Scanned from 24 × 36 colour diapositive.

(1983), who prefers to call it *Transition from undifferentiated woodland to Acacia deciduous bushland and wooded grassland* and indicate a slightly different distribution, this vegetation extends much further to the north and to the north-east, reaching approximately to the level of Mongalla in the Nile valley to the north and to the Didinga Mountains group to the north-east. The map by Wickens (1976, p. 17, Fig. 6) shows the area away from the mountains as covered with a vegetation termed *Thorn savanna on clay soil*. In his hypothetical reconstruction of the vegetation regions of the more humid Sudan approximately 10,000 years BP he

(Wickens 1976, p. 59, Fig. 24) has assumed that the area was then covered by a deciduous woodland and has indicated this entire area as *Deciduous savanna woodland on clay soils*.

Near the northern end of the Imatong Mountains group *Acacia hockii* [Jackson has it as *Acacia seyal* var. *multijuga*] is the dominant species, both according to Jackson (1956, p. 358) and our observations, but *Balanites aegyptiaca* and *Balanites rotundifolia* have also been observed as locally co-dominant species, especially on alluvial soils.

Further to the south, in the upper part of the Koss valley between the Imatong Mountains

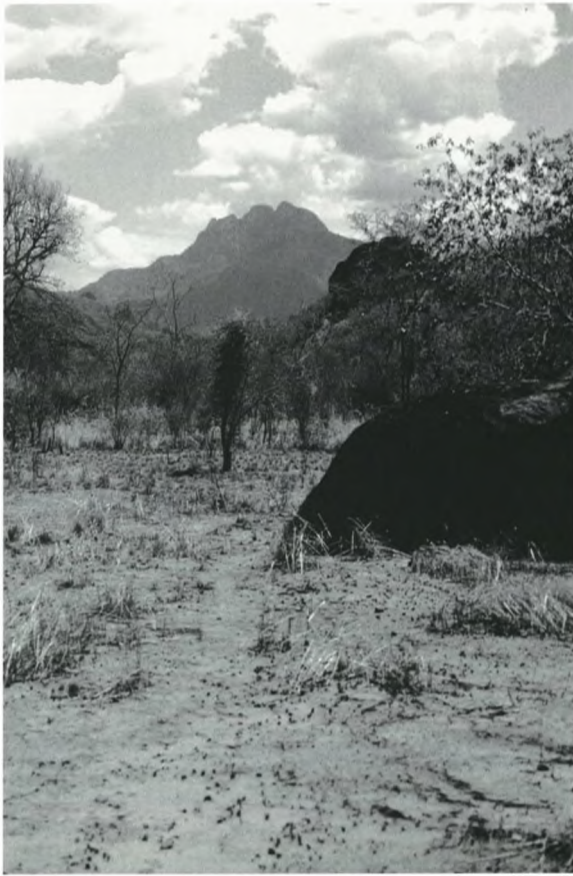


Fig. 16. Mt. Garia in the Imatong Mountains (in the strict sense), seen in the distance from the dry plains between the Imatong and the Dongotona Mountains. The vegetation in the foreground has been burnt some time ago, and small tufts of burnt grass and other plants are seen. The vegetation is described in the text under (1.F) *The dry plains with Acacia- and Acacia-Commiphora bushland to the north-east of the Imatong Mountains group and towards the Dongotona and Didinga Mountains groups*. Dry season aspect. Photograph: I. Friis. March 1984. Scanned from 24 × 36 colour diapositive.

group and the Dongotona Mountains group, Jackson (1956, p. 358) has reported that the thorn bushland is composed by the species listed here (and the list supplemented with data from the current authors):

Acacia mellifera, *Acacia nilotica* subsp. *subalata*, *Acacia oerfota*, *Acacia reficiens* subsp. *miser*, *Acacia*

senegal var. *senegal*, *Acacia tortilis* subsp. *raddiana*, *Adenium obesum*, *Albizia amara* subsp. *sericocephala*, *Berchemia discolor*, *Dalbergia melanoxylon*, *Dichrostachys cinerea*, *Ehretia braunii*, *Ehretia* sp. cf. *C. amoena* (both species of *Ehretia* were found on termite mounds), *Terminalia spinosa*, *Combretum aculeatum*, *Commiphora africana* and *Sclerocarya birrea* subsp. *birrea*.

In the shrub layer *Cadaba farinosa*, *Capparis fascicularis* var. *fascicularis*, *Maerua oblongifolia*, *Pavetta subcana* var. *longiflora* and *Psilanthus leroyi* occur.

Among the climbers are: *Abrus precatorius* subsp. *africanus*, *Adenia venenata* and *Tylosema fassoglensis* and among the herbs are *Kalanchoe glaucescens*. According to Harrison & Jackson (1958) this vegetation also dominates in the Kidepo valley, between the Dongotona Mountains group and the Didinga Mountains group.

Jackson (1950) lists *Acacia hockii* [Jackson has it as *Acacia seyal*], *Acacia senegal* and *Albizia amara* subsp. *sericocephala* as dominant in dry woodland to the east of the Dongotona Mountains, with large specimens of *Acacia tortilis*, *Acacia albida* and *Trichilia emetica* in places. *Trichilia emetica* must presumably have been seen in localities along temporary streams, as elsewhere in the study area.

In the entire area to the north east and east of the Imatong Mountains group there is a tendency for thickets of evergreen species to occur around termite mounds. In the clumps of semi-evergreen vegetation on the termite mounds, and elsewhere where the vegetation is dense, *Acacia brevispica* may occur as a scrambler; however, it has only been recorded with certainty south of the Imatong Mountains and around the Didinga Mountains in *Acacia-Terminalia* woodland.

Between the plains and the foot hills of the mountains there is a slope consisting of material from the crumbling rocks of the hillsides. Jackson (1956, p. 358) has referred to this as the *detritus slope* with, as a rule, more sandy soils

than in the plains. Here, according to Jackson, the dominant tree species is *Combretum adenogonium*, with a number of associated species. Somewhat larger evergreen trees such as *Diospyros mespiliformis* and *Tamarindus indica* occur round termite mounds.

A number of other species characteristic of *Acacia-Commiphora* bushland occur, e.g. *Acalypha fruticosa* var. *fruticosa*, *Grewia tenax* and *Grewia velutina*. Among the herbs are, e.g., *Hibiscus micranthus*. The dominant grass is generally *Hyperthelia dissoluta*, with local patches dominated by *Hyparrhenia rufa* and *Heteropogon contortus*. After grazing and cultivation the vegetation of the detritus slope often becomes reduced to almost pure stands of *Acacia hockii*.

The mapping of this area by Morrison & Jackson (1958) and Wickens (1976) has already been described and discussed above. As discussed above under (A), White (1983) has mapped the vegetation of this area partly as 29a, *Sudanian undifferentiated woodland*, partly as 35b, *The transition from undifferentiated Ethiopian woodland to Acacia deciduous bushland and wooded grassland*. From the data presented in this work, it is the impression of the current authors that the mapping proposed by Harrison & Jackson (1958) and supported by Wickens (1976) reflects the known plant distributions better than White's mapping. Our satellite-image analyses indicate that the areas around the Dongotona and the Didinga Mountains are largely dominated by our class no. 4, *Light woodland or bushland*. Quite extensive areas, especially in the two river valleys between the three major mountain groups are categorised as class no. 1, *Fire-affected areas*; this is slightly surprising, since the biomass of the vegetation in this area is not normally so large that fierce burning would be expected to occur. The fire-affected areas in the eastern part of the satellite-image are even more extensive than the fire-affected areas in the parts of the image dominated by woodlands of type (A),

which has much more ground biomass to burn. Perhaps the areas in the eastern part of the satellite-image represent depressions or low hills or rocky outcrop with higher and more biomass-rich vegetation than what is normally found on the clay plains. The fire-affected areas are sometimes surrounded by narrow zones of class no. 12, *Open scrub or lowland bamboo thicket, with a mixture of bare rock*, apparently here indicating a transition between classes no. 1 and no. 4. A few areas are recorded as class no. 2, *Very open areas with (sandy?) soil exposed*. This could represent dry clay plains almost completely devoid of vegetation.

(G) Open bushland and grassland to the north and east of the Didinga Mountains

The lowlands to the north and north east of the Didinga Mountains, almost as far as the border with Ethiopia and the northern limit of the Equatoria province, are covered by extensive areas of open vegetation forming a vast mosaic. This mosaic consists chiefly of various types of grasslands and *Acacia* open bushland and grassland on predominantly alluvial soils. Harrison & Jackson (1958) have classified this mosaic as representing two kinds of vegetation: (1) a part of their *Woodland savannah (high rainfall, laterite catena soils): Flood region*, and (2) a part of their *Special Areas of Low Rainfall Woodland Savannah: Toposa Area*. The latter is named from the name of the largest ethnic group that lives in this area. The former, Harrison & Jackson's (1958) *Woodland savannah (high rainfall, laterite catena soils): Flood region* has previously been dealt with under (A) and (B), and it has been shown that it largely within the study area agrees with White's mapping unit no. 62, *Edaphic grassland mosaics with Acacia wooded grassland*, no. 64, *Edaphic grassland mosaics with semi-aquatic vegetation*, and no. 35b, *The transition from undifferentiated Ethiopian woodland to*

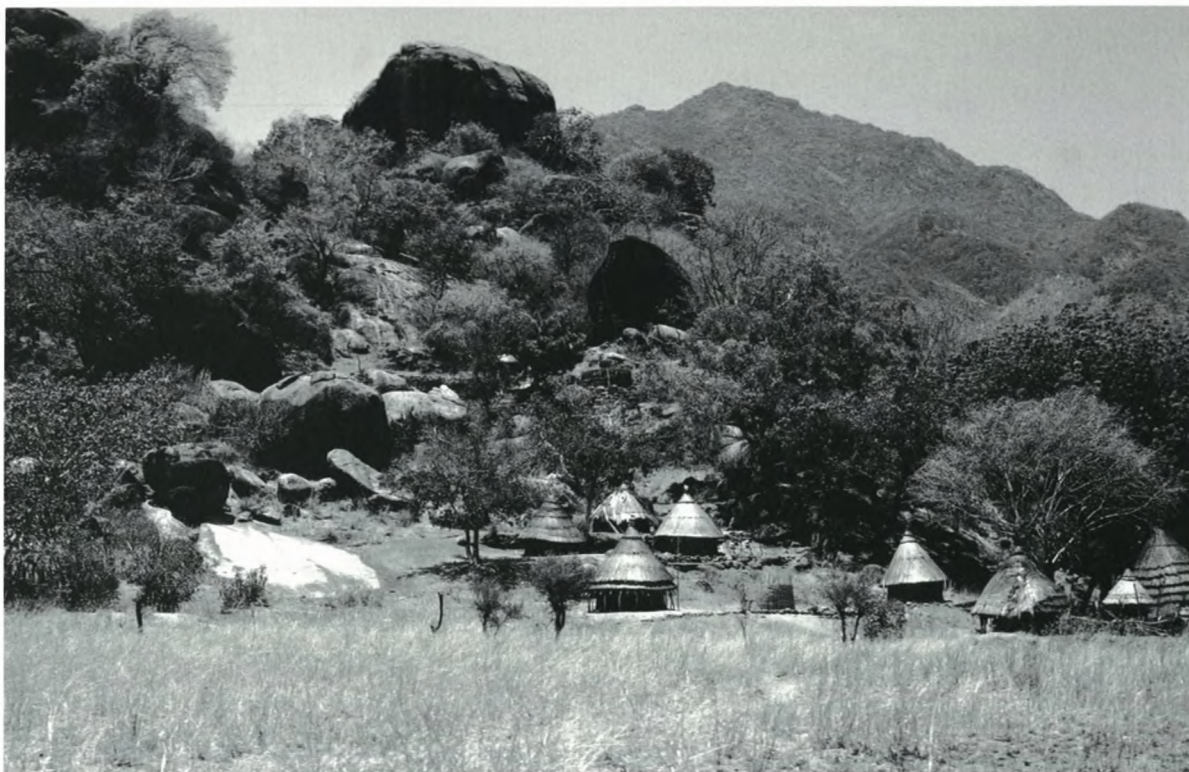


Fig. 17. Vegetation on thin, bouldery soil on the north-east facing side of the Imatong Mountains (in the strict sense). This vegetation is described in the text under (1.K) *Woodland on bouldery soil of the lower hill sides*. The annual grasses in the foreground have germinated after a fire. Dry season aspect. Photograph: I. Friis. March 1982. Scanned from 24 × 36 colour diapositive.

Acacia deciduous bushland and wooded grassland. The latter area, Harrison & Jackson's *Special Areas of Low Rainfall Woodland Savannah: Toposa Area*, is unique for the eastern part of the study area. White (1981, 1983) classified the major part of the *Toposa Area* under his mapping unit no. 42, *Somalia-Masai Acacia-Commiphora deciduous bushland and thicket*, and a small area on the eastern border of the study area as no. 64, *Edaphic grassland mosaic with semi-aquatic vegetation*.

From a report by A.W. Peers, submitted to the relevant authorities in 1954, but never formally published, Harrison & Jackson quote six vegetation types, some of which extend beyond the *Toposa area*:

(i) *Grassland of sour perennial grasses*, dominated by *Hyparrhenia rufa* and *Setaria incrassata*; as they point out (Harrison & Jackson 1958, p. 16), this type is very similar to the *Intermediate land* of their *Flood Region* further to the north-west and closer to the Nile.

(ii) *Grassland of sweet perennial grasses*, which is dominated by *Chrysopogon plumulosus* (= *Chrysopogon aucheri* var. *quinqueplumis*), *Bothriochloa insculpta*, *Sehima nervosum*, *Themeda triandra* and *Sporobolus helvolus*. The term *sweet* means here palatable to grazing animals when mature. This vegetation type is marginal to the present study, and *Chrysopogon plumulosus* is indeed restricted to a small part of the study area; Harrison & Jackson (1958, p. 17) also point out

that, as described by Peers, it agrees better with the dry and open *Semi-desert Grassland of North West Kenya* (Edwards & Bogdan 1951) than it does with anything else in the Sudan. *Bothriochloa insculpta*, *Sehima nervosum*, and *Themeda triandra* are more common in this area than in any other part of the Sudan, where these species are absent or rare.

(iii) *Grassland of annual grasses at present ungrazed*, dominated by *Eriochloa fatmensis* (= *Eriochloa nubica*) in the lower areas and *Sporobolus ioclados* (= *Sporobolus marginatus*) on the higher sandy areas.

(iv) *Present wet season grazing areas of grassland*, also dominated by *Sporobolus ioclados*; according to Harrison & Jackson (1958, p. 16), this type is only a grazed variant of (ii).

(v) *Poor hill grazing*, a vegetation type of the *Hill Catena* with scattered, slender bushes and *Aristida adscensionis* (= *Aristida submucronata*) as the dominant grass species.

(vi) *Acacia mellifera thornland*, which, according to Harrison & Jackson (1958), is a mosaic of *Acacia mellifera* Thornland [bushland] on Dark Cracking Clays and grass-covered areas.

Wickens (1976, p. 17, Fig. 6) has classified the whole of the *Toposa Area* as Flood Region grassland, and has given an extremely abbreviated summary of the floristic data collected by Peers and quoted by Harrison & Jackson (1958).

The vegetation of the *Toposa Area* has not been classified by Greenway (1973), but it would presumably be referred to as a mosaic of *grassland* and *open bushland*. As mentioned above, White (1981, 1983) classified the major part of the *Toposa Area* under his mapping units no. 42 and no. 64; the former largely corresponds to Peers' vegetation unit no. (vi), while the small area on the eastern border of the study area (no. 64) is probably best compared with Peers' type (i).

Our satellite-image analyses would seem to

confirm the views of Peers, as quoted by Harrison & Jackson (1958, p. 16-17). Most of the areas to the north and north-east of the Donogona mountains are, according to our analysis, rather similar to the areas north-east of the Imatong Mountains group, areas which are largely dominated by our class no. 4, classified as *Light woodland or bushland*, which would correspond to Peers' vegetation unit no. (vi) *Acacia mellifera Thornland*, but differing in the presence of large areas of class no. 2, *Very open areas with (sandy) soil exposed*, which would seem to correspond to Peers' categories (iii) and (iv), and possibly smaller areas of (i), (ii), and (v). The central part of the *Toposa Area*, classified as White's mapping unit no. 64, *Edaphic grassland mosaic with semi-aquatic vegetation*, is outside the area covered by our satellite-image analyses.

(H) Fringing forests of the *Acacia* bushland to the east of the Imatong Mountains group

The gallery forests to the west of the Imatong Mountains group has been dealt with above under (C). According to Jackson (1956, p. 358) and the observations of the current authors, streams in the *Acacia* bushland to the east of the Imatong Mountains group have a more open and much less species-rich type of fringing forest, with *Trichilia emetica*, *Kigelia africana*, *Ficus sycomorus* and *Crateva adansonii* over a layer of slender shrubs. These canopy species are widespread in similar habitats throughout eastern and north-eastern tropical Africa. *Celtis toka*, which has been observed elsewhere in the study area along rivers and which is an important riparian tree in the drier parts of East and Northeast Tropical Africa, must almost certainly also form part of the vegetation dealt with here.

There are, however, also according to Jackson (1956, p. 358), in *Acacia* bushland a few remnants of fringing forest of a wetter type,

more like that of (C) *Gallery forests of the lowland woodlands to the west of the Imatong Mountains group*, which is dominated by relict forest trees, such as *Milicia excelsa*, and forest edge species such as *Rauwolfia vomitoria*, *Caloncoba crepiniana* and *Ficus asperifolia*. Local occurrence of *Trema orientalis*, and *Pennisetum purpureum* may also indicate the site of former fringing and gallery forests.

The fringing forests dealt with here do not cover large enough areas to have been mapped by Harrison & Jackson (1958) or by White (1983). No area with fringing forests of the *Acacia* bushland to the east of the Imatong Mountains group is prominent enough to appear in our satellite-image analyses, and the fringing forests have probably in the analyses been included with the various surrounding vegetation types.

(I) Bare rock faces of the lower dry hill-slopes of the mountain groups and of large rocky outcrops

These descriptive notes on the bare rock faces are chiefly based on the observations from the Imatong Mountains group by Jackson (1956, p. 358) and the current authors, with additional information about the Dongotona and the Didinga Mountains group (Jackson 1950, 1951). Information from these sources has been supplemented with information from the catalogue of vascular plants in this work. Fig. 11 and 18 show examples of the vegetation associated with bare rock faces at low altitudes.

Much of the lower slopes of the dry north-east side of the Imatong Mountains group consist of bare gneiss rocks (Jackson 1956, p. 358). These rocks have weathered to form steep and smooth rock faces and steep dome-shaped hills. *Selaginella njamnjamensis* is the first coloniser of these rocks. This species is followed by invasion of the shrubby *Xerophyta simulans*

growing to some 2 m. in height, and by the candlebra-shaped *Euphorbia magnicapsula* var. *laertosa*, *Sarcostemma viminale*, and species of *Aloe*. Species of *Ficus*, especially *Ficus populifolia* and to a lesser extent *Ficus glumosa* and *Ficus ingens* establish themselves in crevices on otherwise bare rock faces.

Where sufficient amounts of soil have collected between the boulders the following species are found: *Acridocarpus ugandensis*, *Aloe labworana*, *Adenium obesum*, *Celtis toka* (along drainage), *Lannea fulva*, *Diospyros mespiliformis*, *Hexalobus monopetalus* var. *monopetalus*, *Maerua triphylla* var. *triphylla* and *Cissus quadrangularis*.

Frequently, species of *Cissus*, e.g. *Cissus petiolata* and *Cissus populnea*, as well as *Secamone africana*, trail over these bare rock-faces.

Tapinanthus globiferus has been recorded as a parasite on *Lannea fulva* in this kind of habitats.

On flatter areas where a few centimetres of soil have developed *Loudetia arundinacea* and *Chloris gayana* are dominant grasses.

This vegetation has not been reported from the Dongotona and Didinga Mountains group, but it almost certainly occurs there.

On larger rocky outcrops in the woodlands to the northwest and west of the Imatong Mountains there are very similar vegetation types, in which the current authors have noted the following species of herbs:

Aeollanthus myrianthus, *Aeollanthus suaveolens*, *Anagallis djaloniis*, *Anagallis pumila*, *Aneilema spekei*, *Asplenium stuhlmannii*, *Bidens prestinaria*, *Biophytum abyssinicum*, *Biophytum umbraculum*, *Bulbostylis abortiva*, *Bulbostylis coleotricha*, *Canscora decussata*, *Cyanotis arachnoidea* var. *arachnoidea*, *Cyanotis lanata*, *Cyperus capillifolius*, *Cyperus dubius* subsp. *dubius*, *Cyperus exaltatus*, *Diplacrum africanum*, *Dissotis senegambiensis* var. *senegambiensis*, *Drosera indica*, *Englerastrum schweinfurthii*, *Eulophia petersii*, *Exacum oldenlandioides*, *Fimbristylis dichotoma*, *Indigofera secundiflora*, *Indigofera welwitschii* var. *welwitschii*, *Justicia matam-*

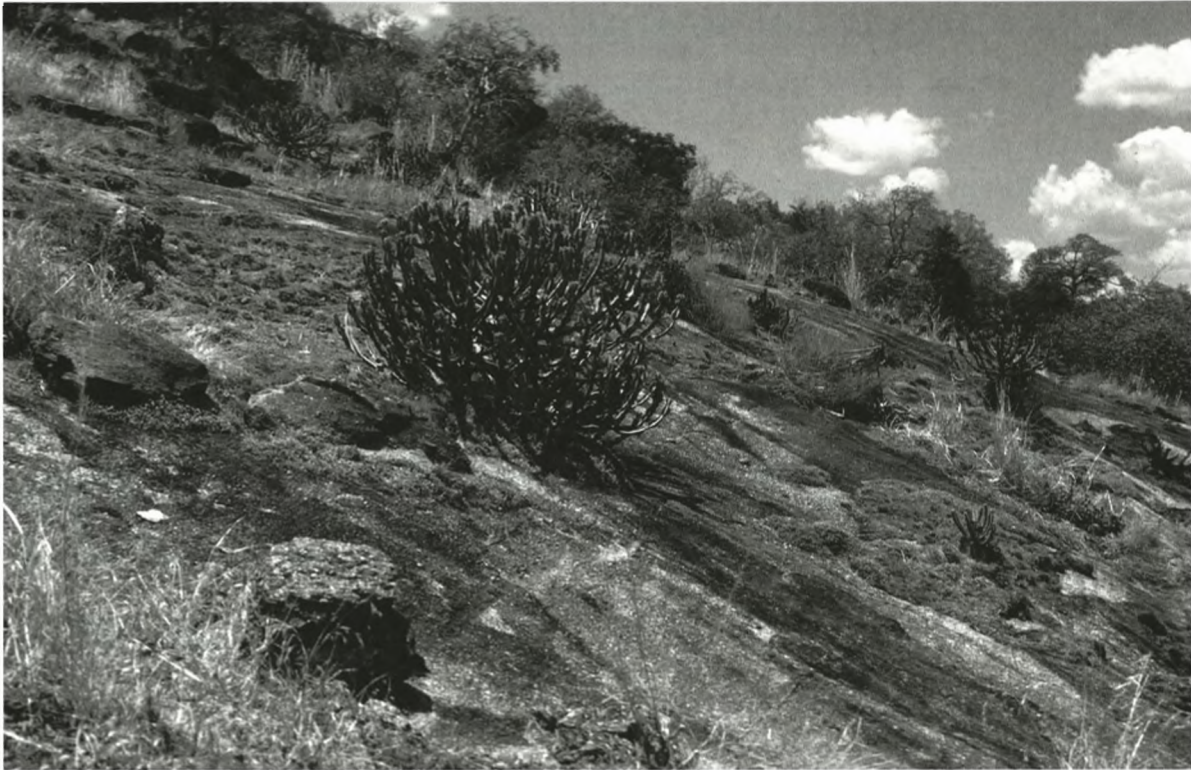


Fig. 18. Vegetation on bare rocks on the north-east facing side of the Imatong Mountains (in the strict sense). The vegetation in this illustration is described in the text under (1.I) *Bare rock faces of the lower dry hill-slopes of the mountain groups and of large rocky outcrops*. Dry season aspect. Photograph: I. Friis. March 1982. Scanned from 24 × 36 colour diapositive.

mensis, *Lindernia debilis*, *Leucas calostachys*, *Lindernia exilis*, *Lindernia nummulariifolia*, *Lindernia pulchella*, *Lindernia schweinfurthii*, *Lindernia sudanica*, *Macrotyloma stenophyllum*, *Nesaea cordata*, *Neurotheca loeselioides*, *Panicum griffonii*, *Panicum tenellum*, *Pellaea longipilosa*, *Phyllanthus leucanthus*, *Pilea angolensis* subsp. *angolensis*, *Plectranthus gracillimus*, *Sacciolepis indica*, *Scleria melanotricha*, *Sebaea pumila*, *Solenostomon porpeodon*, *Sporobolus pectinellus*, *Stemodiopsis rivae*, *Tephrosia pumila* var. *pumila*, *Utricularia andongensis*, *Utricularia arenaria* and *Vigna ambacensis*.

The areas with bare rock faces are not large enough to have been mapped separately by Harrison & Jackson (1958), but are included under their category *Hill Catena: Special areas of*

low rainfall woodland savannah. White (1983) has not mapped this vegetation type separately. Areas with bare rock faces of the lower dry hill-slopes of the mountain groups and of large rocky outcrops are probably too small to appear in our satellite-image analyses. However, they may have been recorded as part of class no. 12, *Open scrub, woodland or bamboo with bare rocks*.

(K) Woodland on bouldery soil of the lower hill sides

Jackson (1956, p. 359) has reported that towards the foot of the hill-slopes and in the

lower parts of the valleys of the Imatong Mountains there are frequently areas consisting of masses of rounded boulders. Most of these are rounded blocks up to 30 or 40 cm. in diameter, with soil in the crevices between them, but some boulders are much larger, up to several metres in diameter, and may give shade. The current authors observed the vegetation of this type of landscape in the Kinyeti valley and on the north-eastern side of the Imatong Mountains. The vegetation is also found in association with rocky outcrops, where catenas may have developed. Fig. 11 and 17 show examples of vegetation associated with bouldery soil at or around the Imatong Mountains and vegetation associated with catena formation.

The dominant woody species in these habitats is *Terminalia brownii*, associated with a number of other tree species over a shrubby undergrowth. As discussed under the enumeration of biotic factors which have influenced the vegetation, it has been considered by Jackson (1956, p. 359) that this community is largely the result of intensive cattle grazing which has eliminated the grasses and allowed them to be replaced by weak shrubs, at the same time eroding the surface soil so that only boulders are left. The distribution of this vegetation agrees with the densely inhabited areas on the north-eastern side of the Imatong Mountains.

The following is a list of species which are found in these habitats:

Larger trees: *Acacia amythetophylla* (occasional), *Acacia polyacantha* subsp. *campylacantha* (occasional), *Azelia africana* (occasional), *Albizia zygia* (occasional), *Antiaris toxicaria* subsp. *welwitschii* (frequent), *Boscia salicifolia* (occasional), *Boswellia papyrifera* (occasional), *Capparis fascicularis* var. *fascicularis*, *Combretum molle* (occasional), *Cordyla richardii* (occasional), *Diospyros mespiliformis* (frequent), *Ehretia braunii* (rare), *Ficus abutilifolia*, *Ficus glumosa* (occasional), *Hexalobus monopetalus* (occasional), *Lannea barteri* (occasional), *Lannea schimperi*

(occasional), *Ozoroa insignis* subsp. *reticulata*, *Pterocarpus lucens* (occasional), *Steganotaenia araliacea* (occasional), *Sterculia setigera* (occasional), *Terminalia brownii* (common), *Terminalia laxiflora* (occasional) and *Vepris nobilis* (occasional).

Smaller trees: *Acacia hockii* (locally frequent), *Acacia senegal* var. *senegal* (occasional), *Cordia monoica* (occasional), *Ficus exasperata* (occasional, locally common), *Ormocarpum trichocarpum* (rare), *Vangueria apiculata* (only recorded from Didinga Mountains), *Vernonia amygdalina* (occasional), *Ximenia americana* (occasional) and *Ziziphus abyssinica* (frequent).

Shrubs: *Acalypha ornata* (common), *Combretum capituliflorum* (occasional), *Feretia apodanthera* subsp. *apodanthera*, *Flueggea virosa* (frequent), *Grewia bicolor*, *Grewia flavescens* (frequent), *Grewia villosa* (occasional), *Harrisonia abyssinica* (occasional), *Hoslundia opposita* (common), *Meyna tetraphylla* (occasional), *Monanthotaxis buchananii* (occasional, locally common), *Pseudomussaenda flava* (common), *Rhus spp.* (frequent), *Tarenna graveolens* var. *graveolens* and *Tinnea aethiopica* (occasional, locally common).

Climbers: *Paullinia pinnata* (occasional), *Phyllanthus muellerianus* (occasional), *Reissantia indica* var. *loesneriana*, *Saba comorensis* var. *florida* (occasional), *Schizostephanus alatus* and *Trochomeria macrocarpa*.

Ground cover: *Actinopterys radiata* (common, especially under and between boulders), *Pellaea schweinfurthii* and *Setaria sp.* (frequent) and various Acanthaceous herbs. In gravel among the boulders, the rosette annuals *Gisekia pharnaceoides* var. *pharnaceoides* and *Mollugo nudicaulis* occur.

According to Jackson (1950) places with boulders or with little soil over stones or rocks on the western slopes of the Dongotona Mountains have woodland dominated by *Terminalia brownii*. Vegetation very similar to this has been reported from the south slope of Mt. Lotuke in

the Didinga Mountains group (Jackson 1951); also here Jackson suggests that the physiognomy has been deeply influenced by overgrazing. Characteristic tree species on the very eroded and stony soil below 1370 m. are: *Terminalia brownii*, *Vepris sp.*, and *Grewia sp.*, with an undergrowth of weak shrubs, such as: *Acacia ataxacantha*, *Acalypha sp.*, and *Phyllanthus sp.* There are no records of species in the ground cover.

The discussion in the final paragraph under (I) applies also here with regard to the mapping by Harrison & Jackson (1958), White (1983) and our satellite-image analyses: the woodland on bouldery soil of the lower hill sides does not cover large enough areas to appear in the mapping or in the analyses, and it must have been included with other vegetation in, for example, class no. 12, *Open scrub or lowland bamboo thicket, with a mixture of bare rocks.*

(L) Lower hill-slopes of the mountain groups with woodland on shallow soil

Jackson (1956, p. 360) has reported on a type of dry woodland on shallow soil found on the lower slopes in the Kinyeti valley and on the north-eastern side of the Imatong Mountains. The current authors have observed this or similar vegetation in the same two localities.

Outside the areas with bare rocks, but where the ground is still fairly steep, much of the hill-slopes consist of shallow skeletal soil over gravel and angular rock fragments. In such areas *Boswellia papyrifera* is dominant, and may often form almost pure stands over the grasses *Hyparrhenia filipendula*, *Loudetia arundinacea* and *Digitaria nuda*. *Euphorbia venenifera* is locally common. Occasional associates of the *Boswellia* stands include the trees *Cordyla richardii*, *Combretum molle* and *Sterculia setigera*.

A counterpart of this vegetation has not been described from the Dongotona or the Didinga Mountains group, but it almost cer-

tainly occurs also there. From the lower parts near the plains of the eastern slopes of the Dongotona Mountains Jackson (1950) has mentioned a sparse vegetation of thorny species of *Acacia* and *Euphorbia venenifera*.

The discussion in the final paragraph under (I) applies also here with regard to the mapping by Harrison & Jackson (1958), White (1983) and our satellite-image analyses: the lower hill-slopes of the mountain groups with woodland on shallow soil do not cover large enough areas to appear in the mapping or in the satellite-image analyses.

(M) Lower hill-slopes of the mountain groups with woodland on deeper soil

Jackson (1956, p. 360) has reported on a type of woodland on deeper soil found on the north-eastern side of the Imatong Mountains. The current authors have observed similar vegetation in the same general localities. Where the soil is slightly deeper the vegetation resembles that of the lower part of the hillside catena, with a few additional species.

The following species of trees are characteristic: *Acacia hockii* [Jackson has it as *Acacia seyal* var. *multijuga*], *Acacia nilotica* subsp. *subalata*, *Acacia senegal*, *Acacia seyal*, *Albizia amara* subsp. *sericocephala*, *Boscia salicifolia*, *Carissa edulis*, *Combretum adenogonium*, *Dalbergia melanoxylon*, *Euclea divinorum*, *Grewia mollis*, *Lannea fruticosa*, *Lannea humilis*, *Lannea schimperi*, *Lannea schweinfurthii*, *Manilkara multinervis* subsp. *schweinfurthii*, *Ormocarpum trichocarpum*, *Ozoroa insignis*, *Piliostigma thonningii*, *Rhus natalensis*, *Sclerocarya birrea* subsp. *birrea*, *Strychnos innocua* and *Tamarindus indica*.

Monanthotaxis buchananii is a characteristic liana in this vegetation.

The vegetation referred to here is not specifically described from the Dongotona or the Didinga Mountains group, but it almost cer-

tainly occurs also there, as the papers by Jackson (1950, 1951) imply on bouth mountain groups a range of woodland types from woodland on almost bare rock to woodland on deeper soil. The discussion in the final paragraph under (I) applies also here with regard to the mapping by Harrison & Jackson (1958), White (1983) and our satellite-image analyses: the lower hill-slopes of the mountain groups with woodland on deeper soil do not cover large enough areas to appear in the mapping or in the satellite-image analyses.

(N) *Oxytenanthera* bamboo belt

The *Oxytenanthera* dominated patches of vegetation in the lowland habitats away from the mountains has been discussed above under (A). Jackson (1956, p. 360) has reported on an *Oxytenanthera* bamboo belt on the north-eastern side of the Imatong Mountains; Sommerlatte & Sommerlatte (1990) have described *Oxytenanthera* bamboo thickets near the Laboni forest in the Ateppi basin and on the eastern side of the Imatong Mountains. The current authors have observed similar vegetation in the same localities. In a zone between approximately 1000 and 1500 m a belt of the bamboo *Oxytenanthera abyssinica* stretches almost continuously along the north east face of the Imatong Mountains group, associated with the grasses *Hyparrhenia filipendula* and *Loudetia arundinacea*. Fig. 12 shows a clump of *Oxytenanthera* bamboo in the lowlands away from the mountains.

These bamboo stands are generally almost pure, but are locally associated with species found in the woodlands on the wetter western side of the Imatong Mountains group, such as: *Combretum collinum* subsp. *binderianum* (frequent), *Stereospermum kunthianum* (frequent), *Strychnos innocua* (occasional) and *Vitex doniana* (occasional).

The climber *Ampelocissus abyssinica* has been recorded from *Oxytenanthera* bamboo forest at Laboni.

On the eastern massifs, Jackson (1950) has only reported *Oxytenanthera abyssinica* from the lower western slopes of the Dongotona Mountains.

The discussion in the final paragraph under (I) applies also here with regard to the mapping by Harrison & Jackson (1958), White (1983) and our satellite-image analyses: the *Oxytenanthera* bamboo belt does not cover large enough areas to appear in the mapping or in the satellite-image analyses.

(O) Upper hill-slopes with a lowland-type vegetation on the Imatong and Dongotona Mountain groups

Jackson (1956, p. 360) has reported on how, in places on the Imatong Mountains group, the bamboo may extend to the lower edge of the montane *Acacia abyssinica* woodland and wooded grassland at 1700 to 1800 m. a.s.l. On the dry side of the mountains the lowest *Acacia abyssinica* occurs at 1700 to 1800 m. a.s.l., as against 1500 m. a.s.l. on the wetter side. Above this altitude there is little difference between the vegetation on the two sides. *Hyparrhenia rufa* accompanies the grasses characteristic of the wetter side, *Hyparrhenia cymbaria* and *Pennisetum unisetum*. There is, however, a very characteristic plant, which is peculiar to the dry, eastern side of the mountains, where it occurs above 1400 m. a.s.l. This is the cycad *Encephalartos septentrionalis*. It may form dense stands where the rock is fissured by crevices and where little other than a few species of grasses grows. *Encephalartos septentrionalis* has also been recorded from open woodlands on almost bare rocks on the Dongotona Mountains group (Jackson 1950).

Jackson (1956) has reported on a moderate-

ly mesophytic type of woodland on Mt. Lotuke in the Didinga Mountains between 1500 and 2000 m. The tree stratum is dominated by *Combretum molle*, which is associated with *Acacia hockii*, (by Jackson called *A. "stenocarpa"*), *Gardenia ternifolia* subsp. *ternifolia*, *Lonchocarpus laxiflorus*, *Maytenus senegalensis*, *Stereospermum kunthianum* and *Strychnos innocua*. Near the upper limit of this zone, *Faurea rochetiana* appears.

The upper hill-slopes of the Imatong and Dongotona Mountain group do not cover large enough areas to have been mapped separately by Harrison & Jackson (1958). They are included under the category *Hill Catena: Special areas of low rainfall woodland savannah*, or *Montane vegetation*. In White (1983), it is also covered under various vegetation types of lowland vegetation or undifferentiated Afromontane vegetation. In our satellite-image analyses it is difficult to detect the exact areas of the upper hill-slopes with a lowland-type vegetation on the Imatong and Dongotona Mountain groups, which cover only very small areas.

(P) Fringing forests of the hill-sides of the mountain groups

Jackson (1956, p. 360) has described how, on the dry side of the Imatong Mountains group, the forest along streams has been much reduced by human interference, but especially above 1300 m. a.s.l. those fragments of forest, which remain, are of quite a moist type. Characteristic dominants are *Mimusoys sp.* (probably *Mimusoys kummel*) and *Pouteria altissima*.

Trees in the second storey are: *Albizia grandibracteata*, *Cordia africana*, *Dovyalis abyssinica*, *Flacourtia indica*, *Glenniea africana*, *Margaritaria discoidea*, *Rauvolfia caffra*, *Vepris nobilis*, and occasionally *Ficus sycomorus* subsp. *gnaphalocarpa*. *Turraea floribunda* and *Mimulopsis solmsii* occur in the shrub layer. *Combretum paniculatum* subsp. *paniculatum* is a common climber,

while *Combretum racemosum* and *Combretum rhodanthum* have only been recorded once.

Pennisetum trachyphyllum has been recorded as a grass of fringing forests at this altitude.

Lower down, and in more degraded areas *Diospyros mespiliformis* and *Terminalia brownii* are dominant along rocky streams.

The discussion in the last paragraph under (I) applies also here with regard to the mapping by Harrison & Jackson (1958), White (1983) and our satellite-image analyses: the vegetation described here as fringing forests of the hill-sides of the mountain groups does not cover large enough areas to appear in the analyses.

(2) Transitional vegetation

In general the hillsides of the western side of Imatong Mountains group and the Kinyeti Valley up to an altitude of about 1500 m. a.s.l. have a vegetation very similar to that of the plains, though on the steep slopes the larger trees are rare. Jackson (1956, p. 356) has in his description of the transition from the woodlands of the plains to the west of the Imatong Mountains and the montane vegetation of the Imatongs pointed out that with increasing altitude the dominant grasses in the open vegetation remain *Hyparrhenia cymbaria*, and *Pennisetum unisetum*. *Hyperthelia dissoluta* occurs on shallower soil and *Loudetia arundinacea* is found in very stony places (see below under (B) *Transitional woodland ...*). *Pennisetum purpureum* is locally dominant and in some areas (e.g. above Katire) has been observed to increase perhaps as a result of systematic early burning.

Slightly above 1500 m. a.s.l., the first *Acacia abyssinica* and *Pteridium aquilinum* appear in the valleys. At 1700 m. a.s.l. *Acacia abyssinica* becomes widespread, on ridges as well as in valleys, but *Combretum molle* and *Erythrina abyssinica* persist to between 1800 and 1900 m. a.s.l. as scattered trees.

On the hillsides with shallow stony soil and where fires are intense *Loudetia arundinacea* becomes the dominant grass at about 1700 m. a.s.l., in some places mixed with *Andropogon schirensis*. Among the dense grass-vegetation are scattered gnarled trees of *Protea madiensis* and *Protea gaguedi*. The former disappears above 1900 m. a.s.l., and at higher altitudes *Protea gaguedi* becomes dominant in this type of grassland. The bamboo *Oxytenanthera abyssinica* extends to above 1700 m. a.s.l. on hillsides of the wetter side of the mountains.

(A) Transitional forest (*Entandophragma-Manilkara* intermediate forest)

The altitudinally transitional or intermediate forests are in the study area only known from the Imatong Mountains group and have been described by Jackson (1956, p. 356-357) and Sommerlatte & Sommerlatte (1990). Because of the scarcity of level ground between c. 1100 and 1800 m. a.s.l., and the intensity of fires sweeping up steep slopes, closed forest is scarce between 1200 and 1800 m. a.s.l. and is mostly in the form of fringing forest. Jackson (1956, p. 356) has observed the largest area of this type of forest to occur in the Ateppi valley above Isore, and in the Iyedo valley, mostly between 1200 and 1500 m. a.s.l. Sommerlatte & Sommerlatte (1990) named this forest type *Entandophragma-Manilkara* intermediate forest and observed it in the Ateppi basin, the foothills of the West Acholi Mountains and in the lower Kinyeti basin. The current authors have observed various stages in the regrowth of this forest type, but not worked in well developed forest of this type. *Spathodea campanulata* subsp. *nilotica* may occur as a pioneer species of this forest type in the woodlands surrounding intermediate forest at 1200-1600 m. a.s.l. At this altitude Jackson (1956, p. 356) has frequently observed a well-marked zone of *Pennisetum pur-*

pureum with an unidentified shrubby species of *Dombeya* (perhaps *D. burgesiae*, but from the check list of this work, it is not possible to establish the identity with certainty), and he suggests that this vegetation is a stage in the regrowth of transitional forest.

Characteristic of this forest of intermediate altitudes is the dominance of species of Sapotaceae, while *Entandophragma angolense* is also common. According to Jackson (1956, p. 356) some of these forests have stands of the palm *Raphia farinifera*. In general the dominant trees in the transitional forests are the lowland species rather than the species of the montane forest.

The following is a list of species which are found in medium-altitude forests; it is based on Jackson (1956, p. 356-357), Sommerlatte & Sommerlatte (1990), the observations of the current authors and the information in the catalogue of this work:

Canopy trees, 15-30 m. high: *Albizia schimperiana* (occasional), *Bridelia ndellensis* var. *orientalis* (forest pioneer), *Celtis gomphophylla*, *Chrysophyllum albidum* (occasional), *Chrysophyllum muerense* (occasional), *Cordia africana* (occasional), *Diospyros abyssinica* subsp. *abyssinica*, *Entandophragma angolense* (frequent), *Flacourtia indica*, *Harungana madagascariensis* (occasional, locally common, especially along forest edges, a forest pioneer), *Klainedoxa gabonensis* (rare), *Manilkara butugi* (frequent), *Mimusops bagshawei* (frequent), *Pouteria adolfi-friederici* (occasional), *Pouteria altissima* (frequent), *Prunus africana* (rare), *Pseudospondias microcarpa* (occasional, locally frequent), *Schefflera abyssinica* (rare) and *Zanthoxylum cf. gillettii* (occasional).

Second-storey trees, 5-15 m. high: *Albizia grandibracteata* (frequent), *Albizia zygia* (occasional, locally frequent), *Anthocleista grandiflora* (occasional), *Bersama abyssinica* (occasional), *Blighia unijugata* (rare), *Craibia brownii*, *Croton macrostachyos* (occasional), *Dracaena steudneri* (frequent), *Flacourtia indica*, *Garcinia bucha-*

nanii, *Glennia africana* (occasional), *Kigelia moosa* (occasional), *Lasiodiscus mildbraedii*, *Lepisanthes senegalensis* (occasional), *Neoboutonia melleri* (frequent), *Phoenix reclinata* (occasional, locally frequent), *Polyscias fulva* (occasional), *Sapium ellipticum* (rare), *Spathodea campanulata*, *Strombosia grandifolia* (frequent, locally common), *Trichilia prieuriana* (occasional), *Turraea floribunda*, *Uvariopsis congoensis*, *Vepris nobilis* (occasional) and *Xylopia parviflora*.

Climbers: *Acacia kamerunensis* (occasional), *Cardiospermum halicacabum*, *Culcasia falcifolia* (frequent), *Dichapetalum madagascariense* (rare), *Dioscorea preussii*, *Mucuna pruriens* (occasional, locally abundant), *Paullinia pinnata* (occasional), *Rhaphiostylis beninensis*, *Rourea thomsonii* (occasional), *Rubus* sp. (occasional), *Stictocardia beraviensis*, *Toddalia asiatica* and *Uvaria angolensis* var. *angolensis*.

Shrubs, small trees less than 5 m. high and forest-floor herbs: *Acalypha ornata*, *Acanthus eminens* (frequent, locally abundant), *Achyranthes aspera* (occasional), *Aneilema umbrosum* subsp. *ovato-oblongum*, *Begonia eminii* (rare), *Campylospermum densiflorum* (locally frequent), *Chasalia cristata*, *Cyathula prostrata* (occasional), *Eremomastax speciosa* (rare), *Ficus asperifolia* (occasional), *Isodon ramosissimum*, *Isoglossa punctata*, *Leea guineensis* (rare), *Lobelia giberroa* (occasional), *Maytenus gracilipes* (rare), *Metarungia pubinervia*, *Palisota schweinfurthii* (occasional), *Panicum bambusiculme*, *Pavetta oliveriana* var. *oliveriana*, *Pennisetum trachyphyllum* (occasional, near streams), *Phyllanthus ovalifolius*, *Phytolacca dodecandra* (occasional), *Piper umbellatum* (frequent), *Pseuderanthemum ludovicianum* (rare), *Psychotria kirkii* var. *mucronata*, *Pteridium aquilinum* (rare, only along edges), *Securidaca welwitschii*, *Setaria megaphylla* (frequent), *Solanecio mannii* (occasional), *Solanum giganteum*, *Solenostomon latifolius*, *Tricalysia niamniamensis* var. *niamniamensis*, *Tricalysia niamniamensis* var. *djurensis* and *Triumfetta cordifolia* (frequent, locally abundant). The species list of Jackson

(1956, p. 357) also reported several unidentified shrubby Acanthaceae that have not been identified by the current authors.

The altitudinal range of the typical lowland gallery forest overlaps the lower part of the range of this type of intermediate forests, but Jackson (1956, p. 357) suggests that the *Khaya-Syzygium* and the *Entandophragma-Manilkara* types of forest appear to be distinct and that mixtures of the two types rarely occur.

The transitional forest is mapped by Harrison & Jackson (1958) as part of the *Montane vegetation* and by White (1983) as part of his mapping unit no. 19a, *Undifferentiated Afromontane vegetation*. The areas with transitional forest (*Entandophragma-Manilkara* intermediate forest) are too small to be clearly detectable in our satellite-image analysis, where it has probably been included with class no. 9, *Evergreen montane forest*, or no. 10, *Dense montane forest*.

(B) Transitional woodland and grassland (*Combretum-Entada* wooded grassland) of the Imatong Mountains

Jackson (1956, p. 358-361) has described how the vegetation on the dry eastern or north-eastern sides of the Imatong Mountains forms a complex zonation with a range of rather similar dry woodlands, and that there is limited altitudinal change until the moisture increases at c. 1700 m. a.s.l. because of the altitude. In the Kinyeti valley there is a well developed transitional woodland described by Sommerlatte & Sommerlatte (1990); this has also been observed in some places on the western and southern side of the Imatong Mountains. Sommerlatte & Sommerlatte (1990) have named this *Combretum-Entada* wooded grassland. It is most common between 1500 and 1800 m. a.s.l., but in places it has been noted to occur as far down as to about 1000 m. a.s.l. The following is a description based on Sommerlatte & Som-

merlatte (1990), combined with observations made by the current authors. Fires are very frequent in this vegetation type, and the fires sweep with great speed and force up along the hill slopes. The ground cover, mainly grasses, is tall, up to 2 m. or more, and the tree stratum is scattered and the trees generally 5-10 m. tall. Fig. 14 shows an example of very frequently burnt and consequently nearly treeless grassland in the middle range of the Kinyeti Valley.

Floristically, the similarity is both with the grasslands at slightly higher altitudes and with the *Albizia-Terminalia* woodlands on the plains below, but the most prominent trees of the plains are missing or rare. We observed this vegetation type over large areas of the slopes in the Kinyeti Valley.

Between 1200 and 1500 m. a.s.l. certain of the lowland woodland species of the plains disappear, and others become more abundant, until towards 1500 m. a.s.l. the following are characteristic: *Acacia persiciflora*, *Combretum collinum* subsp. *binderianum*, *Combretum molle*, *Cussonia arborea*, *Entada abyssinica*, *Erythrina abyssinica*, *Protea madiensis* and *Stereospermum kunthianum*. All these woody species are common. At this and slightly higher altitudes, *Ficus vasta* is common in association with rocky outcrops.

The shrub stratum includes specimens of *Maytenus senegalensis*.

The ground stratum is almost completely dominated by the tall grasses: *Pennisetum unisetum*, *Hyparrhenia cymbaria*, *Hyperthelia dissoluta* and *Loudetia arundinacea*, but *Phyllanthus nummularifolius* has also been recorded.

A few rocky outcrops may have a vegetation similar to that on rocks at lower or higher altitudes; from the intermediate levels are particularly recorded: *Actiniopteris semiflabellata* and *Haumaniastrum villosum*.

The transitional woodland is mapped by Harrison & Jackson (1958) as part of their *Montane vegetation* and by White (1983) as part of his mapping unit no. 19a, *Undifferentiated*

Afromontane vegetation. The areas with transitional woodland and grassland (*Combretum-Entada* wooded grassland) of the Imatong Mountains are too small to appear in our satellite-image analysis; they have probably been included with the classes no. 8, *Conifer-dominated mountain forest*, no. 9, *Evergreen montane forest*, or no. 10, *Dense montane forest*.

(3) Montane vegetation

The striking similarity between African habitats of high ground (above c. 1500 m. a.s.l.) in different parts of the continent has repeatedly been pointed out by many authors since White (1965) and Troupin (1966) first proposed a distinct Afromontane phytogeographical region. The montane vegetation of the study area has similarities with both the montane vegetation of Ethiopia and that of East Tropical Africa. The description in the following account is based on the observations by Jackson (1950; 1951; 1956, p. 361-371), Jenkin *et al.* (1977), Sommerlatte & Sommerlatte (1990) and the observations made by the current authors.

The whole zone has been mapped by Harrison & Jackson (1958) as part of their *Montane vegetation* and by White (1983) as part of his mapping unit 19a, *Undifferentiated Afromontane vegetation*. There are therefore in the following presentations and discussions of the montane vegetation no further comments on the mapping of the vegetation types, only comparisons with the descriptions in Jackson (1956, p. 361-370), Jenkin *et al.* (1977) and Sommerlatte & Sommerlatte (1990), and comments on how the vegetation may appear in our satellite-image analyses.

(A) Lower Afromontane grasslands and forests

In the Imatong Mountains group this zone is characterised by the occurrence of forest containing *Podocarpus latifolius* mixed with a number of other species, the most important of which are *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*. However, this forest does not occupy the whole of the zone but exists in a dynamic balance with other vegetation types through most of the zone and is, under extreme conditions, replaced with specially adapted types. The summits of peaks and ridges consist frequently of bare rock, while below them lies areas of grassland or woodland. Below 2300 m. a.s.l. this grassland or woodland has scattered trees, including the common *Protea gagedi*, while above this altitude it contains fewer trees, as it is burnt annually. Forest often extends to within 20 or 30 m. vertical distance of hill crests, and in this case there is often a narrow transition zone between the forest and the grassland in which, according to Jackson (1956, p. 361), *Hagenia abyssinica* is the characteristic tree. When the grassland is protected from fire, *Hagenia abyssinica* spreads into it rapidly, followed by forest species.

In other areas, particularly at lower altitudes, there is a more gradual transition from grassland through tangle, often with *Maesa lanceolata* or shrubby species of *Vernonia*, through a phase of woodland with *Acacia abyssinica* and *Albizia gummifera* to forest with *Podocarpus latifolius*, *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum*. On the Dongotona Mountains group there is a rather similar range between grassland and *Podocarpus* forest, although the trees are reported to grow into a stunted elfin forest only (Jackson 1950).

On the Didinga Mountains, the range of montane vegetation types is rather as on the Dongotona Mountains, but from altitudes be-

tween 1800 and 2300 m. on Mt. Lotuke in the Didinga Mountains Jackson (1951) reported that there were remaining patches of a dry Afromontane forest of *Juniperus procera*. The forest was, when observed by Jackson, largely destroyed by fire, and only trees growing in protected positions between large rocks had survived. *Olea europaea* subsp. *cuspidata*, which is normally associated with *Juniperus* forest, was not reported by Jackson (1951).

Along streams there are various kinds of riparian vegetation, and there are small areas of swamps. Also, particularly along streams and in valleys, there are fairly large areas of broken forest, which appear to represent a post-climax vegetation type, occurring after the trees of the climax forest has fallen.

It has been difficult in our satellite-image analyses to distinguish between more than a few classes in the montane vegetation, in which the recognizable vegetation types are connected by many intermediates. Jackson (1956, p. 361-367) has suggested that, at least on the Imatong Mountains group, the major montane vegetation types represent seral stages that lead towards a climax forest vegetation dominated by *Podocarpus latifolius* and a post-climax stage with many broken trees. Jackson's ideas about the vegetation types as seral stages have been incorporated in the descriptions in the following.

(a) Rocky outcrops, *Loudetia* grassland and scattered woody vegetation of *Protea*

The subsequent descriptive notes about the rocky vegetation with *Loudetia* between 1800 and 2600 m. a.s.l. are chiefly based on the observations from the Imatong Mountains group by Jackson (1956, p. 362), Jenkin *et al.* (1977, p. 65), Sommerlatte & Sommerlatte (1990) and the current authors, supplemented with information from the catalogue of vascular plants in the present work. When frequently burnt, this vegetation may become almost devoid of trees, as in Fig. 14, which shows an altitudinally



Fig. 19. Mt. Garia in the Imatong Mountains (in the strict sense), seen from the mountains around Gilo in the upper part of the Kinyeti Valley. The vegetation in this illustration is a mosaic and is described in the text as (3.A.a) *Rocky outcrops, Loudetia grassland grassland and scattered woody vegetation of Protea* and (3.A.e) *Afromontane forest dominated by Podocarpus latifolius, Olea capensis and Syzygium guineense*. Small areas near the edges of the forest patches are covered with (3.A.d) *Vernonia thickets*. Late rainy season aspect. Photograph: I. Friis. November 1980. Scanned from 24 × 36 colour diapositive.

transitional form, and Fig. 25. Mosaics of montane grassland and montane forest are shown in Fig. 19, 21 and 24.

Rocks at these altitudes are first colonised by lichens, these are followed in turn by mosses and *Selaginella njamnjamensis*. In the mat of vegetation and decaying organic matter produced by these species *Coleochloa abyssinica*, *Sporobolus centrifugus*, *Aeollanthus suaveolens* *Eragrostis hispida* and *Trachypogon spicatus* establish themselves.

In the cracks in the rocks a number of succulent or geophytic species can establish themselves, e.g. *Albuca abyssinica*, *Aloe macleayi*, *Plec-*

tranthus lactiflorus, *Aloe sp.* and occasionally also the semi-succulent shrub *Hymenodictyon floribundum* occurs. On bare rocky outcrops there are a number of highly fire-resistant species of Cyperaceae, e.g. *Cyperus albo-sanguineus* and *Cyperus comosipes* subsp. *decolorans*.

The current authors have made notes about the vegetation on rocky outcrops above c. 1800 m. a.s.l., where this kind of vegetation includes the following additional species:

Aeollanthus densiflorus, *Aeollanthus repens*, *Aspilia africana*, *Asplenium aethiopicum*, *Asplenium theciferum*, *Bidens negriana*, *Bulbostylis densa*, *Bulbostylis hispidula* subsp. *hispidula*, *Chlorophytum*



Fig. 20. Air photograph of almost pure *Albizia* woodland, presumably an early stage in forest regeneration in the lower montane zone of the Agoro Forest Reserve on the Ugandan side of the Imatong Mountains group. This vegetation is described in the text under (3.A.c) *Afromontane Albizia woodland or forest and the transition to Afromontane Podocarpus forest*. This almost pure *Abizia* stand is usually short-lived and soon an invasion of other woody species occurs. Early rainy season aspect. Phot. A. Plumptre, Wildlife Conservation Society. March 2005. Digital colour image.

cameronii var. *cameronii*, *Chlorophytum cameronii* var. *pteroaulon*, *Commelina africana* var. *villosior*, *Commelina subulata*, *Crotalaria cylindrica* subsp. *cylindrica*, *Eriospermum abyssinicum*, *Hedbergia abyssinica*, *Justicia matammensis*, *Lindernia nummulariifolia*, *Lindernia pulchella*, *Lindernia sudanica*, *Lipocarpa nana*, *Microchloa kunthii*, *Orthosiphon rubicundus*, *Polygala albida* var. *angustifolia*, *Sporobolus festivus*, *Stomatanthes africana*, *Trifolium multinerve*, *Utricularia pentadactyla* and *Xyris straminea*.

A number of geophytes flower after the fires,

e.g. *Drimia elata* and *Drimia indica*, *Drimia sudanica*, *Ledebouria revoluta* and *Ornithogalum tenuifolium*.

The next seral stage in this succession, according to Jackson (1956, p. 362), is grassland of *Loudetia arundinacea*, among which are scattered fire-gnarled trees of *Protea*. At slightly higher altitudes, mainly above 2000 m. a.s.l., *Loudetia arundinacea* may be accompanied or replaced by *Loudetia simplex*. When this grassland burns annually its composition remains fairly constant, being at the end of the rainy



Fig. 21. Air photograph of mosaic of montane grassland and forest in the lower montane zone of the Agoro Forest Reserve on the Ugandan side of the Imatong Mountain group. The components of the mosaic are described in the text as (3.A.a) Rocky outcrops, *Loudetia* grassland grassland and scattered woody vegetation of *Protea* and (3.A.e) Afromontane forest dominated by *Podocarpus latifolius*, *Olea capensis* and *Syzygium guineense*. A combination of frequent grass fires and the steepness of the rocks restrict the extension of the forest. Early rainy season aspect. Photograph: A. Plumptre, Wildlife Conservation Society. March 2005. Digital colour image.

season a sea of *Loudetia* with culms ca. 1 to 1.5 m. high and with fire-blackened and gnarled *Protea* trees among it. Below c. 2000 m. a.s.l. the species of *Protea* is *Protea gaguedi* accompanied by *Protea madiensis*, and at this altitude it is also accompanied by *Faurea rochetiana* and two species from the plains woodland, *Combretum molle* and *Erythrina abyssinica*. From a rocky outcrop in this vegetation the rather rare Dipterocarp tree *Monotes kerstingii* has been recorded.

In crevices at the foot of rocky outcrops in

this type of grassland there are often clumps of *Phoenix reclinata*; these plants are presumably associated with springs or seepage.

A number of shrubs occur in the wooded grasslands, e.g.: *Gnidia kraussiana*, *Pavetta crasipes*, *Premna schimperi*, *Rhus vulgaris*, *Senna petersiana* and *Vangueria volkensii* var. *volkensii*.

There are a few parasites on the woody plants in the wooded grasslands. *Agelanthus oehlerii* and *Oncocalyx fischeri* have been recorded as parasitic on a species of *Maytenus*, *Tapinan-*



Fig. 22. Air photograph of mosaic of montane grassland and forest in the upper montane zone of the Agoro Forest Reserve on the Ugandan side of the Imatong Mountain group. The components of the mosaic in this illustration are described under (3.B.a) *High-altitude Afromontane grasslands, Hagenia abyssinica woodlands and transition to forest* and (3.B.c) *High-altitude Afromontane forest*. Early rainy season aspect. Photograph: A. Plumptre, Wildlife Conservation Society. March 2005. Digital colour image.

thus globiferus has been recorded as parasitic on *Combretum sp.* and *Viscum tuberculatum* has been recorded as parasitic on *Nuxia congesta* and *Maytenus sp.*

In the grasslands or wooded grasslands two seasonal aspects can be distinguished, as first indicated by Jackson (1956, p. 362). However, the current authors have added a number of species to the characteristic flora of the two seasonal aspects. After the grass-fires a number of geophytes come into flower, as in the grass-

lands of the plains. These species include: *Ascolepis protea* subsp. *bellidiflora*, *Bulbostylis oritropes*, *Crepis ruepellii*, *Cyperus angolensis*, *Cyperus fibrillosus*, *Cyperus niveus* var. *leucocephalus*, *Cyperus niveus* var. *tisserantii*, *Delphinium leroyi*, *Dolichos kilimandscharicus* subsp. *kilimandscharicus*, *Dolichos schweinfurthii*, *Eriosema chrysadenium* var. *chrysadenium*, *Eriosema rhodesicum* var. *rhodesicum*, *Gladiolus dalenii* subsp. *dalenii*, *Gladiolus dalenii* subsp. *andongensis*, *Gnidia involucrata*, *Gnidia lamprantha*, *Habenaria chirensis*, *Ha-*

benaria schimperiana, *Hypoxis villosa*, *Sporobolus olivaceus*, *Wahlenbergia silenoides*, *Wahlenbergia napiformis* and a number of ground orchids, e.g. *Brachycorythis ovata* subsp. *schweinfurthii*, *Brachycorythis pleistophylla*, *Disa aconitoides* subsp. *concinna*, *Disa erubens* subsp. *erubens*, *Disa ochrostachya* (only recorded from Mt. Lonyili in the Dongotona Mountains group), *Satyrium carsonii*, *Satyrium sacculatum*, *Satyrium trinerve* and *Satyrium volkensis*.

During the other seasonal aspect the grass grows to its maximum height and a number of shrubs or partially woody-stemmed herbs of about the same height as the grass come into flower. These species include *Echinops amplexicaulis*, *Guizotia scabra*, *Indigofera atriceps* subsp. *atriceps*, *Lantana trifolia* and *Maytenus buchananii*. Occasionally, the rather rare climbers *Peponium cienkowskii* and *Rhynchosia tricuspida* subsp. *imatongensis*, endemic to the Imatong Mountains group, can be found in association with rocky outcrops.

As pointed out by Jackson (1956, p. 362), the species of *Loudetia* are locally replaced by *Setaria sphacelata*, especially where the soil is somewhat deeper. *Alloteropsis semialata* and *Andropogon schirensis* may also be present. *Cymbopogon nardus* has been recorded from similar habitats on Mt. Emogadung on the Dongotona Mountains.

The current authors have made notes about the vegetation dominated by *Loudetia* at altitudes above c. 1800 m. a.s.l. In places where the fire is not too destructive, there are patches of trees, chiefly *Combretum molle*. This kind of wooded grassland includes the following herbaceous species that were observed during the late part of the rainy season:

Aeschynomene abyssinica, *Andropogon schirensis*, *Anisopappus africanus*, *Antherotoma naudinii*, *Antopetitia abyssinica*, *Argyrolobium fischeri*, *Aspilia congoensis*, *Berkheya spekeana*, *Bidens somaliensis*, *Bidens ugandensis*, *Crotalaria alexandri*, *Conyza pyrropappus* subsp. *pyrropappus*, *Crotalaria in-*

cana subsp. *purpurascens*, *Crotalaria natalitia* var. *rutshuruensis*, *Crotalaria shirensis*, *Cynanchum praecox*, *Dichrocephala chrysanthemifolia*, *Diplophium africanum*, *Dissotis brazzae*, *Dissotis perkinsiae*, *Ectadiopsis oblongifolia*, *Eriosema chrysadenium*, *Eulophia guineensis*, *Eulophia livingstoniana*, *Eulophia montis-elgonis*, *Eulophia odontoglossa*, *Eulophia orthoplectra*, *Euphorbia depauperata* var. *depauperata*, *Euphorbia depauperata* var. *laevicarpa*, *Euphorbia schimperiana* var. *schimperiana*, *Gerbera piloselloides*, *Guizotia scabra* subsp. *scabra*, *Helichrysum schimperi*, *Hyparrhenia bracteata*, *Hyparrhenia pilgeriana*, *Hypoxis* sp. (Andrews 1892), *Indigofera arrecta*, *Indigofera atriceps* subsp. *atriceps*, *Indigofera emarginella*, *Inula paniculata*, *Kotschya aeschymenoides*, *Lablab purpureus* subsp. *uncinatus*, *Lactuca inermis*, *Laggera crassifolia*, *Lotus bequetii*, *Melinis minutiflora*, *Moraea afro-orientalis*, *Moraea schimperi*, *Ochrocephala imatongensis*, *Ocimum gratissimum* var. *gratissimum*, *Osyris quadripartita* (in sites protected from fires), *Pentas decora* var. *decora*, *Pentas lanceolata* subsp. *lanceolata*, *Pentas purseglovei*, *Pentas schimperiana* subsp. *schimperiana*, *Phyllanthus nummularifolius*, *Platostoma rotundifolium*, *Platycoryne crocea* subsp. *montis-elgon*, *Plectranthus cyaneus*, *Plectranthus lactiflorus*, *Polygala petitiana* subsp. *parviflora*, *Pseudarthria confertiflora*, *Satureja abyssinica*, *Satureja imbricata*, *Setaria sphacelata* var. *sericea*, *Sopubia ramosa*, *Spermacoce pusilla*, *Sphaerocodon caffrum*, *Thesium schweinfurthii*, *Thesium* sp. cf. *T. leucanthum*, *Verbascum brevipedicellatum*, *Vernonia adoensis*, *Vernonia karaguensis*, *Vernonia purpurea*, *Vigna comosa*, *Vigna frutescens* subsp. *kotschyi*, *Vigna luteola*, *Vigna schimperi* and *Wahlenbergia virgata*.

Jackson (1956, p. 362) suggests that if this kind of grassland or wooded grassland is protected from fire, a succession towards *Acacia abyssinica* woodland will begin. A similar succession may also be seen in the gradient from the top of the rocky hills through *Protea* grassland to *Acacia abyssinica* woodland.

On slightly deeper soil dense stands of *Pterid-*

ium aquilinum may become established in the *Loudetia* grassland. These *Pteridium* stands are often fire-resistant, because the horizontal rhizomes continue to grow and send up new fronds after the old ones are burnt, but *Pteridium* is absent from the most fiercely burnt hill-sides with shallow soil.

The first woody species to appear after fire-protection is *Maesa lanceolata*, with the bramble *Rubus steudneri* generally accompanying it. *Conyza pyrrhopappa* subsp. *pyrrhopappa*, *Conyza gouanii* and *Conyza newii* also occur at this stage. The species of *Rubus* and other trailing plants such as *Periploca linearifolia* and *Toddalia asiatica*, which accompany it, gradually suppress the *Loudetia*. At the edge of clumps of trees the *Loudetia* is sometimes replaced by *Hyparrhenia cymbaria*.

Maesa lanceolata is generally dominant and characteristic at this stage, but is often accompanied by other small trees and shrubs, which, according to Jackson (1956), include: *Clutia abyssinica*, *Nuxia congesta*, *Rhamnus prinoides* and *Vernonia* sp. aff. *V. adolfi-friderici* (a specimen of this *Vernonia* has not been traced. As mentioned above, *Vernonia adoensis*, *V. karaguensis* and *V. purpurea* occur in this habitat. In the absence of material, Jackson's *Vernonia* species cannot be identified).

These are accompanied by climbers, including: *Clerodendrum johnstonii* subsp. *johnstonii*, *Dioscorea schimperana*, *Smilax anceps*, *Gouania longispicata* and *Phytolacca dodecandra*.

The giant lobelia, *Lobelia giberroa*, is an erect woody herb, which grows to at least 5 m. and is common in these situations. Other herbs include *Alectra sessiliflora* var. *senegalensis*, *Leonotis ocyimifolia*, *Plectranthus defoliatu*s, *Cynium erectum*, *Satureja imbricata*, *Helichrysum odoratissimum*, *Helichrysum schimperi*, *Guizotia scabra*, *Bidens somaliensis*, *Thalictrum rhynchocarpum*, *Clerodendrum myricoides* subsp. *myricoides*, *Pycnostachys meyeri*, and *Dissotis senegambiensis* var. *senegambiensis*. Grasses are sparse, the principal

species being *Panicum monticola*, *Poa schimperiana*, and *Brachypodium flexum*.

Eventually, young trees of *Acacia abyssinica* subsp. *calophylla* may appear, which marks the beginning of the next stage in the succession. At this and later stages in the succession, *Acacia abyssinica* is often associated with *Hypericum quartinianum*.

Protea gagedi is most common between 2000 and 2300 m. a.s.l.; above 2300 m. it is quite rare and below about 2000 m. it is largely replaced by *P. madiensis*. *Hagenia abyssinica* becomes the most important colonist of grassland, especially where the forest is separated from grassland by a narrow transitional zone. *Hagenia abyssinica* occurs with *Maesa lanceolata* and at higher altitudes replace it; at these higher altitudes *Tephrosia interrupta* is also an important colonist. *Hagenia abyssinica* may also be succeeded by *Acacia abyssinica* subsp. *calophylla*, but generally passes directly into *Podocarpus latifolius*-*Syzygium guineense* subsp. *afromontanum* forest, without a stage with *Acacia abyssinica* woodland.

Jackson (1951) has briefly described a rather similar wooded grassland from between 2000 and 2300 m. on Mt. Lotuke in the Didinga Mountains. This vegetation contains *Hymenodictyon floribundum*, *Protea gagedi*, and *Syzygium guineense* (presumably subsp. *guineense*).

In our satellite-image analyses it is difficult to locate areas of rocky outcrops, *Loudetia* grassland and scattered woody vegetation of *Protea*, which has probably been included with class no. 7, *Swamp or other dense low green vegetation ...*, and no. 12, *Open scrub, woodland or bamboo thicket with a mixture of bare rocks*. There is in the satellite-image analyses no clear distinction between lowland and montane habitats in these classes.

(b) *Acacia abyssinica* woodland

According to Jackson (1956, p. 363) and Sommerlatte & Sommerlatte (1990), *Acacia abyssini-*

ca woodland [in Jackson 1956 named *Acacia xiphocarpa* woodland] follows *Loudetia* grassland, perhaps, as described above under (a), through a stage with a tangle of *Maesa lanceolata* and *Rubus steudneri*, in the succession from grassland towards forest.

Acacia abyssinica woodland is generally found at altitudes between 1500 and 2100 m. a.s.l. However, on the north-east side of the Imatong Mountains group the vegetation types occurs at slightly higher altitudes, between 1700 and 2500 m. a.s.l., probably because of the lower rainfall. In some parts of the mountain massifs *Acacia abyssinica* woodland does not occur at all, and in such places the succession appears to be direct from *Protea* grassland to *Albizia gummifera* woodland or *Podocarpus latifolius* forest. *Acacia abyssinica* subsp. *calophylla* woodland is, according to Jackson (1956, p. 363), especially characteristic of areas, which have been cultivated in the past.

In typical *Acacia abyssinica* woodland a densely tangled herbaceous undergrowth develops as a seral stage towards the development of evergreen bushland or forest. The following is a typical list of species as they generally occur at 1900 m. altitude:

Trees: *Acacia abyssinica*, *Croton macrostachyus*, *Maesa lanceolata*, *Nuxia congesta*, *Albizia gummifera* (*), *Albizia schimperiana* (*), *Polyscias fulva* (*). The species marked with (*) are young trees, which, according to Jackson (1956, p. 363), represent the next stage in the succession.

Shrubs and woody herbs: *Calpurnia aurea* subsp. *aurea*, *Chamaecrista kirkii*, *Hypericum quartianum* (common), *Lobelia giberroa* (common), *Lantana trifolia* (occasional), *Vernonia myriantha*, *Vernonia amygdalina*, *Vernonia theophrastifolia* and *Triumfetta brachyceras*.

Climbers: *Cissampelos* sp. cf. *C. pareira* [perhaps a misidentification of specimens of the common *Cissampelos mucronata*], *Clerodendrum johnstonii*, *Mucuna pruriens*, *Periploca linearifolia*,

Pterolobium stellatum, *Rubus steudneri*, *Stephania abyssinica* and *Toddalia asiatica*.

A number of epiphytes may be common, for example *Drynaria volkensii*, *Lepisorus excavata*, *Loxogramme abyssinica* and *Phragmanthera usuiensis*.

Herbs: *Emilia coccinea*, *Eulophia abyssinica*, *Pteridium aquilinum*, *Thalictrum rhynchocarpum*, *Pentas lanceolata* subsp. *quartiniana*

The tree stratum in *Acacia abyssinica* woodland is to some extent fire resistant when the trees are mature. Jackson (1956, p. 364) has reported that it often happens that a severe fire has partially reversed the succession and left the *Acacia abyssinica* trees in the tree stratum, while it has destroyed its shrub layer, so that the result is a layer of *Acacia abyssinica* trees over open grassland.

Jackson (1950) has reported on a zone with *Acacia abyssinica* woodland on the Dongotona Mountains, but it is not very extensive, as the altitudes at which it would be found are mostly occupied with barren rocks or rocks with very thin soil and a sparse grass stratum with *Protea gaguedi*. There is no record of this vegetation from the Didinga Mountains, and *Acacia abyssinica* has nor been recorded from there.

In our satellite-image analyses it is not possible to locate areas of *Acacia abyssinica* woodland, the dense forms of which has probably been included with class no. 6, *Other dense woodland*, and the more open forms with no. 12, *Open scrub or lowland bamboo thicket with a mixture of bare rocks*.

(c) Afromontane *Albizia* woodland or forest and the transition to Afromontane

Podocarpus forest

Between 1800 m. and 2100 m. a.s.l. there are on all three mountain massifs patches of rather dense woody vegetation, which are characterised by the dominance of species of *Albizia*. As pointed out by Jackson (1956, p. 364) *Albizia gummifera* occurs throughout the range of this



Fig. 23. Air photograph of almost closed canopy of *Podocarpus* forest in the montane zone of the Agoro Forest Reserve on the Ugandan side of the Imatong Mountain group, but parts of the forest shown in the photograph are on the Sudan side of the border. The vegetation extends through several altitudinal zones, which are described in the text under (3.A.e) *Afromontane forest dominated by Podocarpus latifolius, Olea capensis and Syzygium guineense* and (3.B.c) *High-altitude Afromontane forest*. Early rainy season aspect. Phot. A. Plumptre, Wildlife Conservation Society. March 2005. Digital colour image.

vegetation in the Imatong Mountains group, but it is most frequent above c. 2000 m. a.s.l., while, below 2000 m., *Albizia schimperiana* is the most frequent species of *Albizia* in woodlands and forest. Jenkin *et al.* (1977, p. 68) refer to this vegetation type as *Croton-Macaranga-Albizia* forest, and we agree that the vegetation has the general appearance of forest. Sommerlatte & Sommerlatte (1990) have chosen to refer to these *Albizia*-dominated communities as *Albizia* forest, and they point out that the vegetation is

widespread and important, since it occupies areas of more than 18,000 ha. in the Acholi Mountains and the Ateppi and Ngairigi basins of the Imatong Mountains. Sommerlatte & Sommerlatte have also confirmed the altitudinal separation between *Albizia schimperiana*, at altitudes mainly below 2000 m. a.s.l., and *Albizia gummifera*, at altitudes mainly above c. 2000 m. a.s.l. According to the records in this work *Albizia schimperiana* has been recorded from c. 1400 to c. 2000 m. a.s.l. on the Imatong

and the Didinga Mountains, while *Albizia gummifera* occurs from c. 1800 to c. 2100 m. a.s.l. on all three mountain massifs in habitats rather similar to the ones described by Jackson and Sommerlatte & Sommerlatte. Fig. 20 shows an almost pure stand of trees of *Albizia*, which must represent an early stage in the succession involving this vegetation.

According to Jackson (1956, p. 364) these woodlands most often represent a relatively short-lived stage in the succession from *Acacia abyssinica* woodland to forest dominated by *Podocarpus latifolius*, *Olea capensis* subsp. *hochsteteri* and *Syzygium guineense* subsp. *afromontanum*. According to Jackson (1956, p. 364), the *Albizia* woodland occasionally succeeds the *Loudetia* grasslands with *Protea* and *Maesa* directly without the intervening *Acacia abyssinica* stage.

The current authors agree with Jenkins *et al.* and Sommerlatte & Sommerlatte that this vegetation should be considered a kind of open forest, and that it may be more stable and long-lived than suggested by Jackson, but we have decided to apply the heading *Albizia* woodland or forest in order to keep the link with the description by Jackson (1956, p. 364-365) and to emphasise that it may form an important seral stage in the regrowth of *Podocarpus latifolius* forest from grassland, wooded grassland, thicket and woodland. Jenkin *et al.* (1977, p. 23) point out that this forest type is most common in the areas around the villages of Gilo and Itibol in the Imatong Mountains group, where farming has taken place in the past; this is suggested to indicate that it is a secondary forest type that might in due time develop into forest dominated by *Podocarpus*.

The *Croton-Macaranga-Albizia* forest seems to be the most species-rich of the montane vegetation types in the study area, considerably richer in species than the mature *Podocarpus latifolius* forest. The *Albizia* dominated vegetation also equals several aspects of the submontane seasonal rain forest of White in Chapman

& White (1970). As pointed out by Sommerlatte & Sommerlatte, between 1600 and 1800 m. a.s.l., woodlands with *Albizia schimperiana* occupy quite large areas in which the trees grow to great dimensions up to 25 or 30 m. in height and 80 cm. in diameter. At such altitudes the *Albizia* woodland or forest may possibly represent the climax, as admitted by Jackson (1956, p. 364).

In the following is presented a long list of species recorded from afro-montane *Albizia* woodland. The list is based on a much shorter list by Jackson (1956, p. 364-365), and the current authors have added a considerable number of species from their own observations. Here some species which are somewhat marginal have been included, in order to avoid splitting the species list into too many subunits.

With *Albizia gummifera* occur *Polyscias fulva*, *Croton macrostachyus*, *Ilex mitis*, *Macaranga capensis* var. *kilimandscharica*, occasional *Dombeya torrida* subsp. *torrida*, and locally *Bridelia brideliifolia*. In some places *Bridelia brideliifolia* is common, and both that species, and more commonly *Macaranga capensis* var. *kilimandscharica* may locally replace *Albizia gummifera* as dominants. *Clausena anisata* is a common understorey tree. Relict trees of *Maesa lanceolata* and *Acacia abyssinica*, often moribund, may remain. Near streams, *Schefflera abyssinica* may occur, starting as an epiphyte on other trees, but eventually strangling its host and forming a tree.

The tangle of herbs and scandent shrubs associated with *Acacia abyssinica* woodland is gradually weakened by the shade, until the ground flora becomes scanty, consisting chiefly of the grasses *Oplismenus hirtellus*, *Brachypodium flexum* and *Festuca africana*. in fairly moist situations *Lycopodiella cernua* may occur on slopes.

At this dense stage colonisation by the species of the climax forest may begin with species like the following (a few species are quoted from Jackson (1956, p. 364-365), but

most have been listed from the observations of the current authors): *Ekebergia capensis*, *Fagaropsis angolensis*, *Ocotea kenyensis*, *Olea capensis* subsp. *hochstetteri*, *Podocarpus latifolius*, *Strombosia scheffleri* and *Syzygium guineense* subsp. *afromontanum*.

A number of large shrubs or small trees (3-15 m.) occur in the lower stratum in later stages in the succession: *Alangium chinense*, *Anthocleista grandiflora*, *Allophylus abyssinicus*, *Bridelia brideliifolia*, *Campylospermum densiflorum*, *Canthium oligocarpum* subsp. *oligocarpum*, *Casipourea malosana*, *Celtis africana*, *Chaetachme aristata*, *Clausena anisata*, *Craterispermum schweinfurthii*, *Ficus thonningii*, *Heinsenia diervilleoides*, *Lepidotrichilia volkensii*, *Peddiea fischeri*, *Solanum aculeastrum*, *Suregada procera*, *Trema orientalis*, *Trichocladus ellipticus* subsp. *malosanus* (very rare, not yet seen from the Sudan side of the Imatong Mountains) and *Turraea holstii*.

Among streams, there may be stands of tree ferns: *Cyathea manniana*, and possibly other species.

The shrub stratum includes: *Acanthopale pubescens*, *Agauria salicifolia*, *Argomuellera macrophylla*, *Boehmeria macrophylla*, *Brucea antidysenterica*, *Clerodendrum johnstonii* subsp. *johnstonii*, *Clerodendrum myricoides* subsp. *myricoides* var. *discolor*, *Discopodium penninervium*, *Dovyalis macrocalyx*, *Dracaena laxissima*, *Dracaena steudneri*, *Galiniera saxifraga*, *Grewia stolzii*, *Halleria lucida*, *Maytenus gracilipes* subsp. *arguta*, *Maytenus undata*, *Oxyanthus speciosus* subsp. *stenocarpus*, *Pavetta* sp. nov. near *P. abyssinica*, *Psychotria mahonii* var. *puberula*, *Rinorea brachypetala*, *Ritchiea albersii*, *Rytigynia neglecta* var. *neglecta*, *Tephrosia interrupta* subsp. *interrupta*, *Thunbergia vogeliana*, *Turraea floribunda*, *Vernonia biafrae*, *Vernonia iturienensis* and *Vernonia wollastonii*.

The lianas and vines include: *Agelaea pentagona*, *Cayratia gracilis*, *Combretum paniculatum* subsp. *paniculatum*, *Culcasia falcifolia*, *Cyphostemma bambuseti*, *Cyphostemma ukereuwense*, *Dalbergia lactea*, *Embelia schimperi*, *Fagopyrum snowdenii*,

Gouania longispicata, *Jasminum abyssinicum*, *Loeseneriella africana*, *Macrotyloma axillare* var. *glabrum*, *Momordica pterocarpa*, *Monanthes schweinfurthii*, *Oncinotis tenuiloba*, *Oreosyce africana*, *Pristimera graciliflora*, *Rhynchosia resinosa*, *Rubus pinnatus* var. *afrotropicus*, *Sericostachys scandens*, *Smilax anceps*, *Stephania abyssinica*, *Tacazzea conferta*, *Thunbergia alata*, *Tiliacora unifera* and *Toddalia asiatica*.

In the fairly closed vegetation, epiphytes are common and include the following: *Angraecum humile*, *Asplenium aethiopicum*, *Asplenium dregeanum*, *Asplenium friesiorum*, *Asplenium sanderonii*, *Cyperus ajax* (in moist places), *Diaphanante lorifolia*, *Drynaria volkensii*, *Elaphoglossum lastii*, *Globimetula braunii* (parasitic), *Huperzia dacrydioides*, *Lepisorus excavata*, *Loxogramme abyssinica*, *Oleandra distenta*, *Peperomia abyssinica*, *Peperomia fernandopoiana*, *Peperomia tetraphylla*, *Phragmanthera polycrypta* subsp. *subglabriiflora* (parasitic on *Ilex mitis*), *Pleopeltis macrocarpa*, *Plicosepalus curviflorus* (parasitic on *Albizia* spp.), *Polystachya cultriformis*, *Trichomanes pyxidiferum* var. *melanotrichum* and *Vittaria volkensii*.

At this stage of the succession, when a number of other tree species are co-dominant with *Albizia*, a very rich stratum of ground floor herbs may occur (the records have been made by the current authors, no other observer seems to have gone into such detail with the forest floor in this vegetation type; again a number of species that are somewhat marginal have been included in order to avoid splitting the species list into too many units): *Acalypha psilostachya*, *Acalypha volkensii*, *Achyrospermum parviflorum*, *Adenostemma mauritanium*, *Adenostemma perrottetii*, *Alchemilla abyssinica*, *Amphicarpaea africana*, *Aneilema hirtum*, *Ardisiandra sibthorpioides*, *Aristea alata* subsp. *abyssinica* (edge), *Arthraxon micans*, *Arthropteris monocarpa*, *Arthropteris orientalis*, *Asplenium hypomelas*, *Asplenium lunulatum*, *Asplenium megalura*, *Asplenium monanthes*, *Asplenium protensum*, *Asystasia gangetica*, *Athyrium scandicinum*, *Barleria ventri-*



Fig. 24. Mt. Kinyeti (left peak in the background) and *Podocarpus* forest in the upper reaches of the Kinyeti Valley, seen from mountain ridges near Bushbuck Hill. The vegetation in the fore- and middleground is a mosaic of (3.A.a) Rocky outcrops, *Loudetia* grassland grassland and scattered woody vegetation of *Protea* and (3.A.e) Afromontane forest dominated by *Podocarpus latifolius*, *Olea capensis* and *Syzygium guineense*. Late rainy season aspect. Photograph: I. Friis. December 1980. Scanned from 24 × 36 colour diapositive.

cosa, *Brachiaria scalaris*, *Brillantaisia cicatricosa*, *Brillantaisia madagascariensis*, *Carduus nyassanus*, *Carex echinochloe* subsp. *echinochloe*, *Celosia schweinfurthiana*, *Cheilanthes farinosa*, *Chlorophytum comosum*, *Christella dentata*, *Christella gueinziana*, *Commelina benghalensis* var. *benghalensis*, *Commelina diffusa* subsp. *montana*, *Conyza steudellii*, *Conyza tigrensis*, *Crassocephalum bauchiense*, *Crassocephalum crepidioides* (edge), *Crassocephalum montuosum* (edge), *Crassocephalum vitellinum* (edge), *Crassula alsinoides*, *Crotalaria glauca*, *Crotalaria intonsa*, *Crotalaria lachnocarpoides*, *Cyathula achyranthoides*, *Cyperus amabilis*, *Cyperus denudatus* var. *denudatus*, *Cyperus dichroostachyus*, *Cyperus elegantulus*, *Cyperus fischerianus*, *Cyperus*

pinguis, *Cyperus sesquiflorus* subsp. *appendiculata*, *Diclis ovata*, *Dorstenia annua*, *Dorstenia brownii*, *Droguetia iners* subsp. *iners*, *Drymaria cordata*, *Dryopteris inaequalis*, *Dryopteris kilemensis*, *Elatostema monticola*, *Epilobium salignum*, *Epipogium roseum*, *Eulophia galeoloides*, *Eulophia streptopetala* var. *streptopetala* (edge), *Festuca africana*, *Floscopa glomerata* subsp. *glomerata*, *Galium chlorionanthum*, *Geranium aculeolatum*, *Geranium ocellatum*, *Habenaria malacophylla*, *Hydrocotyle siphonpioides*, *Hypericum peploidifolium*, *Hypoestes consanguinea*, *Hypoxis angustifolia*, *Impatiens ethiopica*, *Impatiens hochstetter* subsp. *hochstetteri*, *Impatiens tinctoria* subsp. *tinctoria*, *Isachne mauritiana*, *Isodon schimperi*, *Isoglossa punctata*, *Isoglossa so-*

malensis, *Juncus oxycarpus*, *Justicia ladanoides*, *Justicia nyassana*, *Kosteletzkya adoensis*, *Lefebvrea abyssinica*, *Lepidagathis glandulosa* (edge), *Leucas deflexa* var. *deflexa* (edge), *Lobelia dissecta* subsp. *humidulorum*, *Lobelia giberroa*, *Lobelia inconspicua*, *Lobelia molleri*, *Ludwigia abyssinica*, *Lycopodiella cernua* (seepage at forest edge), *Marattia fraxinea*, *Nephrolepis undulata*, *Oldenlandia herbacea* var. *herbacea*, *Oplismenus compositus*, *Panicum calvum*, *Panicum pusillum*, *Pellaea quadripinnata*, *Phaulopsis imbricata* subsp. *imbricata*, *Phyllanthus boehmii*, *Pilea johnstonii* subsp. *johnstonii*, *Pilea tetraphylla*, *Pimpinella hirtella*, *Piper capense*, *Pouzolzia parasitica*, *Pseudechinolaela polystachya*, *Pteris pteridioides*, *Pycnostachys meyeri*, *Ranunculus multifidus*, *Rumex abyssinicus*, *Rumex nepalensis*, *Sanicula elata*, *Scleria distans*, *Selaginella abyssinica*, *Setaria poiretiana*, *Solenostomon autranii*, *Tectaria gemmifera*, *Thalictrum rhynchocarpum*, *Torilis arvensis* subsp. *heterophylla* (edge) and *Viola abyssinica*.

At lower levels, Jackson (1956, p. 365) has recorded more shrubs associated with the *Albizia* woodland; the following is from c. 1700 m. a.s.l., and with some records made by the current authors added:

Albizia schimperiana, *Albizia gummifera*, *Dracaena steudneri*, *Lepidotrichilia volkensii*, *Clausena anisata*, *Clerodendrum johnstonii*, *Zanthoxylum sp.*, and *Ochna sp.* In the ground cover the following herbs were observed: *Monothecium glandulosum* and *Brillantaisia sp.*

Albizia woodland is not usually susceptible to fire but is occasionally damaged by fierce fires at the end of the dry season. Jackson (1956, p. 348, 365) observed that large areas of such woodlands of *Albizia schimperiana* were burnt by late fires in 1946; in some places the trees were not severely damaged, but the undergrowth was destroyed and a dense growth of *Impatiens tinctoria* and *Girardinia diversifolia* followed the fire.

Jackson (1950) has recorded the presence of a fringe of *Albizia gummifera* with *Croton macrostachyus*, *Macaranga schweinfurthii*, (this is

more likely to be the montane species *Macaranga capensis*) and *Polyscias fulva*.

In our satellite-image analyses it not possible to locate specific areas of afro-montane *Albizia* woodland or forest and the transition to afro-montane *Podocarpus* forest, which must have been included with class no. 6, *Other dense woodland*, no. 7, *Swamp or other dense low green vegetation ...* and no. 9, *Evergreen montane forest*.

(d) *Vernonia* thickets

Thickets of shrubs or small trees, mainly species of *Vernonia*, were recognised as a seral stage in the regrowth of the lower montane forest by Jenkin *et al.* (1977, p. 77-78), who suggested that abandoned farmland and open [post climax] *Podocarpus*-*Syzygium* forest typically would develop through *Vernonia* thickets, first into *Croton*-*Macaranga*-*Albizia* forest and ultimately into *Olea*-*Podocarpus* closed forest. Sommerlatte & Sommerlatte (1990) supported this view. *Vernonia* thickets have not been described and discussed as a separate vegetation type by Jackson (1956). The thickets occur on the mountains at altitudes between 1600 and 2400 m. a.s.l., and are not continuous in their distribution, although they cover an area of over 8.500 ha. in the Imatong Forest Reserve alone (Jenkin *et al.* 1977, p. 77-78). *Vernonia* thickets mainly occur where there has been disturbance other than fire in the montane forests and *Albizia* woodlands. Thickets are particularly common where abandoned farmland has been derived from and is still surrounded by forest. In this respect they differ from the *Maesa*-*Rubus* tangle which usually is associated with the transition from *Loudetia* grassland to forest via *Acacia abyssinica* woodland (see above under (b)). In the Imatong Mountains *Vernonia* thickets are particularly common around the upper reaches of the Kinyeti Valley, in the Ateppi Basin and in the Acholi Mountains. The two most common species of *Vernonia* are according to our observations *Vernonia amygdali-*

na and *Vernonia myriantha*. The *Vernonia* thickets consists of a very discontinuous tree stratum in which *Albizia gummifera* or *Albizia schimperiana* are the most common trees, indicating that the next seral stage in the regrowth of the forest is the dense *Albizia* woodland described here as (c). According to Sommerlatte & Sommerlatte (1990) the shrub layer is dense and continuous, c. 2-5 m. high, with the emerging trees 5-10 m. high, but we noted much lower types for example in the valleys towards Issore. Fires are infrequent in these thickets, which are often surrounded by forest. In Fig. 19, there are small areas with *Vernonia* thickets surrounding the mountain forests, but they are not clearly visible in the illustration.

In the tree stratum, higher than 5 m., the following species occur: *Albizia gummifera* (common), *Albizia schimperiana*, *Dombeya torrida* (common), and *Croton macrostachyus* (common).

The shrub and herb stratum, 2-5 m. high, includes the following species: *Astragalus atropilosus* subsp. *burkeanus*, *Carissa edulis*, *Guizotia arborescens*, *Harungana madagascariensis* (occasional), *Heteromorpha trifoliata*, *Maesa lanceolata* (common), *Lobelia giberroa* (occasional), *Rhus ruspolii*, *Vernonia myriantha* [syn. in Sommerlatte & Sommerlatte (1990): *V. subuligera*] (very common), *Vernonia amygdalina* (occasional).

The following lianas have been recorded: *Embelia schimperi* (occasional), *Mucuna poggei* var. *pesa*, *Rubus apetalus*, *Rubus pinnatus* var. *afrotropicus* and *Rubus steudneri* var. *aberensis* (common).

The ground stratum, less than 2 m. high, includes grasses and large herbs: *Commelina erecta* subsp. *livingstonii*, *Hyparrhenia cymbaria*, *Leonotis ocyimifolia*, *Pavonia urens*, *Pennisetum unisetum* [syn. in Sommerlatte & Sommerlatte (1990): *Beckeropsis uniseta*], *Plectranthus alpinus*, *Setaria megaphylla* [syn. in Sommerlatte & Sommerlatte (1990): *Setaria chevalieri*].

Under shade and in moist places the low

grass *Digitaria abyssinica* is common, together with a range of other species, e.g. *Panicum chionachne*, *Panicum pusillum* and *Panicum weihei*.

In our satellite-image analyses it is not possible to locate areas of *Vernonia* thickets, which must have been included with classes no. 6, *Other dense woodland*, no. 7, *Swamp or other dense low green vegetation ...* and no. 9, *Evergreen montane forest*.

(e) Afromontane forest dominated by *Podocarpus latifolius*, *Olea capensis* and *Syzygium guineense*

This is the most humid montane climax forest in the study area, and is dominated by *Podocarpus latifolius*, *Olea capensis* and *Syzygium guineense*. According to Jackson (1956, p. 365) it occurs from the edge of streams in valleys (provided the ground is not too swampy) almost to the summit of the ridges, but is perhaps most abundant on the upper parts of the slopes towards the ridge-tops. The description of the mountain forest of the study area as "ravine forest" (e.g. in Andrews 1948) is therefore misleading, but has probably been introduced because such forest, as is the case with forests at lower altitudes, are best protected against fire in deep ravines. The records of the present work documents the dominant species from all three mountain massifs but areas with Afromontane forest dominated by *Podocarpus latifolius*, *Olea capensis* and *Syzygium guineense* is by far most extensive in the Imatong Mountains group.

Jenkin *et al.* (1977, p. 23) point out that there are subtypes of this forest, chiefly *Olea-Podocarpus* closed forest and *Podocarpus-Syzygium* open forest, but the current authors did not observe marked floristic distinctions between these types and have not been able to take the distinction into account here, where we have basically followed the broad concept of *Podocarpus-Olea-Syzygium* forest in the classifi-



Fig. 25. Mountain grassland on gravelly soil near Observation Hill. The vegetation in this illustration is described in the text under (3.A.a) *Rocky outcrops, Loudetia grassland grassland and scattered woody vegetation of Protea*. Late rainy season aspect. Photograph: I. Friis. November 1980. Scanned from 24 × 36 colour diapositive.

cation of Jackson (1956, p. 365-368). However, the term *Podocarpus-Syzygium* is used by Jackson once in the paper, in the legend to his Fig. 4, an illustration showing the profile of a “*Podocarpus-Syzygium*” forest.

The trees in the top stratum of the canopy are generally 20 to 25 m. high, and the canopy is closed. There is a moderately well-developed but not continuous second storey of trees 5 to 8 m. high and a shrub layer 2 to 3 m. high in which *Acanthus eminens* is dominant almost throughout. The ground flora (except where gaps occur in the canopy) is generally sparse and sometimes completely absent.

The following is a list of species which are

found in the *Podocarpus latifolius*, *Olea capensis* and *Syzygium guineense* forests:

Trees of the upper stratum: *Allophylus abyssinicus* (rare), *Apodytes dimidiata* subsp. *acutifolia*, *Celtis africana*, *Chrysophyllum gorungosanum* (rare), *Croton macrostachyus* (occasional), *Cussonia spicata* (only recorded from the Dongotona Mountains), *Dombeya torrida* (occasional), *Fagaropsis angolensis* (rare), *Macaranga capensis* var. *kilimandscharica* (occasional), *Ochna holstii* (occasional), *Ocotea kenyensis* (occasional), *Olea capensis* subsp. *hochstetteri* (common), *Olea capensis* subsp. *welwitschii* (common), *Olinia rochetiana* (occasional), *Podocarpus latifolius* (frequent, locally common), *Prunus africana*

(occasional), *Syzygium guineense* subsp. *afromontanum* (common), *Vepris nobilis* (common) and *Zanthoxylum gillettii* (occasional),

There are examples of forest clearings in this vegetation type being invaded by the tall, succulent tree-euphorbia, *Euphorbia ampliphylla*.

Second-storey trees: *Afrocrania volkensis*, *Bersama abyssinica* (rare), *Cassipourea malosana* (occasional), *Hypericum roeperianum*, *Ilex mitis* (occasional), *Lepidotrichilia volkensis*, *Maytenus undata* (occasional), *Pittosporum viridiflorum* (occasional), *Psychotria mahonii* (rare), *Psychotria orophila* (common), *Ritchiea albersii* (rare), *Strychnos mitis* (rare), *Trichocladus ellipticus* subsp. *malosanus* (very rare), *Vepris nobilis* (frequent) and *Xymalos monospora* (rare).

Shrubs: *Acanthus eminens* (common), *Brucea antidysenterica*, *Dracaena afromontana* (locally common), *Erythrococca trichogyne* (occasional), *Galiniera saxifraga* (occasional), *Heinsenia diervilleoides* (occasional), *Heteromorpha trifoliata* (rare, mainly at edges), *Pavetta abyssinica* var. *abyssinica*, *Rhamnus prinoides* (rare, at edges) and *Tarenna pavetoides* subsp. *gillmanii*.

Climbers: *Clerodendrum johnstonii* (locally common), *Cyphostemma kilimandscharicum* (rare), *Dalbergia lactea* (rare), *Dioscorea quartiniana* var. *quartiniana* (rare), *Jasminum abyssinicum* (occasional), *Landolphia buchananii* (occasional), *Loeseneriella africana* (occasional) and *Rubus steudneri* var. *aberensis*.

Epiphytes: *Asplenium abyssinicum*, *Asplenium aethiopicum*, *Asplenium bugoiense*, *Asplenium dregeanum*, *Asplenium elliottii*, *Asplenium lunulatum*, *Asplenium manni*, *Asplenium megalura*, *Asplenium theciferum*, *Drynaria volkensis*, *Huperzia dacrydioides*, *Huperzia ophioglossoides*, *Pleopeltis macrocarpa*, *Stolzia repens*, *Tapinanthus constrictiflorus* (parasitic on unknown host tree), *Trichomanes pyxidiferum* var. *melanotrichum*, *Vittaria volkensis*.

Grasses and herbs on the forest floor: *Acritochaete volkensis* (frequent), *Adiantum poiretii*, *Amauropelta bergiana*, *Amauropelta opposi-*

tiformis, *Arisaema schimperanum*, *Asplenium anisophyllum*, *Asplenium monanthes*, *Athyrium scandicinium*, *Athyrium schimperii*, *Botrychium chamaeconium*, *Brachypodium flexum* (occasional), *Cardamine africana*, *Carex conferta* var. *conferta*, *Cerastium afromontanum* (occasional), *Cheilanthes inaequalis* var. *inaequalis*, *Commelina imberbis*, *Desmodium repandum* (occasional), *Dicliptera laxata* (occasional), *Ehrharta erecta* var. *abyssinica* (occasional), *Festuca africana* (occasional), *Girardinia bullosa* (rare, only at higher altitudes), *Girardinia diversifolia* (occasional, only in clearings), *Hypoestes aristata* (occasional), *Hypoestes forskoolii* (occasional), *Impatiens ethiopica*, *Impatiens hochstetteri* subsp. *hochstetteri*, *Lycopodium clavatum* (forest edges), *Ophioglossum costatum*, *Ophioglossum reticulatum*, *Oplismenus hirtellus* (frequent), *Osmunda regalis*, *Pilea rivularis* (occasional), *Pilea tetraphylla* (occasional), *Plantago palmata*, *Pneumatopteris unita*, *Poecilostachys oplismenoides* (occasional), *Polystichum setiferum* var. *fuscopaleaceum*, *Pteris catoptera* (occasional), *Scaadoxus puniceus*, *Stegnogramma pozoi*, *Selaginella kraussiana* and *Streblochaete longiarista*.

A rough idea of the proportion of the various dominants can be obtained from the following results of a strip survey to estimate timber volume in typical forest of this type, at 2000 m. a.s.l. (Jenkin *et al.* 1977). Only trees over 90 cm. in girth were recorded (the figures in brackets indicate number of trees per hectare): *Syzygium guineense* subsp. *afromontanum* (46), *Olea capensis* subsp. *hochstetteri* (44), *Podocarpus latifolius* (18), *Olea capensis* subsp. *welwitschii* (6), *Ocotea kenyensis* (6), *Ochna holstii* (4), *Vepris nobilis* (4), *Psychotria sp.* (4), *Croton macrostachyus* (2), *Fagaropsis angolensis* (2), *Dombeya torrida* (1).

As the altitude increases so does the proportion of *Podocarpus latifolius* until in the upper part of this type of forest *Podocarpus latifolius* forms almost pure stands except for a small number of specimens of *Olea capensis* subsp. *hochstetteri*.



Fig. 26. High altitude montane grassland and swamps surrounded by high-altitude forest. High-altitude valley near Bushbuck Hill. The vegetation in this illustration is described in the text under (3.B.a.) *High-altitude Afromontane grasslands, Hagenia abyssinica woodlands and transition to forest*. Late rainy season aspect. Photograph: I. Friis. December 1980. Scanned from 24 × 36 colour diapositive.

Podocarpus latifolius may, according to Jackson (1956, p. 366), act as a colonising species if the conditions needed for establishment of its seedlings are present: absence of both fire and severe competition from grasses and herbs, and presence of moderate, but not too heavy shade. Thus *Podocarpus latifolius* seedlings may occur in any place at a suitable altitude where there is light shade and a fairly clean forest floor, weather at a relatively early stage in the succession, for instance below *Maesa*; in the *Albizia gummifera* stage; or under mature *Podocarpus latifolius* forest. Perhaps the commonest site where seedlings are found is in the ecotone of *Maesa*, *Hagenia*, etc., between grassland and

forest. If *Podocarpus latifolius* occurs early in the succession the intermediate stages may be passed over.

Near Gilo large numbers of young *Podocarpus latifolius* were cut for poles in the 1940es. Elsewhere, however, and particularly at altitudes of over 2200 m. all ages of *Podocarpus latifolius* from seedlings to mature trees are found in the same area. Thus *Podocarpus latifolius* does regenerate itself under its own shade, and the climax forest would appear to be self-perpetuating, or at least capable of enduring for several generations. *Olea capensis* subsp. *hochstetteri* and *Syzygium guineense* subsp. *afromontanum* make their first appearance later in the succes-

sion than *Podocarpus latifolius*, and at altitudes of between 1800 m. and 2000 m.

Jackson (1950) has reported on a patch of *Podocarpus latifolius* forest covering approximately 20 kmsq. in a valley basin on the slopes of the Dongotona Mountains. The following additional tree species have been reported from that forest: *Celtis* sp., *Ochna holstii*, *Ocotea kenyensis*, *Olea capensis* subsp. *welwitschii*, *Prunus africana*, *Schefflera abyssinica* and *Syzygium guineense* subsp. *afromontanum*. It has not been possible to establish with certainty the identity of the tree species indicated by Jackson as "*Malacantha* nr. *M. superba*", but it could quite likely be *Pouteria adolfi-friederici*, which on the Imatong Mountains occur as a rare species in similar habitats. In the lower storeys: *Clausena anisata*, *Dracaena afromontana*, *Galimiera saxifraga*, *Lepidotrichilia volkensii*, *Psychotia* sp., and *Vepris nobilis*.

Along edges of the patch of *Podocarpus* forest on the Dongotona Mountains there is a canopy of *Albizia gummifera*, comparable to the Afromontane *Albizia* woodland or forest on the Imatong Mountains. Other species in this canopy are: *Croton macrostachyus*, *Macaranga schweinfurthii* (this is Jackson's identification, *M. schweinfurthii* is a species of the lowland rain forest, and it is more likely that the plant is the montane species *Macaranga capensis*) and *Polyscias fulva*. Shrubs along the edge were: *Abutilon mauritanum*, *Gnidia kraussiana*, *Maesa lanceolata* and *Nuxia congesta*.

Jackson (1951) has listed a few additional tree species from the *Podocarpus* forest of Mt. Lotuke in the Didinga Mountains, where it occurs above 2300 m.: *Olea capensis* subsp. *hochstetteri*, *Olea capensis* subsp. *welwitschii*, *Prunus africana*, and *Syzygium guineense* subsp. *afromontanum*.

There is some variance of opinion with regard to which forest subtype that may represent the climax vegetation. The opinion quoted above represents that of Jackson (1956, p. 365), while Sommerlatte & Sommerlatte

(1990) suggests that the almost pure *Podocarpus* forest, with some specimens of *Olea capensis* represents the climax.

In our satellite-image analyses it is not possible to distinguish areas with afromontane forest dominated by *Podocarpus latifolius*, *Olea capensis* and *Syzygium guineense*, which must have been included with class no. 8, *Conifer-dominated mountain forest*, no. 9, *Evergreen mountain forest*, and no. 10, *Dense montane forest*.

(f) Afromontane forest with other dominant species

In the study area, forest vegetation very similar to that described above from the Imatong Mountains group is found on the two other groups of mountains, particularly near the summit of the Dongotona Mountains and in the Didinga Mountains, including the forest on Mount Lotuke. The forest vegetation of the Dongotona Mountains group differs only in minor details from that of the Imatong Mountains group and the two areas can be considered together (Jackson 1950). (The record of *Podocarpus falcatus* from the Dongotona Mountains group in Andrews (1950) has never been confirmed and must be based on a misidentification of a specimen of *Podocarpus latifolius*). However, as mentioned previously, the forests of Mount Lotuke in the Didinga Mountains differ somewhat in that the area of moist *Podocarpus latifolius* forest is surrounded by a drier belt at 1800-2300 m. with remains of a forest of *Juniperus procera*. Previously, this forest has probably also contained *Olea europaea* subsp. *cuspidata*, a characteristic associate of *Juniperus procea* in eastern Africa (Jackson 1951), and, as it appears from the catalogue in the current work, *Olea europaea* subsp. *cuspidata* has been recorded elsewhere from the Didinga Mountains. *Catha edulis* has also elsewhere been recorded from these forests; as it appears from the present catalogue, *Catha edulis* has also been recorded from the Didinga

Mountains, but not in direct association with the surviving *Juniperus procera* trees.

Such a division of montane forest types based on humidity, *i.e.* a separation between drier *Juniperus procera* forest and moister *Podocarpus latifolius* forest, is common further south, for instance on Mount Kenya, but *Juniperus* does not occur in the Sudan west of the Didinga Mountains. North of Mount Lotuke *Podocarpus latifolius* also occurs in the Didinga Mountains group as a constituent of evergreen thicket in grassland, where it is mixed with *e.g.* *Euclea divinorum*, *Scutia myrtina*, etc. Apart from the notes by Jackson (1950, 1956) there is very little information on the *Juniperus* forest of Mt. Lotuke, but this type of vegetation is well known from Ethiopia and from East Tropical Africa as far south as Tanzania.

In our satellite-image analyses it is not possible to distinguish areas of afro-montane forest with other dominant species, which must have been included with class no. 12, *Open scrub or lowland bamboo with a mixture of bare rocks*. In our analyses, the latter type is very frequent in the south-eastern part of the Didinga Mountains.

(g) Broken Afro-montane forest

Considerable areas of the higher parts of the Imatong Mountains group are occupied by this type of vegetation, which is particularly common in damp valleys and on south-facing slopes. Jackson (1956, p. 367) has described how the ground is covered by a tangled mass of scrambling and climbing herbs, which may be 2 or 3 m. deep. Beneath this tangle lies rocks and the fallen stems of trees. The trees that remain standing are covered almost to their crowns with creepers, often producing the effect of thick green columns.

The trees are basically the same as in the upper part of the zone below: *Syzygium guineense* subsp. *afromontanum*, *Olea capensis* subsp. *hochstetteri* and *Podocarpus latifolius*. Among the

creepers and scrambling herbs there is a predominance of Acanthaceous species, including *Isoglossa somalensis*, *Mimulopsis solmsii*, *Hypoestes aristata*, *Hypoestes forskalii* and *Hypoestes triflora*, together with *Triumfetta brachyceras*, *Clerodendrum johnstonii*, *Urera hypselodendron*, and *Rubus steudneri*. A few small trees or shrubs occur among the creepers, especially *Galiniera saxifraga* and *Abutilon longicuspe*.

This type of vegetation is eventually re-colonised by trees, of which the most characteristic species are *Dombeya torrida* and *Croton macrostachyus*, followed by *Albizia gummifera*, after which the climax returns.

In some places, especially in very deep, rather dark valleys, the post climax vegetation has rather a different composition with *Dracaena steudneri* and *Ensete ventricosum* as the most characteristic species; with these are found *Solanecio mannii* and *Alangium chinense*, with Acanthaceous scramblers, etc., as before.

The cause of these areas of broken forest is not known exactly. Jackson (1956, p. 367) suggests that in some places they are found where a late fire has entered the forest, but it seems unlikely this can be the cause of all such areas. Perhaps they are due merely to a collective senescence and eventual wind-blow of the forest climax. The forest is regularly subject to very strong katabatic winds.

In our satellite-image analyses it is not possible to distinguish broken afro-montane forest, which must have been included with class no. 8, *Conifer-dominated mountain forest*, no. 9, *Evergreen mountain forest*, and no. 10, *Dense montane forest*.

(h) Riparian vegetation in the lower Afro-montane zone

According to Jackson (1956, p. 368) swampy stream beds in this zone have the following species: *Panicum subalbidum* (locally dominant), *Pennisetum trachyphyllum* (frequent), *Perisicaria setosula* (locally common), *Ranunculus*

multifidus (frequent), *Droguetia iners* (occasional). At the edge of the streams there are often beds of *Impatiens tinctoria*. Trees characteristically found near streams are: *Dovyalis abyssinica*, *Kigelia moosa*, *Pouteria adolfi-friederici* (especially in deep valleys), *Schefflera abyssinica* and *Trichocladus ellipticus* subsp. *malosanus* (very rare). The tree fern *Cyathea manniana* also occurs in marshy ground near streams, usually in valleys under heavy shade. Other large ferns in this habitat are *Marattia fraxinea* and *Osmunda regalis*.

Jackson (1951) has reported on remains of hillside gallery forest on Mt. Lotoke, Didinga Mountains. In the Kurumo Vally there were patches of forest with *Mimusops kummel* in the canopy. Associated with *Mimusops* were forest pioneer species: *Trema orientalis* and *Polyscias fulva*. Smaller trees were *Ritchiea albersii*, *Dombeya sp.* and *Celtis sp.* Another valley had *Albizia schimperiana* associated with *Celtis sp.* and *Diospyros sp.*

In our satellite-image analyses it is not possible to distinguish riparian vegetation in the lower afro-montane zone, but it has probably been included with class no. 7, *Swamp or other dense low green vegetation ...*, and with no. 8, *Conifer-dominated mountain forest*, no. 9, *Evergreen mountain forest*, and no. 10, *Dense montane forest*.

(B) The high-altitude Afro-montane forests and grasslands

According to Jackson (1956, p. 368) *Podocarpus latifolius* continues to form the climax in the higher montane zone (2600-3000 m. a.s.l.), though here it forms almost pure stands or is mixed with a little *Olea capensis* subsp. *hochstetteri*. Seral stages with *Rapanea melanophloeos*, *Hypericum revolutum* and *Hagenia abyssinica* cover a large part of the area, and the bamboo *Sinarundinaria alpina* is locally dominant. Either of

these species may be the dominant species in the vegetation, but very often a few specimens of the others are present even in apparently single-dominant stands. Lichens, particularly *Usnea* spp., become very abundant and much of the forest is wet or swampy. There are rather large areas of fire-climax grassland, and the forest is often reduced to strips and patches among the mountain meadows so that the landscape has the appearance of a park with small copses.

(a) High-altitude Afro-montane grasslands, *Hagenia abyssinica* woodlands and transition to forest

As in the drier forms of grasslands at lower altitudes species of *Andropogon*, *Digitaria* and *Setaria* are common in the high-altitude Afro-montane grassland. According to Jackson (1956, p. 368) the high-altitude afro-montane grasslands have been subject to very frequent burning. When burning is stopped *Hagenia abyssinica* rapidly colonises the grassland, together with *Tephrosia interrupta*, *Hypericum revolutum*, and *Gnidia glauca*. Fig. 22 and 26 show examples of high-altitude Afro-montane grassland, in both cases forming mosaics with other vegetation with trees. In Fig. 22 the almost pure patches of grassland are surrounded by Afro-montane forest, in Fig. 26 the swampy grassland is surrounded by *Hagenia abyssinica*, *Hypericum revolutum* and other species.

The species mentioned above are followed by higher forest with *Dombeya torrida*, *Hagenia abyssinica*, *Rapanea melanophloeos* and *Olinia rochetiana*. The trees of this transition average about 8 m. in height and are rather widely spaced. Finally, *Podocarpus latifolius* comes in and the vegetation changes into High-altitude Afro-montane forest. This type of transition occurs over considerable areas at higher elevation in the Imatong Mountains group, and probably also in the other massifs. This dynamic vegetation seems, according to Jackson

(1956, p. 369, 372), to be analogous to the *Hagenia-Hypericum* zone of the East African mountains (Hedberg 1951). However, in the Imatong Mountains group at least it is not the climax but is succeeded by *Podocarpus latifolius* forest. Jenkins *et al.* (1977, p. 72) describes this vegetation as *Podocarpus-Dombeya* open forest, where the *Podocarpus* trees form a very open canopy over a storey of *Dombeya*, but offers no opinion about its possible regeneration to forest dominated by *Podocarpus*.

Epiphytes may occur, the most common example is probably the fern *Asplenium abyssinicum*.

Shrubs or shrubby-based herbs in the lower strata are: *Clutia abyssinica* var. *abyssinica*, *Maytenus* sp., *Guizotia arborescens*, *Rhamnus prinoides* and *Agauria salicifolia*.

The ground beneath the trees is often moist, in which case *Cyperus dereilema* is often dominant in the ground flora.

With *Cyperus dereilema* in moist sites a number of other species may occur: *Arisaema enneaphyllum*, *Carex johnstonii*, *Carex petitiiana*, *Carex thomasi*, *Fuirena stricta*, *Gladiolus dichrous*, *Habenaria papyracea*, *Habenaria quartiniiana*, *Isolepis fluitans*, *Kniphofia pumila*, *Veronica abyssinica*, *Alchemilla* sp., *Impatiens hochstetter*, *Plantago palmata*, *Polystichum setiferum* var. *fuscopaleaceum*, *Rhynchosia elegans* and *Viola eminii*.

On drier sites a number of other species may come in: *Asparagus africanus*, *Bothriocline congesta*, *Bothriocline imatongensis*, *Bothriocline monticola*, *Dicliptera umbellata* and *Wurmbea tenuis* subsp. *hamiltonii*. Species common at lower altitudes, e.g. *Lobelia giberroa* and *Rubus steudneri*, have also been reported to occur.

Common grasses are *Andropogon lima*, *Bromus leptoclados*, *Ehrharta erecta* var. *abyssinica*, *Brachypodium flexum* and *Streblochaete longiarista*.

Another form of transitional vegetation is the fringe of shrubs and woody herbs separating forest from annually burnt grassland; this belt forms a protective zone preventing fire

(unless exceptionally fierce) from entering the forest. In this zone are found: *Tephrosia interrupta*, *Kalanchoe densiflora*, *Cyathula cylindrica*, *Cineraria deltoidea*, *Plectranthus schimperi*, *Coleus grandicalyx*, *Leonotis ocyimifolia*, *Bothriocline imatongensis*, *Vigna schimperi*, *Berkheya spekeana*, *Spergula arvensis*, *Justicia betonica*, *Carduus nyasanus*, *Sparrmannia ricinocarpa*, and *Agrocharis incognita*. *Hyparrhenia cymbaria* is a common grass at the forest edge.

In our satellite-image analyses it is not possible to locate areas of high-altitude afro-montane grasslands, *Hagenia abyssinica* woodlands and transition to forest, but it has most likely included with no. 10, *Dense mountain forest*.

(b) High-altitude Afromontane moist grasslands and swamps

In the Imatong Mountains group there is above c. 2400 m. a.s.l. a sequence of rather moist types of vegetation dominated by grasses and sedges, which covers large areas, particularly round Kipia. It has short, generally not more than knee-high grasses, mixed with very numerous and abundant herbs and sedges. It includes frequently boggy areas.

Jackson (1956, p. 368) has given this description of the grass and sedge-dominated vegetation around Kipia: *Bulbostylis setifolia*, a wiry-leaved, tussock-forming sedge, is dominant over wide areas. The most common grass is *Exothea abyssinica*, with *Digitaria diagonalis* var. *uniglumis* and *Setaria sphacelata* also common; other species of grasses are *Andropogon amethystinus*, *Koeleria capensis*, *Festuca sudanensis*, *Agrostis producta* and *Helictotrichon elongatum*.

Among the herbs the following have been recorded by Jackson (1956, p. 368-369) or from the material examined by the current authors: *Alchemilla ellenbeckii*, *Alepidea peduncularis*, *Athrixia rosmarinifolia*, *Carex mannii*, *Cyanotis barbata*, *Cycnium tenuisectum*, *Cyperus triceps*, *Cystopteris fragilis*, *Delphinium leroyi*, *Dipsacus pinnatifidus*, *Disa scutellifera*, *Epilobium stereophyllum*, *Erio-*

caulon schimperi, *Euphorbia depauperata*, *Geranium arabicum* subsp. *arabicum*, *Habenaria peristyloloides*, *Hebenstretia angolensis*, *Heraclium elgonense*, *Holothrix brongniartiana*, *Hypoxis villosa*, *Impatiens meruensis* subsp. *septentrionalis*, *Justicia afromontana*, *Lactuca inermis*, *Linum volkensisii*, *Lotus bequetii*, *Lysimachia ruhmeriana*, *Lythrum rotundifolium*, *Moraea schimperi*, *Peucedanum dispersum*, *Peucedanum linderi*, *Plectranthus schimperi*, *Polygala abyssinica*, *Ranunculus oreophytus* var. *oreophytus*, *Salvia nilotica*, *Satureja imbricata*, *Satyrium sceptrum*, *Sopubia ramosa*, *Trifolium polystachyum*, *Trifolium rueppellianum*, *Trifolium simense* and *Xyris capensis*.

Bidens chippii is abundant and at certain times of the year the grassland is yellow with its flowers.

Swampy areas in the mountain meadows are often rich in sediments and have deep wet black soil. In these swamps occur *Bidens isostigmatoides*, *Bidens ternata*, *Disa erubens* subsp. *erubens*, *Carex petitiana*, *Carex steudneri*, *Helichrysum splendidum*, *Juncus dregeanus* subsp. *bachitii*, *Eriocaulon schimperi*, *Schoenoplectus corymbosus* var. *brachyceras* and *Utricularia arenaria*. In slightly less wet places are found *Lathyrus hygrophilus*, *Hypericum peplidifolium* and *Carduus chamaecephalus*, while at edges of the swamp grow *Gunnera perpensa*, *Setaria atrata*, in thick clumps, and *Agrostis* sp. From this habitat Jackson (1956, p. 368) also mentions a species which he refers to as *Carex fischeri*, but we have not been able to establish the identity of this plant.

In other swampy areas *Impatiens hochstetteri*, *Alchemilla* sp. and *Ranunculus oreophytus* are found.

Sommerlatte & Sommerlatte (1990) suggest that two vegetation types can be separated in this formation. They term the first type *Exothecca* grassland, which occurs on sloping ground in a rather large area around Kipia (and elsewhere at the same altitude) above 2600 m. a.s.l. *Exothecca abyssinica*, *Setaria sphacelata*, *Digitaria diagonalis* var. *uniglumis* [syn. in Sommerlatte &

Sommerlatte (1990): *Digitaria uniglumis*] and *Bulbostylis setifolia* are the dominant species. The other type is termed *Carex* swamp grassland and occurs between 2400 and 2600 m. a.s.l. in the immediate surroundings of Kipia. In this vegetation type *Carex steudneri* is dominating; other prominent species are *Carex fischeri* and *Juncus dregeanus* subsp. *bachitii*.

In our satellite-image analyses it is not possible to locate areas of high-altitude afromontane moist grasslands and swamps, but it has most likely been included with class no. 7, *Swamp or other dense low green vegetation* ...

(c) High-altitude Afromontane forest

Jackson (1956, p. 369-370) has suggested that the climax vegetation at altitudes between 2600 and 3000 m. a.s.l., altitudes that in the study area are almost entirely restricted to the Imatong Mountains group, consists of almost pure stands of *Podocarpus latifolius*, with occasional *Olea capensis* subsp. *hochstetteri*. However, Sommerlatte & Sommerlatte (1990) included it with the pure *Podocarpus latifolius* forest, which according to them occur at slightly lower altitudes, between 2400 and 2900 m. a.s.l. in the central part of the Imatong Mountains. The trees, which occur in the elfin-like forest above an altitude of 2600 m., are rarely over 10 m. in height and are covered in *Usnea* and mosses. The lower strata are poorly known, but some species of the Ericaceous zone occurs, e.g. *Hypericum revolutum*, and *Myrica humilis*. *Afrocrania volkensisii* has been recorded to occur. Fig. 22 shows high-altitude Afromontane forest dominated by *Podocarpus* in mosaic with high-altitude Afromontane grassland.

The ground flora in high-altitude Afromontane forest is both according to the very short list by Jackson (1956, p. 369) and to the observations of the current authors mostly of a wet type, and has the following dominant species: *Cyperus dereilema*, *Carex thomasi*, *Ranunculus multifidus*, *Fumaria abyssinica*, *Impatiens tinctoria*, *Hy-*

poestes triflora, *Pteris catoptera*, *Pteris serrulata* and *Alchemilla* sp. *Peucedanum linderi* has been recorded in moist places.

Clematis simensis is a common climber, and *Drynaria volkensii* is a frequent epiphyte in these forests. The tall, shrubby herb *Senecio myriocephala* occurs in forest clearings and *Bothriocline congesta* occurs at the forest edge.

On Mt. Lotuke, *Sedum ruwenzoriense* is frequent on the rocks in the *Podocarpus* forest.

The most common grasses are *Helictotrichon umbrosum* and *Ehrharta erecta* var. *abyssinica*. *Impatiens meruensis* subsp. *septentrionalis* is frequent. The herb flora of the forest floor has a notable similarity with the flora of the grasslands at the same altitudes, but a few species have only been recorded from here, e.g. the orchid *Habenaria bracteosa*.

The areas occupied by mature forest of this type are relatively small and seral stages with *Dombeya torrida* and *Rapanea melanophloeos* mixed with *Podocarpus latifolius* are much more common.

In our satellite-image analyses it is not possible to locate areas of high-altitude afro-montane forest, but it has most likely been included with class no. 7, *Swamp or other dense low green vegetation* ..., no. 8, *Conifer-dominated mountain forest*, no. 9, *Evergreen mountain forest*, or no. 10, *Dense montane forest*.

(d) Afro-montane bamboo forest

In the Imatong Mountains group a zone of forest- or thicket-like vegetation dominated by Afro-montane bamboo has been described by Jackson (1956, p. 370), Jenkin *et al.* (1977), Sommerlatte & Sommerlatte (1990) and studied by the current authors. The alpine bamboo, *Sinarundinaria alpina*, occurs in a discontinuous belt at about 2700 m. a.s.l., especially to the east and north of Mount Kinyeti. It is often mixed with *Podocarpus latifolius* forest. As in the case of the *Oxytenanthera abyssinica* bamboo forest at lower altitudes the factors governing

the distribution of *Sinarundinaria* and its place in the succession are rather obscure.

In our satellite-image analyses it is not possible to locate areas of afro-montane bamboo forest, but it has most likely been included with class no. 7, *Swamp or other dense low green vegetation* ..., no. 8, *Conifer-dominated mountain forest*, no. 9, *Evergreen mountain forest*, or no. 10, *Dense montane forest*.

(4) The Ericaceous zone

This zone is found in the Imatong Mountains group at the summit of Mount Kinyeti and a few other high peaks in the central and southern part of the Imatong Mountains, e.g. Langia, and on Mt. Lomwaga on the Uganda side of the border. A list of species has been published by Jackson (1956, p. 370) and a number of additional records have been provided by the current authors. Hardly any of the species characteristic of this zone have been collected from the highest peaks of the other mountain massifs of the study area, and it seems from the available information likely that the highest peaks of the Imatong Mountains group are the only ones within the study area that have an Ericaceous zone. Fig. 27 shows vegetation in the Ericaceous zone and some vegetation from the upper range of the zone below.

The Ericaceous zone is found above the line of *Podocarpus latifolius* forest or the *Hagenia-Rapanea* woodland at 2900 to 3000 m. a.s.l. Some of its characteristic species also occur at lower altitudes on exposed rocky peaks within the forest or grassland zones, indicating that exposure rather than altitude alone may be the chief factor producing this type of vegetation in the Imatong Mountains group. The substrate is rocky, with a thin, stony layer of soil, or the soil may be restricted to pockets in the rocks. The vegetation is characteristically windswept.



Fig. 27. Mt. Kinyeti. Ericaceous vegetation and grassland near the summit. Most of the vegetation in this illustration is described in the text as (4) *Ericaceous zone*, but in the middle ground there is woody vegetation similar to that of the uppermost range of (3.B.a) *High-altitude Afromontane grasslands, Hagenia abyssinica woodlands and transition to forest*. Late rainy season aspect. Photograph: I. Friis. 1982. Scanned from 24 × 36 colour diapositive.

Certain life-forms are very characteristic of this zone such as ericoid shrubs; wiry, often aromatic herbs; and plants with white tomentose leaves. All these characters seem to be adaptations to the intense insolation and rather high transpiration found at high altitudes near the equator.

Woody plants in this zone rarely reach more than 2 m. in height. The dominant shrub is *Erica arborea* (it is possible that other species have been included under this name), *Gnidia glauca*, *Hypericum revolutum*, and *Myrica humilis*.

Partly shrubby-based herbs in this vegetation are: *Adenocarpus mannii*, *Anthospermum usambarense*, *Argyrolobium rupestre* subsp. *aberdaricum*, *Senecio ragazii*, *Alchemilla argyrophylla* subsp. *ar-*

gyrophylla, *Alchemilla cryptantha*, *Blaeria spicata* and *Kotschyia aeschymenoides*.

Herbs in this vegetation include: *Alepidea peduncularis*, *Asparagus africanus*, *Aspilia pluriseta*, *Bidens chippii*, *Bothriocline congesta*, *Bothriocline imatongensis*, *Bulbostylis setifolia*, *Carex chlorosaccus*, *Carduus chamaecephalus*, *Cerastium afromontanum*, *Crassula schimperi* subsp. *phyturus*, *Crassula vaginata*, *Cycnium tenuisectum*, *Cyperus bracheilema*, *Cyperus kerstenii*, *Hebenstretia angolensis*, *Helichrysum argyranthum*, *Helichrysum formosissimum*, *Helichrysum forskaohlii*, *Hesperantha petitiiana*, *Isolepis costata*, *Justicia afromontana*, *Lycopodium clavatum*, *Pimpinella oreophila*, *Plectranthus grandicalyx*, *Sagina abyssinica*, *Satureja imbricata*, *Satureja simensis*, *Silene burchelli*, *Solenos-*

tomon autranii, *Swertia schimperi*, *Trifolium elgonense* and *Verbascum scrophulariaefolia*.

The dominant grasses are: *Exothea abyssinica*, with *Tripogon major*, *Festuca sudanensis*, *Andropogon mannii* and *Agrostis kilimandscharica*.

Polystachya transvaalensis has been recorded as an epilithic orchid growing on rocks above the tree-limit.

In slight depressions, where a little water can collect, the following species are found: *Hypericum revolutum* (here a stunted undershrub), *Anthospermum usambarense*, *Rubus* sp., *Dipsacus pinnatifidus*, *Pimpinella oreophila*, *Cyperus* sp., *Anemone thomsonii* var. *thomsonii*, *Phyllanthus fischeri* and *Lithospermum afromontanum*.

The actual summit of Mount Kinyeti consists of rock slabs and boulders, heavily covered with *Usnea* in the crevices of the rocks, and among the boulders, the following species are found:

Adenocarpus mannii, *Alepidea peduncularis*, *Anthospermum usambarense*, *Bartsia trixago*, *Bothriocline imatongensis*, *Crotalaria vatkeana*, *Cyanotis barbata*, *Cyperus kerstenii*, *Disa fragrans* subsp. *deckenii*, *Disa hircicornis*, *Disa welwitschii* subsp. *welwitschii*, *Habenaria petitiana*, *Helichrysum formosissimum*, *Helichrysum forskaohlii*, *Hesperantha petitiana*, *Holothrix squamata*, *Lobelia dissecta*,

Minuartia filifolia, *Myrica humilis* (normally a small tree, but here only about 50 cm. high), *Pimpinella oreophila*, *Romulea fischeri*, *Satureja imbricata*, *Satyrium fimbriatum*, *Trifolium elgonense*, *Trifolium multinerve*, *Trifolium polystachyum*, *Vicia hirsuta*, *Vicia sativa* var. *angustifolia* and *Viola eminii*.

Grasses at the summit include *Aira caryophylla*, *Festuca elgonensis*, *Pentastichis pictigluma* and *Tripogon major*.

Jackson (1956, p. 370) has pointed out that in the past the ericaceous zone was sometimes burnt, and he is therefore of the opinion that the vegetation is possibly fire-climax, rather than a true climax. However, this is not accepted by Sommerlatte & Sommerlatte (1990) who point out that in other parts of East Africa the shrubby vegetation of *Erica*, etc., appears to be the climax vegetation at these altitudes (see e.g. Thomas 1943). There is no evidence of colonisation by other types of vegetation at the highest altitudes in the Imatong Mountains group.

In our satellite-image analyses it has not possible to locate areas with the Ericaceous zone (afromontane heathland), and it has most likely been included with no. 9, *Evergreen mountain forest*, or no. 10, *Dense montane forest*.

V. Zoogeographical analyses of the Imatong Mountains area

by Jon Fjeldså

These analyses utilise data from databases over vertebrate distributions in Africa south of the Sahara, which were developed since 1994 at the Zoological Museum, University of Copenhagen (ZMUC). Preliminary descriptions of these databases are given by Burgess *et al.* (2000) and Fjeldså *et al.* (1997, 2000, 2004). The fauna of the Imatong Mountains area can therefore be interpreted here in a continent-wide perspective.

Distributional data were compiled and analysed in the WorldMap software, which is a PC-based graphical tool designed for rapid and interactive accommodation of distributional data for large numbers of species (Williams 1998). Currently this database has more than one million data entries for land vertebrates. The spatial resolution is one geographical degree grid-cell, which extends approximately over 110 x 110 km. near the Equator.

In this account, most emphasis will be given to the bird data since they are the most accurate. All source-maps for the data have been range-maps, where collecting gaps are filled in where suitable macrohabitat exists between the collecting points, except where a species is unrecorded from a well studied site, or when the species is considered to be genuinely rare or local, in which case only point records are used. The mammal data set still has many collecting artefacts, especially for shrews and rodents, and will be analysed in less detail. Some remarks will be given on the frog and snake data, and to botanical databases developed using the same software (Lovett *et al.* 2000).

(1) The birds

The exploration of the bird fauna of south-eastern Sudan, including the Imatong Mountains area, started in 1933-50 with the work of F.O. Cave and J.D. Macdonald (see Cave & Macdonald 1955). Later, birds were collected here by an expedition from the Field Museum of Chicago in 1978 (Traylor & Archer 1982). On the first of the two trips which Ib Friis and Kaj Vollesen undertook to the Imatong Mountains they were together with zoologists, including Flemming Pagh Jensen from the Zoological Museum of the University of Copenhagen (ZMUC), who collected birds and provided a species list (in Friis & Rasmussen 1981). Gerhard Nikolaus collected data from all over Sudan over a long period, and spent considerable time in the Imatong Mountains area (Nikolaus 1978, 1989; see also Elzen & König 1983 for taxonomic and zoogeographic treatment of Nikolaus' collections). Later, Nikolaus (1987) published bird distribution maps for the whole of Sudan in a one-degree grid. These records were all incorporated into the ZMUC WorldMap databases.

Although many parts of the Sudan must still be regarded as poorly explored, the avifauna of the Imatong Mountains area is probably recorded quite completely. The three one-degree cells which include the Imatong Mountains and its companion ranges, the Dongotonas and Didingas (3-4° N, 32-33° E; 4-5° N, 32-34° E) may have as many as 566 bird species. This places the Imatongs Mountains area within the 'hotspot' of the 100 most species rich one-degree cells in Africa (Fig. 28A). This 'hotspot' includes the altitudinal gradient in the upper

Congo Basin to the Western (Albertine) Rift, a zone across Uganda, the Kenya highlands and the mountains of eastern Tanzania to the Malawi Rift and adjacent woodland savannas in eastern Zambia, and a few isolated areas.

The high species richness in the Imatong Mountains area undoubtedly reflects the habitat complexity caused by the large altitudinal range and marked gradients of rain exposure causing a mosaic of forest and non-forest habitats at all altitudes. Another possible explanation is the orographic climate moderation, leading to locally more predictable conditions, at least compared with the hydrologically unstable plains of southern Sudan (where most cells have only 200-300 bird species).

(A) The biogeographic relationships of the avifauna

de Klerk (1998) used the WorldMap bird dataset to analyse patterns of faunal replacement across Africa and to define faunal regions using a distance index comparing all grid cells and a hierarchical classification algorithm (UPGMC). She found, with the use of her terminology for fauna regions, that the Imatong Mountains area marks the north-eastern boundary of the Guineo-Congolian Subregion towards the Northern Savanna Subregion and the dry Turkana/Somalia districts of the North-eastern Subregion. However, the eastern part (Albertine Rift Province) of the Guineo-Congolian Subregion also includes a substantial number of species of the Southern Savanna Subregion, which inhabit montane habitat islands north to the Imatong Mountains area. This faunal boundary combines a very high taxonomic neighbour segregation (difference in taxic composition between adjacent one-degree cells) and a high neighbourhood heterogeneity (calculated as difference in species richness between cells). This latter

measure is caused by the contrast between the species richness of the 'hotspot' (Fig. 28) and of the depauperate fauna of the Turkana Desert and of the seasonally inundated and sparsely wooded plains of southern Sudan.

In Fig. 29A the distributions of all 566 birds recorded in the Imatong Mountains area are superimposed. It is apparent that the variation in richness of Imatong species is not a simple reduction by distance. Instead a high richness of Imatong birds are found widely along the Northern (Sudanesian-Sahel) and Southern savanna biomes, and through the highlands of eastern Africa. This reflects the position of the Imatong Mountains area on a suture between different biogeographic regions and the lack of a unique (endemic) fauna. A large number of species are widely distributed and with slight differentiation through all zones of woodland savannas. Within the northern savannas, the species richness is relatively low in the Chad depression and locally further west. This may reflect the lack of highland habitats in large parts of the northern savannas, and also the high extinction risks caused by climatic instability and the narrow area of parallel vegetation zones. Louette (1999) concluded that there is a decline in number of species along a line marked by the northern mountain ranges of Cameroon and the Lake Chad depression. Clayton & Hepper (1974) and Wickens (1976, p. 61-64) had found a similar decline in the grass and tree floras when the areas to the east and west of the Lake Chad basin were compared.

Although the majority of southern savanna and woodland birds of the Imatong Mountains area are widespread, there are also some quite isolated populations. Especially for the highland species, the Imatong Mountains area represent a more or less isolated northern forepost (e.g., *Sarothura affinis*, *Caprimulgus poliocephalus*, *Zoothera piaggiae*, *Cossyphus caffra*, *Cisticola ayresi* and *Batis molitor*). The low species richness in the savanna plains of south-eastern Sudan and

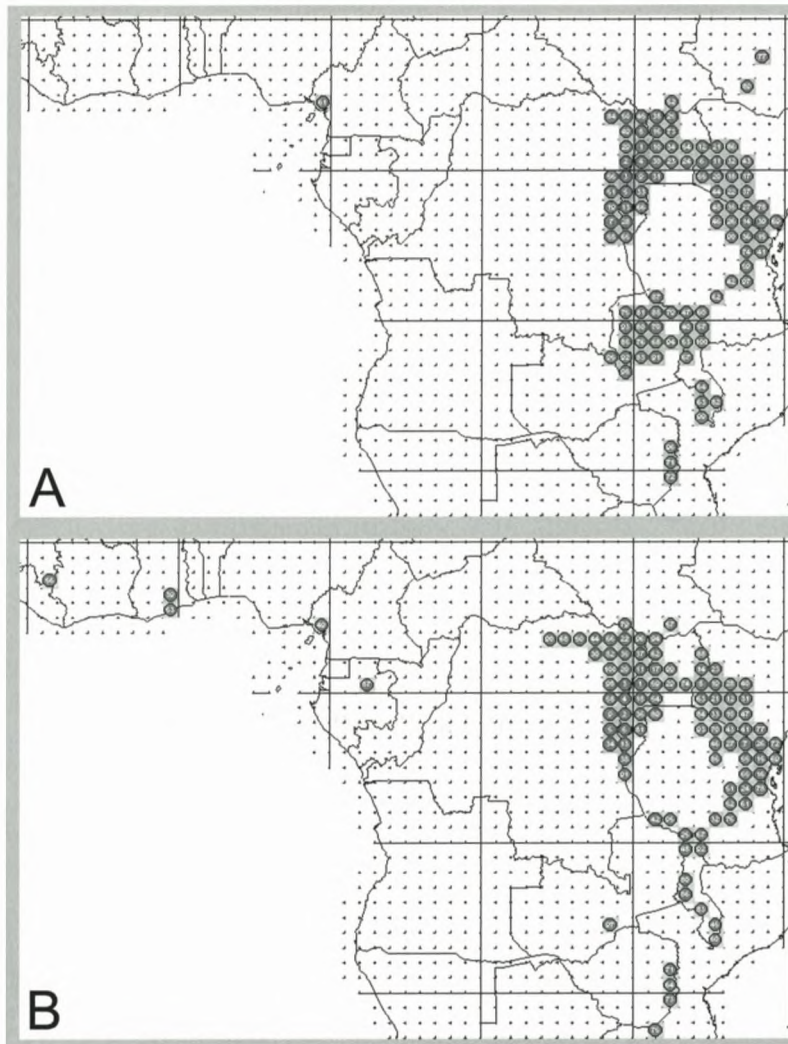


Fig. 28. "Richness hotspots" for birds (A) and mammals (B) in Africa. "Hotspots" were defined here as the 100 cells with the highest species numbers, 485-687 resident species of birds, 141-210 species of mammals.

in the dry Turkana steppe (Fig. 29A) suggests a partial isolation from the Ethiopian highland fauna, as also suggested by the differentiation of subspecies (Elzen & König 1983).

(B) Forest birds

A rather different picture is seen if we restrict the analysis to only the forest birds. This category is defined broadly as all species recorded

for forest habitats in the Imatong Mountains area by Nikolaus (1987), including species of forest edges, riverine forests and lowland bowl forests. This gives a total list of 105 species, or less than one fifth of the total avifauna of the Imatong Mountains area. Their distributions are reviewed in Table 9 and are overlaid in Fig. 30A, and clearly illustrate the position of the Imatong Mountains as the north-eastern forepost for the Guineo-Congolian forest birds (de Klerk 1998). A few forest birds characterise the

Table 9. Birds which have been recorded in forests habitat in the Imatong Mountains area, and their biogeographic affinities. F: species with distribution mainly or exclusively in closed forests (the remaining species inhabiting also edge and riverine habitats and the richer woodlands). Species recorded by Nikolaus marked with x, species recorded by Jensen marked with +.

<i>Anas sparsa</i>		X	Widespread, mainly southern/eastern Afr.
<i>Circaetus cinerascens</i>		X	Widespread, incl. Ethiopia
<i>Accipiter melanoleucus</i>		X	Widespread, incl. Ethiopia
<i>Accipiter minullus</i>		X	Widespread, incl. Ethiopia
<i>Accipiter tachiro</i>		X +	Widespread, incl. Ethiopia
<i>Stepanoaetus coronatus</i>		X +	Widespread, incl. Ethiopia
<i>Francolinus squamatus</i>		X	Widespread, incl. Ethiopia
<i>Guttera pucherani</i>		X	Widespread/patchy, NE limit
<i>Columba delegorguei</i>	F	X	East African montane, N isolate
<i>Columba arquatrix</i>	F	X	Montane eastern Africa, N limit
<i>Columba larvata</i>	F	X	Widespread, mainly montane, incl. Ethiopia
<i>Streptopelis lugens</i>		X	Montane eastern Africa, incl. Ethiopia
<i>Turtur tympanistra</i>		X	Widespread, incl. Ethiopia
<i>Corythaeola cristata</i>		X	Guineo-Congolian, NE isolate
<i>Tauraco leucolophus</i>		X	Ubangi-Uelle forest savanna province
<i>Tauraco schuetti</i>	F	X	Congolian, NE boundary
<i>Ceuthmochares aereus</i>		X	Widespread, incl. Ethiopia
<i>Strix woodfordi</i>		X	Widespread, incl. Ethiopia
<i>Apaloderma narina</i>		X	Widespread forest/woodl., incl. Ethiopia
<i>Ispidina picta</i>		X +	Widespread, incl Ethiopia
<i>Merops oreobates</i>		X +	E African montane, N isolate
<i>Phoeniculus bollei</i>		X	Mainly Ubangi-Uelle zone, to Kenya
<i>Pogoniulus bilineatus</i>		X +	Widespread, NE limit
<i>Gymnobucco bonapartei</i>		X	Guineo-Congolian, NE boundary
<i>Trachylaemus purpuratus</i>	F	X	Guineo-Congolian, NE boundary
<i>Indicator exilis</i>	F	X +	Guineo-Congolian, NE boundary
<i>Indicator maculatus</i>		X	Congolian, NE isolate
<i>Indicator variegatus</i>		X +	Widespread forest/woodl. Incl. Ethiopia
<i>Prodotiscus insignis</i>		X	Guineo-Congolian, NE boundary
<i>Campethera caroli</i>		X +	Guineo-Congolian, NE boundary
<i>Psaldoprocne albiceps</i>		X	East African montane, N boundary
<i>Dicrurus ludwigii</i>	F	X	Widespread, mainly montane, N boundary
<i>Parus funereus</i>	F	X	Guineo-congolian, NE isolate
<i>Parus albiventris</i>		X	Disjunct Afromontane, N isolate
<i>Pseudoalcippe abyssinica</i>	F	X +	Disjunct Afromontane, incl. Ethiopia
<i>Illadopsis fulvescens</i>	F	X +	Guineo-Congolian, NE boundary
<i>Illadopsis albipectus</i>	F	X	Congolian NE isolate
<i>Campephaga quiscalina</i>	F	X	Patchy across Africa, NE boundary
<i>Coracina caesia</i>	F	X	Disjunct Afromontane, incl. Ethiopia
<i>Andropadus curvirostris</i>		X	Guineo-Congolian, NE marginal pop.
<i>Andropadus gracilirostris</i>	F	X	Guineo-Congolian, NE boundary
<i>Andropadus latirostris</i>	F	X +	Guineo-Congolian, NE boundary
<i>Baeopogon indicator</i>		X	Guineo-Congolian, NE boundary

Table 9. Continued.

Bleda syndactyla	F	X +	Guineo-Congolian, NE boundary
Chlorocichla laetissima		X	W Rift and Kenya Highlands, N isolate
Pyrrhurus scandens		X	Guineo-Congolian, NE marginal
Nicator chloris		X	Guineo-Congolian, NE marginal
Phyllastrephus albigularis	F	X +	Guineo-Congolian, NE boundary
Phyll. hypochloris	F	X +	W Rift, NE marginal isolate
Phyllastrephus cabanisi	F	X +	Southern Congolian and W Rift, isolated N population; 1400-2000 m
Cossypha caffra		X +	Eastern African, montane. N isolate
Cossypha cyanocampter	F	X	Guineo-Congolian, to Kenya, NE marginal isolate
Alethe poliocephala	F	X +	Guineo-Congolian, distinctive marginal race <i>giloensis</i>
Cossypha natalensis		X +	Widespread N to Ethiopia, but mainly southern woodland/forest mosaics
Cossypha niveicapillus		X +	Widespread Guineo-Congolian to Ethiopia
Cossypha polioptera		X +	Disjunctly at periphery of the Congo Basin, NE marginal isolate
Sheppardia aequatorialis	F	X +	W Rift and Kenya highland, N isolate
Pogonocichla stellata		X	Widespread/patchy in Eastern Africa. N isolate
Turdus olivaceus	F	X +	Widespread in eastern Africa incl. Ethiopia
Zoothera piaggiae	F	X +	Local in East Africa and Ethiopia
Zoothera guttata		X	Local in SE and E africa, very isolated ssp. <i>maxis</i> in Imatong Mts.
Apalis cinerea		X +	Disjunct afromontane. NE boundary
Apalis jacksoni	F	X	Disjunctly around Congo Basin and in E Africa. NE marginal
Apalis pulchra		X +	Disjunct Afromontane, NE isolate
Bathmocercus rufus	F	X +	Congolian. NE isolate. To 2400 m
Bradypterus cinnamomeus		X	Widespread but patchy Afromontane, incl. Ethiopia
Chloropeta similis		X	E African montane. N marginal pop.
Hylia prasina	F	X +	Guineo-Congolian, NE isolate
Macrosphenus flavicans	F	?	Guineo-Congolian; unconfirmed marginal record (heard)
Phylloscopus umbrovirens		X	Patchy E African; montane, incl. Ethiopia
Eminia lepida		X	E Africa. N limit.
Eremomela badiceps		X	Guineo-Congolian, NE limit
Dioptrornis fischeri		X	E African montane. N marginal pop.
Muscicapa caerulescens		X	Widespread, NE marginal
Muscicapa adusta		X	Widespread montane, incl. Ethiopia
Platysteira jamesoni		X	Upper Congolian, NE marginal
Platysteira castanea	F	X +	Guineo-Congolian, NE margin
Platysteira cyanea		X	Mainly Guineo-Congolian, Ethiopia
Bias flammulatus		X	Guineo-Congolian, NE marginal
Elminia longicauda		X	Northern Guineo-Congolian, NE boundary
Tersiphone viridis		X +	Widespread incl. the woodland savannas
Laniarius luehderi	F	X +	Disjunct Congolian + Kenya, NE marginal

Table 9. Continued.

Poeoptera stuhlmanni		X	E African montane, incl. Ethiopia
Cinnyricinclus sharpii	F	X +	E African montane, incl. Ethiopia
Onychognathus walleri		X	E African montane, N marginal pop.
Anthreptes rectirostris		X	Guineo-Congolian, NE isolate
Anthreptes collaris		X	Widespread, incl. Ethiopia
Nectarinia olivacea		X +	Widespread, to SE Ethiopia
Nectarinia preussi		X +	W Rift and Kenya Mts, N isolate
Nectarinia rubescens		X	Congolian, NE isolate
Nectarinia seimundi		X	Guineo-Congolian, NE isolate
Nectarinia verticalis		X +	Guineo-Congolian, NE marginal
Zosterops poligaster		X +	Widespread species (or species group) in E African montane areas, incl. Ethiopia.
Malimbus rubricollis	F	X +	Guineo-Congolian, NE margin
Ploceus insignis	F	X +	Mainly montane, disjunct. NE marginal
Ploceus bicolor		X	Widespread in forest/woodlands. N margin
Ploceus melanogaster		X +	Disjunct Afromontane. NE isolate
Cryptospiza salvadorii	F	X	E African montane, incl. Ethiopia
Estrilda nonnula		X +	Guineo-Congolian, NE boundary
Mandingoa nitidula		X +	Widespread in forest/woodlands, at N boundary
Nigrita canicapilla		X	Guineo-Congolian NE limit
Linurgus olivaceus	F	X +	Disjunct Afromontane, NE isolate
Serinus citrinelloides		X	Ethiopia, and Imatong isolate
Serinus canicollis	F	X	Disjunct Afromontane, incl. Ethiopia
Spermophaga ruficapilla		+	Mainly upper Congolian, NE margin

Ubangi-Uelle district (the ecotone between the Congolian forest and the northern savanna woodlands; *Tauraco leucolophus*, *Phoeniculus bollei* and the range-restricted *Turdoides tenebrosus* in south-western Sudan and adjacent Uganda and Congo). Out of 39 Guineo-Congolian species only two continue to the Ethiopian highland. The Guineo-Congolian, and to some extent the Western Rift species inhabit mainly the lowland and foothill forests of Imatongs, but *Tauraco schuetti*, *Phoeniculus bollei*, *Laniarius luehderi* and *Bathmocercus rufus* go high up here (Nikolaus 1987). Some of the species are very widespread, or they are widespread Afromontane disjunct, with isolated populations in the Cameroon Mountains or even in the mountains of the Huambo region in central Angola. Many of these extend to the Ethiopian high-

land. However, Fig. 13A shows a marked hiatus for forest birds in south-eastern Sudan and the lake Turkana district.

The Imatongs is a somewhat isolated northern forepost for many montane birds in eastern Africa, but seven out of twenty are also found in Ethiopia. One species (*Serinus citrinelloides*) is Ethiopian with an isolated forepost in the Imatongs, but is part of a superspecies which is widespread in eastern Africa.

Most montane birds in the Imatong Mountains are represented by the same subspecies as in adjacent mountains of northern Kenya (*Campephaga quiscalina martini*, *Pogonocichla stellata intensa*, *Cossypha caffra iolaema*, *Apalis c. cinerea*, *Sylvietta whytii loringi*, *Phylloscopus umbrovirens*, *Dioptrornis f. fisheri*, *Onychognathus walleri elgonensis*, *Linurgus olivaceus elgonensis*), and

in some cases the same subspecies as in Ethiopia (*Alcippe a. abyssinica*, *Turdus olivaceus abyssinicus*, *Bradypterus c. cinnamomeus*, *Cryptospiza salvadorii*). Also for Guineo-Congolian species, or those of the Western Rift, the Imatong population is generally undifferentiated (Elsen & König 1983).

(C) Endemism in birds

Endemism can be defined using a cut-off limit, either a specific geographical area (nation or ecoregion) or a specific range-size. For birds a range limit of 50,000 km² is often used (Stattersfield *et al.* 1998). Endemism may also be assessed more objectively and in a way that applies to all species: as the inverse range-size (range-size rarity). The WorldMap software automatically calculates the sum of such range-size rarity scores for all species present in a cell, or a mean endemism per species present.

For most of Africa, such as the entire Guineo-Congolian forest biome, the range-size rarity score correlates closely with species richness and with environmental parameters (de Klerk 1998; Fjeldså *et al.* 1997, 2000 & 2004; J. Lovett pers. comm. for plants). Thus, the higher the carrying capacity, for example landscape complexity, temperature, rainfall, the more species are found, and the higher is the chance that there will also be some very rare or local species. Such patterns could in theory be explained as a simple consequence of current ecology, so there is no need to invoke historical explanations.

For montane regions the pattern is more complex, with some local aggregates of endemic species which can not be accounted for by species richness alone (Fjeldså *et al.* 2004). This applies for example to the Ethiopian highlands, the Bamenda highlands of Cameroon, the Angola scarp at Gabela, the Itombwe Mountains of the Western (Albertine) Rift and

in the East Usambara and Udzungwa Mountains of Tanzania. These peaks may reflect isolation as well as intrinsic ecoclimatic properties of some local areas, which enhance the possibilities for persistence of relict taxa (Fjeldså & Lovett 1997). This creates a highly nested distribution of endemic species

Among the 37 endemic birds of the Western (Albertine) Rift area (50,000 km² criterion) only ten extend north of the Rwenzori Mountains, with one of them (*Sylvietta chapini*) being endemic to the Lendu plateau. No narrow endemics extend north of the Lendu Plateau. Similarly, none of the narrow endemics of the eastern Congo (Ituri) lowlands reach Sudan. However, a few highland birds with slightly wider ranges (in the Albertine-Kenya highland) reach the Imatong Mountains area (*Phyllostrephus hypochloris*, *Chlorocichla laetissima*, *Sheppardia aequatorialis*, *Nectarinia preussi*). Among the nine Kenya highland endemics (50,000 km² criterion), five extend north to the Cherangani Hills and three to Mt Elgon (including only one forest species).

Narrow East African endemics which do not form decided aggregates are: two species of the Jubba riverine habitats and of the South Ethiopian highland which extend west to Lake Chamo (*Caprimulgus solala*, *Ploceus dichrocephalus*), the Karamoja Apalis *Apalis karamojae* in riverine *Acacia* scrub in Karamoja in north-east Uganda (and on the Serengeti plains, Tanzania), the Kulal White-eye *Zosterops (poliogaster) kulalensis* on Mt Kulal forest and William's Lark *Mirafra williamsi* in desert areas in northern Kenya, and Fox's Weaver *Ploceus spekeoides* in bushed grassland near Lake Kyoga, northern Uganda (Stattersfield *et al.* 1998). This non-nested pattern may reflect a mosaic of different habitats in the Somalia-Masai Region. Only one Turkana endemic with a slightly wider range (*Tockus jacksoni*) reaches the Didinga Mountains. Curiously, the range-restricted swallow *Psalidoprocne oleaginea* of SW Sudan and

SW Ethiopia is unrecorded in the Imatongs, as is *Cisticola mongalla*, an endemic of the upper White Nile valley.

The conclusion of this survey (and Table 9) is that the Imatong Mountains area falls outside the centres of endemism for forest birds. For all Imatong species, the average range-size is 311.3 grid cells, which is extremely close to the average range-size for all African birds (309.8 cells).

Even on the subspecies level the endemism is low. The montane forest birds of the Imatongs are mainly the same subspecies as in adjacent parts of the species range to the south and west (Elzen & König 1983). Among the few strictly endemic subspecies, most are rather subtle (*Cisticola ayresii imatong*, which inhabits montane meadows above 2000 m. a.s.l., *Zoothera piaggiae hadii*, *Zosterops poliocephala gerhardi* in the montane forest, which resembles the East African *stierlingi* and the Central African *stuhmanni*; probably more distinctive are *Alethe poliocephala giloensis* and *Zoothera fischeri maxis*, the latter being isolated by 1200 km from the nearest conspecific population at the Kenya coast (Nikolaus 1982).

The lack of endemic taxa, apart from some subspecies, may reflect a rather high frequency of (re-) colonisation from the south and west, or a low historical persistence of forest tracts which are large enough to hold viable bird populations. Traylor & Archer (1982) suggest that *Nectarinia seimundi* may have immigrated to the Imatong Mountains area since the exploration by Cave and Macdonald. However, there is little evidence for direct colonisation from the Ethiopian highland across the savanna plains of south-eastern Sudan.

(2) The mammals

The ZMUC mammal database is less complete than the bird database. This is because histor-

ical distributions (which are rather crude range-maps) are used for the larger and better known species, while only point maps (documented records) are used for poorly sampled taxa, and for those, mainly rodents, where the taxonomy is still unclear. This means that maps showing species richness and endemism still have quite strong sampling biases. Mammal data from Sudan are documented mainly in the collections of The Natural History Museum (London), the Field Museum (Chicago) and the US National Museum (Washington, D.C.) and were reviewed by Setzer (1956) and Yalden *et al.* (1976). Specimens from the Imatong Mountains area are mainly those of H. Hoogstraal, A.L. Archer and J.S. Owen (Field Museum, Chicago) and by G. Nikolaus (Museum Koenig, Bonn), and there is also some material in Copenhagen, by Harry Madsen, collected on the first trip which Ib Friis and Kaj Vollesen undertook to the area. The larger mammals of the Imatong Mountains area are reviewed by Jackson (1956) and Sommerlatte & Sommerlatte (1990) (see Chapter II(3A) of this volume). Because of the undersampling of many mammal groups, only a preliminary and crude overview can be given.

In our databases, 154 mammal species are recorded for the three grid-cells which include the Imatong, Dongotonas and Didinga Mountains. As with birds, the mountains are included in the 'hotspot' of the one hundred most species rich cells in Africa (Fig. 28B). The 'hotspot' has approximately the same extension as for birds.

Fig. 29B shows the regional distribution for all 154 species. Because of the undersampling of some mammal groups (in large parts of Africa) the overall pattern is influenced quite much by the range-maps for large and well known savanna species. This may explain the quite uniform species richness in southern Sudan and the Central African Republic. Overall, the pattern resembles that for birds. However,

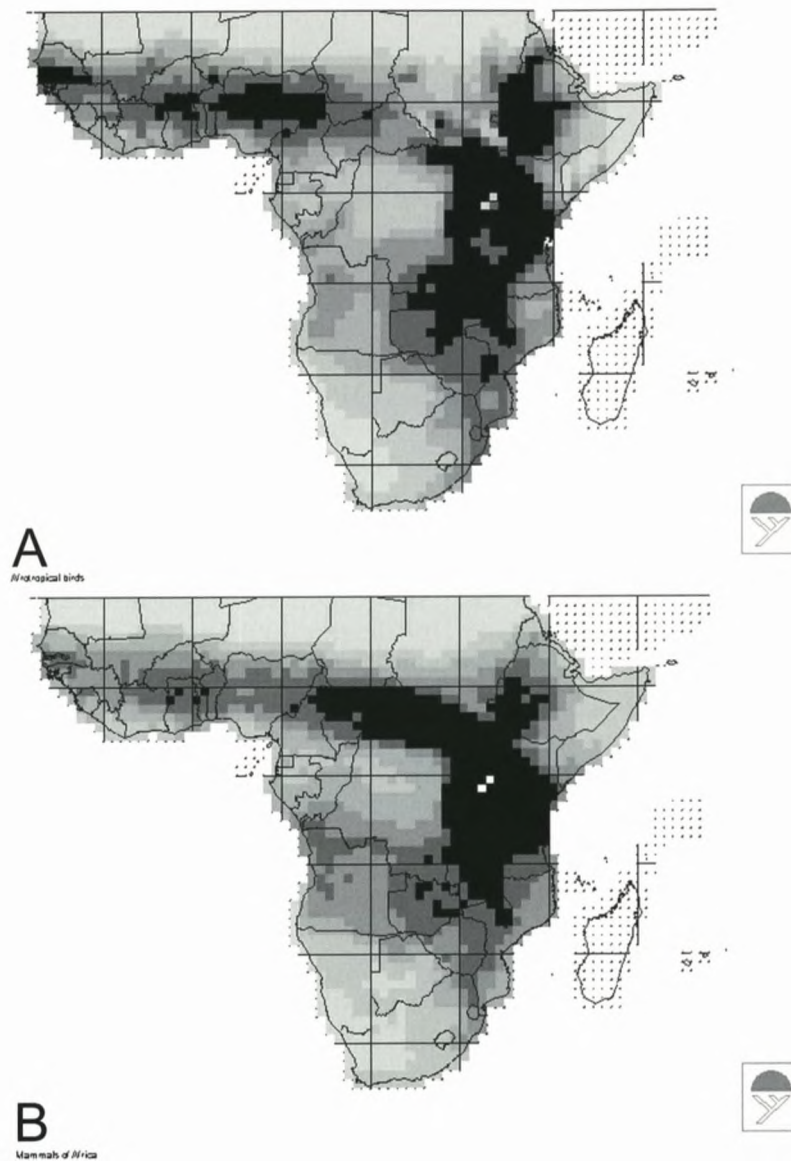


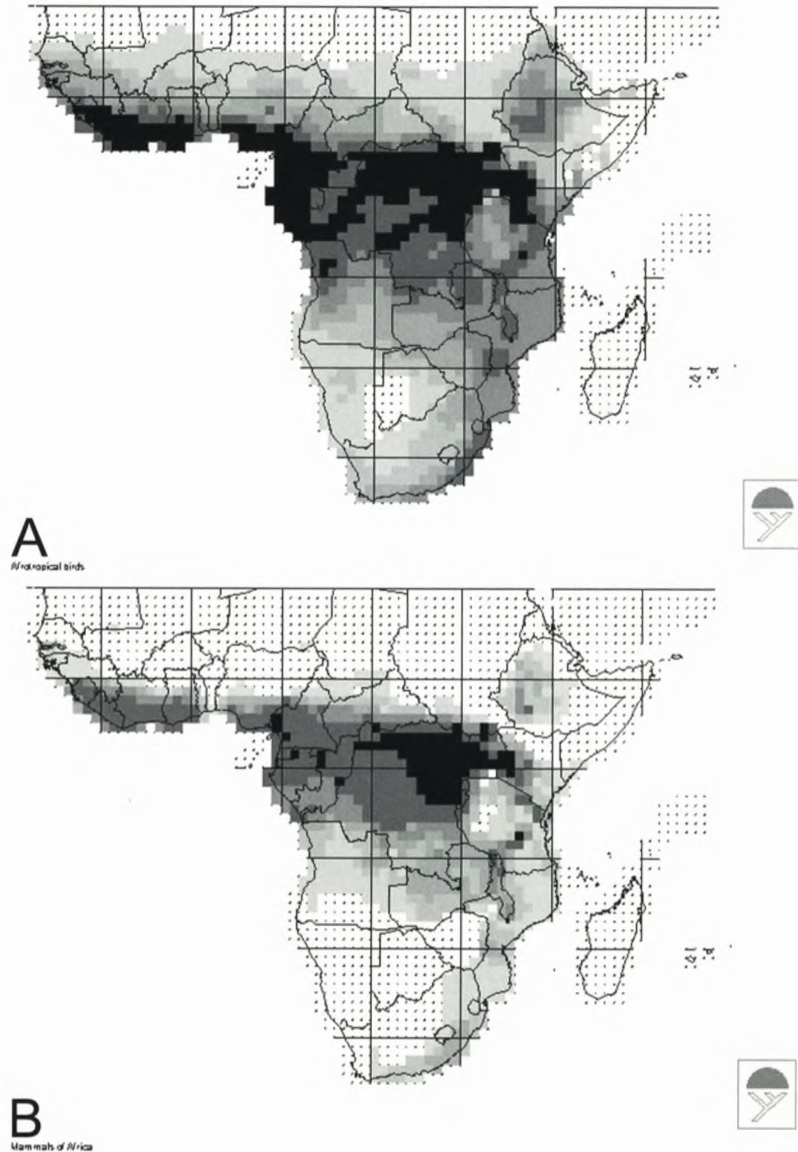
Fig. 29. The geographical distribution of all birds (A) and mammals (B) which are recorded in the three grid-cells which include the Imatong Mountains. The darkest shading marks the highest species richness, >300 for birds, >80 for mammals.

there can be little doubt that the Imatong mammals are somewhat better represented than birds in the Ubangi-Uelle forest savanna ecotone and across the savannas of the Chad Basin. The decline west of the Chad Basin may reflect the barrier effect of the northern mountain ranges of Cameroon (Louette 1999).

(A) Forest mammals

Fig. 30B shows the distribution pattern for the 16 forest dependent Imatong mammals (because of insufficient data a more restrictive definition was used than for birds). The richness pattern is similar to that for forest birds, except that the forest mammals are less widespread, giving a relatively

Fig. 30. The geographical distribution of all 105 forest birds (A) and 16 forest-dependent mammals (B) which are recorded in the three grid-cells which include the Imatong Mts.



stronger concentration in eastern Congo and in the adjacent lowland forests of Uganda and north-western Kenya. A few of the species are very widespread, even extending to the Ethiopian highland (Table 10). For four montane species which are strictly eastern African, the Imatongs is a northern forepost. However, a fifth species is found also in Ethiopia.

As for birds, the Imatong Mountains area falls outside the areas of exceptional endemism in the Western Rift and Kenya highland areas. However, there is a fairly high endemism on the subspecies level, especially among shrews and rodents (altogether 13 endemic forms according to Setzer 1956). Some of this variation may be rather subtle, or with

Table 10. Forest mammals recorded in the Imatong Mountains area, and their biogeographic affinities. Legend as for Table 9.

<i>Crocidura montis</i>	F	X	E African montane, N isolate
<i>Crocidura hildegardeae</i>	F	X	Guineo-Congolian to Kenya, NE margin
<i>Rousettus lanosus</i>	F	X	E African montane, incl. Ethiopia
<i>Nycteris arge</i>		X	Guineo-Congolian, NE margin
<i>Hipposideros cyclops</i>	F	X	Guineo-Congolian, some eastern populations
<i>Cercopithecus mitis</i>		X	Widespread Congolian, E Africa, Ethiopia
<i>Colobus guereza</i>		X	Congolian to Ethiopia
<i>Profelis aurata</i>		X	Widespread Guineo-Congolian
<i>Dendrohyrax arboreus</i>		X	Eastern Africa, N isolate
<i>Cephalophus monticola</i>		X	Widespread but not Ethiopia
<i>Cephalophus weynsi</i>	F	X	Congolian to Kenya, NE isolate
<i>Manis tetradactyla</i>	F	X	Guineo-Congolian, NE margin
<i>Otomys typus</i>	F	X	E Afrocam, pmtame. N isolate
<i>Grammomys ibeanus</i>	F	X	E African montane, N isolate
<i>Grammomys macmillani</i>	F	X	Highly disjunct E African incl. Ethiopia and Sierra Leone
<i>Atherurus africanus</i>	F	X	Guineo-Congolean, NE margin

intergradation (*Heliosciurus gambianus hoogstraali*), but other forms are well marked, such as *Oreomys hypoxanthus talangai* (Setzer 1956). However, the differentiation is difficult to evaluate because of the poorly resolved taxonomy of some groups. Thus, an Imatong shrew was initially described as a subspecies *tephra* of *Crocidura turba* (of the adjacent Nile Valley; Setzer 1956) but was later lumped with *C. foxi* of the Jos plateau and maybe additional sites in Nigeria (Wilson & Reeder 1993). The interpretation of such a pattern could be that (1) this is not a natural taxon, or (2) it is relictual, or (3) it is more widespread in the northern woodland savannas but poorly sampled. The remaining subspecies are referred to current species which are narrowly associated with the Ubangi-Uelle district (one) or the Guineo-Congolian forest (two), or which are widespread (but in some cases patchy) in woodland savannas or montane habitats (seven), or they are more narrowly East African montane species (two) or associated with the Somali-Masai fauna (one).

(3) Other groups

Among frogs, only 12 species of widespread savanna forms are recorded for the Imatong Mountains area. However, there is no published information suggesting that frogs have ever been collected in forest habitat in the Imatong Mountains area, and there is no published synthesis of frog data from the Sudan (A. Schiøtz pers. comm.). Snakes are better documented, with 49 species recorded. Overall, this group is most species rich in tropical lowlands, with wide species distributions, except in the Typhlopidae. The biogeographic pattern for the Imatong species resembles that described for birds and mammals, although they are less represented in the northern savanna belt and in the Ethiopian highland. No snake is endemic or near-endemic to the Imatong Mountains area, but *Rhinotyphlops pallidus* shows a peculiar disjunct range: Imatong (Gilo area) and East Usambara Mountains (coastal Tanzania).

A difficulty in comparing the zoological data in this chapter and the botanical data presented in the remaining part of the book, and discussed in more detail in Chapter VI, is that the zoological data represent historical ranges while the botanical data represent actually recorded occurrences. The difference is particularly notable in a comparison of the plant data from the lowland savanna and woodland, which is strongly impacted by burning and other seasonal variation, and the animal data from the same habitats. The savanna and woodland plants are only observable for a short part of the year, and it is likely that a not insignificant number of widespread lowland savanna and woodland plant species are still unrecorded for the Imatong Mountains area. Similarly widespread lowland savanna and woodland animals will be included by the method used for the ZMUC databases. Inherent in the two methods is a likely tendency to underrepresentation of the plant species in the lowland savanna and woodland, and perhaps a slight overrepresentation of the widespread animal species. However, the general pattern of plant distributions as presented in this work seems to be similar to that of the various animal groups, although relatively more Imatong plants than animals are found in the Ethiopian highland. Another noteworthy difference is that one per cent of the plants are endemic or near endemic on the species level, while the figure for endemic animal species is very low.

Botanical databases developed in the WorldMap software (Lovett *et al.* 2000) are promising but still not satisfactory to use for comparative studies because of the incomplete taxon sampling. Lovett's data include the well-studied geophyte genera *Moraea* and *Watsonia*, the herbaceous or shrubby genus *Crotalaria*, the mesophytic herbs *Begonia* and *Impatiens*, and forest trees. On species richness maps for the entire sub-Saharan Africa, the Imatong

Mountains area appears like a northern forepost for the rich flora of geophytes and *Crotalaria* of East Africa and the southern woodland savanna belt, and as a somewhat impoverished forepost for the forest tree floras. All groups (and *Crotalaria* in particular) are well represented in the Ethiopian highlands, but not in the northern savanna region.

(4) Some concluding remarks

The Imatong Mountains area represent the only large block of ancient basement rocks in the region. One may assume that this was upthrust in connection with the rifting in eastern Africa, in the late Tertiary, but I am not aware of geological studies documenting the time of the uplift. Anyway, the zoological data do not provide any data indicating that a distinctive (old) Imatong fauna ever existed. The few endemics are recently derived subspecies, as also found for plants (Chapter VI).

During the Pleistocene, Africa was characterised by a high level of ecoclimatic instability, with marked displacements of life zone boundaries (deMenocal 1995). The Imatong Mountains area is situated in an inherently unstable region, where marked historical rainfall changes are documented (Nicholson 1994), and where also today the vegetation index shows high levels of interannual variability (Fjeldså *et al.* 1997, Fig. 6). Obviously, large-scale displacements of life zones will lead to faunal displacements, but it is also important to note that high levels of local biotic turnover within the same life zone will affect the community structure, leading to local elimination of rare and specialised species (Hubbell 1999). Because of such community drift, we would predict a predominance of widespread species, even if suitable macrohabitat for some rare and range-restricted species persists locally because of orographic climate moderation.

Depending on their dispersal strategies and area requirements, different taxonomic groups may be differently capable of maintaining viable local populations where the climatic instability is locally moderated. Birds (and large mammals) represent one extreme, as viable populations are unlikely to persist (in isolation), and diverge, for long periods of time. Small mammals are in an intermediate position, judging from the fairly high level of sub-specific differentiation. Judging from the number of isolated relict populations of plants, and from the amount of species level endemism (Chapter VI), plant must have a higher ability

to persist, in isolation, in tiny areas which remain stable because of special local climates, local mist formation, spray from waterfalls, or the like.

Acknowledgements: For the development of the databases which were used I will thank Neil Burgess (who was the main responsible for the data compilation), Steffen Galster, Louis Hansen, Helen de Klerk and Jesper Larsen. Steffen Galster and Louis Hansen provided technical assistance for the analysis presented here. Bruce D. Patterson is thanked for information about the mammal collections of the Field Museum (Chicago).

VI. Phytogeographical analyses of zonation, plant-diversity and -distribution patterns of the Imatong Mountains area

In spite of notable recent progress, *e.g.* La Ferla *et al.* (2002) and Linder *et al.* (2005), the data sets available for analyses of plant diversity and distribution on a continental African scale are still much less representative than the data sets for birds and mammals discussed in Chapter V. As mentioned by Fjeldså under (3) *Other groups* there is as yet no complete data base of plant distributions on one-degree squares available for the approximately 26,000 species of flowering plants currently recorded from tropical Africa (Lebrun & Stork 1997), and our knowledge about African plant distribution is still likely to be influenced by collecting artefacts. The number of flowering plants in tropical Africa alone is almost three times as high as the 9,672 species of birds known from the whole world (Sibley & Monroe 1990). It is as yet an unrealistic undertaking to map the entire tropical African flora on one degree squares and analyse the results with the WorldMap software, as has now been done for birds. Beentje (1996) has pointed out that WorldMap is only useful when recent and ample data is available, and when the taxonomy has been reasonably well worked out. He illustrated this by an analysis of the palms of Madagascar before and after an intensive field campaign, and showed how misleading the results would have been with the old data set. The vascular plants of the study area must therefore be analysed in a cruder way than the analyses of the birds and mammals using much larger geographical units than one degree squares for recording.

(1) Taxon richness and endemism in a tropical African context

The study area as indicated in Fig. 1 (in Vol. 1) is approximately 30,000 km². A total of 1959 species of vascular plants are included in the catalogue from within this area. The vascular plant species density of the study area is therefore according to this approximately 650 species per 10,000 km², which is slightly higher than half the density of 1200 species of flowering plants per 10,000 km² indicated for the southern Sudanian zone from Senegal to Southern Sudan by Lebrun & Stork (1991, p. 25). The fact that ferns are included in this work, but not in the work by Lebrun & Stork, further reduces the figure 650 for the species density in the study area. The highest species density figures on Lebrun & Stork's map are 3200-3800 species per 10,000 km² in the border zone between Eastern Congo [previously Zaire] and East Africa, especially Tanzania and Northern Zambia. Mutke & Barthlott (2005) have recorded species densities for flowering plants above 3000 species per 10,000 km² in the forest region of the Gulf of Guinea and in a number of habitats of high environmental complexity in East Africa. For the study area, they have recorded sections with three different density categories: 500-1000 in the plains to the north and north-east of the mountains, 1000-1500 in the plains to the west of the mountains, and 2000-3000 within the mountains. Our analysis later in this chapter shows (Table 13) that the taxon density varies from below 1000 per 10,000 km² in the plains and on the lower mountain slopes (below c. 1500 m. a.s.l.), but rises to figures comparable to the

highest diversities recorded for Africa in the very small areas at altitudes above ca. 1800 m. a.s.l. A combination of these figures results in the low average species density for the flowering plants of the study area as a whole, as has been mentioned above. This, of course, is to some extent due to inbuilt characteristics of the method, but it does underline the importance of the higher parts of the mountains of the study area for conservation of plant biodiversity.

In the previous chapter, Fjeldså pointed out that the three one-degree squares within the study area he had analysed were among the 'hotspots' of the 100 most species rich one-degree squares in tropical Africa for birds and mammals. The three one-degree squares studied ranked as no. 18, 25 and 51 among the most diverse in Africa with regard to birds, and as no. 57, 94 and 95 with regard to mammals. The richness of plant species in the study area would not appear to score quite as high a ranking as the richness of bird species, in spite of the high habitat complexity, the considerable altitudinal range, and the mosaic of forest and non-forest habitats in the study area. However, when all factors are combined, plant and bird diversity, habitat complexity and the comparatively well preserved forests and grasslands in the upper parts of the mountain massifs, the study area would definitely seem to merit conservation efforts.

Studies on a continental African scale by La Ferla *et al.* (2002) have suggested that centres of high species richness and high endemism tend to be located in approximately the same areas. However, Thulin (1994) and Friis *et al.* (2005) have demonstrated that by far the highest flowering plant diversity in the Horn of Africa is in central and southern Ethiopia, while the highest degree of narrow endemism is in north-eastern Somalia, on the very tip of the Horn. A correlation between high diversity and high endemism is not found on oceanic is-

lands either. There the diversity is often relatively low, but the endemism may be high, as can be seen from most tables of species richness and endemism, for example Table 1 in Davis, Heywood & Hamilton (1994). The situation may be similarly complex in mountain systems, but no good examples have been found.

The conclusion of the study of endemism among the birds of the Imatong Mountains and adjacent areas was that only five subspecies of montane forest birds would meet the criteria for endemism, resulting in an endemism of c. 0.9%. The endemism in plants includes 25 endemic taxa. Of these, the following 17 are endemic or near-endemic species:

Dorstenia annua (Moraceae), *Pentas purseglovei* (Rubiaceae), *Psilanthus leroyi* (Rubiaceae), *Bidens chippii* (Asteraceae), *Bidens isostigmatoides* (Asteraceae), *Bothriocline imatongensis* (Asteraceae), *Bothriocline monticola* (Asteraceae), *Lindernia sudanica* (Scrophulariaceae), *Justicia afromontana* (Acanthaceae), *Oreacanthus sudanicus* (Acanthaceae), *Achyrospermum axillare* (Lamiaceae), *Aloe labworana* (Aloaceae), *Aloe macleayi* (Aloaceae), *Carex thomasi* (Cyperaceae), *Kyllingiella ugandensis* (Cyperaceae), *Festuca sudanensis* (Poaceae), and *Panicum bambusiculme* (Poaceae). The following three endemic or near-endemic taxa are subspecies: *Rhynchosia tricuspida* subsp. *imatongensis* (Leguminosae subfam. Faboideae), *Vigna frutescens* subsp. *kotschyi* (Leguminosae subfam. Faboideae), and *Lobelia dissecta* subsp. *humidulorum* (Lobeliaceae). And finally are the following three endemic or near-endemic taxa on the level of variety: *Cyathea camerooniana* var. *ugandensis* (Cyatheaceae), *Euphorbia depauperata* var. *laevicarpa* (Euphorbiaceae), *Tricalysia niamniensis* var. *djurensis* (Rubiaceae).

According to the above data the degree of endemism in vascular plants is 1.2% in the study area, a slightly higher absolute figure and a higher degree of endemism at the species level than for birds, but again not a very high fig-

ure when compared with, *e.g.*, figures in Table 1 of Davis, Heywood & Hamilton (1994), where many East and Central African regions reach a degree of species endemism between 10 and 15%.

(2) A data base for analysis of plant distributions

The lowest recognised taxonomic level (species or infraspecific taxa) has been chosen as the taxonomic units to be used for this analysis. The total data set (1959 species, including subspecies and varieties a total of 2015 taxa) was entered in a database (using the software package Microsoft Access 2002 for Windows XP) and the following data recorded in separate fields:

- (1) presence or absence of each taxon in the four parts (in the following named floristic regions) of the study area:
 - Imatong Mountains, Sudan side;
 - Imatong Mountains, Uganda side;
 - Lafit, Dongotona and Nangeya Mountains;
 - Didinga Mountains);
- (2) presence and absence of each taxon in 10 equally wide but arbitrarily defined altitudinal zones, ranging from below the lowest plains to the highest mountain peaks. These arbitrarily defined zones have since Hamilton (1975) been used in a number of zonation studies in Africa, and they are therefore also convenient to adopt here:
 - 305-609 m. a.s.l.,
 - 610-914 m. a.s.l.,
 - 915-1219 m. a.s.l.,
 - 1220-1524 m. a.s.l.,
 - 1525-1829 m. a.s.l.,
 - 1830-2134 m. a.s.l.,
 - 2135-2439 m. a.s.l.,
 - 2440-2744 m. a.s.l. (not present in the Lafit, Dongotona and Nangeya Mountains; only about 50 m. of the zone is present in the Didinga Mountains),
 - 2745-3049 m. a.s.l. (not present in the Lafit, Dongotona, Nangeya or Didinga Mountains; only some of this zone present in the Imatong Mountains (Uganda side));
 - 3050-3354 m. a.s.l. (in reality only 137 m. of this zone is present in the Imatong Mountains (Sudan Side), where the highest point reaches 3187 m.);
- (3) presence and absence of each taxon in a number of distribution areas that cover all possible distribution patterns of the material outside the study area:
 - taxon endemic or near-endemic, sometimes also occurring on a few adjacent mountains in South Sudan and/or North-eastern Uganda;
 - taxon distributed in study area, Ethiopia and Eritrea;
 - taxon distributed in study area, Somalia and/or Yemen;
 - taxon distributed in study area and the Mediterranean region, here taken to include lower Egypt;
 - taxon distributed in Europe north of the Mediterranean region;
 - taxon distributed in the lowlands of the Central African Republic, Congo [previously Zaire], Congo and/or Gabon;
 - taxon distributed in West Africa (between Senegal or Gambia and Cameroon);
 - taxon distributed through eastern and southern tropical Africa as far south as Angola, Zimbabwe, Zambia, Malawi and/or Mozambique;
 - taxon distributed through eastern Africa as far south as Namibia, Botswana and/or South Africa (Transvaal and/or Natal);
 - taxon distributed through eastern Africa

Table 11. Total taxon-richness and richness of endemic taxa, and distribution on floristic regions. The percentages are calculated of the total number of taxa in the floristic regions.

	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
Total number of taxa	2015	1747 (86.7%)	546 (27.1%)	173 (8.6%)	446 (22.1%)
No. of endemics and near endemics	24 (1.2%)	21 (1.0%)	5 (0.2%)	1 (0.0%)	4 (0.2%)
No. of single-area endemics	–	17	1	0	2

as far south as South Africa (Cape Province);

- taxon distributed in Madagascar and/or on the Mascarene Islands or other islands around Madagascar;
 - taxon distributed in Asia apart from the Arabian Peninsula (India, China, Indochina, Indonesia (apart from the New Guinean part));
 - taxon distributed in New Guinea, Australia, New Zealand and/or the islands in the Pacific Ocean;
 - taxon distributed in the New World.
- (4) presence or absence in the main physiognomic vegetation types in the study area. Distinction between lowland and montane habitats can be made by combining this field with the relevant ones of (2):
- forest;
 - woodland;
 - bushland;
 - grassland and swamp;
 - or the taxon restricted to disturbed habitats (weedy species).

None of the categories within these four fields are mutually exclusive, except the category endemic or near endemic taxa versus all other categories in (3). The definition of 'near-endemic' includes taxa occurring in the study

area and a few sites outside, mainly taxa with a few outlying populations on adjacent mountains in the Karamoja Region, or in rare cases, also on mountains in South Western Ethiopia. The definition of the category 'near-endemic' is admittedly problematical, but the use of this category was the only feasible way to treat these taxa. Without more detailed knowledge of the distribution of the plant taxa, it will not be possible to use the definitions of range limits (as the 50,000 km² used in birds), nor can a limit to the inverse range-size be applied without great difficulty.

(3) Local distribution of the flora; local variation in floristic richness and endemism

The taxon-richness in the local regions used for floristic recording in this work is seen in the first row of Table 11. The highest taxon-richness is found in the Imatong Mountains and surrounding lowlands, especially on the Sudan side, where the recorded taxon richness is more than three times as high as in any of the other parts of the study area. The Didinga Mountains and surrounding lowlands is ranked after the Uganda side of the Imatong Mountains group with regard to taxon richness, and the Lafit, Dongotona, Nangeya

Mountains and surrounding lowlands have the lowest diversity.

The second row of Table 11 shows the distribution of endemics and near-endemics. The highest number of these is again found in the Imatong Mountains and surrounding lowlands, especially on the Sudan side. The number of endemics and near-endemics is considerably lower in the Didinga Mountains, and it is very low in the Lafit, Dongotona, Nangeya Mountains and the surrounding lowlands.

The distribution of endemic taxa that only occur in a single part of the study area (third row of Table 11) shows again the highest number in the Imatong Mountains (Sudan side) and surrounding lowlands, with a much lower figure in the Didinga Mountains and surrounding lowlands. The figures for the Imatong Mountains (Uganda side) and the Lafit, Dongotona, Nangeya Mountains and surrounding lowlands are one or none. Analyses of endemism in combinations of the areas (not shown in the table) show that the number of endemic taxa shared between two or more parts of the study area is only one or none in all combinations.

(4) Similarity between the floristic regions

For this analysis the study area has been divided into the same four parts as used in the catalogue and above, and the presence and absence of taxa in the data base recorded accordingly. The similarity between these parts with regard to species contents has been studied through a cluster analysis of the same data set as the one that has been used for the previous analyses in this chapter. A 4×2015 matrix was extracted from the data base, indicating presence and absence of all taxa in all the four parts of the study area. The four columns, representing the four parts, were then compared with a range of similarity indices (Jaccard,

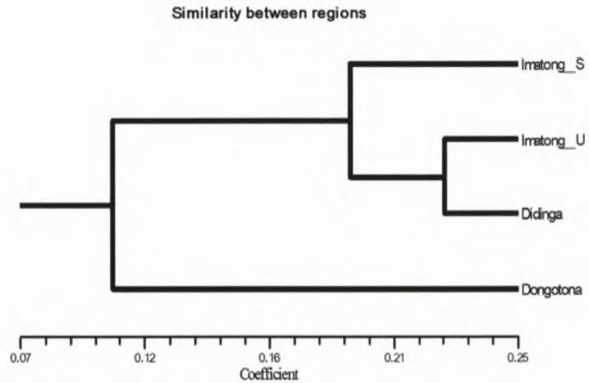


Fig. 31. Strict consensus tree of similarity between major floristic regions of the study area. The tree is produced with a range of similarity coefficients (Jaccard, Kulczynski and two unnamed coefficients) and single and complete linkage clustering, all as available in the software package NTSYSpc for Windows Ver. 2.0.

Kulczynski and two unnamed coefficients in NTSYS, see below), each resulting in a 4×4 similarity matrix. The matrices were clustered with a range of methods, all providing rather similar cluster diagrams. Clustering was carried out with single-linkage and complete linkage methods for all indices in order to provide consensus trees which were as robust as possible; some trees collapse to a comb-like structure by this procedure, but Fig. 31 shows a typical robust consensus tree. All similarity indices and cluster algorithms in the software package NTSYSpc for Windows Vers. 2.0 (Rohlf 1998) were tried.

As seen from Table 11, the sample from the Imatong Mountains group, Sudan side, is 3-10 times as large as the samples from the other groups. It is therefore not surprising that that sample stands out in the cluster as an area with a distinct flora. The Ugandan side of the Imatong Mountains, which is drier than the Sudan side, and the Didinga mountains form a cluster associated with the Sudan side, while the very poorly known Lafit, Dongotona and Nangeya

Table 12. The total number of taxa distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. Land below 600 m. a.s.l. is generally poorly collected. Similarly, only small areas associated with mountain peaks in the Imatong Mountains (Sudan side) reach into the highest zone. The percentages are calculated of the number of taxa in the floristic region and altitudinal zone.

Total number of taxa in all vegetation types	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	2015	1747	546	173	446
305-609 m.	7	7	–	–	–
610-914 m.	713	636	172	61	235
915-1219 m.	820	766	240	56	214
1220-1524 m.	499	441	250	56	179
1525-1829 m.	623	572	250	85	192
1830-2134 m.	690	613	266	110	205
2135-2439 m.	358	330	172	81	83
2440-2744 m.	290	272	121	43	60
2745-3049 m.	131	127	44	–	19
3050-3187 m.	116	116	–	–	–

mountains appear only loosely associated. These results differ completely from what should be expected from the geographical position of the regions, and it seems likely that the result is influenced by incomplete sampling of the southern and eastern parts of the study area. It seems necessary to carry out an analysis based on a more complete sample of the flora of the three most poorly collected southern and eastern areas before the result can be interpreted in a meaningful way.

(5) Floristic richness and endemism in altitudinal zones

The data base also allows studies of the altitudinal distribution of plants in the study area. Table 12 shows the distribution of taxa on altitudinal zones. The variation in the total number of taxa per altitudinal zone indicates a pattern with two peaks in the taxon richness. The

taxon richness increases from the lowermost zones to a first maximum at 915-1220 m. a.s.l. The numbers decline again and reach a second maximum at 1525-2130 m. a.s.l. At higher altitudes, the numbers decline again to fairly low values above c. 2700 m. Fig. 32 shows the decline in floristic richness with increasing altitude and demonstrates that, in spite of the fluctuating patterns with two peaks mentioned above, there is a clear negative linear correlation between altitude and taxon richness. The numerical value of r is high ($r = -0.9031$), indicating a good fit between the data and the linear correlation.

In order to further test whether the variation in diversity with altitudinal zone differs from the expected, we have constructed a species-area curve. The areas of the different altitudinal zones have been calculated using the data from an altitudinal model of the Earth (GLOBE team 1999). Data relevant to the study area has been derived from this model,

Table 13. Number of taxa in altitudinal zones, calculated area of zones and calculated taxon density in these zone (number of taxa/10,000 km²). The study area is here for practical reasons 36,500 km² instead of ca. 30,000 km², as it is shown in Fig. 1 (Vol. 1). The incomplete lowermost and uppermost zones (305-609 and 3050-3187 m. a.s.l.) have been omitted because of the incomplete recording of the diversity in the former and the incomplete altitudinal range in the latter.

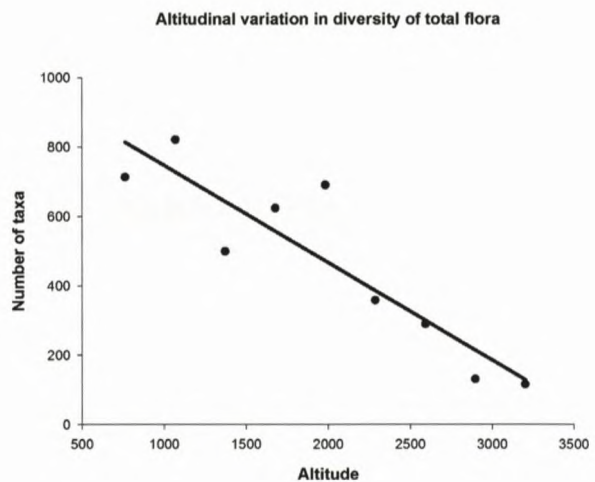
Altitudinal zone	Number of taxa	Calculated area of zone (km ²)	Taxon density (number of taxa/10,000 km ²)
610-914 m.	713	17782	402
915-1219 m.	820	12098	678
1220-1524 m.	499	5124	974
1525-1829 m.	623	1427	4367
1830-2134 m.	690	806	8563
2135-2439 m.	358	285	12578
2440-2744 m.	290	150	19293
2745-3049 m.	131	49	26581

which records the average altitude for each square kilometre of the entire surface of the Earth, and this data has been analysed with the GIS software package ArcView for Windows Vers. 3.3 with the spatial analyst extension. The result with regard to the areas of the altitudinal zones is shown in Table 13 and Fig. 33. A species-area curve for the altitudinal zones has been constructed in Fig. 34. The logarithmic regression curve (with $r^2 = 0.7716$) confirms that the general taxon diversity in the altitudi-

nal zones is clearly related to the areas of these zones in a way normally seen in generalised species-area curves as originally proposed by Arrhenius (1921). However, the diversity is somewhat higher than expected from the curve between 915 and 1220 m. a.s.l. and between 1525 and 2135 m. a.s.l., and the diversity is below expected values between 1220 and 1524 m. a.s.l. This agrees with the findings from Table 12 and Fig. 15.

The detailed pattern of the variation in di-

Fig. 32. Altitudinal variation of the diversity of total number of taxa on species level or below in the study area. The number of taxa has been scored in artificially defined intervals of fixed size (the width of each interval is 305 m., which equals 1000 ft.). The dots represent from left to right these intervals: 1: 610-914 m. a.s.l. 2: 915-1219 m. a.s.l. 3: 1220-1524 m. a.s.l. 4: 1525-1829 m. a.s.l. 5: 1830-2134 m. a.s.l. 6: 2135-2439 m. a.s.l. 7: 2440-2744 m. a.s.l. 8: 2745-3049 m. a.s.l. 9: 3050-3354 m. a.s.l. In relation to the horizontal axis the dots are indicated with their lower limits. The regression line has the equation: $Y = 1028 - 0,281 \times X$. The correlation coefficient $r = - 0.9031$ indicates a strong negative correlation between altitude and diversity of taxa in the material. The graph has been produced with the software package SigmaPlot for Windows Vers. 8.01.



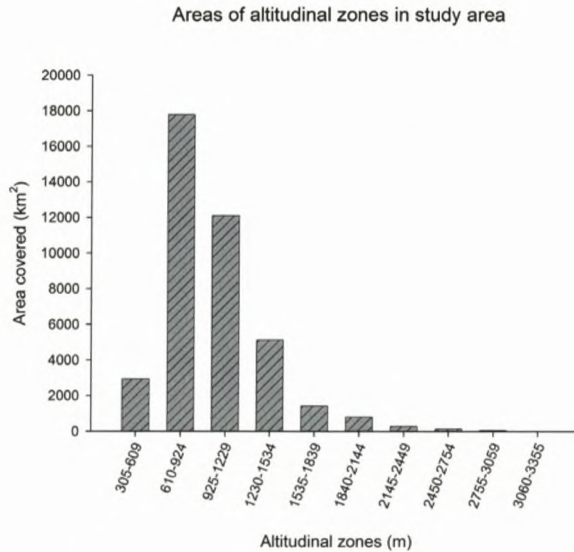


Fig. 33. The areas of the altitudinal zones of 305 m each in the study area, as indicated in Fig. 1 (Vol. 1). There are only limited areas between 305 and 610 m in the study area, although there are very extensive areas further north and north-east. The area has been calculated from the data in the Global Land One-km Base Elevation Project (GLOBE Team 1999), using the spatial analyst extension of the software packages ArcView for Windows Vers. 3.3 and SigmaPlot for Windows Vers. 8.01.

versity with increasing altitude of the study area is somewhat different from the pattern observed in Ethiopia (Friis *et al.* 2001), where there is only one maximum. When a representative sample of the entire flora of Ethiopia and Eritrea is considered the taxon-diversity increases from low values in the lowermost zones to one clearly marked maximum at 1200-1500 m. a.s.l., above which the numbers decline again to very low values above 4000 m. a.s.l. It seems likely to assume that the two peaks shown by the taxon-diversity in the flora of the Sudan-Uganda border area could be caused by different patterns in the most prominent vegetation types. We have therefore in the following subdivided the altitudinal variation into ta-

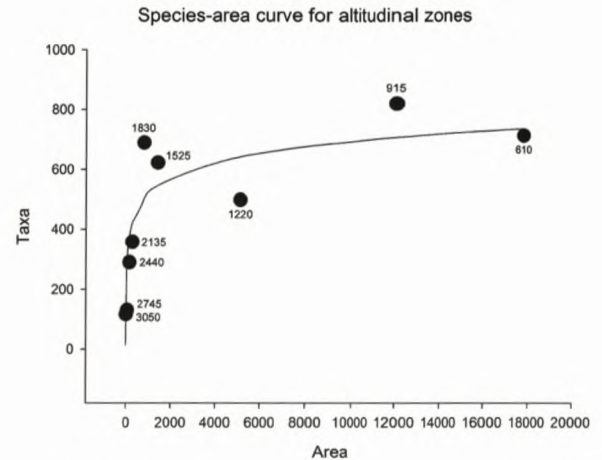


Fig. 34. Species-area curve for altitudinal zones of the study area. The zones are represented by dots, which have been marked by the lower limits of the intervals (610, 915, 1220, 1525, 1830, 2135, 2440, 2745 and 3050 m. a.s.l. The zone between 305 and 609 m. a.s.l. is poorly represented in the material and has therefore been excluded). The areas of the altitudinal zones from Fig. 32 and 33 have been plotted against the number of taxa recorded from them and a regression curve constructed. The regression curve has the equation: $Y = -2.75 + 75.6 \times \ln X$. $r^2 = 0.7716$. The regression curve is rather similar to a normal species-area curve, indicating a typical area-related distribution of the diversity. Three intervals have higher diversity than expected; these are 915-1219 m. and 1525-2134 m. The latter indicates the diverse forest-evergreen bushland-grassland mosaic at these altitudes, which also covers the zones where the montane and the lowland floras meet. The graph has been produced with SigmaPlot for Windows Vers. 8.01.

bles showing the altitudinal variation in forest, woodland, bushland and grassland.

Table 14 shows the distribution of endemic taxa on altitudinal zones, both in the entire study area and in the four parts of the study area used for these analyses. In both the entire study area and in the Imatong Mountains group the percentage of endemic taxa increases with increasing altitude, while the figures from the other parts of the study area are too low to indicate any trend.

Table 14. The total number of endemic taxa distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. Land below 600 m. a.s.l. is hardly present, and only in the lowland surrounding the Imatong Mountains (Sudan side). Similarly, only very small areas associated with mountain peaks in the Imatong Mountains (Sudan side) reach into the highest zone. The percentages are calculated of the number of taxa in the floristic region and altitudinal zone.

Total number (and %) of endemic taxa	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	24 (1.2%)	21 (1.0%)	5 (0.2%)	1 (0.0%)	4 (0.2%)
305-609 m.	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
610-914 m.	5 (0.7%)	3 (0.4%)	0 (0.0%)	0 (0.0%)	3 (0.4%)
915-1219 m.	5 (0.6%)	4 (0.5%)	1 (0.1%)	0 (0.0%)	1 (0.1%)
1220-1524 m.	1 (0.2%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
1525-1829 m.	5 (0.8%)	5 (0.8%)	2 (0.3%)	0 (0.0%)	1 (0.2%)
1830-2134 m.	9 (1.3%)	9 (1.3%)	3 (0.4%)	1 (0.1%)	1 (0.1%)
2135-2439 m.	11 (3.1%)	11 (3.1%)	3 (0.8%)	1 (0.3%)	1 (0.3%)
2440-2744 m.	12 (4.1%)	12 (4.1%)	3 (1.0%)	1 (0.3%)	1 (0.3%)
2745-3049 m.	8 (6.1%)	8 (6.1%)	1 (0.8%)	–	0 (0.0%)
3050-3187 m.	6 (5.2%)	6 (5.2%)	–	–	–

Forest

Table 15 and Fig. 35 show the same overall trend as the figures for all taxa. There are two marked maxima for taxon-diversity in forest, one at 915-1220 m, which is the altitude of most of the lowland rain forest (Talanga, Lotti and Laboni), and another maximum, not quite so high, at 1830-2135 m. a.s.l., which is the altitudinal range where most of the Afromontane forest occurs. The two peaks are separated by a very low diversity value representing the interval 915-1219 m. This pattern is reflected very clearly in the taxon-diversity in forest on the Imatong Mountains (Sudan side), where the lowland rain forests are located. The pattern is not reflected in the other floristic regions, where there is only one clearly marked maximum, which is found at 1800-2100 m. a.s.l., with the same altitudinal range as in the Afromontane forest in the Imatong Mountains

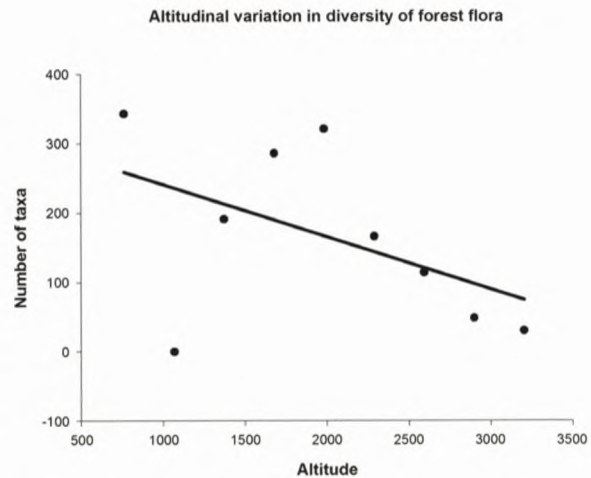


Fig. 35. Altitudinal variation of the diversity of taxa on species level or below in the forest flora. The regression line has the equation: $Y = 689 - 0,223 \times X$. The correlation coefficient $r = -0,7183$ indicates a strong negative correlation between altitude and diversity of taxa in the material. Other information as for Fig. 32.

Table 15. The total number of taxa in forest distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. Land below 600 m. a.s.l. is hardly present, and only in the lowland surrounding the Imatong Mountains (Sudan side). Similarly, only peaks in the Imatong Mountains (Sudan side) reach into the highest zone.

Total number of taxa in forest	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	785	749	159	61	105
305-609 m.	4	4	—	—	—
610-914 m.	177	173	30	9	28
915-1219 m.	362	359	55	16	45
1220-1524 m.	191	188	64	20	44
1525-1829 m.	286	277	93	38	66
1830-2134 m.	321	302	110	50	74
2135-2439 m.	166	161	69	35	36
2440-2744 m.	114	111	44	19	28
2745-3049 m.	48	47	18	7	11
3050-3187 m.	30	30	—	—	—

(Sudan side). Fig. 35 shows that in spite of the notable maxima, there is clearly a negative linear correlation between altitude and taxon diversity in forest plants. However, the numeric value of the correlation is not as high as for the total study area ($r = -0.7183$).

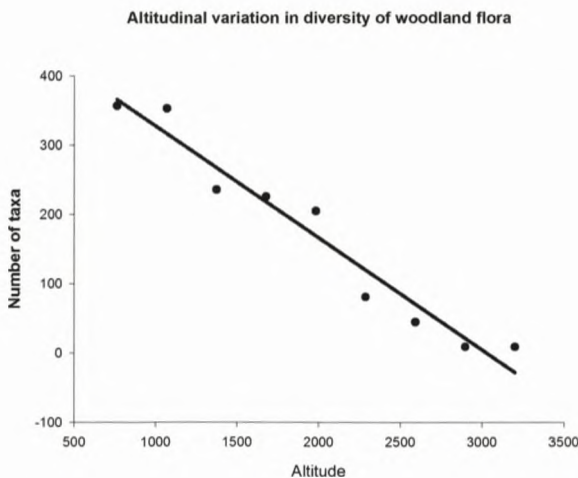


Table 16 indicates that the maximum of endemic forest taxa is found between 610 and 1220 m. a.s.l.

Woodland

Table 17 and Fig. 36 show a rather smooth decline with increasing altitude for the taxon-richness in woodland. A continuous decline with altitude is seen in nearly all the parts of the study area used in this analysis, with the exception of the Lafit, Dongotona and Nangeya Mountains, where woodlands species are comparatively rare at all altitudes. The most no-

Fig. 36. Altitudinal variation of the diversity of taxa on species level or below in the woodland flora. The regression line has the equation: $Y = 489 - 0,161 \times X$. The correlation coefficient $r = -0.9754$ indicates a very strong negative correlation between altitude and diversity of taxa in the material. Other information as for Fig. 32.

Table 16. The number of endemic taxa in forest distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. There is only one endemic forest taxon in the zones above 1200 m. a.s.l., but it is not the same taxon from zone to zone.

Total number of endemic taxa in forest	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	7	7	0	0	0
305-609 m.	0	0	–	–	–
610-914 m.	2	2	0	0	0
915-1219 m.	3	3	0	0	0
1220-1524 m.	1	1	0	0	0
1525-1829 m.	1	1	0	0	0
1830-2134 m.	1	1	0	0	0
2135-2439 m.	1	1	0	0	0
2440-2744 m.	1	1	0	0	0
2745-3049 m.	1	1	0	0	0
3050-3187 m.	0	0	–	–	–

Table 17. The total number of taxa in woodland distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. Land below 600 m. a.s.l. is hardly present, and only in the lowland surrounding the Imatong Mountains (Sudan side). Similarly, only peaks in the Imatong Mountains (Sudan side) reach into the highest zone.

Total number of taxa in woodland	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	703	600	253	59	196
305-609 m.	4	4	–	–	–
610-914 m.	357	327	112	30	129
915-1219 m.	353	328	145	28	122
1220-1524 m.	236	211	144	28	99
1525-1829 m.	226	203	121	26	90
1830-2134 m.	205	175	107	32	75
2135-2439 m.	81	68	53	24	23
2440-2744 m.	45	41	29	11	14
2745-3049 m.	9	9	5	2	2
3050-3187 m.	9	9	–	–	–

Table 18. The number of endemic taxa in woodland distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. No endemic taxa above 1500 m. a.s.l. has been associated with woodland.

Endemic taxa in woodland	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	2	2	0	0	1
305-609 m.	0	0	—	—	—
610-914 m.	2	2	0	0	1
915-1219 m.	2	2	0	0	1
1220-1524 m.	1	1	0	0	0

table drop in taxon-diversity is seen between 1830 and 2135 m. a.s.l., where the diversity drops to approximately half from one altitudinal zone to the other. This drop can be noted in both parts of the Imatong Mountains. Table 17 also shows in all altitudinal zones a notable decline the taxon-diversity in woodland from

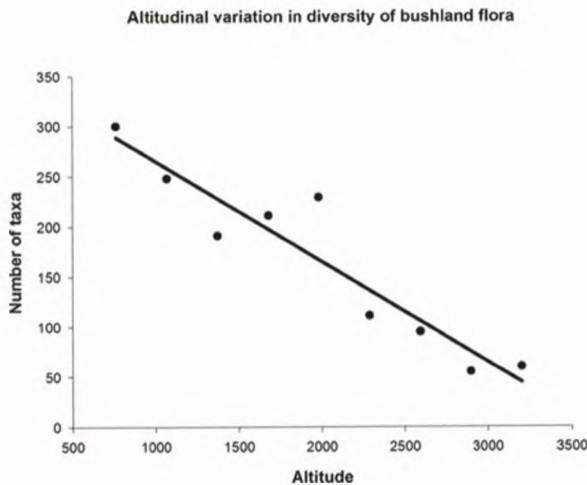


Fig. 37. Altitudinal variation of the diversity of taxa on species level or below in the bushland flora. The regression line has the equation: $Y = 365 - 0,100 \times X$. The correlation coefficient $r = -0.9424$ indicates a very strong negative correlation between altitude and diversity of taxa in the material. Other information as for Fig. 32.

west to east. This drop is very notable between the Imatong Mountains and the Lafit, Dongotona and Nangeya Mountains, an observation which agrees well with the declining importance of woodlands from the lowlands of the Imatong Mountains to the lowlands of the Lafit, Dongotona, Nangeya and Didinga Mountains, where deciduous bushland and grassland are the dominant vegetation types in dry areas. The number of woodland taxa in the Didinga Mountains is again slightly higher, and the drop at c. 2100 m. a.s.l. reappears. Fig. 36 shows that there is a clear negative correlation between altitude and taxon richness in woodland. The numerical value of the correlation coefficient is higher than for the total study area ($r = -0.9754$).

Table 18 shows that the number of endemic taxa in woodland is generally low, and that there are no endemic taxa in woodlands above 1524 m. a.s.l.

Bushland

Table 19 and Fig. 37 show the altitudinal distribution of taxon richness of bushland. Two floristically very different vegetation types are involved here, the lowland deciduous bush-

Table 19. The total number of taxa in bushland distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. Land below 600 m. a.s.l. is hardly present, and only in the lowland surrounding the Imatong Mountains (Sudan side). Similarly, only peaks in the Imatong Mountains (Sudan side) reach into the highest zone.

Total no. of taxa in bushland	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	699	577	213	62	230
305-609 m.	3	3	—	—	—
610-914 m.	300	253	81	28	141
915-1219 m.	248	219	96	19	112
1220-1524 m.	191	154	106	17	94
1525-1829 m.	211	191	88	29	90
1830-2134 m.	229	207	91	38	85
2135-2439 m.	111	103	62	23	26
2440-2744 m.	95	91	38	11	19
2745-3049 m.	55	55	15	3	7
3050-3187 m.	60	60	—	—	—

land, dominated by the genera *Acacia* and *Commiphora*, and the montane evergreen bushland, dominated by species of *Rhus*, *Maytenus*, *Maesa*, etc., and, near the upper limit at 3000-3100 m. a.s.l., by species of *Erica*. When the whole area is considered as one, the taxon-diversity of the deciduous bushland declines gradually with altitude to c. 1500 m. a.s.l. Above c. 1500 m. there is an increase in diversity with a small peak at 1830-2135 m. a.s.l., as in the Afromontane forest. This agrees well with the prominent disturbance regime at this altitude, which causes a balance between the Afromontane forest and the evergreen bushland along the forest edges (see Chapter IV, (A) *Lower Afromontane grasslands and forests*). At higher altitudes, the taxon richness declines both in the forest and in the evergreen bushland, but the number of taxa remains comparably high.

It is notable in Table 19 that the taxon-diver-

sity in bushland below 1500 m. a.s.l. is substantially declining from west to east in the study area, as is the diversity of the woodlands. There could be several explanations for this. The flora of the deciduous bushland can only be studied during repeated visits and is probably best developed shortly after the rains, at a time when the remote areas are usually inaccessible. The lowland bushland of the eastern parts of the study area is therefore probably still considerably undercollected.

Fig. 37 shows a small relative maximum of taxon richness at ca. 2000 m. a.s.l., but otherwise the figure indicates a clearly negative correlation between altitude and taxon diversity in bushland. The numerical value of the correlation coefficient is higher than for the entire study area ($r = -0.9424$).

Table 20 shows that the number of endemic taxa in the bushland is generally low, and that

Table 20. The number of endemic taxa in woodland distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. Land below 600 m. a.s.l. is hardly present, and only in the lowland surrounding the Imatong Mountains (Sudan side). Similarly, only peaks in the Imatong Mountains (Sudan side) reach into the highest zone. The endemic taxa clearly fall into two groups, a low altitude group in deciduous bushland, and a high altitude group in evergreen bushland and ericaceous scrub.

Endemic taxa in bushland	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	4	2	0	0	2
305-609 m.	0	0	—	—	—
610-914 m.	2	0	0	0	2
915-1219 m.	0	0	0	0	0
1220-1524 m.	0	0	0	0	0
1525-1829 m.	0	0	0	0	0
1830-2134 m.	1	1	0	0	0
2135-2439 m.	1	1	0	0	0
2440-2744 m.	2	2	0	0	0
2745-3049 m.	2	2	0	0	0
3050-3187 m.	2	2	—	—	—

there are no endemic taxa at intermediate altitudes from 915 to 1830 m. a.s.l., where bushland is not represented by climax vegetation. It is also notable that there are no endemic taxa

associated with bushland outside the Sudan side of the Imatong Mountains.

Grasslands and swamps

Table 21 and Fig. 38 show the taxon-diversity of grassland and swamps. In nearly all floristic regions there are two marked maxima for taxon-diversity, one at 600-900 m. a.s.l., which is the altitude of the lowland edaphic grassland and the lowland fire climax grassland (see Chapter IV, for example (G) *Open bushland and grass-*

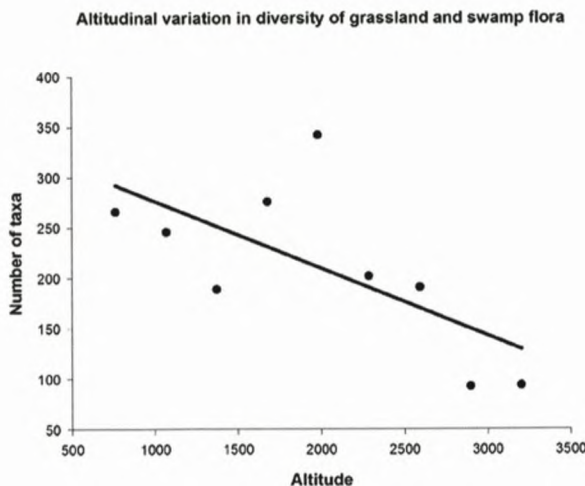


Fig. 38. Altitudinal variation of the diversity of taxa on species level or below in the grassland and swamp flora. The regression line has the equation: $Y = 342 - 0,067 \times X$. The correlation coefficient $r = -0,6748$ indicates only a modest negative correlation between altitude and diversity of taxa in the material. Other information as for Fig. 32.

Table 21. The total number of taxa in grasslands and swamps distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. Land below 600 m. a.s.l. is hardly present, and only in the lowland surrounding the Imatong Mountains (Sudan side). Similarly, only peaks in the Imatong Mountains (Sudan side) reach into the highest zone.

Total no. of taxa in grassland and swamp	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	855	703	268	85	198
305-609 m.	2	2	–	–	–
610-914 m.	266	229	66	25	100
915-1219 m.	246	220	94	26	89
1220-1524 m.	189	160	110	26	75
1525-1829 m.	276	243	121	44	84
1830-2134 m.	342	293	141	62	106
2135-2439 m.	202	185	102	48	47
2440-2744 m.	191	174	83	27	34
2745-3049 m.	93	89	31	11	11
3050-3187 m.	94	94	–	–	–

land to the north and east of the Didinga Mountains), and another maximum, usually with notably higher taxon-richness, at 1830-2135 m. a.s.l., which is the altitudinal range where most of the Afromontane fire climax grassland (see Chapter IV, for example (a) *Rocky outcrops*, *Loudetia grassland*, ...) occurs. In the Imatong Mountains, the taxon richness is high up to c. 2700 m. a.s.l., the altitude of the high-altitude valley-bottom grassland in the Imatong Mountain chain proper. Fig. 38 demonstrates that the observed figures for taxon diversity in grassland and swamps show considerable oscillation around the expected negative linear correlation, with a very notable minimum at c. 1000 m and a clear maximum at 1500-2000 m. a.s.l. These maxima and minima result in a numerically relatively low value for the correlation coefficient, considerably lower than in the entire study area ($r = -0.6748$).

Table 22 shows that the number of grassland and swamp endemics is low in the lowlands,

but increases with altitude to the zones between 2135 to 2745 m. a.s.l., from which altitudes the numbers again decrease.

(6) Zonation of the flora

In the literature, altitudinal variation in African flora and vegetation has often been described and classified by means of vegetational zones (e.g. Hedberg 1951; Boughey 1955; White 1970; Friis 1994; Friis *et al.* 2001). The main discontinuity in the flora and vegetation of Africa is generally believed to be between a lowland and a montane flora and vegetation, followed at higher altitudes by a distinction between a montane and an Afroalpine flora and vegetation. The altitudinal limits between the lowland, the montane and the Afroalpine floras and vegetations have been placed at somewhat different altitudes depending on which type of vegetation and flora is under

Table 22. The number of endemic taxa in grasslands and swamps distributed on altitudinal zones (each covering a range of 305 m.) in the entire study area and in the individual mountain massifs. Land below 600 m. a.s.l. is hardly present, and only in the lowland surrounding the Imatong Mountains (Sudan side). Similarly, only peaks in the Imatong Mountains (Sudan side) reach into the highest zone.

Endemic taxa in grassland and swamp	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
All altitudes	13	12	4	1	2
305-609 m.	0	0	—	—	—
610-914 m.	1	0	0	0	1
915-1219 m.	2	1	1	0	1
1220-1524 m.	0	0	0	0	0
1525-1829 m.	4	4	2	0	1
1830-2134 m.	7	7	3	1	1
2135-2439 m.	8	8	2	1	1
2440-2744 m.	8	8	2	1	1
2745-3049 m.	4	4	0	0	0
3050-3187 m.	4	4	—	—	—

study. The altitudinal limit between the lowland and the montane vegetation types also depends on the distance from Equator of the study area; this is the well known descent to sea level of the montane flora regions described for example for Afromontane forest by White (1970) (see review by Friis 1998, p. 28-30). When the focus has been on the forest flora and vegetation, the limit has generally been placed between 1300 and 2000 m. a.s.l. Greenway (1973) suggested that in East Africa the limit should be placed at 1300 m. a.s.l. White (1970, p. 89) suggested that all montane forest in Malawi occurred above 4500 ft (1370 m. a.s.l.), Moreau (1963) suggested a limit at 1500 m. a.s.l., while Lind & Morrison (1974) and others have suggested a major change in flora and vegetation at 2000 m. a.s.l. Lebrun (1935) claimed on the mountains of eastern Zaire to detect a transitional vegetation zone between the lowland and the montane forest vegetation, with a lower limit at 1100-1300 m. a.s.l.

and an upper limit at 1650-1750 m. a.s.l. Friis (1992) concluded that the forest tree flora of Ethiopia, Eritrea, Djibouti and Somalia showed marked zonation with a shift between lowland and montane forest at c. 1500 m. a.s.l. and between low and high altitude montane forest at c. 3000 m. a.s.l. For the study area, a very preliminary analysis of 316 taxa in 700 m. wide altitudinal zones was made by Friis (1994), suggesting a limit between a lowland and a montane flora somewhere between 700 and 1400 m. a.s.l. In a review of Friis (1992), Hawthorne (1993) pointed out that ordinations should have been used to supplement or instead of the cluster analyses in order to establish altitudinal limits convincingly.

Not all have accepted this distinction between lowland, Afromontane and Afroalpine floras. Hamilton (1975) studied the forest tree distribution in Uganda in relation to altitude; the distribution of each species has been recorded between 914 m. and well over 4000 m.

a.s.l., using intervals of 305 m. (1000 ft.) His main purpose was to see whether or not there was a 'critical altitude' marking the lowland/montane forest boundary. The floristic contents of each 305 m. interval were compared with the one above and the one below; the similarity between two adjacent intervals was estimated by the use of Jaccard's Coefficient of Similarity. Hamilton observed that the coefficient remained remarkably constant over the entire range studied (1219-3353 m. a.s.l.); he concluded that his result provided clear evidence that floristic critical altitudes are absent from the Uganda forests, and that forest vegetation thus formed an altitudinal continuum. Later, the existence of a distinctive Afro-montane flora with a geographically separate area and altitudinal zone has been questioned repeatedly, for example by Linder *et al.* (2005).

Possible discontinuities in the continued altitudinal variation of the flora in the study area have, according to the above mentioned suggestion by Hawthorne, been studied by various ordination methods in the PCord Vers. 4 package (McCune & Mefford 1999; McCune & Grace 2002). An example is the NMS ordination shown in Fig. 39, which shows a fairly gradual change from altitudinal zone to altitudinal zone, with exception of an isolated zone (the lowermost one at 305-609 m. a.s.l.). Due to the small area and low number of taxa involved in this zone, it should be ignored. The next zone (610-914 m. a.s.l.) has also a somewhat isolated position. Grouped together in a vaguely marked cluster are the altitudinal zones from 915-1830 m. a.s.l. Another cluster is formed by the intervals from 2135-3187 m. a.s.l. This cluster represents the montane flora.

Cluster analyses of both the entire flora and the flora in various vegetation types were obtained by using the software package NTSYSpc for Windows Vers. 2.0 (Rohlf 1987, 1998). In Fig. 40-44 the results of cluster analyses using the unweighted pair-group method with arith-

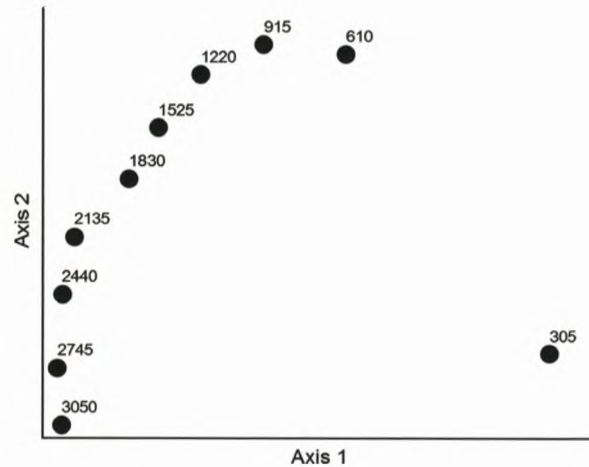


Fig. 39. NMS ordination of the total floristic contents (presence/absence) in artificially defined and equidistant altitudinal zones in the study area. Sørensen's index of similarity has been used. Each zone covers a range of 305 m. The intervals are indicated on ordination with their lower limits as label. The position in the ordination of the lowermost zone (305-610 m) differs markedly from the other zones, but represents a relatively small area and a few taxa. It is not included in the cluster analyses shown in the following figures. The lowermost zone fully included in the analysis (610-914 m. a.s.l.) is slightly set apart from the higher zones, a break which is shown by all the subsequent cluster analyses. There is also a slight break in the continuous variation at the interval 1830-2135. This break is also found in the cluster analyses of the various vegetation types, with exception of the forest vegetation, where the break is located between 1220 and 1525 m. a.s.l. The graph has been produced with the software package PCord for Windows Vers. 4.0.

metic average (UPGMA) are shown. The cluster analysis of the entire flora (Fig. 40) has the most marked discontinuities between 610 and 915 m. a.s.l., and even more so between 1830 and 2135 m. a.s.l., as in the NMS ordination. This would seem to provide support for a general zonation at these two altitudinal zones, which are supported by evidence from the floras of woodland (Fig. 42), bushland (Fig. 43) and grasslands and swamps (Fig. 44), while

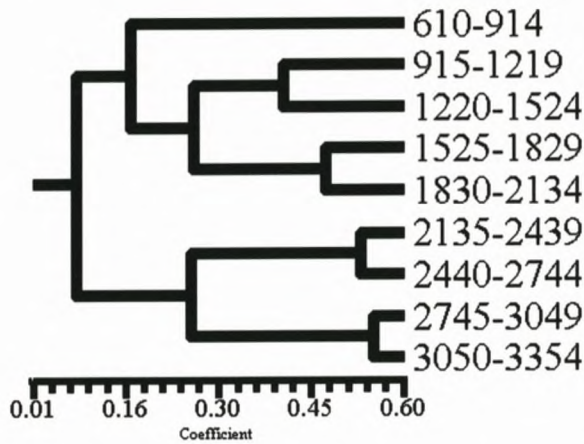


Fig. 40. Cluster analysis of the total floristic contents in artificially defined and equidistant altitudinal zones in the study area. Each zone covers a range of 305 m. The intervals are indicated on the dendrogram with their lower limits as label. Jaccard's similarity index (coefficient) has been used for comparisons between the zones, and the dendrogram has been produced by the use of the Unweighted pair-group method, arithmetic average (UPGMA). The graph has been produced with the software package NTSYSpc for Windows Vers. 2.0.

the most clearly marked break in the forest flora (Fig. 41) is found between 1220 and 1525 m. a.s.l.

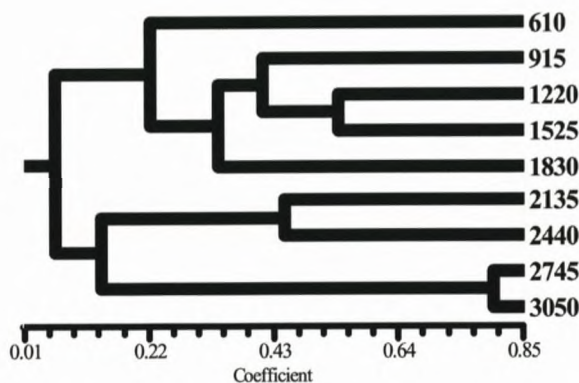


Fig. 42. Cluster analysis of the floristic contents of the woodlands in artificially defined and equidistant altitudinal zones in the study area. Other information as for Fig. 40.

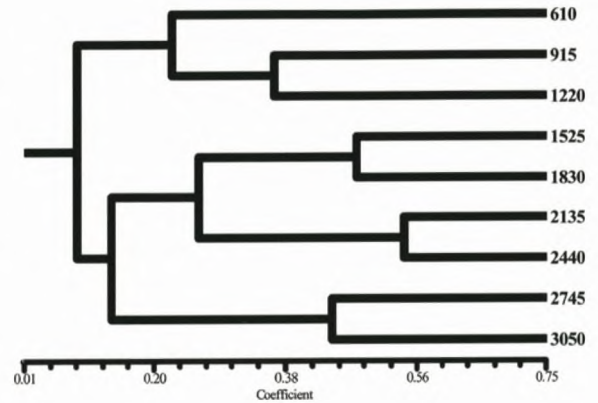


Fig. 41. Cluster analysis of the floristic contents of the forests in artificially defined and equidistant altitudinal zones in the study area. Other information as for Fig. 40.

(7) Overall distribution of the flora

As mentioned previously, it has not been possible to analyse the general distribution of the flora of the study area on such a fine scale as the study of the birds in Chapter V, where one degree squares have been used. The overall distribution of the taxa in the sample has been analysed using broadly defined geographical unit areas which together cover the whole world. See Table 23: Ethiopia & Eritrea, Soma-

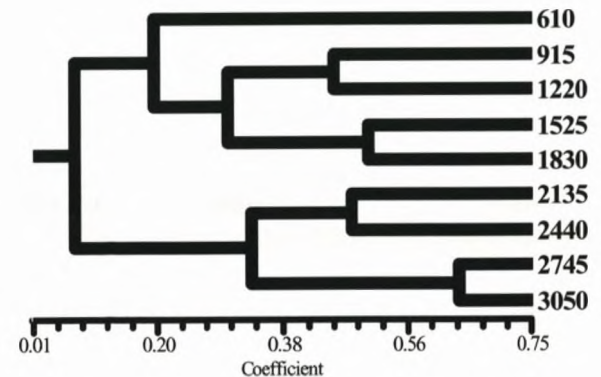


Fig. 43. Cluster analysis of the floristic contents of the bushland in artificially defined and equidistant altitudinal zones in the study area. Other information as for Fig. 40.

lia & Yemen, Tropical East Africa (Kenya, Uganda, Tanzania), South Central Africa (Zambia, Ethiopia & Eritrea, Somalia & Yemen), Tropical East Africa (Kenya, Uganda, Tanzania), South Central Africa (Zambia, Zimbabwe, Malawi, Mozambique, Angola, Botswana), South Tropical Africa (Namibia, tropical parts of South Africa); the Cape Region; the Guineo-Congolian forest regions of Central Africa, the non-forested parts of West Tropical Africa, Madagascar and the Mascarenes, the Mediterranean, Europe, Mainland Asia, Indonesia/Australia/Pacific, and the New World.

It is a general feature of both Table 23 and 24 that by far the highest number of non-endemic taxa in the study area is shared with the three East African countries (Kenya, Uganda

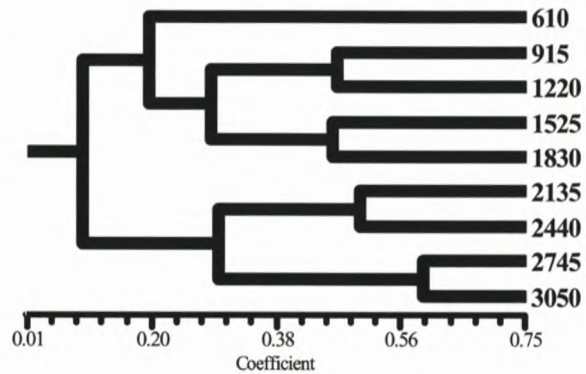


Fig. 44. Cluster analysis of the floristic contents of the grasslands and swamps in artificially defined and equidistant altitudinal zones in the study area. Other information as for Fig. 40.

Table 23. The taxa shared between the entire study area or various parts of the study area and the following geographical regions: Ethiopia/Eritrea, Somalia/Yemen, Tropical East Africa, South Central Africa, South Tropical Africa, the Cape region, the Guineo-Congolian region, the non-forested part of West Tropical Africa, Madagascar and the Mascarenes, the Mediterranean region, temperate Europe, mainland Asia, Indonesia and other tropical Asian islands, and the New World.

Shared taxa with	Entire study area	Imatong Mountains (Sudan side)	Imatong Mountains (Uganda side)	Lafit, Dongotona, Nangeya Mountains	Didinga Mountains
Ethiopia & Eritrea	1481	1279 (86 %)	441 (30 %)	142 (10 %)	382 (26 %)
Somalia & Yemen	565	447 (79 %)	181 (32 %)	53 (9 %)	221 (39 %)
Tropical East Africa	1939	1680 (87 %)	531 (27 %)	168 (9 %)	430 (22 %)
South Central Africa	1430	1247 (87 %)	411 (29 %)	135 (9 %)	326 (23 %)
South Tropical Africa	726	621 (86 %)	221 (30 %)	78 (11 %)	200 (28 %)
Cape Region	140	114 (81 %)	62 (44 %)	17 (12 %)	44 (31 %)
Guineo-Congolian forest region	1080	976 (90 %)	269 (25 %)	72 (7 %)	237 (22 %)
Non-forested W. Tropical Africa	1289	1170 (91 %)	334 (26 %)	104 (8 %)	265 (21 %)
Madagascar &c.	302	283 (94 %)	56 (19 %)	21 (7 %)	62 (21 %)
Mediterranean	85	67 (79 %)	23 (27 %)	10 (12 %)	23 (27 %)
Europe	41	35 (85 %)	8 (19 %)	4 (10 %)	9 (22 %)
Mainland Asia	362	307 (85 %)	79 (22 %)	25 (7 %)	99 (27 %)
Indonesia &c.	109	99 (91 %)	14 (13 %)	9 (8 %)	22 (20 %)
New World	159	148 (93 %)	23 (14 %)	10 (6 %)	26 (16 %)

Table 24. The taxa shared between various altitudinal zones of the study area and the following geographical regions: Ethiopia/Eritrea, Somalia/Yemen, Tropical East Africa, South Central Africa, South Tropical Africa, the Cape region, the Guineo-Congolian region, the non-forested part of West Tropical Africa, Madagascar and the Mascarenes, the Mediterranean region, temperate Europe, mainland Asia, Indonesia and other tropical Asian islands, and the New World.

Shared taxa with	305- 609 m.	610- 914 m.	915- 1219 m.	1220- 1524 m.	1525- 1829 m.	1830- 2134 m.	2135- 2439 m.	2440- 2744 m.	2745- 3049 m.	3050- 3187 m.
Ethiopia & Eritrea	6	563	568	407	513	566	286	231	99	87
Somalia & Yemen	3	298	223	170	180	195	78	59	33	23
Tropical East Africa	7	687	798	488	607	661	338	269	119	107
South Central Africa	4	528	584	383	493	531	273	201	81	61
South Tropical Africa	3	320	288	220	264	264	143	105	43	29
Cape Region	2	45	42	41	59	64	42	38	18	11
Guineo-Congolian forest region	5	560	628	338	300	235	79	41	11	4
Non-forested W. Tropical Africa	5	523	606	349	413	424	204	135	61	47
Madagascar &c.	1	133	118	80	113	115	48	35	16	7
Mediterranean	1	46	21	17	18	20	7	9	6	5
Europe	0	10	10	7	13	15	7	11	5	6
Mainland Asia	1	202	158	90	89	99	32	23	14	9
Indonesia &c.	1	70	41	20	22	21	6	5	4	4
New World	1	90	68	30	35	38	17	13	8	1

and Tanzania) and with Ethiopia and Eritrea. Declining numbers for shared taxa are recorded for the areas towards temperate South Africa (South Central Africa; South Tropical Africa; Cape Region). A higher number of taxa is shared with the non-forested parts of West Tropical Africa than with the Guineo-Congolian forest regions, although over 1000 taxa are shared with both areas. A much higher proportion of the taxa are shared with Mainland Asia than with the Mediterranean and Europe. A smaller number is shared with Indonesia/Australia/Pacific than with Mainland Asia, but a higher number is shared with the New World. The latter group of taxa is mainly pantropical and weedy taxa.

Table 23 shows the variation in the overall distribution of the flora in the four major parts of the study area (Imatong Mountains group

(Sudan side), Imatong Mountains group (Uganda side), Lafit, Dongotona and Nangeya Mountains, and Didinga Mountains). The results show fairly uniform patterns; particularly notable features are pointed out below.

- For the Imatong Mountains group (Sudan side) the distribution profile varies from 79 to 94% of the total number of taxa; particularly high figures are found for taxa distributed in the forested and non-forested parts of Central and West Africa and for widespread tropical taxa reaching the Indonesian island and Australia or the new World. There is particularly low representation of taxa with distribution in Somalia, the Yemen and the Mediterranean region. The high percentage of Central and West African taxa supports the basically Sudanian nature of the lowland

flora in this part of the study area. Similarly does the low percentage of taxa distributed in Somalia, Yemen and the Mediterranean region suggest such a phytogeographical distinction (see also the particularly high representation of taxa distributed in Somalia and the Yemen in the Didinga Mountains in the eastern part of the study area).

- For the Imatong Mountain group (Uganda side) the distribution profile varies from 13 to 44% of the total number of taxa. It seems difficult to suggest the possible significance of the particularly well represented (taxa reaching the Cape Region) and poorly represented distribution patterns (widespread tropical taxa reaching the Indonesian island and Australia or the new World).
- For the Lafit, Dongotona and Nangeya Mountains the distribution profile varies from 6 to 12% of the total number of taxa. Also for this part of the study area it seems difficult to suggest possible significances of the particularly well represented or poorly represented distribution patterns. The flora of this part of the study area is little known.
- For the Didinga Mountains the distribution profile varies from 16 to 39% of the total number of taxa. The latter figure is represented by taxa with distribution in Somalia and the Yemen, a feature which has been mentioned above, and which underline the position of the study area on the phytogeographical boundary between the Sudanian and the Somalia Masai regions.

Table 24 shows that there are also differences with regard to overall distribution between the taxa in the various altitudinal zones of the studied area. In Fig. 45 these differences have been summarised in diagrammatic form.

- As mentioned above, the highest number of taxa is shared with Tropical East Africa, of which the study area is almost a part, and the number of shared taxa above 1525 m. a.s.l. is

very slightly higher than the number of shared taxa below 1525 m. a.s.l.

- The second highest number of taxa is shared with Ethiopia and Eritrea; here the number of shared taxa above 1525 m. a.s.l. is also slightly higher than the number of shared taxa below 1525 m.
- The third highest number of taxa are shared with South Central Africa, where the number of shared taxa is again slightly higher above than below 1525 m. a.s.l.
- The number of shared taxa with central and western Africa is also high, but the pattern is more complex: Below 1525 m. a.s.l. the number of taxa shared with the forested central and western Africa (the Guineo-Congolian region) is almost of the same size as the number of taxa shared with the non-forested parts of Africa to the west of the study area (predominantly the Sudanian region and various transition zones). Above 1525 m. a.s.l. the number of shared taxa in both categories are lower, but there is a very notable difference between the number of taxa shared with the forested central and western Africa and the number of taxa shared with the non-forested parts of Africa to the west of the study area. This expresses undoubtedly that most of the Guineo-Congolian species drop out above 1525 m. a.s.l. while a smaller element of non-forest taxa widespread in western Africa do also occur in the study area above 1525 m. a.s.l.
- The number of taxa shared with South Tropical Africa is almost the same below and above 1525 m. a.s.l., reflecting that comparable altitudinal ranges are found in the study area and in South Tropical Africa.
- The number of taxa shared with Somalia and Yemen is slightly higher below than above 1525 m. a.s.l., reflecting the element of Somalia-Masai species in the eastern lowlands of the study area.
- The number of taxa shared with mainland

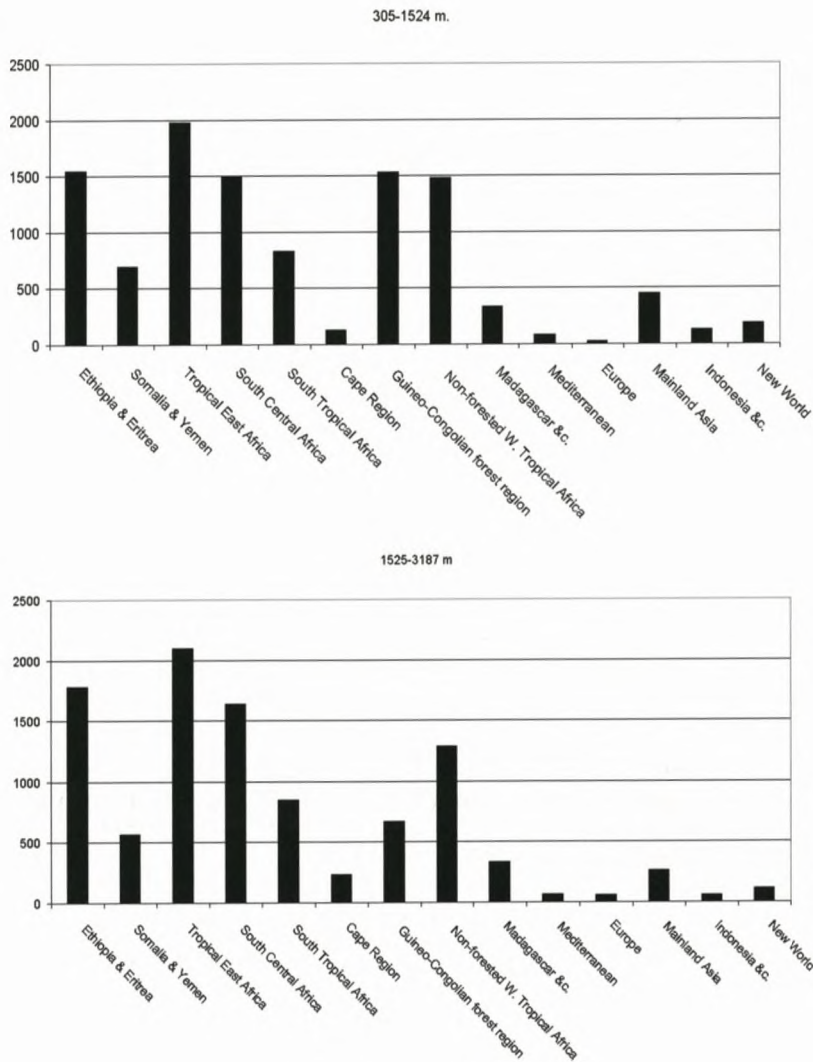


Fig. 45. The distribution outside the study area of the species recorded in the altitudinal zones between 305 and 1524 m. a.s.l. and in the zones between 1525 and 3187 m. a.s.l. The height of the columns indicate number of taxa. The highest number of taxa is shared with Tropical East Africa, of which the study area is almost a part. The second highest number of taxa is shared with Ethiopia and Eritrea. The third highest number of taxa are shared with South Central Africa. The number of shared taxa with central and western Africa is also high, but the pattern is more complex: Below 1525 m. a.s.l. the number of taxa shared with the forested central and western Africa (the Guineo-Congolian region) is almost of the same size as the number of taxa shared with the non-forested parts of Africa to the west of the study area (predominantly the Sudanian region and various transition zones). Above 1525 m. a.s.l. the number of shared taxa in both categories are lower, but there is a notable difference between the number of taxa shared with the forested central and western Africa and the number of taxa shared with the non-forested parts of Africa to the west of the study area. The number of taxa shared with South Tropical Africa is

almost the same below and above 1525 m. a.s.l. The number of taxa shared with Somalia and Yemen is slightly higher below than above 1525 m. a.s.l. The number of taxa shared with mainland Asia, the Cape Region, Madagascar, the Mediterranean region, Europe north of the Mediterranean, the Indonesian islands and Australia and the New World are all low. The graph has been produced with the software package SigmaPlot for Windows Vers. 8.01.

Asia is slightly higher below than above 1525 m. a.s.l., indicating that there are more lowland taxa than highland taxa in this element.

- As frequent in montane regions of tropical Africa, there is a higher number of taxa shared with the Cape Region above than below 1525 m. a.s.l.

- The number of taxa shared with Madagascar is almost the same below and above 1525 m. a.s.l., which probably, as for South Tropical Africa, reflects that comparable altitudinal ranges are found in the study area and in Madagascar.
- The numbers of taxa shared with the

Mediterranean region, Europe north of the Mediterranean, the Indonesian islands and Australia and the New World are all low and with little variation below and above 1525 m. a.s.l.

(8) Review of the findings

As a whole, the study area has a rather low diversity of vascular plants. This is caused by the extensive areas with open grassland in the northern and eastern parts of the study area, while the much smaller montane areas have a rather high diversity. In the entire study area the endemism is moderate, but again there are higher values from the mountains than from the plains. Compared with the diversity and endemism in birds, the vascular plants of the study area show lower diversity, but slightly higher endemism.

As mentioned, the taxon diversity of plants varies considerably with altitude. In the study area the altitudinal zones at 915-1220 m. a.s.l. and 1525-1830 m. a.s.l. have both the highest taxon richness and the highest number of plant endemics. The position and distinctiveness of the peaks in taxon diversity at mid-altitude varies between the different vegetation types, and is most prominent in forest and grassland and least prominent in woodland. But generally the plant diversity drops off regularly with increasing altitudes according to a

linear function, from which the above mentioned peaks represent minor fluctuations. The declining diversity agrees with the declining areas of the upper altitudinal zones, and the species-area curve for the altitudinal zones follow the well-known patterns for relations between species richness and area.

The zonation in the flora is not prominent, but there are detectable discontinuities at c. 1000 m. a.s.l. and at 1800-2100 m. a.s.l. These discontinuities occur in all vegetation types except in forest, where there is one discontinuity between 1200 and 1500 m. a.s.l.

The general position of the flora of the study area has been analysed by investigating the broad distribution of all species both in the study area in general, in the four parts of the study area used for general analyses in this work (basically dividing the study area in western, central and eastern parts) and in altitudinal zones. The largest component of the flora is shared with East Africa, smaller components with Ethiopia and Eritrea, central and western Africa, south central Africa, south tropical Africa and elsewhere. Like in the birds, there are close links to the forests of the Guineo-Congolian region, but in plants this link drops off with increasing altitude. There is an east-west gradient through the study area, with stronger links to the Guineo-Congolian region in the west than in the east, and stronger links to the Somalia-Masai region in the east than in the west.

VII. References

- Alexeev, E.B. 1986. Nove uzkolistnye ovyanitsy (Festuca, Poaceae) tropischenkoi i yuzhnoi Afriki. (New narrow-leaved Festuca (Poaceae) members from tropical and southern Africa). *Bot. Zhurn.* **71(8)**: 1109-1117.
- 1987. Ovsyanitsy gruppy Festuca abyssinica s.l. (Poaceae). (Fescues of the Festuca abyssinica s.l. (Poaceae) group). *Bot. Zhurn.* **72(9)**: 1260-1268.
- Andersen, H.S., Grundtmann, J., Rasmussen, K. & Fog, B. 1992. *CHIPS version 3.0 User's Guide*. Institute of Geography, University of Copenhagen.
- Andrews, F.W. 1948. The vegetation of the Sudan. In: Tothill, J. D. (ed.), *Agriculture in the Sudan*. London. Pp. 32-61.
- 1950. *The flowering plants of the Anglo-Egyptian Sudan, Vol. 1. (Cycadaceae-Tiliaeae)*. T. Buncle & Co., Arbroath.
- Arrhenius, O. 1921. Species and area. *J. Ecology* **9**: 95-99.
- Aylmer, G. [unpublished manuscript]. *Check List of the Trees and Shrubs of the Anglo-Egyptian Sudan*. Khartoum. [Seen in the Library of the Royal Botanic Gardens, Kew].
- Baden, C. 1984. Metarungia, a valid name for Macrorungia. – *Kew Bull.* **39(3)**: 638.
- Barrett, E.C. & Curtis, L.S. 1980. *Introduction to environmental remote sensing*. Second edition. Chapman and Hall.
- Beentje, H.J. 1996. Centres of plant diversity in Africa. In: L.J.G. van der Maesen et al. (eds.), *The Biodiversity of African Plants*. Kluwer, Dordrecht, Boston, London. Pp. 101-109.
- Belward, A.S., Taylor, J.C., Stuttard, M.J., Bignal, E., Mathews, J. & Curtis, D. 1990. An unsupervised approach to the classification of semi-natural vegetation from Landsat Thematic Mapper data. A pilot study on Islay. – *Int. J. Remote Sensing* **11(3)**: 429-445.
- Boughey, A.S. 1955. – The nomenclature of the vegetation zones on the mountains of tropical Africa. – *Webbia* **11**: 413-423.
- Bruce, E.A. 1936. Achyrospermum in tropical Africa. – *Bull. Misc. Inf., Kew* **1936**: 47-60.
- Burgess, N.D., de Klerk, H., Fjelds , J., Crowe, T., Rahbek, C. 2000. A preliminary assessment of congruence between biodiversity patterns in Afrotropical forest birds and forest mammals. – *Ostrich* **71**: 286-290.
- Cave, C.F.O. & Macdonald, J.D. 1955. *Birds of the Sudan: their identification and distribution*. Edinburgh: Oliver & Boyd.
- Chermезon, H. 1931. Les Cyperrac es du Haut-Oubangui. – *Arch. Bot. (Ca n)* **4, M m.** **7**: 1-56.
- Chipp, T.F. 1929. The Imatong Mountains, Sudan. – *Bull. Misc. Inf., Kew* **1929**: 177-197.
- 1930. Forests and Plants of the Anglo-Egyptian Sudan. – *Geogr. J.* **75**: 123-141.
- Clayton, W.D. 1987. Miscellaneous notes on Panicoid grasses. – *Kew Bull.* **42(2)**: 401-403.
- & Hepper, F.N. 1974. Computer aided chorology of West African grasses. – *Kew Bull.* **29**: 213-233.
- Crist, E.P. & Cicone, R.C. 1984. Comparisons of dimensionality and features of Simulated Landsat-4 MSS and TM data. – *Remote Sensing of Environment* **14**: 235-246.
- Cufodontis, G. 1960. Enumeratio plantarum Aethiopiae, Spermatophyta (Sequentia). Ericaceae – Asclepiadaceae (partly). – *Bull. Jard. Bot.  tat. Brux.* **30(4), Suppl.**: 653-708.
- 1969. Enumeratio plantarum Aethiopiae, Spermatophyta (Sequentia). Zweiter Nachtrag zur Einleitung. *Bull. Jard. Bot. nat. Belg.* **39(4), Suppl.**: XIX – XXXI.
- Curran, P.J. 1980. Multispectral photographic remote sensing of vegetation amount and productivity. In: *Proceedings of the 14th International Symposium on Remote Sensing of the Environment*. Ann Arbor, Michigan. Pp. 623-637.
- 1983. Multispectral remote sensing for estimation of green leaf area index. – *Phil. Trans. R. Soc. A.* **309**: 257-268.
- Dale, I.R. 1961. The vegetation of Mount Lorientom. – *Sudan Silva (published by the Sudan Forestry Society)* **11**: 16-17.
- Davis, S.D., Heywood, V.H. & Hamilton, A.C. (eds). 1994. *Centres of Plant Diversity. A guide and Strategy for their Conservation*. Vol. 1. Europe, Africa, South West Asia and the Middle East. WWF & IUCN, Cambridge.
- Dawkins, H.C. 1954. Notes on a visit to the Imatong Mountains. III. The Imatong Lowland Forest. *Uganda Forestry Department Technical Note, No. 6*. Entebbe. [cyclostyled, not seen, cited from Jackson 1956].
- de Klerk, H. 1998. *Biogeography and conservation of terrestrial Afrotropical birds*. Ph.D. thesis, Percy FitzPatrick Institute of African Ornithology, University of Cape Town, Rondebosch.
- DeMenocal, R.B. 1995. Plio-Pleistocene African climate. – *Science* **270**: 53-58.
- Edwards, D.C. & Bogdan, A.V. 1951. *Important Grassland Plants of Kenya*. Nairobi.

- Eggeling, W. J. 1947. Observations on the ecology of the Budongo rain forest, Uganda. *J. Ecol.* **34**: 20-87.
- El Amin, H. M. 1990. *Trees and shrubs of the Sudan*. Ithaca press, Exeter. Pp. 1-484.
- Elzen, R. v.d. & König, C. (1983) Vögel des (Süd-) Sudan: taxonomische und tiergeographische Bemerkungen. – *Bonner Zool. Beitr.* **34**: 149-196.
- Ensermu Kelbessa 1990. *Justicia* sect. *Ansellia* (Acanthaceae). – *Symb. Bot. Upsal.* **29(2)**: 1-96.
- Faden, R. 1991. The morphology and taxonomy of *Aneilema* R. Br. (Commelinaceae). – *Smithsonian Contr. Bot.* **76(1)**: 1-166.
- Fischer, E. 1989. Contributions to the flora of Central Africa II. *Crepidiorhopalum*, a new genus within the relationship of *Ceratostigma*, *Torenia* and *Lindernia* (Scrophulariaceae) with two new and noteworthy species from Central and South Central Africa (Zaire, Zambia). – *Feddes Repert.* **100**: 439-450.
- 1992. Systematik der afrikanischen *Lindernieae* (Scrophulariaceae). – *Tropische und Subtropische Pflanzenwelt* **81**: 1-365.
- & Hepper, F.N. 1991. Four new species of *Lindernia* (Scrophulariaceae) from East Africa. – *Kew Bull.* **46**: 529-534.
- Fjeldså, J. & de Klerk, H. 2001. Avian endemism in north-eastern tropical Africa. *Biol. Skr.* **54**: 259-271.
- & Lovett, J.C. 1997. Geographical patterns of phylogenetic relicts and phylogenetically subordinate species in tropical African forest biota. – *Biodiv. Conserv.* **6**: 325-346.
- , Burgess N.D. & Botterweg, R. 2000. Faunal importance of the Eastern Arc Mountains of Kenya and Tanzania. – *J. East African Nat. Hist.* **87**: 37-58.
- , Ehrlich, D., Lambin, E. & Prins, E. 1997. Are biodiversity 'hotspots' correlated with current ecoclimatic stability? A pilot study using the NOAA-AVHRR remote sensing data. – *Biodiv. Conserv.* **6**: 401-422.
- , Bayes, M.K., Bruford, M.W. & Roy, M.S. 2004. Biogeography and diversification of African forest faunas: implications for conservation. In: Bermingham, E., Dick, C.W. & Moritz, C. (eds.), *Tropical Rain Forests: Past, Present and Future*. University of Chicago Press, Chicago.
- Friis, I. 1992. Forests and forest trees of Northeast Tropical Africa. Their natural habitats and distribution patterns in Ethiopia, Djibouti and Somalia. – *Kew Bull. Add. Ser.* **15**: i – iv, 1-396.
- 1993a. C.F. Hochstetter's scientific names for G.W. Schimper's early collections of African plants. – *Fragm. Flor. Geobot. Suppl.* **2(1)**: 183-201.
- 1993b. Additional observations on forests and forest trees of Northeast Tropical Africa (Ethiopia, Djibouti and Somalia). – *Opera Bot.* **121**: 119-124.
- 1994. Some general features of the afro-montane and afrotemperate floras of the Sudan, Ethiopia and Somalia. In: Seyani, J.H. & Chikuni, A.C. (eds.), *Proceeding of the XIIIth Plenary Meeting of AETFAT, Zomba, Malawi, 2-11 April 1991*. Pp. 953-968. National Herbarium and Botanic Gardens of Malawi, Zomba, Malawi.
- 1998. Frank White and the development of African chorology. In: Huxley, C.R., Lock, J.M. & Cutler, D.F. (eds.), *Chorology, Taxonomy and Ecology of the Floras of Africa and Madagascar*. Royal Botanic Gardens, Kew.
- & Rasmussen, J.B. 1981. Flora and Fauna of the Imatong Mountains, Southern Sudan. Report on the botanical and zoological field work. Univ. of Copenhagen, cyclostyled. 48 pp.
- & Vollesen, K. 1982. New taxa from the Imatong Mountains, S. Sudan. – *Kew Bull.* **38**: 221-228.
- & Vollesen, K. 1999. *Drimia sudanica*, nom. nov. (Hyacinthaceae), a rare species of the Sudanian grasslands. – *Nordic. J. Bot.* **19(2)**: 209-212.
- , Edwards, S., Ensermu Kelbessa, & Sebsebe Demissew. 2001. Diversity and endemism in the flora of Ethiopia and Eritrea – what do the published Flora volumes tell us ...? – *Biol. Skr.* **54**: 173-193.
- , Thulin, M., Adersen, H. & Bürger, A.-M. 2005. Patterns of plant diversity and endemism in the Horn of Africa. – *Biol. Skr.* **55**: 289-314.
- GLOBE Task Team (eds.) 1999. *The Global Land One-kilometer Base Elevation (GLOBE) Digital Elevation Model, Version 1.0*. National Oceanic and Atmospheric Administration, National Geophysical Data Center, 325 Broadway, Boulder, Colorado 80303, U.S.A. Digital data base on the World Wide Web (URL: <http://www.ngdc.noaa.gov/seg/topo/globe.shtml>) and four CD-ROMs.
- Goetghebeur, P. & Van den Borre, A. 1989. Studies in Cyperaceae 8. A revision of *Lipocarpa*, including *Hemicarpa* and *Rikliella*. *Meded. Landbouwhogeschool Wageningen* **89-1**: 1-87.
- Goldblatt, P. 1977. Systematics of *Moraea* (Iridaceae) in tropical Africa. – *Ann. Missouri Bot. Gard.* **64**: 243-295.
- Greene, H. 1948. Soils of the Anglo-Egyptian Sudan. In: Tothill, J. D. (ed.), *Agriculture in the Sudan*. London. Pp. 144-175.
- Greenway, P.J. 1943. Second draft report on vegetation classification for the approval of the vegetation Committee, Pasture Research Conference, Nairobi. Nairobi (mimeographed). 78 pp.
- 1973. A classification of the vegetation of East Africa. – *Kirkia* **9**: 1-68.
- Grisebach, R. *Gentianaceae*, Suppl. In De Candolle, A. (ed.), *Prodromus systematis naturalis regni vegetabilis*, Vol. 9. Paris. Pp. 561-563.

- Hallé, N. & Toilliez, J. 1971. Le genre *Nervillia* en Côte d'Ivoire. – *Adansonia, Sér.* 2 **11**: 443-461.
- Haines, R.W. & Lye, K. A. 1983. The sedges and rushes of East Africa. A flora of the families Huncaceae and Cyperaceae in East Africa – with a particular reference to Uganda. Nairobi.
- Hamilton, A. 1975. A quantitative analysis of altitudinal zonation in Uganda forests. – *Vegetatio* **30**: 99-106.
- Hansen, B. 1989. *Justicia* and *Rungia* (Acanthaceae) in the Indo-Chinese Peninsula. In: Holm-Nielsen, L.B., Nielsen, I.N. & Balslev, H. (eds.), *Tropical forests. Botanical Dynamics, Speciation and Diversity*. Academic Press, London. Pp. 201-210.
- Hansen, O.J. 1975. The East African species of *Sopubia* (Scrophulariaceae). – *Kew Bull.* **30**: 543-558.
- 1975. The genus *Rhamphicarpa* Benth. emend. Engler (Scrophulariaceae): A taxonomic revision. – *Bot. Tidsskr.* **70**: 103-125.
- 1978. The genus *Cycnium* Benth. emend. Engler (Scrophulariaceae): A taxonomic revision. – *Dansk Bot. Arkiv* **32(3)**: 1-72.
- Harrison, M.N. & Jackson, J.K. 1958. Ecological classification of the vegetation of the Sudan. – *Sudan Forests Dept. Forests Bull. No. 2 (New Ser.)*.
- Hawkes, J.G. & Edmonds, J.M. 1972. *Solanum*. In: T.G. Tutin et al., *Flora Europaea, Vol. 3*. Cambridge. Pp. 197-199.
- Hawthorne, W.D. 1993. Book review of Friis, I., *Forests and Forest Trees of Northeast Tropical Africa. Their Natural habitats and distribution patterns in Ethiopia, Djibouti and Somalia*. – *J. Trop. Ecology* **9**: 43-44.
- Hedberg, O. 1951. Vegetation belts of the East African mountains. – *Svensk Bot. Tidsskrift* **45**: 140-202.
- 1957. Afroalpine Vascular Plants. A Taxonomic Revision. – *Symb. Bot. Upsal.* **15,1**: 1-411.
- Hedrn, M. 1989. *Justicia* section *Harnieria* (Acanthaceae) in tropical Africa. *Symb. Bot. Upsal.* **29(1)**: 1-141.
- Hill, R.A. & Foody, G.M. 1994. Separability of tropical rainforest types in the Tambopata-Candamo Reserved Zone, Peru. – *Int. J. Remote Sensing* **15**: 2687-2695.
- Hochstetter, C.F. 1844. Nova genera plantarum Africae, proponit et describit Ch. F. Hochstetter. Continuatio. – *Flora (Regensburg)* **27**: 17-32.
- Hubbel, S.P. (1999) A unified theory of biogeography and biodiversity. Princeton Univ. Press.
- Hutchinson, J. & Dandy, J.E. 1926. The genus *Englerastrum*. *Bull. Misc. Inf. Kew* **1926**: 479-481.
- Jackson, J.K. 1950. The Dongotona Hills, Sudan. – *Emp. For. Rev.* **29**: 139-142.
- 1951. Mount Lotuke, Didinga Hills. – *Sudan Notes and Records* **32**: 339-341.
- 1956. The vegetation of the Imatong Mountains, Sudan. – *J. Ecology* **44**: 341-374.
- Jackson, R.D. 1983. Spectral indices in n-space. *Remote Sensing of Environment* **13**: 409-421.
- Jaeger, P. 1985. *Systematic studies in the genus Solanum in Africa*. Unpublished Ph.D.-thesis. University of Birmingham.
- Jeffrey, C. 1986. The Senecioneae in East Tropical Africa. Notes on Compositae: IV. – *Kew Bull.* **41**: 873-943.
- 1988. The Vernoniae in East Tropical Africa. Notes on Compositae: V. – *Kew Bull.* **43**: 195-277.
- Jenkin, R.N., Howard, W.J., Thomas, P., Abell, T.M.B. & Deane, G.C. 1977. *Forestry development prospects in the Imatong Central Forest Reserve, Southern Sudan. Vol. 1-2*. Land Resources Study 28, Land Resources Division, Ministry of Overseas Development, England, U.K.
- Jensen, M. & Friis, I. 2001. Fire regimes, floristics, diversity, life forms and biomass in wooded grassland, woodland and dry forest at Gambella, western Ethiopia. – *Biol. Skr.* **54**: 349-387.
- Kalina, J. (1989) Nest intruders, nest defence and foraging behaviour in the Black-and-white Casqued Hornbill *Bycanistes subcylindricus*. – *Ibis* **131**: 567-71.
- Kativu, S. & Nordal, I. 1993. New combinations of African species in the genus *Chlorophytum* (Anthericaceae). – *Nordic J. Bot.* **13**: 59-65.
- Kauth, R.J., Lambeck, P.F., Richardson, W., Thomas, G.S. & Pentland, A.P. 1979. Feature extraction applied to agricultural crops seen by Landsat. *Proceedings of the LACIE Symposium, NASA/Johnson Space Center, Houston, TX. Houston, Texas*. Pp. 705-721.
- Klackenberg, J. 1985. The genus *Exacum* (Gentianaceae). – *Opera Bot.* **84**: 1-144.
- Kükenthal, G. 1909. Cyperaceae – Caricoideae. In: A. Engler, (ed.), *Das Pflanzenreich, Regni vegetabilis conspectus, Vol. IV.20*. Leipzig. Pp. 1-824.
- 1935. Cyperaceae – Scirpoideae – Cyperaceae, 1. Lieferung. In: A. Engler & L. Diels, (eds.), *Das Pflanzenreich, Regni vegetabilis conspectus, IV.20. (101 Heft)*. Weinheim. Pp. 1-160.
- 1936. Cyperaceae – Scirpoideae – Cyperaceae, 2-4. Lieferung. In: A. Engler & L. Diels, (eds.), *Das Pflanzenreich, Regni vegetabilis conspectus, IV.20. (101 Heft)*. Weinheim. Pp. 161-671.
- La Ferla, B., Taplin, J., Ockwell, D., Lovett, J.C. 2002. Continental scale patterns of biodiversity: can higher taxa accurately predict African plant distributions? *Bot. J. Linn. Soc.* **138**: 225-235.
- Langdale-Brown, I., Osmaston, H.A. & Wilson, J.G. 1964. *The vegetation of Uganda and its bearing on land-use*. Government of Uganda, Entebbe and London.
- Lebrun, J. 1935. Les essences forestières du Congo Belge 1. Les essences forestières des régions montagneuses du Congo oriental. – *Publ. I.N.É.A.C., Sér. sci.* **1**: 1-264.
- Lebrun, J.-P. & Stork, A.L. 1991. Énumération des plantes à

- fleurs d'Afrique tropicale, Vol. 1-Généralités at Annonaceae à Poaceae. Conservatoire et Jardin botanique de la ville de Genève, Genève.
- 1997. Énumération des plantes à fleurs d'Afrique tropicale, Vol. 4 – Gamopétales: Clethraceae à Lamiaceae. Conservatoire et Jardin botanique de la ville de Genève, Genève.
- Leeuwenberg, A.J.M. 1975. The Loganiaceae of Africa XIV. A revision of *Nuxia* Lam. – *Mededelingen Landbouwhogeschool Wageningen* **75-8**: 1-20.
- Linder, H.P., Lovett, J., Mutke, J.M., Barthlott, W., Jürgens, N., Rebelo, T. & Küper, W. 2005. A numerical re-evaluation of the sub-Saharan phytochoria of mainland Africa. *Biol. Skr.* **55**: 229-252.
- Louette, M. 1999. Composition of the West African lowland avifauna. In: Adams, N.J. & Slotow, R.H. (eds), *Proceedings of the 22nd International Ornithological Congress, Durban*. Johannesburg: BirdLife South Africa. Pp. 3042-3062.
- Lwanga, J. 1996. Trees and shrubs. In: Davenport, T. & P. Howard (eds.), *Biodiversity Report No. 14, Agoru-Agu and Lokung Forest Reserves*. Forest Department, Kampala, Uganda. Pp. 17-35.
- Lind, E.M. & Morrison, M.E.S. 1974. *East African Vegetation*. Longman, London.
- Lovett, J.C., Rudd, S., Taplin, J. & Frimodt-Møller, C. 2000. Patterns of plant diversity in Africa south of the Sahara and their implications for conservation management. *Biodiver. Conserv.* **9**: 33-42.
- Lye, K.A. 1981. Studies in African Cyperaceae 20. New taxa and combinations in *Pycurus* Beauv. *Nordic J. Bot.* **1**: 617-622.
- MacLeay, K.N.G. 1953. The Ferns and Fern-Allies of the Sudan. – *Sudan Notes and Records* **34**: 286-298.
- 1955. Geographical relationships of the Pteridophyte flora of the Sudan. – *Bull. Jard. Bot. État Brux.* **25**: 213-220.
- 1963. Corrections and emendations to the flora of the Sudan. – *Sudan Notes and Records* **44**: 140-142.
- Manktelow, M. 1996. *Phaulopsis* (Acanthaceae) – A monograph. – *Symb. Bot. Upsal.* **31(2)**: 1-183.
- McCune, B. & Grace, J.B. 2002. *Analysis of Ecological Communities*. MJM Software Design, Oregon.
- & Mefford, M.J. 1999. PC-ORD. *Multivariate analysis of Ecological data, Vers. 4*. MJM Software Design, Oregon.
- Mesfin T. 1984. The genus *Bidens* (Compositae) in NE. tropical Africa. – *Symb. Bot. Upsal.* **24(1)**: 1-138.
- Moreau, R.E. 1966. *The bird fauna of Africa and its islands*. Academic Press, New York, London.
- Morison, C.G.T., Hoyle, A.C. & Hope-Simpson, J.F. 1948. Tropical soil vegetation catenas and mosaics. – *J. Ecology* **36**: 1-84.
- Morton, J.K. 1962. Cytotaxonomic studies on the West African Labiatae. – *Bot. J. Linn. Soc.* **58**: 231-283.
- 1988. The *Lepidagathis hamiltoniana-collina* complex (Acanthaceae) in Africa and Asia. – *Bot. J. Linn. Soc.* **96**: 333-344.
- 1998. New names in *Plectranthus* (Lamiaceae) and allied genera from the Ethiopian region. – *Novon* **8**: 265-266.
- Mutke, J. & Barthlott, W. 2005. Patterns of vascular plant diversity at continental to global scales. *Biol. Skr.* **55**: 521-537.
- Napper, D.M. 1963. Cyperaceae of East Africa. I. – *Journ. East Afr. Nat. Hist. Soc.* **24,2 (106)**: 1-18.
- 1964. Cyperaceae of East Africa. II. – *Journ. East Afr. Nat. Hist. Soc.* **24,5 (109)**: 23-46.
- 1965. Cyperaceae of East Africa. III. – *Journ. East Afr. Nat. Hist. Soc.* **25,1 (110)**: 1-27.
- 1966. Cyperaceae of East Africa. IV. – *Journ. East Afr. Nat. Hist. Soc.* **26,1 (113)**: 1-17.
- 1971. Cyperaceae of East Africa. V. – *Journ. East Afr. Nat. Hist. Soc.* **28,1 (124)**: 1-24.
- Niblack, W. 1985. *An introduction to digital image processing*. Strandberg, Copenhagen. Pp. 1-211.
- Nicolson, D.H., Suresh, C.R. & Manilal, K.S. 1988. An interpretation of Van Rheede's *Hortus Malabaricus*. – *Regnum Vegetabile* **119**: 1-378.
- Nicholson, S.E. 1994. Recent rainfall fluctuations in Africa and their relationships to past conditions over the continent. – *Holocene* **4**: 121-131.
- Nikolaus, G. 1978. *Bird Species List from the Imatongs*. Report to the Regional Ministry of Wildlife, Juba.
- 1982. A new race of the spotted ground thrush *Turdus fischeri* from South Sudan. – *Bull. Brit. Orn. Club* **102**: 45-47.
- 1987. Distribution atlas of Sudan's birds with notes on habitat and status. – *Bonner Zool. Monogr.* Vol. 25. Bonn.
- 1989. Birds of South Sudan. – *Scopus Suppl.* **3**: 1-124.
- Nordal, I. 1979. Revision of the genus *Cyrtanthus* (Amaryllidaceae) in East Africa. – *Norw. J. Bot.* **26**: 183-192.
- & Thulin, M. 1993. Synopsis of *Anthericum* and *Chlorophytum* (Anthericaceae) in the Horn of Africa, including the description of nine new species. – *Nordic J. Bot.* **13**: 257-280.
- Nordenstam, B. 1978. The genus *Wurmbea* in Africa except the Cape Region. – *Notes Roy. Bot. Gard. Edinb.* **36**: 211-233.
- Paton, A. 1992a. The genus *Scutellaria* L. (Labiatae) in tropical Africa. – *Kew Bull.* **47**: 41-48.
- 1992b. A synopsis of *Ocimum* L. (Labiatae) in Africa. – *Kew Bull.* **47**: 403-435.
- 1995. The genus *Becium* (Labiatae) in East Africa. – *Kew Bull.* **50**: 199-242.

- 1997a. Classification and species of *Platostoma* and its relationship with *Haumanniastrum* (Labiatae). – *Kew Bull.* **52**: 257-292.
- 1997b. A revision of *Haumanniastrum* (Labiatae). – *Kew Bull.* **52**: 293-378.
- Peers, A.W. 1953. *Report of a Grazing Survey of Eastern Districts, Equatoria Province*. (Unpublished report, not seen, quoted from Harrison & Jackson, 1958).
- Pennington, T.D. 1991. *The Genera of Sapotaceae*. Royal Botanic Gardens, Kew, and New York Botanical Garden, New York.
- Petterson, B. 1991. The genus *Nervillia* (Orchidaceae) in Africa and the Arabian peninsula. – *Orchid Monographs* **5**: 1-90.
- Reynolds, G.W. 1966. *Aloes of Tropical Africa and Madagascar*. Mbabane, Swaziland.
- Rohlf, F.J. 1987. NTSYS-pc. Numerical Taxonomy and Multivariate Analysis System for the IBM PC microcomputer (and compatible). Manual and computer software. Scotts Valley, California & Setauket, New York.
- 1998. NTSYS-pc. *Numerical Taxonomy and Multivariate Analysis System. Version 2.0*. User Guide. Exeter Software, Setauket, New York.
- Rouse, J.W., Haas, R.H., Schell, J.A., Deering, D.W. & Harlan, J.C. 1974. *Monitoring the vernal advancement and retrogradation (greenwave effect) of natural vegetation*. NASA/GSFC Type III Final Report, Greenbelt, Maryland.
- Ryding, O. 1986. The genus *Aeollanthus*: (Labiatae). – *Symb. Bot. Upsal.* **26**(1): 1-152.
- 1999. *Plectranthus alpinus* (Vatke) Ryding, new combination and correct name for *P. assurgens* (Baker) J.K. Morton (Lamiaceae). – *Bot. Jahrb. Syst.* **121**: 145-148.
- Schowengerdt, R.A. 1983. *Techniques for Image Processing and Classification in Remote Sensing*. Academic Press; London.
- Sebald, O. 1980. Die Gattung *Leucas* R. Brown (Labiatae) in Africa und auf der Arabischen Halbinsel. *Stuttgarter Beitr. Naturkunde, Ser. A (Biologie)* **341**: 1-200.
- Sebsebbe D. 1985. The genus *Maytenus* (Celastraceae) in NE Tropical Africa and Tropical Arabia. – *Symb. Bot. Upsal.* **25**(2): 1-101.
- Seegeler, C.J.P. 1989. *Sesamum orientale* L. (Pedaliaceae): Sesame's corect name. *Taxon* **38**: 656-659.
- Sellers, P.J. 1985. Canopy reflectance, photosynthesis and transpiration. *Int. J. Remote Sensing* **6**: 1335-1372.
- 1987. Canopy reflectance, photosynthesis and transpiration II. *Remote Sensing of Environment* **21**: 143-183.
- Setzer, H. 1956. Mammals of the Anglo-Egyptian Sudan. – *Proc. U.S. Natn. Mus.* **106**: 447-587.
- Seybold, S. 1988. Die Arten der Gattung *Satureja* L. (Labiatae) in Äthiopien. *Stuttgarter Beiträge zur Naturkunde, Ser. A. (Biologie)* **421**: 1-38.
- Sibley, C.G. & Monroe, B.L. 1990. *Distribution and Taxonomy of Birds of the World*. Yale University Press, New Haven and London.
- Sidwell, K. 1998. A revision of *Brilanaisia* (Acanthaceae). – *Bull. Nat. Hist. Mus. London (Bot.)* **28**: 67-113.
- Smith, J. 1949. Distribution of Tree Species in the Sudan in Relation to Rainfall and Soil Texture. – *Min. Agree. Sudan Govt. Bull., No. 4*.
- Smith, L. & Ayensu, E. 1974: A classification of the Old World *Veloziaceae*. – *Kew Bull.* **29**: 181-205.
- Sommerlatte, H. & Sommerlatte, M. 1990. *A Field Guide to the Trees and Shrubs of the Imatong Mountains, Southern Sudan*. Deutsche Gesellschaft für Technische Zusammenarbeit, Nairobi. Nairobi. Pp. 1-373.
- Stattersfield, A.J., Crosby, M.J., Long, A.J. & Wege, D.C. 1998. *Endemic bird areas of the world. Priorities for biodiversity conservation*. BirdLife International, Cambridge, U.K.
- Stearn, W.T. 1980. African species of *Chionanthus* L. (Oleaceae) hitherto included in *Linociera* Swartz. – *Bot. J. Linn. Soc.* **80**: 191-206.
- Swain, P.H. & Davis, S.M. (eds.) 1978. *Remote Sensing: The Quantitative Approach*. London, McGraw-Hill.
- Taylor, P.G. 1989. The genus *Utricularia*: a taxonomic monograph. – *Kew Bull. Add. Ser.* **14**.
- Thomas, A.S. 1943. The vegetation of the Karamoja District, Uganda. *J. Ecology* **31**: 149-177.
- Thulin, M. 1983. Some tropical African *Lobeliaceae*. Chromosome numbers, new taxa and comments on taxonomy and nomenclature. – *Nordic J. Bot.* **3**: 371-382.
- 1994. Aspects of disjunct distribution and endemism in the arid parts of the Horn of Africa, particularly Somalia. In: Seyani, J.H. & Chikuni, A.C. (eds.), *Proc. XI-Iith AETFAT Congress, Zomba, Vol. 2*. Pp. 1105-1119.
- Traylor, M.A. Jr. & Archer, A.L. 1982. Some results of the Field Museum 1977 Expedition to South Sudan. – *Scopus* **6**: 5-12.
- Troupin, G. 1966. Étude phytocénologique du Parc National de l'Akagera et du Rwanda Oriental. Recherches d'une méthode d'analyse appropriée a la vegetation d'Afrique Intertropicale. – *Inst. nat. Rech. sci. Butare, Rép. Rwandaise, Publ. No. 2*. Pp. 1-293.
- Tucker, C.J. 1978. A comparison of satellite sensor bands for vegetation monitoring. *Photogram. Eng. and Remote Sensing* **44**: 1369-1380.
- 1979. Red and photographic infrared linear combinations for monitoring vegetation. *Remote Sensing of Environment* **8**: 127-150.
- , Townsend, J.R.G. & Goff, T.E. 1985. African land-cover classification using satellite data. *Science* **227**: 369-375.
- & Sellers, P.J. 1986. Satellite remote sensing of primary production. *Int. J. Remote Sensing* **7**: 1395-1416.

- Vollesen, K. 1975. A taxonomic revision of the genera *Tinea* and *Renschia*. – *Bot. Tidsskr.* **70**: 1-63.
- 1990. The genus *Crossandra* (Acanthaceae) in the African continent. – *Kew Bull.* **45**: 503-534.
- 1992. The Old World species of *Stenandrium* (Acanthaceae: Acantheae). – *Kew Bull.* **47**: 169-202.
- 1994. Taxonomy, ecology and distribution of *Nelsonia* (Acanthaceae) in Africa. In: Seyani, J.H., Chikuni, A.C. (eds.), *Proceedings of the 13th Plenary meeting of AETFAT, Zomba, Malawi, 2-11 April 1991, Vol. 1*. Zomba, Malawi. Pp. 315-325.
- Warfa, A.M. 1990. Taxonomy and distribution of *Cordia sinensis* and *C. nevillei* (Boraginaceae), a widespread species pair in Africa and Asia. – *Nordic J. Bot.* **9**: 649-656.
- Weber, N.A. 1943. The ants of the Imatong Mountains, Anglo-Egyptian Sudan. – *Bull. Mus. Comp. Zool.* **93**: 264-383.
- White, F. 1965. The savanna woodlands of the Zambesian and Sudanian Domains. An ecological and phytogeographical comparison. – *Webbia* **19**: 651-681.
- 1970. Floristics and Plant Geography. Classification. In: Chapman, J. D. & White, F. *The Evergreen Forests of Malawi*. Commonwealth Forestry Institute, Oxford. Pp. 38-112.
- 1976. The vegetation map of Africa: the history of a completed project. – *Boissiera* **24**: 659-666.
- 1981. UNESCO/AETFAT/UNSO Vegetation Map of Africa. Scale 1:5 000 000. 3 maps and legends. UNESCO, Paris.
- 1983. The Vegetation of Africa. A Descriptive Memoir to Accompany the UNESCO/AETFAT/UNSO Vegetation Map of Africa. *UNESCO Natural Resources Research* **20**: 1-356.
- 1993. The AETFAT chorological classification of Africa: history, methods and application. – *Bull. Jard. Bot. Nat. Belg.* **62**: 225-281.
- Whitehouse, G.J. 1931. The Langia-Acholi mountain region of the Sudan-Uganda borderland. – *Geogr. J.* **77**: 140-159.
- Wickens, G.E. 1976. The Flora of Jebel Marra (Sudan Republic) and its geographical affinities. – *Kew Bull. Additional Series* **5**.
- Williams, P.H. 1998. *WorldMap, Version 4*. London, The Natural History Museum.
- Wilson, D.E. & Reeder, D.M. 1993. *Mammal species of the world*. 2nd ed. Smithsonian, Washington, D.C.
- Yalden, D.W., Lagen, M.J. & Kock, D. 1976. Catalogue of the mammals of Ethiopia. 2. Insectivora and Rodentia. – *Monitore Zool. Ital. N.S. Suppl.* **VIII(1)**: 1-118.
- Zizka, G. 1988. Revision der Melinideae Hitchcock (Poaceae, Panicoideae). – *Biblioteca Botanica* **138**: 1-144.

VIII. Index to plant taxa

A

- Abelmoschus** Medic. 147
Abelmoschus ficulneus (L.) Wight & Arn. 147
Abildgaardia abortiva (Steud.) K. Lye 522
Abildgaardia coleotricha (Steud.) K. Lye 522
Abildgaardia oligostachys (A. Rich.) K. Lye 523
Abildgaardia oritrephes (Ridl.) K. Lye 524
Abildgaardia pusilla (A. Rich.) K. Lye 524
 subsp. *yalingensis* (Cherm.) K. Lye 524
Abildgaardia setifolia (A. Rich.) K. Lye 524
Abildgaardia hispidula (Vahl) K. Lye 523
Abrus Adans. 198
Abrus canescens Bak. 198;692
Abrus precatorius L. 198
 subsp. **africanus** Verdc. 198;706
Abrus schimperi Bak. 198
 subsp. **schimperi** 199;692
Abutilon Mill. 147
Abutilon figarianum Webb 147
Abutilon graveolens auct., non Wight & Arn. 147
Abutilon longicuspe Hochst. ex A. Rich. 147;737
Abutilon mauritianum (Jacq.) Medic. 148;736
Acacia Mill. 184
Acacia abyssinica auct., non Hochst. ex Benth. 1184
Acacia abyssinica Hochst. ex Benth. 184;668;714;715;719;724;725;726;728;731
 subsp. **calophylla** Brenan 184;725;726
Acacia adansonii auct., non Guill. & Perr. 188
Acacia albida Del. 185;696;706
Acacia amythetophylla A. Rich. 185;614;712
Acacia arabica (Lam.) Willd. 188
 var. *adansoniana* auct., non Dubard 1188
Acacia ataxacantha DC. 185;713
Acacia brevispica Harms 185;614;706
Acacia bussei Harms ex Sjoest. 187
 var. *benadirensis* Chiov. 187
Acacia campylacantha Hochst. ex A. Rich. 189
Acacia dolichocephala Harms 186
Acacia drepanolobium Harms ex Sjoest. 186
Acacia eggelingii Bak. f. 189
Acacia etbaica Schweinf. 186
 subsp. **etbaica** 186
Acacia fistula Schweinf. 191
Acacia gerrardii Benth. 186;614;692
 var. **gerrardii** 186;692
Acacia hebecladoides Harms. 186
Acacia hecatophylla Steud. ex A. Rich. 187;692
Acacia hockii De Wild. 187;614;699;705;706;707;712;713;715
Acacia horrida (L.) Willd. 187
 subsp. **benadirensis** (Chiov.) Hillc. & Brenan 187
Acacia kamerunensis Gand. 188;701;717
Acacia macrothyrsa Harms 185
Acacia mellifera (Vahl) Benth. 188;706;709
Acacia misera Vatke 190
Acacia nilotica (L.) Del. 188
 subsp. **subalata** (Vatke) Brenan 188;693;706;713
Acacia nubica Benth. 188
Acacia oerfota (Forssk.) Schweinf. 188;706
Acacia paolii Chiov. 189
Acacia pennata auct., non (L.) Willd. 185;188
Acacia persiciflora Pax 189;614;718
Acacia polyacantha Willd. 189;696;712
 subsp. **campylacantha** (Hochst. ex A. Rich.) Brenan 189; 696;712
Acacia raddiana Savi 191
Acacia reficiens Wawra 190
 subsp. **misera** (Vatke) Brenan 190;706
Acacia schweinfurthii Brenan & Exell 190
 var. **schweinfurthii** 190;693
Acacia senegal (L.) Willd. 190;614;706;712;713
 var. **senegal** 190;706;712

- Acacia seyal** Del. 190;614;686;692;699;704;705;706;713
 var. **fistula** (Schweinf.) Oliv. 190
 var. *multijuga* Schweinf. ex Bak. f. 187
 var. **seyal** 191
Acacia sieberiana DC. 191;614;692
 var. **sieberiana** 191;692
 var. **woodii** (Burt Davy) Keay & Brenan 191
Acacia spirocarpa A. Rich. 192
Acacia stenocarpa auct., non A. Rich. 187
Acacia tortilis (Forssk.) Hayne 191;614;706
 subsp. **raddiana** (Savi) Brenan 191;706
 subsp. **spirocarpa** (A. Rich.) Brenan 192
Acacia vereke Guill. & Perr. 190
Acacia xiphocarpa auct., non Hochst. ex Benth. 184
Acalypha L. 154
Acalypha acrogyna Pax 154;609;701
Acalypha bipartita Muell. Arg. 154;609;698
Acalypha ciliata Forssk. 155
Acalypha fruticosa Forssk. 155
 var. **eglandulosa** Radcl.-Sm. 155
 var. **fruticosa** 155;707
 var. **villosa** Hutch. 155
Acalypha indica L. 156
Acalypha neptunica Muell. Arg. 156;609;701
Acalypha ornata Hochst. ex A. Rich. 156;609;665;692;698;699;702;712;717
Acalypha paniculata auct., non Miq. 157
Acalypha psilostachya Hochst. 157;729
Acalypha racemosa Baill. 157;609;701
Acalypha senensis Klotzsch 157
Acalypha villicaulis Hochst. ex A. Rich. 157
Acalypha volkensii Pax 158;729
Acanthaceae Juss. 435
Acanthopale C.B. Clarke 435
Acanthopale pubescens (Lindau) C.B. Clarke 435;729
Acanthospermum Schrank 351
Acanthospermum hispidum DC. 351
Acanthus L. 435
Acanthus arboreus auct., non Forssk. 436
Acanthus eminens C.B. Clarke 435;701;717;733;734
Acanthus pubescens (Oliv.) Engl. 436;700
Achyranthes L. 96
Achyranthes aspera L. 96;717
 var. **aspera** 96
 var. **sicula** L. f. 96
Achyrocline hochstetteri Sch. Bip. 371
Achyrocline schimperi Sch. Bip. ex A. Rich. 371
Achyropermum Blume 462
Achyropermum axillare E.A. Bruce 462;702;758
Achyropermum parviflorum S. Moore 462;702;729
Achyropermum schimperi (Briq.) Per. 462;702
Acmella L.C. Rich. ex Pers. 351
Acmella caulirhiza Del. 351
Acokanthera G. Don 316
Acokanthera schimperi (A. DC.) Oliv. 316
Acokanthera schimperi auct., non (A. DC.) Oliv. 317
Acridocarpus Guill. & Perr. 154
Acridocarpus ugandensis Sprague 154;710
Acritochaete Pilg. 544
Acritochaete volkensii Pilg. 544;734
Acrocephalus Benth. 462;465
Acrocephalus cylindraceus Oliv. 465
Acrocephalus galeopsifolius Bak. 465
Acroceras Stapf 544
Acroceras gabunense (Hack.) W.D. Clayton 544;702
Acroceras oryzoides Stapf 545
Acroceras zizanioides (Kunth) Dandy 545;702
Actiniopteris Link 38
Actiniopteris australis auct., non (L. f.) Link 38
Actiniopteris radiata (Sw.) Link 38;712
Actiniopteris semiflabellata Pic. Serm. 38;718
Adenia Forssk. 117
Adenia cissampeloides (Planch. ex Benth.) Harms 117;698
Adenia schweinfurthii Engl. 117
Adenia venenata Forssk. 118;706
Adenium Roem. & Schult. 316
Adenium coetaneum Stapf 316
Adenium honghel A. DC. 316

- Adenium obesum** (Forssk.) Roem. & Schult. 316;706;710
Adenium speciosum Fenzl 316
Adenocarpus DC. 199
Adenocarpus mannii (Hook. f.) Hook. f. 199;742;743
Adenostemma J.R. & G. Forst. 351
Adenostemma cafferum DC. 351
Adenostemma mauritianum DC. 351;729
Adenostemma perrottetii DC. 352;729
Adenostemma viscosum auct., non J.R. & G. Forst. 352
Adiantaceae Presl 38
Adiantum L. 38
Adiantum incisum Forssk. 38
Adiantum oatesii Bak. 38
Adiantum patens Willd. 38
 subsp. *oatesii* (Bak.) Schelpe 38;702
Adiantum philippense L. 39;702
Adiantum poiretii Wikstr. 39;734
Adiantum thalictroides Schlecht. 39
Aeollanthus Mart. 462
Aeollanthus densiflorus Ryding 462;720
Aeollanthus heliotropioides Oliv. 463
Aeollanthus myrianthus Bak. 463;710
Aeollanthus repens Oliv. 463;720
Aeollanthus stormsii auct., non Guerke 462
Aeollanthus suaveolens Spreng. 463;710;720
Aerangis Rchb. f. 508
Aerangis brachycarpa (A. Rich.) Dur. & Schinz 508
Aeschynomene L. 199
Aeschynomene abyssinica (A. Rich.) Vatke 199;724
Aeschynomene ruppellii Bak. 199
Aframomum K. Schum. 483
Aframomum alboviolaceum (Ridl.) K. Schum. 483;683;695
Aframomum angustifolium (Sonn.) K. Schum. 483;698
Aframomum luteoalbum (K. Schum.) K. Schum. 483;698
Aframomum sp. 483
Afrocrania (Harms) Hutch. 294
Afrocrania volkensii (Harms) Hutch. 294;626;734;740
Afromendoncia gilgiana Lindau 450
Afzelia Sm. 179
Afzelia africana Pers. 179;692;712
Agauria (DC.) Hook. f. 302
Agauria salicifolia (Lam.) Oliv. 302;627;729;739
Agavales Hutch. 502
Agelaea Solander ex Planch. 293
Agelaea dewevrei De Wild. & T. Durand 293
Agelaea heterophylla Gilg 293
Agelaea hirsuta De Wild. 293
Agelaea lamarckii Planch. 293
Agelaea nitida Planch. 293
Agelaea obliqua (P. Beauv.) Baill. 293
 var. *cordata* (Schellenb.) Exell 293
Agelaea pentagyna (Lam.) Baill. 293;701;729
Agelaea sp. 293
Agelaea thouarsii Baill. 293
Agelaea trifolia (Lam.) Baill. 293
Agelaea ugandensis Schellenb. 293
Agelanthus Van Tiegh. 263
Agelanthus oehlerii (Engl.) Polhill & Wiens 263;722
Ageratum L. 352
Ageratum conyzoides L. 352
Agrocharis Hochst. 297
Agrocharis incognita (Norm.) Heywood & Jury 297;739
Agrocharis pedunculata (Bak. f.) Heywood & Jury 297
Agrostis L. 545
Agrostis diffusa S.M. Phillips 545
Agrostis kilimandscharica Mez 545;743
Agrostis producta Pilg. 545;739
Agrostis sororia C.E. Hubb. 545
Agrostis sp. 740
Aira L. 545
Aira caryophyllea L. 545;743
 var. *latigluma* (Steud.) C.E. Hubb. 545
Alangiaceae DC. 295
Alangium Lam. 295
Alangium chinense (Lour.) Harms 295;729;737

- Albizia** Durazz. 192
Albizia adianthifolia (Schumach.) W.F Wright 614
Albizia amara (Roxb.) Boivin 192
 subsp. **sericocephala** (Benth.) Brenan 192;694;706;713
Albizia anthelmintica Brongn. 192
Albizia brownei (Walp.) Oliv. 195
Albizia coriaria Welw. 193;615;698
Albizia eggelingii Bak. f. 193
Albizia fastigiata (E. Mey.) Oliv. 614
Albizia glaberrima (Schumach. & Thonn.) Benth. 193;615;701
Albizia grandibracteata Taub. 193;615;701;715;716
Albizia grandibracteata x gummifera 194
Albizia gummifera (J.F. Gmel.) C.A. Sm. 194; 615;663;719;726;727;728;731;732; 735;736;737
 var. **gummifera** 194
Albizia malacophylla (A. Rich.) Walp. 615
Albizia maranguensis Taub. ex Engl. 194
Albizia schimperiana Oliv. 194;615;667;668; 716;726;727;728;731;732;738
 var. **schimperiana** 194
 var. **tephrocalyx** Brenan 195
Albizia sericocephala Benth. 192
Albizia zygia (DC.) Macbr. 195;615;689;692;694;699;712;716
Albuca L. 486
Albuca abyssinica Jacq. 486;720
Alchemilla L. 175
Alchemilla abyssinica Fresen. 175;729
Alchemilla argyrophylla Oliv. 175
 subsp. **argyrophylla** 175;742
Alchemilla cryptantha Steud. ex A. Rich. 175;742
Alchemilla ellenbeckii Engl. 176;739
Alchemilla mildbraedii Engl. 176
Alchemilla rothii Oliv. 175
Alchemilla sp. 739;741
Alchemilla tenuicaulis Hook. f. 175
Alchornea Sw. 158
Alchornea floribunda Muell. Arg. 609
Alchornea laxiflora (Benth.) Pax & K. Hoffm. 158;609;701
Alectra Thunb. 422
Alectra senegalensis Benth. 422
Alectra sessiliflora (Vahl) O. Kuntze 422;725
 var. **senegalensis** (Benth.) Hepper 422;725
Alepidea Delar. 297
Alepidea peduncularis A. Rich. 297;739;742;743
Alepidea sp. 297
Allanblackia Oliv. 606
Allanblackia floribunda auct., non Oliv. 606
Allanblackia kimbiliensis Spirlet 606
Allophylus L. 285
Allophylus abyssinicus (Hochst.) Radlk. 285;624;662;729;733
Allophylus dummeri Bak. f. 624
Allophylus ferrugineus Taub. 625
 var. **ferrugineus** 625
Allophylus macrobotrys Gilg 285;625;701
Allophylus oreophilus Gilg 625
Allophylus rubifolius (A. Rich.) Engl. 285
Allophylus welwitschii Gilg 625
Alloteropsis C. Presl 546
Alloteropsis cimicina (L.) Stapf 546
Alloteropsis semialata (R. Br.) Hitchc. 546;724
Aloaceae J. Agardh 489
Alocasia (Schott) G. Don 495
Alocasia macrorrhiza (L.) G. Don 495
Aloe L. 489
Aloe labworana (Reynolds) S. Holmes 489;710;758
Aloe macleayi Reynolds 489;720;758
Aloe schweinfurthii Bak. 489
 var. **labworana** Reynolds 489
Aloe schweinfurthii Bak., pro parte 489
Aloe sp. 489
Alsodeia brachypetala Turcz. 82
Alsodeia ilicifolia Oliv. 82
Alsodeia welwitschii Oliv. 82
Alstonia R. Br. 316
Alstonia boonei De Wild. 316;630;701
Alstonia congensis Engl. 316
Alternanthera Forssk. 93

Alternanthera pungens Kunth	97	<i>Ampelocissus cavicaulis</i> (Bak.) Planch.	270
<i>Alternanthera repens</i> (L.) Link, non Gmel.	97	<i>Ampelocissus grantii</i> (Bak.) Planch.	270
Alysicarpus Neck.	199	<i>Ampelocissus obtusata</i> Bak.	270
Alysicarpus ovalifolius (Schweinf.) Léonard	199	subsp. <i>kirikiana</i> (Planch.) Wild & Drummond	270
Alysicarpus rugosus (Willd.) DC.	200	Ampelocissus sp. cf. A. sarcocephala Planch.	270
subsp. rugosus	200	Amphicarpaea Nuttall	200
<i>Alysicarpus rugosus</i> auct., non DC.	200	Amphicarpaea africana (Hook. f.) Harms	200;729
Amaranthaceae Juss.	96	Anacardiaceae Link	289;626
Amaranthus L.	97	Anagallis L.	403
Amaranthus dubius Thell.	97	Anagallis djaloni A. Chev.	403;710
Amaranthus hybridus L.	97	Anagallis pumila Sw.	404;710
subsp. cruentus (L.) Thell.	97	var. <i>barbata</i> P. Taylor	404
subsp. hybridus	97	Anagallis serpens Hochst. ex DC.	404
<i>Amaranthus patulus</i> auct., non Bertol.	97	subsp. serpens	404
Amaranthus spinosus L.	97	Anchomanes Schott	495
Amaryllidaceae Jaume St-Hill.	496	Anchomanes difformis (Bl.) Engl.	495;702
Amaryllidales Bromhead	496	<i>Anchomanes dubius</i> Schott	495
Amauropelta Kunze	54	<i>Anchomanes hookeri</i> (Kunth) Schott	495
Amauropelta bergiana (Schlechtend.) Holttum	54;734	Andira A.L. Juss.	200
Amauropelta oppositifolmis (C. Chr.) Holttum	54;734	Andira inermis (Wright) DC.	200;692
Ammannia L.	106	subsp. rooseweltii (De Wild.) Polhill	200
Ammannia auriculata Willd.	106	Andropogon L.	546
Ammannia baccifera L.	107	Andropogon amethystinus Steud.	546;739
<i>Ammannia senegalensis</i> auct., non Lam.	107	<i>Andropogon dummeri</i> Stapf	547
<i>Amomum alboviolaceum</i> Ridl.	483	Andropogon gayanus Kunth	546
<i>Amomum angustifolium</i> Sonn.	483	var. gayanus	546
<i>Amomum luteoalbum</i> K. Schum.	483	var. polycladus (Hack.) Clayton	546
Amorphophallus Decne.	495	Andropogon lima (Hack.) Stapf	547;739
Amorphophallus abyssinicus (A. Rich.) N.E. Br.	495;695	Andropogon mannii Hook. f.	547;743
<i>Amorphophallus barteri</i> N.E. Brown	495	Andropogon schirensis A. Rich.	547;716;724
<i>Amorphophallus schweinfurthii</i> (Engl.) N.E. Brown	495	<i>Andropogon thomasi</i> C.E. Hubb.	547
Ampelidaceae Kunth	269	Aneilema R. Br.	475
Ampelocissus Planch.	269	Aneilema aequinoctiale (P. Beauv.) G. Don	475;702
Ampelocissus abyssinica (A. Rich.) Planch.	269;714	Aneilema beniniense (P. Beauv.) Kunth	475;702
Ampelocissus africana (Lour.) Merr.	270;692	Aneilema hirtum A. Rich.	475;729
<i>Ampelocissus asarifolia</i> (Bak.) Planch.	270	Aneilema lanceolatum Benth.	476;696
Ampelocissus bombycina (Bak.) Planch.	270;692	<i>Aneilema ovato-oblongum</i> P. Beauv.	476
		<i>Aneilema schweinfurthii</i> C.B. Clarke	476
		<i>Aneilema sinicum</i> (Roem. & Schult.) Lindl.	480

- var. *simplex* (Vahl) C.B. Clarke 480
Aneilema soudanicum C.B. Clarke 476
Aneilema spekei C.B. Clarke 476;710
Aneilema umbrosum (Vahl) Kunth 476; 710
 subsp. **ovato-oblongum** (P. Beauv.)
 J.K. Morton 476;710
Anemone L. 68
Anemone thomsonii Oliv. 68
 var. **thomsonii** 68;743
Angiospermae Lindl. 63
Angraecum Bory 508
Angraecum brachycarpum (A. Rich.) Rchb. f. 508
Angraecum humile Summerh. 508;729
Angraecum schimperianum (A. Rich.) Rchb. f.
 510
Aningeria Aubrév. & Pellegr. 307
Aningeria adolfi-friederici (Engl.) Robyns &
 Gilbert 307; 628
 subsp. *adolphi-friederici* 307
Aningeria altissima (A. Chev.) Aubrév. &
 Pellegr. 307
Anisopappus Hook. & Arn. 352
Anisopappus africanus (Hook f.) Oliv. &
 Hiern 352;724
Anisotes pubinervis (T. Anderson) Heine 450
Annona L. 63
Annona chrysophylla Bojer 63
Annona senegalensis Pers. 63559; 692;693
 subsp. **senegalensis** 63;692
Annonaceae Juss. 63;599
Annonales Lindl. 63
Anomatheca Ker Gawl. 499
Anomatheca laxa (Thunb.) Goldbl. 499
Anthericaceae J. Agardh 491
Anthericum L., pro parte 491
Anthericum buchananii Bak. 492
Anthericum cameronii Bak. 491
Anthericum giryamae Rendle 491
Anthericum longifolium A. Rich. (1850),
 nom. illeg., non Jacq. 492
Anthericum monophyllum Bak. 493
Anthericum pterocaulon Bak. 491
Anthericum purpuratum Rendle 492
Anthericum rubellum Bak. 491
Anthericum speciosum Bak. 491
Anthericum subpetiolatum Bak. 493
Anthericum triflorum auct., non Ait. 491
Anthericum zanguebaricum Bak. 491
Antherotoma (Naudin) Hook. f. 127
Antherotoma naudinii Hook. f. 127;724
Anthocleista Afzel. ex R. Br. 311
Anthocleista grandiflora Gilg 311;629;716;729
Anthocleista pulcherrima Gilg 311
Anthocleista zambesiaca Bak. 311
Anthospermum L. 326
Anthospermum usambarense K. Schum.
 326;742;743
Antiaris Lesch. 241
Antiaris africana Engl. 241
Antiaris toxicaria Lesch. 241; 618;701;712
 subsp. **welwitschii** (Engl.) C.C. Berg
 241;618;701;712
 var. **africana** A. Chev. 241
Antiaris welwitschii Engl. 241
Antidesma L. 158
Antidesma meiocarpum J. Léonard 158
Antidesma membranaceum Muell. Arg.
 158;701
Antopetitia A. Rich. 201
Antopetitia abyssinica A. Rich. 201;724
Aphania Blume 287
Aphania senegalensis (Juss.) Radlk. 287
Apiaceae Lindl. 297;627
Apiales Nakai 294
Apocynaceae Juss. 316;630
Apocynales Bromhead 316
Apodytes Arn. 260
Apodytes beninensis Planch. 261
Apodytes dimidiata E. Mey. ex Arn. 260
 subsp. **acutifolia** (A. Rich.) Cufod. 260;733
 var. **acutifolia** (A. Rich.) Boutique 260
Aquifoliaceae Bartl. 254;620
Araceae Juss. 495
Arales Dumort. 495
Araliaceae Juss. 295;626
Archichlamydeae Engl. 63
Ardisiandra Hook. f. 404
Ardisiandra engleri Weim. 404

- var. *microphylla* Weim. 404
Ardisiandra sibthorpioides Hook. f. 404;729
Areaceae Schultz-Schultzenst. 504
Arecales Bromhead 504
Arenaria schimperii (Hochst.) Oliv. 90
Argomuelleria Pax 158
Argomuelleria macrophylla Pax
 158;609;701;729
Argyreia beraviensis (Vatke) Bak. 422
Argyrobium Eckl. & Zeyh. 201
Argyrobium fischeri Taub. 201;724
Argyrobium rupestre (E. Mey.) Walp. 201
 subsp. **aberdaricum** (Harms) Polhill 201;742
 subsp. **kilimandscharicum** (Taub.) Polhill
 201
Arisaema Mart. 495
Arisaema enneaphyllum Hochst. ex A. Rich.
 495;739
Arisaema schimperanum Schott 495;734
Arisaema sp. 495
Aristea Ait. 498
Aristea abyssinica Pax 498
Aristea alata Bak. 498
 subsp. **abyssinica** (Pax) Weim. 498;729
Aristea cognata N.E. Br. ex Weim. 498
 subsp. **abyssinica** (Pax) Marais 498
Aristida L. 548
Aristida adoensis Hochst. 548
Aristida adscensionis L. 548;709
Aristida hordacea Kunth 548
Aristida submucronata Schumach. 548;709
Aristolochia L. 73
Aristolochia bracteata Retz. 73
Aristolochia bracteolata Lam. 73;692
Aristolochiaceae Juss. 73
Aristolochiales Dumort. 73
Artabotrys R. Br. 63
Artabotrys monteiroae Oliv. 63;701
Arthraxon P. Beauv. 548
Arthraxon micans (Nees) Hochst. 548;729
Arthraxon quartinianus (A. Rich.) Nash 548
Arthropteris J. Sm. 46
Arthropteris monocarpa (Cordem.) C. Chr.
 46;729
Arthropteris orientalis (J.F. Gmel.) Posth.
 46;729
Arundinaria Michx. 548
Arundinaria alpina K. Schum. 590
Arundinaria sp. near *A. alpina* K. Schum. 590
Asclepiadaceae R. Br. 319
Asclepias lineolata (Decne.) Schltr. 323
Asclepias schweinfurthii N.E. Br. 323
Ascolepis Nees 522
Ascolepis elata auct., non Welw. 522
Ascolepis protea Welw. 522; 723
 subsp. **bellidifolia** (Welw.) Lye 522;723
 var. **bellidiflora** Welw. 522
Asparagaceae Juss. 490
Asparagus L. 490
Asparagus africanus Lam. 490;739;742
Asparagus asiaticus L. 490
 var. **scaberulus** (A. Rich.) Engl. 490
Asparagus b Buchananii Bak. 490
Asparagus flagellaris (Kunth) Bak. 490;692
Asparagus paulo-guelmi Solms-Laub. 490
Asparagus racemosus Willd. 490;692
Asparagus scaberulus A. Rich. 490
Asphodelaceae Juss. 488
Aspidiaceae S.F. Gray 58
Aspidoglossum E. Mey. 319
Aspidoglossum angustissimum (K. Schum.)
 Bullock 319
Aspilia Thouars 352
Aspilia africana (Pers.) Adams. 352;720
Aspilia congoensis S. Moore 352;724
Aspilia kotschyi (Sch. Bip.) Oliv. 353
Aspilia pluriseta Schweinf. 353;742
Aspleniaceae S.F. Gray 47
Asplenium L. 47
Asplenium abyssinicum Fée 47;734;739
Asplenium aethiopicum (Burm. f.) Becherer
 47;720;729;734
Asplenium anisophyllum Kunze 48;734
Asplenium blastophorum Hieron. 48;702
Asplenium bugoiense Hieron. 48;734
Asplenium ceii Pic. Serm. 48
Asplenium dregeanum Kunze 49;702;729;734
Asplenium elliottii C.H. Wright 49;734

- Asplenium emarginatum** P. Beauv. 49
Asplenium erectum Bory ex Willd. 50
 var. *usambarense* (Hieron.) Schelpe 50
Asplenium eylesii Sim 52
Asplenium filare (Forssk.) Alston 48
Asplenium formosum Willd. 49
Asplenium friesiorum C. Chr. 50;729
Asplenium hypomelas Kuhn 50;729
Asplenium inaequilaterale Willd. 50;702
Asplenium lunulatum Sw. 50;729;734
Asplenium macrophlebium Bak. 51;702
Asplenium mannii Hook. 51;734
Asplenium megalura Hieron. 51;729;734
Asplenium monanthes L. 51;729;734
Asplenium protensum Schrad. 52;729
Asplenium pumilum Sw. 52;702
Asplenium ruwenzoriense Bak. 52
Asplenium sandersonii Hook. 53;729
Asplenium sp. 54
Asplenium sp. aff. A. schweinfurthii Bak. 54
Asplenium stuhlmannii Hieron. 53;710
Asplenium suppositum Hieron. 50
Asplenium theciferum (Kunth) Mett. 53;720;734
Asplenium thunbergii auct., non Kunze. 48
Asplenium unilaterale Lam. 54
Asplenium usambarense Hieron. 50
Asteracantha longifolia (L.) Nees 443
Asteraceae Dumort. 351;633
Asterales Lindl. 350
Astragalus L. 202
Astragalus abyssinicus auct., non (Hochst.) Steud. ex A. Rich. 202
Astragalus atropilosus (Hochst.) Bunge 202;732
 subsp. **burkeanus** (Harv.) Gillett 202;732
Astripomoea A. Meeuse 416
Astripomoea malvacea (Klotzsch) A. Meeuse 416;696
 var. **floccosa** (Vatke) Verdc. 416
 var. **vokensii** (Dammer) Verdc. 416
Astrochlaena engleriana Dammer 416
Astrochlaena malvacea (Klotzsch) Hall. f. 416
Astrochlaena philippisiae Rendle 416
Astrochlaena volkensisii Dammer 416
Asystasia Blume 436
Asystasia africana (S. Moore) C.B. Clarke 436
Asystasia coleae Rolfe 436
Asystasia coromandeliana Nees 436
Asystasia gangetica (L.) T. Anderson 436;702;729
Asystasia guttata (Forssk.) Brummitt 436
Asystasia mysorensis (Roth) T. Anderson 437
Asystasia schimperi T. Andersson 437
Asystasia vogeliana Benth. 437;702
Athrixia Ker-Gawl. 353
Athrixia rosmarinifolia (Sch. Bip. ex Walp.) Oliv. & Hiern 353;739
Athyriaceae Alston 57
Athyrium Roth 57
Athyrium scandicinum (Willd.) C. Presl 57;729;734
Athyrium schimperi Moug. ex Fée 57;734
Aulacocalyx Hook. f. 332
 subgen. *Heinsenina* (K. Schum.) Verdc. 332
Aulacocalyx diervilleoides (K. Schum.) Petit 332
- B
- Baikiaea** Benth. 612
Baikiaea eminii Taub. 612
Baikiaea insignis Benth. 612
 subsp. **minor** (Oliv.) J. Léon. 612
Baikiaea minor Oliv. 612
Balanitaceae Endl. 102
Balanites Del. 102
Balanites aegyptiaca (L.) Del. 102;693;705
Balanites orbicularis Sprague 102
Balanites rotundifolia (van Tiegh.) Blatter 102;705
Balanophoraceae Rich. 266
Balsaminaceae A. Rich. 105
Balsamodendrum africanum (A. Rich.) Arn. 280
 var. *habessinicum* (Berg) Oliv. 281
Baphia Lodd. 202
Baphia wollastonii Bak. f. 202
Barleria L. 437
Barleria acanthoides Vahl 437

- Barleria brownii** S. Moore 437;702
Barleria submollis Lindau 437
Barleria ventricosa Hochst. ex Nees. 437;729
Barleria vix-dentata C.B. Clarke 438
Bartsia L. 423
Bartsia abyssinica Benth. 425
Bartsia trixago L. 423;734
Basananthe Peyr. 118
Basananthe hanningtoniana (Mast.) De Wilde 118;702
Basilicum Moench. 463
Basilicum polystachion (L.) Moench 463
Bauhinia fassoglensis Schweinf. 184
Bauhinia reticulata DC. 181
Bauhinia thonningii Schumach. 181
Becium Lindl. 464
Becium affine (Hochst.) Chiov. 464
Becium obovatum (E. Mey. ex Benth.)
N.E. Br. 464;695
var. **obovatum** 464;695
Beckeropsis Fig. & De Not. 581
Beckeropsis procera Stapf 582
Beckeropsis unisetata (Nees) K. Schum. 583;732
Begonia L. 124
Begonia eminii Warb. 124;702;717;755
Begoniaceae C. Agardh 124
Bellardia trixago (L.) All. 423
Belonophora Hook. f. 326
Belonophora glomerata M.B. Moss in Chipp 327
Belonophora hypoglauca (Welw. ex Hiern)
A. Chev. 326;701
Bequaertiodendron oblanceolatum (S. Moore)
Heine & Hemsley 627;628
Berberidales Dumort. 71
Berchemia DC. 266
Berchemia discolor (Klotzsch) Hemsl. 266;706
Berkheya Ehrh. 353
Berkheya spekeana Oliv. 353;724;739
Bersama Fresen. 288
Bersama abyssinica Fresen. 288;626;701;716;734
Bidens L. 354
Bidens buchneri (Klatt) Sherff 354;696
Bidens chaerodonta Sherff 355
Bidens chippii (M.B. Moss) Mesfin 354;740;742;758
Bidens coriacea (O. Hoffm.) Sherff 354
Bidens dielsii Sherff 356
Bidens imatongensis Sherff 356
Bidens isostigmatoides Sherff 354;740;756
Bidens kilimandscharica (O. Hoffm.)
Sherff 355
Bidens mossiae Sherff 354
Bidens natator Friis & Vollesen 355
Bidens negriana (Sherff) Cufod. 355;720
Bidens pilosa L. 355
Bidens prestinaria (Sch. Bip.) Cufod. 355;710
Bidens schimperi Sch. Bip. 356
Bidens setigeroides Sherff 355
var. *munita* Sherff 355
Bidens somaliensis Sherff 356;724;725
Bidens sp. 356
Bidens ternata (Chiov.) Sherff 356;740
Bidens tripartita L. 354
Bidens ugandensis (S. Moore) Sherff 356;724
Bignoniaceae Juss. 432
Biophytum DC. 104
Biophytum abyssinicum A. Rich. 104;710
Biophytum petersianum Klotzsch 104
Biophytum umbraculum Welw. 104;710
Bixales Lindl. 115
Blaeria L. 302
Blaeria breviflora Engl. 302
Blaeria spicata Hochst. ex A. Rich. 302;742
Blainvillea Cass. 356
Blainvillea gayana Cass. 356
Blepharis Juss. 438
Blepharis boerhaviifolia Pers. 438
Blepharis ciliaris auct., non (L.) B.L. Burtt 438
Blepharis edulis (Forssk.) Pers. 438
Blepharis integrifolia (L.f.) Schinz 438
var. **integrifolia** 438
Blepharis linariifolia auct., non Pers. 438
Blepharis maderaspatensis (L.) Roth 438
Blepharis molluginifolia Pers. 438
Blepharis persica auct., non (Burm. f.)
O. Kuntze. 438
Blepharis sp. 438

- Blighia** Koenig 285
Blighia unijugata Bak. 285;625;701;716
Blighia welwitschii (Hiern) Radlk. 286;625;701
Blighia wildemanniana Gilg & Radlk. 286
Blumea DC. 357
Blumea abyssinica Sch. Bip. ex A. Rich. 357
Blumea alata (D. Don) DC. 374
Blumea bovei (DC.) Vatke 357
Blumea crassifolia A. Rich. 374
Blumea crispata (Vahl) Merxm. 374
Blumea elatior (R.E. Fr.) Lisowski 374
Boehmeria Jacq. 250
Boehmeria macrophylla Hornem. 250;729
Boehmeria platyphylla D. Don 250
Boerhavia L. 111
Boerhavia adscendens Willd. 112
Boerhavia diffusa L. 111
Boerhavia erecta L. 112
Boerhavia pentandra Burch. 112
Boerhavia plumbaginea Cav. 112
Boerhavia repens L. 112
var. *diffusa* (L.) Hook. f. 112
Bolbitis Schott 58
Bolbitis acrostichoides (Afzel.) Ching 58;702
Bombacaceae Kunth 147
Bonnaya trichotoma Oliv., non *Lindernia trichotoma* Schlechter 427
Boophone Herb. 496
Boophone disticha (L. f.) Herb. 496
Boraginaceae Juss. 409
Boraginales Dumort. 409
Borassus L. 504
Borassus aethiopum Mart. 504
Borreria chaetocephala (DC) Hepper 347
Borreria kotschyana (Oliv.) K. Schum. 347
Borreria princeae K. Schum. 348
Borreria pusilla (Wall.) DC. 348
Boscia Lam. 76
Boscia salicifolia Oliv. 76;600;712;713
Bosqueia angolensis Ficalho 250
Bosqueia phoberos Baill. 250
Boswellia Roxb. ex Colebr. 280
Boswellia papyrifera (Del.) Hochst. 280;623;712;713
Bothriochloa O. Kuntze 548
Bothriochloa insculpta (Hochst.) A. Camus 548;708;709
Bothriochloa radicans (Lehm.) A. Camus 548
Bothriocline Oliv. ex Benth. 357
Bothriocline congesta (M.R.F. Taylor) Wechuysen 357;739;741;742
Bothriocline imatongensis (M.R.F. Taylor) C. Jeffrey 357;739;742;743
Bothriocline monticola (M.R.F. Taylor) Wechuysen 357;739;758
Bothriocline schimperi Oliv. 357
Botrychium Sw. 34
Botrychium chamaeconium Bitter & Hieron. 34;734
Brachiaria (Trin.) Griseb. 549
Brachiaria brevis Stapf 550
Brachiaria brizantha (Hochst.) Stapf 549;696
Brachiaria comata (A. Rich.) Stapf 549;696
Brachiaria decumbens Stapf 550
Brachiaria deflexa (Schumach.) Robyns 550
Brachiaria jubata (Fig. & de Not.) Stapf 550;696
Brachiaria leersioides (Hochst.) Stapf 550
Brachiaria leucacrantha (K. Schum.) Stapf 551
Brachiaria ovalis Stapf 551
Brachiaria regularis (Nees) Stapf 550
Brachiaria scalaris Pilg. 551;730
Brachiaria serrifolia (Hochst.) Stapf 551
Brachycorythis Lindl. 508
Brachycorythis ovata Lindl. 508
subsp. *schweinfurthii* (Rchb. f.) Summerh. 508;724
Brachycorythis pleistophylla Rchb. f. 508;724
subsp. *pleistophylla* 508;724
Brachycorythis pubescens Harv. 509
Brachycorythis schweinfurthii Rchb. f. 508
Brachypodium P. Beauv. 551
Brachypodium flexum Nees 551;725;728;734;739
var. *abyssinicum* Hochst. 551
Brachypodium simplex Nees 552
Brachystelma R. Br. 319
Brachystelma lineare A. Rich. 319

- Brachystelma** sp. ?nov. 320
- Brassicaceae** Burnett 81
- Brassicales** Bromhead 81
- Brayera anthelmintica* Kunth 176
- Bridelia** Willd. 159
- Bridelia abyssinica* Pax 610
- Bridelia atroviridis** Muell. Arg. 159;609;701
- Bridelia aubrevillii* auct., non Pellegr. 159
- Bridelia brideliifolia** (Pax) Fedde 159;609;728;729
- Bridelia duvigneaudii* auct., non J. Léonard 159
- Bridelia ferruginea* auct., non Benth. 159
- Bridelia ferruginea* Benth. 159
- var. *orientalis* Hutch. 159
- Bridelia micrantha** (Hochst.) Baill. 610
- Bridelia mildbraedii* Gehrm. 610
- Bridelia ndellensis** Beille 159;610;699;703;716
- var. *orientalis* 716
- Bridelia scleroneura** Muell. Arg. 160;610;692;693
- Bridelia scleroneuroides* Pax 160
- Brillantaisia** P. Beauv. 439
- Brillantaisia cicatricosa** Lindau 439;730
- Brillantaisia eminii* Lindau 439
- Brillantaisia kirungae* Lindau 439
- Brillantaisia lamium** (Nees) Benth. 439;702
- Brillantaisia madagascariensis** Lindau 439;702;730
- Brillantaisia nyanzarum* Burkill 439
- Brillantaisia owariensis** P. Beauv. 439;702
- Brillantaisia** sp. 731
- Brillantaisia vogeliana** (Nees) Benth. 440;702
- Bromus** L. 552
- Bromus leptoclados** Nees 552;739
- Bromus runssorensis* K. Schum. 552
- Brucea** J.F. Mill. 278
- Brucea antidysenterica** Lam. 278;729;734
- Brucea ferruginea* L'Hér. 278
- Buchnera** L. 423
- Buchnera nuttii** Skan 423
- Buckollia** Venter & Verhoeven 320
- Buckollia tomentosa** (E.A. Bruce) Venter & Verhoeven 320
- Buforrestia imperforata* C.B. Clarke 482
- Bulbine** Willd. 488
- Bulbine abyssinica** A. Rich. 488;696
- Bulbine asphodeloides* auct., non (L.) Schult. f. 488
- Bulbophyllum** Thou. 509
- Bulbophyllum cochleatum** Lindl. 509
- Bulbostylis** Kunth 522
- Bulbostylis abortiva** (Steud.) C.B. Clarke 522;710
- Bulbostylis atosanguinea* (Boeck.) C.B. Clarke 524
- Bulbostylis capillaris* (L.) C.B. Clarke 523
- var. *trifida* (Nees) C.B. Clarke 523
- Bulbostylis coleotricha** (A. Rich.) C.B. Clarke 522;710
- Bulbostylis densa** (Wall.) Hand.-Mazz. 523;720
- Bulbostylis hispidula** (Vahl) R. Haines 523;720
- subsp. *hispidula* 523;720
- subsp. *oligostachys* (A. Rich.) Lye 523
- Bulbostylis oligostachys* (A. Rich.) Lye 523
- Bulbostylis oritrephes** (Ridl.) C.B. Clarke 524;723
- Bulbostylis pusilla** (A. Rich.) C.B. Clarke 524
- subsp. *yalingensis* (Cherm.) R. Haines 524
- Bulbostylis setifolia** (A. Rich.) Bodard 524;739;740;742
- Bulbostylis yalingensis* Cherm. 524
- Burseraceae** Kunth 280;623
- Butomales** Hutch. 474
- Butyrospermum* Kotschy 308
- Butyrospermum niloticum* Kotschy 308
- Butyrospermum paradoxum* (C.F. Gaertn.) Hepper 308
- subsp. *niloticum* (Kotschy) Hepper 308
- Butyrospermum parkii* (G. Don) Kotschy 308
- var. *niloticum* (Kotschy) Pierre 308
- Byttneria** Loefl. 143
- Byttneria africana* Mast. 143
- Byttneria catalpifolia** Jacq. 143;698;701
- subsp. *africana* (Mast.) Exell & Mendonca 143;701

C

<i>Cacalia angulata</i> Vahl	378	Cannaceae Juss.	485
Cadaba Forssk.	76	Cannabaceae Endl.	254
Cadaba farinosa Forssk.	76;706	Cannabis L.	254
subsp. farinosa	76	Cannabis sativa L.	254
Caesalpinioideae DC.	179	Canscora Lam.	402
Cajanus DC.	202	Canscora decussata Roem. & Schult.	402;710
Cajanus cajan (L.) Millsp.	202	Canthium Lam.	327
<i>Cajanus indicus</i> Spreng.	202	<i>Canthium afzelianum</i> Hiern	345
<i>Calamintha simensis</i> Benth.	472	<i>Canthium captum</i> auct., non Bullock	327
<i>Calamintha</i> sp.	472	<i>Canthium crassum</i> Hiern	327;336
Callitrichaceae Link.	109	<i>Canthium gueinzii</i> Sond.	334
Callitriche L.	109	Canthium lactescens Hiern	327
Callitriche stagnalis Scop.	109	<i>Canthium laurinum</i> auct., non (Poir.) Benth.	329
Caloncoba Gilg	115	<i>Canthium neglectum</i> Hiern	346
Caloncoba crepiniana (De Wild. & T. Durand)		Canthium oligocarpum Hiern	327;729
Gilg	115;698;699;701;710	subsp. oligocarpum	327;729
<i>Caloncoba schweinfurthii</i> Gilg	115	<i>Canthium rubrocostatum</i> Robyns	345
Calotropis R. Br.	320	<i>Canthium ruwenzoriense</i> Bullock	327
Calotropis procera (Willd.) Aiton	320	<i>Canthium scabrosum</i> Bullock	334
Calpurnia E. Mey.	202	<i>Canthium sillitoei</i> Bullock	336
Calpurnia aurea (Aiton) Benth.	202;726	Canthium sp. / Rytigynia sp. ?	328
subsp. aurea	202;726	<i>Canthium venosum</i> (Oliv.) Hiern	334
<i>Calpurnia subdecandra</i> (L'Hér.) Schweick.	202	<i>Canthium vulgare</i> (K. Schum.) Bullock	345
Calycosiphonia Robbr.	327	<i>Canthium zanzibaricum</i> Klotzsch	334
Calycosiphonia spathicalyx (K. Schum.)		Caperonia A. St.-Hil.	160
Robbr.	327;701	<i>Caperonia gallabatensis</i> Pax & K. Hoffm.	160
Campanulaceae Juss.	405	<i>Caperonia senegalensis</i> Muell.Arg.	160
Campanulales Rchb. f.	405	Caperonia serrata (Turcz.) Presl	160
CampylospERMUM van Tiegh.	118	Capparaceae Juss.	76;600
CampylospERMUM bukobense (Gilg) Farron	124;702	Capparales Hutch.	76
CampylospERMUM calanthum (Gilg) Farron	124	Capparis L.	76
CampylospERMUM densiflorum (De Wild. & T. Durand) Farron	124;603;702;717;729	<i>Capparis afzelii</i> sensu Aylmer, non Pax	79
Canarina L.	405	<i>Capparis corymbosa</i> auct., non Lam.	77;78
Canarina abyssinica Engl.	405	<i>Capparis djurica</i> Gilg & Bened.	78
Canarina eminii Asch. & Schweinf.	405	<i>Capparis duchesnei</i> De Wild.	79
Canarium L.	280	Capparis erythrocarpos Isert	76;698
Canarium schweinfurthii Engl.	280;701	var. erythrocarpos	76
Canna L.	485	Capparis fascicularis DC.	77; 706;712
Canna sp.	485	var. eleagnoides (Gilg) De Wolf	77;706;712
		var. fascicularis	77;706;712
		<i>Capparis jodotricha</i> Gilg & Bened.	77
		Capparis micrantha A. Rich.	77
		<i>Capparis rothii</i> Oliv.	77

Capparis sepiaria L.	77;693	Caryophyllaceae Juss.	89;601
var. fischeri (Pax) De Wolf	77;693	Caryophyllales Perleb	89
Capparis tomentosa Lam.	78;600;693	Casearia Jacq.	115
<i>Caraiipa</i> (?) <i>africana</i> Oliv.	126	<i>Casearia battiscombei</i> R.E. Fr.	116
Caralluma R. Br.	320	Casearia battiscombei R.E. Fries	602
Caralluma acutangula (Decne.) N.E. Br.	320	<i>Casearia engleri</i> auct., non Gilg	115
Cardamine L.	81	Casearia runssorica Gilg	115;701
Cardamine africana L.	81;734	Cassia L.	179
Cardiospermum L.	286	<i>Cassia absus</i> L.	179
Cardiospermum grandiflorum Sw.	286;699	<i>Cassia bicapsularis</i> L.	182
Cardiospermum halicacabum L.	286;699;703;717	<i>Cassia didymobotria</i> Fresen.	182
		<i>Cassia goratensis</i> Fresen.	183
Carduus L.	358	<i>Cassia kirkii</i> Oliv.	179
Carduus chamaecephalus (Vatke) Oliv. & Hiern	358;740;742	var. <i>kirkii</i>	179
<i>Carduus kikuyorum</i> R.E. Fr.	358	Cassia mannii Oliv.	179;613;701
Carduus nyassanus (S. Moore) R.E. Fr.	358;730;739	<i>Cassia mimosoides</i> L.	180
<i>Carduus theodori</i> R.E. Fr.	358	<i>Cassia nigricans</i> Vahl	180
Carex L.	524	<i>Cassia obtusifolia</i> L.	182
Carex chlorosaccus C.B. Clarke	524;742	<i>Cassia occidentalis</i> L.	183
Carex conferta Hochst. ex A. Rich.	525;734	<i>Cassia petersiana</i> Bolle	183
var. conferta	525;734	Cassia sieberiana DC.	613
<i>Carex cyrtosaccus</i> auct., non C.B. Clarke	526	<i>Cassia singueana</i> Del.	183
Carex cyrtosaccus C.B. Clarke	526	<i>Cassia tora</i> auct., non L.	183
Carex echinochloe Kunze	525;730	<i>Cassine buchananii</i> Loes.	255
subsp. echinochloe	525;730	Cassipourea Aubl.	135
var. <i>chlorosaccus</i> (C.B. Clarke) Kük.	524	<i>Cassipourea elliotii</i> (Engl.) Alston	135
Carex elgonensis Nelmes	526	Cassipourea gummiflua Tul.	605
Carex fischeri K. Schum.	525;740	var. ugandensis (Stapf) J. Lewis	605
Carex johnstonii Boeck.	525;739	Cassipourea malosana (Bak.) Alston	135;606;729;734
Carex mannii E.A. Bruce	525;526;739	Cassipourea ruwenzoriensis (Engl.) Alston	135;606;701
Carex petitiana A. Rich.	525;739;740	<i>Cassipourea ugandensis</i> (Stapf) Alston	606
Carex sp. cf. C. cuprea (Kük.) Nelmes	526	Catha Schreb.	255
Carex sp. cf. C. petitiana A. Rich.	526	Catha edulis (Vahl) Endl.	255;620;736
Carex steudneri Boeck.	526;740	Catunaregam Wolf	328
Carex thomasi Nelmes	526;739;740;758	Catunaregam nilotica (Stapf) Tirveng.	328;692
Carex vallis-rosetto K. Schum.	526	<i>Caucalis incognita</i> Norm.	297
Carissa L.	317	<i>Caucalis pedunculata</i> Bak. f.	297
Carissa edulis (Forssk.) Vahl	317;631;713;732	Caylusea A. St.-Hil.	83
Carpolobia Don	83	Caylusea abyssinica (Fresen.) Fisch. & Mey.	83
<i>Carpolobia conradsiana</i> Engl.	83	Cayratia Juss.	270
Carpolobia goetzei Guerke	83;702	Cayratia debilis (Bak.) Suess.	270;702
<i>Carpolobia sp. sensu FPS</i>	83		

Cayratia gracilis (Guill. & Perr.) Suss.	271;702;729	<i>Centaurea rhizocephala</i> Oliv. & Hiern, nom. illeg	358
Cecropiaceae C.C. Berg	250;620	Centella L.	298
Cedrela P. Browne	281	Centella asiatica (L.) Urb.	298;702
Cedrela odorata L.	281	<i>Cephaelis peduncularis</i> Salisb.	344
Ceiba Mill.	147	var. <i>suaveolens</i> (Schweinf. ex Hiern)	
Ceiba pentandra (L.) Gaertn.	147;703	Hepper	344
Celastraceae R. Br.	255;620	<i>Cephaelis suaveolens</i> Schweinf. ex Hiern	344
Celastrales Baskerville	254	Cerastium L.	89
<i>Celastrus gracilipes</i> Welw.	256	Cerastium afromontanum T.C.E. Fr. &	
<i>Celastrus lancifolius</i> Thonn.	258	Weim.	89;734;742
<i>Celastrus senegalensis</i> Lam.	257	Cerastium octandrum Hochst. ex A. Rich.	89
<i>Celastrus serratus</i> Hochst. ex A. Rich.	621	Ceratopteris Brongn.	39
Celosia L.	98	<i>Ceratopteris cornuta</i> (P. Beauv.) Le Prieur	39
Celosia argentea L.	98	Ceratopteris thalictroides (L.) Brongn.	39;698
<i>Celosia laxa</i> Schumach. & Thonn.	98	Ceratotheca Endl.	434
Celosia schweinfurthiana Schinz	98;730	Ceratotheca sesamoides Endl.	434
Celosia trigyna L.	98;702	Ceropegia L.	320
<i>Celsia</i> L.	430	Ceropegia abyssinica (A. Rich.) Decne.	320
<i>Celsia brevipedicellata</i> Engl.	430	Ceropegia meyeri-johannis Engl.	321
<i>Celsia floccosa</i> Benth.	430	var. <i>angiensis</i> (De Wild.) H. Huber	321
<i>Celsia scrophulariaefolia</i> A. Rich.	430	Chaetachme Planch.	240
Celtis L.	238	Chaetachme aristata Planch.	240;618;702;729
Celtis africana Burm. f.	238;617;729;733	<i>Chaetachme microcarpa</i> Rendle	240
<i>Celtis brownei</i> Rendle	239	<i>Chailletiaceae</i> R. Br.	178
<i>Celtis durandii</i> Engl.	239	Chamaecrista (L.) Moench	179
var. <i>ugandensis</i> Rendle	239	Chamaecrista absus (L.) Irwin & Barneby	179
Celtis gomphophylla Bak.	239;716	Chamaecrista kirkii (Oliv.) Standl.	179;726
<i>Celtis integrifolia</i> Lam.	239	Chamaecrista mimosoides (L.) Greene	180
<i>Celtis kraussiana</i> Benth.	238	Chamaecrista nigricans (Vahl) Greene	180
Celtis mildbraedii Engl.	239;617;701	Chasmanthera Hochst.	71
Celtis philippensis Blanco	239; 617;701	Chasmanthera dependens Hochst.	71;692
<i>Celtis soyauxii</i> auct., non Engl.	239	Chassalia Commers. ex Poir.	328
Celtis toka (Forssk.) Hepper & Wood	239;698;709;710	Chassalia cristata (Hiern) Bremek.	328;717
<i>Celtis wightii</i> Planch.	239	<i>Chassalia sp.</i> sensu FPS	333
Celtis zenkeri Engl.	240;617;699;701	Cheilanthes Sw.	40
Cenchrus L.	552	Cheilanthes farinosa (Forssk.) Kaulf.	40;730
Cenchrus ciliaris L.	552	Cheilanthes inaequalis (Kunze) Mett.	40;734
Cenchrus setigerus Vahl	552	var. <i>inaequalis</i>	40;734
Centaurea L.	358	Cheilanthes multifida (Sw.) Sw.	40
<i>Centaurea imatongensis</i> Philipson	377	Chenopodiaceae Vent.	95
Centaurea praecox Oliv. & Hiern	358	Chenopodiales Dumort.	95
		Chenopodium L.	95

- Chenopodium mucronatum* Thunb. 95
 var. *subintegrum* Aellen pro parte 95
Chenopodium opulifolium Schrad. ex Koch & Ziz 95
Chenopodium procerum Hochst. ex Moq. 96
Chenopodium pumilio R. Br. 96
Chenopodium schraderianum Schult. 96
Chionanthus L. 313
Chionanthus africanus (Knobl.) Stearn 629
Chionanthus mildbraedii (Gilg & Schellenb.) Stearn 313;630
Chloachne Stapf 553;585
Chloachne oplismenoides (Hack.) Robyns 585
Chloachne secunda Stapf 585
Chloris Sw. 553
Chloris breviseta Benth. 553
Chloris gayana Kunth 553;695;696;710
Chloris lamproparia Stapf 553
Chloris myriostachya Hochst. 554
Chloris pilosa Schumach. 553;696
Chloris pycnothrix Trin. 553;696
Chloris robusta Stapf 554
Chloris roxburghiana Schult. 554
Chloris virgata Sw. 554
Chlorocodon whitei Hook. f. 323
Chlorophora auct., non Gaudich. 249
Chlorophora excelsa (Welw.) Benth. & Hook. f. 249
Chlorophytum Ker-Gawl. 491
Chlorophytum andongense Bak. 491;696
Chlorophytum blepharophyllum Schweinf. ex Bak. 491;696
Chlorophytum bukobense Engl. 492
Chlorophytum cameronii (Bak.) Kativu 491;721
 var. **cameronii** 491;721
 var. **pteroaulon** (Bak.) Nordal 491;721
Chlorophytum comosum (Thunb.) Jacq. 492;730
Chlorophytum cordatum Bak. & Engl. 492
Chlorophytum gallabatense Schweinf. ex Bak. 492;696
Chlorophytum lancifolium Welw. ex Bak. 492;696;702
Chlorophytum longifolium Bak. 492
Chlorophytum menyharthii Bak. 493
Chlorophytum micranthum Bak. 492;696
Chlorophytum miserum Rendle 492
Chlorophytum pterocaulon (Bak.) Kativu 491
Chlorophytum ramiferum Rendle 492
Chlorophytum schweinfurthii Bak. 493
Chlorophytum sparsiflorum Bak. 492
Chlorophytum stenopetalum Bak. 493
Chlorophytum subpetiolatum (Bak.) Kativu 493;696
 var. **subpetiolatum** 493;696
Chlorophytum tuberosum (Roxb.) Bak. 493;696
Christella Lév. 54
Christella chaseana (Schelpe) Holttum 54
Christella dentata (Forssk.) Brownsey & Jeremy 55;730
Christella gueinziana (Mett.) Holttum 53;730
Christella hispidula (Decne.) Holttum 55
Chrozophora A. Juss. 160
Chrozophora plicata (Vahl) Spreng. 160
Chrysanthellum Rich. 359
Chrysanthellum americanum auct., non (L.) Vatke 359
Chrysanthellum indicum DC. 359
 var. **afroamericanum** B.L. Turner 359
Chrysanthellum procumbens Pers., nom. illeg. 359
Chrysobalanaceae R. Br. 178;612
Chrysophyllum L. 304
Chrysophyllum albidum G. Don 304;628;699;701;716
Chrysophyllum fulvum S. Moore 305
Chrysophyllum gorungosanum Engl. 305;733
Chrysophyllum muerense Engl. 305;628;701;716
Chrysophyllum natalense auct., non Sond. 305;627
Chrysophyllum natalense Sond. 305
Chrysophyllum sp. nov. of Jackson 701
Chrysophyllum sp. nov. sensu ITU 305
Chrysopogon Trin. 554
Chrysopogon aucheri (Boiss.) Stapf 554;708
 var. *quinqueplumis* (A. Rich.) Stapf 554;708

Chrysopogon plumulosus Hochst.	554;708	<i>Clematis grata</i> auct., non Wall.	68
Cineraria L.	359	<i>Clematis hirsuta</i> Guill. & Perr.	68
Cineraria deltoidea Sond.	359;739	<i>Clematis inciso-dentata</i> A. Rich.	68
<i>Cineraria grandiflora</i> Vatke	359	Clematis simensis Fresen.	69;741
<i>Cineraria kilimandscharica</i> Engl.	359	<i>Clematis</i> sp.	69
Cirsium Mill.	359	<i>Clematis thunbergii</i> Steud.	68
Cirsium buchwaldii O. Hoffm.	359	Cleome L.	78
<i>Cirsium</i> sp. sensu FPS	359	Cleome gynandra L.	78
Cissampelos L.	71	Cleome monophylla L.	78
Cissampelos mucronata A. Rich.	71;726	Clerodendrum L.	457
<i>Cissampelos pereira</i> auct., non L.	71	Clerodendrum capitatum (Willd.) Schumach.	
<i>Cissampelos rigidifolia</i> (Engl.) Diels	71	& Thonn.	457;698;702
Cissampelos sp. cf. C. pareira L.	71;726	<i>Clerodendrum cordifolium</i> (Hochst.) A. Rich.	458
Cissus L.	271	<i>Clerodendrum discolor</i> (Klotzsch) Vatke	457
<i>Cissus adenocaulis</i> A. Rich.	272	Clerodendrum johnstonii Oliv.	
<i>Cissus bambuseti</i> Gilg & Brandt	273	457;725;726;729;731;734;737	
Cissus cornifolia (Bak.) Planch.	271;695	subsp. johnstonii	457;725;729
<i>Cissus crotalarioides</i> Planch.	273	Clerodendrum myricoides (Hochst.) Vatke	
<i>Cissus cyphopetala</i> Fresen.	273	457;725;729	
<i>Cissus debilis</i> (Bak.) Planch.	270	subsp. myricoides	457;725;729
<i>Cissus gracilis</i> auct., non Guill. & Perr.	270	var. discolor (Klotzsch) Bak.	457;729
<i>Cissus gracilis</i> Guill. & Perr.	271	var. myricoides	457
Cissus integrifolia (Bak.) Planch.	271	Clerodendrum rotundifolium Oliv.	458
<i>Cissus jatrophioides</i> (Welw. ex Bak.) Planch.	274	Clerodendrum schweinfurthii Guerke	458;702
<i>Cissus juncea</i> Webb	274	Clerodendrum umbellatum Poir.	458;695
<i>Cissus kilimandscharica</i> Gilg	274	<i>Clinogyne ugandensis</i> K. Schum.	485
<i>Cissus pallida</i> auct., non (Wight & Arn.) Steud.	272	Clusiaceae Lindl.	136;606
Cissus petiolata Hook. f.	271;710	Clutia L.	161
Cissus populnea Guill. & Perr.	272;710	Clutia abyssinica Jaub. & Spach	
Cissus quadrangularis L.	272;710	161;610;725;739	
Cissus rotundifolia (Forsk.) Vahl	272	var. abyssinica	161;739
<i>Cissus schweinfurthii</i> Planch.	274	var. pedicellaris (Pax) Pax	161
<i>Cissus serpens</i> A. Rich.	274	Cnestis Juss.	293
<i>Cissus ukerevensis</i> Gilg	274	<i>Cnestis ferruginea</i> auct., non DC.	293
Clausena Burm. f.	275	Cnestis mildbraedii Gilg	293;702
Clausena anisata (Willd.) Hook. f.	275;622;728;729;731;736	<i>Cnestis ugandensis</i> Schellenb.	293
		Coccinia Wight. & Arn.	118
Cleistopholis Engl.	64	Coccinia schliebenii Harms	118
Cleistopholis patens (Benth.) Engl. & Diels	62;703	<i>Coccinia</i> sp. <i>D</i>	118
		Coccinia subsessiliflora Cogn.	118;702
Clematis L.	68	Cocculus DC.	71
Clematis brachiata Thunb.	68	Cocculus hirsutus (L.) Diels	71
<i>Clematis glaucescens</i> Fresen.	68	<i>Cocculus holopeira-torrída</i> Broun & Massey	71
		<i>Cocculus villosus</i> DC.	71

- Coffea** L. 328
Coffea arabica L. 328;631;703
Coffea canephora Pierre ex Froehner 328;631;702
Coffea excelsa A. Chev. 329
Coffea hypoglauca Welw. ex Hiern 326
Coffea liberica Hiern 329;631;702
Coffea robusta Linden 328
Coffea spathicalyx K. Schum. 327
Cola Schott & Endl. 148
Cola cordifolia auct., non (Cav.) R. Br. 143
Cola gigantea A. Chev. 143;608;698;699;701;703
Colchicaceae DC. 488
Coleochloa Gilly 526
Coleochloa abyssinica (A. Rich.) Gilly 526;720
 var. **castanea** (C.B. Clarke) Pic. Serm. 527
Coleochloa schweinfurthiana auct., non (Boeck.) Nelmes 527
Coleus alpinus Vatke 469
Coleus assurgens Bak. 469
Coleus autranii Briq. 473
Coleus comosus A. Rich. 469
Coleus flavovirens Guerke 469
Coleus grandicalyx E.A. Bruce 470;739
Coleus latifolius Benth. 473
Coleus lactiflorus Vatke 470
Coleus sp. 470
Combretaceae R. Br. 130;605
Combretum Loefl. 130
Combretum aculeatum Vent. 130;706
Combretum adenogonium A. Rich. 130;707;713
Combretum binderianum Kotschy 131
Combretum capituliflorum Fenzl 130;698;712
Combretum collinum Fresen. 131;605;692;693;694;699;714;718
 subsp. **binderianum** (Kotschy) Okafor 131; ;692;693;694;699;714;718
 subsp. **elgonense** (Exell) Okafor 131
Combretum fragrans F. Hoffm. 130
Combretum ghasalense Engl. & Diels 130
Combretum gueinzii Sond. 132
Combretum hobol Engl. & Diels. 132
Combretum laboniense M.B. Moss 131
Combretum molle G. Don 131;605;693;712;713;715;718;722;724
Combretum multispicatum Engl. & Diels 130
Combretum paniculatum Vent. 132;605;715;729
 subsp. **paniculatum** 132;605;715;729
Combretum racemosum P. Beauv. 133;715
Combretum rhodanthum Engl. & Diels 133;715
Combretum sp. cf. C. tanaense J.J. Clark 133;702
Combretum splendens Engl. 131
Combretum trichanthum Fresen. 131
Combretum undulatum Engl. & Diels 130
Commelina L. 476
Commelina aethiopica C.B. Clarke 477
Commelina africana L. 476;721
 var. **villosior** (C.B. Clarke) Brenan 476;721
Commelina bainesii C.B. Clarke 477
Commelina benghalensis L. 477;730
 var. **benghalensis** 477;730
Commelina bracteosa Hassk. 477
Commelina diffusa Burm. f. 477;730
 subsp. **montana** J.K. Morton 477;730
Commelina erecta L. 478;732
 subsp. **livingstonii** (C.B. Clarke) J.K. Morton 478;732
Commelina forsskaolii Vahl 478;696
Commelina imberbis Hassk. 478;734
Commelina latifolia A. Rich. 478;702
Commelina livingstonii C.B. Clarke 478
Commelina nudiflora L., pro parte, excl. typo 477
Commelina purpurea Rendle 478
Commelina schweinfurthii C.B. Clarke 479;696
Commelina subulata Roth 479;721
Commelinaceae R. Br. 475
Commelinales Dumort. 475
Commelinidium Stapf 544
Commelinidium gabunensis (Hack.) Stapf 544
Commelinidium mayumbense (Franch.) Stapf 544
Commicarpus Standl. 112
Commicarpus africanus auct., non (Lour.) Dandy ex Andrews 112

- Commicarpus grandiflorus** (A. Rich.) Standl. 112
Commicarpus pentandrus (Burch.) Heimerl 112
Commicarpus plumbagineus (Cav.) Standl. 112
Commiphora Jacq. 280
Commiphora africana (A. Rich.) Engl. 280;623;706
 var. **africana** 280;693
 var. **rubriflora** (Engl.) Wild 280
Commiphora habessinica (Berg) Engl. 281
 subsp. **habessinica** 281
Commiphora lindensis auct., non Engl. 281
Compositae Giseke 351
Coniferae F.C.L. Spenner 61
Connaraceae R. Br. 293
Connarus L. 294
Connarus longistipitatus Gilg 294;702
Connarus thomsonii Bak. 294
Conopharyngia G. Don 319
Conopharyngia holstii (K. Scum.) Stapf 319
Conopharyngia pachysiphon (Stapf) Stapf 319
Conostomium (Stapf) Cufod. 329
Conostomium quadrangulare (Rendle) Cufod. 329
Convolvulaceae Juss. 416
Conyza Less. 359
Conyza aegyptiaca (L.) Aiton 359
Conyza bonariensis (L.) Cronquist 360
Conyza floribunda (H.B.K.) Sch. Bip. 360
Conyza gouanii (L.) Willd. 360;725
Conyza heudelotii Oliv. & Hiern 376
Conyza hochstetteri Sch. Bip. ex A. Rich. 360
Conyza newii Oliv. & Hiern 360;725
Conyza pyrhopappa Sch. Bip. ex A. Rich. 360;724;725
 subsp. **pyrhopappa** 360;724;725
Conyza ruwenzoriensis (S. Moore) R.E. Fr. 361
Conyza steudelii Sch. Bip. 361;730
Conyza subscaposa O. Hoffm. 361
Conyza sumatrensis (Retz.) E.H. Walker 360
Conyza tigrensis Oliv. & Hiern 361;730
Corchorus L. 138
Corchorus tridens L. 138
Corchorus trilocularis L. 138
Cordia L. 409
Cordia abyssinica R. Br. 409
Cordia africana Lam. 409;701;715;716
Cordia crenata Del. 409
 subsp. **meridionalis** Warfa 409
Cordia gharaf auct., non Aschers. 410
Cordia holstii Guerke 409
Cordia millenii Bak. 409;701
Cordia monoica Roxb. 410;712
Cordia nevillei Alston 410
Cordia ovalis R. Br. 410
Cordia quercifolia Klotzsch 410
Cordia rothii Roem. & Schult. 410
Cordia sinensis Lam. 410;697
Cordia sp. (2) sensu ITU 409
Cordyla Lour. 180
Cordyla africana auct., non Lour. 180
Cordyla richardii Planch. ex Milne-Redh. 180;712;713
Coreopsis chippii M.B. Moss 354
Coreopsis elgonensis auct., non Sherff 354
Coreopsis prestinaria Sch. Bip. ex Walp. 355
Coreopsis tripartita M.B. Moss 354
Cornaceae (Dumort.) Dumort. 294;626
Corydalis DC. 75
Corydalis cornuta Royle 75
Corydalis mildbraedii Fedde 75
Corymborkis Thou. 509
Corymborkis corymbis Thou. 509;702
Corymborkis corymbosa Thou. 509
Corymborkis welwitschii (Rchb. f.) O. Kuntze 509
Costus L. 484
Costus afer Ker-Gawl. 484;703
Costus dubius (Afzel.) K. Schum. 484;703
Costus sp. aff. *C. afer* Ker-Gawl. 484
Costus trachyphyllus K. Schum. 484
Courbonia virgata Brongn. 80
Crabbea Harv. 440
Crabbea velutina S. Moore 440
Craibia Harms & Dunn. 203
Craibia brownii Dunn. 203;616;716
Craibia laurentii (De Wild.) De Wild. 203;701
Craibia utilis M.B. Moss 203
Crassocephalum Moench. 361

- Crassocephalum afromontanum* R.E. Fr. 633;634
Crassocephalum bauchiense (Hutch.) Milne-Redh. 361;730
Crassocephalum bojeri (DC.) Robyns 378
Crassocephalum crepidioides (Benth.) S. Moore 361;730
Crassocephalum mannii (Hook. f.) Milne-Redh. 378
Crassocephalum montuosum (S. Moore) Milne-Redh. 362;633;634;730
Crassocephalum multicorymbosum (Klatt) S. Moore 378
Crassocephalum rubens (Juss. ex Jacq.) S. Moore 362
Crassocephalum sarcobasis (DC.) S. Moore 362
Crassocephalum vitellinum (Benth.) S. Moore 362;730
Crassula L. 85
Crassula alba auct., non Forssk. 86
Crassula alsinoides (Hook. f.) Engl. 85;730
Crassula schimperii Fisch. & Mey. 86;742
 subsp. **phyturus** (Mildbr.) R. Fernandes 86;742
Crassula vaginata Eckl. & Zeyh. 86;742
Crassulaceae DC. 85
Craterispermum Benth. 329
Craterispermum schweinfurthii Hiern 329;729
Craterostigma Hochst. 423
Craterostigma plantagineum Hochst. 423
Crateva L. 79
Crateva adansonii DC. 79;709
 subsp. **adansonii** 79
Crateva religiosa auct., non Forst. f. 79
Cremaspora Benth. 329
Cremaspora africana Benth. 329
Cremaspora heterophylla F. Didr. 330
Cremaspora triflora (Thonn.) K. Schum. 329;702
 subsp. **triflora** 329
Crepidiorhopalon whytei (Skan) Fischer 428
Crepis L. 363
Crepis ruepellii Sch. Bip. 363;723
Crepis ugandensis Bab. 363
Crinipes Hochst. 554
Crinipes abyssinica (Hochst.) Hochst. 555
Crinipes longifolius C.E. Hubb. 554
Crinum L. 497
Crinum distichum Herb. 497;695
Crinum macowanii Bak. 497;695
Crinum ornatum (Ait.) Bury 497;695
Crinum pauciflorum Bak. 497
Crinum zeylanicum (L.) L. 497
Crinum zeylanicum auct., non (L.) L. 497
Crossandra Salisb. 440
Crossandra guineensis Nees 454
Crossandra massaica Mildbr. 440
Crossandra nilotica Oliv. 440
 subsp. *massaica* (Mildbr.) Napper 440
Crossandra subacaulis C.B. Clarke 440;696
Crossonephelis Baill. 286
Crossonephelis africanus (Radlk.) Leenh. 286
Crossopteryx Fenzl 330
Crossopteryx febrifuga Benth. 330;692
Crossopteryx kotschyana Fenzl 330
Crotalaria L. 203
Crotalaria aculeata De Wild. 203
 subsp. **claessensii** (De Wild.) Polhill 203
 var. *aculeata*, pro parte 203
Crotalaria alexandri Bak. f. 203;724
Crotalaria astragalina A. Rich. 208
Crotalaria brevidens Benth. 204
 var. **intermedia** (Kotschy) Polhill 204
Crotalaria cannabina Bak. f. 208
Crotalaria cephalotes A. Rich. 204
Crotalaria chrysochlora Bak. f. ex Harms 204;695
Crotalaria comosa Bak. 204;696
Crotalaria congesta Polhill 205
Crotalaria cylindrica A. Rich. 205;721
 subsp. **cylindrica** 205;721
Crotalaria deserticola Bak. f. 205
 subsp. **deserticola** 205
Crotalaria dillonia Bak. 204
Crotalaria glauca Willd. 205;730
Crotalaria goreensis Guill. & Perr. 205;696
Crotalaria hyssopifolia Klotzsch 206;696
Crotalaria impressa Walp. 208

- subsp. *onobrychis* (A. Rich.) Cufod. 208
Crotalaria incana L. 206;724
 subsp. **purpurascens** (Lam.) Milne-Redh. 206;724
Crotalaria intermedia Kotschy 204
Crotalaria intonsa Polhill 206;730
Crotalaria laburnifolia L. 206
 subsp. **laburnifolia** 206
Crotalaria lachnocarpa Bak. 207
Crotalaria lachnocarpoides Engl. 207;730
Crotalaria lachnophora A. Rich. 204
Crotalaria leprieurii Guill. & Perr. 207
Crotalaria linearifolia De Wild. 207
Crotalaria natalitia auct., non Meissn. 207
Crotalaria natalitia Meissn. 207;724
 var. **rutshuruensis** De Wild. 207;724
Crotalaria ochroleuca G. Don 208;696
Crotalaria onobrychis A. Rich. 208
Crotalaria ononoides Benth. 208
 var. **ononoides** 208
Crotalaria pallida Aiton 208
 var. **pallida** 208
Crotalaria petitiiana (A. Rich.) Walp. 204
Crotalaria pchnostachya Benth. 208
 subsp. **pchnostachya** 208
Crotalaria quartiniana A. Rich. 209
Crotalaria retusa L. 209
Crotalaria senegalensis (Pers.) Bacle ex DC. 209
 var. *carinata* auct., non (Steud.) Bak. f. 209
Crotalaria senegalensis auct., non Bacle ex DC. 209
Crotalaria shirensis (Bak. f.) Milne-Redh. 209;724
Crotalaria sp. 210
Crotalaria stenorhampha Harms 209;695
Crotalaria taubertii Bak. f. 209
Crotalaria vatkeana Engl. 210;743
Crotalaria verdcourtii Polhill 210
Crotalaria vogelii Benth. 207
Croton L. 161
Croton macrostachyus Hochst. ex Del. 161;
 610;716;726;728;731;732;733;734;736;737
Croton oxypetalus Muell. Arg. 161
Croton sp. 162
Croton sylvaticus Krauss 161;610;702
Croton zambesicus Muell. Arg. 162
Cruciales 81
Cruciferae Juss., nom. altern. 81
Cryptolepis nigritana (Benth.) N.E. Br. 322
Cryptolepis oblongifolia (Meisn.) Schltr. 322
Cucumella Chiov. 119
Cucumella engleri (Gilg) C. Jeffrey 119
Cucumis L. 119
Cucumis figarei auct., non Naud. 119
Cucumis pustulatus Hook. f. 119
Cucurbitaceae Juss. 118
Cucurbitales Dumort. 118
Culcasia P. Beauv. 496
Culcasia falcifolia Engl. 496;699;703;717;729
Culcasia scandens auct., non (Willd.) P. Beauv. 496;699
Cupressaceae Rich. ex Barthl. 62;599
Cupressus lusitanica Mill. 669;670
Curculigo Gaertner 506
Curculigo gallabatensis Schweinf. ex Bak. 506
Curculigo pilosa (Schumach. & Thonn.) Engl. 506;697
Cuscuta L. 416
Cuscuta kilimanjari Oliv. 416
 var. **kilimanjari** 416
Cussonia Thunb. 295
Cussonia arborea Hochst. ex A. Rich. 295;626;693;718
Cussonia barteri Seem. 295
Cussonia kirkii Seem. 295
Cussonia spicata Thunb. 295;626;733
Cyanotis D. Don 479
Cyanotis arachnoidea C.B. Clarke 479;710
 var. **arachnoidea** 479;710
Cyanotis barbata D. Don 479;739;743
Cyanotis caespitosa Kotschy & Peyr. 4479;696
Cyanotis hirsuta C.A. Mey. 479
Cyanotis lanata Benth. 480;710
Cyanotis lanata sensu FS & FPS 479
Cyathea Sm. 35
Cyathea camerooniana Hook. 35;758
 var. **ugandensis** Holttum 35;758

- Cyathea deckenii* auct., non Kuhn 36
Cyathea deckenii Kuhn 35
Cyathea dregei Kunze 36
Cyathea manniana Hook. 36;598;729;738
Cyathea sp. aff. *Cyathea holstii* Hieron 35
Cyatheaceae Rchb. 35;598
Cyathula Blume 98
Cyathula achyranthoides (Kunth) Moq. 98;730
Cyathula cylindrica Moq. 99;739
 var. *mannii* (Bak.) Suess. 99
Cyathula globulifera Moq. 100
Cyathula mannii Bak. 99
Cyathula orthacantha (Asch.) Schinz 99
Cyathula pedicellata C.B. Clarke 99
Cyathula prostrata (L.) Blume 99;702;717
 var. **pedicellata** (C.B. Clarke) Cavaco 99
 var. **prostrata** 99
Cyathula schimperiana Moq. 99
Cyathula uncinulata (Schrad.) Schinz 100
Cycadaceae Pers. 61;599
Cycadales Dumort. 61
Cyclophorus mechowii Hieron. 45
Cyclosorus Link 55
Cyclosorus afer (Christ) Ching 56
Cyclosorus dentatus (Forssk.) Ching 55
Cyclosorus interruptus (Willd.) H. Ito 55
Cyclosorus patens (Fée) Copel. 56
Cyclosorus quadrangularis (Fée) Tardieu 55
Cyclosorus striatus (Schumach.) Ching 56
Cyclosorus tottus (Thunb.) Pic. Serm. 56;702
Cygnium E. Mey. ex Benth. 423
Cygnium adonense E. Mey. ex Benth. 423
 subsp. **adonense** 423
 subsp. **camporum** (Engl.) O.J. Hansen 423
Cygnium camporum Engl. 423
Cygnium erectum Rendle 424;725
Cygnium recurvum (Oliv.) Engl. 424
Cygnium tenuisectum (Standl.) O.J. Hansen 424;739;742
Cymbopogon Spreng. 555
Cymbopogon caesius (Hook. & Arn.) Stapf 555
Cymbopogon excavatus (Hochst.) Stapf 555
Cymbopogon giganteus Chiov. 555;568;696
Cymbopogon nardus (L.) Rendle 555;724
Cymbosetaria Schweick. 586
Cymbosetaria sagittifolia (A. Rich.) Schweick. 589
Cynanchum L. 321
Cynanchum gerrardii (Harv.) Liede 321
Cynanchum praecox Schult. ex S. Moore 321;724
Cynanchum sarcostemmatoides K. Schum. 321
Cynanchum somaliense auct., non (N.E. Br.) N.E. Br. 325
Cynanchum tetrapterum auct., non (Turcz.) Bullock 321
Cynanchum validum N.E. Br. 325
Cynodon Rich. 556
Cynodon dactylon (L.) Pers. 556
Cynodon nlemfuensis Vanderyst 556
 var. **robustus** Clayton & Harlan 556
Cynoglossum L. 411
Cynoglossum lanceolatum Forssk. 411
Cynoglossum sp. cf. *C. aequatoriale* T.C.E. Fr. 411
Cyperaceae Juss. 522
Cyperales Hutch. 522
Cyperus L. 527
Cyperus aethiops Welw. ex Ridl. 527
Cyperus ajax C.B. Clarke 527;729
Cyperus albo-sanguineus Kük. 527;720
Cyperus alternifolius L. 534
 subsp. *flabelliformis* (Rottb.) Kük. 534
Cyperus amabilis Vahl 527;528;730
Cyperus anemodorus K. Schum. 528;693
Cyperus angolensis Boeck. 528;723
Cyperus aristatus Rottb. 538
Cyperus aromaticus (Ridl.) Mattf. & Kük. 536
 var. *elatior* (Steud.) Kük. 536
Cyperus boreochrysocephalus K. Lye 528
Cyperus bracheilema (Steud.) Mattf. & Kük. 528;742
Cyperus capillifolius A. Rich. 529;710
Cyperus castaneus Willd. 527
Cyperus circumclusus (C.B. Clarke) Kük. 536
Cyperus comosipes Mattf. & Kük. 529;720
 subsp. **decolorans** (Kük.) Lye 529;720
Cyperus compactus Lam. 536
 var. *tenerior* C.B. Clarke 536

- Cyperus cuspidatus** HBK. 529;696
Cyperus cyperoides (L.) O. Kuntze 529;696
 subsp. **cyperoides** 529;696
 subsp. **flavus** Lye 529;696
Cyperus denudatus L.f. 530;730
 var. **denudatus** 530;730
 var. **lucenti-nigricans** (K. Schum.) Kük. 530
Cyperus dereilema Steud. 530;739;740
Cyperus dichroostachyus Hochst. ex A. Rich. 530;730

Cyperus difformis L. 531
Cyperus diffusus Vahl 531;696
 subsp. **buchholzii** (Boeck.) Kük. 531;696
Cyperus distans auct., non L.f. 531
Cyperus distans L. f. 531
 subsp. **distans** 531
 subsp. **longibracteatus** (Cherm.) Lye 531
 var. **rubrotinctus** (Cherm.) Lye 532
Cyperus diurensis Boeck. 532
Cyperus dives Del. 532
Cyperus dubius Rottb. 532;533;710
 subsp. **coloratus** (Vahl) K. Lye 532
 subsp. **dubius** 532;710
 subsp. **macrocephalus** (C.B. Clarke) Lye 533
 var. **coloratus** (Vahl) Kük. 533
 var. **macrocephalus** (C.B. Clarke) Kük. 533
Cyperus elegantulus Steud. 533;730
Cyperus exaltatus Retz. 533;710
 var. **dives** (Del.) C.B. Clarke 532
Cyperus fibrillosus Kük. 533;723
Cyperus fischerianus A. Rich. 534;730
Cyperus flabelliformis Rottb. 534
Cyperus flavescens L. 534
 subsp. **flavescens** 534
Cyperus foliaceus C.B. Clarke 534
Cyperus fresenii auct., non Steud. 530
Cyperus immensus C.B. Clarke 532
Cyperus impubes Steud. 534
Cyperus involucratus Rottb. 534
Cyperus iria L. 535
Cyperus kerstenii Boeck. 535;742;743
Cyperus lanceolatus Poir. 535
Cyperus laxus Lam. 531
 subsp. **buchholzii** (Boeck.) Kük. 531

Cyperus longibracteatus (Cherm.) Kük. 532
 var. **rubrotinctus** (Cherm.) Kük. 532
Cyperus lucenti-nigricans K. Schum. 530
Cyperus macrostachyos Lam. 535;697
 subsp. **tremulus** (Poir.) K. Lye 535;697
Cyperus margaritaceus Vahl 536
 var. **tisserantii** (Cherm.) Kük. 536
Cyperus merkeri C.B. Clarke 537
Cyperus mollipes (C.B. Clarke) K. Schum. 528
Cyperus niger Ruiz & Pav. 533
 subsp. **elegantulus** (Steud.) Lye 533
Cyperus nigricans Steud. 535
Cyperus niveus Retz. 536;723
 var. **leucocephalus** (Kunth) Fosberg 536;723
 var. **tisserantii** (Cherm.) Lye 536;723
Cyperus nuereensis Boeck. 539
Cyperus obtusiflorus Vahl 536
Cyperus phaeorhizus K. Schum. 530
Cyperus pinguis (C.B. Clarke) Mattf. & Kük. 536;730
Cyperus plateilema (Steud.) Kük. 536
Cyperus platycaulis Bak. 530
 var. **lucenti-nigricans** (K. Schum.) Kük. 530
Cyperus pustulatus Vahl 536
Cyperus reduncus Boeckl. 5537
Cyperus remotus (C.B. Clarke) Kük. 5537
Cyperus renschii Boeck. 537;698
Cyperus rotundus L. 537
 subsp. **merkeri** (C.B. Clarke) Kük. 537
 subsp. **rotundus** 537
 var. **spadiceus** Boeck. 538
Cyperus rubicundus Vahl 538
Cyperus sesquiflorus (Torr.) Mattf. & Kük. 538;730
 subsp. **appendiculata** (K. Schum.) Lye. 538;730

Cyperus sp. 539;743
Cyperus sphaerocephalus Vahl 536
 var. **leucocephalus** Kunth 536
Cyperus squarrosus L. 538
Cyperus submacropus Kük. 536
Cyperus subumbellatus Kük. 530
Cyperus teneriffae Poir. 538
Cyperus teneristolon Mattf. & Kük. 528

- Cyperus tisserantii* Cherm. 536
Cyperus tremulus Poir. 535
Cyperus triceps Endl. 538;739
Cyperus uncinatus auct., non Poir. 529
Cyperus uniolooides R. Br. 539
Cyphocarpa orthacantha (Asch.) C.B. Clarke 99
Cyphostemma (Planch.) Alston 272
Cyphostemma adenocaula (A. Rich.)
 Descoings ex Wild & Drummond 272;692
 subsp. **adenocaula** 272;692
Cyphostemma adenocephalum (Gilg & Brandt)
 Descoings 275
Cyphostemma bambuseti (Gilg & Brandt)
 Descoings ex Wild & Drummond 273;729
Cyphostemma crotalarioides (Planch.) Wild
 & Drummond 273
Cyphostemma cyphopetalum (Fresen.)
 Descoings ex Wild & Drummond 273;692
 subsp. **cyphopetalum** 273;692
Cyphostemma junceum (Webb) Descoings ex
 Wild & Drummond 274;696
 subsp. **jatrophioides** (Bak.) Verdc. 274
 subsp. **junceum** 274; ;696
Cyphostemma kilimandscharicum (Gilg)
 Wild & Drummond 274;734
Cyphostemma serpens (A. Rich.) Descoings
 274
 subsp. **serpens** 274
Cyphostemma sp. cf. C. dembianense (Chiov.)
 Vollesen 275
Cyphostemma ukerewense (Gilg) Descoings
 274;729
Cyrtanthus Ait. 497
Cyrtanthus sanguineus (Lindl.) Walp. 497;695
 subsp. **minor** Nordal 497;695
Cyrtanthus sp. (Sect. *Gastronema*) sensu Chipp
 497
Cyrtococcum Stapf 556
Cyrtococcum chaetophorum (Roem. &
 Schult.) Dandy 556;702
Cyrtococcum setigerum Stapf 556
Cystopteris Bernh. 57
Cystopteris fragilis (L.) Bernh. 57;739
- D
- Dactyloctenium** Willd. 556
Dactyloctenium aegyptium (L.) Willd. 556
Daemia extensa R. Br. 323
Dalbergia L. f. 210
Dalbergia lactea Vatke 210;616;729;734
Dalbergia melanoxylon Guill. & Perr.
 210;616;693;703;713
Dalbergia sp. cf. D. lactea Vatke 211
Dalechampia L. 162
Dalechampia parvifolia Lam. 162
Dalechampia scandens auct., non L. 162
Dalechampia scandens L. 162
 var. *cordofana* (Webb) Muell.Arg. 162
Dasystachys drimiopsis (Bak.) Benth. 492
Dasystachys falcata Bak. 492
Dasystachys papillosa Bak. 492
Davallia Sm. 46
Davallia chaerophylloides (Poir.) Steud. 46;702
Davallia nigrescens Hook. 50
Davalliaceae Rchb. 46
Delphinium L. 69
Delphinium candidum Hemsl. 69
Delphinium leroyi Franch. ex Huth 69;723;739
Dennstaedtiaceae Ching. 39
Deroemeria squamata (A. Rich.) Rchb. f. 517
Desmodium Desv. 211
Desmodium adscendens (Sw.) DC. 211;702
 var. **robustum** Schubert 211;702
Desmodium dichotomum (Willd.) DC. 211
Desmodium gangeticum (L.) DC. 211
Desmodium lasiocarpum (P. Beauv.) DC. 212
Desmodium paleaceum Guill. & Perr. 212
Desmodium polygonoides Bak. 211
Desmodium repandum (Vahl) DC. 211;734
Desmodium salicifolium (Poir.) DC. 212
 var. **salicifolium** 212
Desmodium scalpe DC. 212
Desmodium setigerum (E. Mey.) Harv. 212
Desmodium velutinum (Willd.) DC. 212;696
Dialium L. 180
Dialium bipindense auct., non Harms 181
Dialium excelsum Steyaert 180;701

<i>Dialium</i> sp. sensu FPS	181	Digitaria diagonalis (Nees) Stapf	557;739;740
Diaphananthe Schltr.	509	var. hirsuta (De Wild. & T. Durand)	
Diaphananthe adoxa Rasm.	509	Troupin	557
Diaphananthe lorifolia Summerh.	509;729	var. uniglumis (A. Rich.) Pilger	557;739;740
Diaphananthe schimperiana (A. Rich.) Summerh.	510	Digitaria gayana (Kunth) A. Chev.	558
Dichapetalaceae Baill.	178;612	<i>Digitaria horizontalis</i> auct., non Willd.	558
Dichapetalum Thouars	178	<i>Digitaria marginata</i> Link	557
Dichapetalum madagascariense Poir.	178;717	Digitaria nuda Schumach.	558;713
Dichapetalum ugandense M.B. Moss	178;702	<i>Digitaria scalarum</i> (Schweinf.) Chiov.	557
Dichondra L.	417	Digitaria ternata (A. Rich.) Stapf	558
Dichondra repens J.R. & G. Forster	417	<i>Digitaria uniglumis</i> (A. Rich.) Stapf	557;740
var. repens	417	Digitaria velutina (Forssk.) P. Beauv.	558;696
Dichrocephala L'Hér. ex DC.	363	<i>Digitaria vestita</i> Fig. & De Not.	557
Dichrocephala chrysanthemifolia (Blume) DC.	363;724	Dilleniaceae Salisb.	114
Dichrocephala integrifolia (L. f.) O. Kuntze	363	Dilleniales Hutch.	114
<i>Dichrocephala latifolia</i> DC.	363	Dioscorea L.	501
Dichrostachys (DC.) Wight & Arn.	195	Dioscorea dumetorum (Kunth) Pax	501
Dichrostachys cinerea (L.) Wight. & Arn.	195;615;692;706	Dioscorea preussii Pax	502;717
<i>Dichrostachys glomerata</i> (Forssk.) Chiov.	195	Dioscorea quartiniana A. Rich.	502;734
<i>Dichrostachys nutans</i> Benth.	196	var. quartiniana	502;734
Dicliptera Juss.	441	Dioscorea schimperana Kunth	502;725
Dicliptera laxata C.B. Clarke	441;734	Dioscoreaceae R. Br.	501
Dicliptera maculata Nees	441;702	Dioscoreales Hook. f.	501
Dicliptera pumila (Lindau) Dandy	441;695	Diospyros L.	303
Dicliptera umbellata (Vahl) Juss.	442;739	Diospyros abyssinica (Hiern) F. White	303;627;716
Diclis Benth.	425	subsp. abyssinica	303;716
Diclis ovata Benth.	425;730	Diospyros mespiliformis Hochst. ex A. Rich.	303;707;710;712;715
Dicoma Cass.	363	Diospyros scabra (Chiov.) Cufod.	303
Dicoma tomentosa Cass.	363	Dipcadi Medik.	486
<i>Dicotyledones</i> Juss.	63	<i>Dipcadi filifolium</i> Bak.	486
Digera Forssk.	100	<i>Dipcadi lanceolatum</i> Bak.	486
Digera muricata (L.) Mart.	100	<i>Dipcadi tacazzeanum</i> (A. Rich.) Bak.	486
subsp. trinervis C.C. Townsend	100	<i>Dipcadi unifolium</i> Bak.	486
Digitaria Haller	556	Dipcadi viride (L.) Moench	486;695
Digitaria abyssinica (A. Rich.) Stapf	556;732	Diplacrum R. Br.	539
<i>Digitaria adscendens</i> (Kunth) Henrad	557	Diplacrum africanum C.B. Clarke	539;710
subsp. chrysoblephara (Fig. & De Not.) Henrad	557	Diplazium Sw.	57
subsp. nubica (Stapf) Henrad	557	Diplazium proliferum (Lam.) Kaulf.	57;702
Digitaria ciliaris (Retz.) Koel.	557	Diplolophium Turcz.	298
		<i>Diplolophium abyssinicum</i> (A. Rich.) Benth.	298
		Diplolophium africanum Turcz.	298;696;724
		Dipsacaceae Juss.	350

Dipsacus L.	350	Dolichos schweinfurthii Harms	213;723
Dipsacus pinnatifidus Steud. ex A. Rich.	350;739;743	Dolichos sericeus E. Mey.	213
Dipterocarpaceae Blume	126	subsp. formosus (A. Rich.) Verdc.	214
Disa Berg.	510	subsp. sericeus	213
Disa aconitoides Sond.	510	Dolichos trilobus L.	214;702
subsp. concinna (N.E. Br.) H.P. Linder	510;724	subsp. occidentalis Verdc.	214;702
<i>Disa concinna</i> N.E. Br.	510	Dombeya Cav.	144
<i>Disa deckenii</i> Rchb. f.	511	<i>Dombeya bagshawei</i> Bak. f.	144
Disa erubens Rendle	510;724;740	Dombeya buettneri K. Schum.	144
subsp. erubens	510;724;740	Dombeya burgessiae Harv.	144;608;700
Disa fragrans Schltr.	511;743	<i>Dombeya dawei</i> Sprague	144
subsp. deckenii (Rchb. f.) H.P. Linder	511;743	<i>Dombeya elliotii</i> K. Schum. & Engl.	145
Disa hircicornis Rchb. f.	511;743	<i>Dombeya goetzenii</i> K. Schum.	145
Disa ochrostachya Rchb. f.	511;724	<i>Dombeya mukole</i> auct., non Sprague	144
<i>Disa schimperii</i> N.E. Br.	511	Dombeya quinqueseta (Del.) Exell	144;608;692;693
Disa scutellifera A. Rich.	511;739	<i>Dombeya reticulata</i> Mast.	144
Disa welwitschii Rchb. f.	511;743	Dombeya rotundifolia (Hochst.) Planch.	608
subsp. welwitschii	511;743	<i>Dombeya schimperiana</i> A. Rich.	145
Discopodium Hochst.	412	<i>Dombeya spectabilis</i> auct., non Bojer	608
Discopodium penninervium Hochst.	412;729	Dombeya torrida (J.F. Gmel.) Bamps	145;608;728;732;733;734;737;738
Dissotis Benth.	128	subsp. torrida	145;608;728
Dissotis brazzae Cogn.	128;724	<i>Donax leucantha</i> K. Schum.	485
Dissotis canescens (Graham) Hook. f.	128	<i>Donax ugandensis</i> K. Schum.	485
<i>Dissotis capitata</i> (Benth.) Hook. f.	129	Dorstenia L.	241
Dissotis decumbens (P. Beauv.) Triana	128;702	Dorstenia annua Friis & Vollesen	241;730;758
<i>Dissotis erecta</i> (Guill. & Perr.) Dandy	129	Dorstenia barnimiana Schweinf.	242
<i>Dissotis laevis</i> (Benth.) Hook. f.	128	var. barnimiana	242
Dissotis perkinsiae Gilg	128;724	Dorstenia benguellensis Welw.	242
Dissotis rotundifolia (Sm.) Triana	128	<i>Dorstenia bicornis</i> Schweinf.	242
<i>Dissotis scabra</i> Gilg	128	Dorstenia brownii Rendle	242;702;730
<i>Dissotis schweinfurthii</i> Gilg	128	Dorstenia hildebrandtii Engl.	242
Dissotis senegambiensis (Guill. & Perr.)		var. schlechteri (Engl.) Hijman	242
Triana	129;710;725	Dorstenia psilurus Welw.	242;702
var. senegambiensis	129;710;725	<i>Dorstenia schlechteri</i> Engl.	242
Dolichos L.	213	Doryopteris J. Sm.	40
Dolichos compressus Wilczek	213	Doryopteris concolor (Langsd. & Fisch.)	
<i>Dolichos formosus</i> auct., non A. Rich.	213	Kuhn	40;702
Dolichos kilimandscharicus Taub.	213;723	var. nicklesii (Tardieu) Schelpe	40
subsp. kilimandscharicus	213;723	<i>Doryopteris nicklesii</i> Tardieu	40
<i>Dolichos malosanus</i> Bak.	213	Dovyalis Arn.	116
<i>Dolichos pseudopachyrizus</i> Harms	224	Dovyalis abyssinica (A. Rich.) Warb.	116;715;738

- Dovyalis macrocalyx** (Oliv.) Warb. 116;602;702;729
- Dracaena** L. 502
- Dracaena afromontana** Engl. 502;585;734;736
- Dracaena fragrans** (L.) Ker-Gawl. 503;702
- Dracaena fragrans* auct., non (L.) Ker-Gawl. 503
- Dracaena laxissima** Engl. 503;729
- Dracaena steudneri** Engl. 503;701;716;729;731;737
- Dracaenaceae** Salisb. 502
- Dregea** E. Mey. 321
- Dregea abyssinica** (Hochst.) K. Schum.. 321
- Dregea schimperii** (Decne.) Bullock 321
- Drimia** Jacq. 486
- Drimia altissima** (L. f.) Ker Gawl. 486;695
- Drimia elata** Jacq. 487;721
- Drimia indica** (Roxb.) Jessop 487;721
- Drimia sudanica** Friis & Vollesen 487;721
- Drimia zombensis* Bak. 487
- Droguetia** Gaudich. 251
- Droguetia iners** (Forssk.) Schweinf. 251;730;738
subsp. *iners* 251;730;738
- Drosera** L. 88
- Drosera indica** L. 88;710
- Droseraceae** Salisb. 88
- Drymaria** Willd. ex Schult. 89
- Drymaria cordata** (L.) Willd. ex Roem. & Schult. 89;730
- Drynaria** (Bory) J. Sm. 44
- Drynaria sp. nov.* sensu Alston 44
- Drynaria volkensii** Hieron. 44;726;729;734;741
- Drynaria willdenowii* auct., non T. Moore 44
- Dryopteris** Adans. 58
- Dryopteris afra* Christ 56
- Dryopteris africana* (Desv.) C. Chr. 56
- Dryopteris bergiana* (Schlecht.) O. Kuntze 54
- Dryopteris dentata* (Forssk.) C. Chr. 55
- Dryopteris elongata* ?auct., non (Sw.) Sim 58
- Dryopteris gongyloides* auct., non (Schkuhr.) Link 56
- Dryopteris inaequalis** (Schlechtend.) O. Kuntze 58;730
- Dryopteris kilemensis** (Kuhn) C. Chr. 59;730
- Dryopteris maranguensis* (Hieron.) C. Chr. 54
- Dryopteris pauciflora* (Hook.) C. Chr. 56
- Dryopteris pentheri* (Krasser) C. Chr. 58
- Dryopteris schimperiana** (Hochst.) C. Chr. 59
- Dryopteris silvatica* (Pappe & Rawson) C. Chr. 56
- Dryopteris squamiseta** (Hook.) O. Kuntze 59
- Drypetes** Vahl 162
- Drypetes gerrardii** Hutch. 162
- var. *tomentosa* Radcl.-Sm. 162
- Drypetes sp. nov. aff. D. leonensis* (Pax) Pax & K. Hoffm. 162
- Drypetes ugandensis** (Rendle) Hutch. 162;610;701
- Duranta** L. 459
- Duranta erecta** L. 459
- Durantia repens* L. 459
- Dyschoriste** Nees 442
- Dyschoriste clinopodioides** Mildbr. 442;695
- Dyschoriste nagchana** (Nees) Bennet 442;695
- Dyschoriste perrottetii* (Nees) O. Kuntze 442
- Dyschoriste radicans** Nees 442
- E
- Ebenaceae** Guerke 303;627
- Ebenales** Engl. 303
- Echinochloa** P. Beauv. 559
- Echinochloa haploclada** (Stapf) Stapf 559
- Echinops** L. 364
- Echinops amplexicaulis** Oliv. 364;724
- Echinops giganteus** A. Rich. 364;696
- Echinops longifolius** A. Rich. 364;696
- Eclipta** L. 364
- Eclipta alba* (L.) Hassk. 364
- Eclipta prostrata** (L.) L. 364
- Ectadiopsis** Benth. 322
- Ectadiopsis oblongifolia** (Meisn.) Schltr. 322;724
- Ehretia** P. Browne 411
- Ehretia braunii** Vatke 411;706;712
- Ehretia sp. cf. E. amoena** Klotzsch 411;706
- Ehretia stuhlmannii* Guerke 411
- Ehrharta** Thunb. 559
- Ehrharta abyssinica* Hochst. 559
- Ehrharta erecta** Lam. 559;734;739;741

- var. **abyssinica** (Hochst.) Pilger 559;734;739;741
- Ekebergia** Sparrm. 281
- Ekebergia capensis** Sparrm. 281;623;701;729
- Ekebergia rueppelliana* (Fresen.) A. Rich. 281
- Ekebergia senegalensis* Juss. 281;623
- Elaeodendron** Jacq. 255
- Elaeodendron buchananii** (Loes.) Loes. 255
- Elaeodendron sp.* sensu ITU 255
- Elaphoglossum** Schott 58
- Elaphoglossum lastii** (Bak.) C. Chr. 58;729
- Elaphoglossum volkensii* (Hieron.) C. Chr. 58
- Elatostema** J.R. & G. Forst. 251
- Elatostema monticola** Engl. 251;730
- Elatostema orientale* Engl. 251
- Elephantopus** L. 365
- Elephantopus mollis** H.B.K. 365
- Eleusine** Gaertn. 559
- Eleusine africana* Kenn.-O'Byrne 560
- Eleusine coracana** (L.) Gaertn. 559
- Eleusine indica** (L.) Gaertn. 560
- subsp. **africana** (Kenn.-O'Byrne) S.M. Phillips 560
- subsp. **indica** 560
- Elionurus** Humb. & Bonpl. ex Willd. 560
- Elionurus argenteus* Nees 560
- Elionurus muticus** (Spreng.) O. Kuntze 560
- Elytraria** Michx. 443
- Elytraria crenata* auct., non Vahl 443
- Elytraria marginata** Vahl 443;702
- Embelia** Burm. f. 309
- Embelia abyssinica* Bak. 309
- Embelia schimperi** Vatke 309;729;732
- Emilia** (Cass.) Cass. 365
- Emilia abyssinica** (Sch. Bip. ex A. Rich.) C. Jeffrey 365
- Emilia coccinea** (Sims) G. Don 365;726
- Emilia discifolia** (Oliv.) C. Jeffrey 365
- Emilia emilioides** (Sch. Bip.) C. Jeffrey 365
- Emilia sagittata* auct., non DC. 365
- Encephalartos** Lehm. 61
- Encephalartos septentrionalis** Schweinf. 61;599;693;714
- Englerastrum** Briq. 464
- Englerastrum gracillimum* T.C.E. Fr. 470
- Englerastrum schweinfurthii** Briq. 464;710
- Englerodaphne leiosiphon* Gilg 111
- Englerophytum** Krause 627
- Englerophytum oblanceolatum** (S. Moore) Pennington 305;627;701
- Enneastemon schweinfurthii* (Engl. & Diels) Robyns & Ghesq. 65
- Ensete** Horan. 483
- Ensete edule* Horan. 483
- Ensete ventricosum** (Welw.) Cheesman 483;702;737
- Entada** Adans. 196
- Entada abyssinica** Steud ex A. Rich. 196;615;718
- Entada abyssinica x africana** 196
- Entada africana** Guill. & Per. 196;692
- Entada flexuosa* Hutch. & Dalz. 197
- Entada gigas* sensu El Amin 197
- Entada phaseoloides* auct., non (L.) Merr. 197
- Entada pursaetha* DC. 197
- Entada rheedii** Spreng. 197;702
- Entada sudanica* Schweinf. 196
- Entada wahlbergii** Harv. 197;698
- Entadopsis abyssinica* (Steud. ex A. Rich.) Gilbert & Boutique 196
- Entadopsis flexuosa* (Hutch. & Dalz.) Gilb. & Bout. 197
- Entadopsis sudanica* (Schweinf.) Gilbert & Boutique 196
- Entandophragma** C.E. Fisch. 282
- Entandophragma angolense** (Welw.) C. DC. 282;623;701;716
- Entandophragma macrophyllum* A. Chev. 282
- Entandophragma sp.** 282
- Enteropogon** Nees 560
- Enteropogon macrostachyus** (Hochst.) Benth. 560
- Epilobium** L. 108
- Epilobium salignum** Hausskn. 108;730
- Epilobium stereophyllum** Fresen. 108;739
- Epipogium** R. Br. 511
- Epipogium nutans* (Bl.) Rchb. f. 511
- Epipogium roseum** (Don) Lindl. 511;730

- Epithema** Blume 432
Epithema tenue C.B. Clarke 432;702
Eragrostis P. Beauv. 561
Eragrostis arenicola C.E. Hubb. 561
Eragrostis aspera (Jacq.) Nees 561
Eragrostis blepharoglumis K. Schum. 562
Eragrostis chalcantha Trin. 562
Eragrostis cilianensis (All.) Lut. 561
Eragrostis ciliaris (L.) R. Br. 561
Eragrostis cylindriflora Hochst. 562
 var. *gymnorrhachis* Schweinf. 562
Eragrostis hispida K. Schum. 562;720
Eragrostis macilenta (A. Rich.) Steud. 562
Eragrostis olivacea K. Schum. 562
Eragrostis racemosa (Thunb.) Steud. 562
Eragrostis schweinfurthii Chiov. 563
Eragrostis superba Peyr. 563
Eragrostis tenuifolia (A. Rich.) Steud. 563
Eragrostis tremula Steud. 563
Eranthemum decurrens Nees 454
Eranthemum lindau C.B. Clarke 453
Eranthemum ludovicianum Buettn. 453
Eranthemum nigritianum T. Andersson 453
Eremomastax Lindau 443
Eremomastax polysperma (Benth.) Dandy 445
Eremomastax speciosa (Hochst.) Cufod. 443;717
Erica L. 302
Erica arborea L. 302;627;742
Ericaceae Juss. 302;627
Ericales Dumort. 302
Eriocaulaceae Desv. 482
Eriocaulales Nakai 482
Eriocaulon L. 482
Eriocaulon schimperi Koern. ex Ruhl. 482;739;740
Eriochloa Kunth 564
Eriochloa acrothrica (Steud.) Hack. ex Thell.,
 nom. illeg., non (Hook. f.) Schinz 564
Eriochloa fatmensis (Hochst. & Steud.)
 W.D. Clayton 564;709
Eriochloa nubica (Steud.) Hack. & Stapf ex
 Thell. 564;709
Eriosema (DC.) Rchb. 214
Eriosema chrysadenium Taub. 214;723;724
 var. **chrysadenium** 214;723
Eriosema flemingoides Bak. 214;696
Eriosema montanum Bak. f. 215
 var. **montanum** 215
Eriosema nutans Schinz 215
Eriosema polystachyum auct., non (A. Rich.)
 Bak., nec E. Mey. 215
Eriosema rhodesicum R.E. Fr. 215;723
 var. **rhodesicum** 215;723
Eriosema richardii Bak. f. & Haydon 215
Eriosema schoutedenianum Stan. & de Craene 215
Eriosema sp. cf. E. cordifolium A. Rich. 215
Eriosema verdickii De Wild. 215
Eriospermaceae Endl. 494
Eriospermum Jacq. 494
Eriospermum abyssinicum Bak. 494;721
Eriospermum triphyllum Bak. 494;695
Eriospora abyssinica A. Rich. 527
Eriospora schweinfurthiana auct., non (Boeck.)
 C.B. Clarke 527
Erlangea Sch. Bip. 366
Erlangea congesta M.R.F. Taylor 357
Erlangea cordifolia (Oliv.) S. Moore 368
Erlangea imatongensis M.R.F. Taylor 357
Erlangea rueppellii (Sch. Bip.) Broun &
 Massey 368
Erucastrum C. Presl 81
Erucastrum arabicum Fisch. & Mey. 81
Erythrina L. 215
Erythrina abyssinica DC. 215;616;715;718;722
 subsp. **abyssinica** 215;616
Erythrina excelsa Bak. 216;698;703
Erythrina tomentosa R. Br. 216
Erythrococca Benth. 163
Erythrococca bongensis Pax 610
Erythrococca olacifolia Prain 610
Erythrococca paxii Rendle 610
Erythrococca rigidifolia Pax 610
Erythrococca trichogyne (Muell. Arg.)
 Prain 163;734
Erythrophleum Afzel. ex G. Don 181
Erythrophleum guineense G. Don 181

Erythrophleum suaveolens (Guill. & Perr.)		<i>Eulophia zeyheri</i> Hook. f.	512
Brenan	181;613;698;701;703	<i>Eupatorium</i> L.	366
Erythroxyloaceae Kunth.	154	<i>Eupatorium africanum</i> Oliv. & Hiern	380
Erythroxyllum P. Browne	154	Euphorbia L.	163
Erythroxyllum fischeri Engl.	154	Euphorbia ampliphylla Pax	163;734
Ethulia L.f.	366	Euphorbia bongensis Kotschy & Peyr.	163;692
Ethulia gracilis Del.	366	Euphorbia breviarticulata Pax	164
<i>Eucalyptus saligna</i> Sm.	662	var. breviarticulata	164
Euclea L.	304	<i>Euphorbia calycina</i> N.E. Br.	164
Euclea divinorum Hiern	304;627;713;737	Euphorbia candelabrum Kotschy	164;611
<i>Euclea kellau</i> A. Rich.	304	Euphorbia cyparissoides Pax	164
<i>Euclea lanceolata</i> auct., E. Mey.	304	Euphorbia depauperata Hochst. ex A. Rich.	164;724;740;758
<i>Euclea latidens</i> Stapf	304	var. depauperata	164;724
<i>Euclea mildbraedii</i> Guerke	304	var. laevicarpa Friis & Vollesen	164;724;758
Euclea racemosa Murray	304;627	<i>Euphorbia grandicornis</i> Goebel	164
subsp. schimperii (A. DC.) F. White	304; 627	Euphorbia heterophylla L.	165
<i>Euclea schimperii</i> (A. DC.) Dandy	304	Euphorbia hirta L.	165
<i>Euclea urijiensis</i> Hiern	304	<i>Euphorbia hypericifolia</i> auct., non L.	165
Eulophia R. Br.	512	Euphorbia indica Lam.	165
Eulophia abyssinica Rchb. f.	512;726	Euphorbia magnicapsula S. Carter	166;710
<i>Eulophia bella</i> N.E. Br.	514	var. lacertosa S. Carter	166;710
Eulophia calantha Schltr.	512	<i>Euphorbia obovalifolia</i> auct., non A. Rich.	163
Eulophia clitellifera (Rchb. f.) Bolus	512	Euphorbia schimperiana Scheele	166;724
Eulophia cristata (Sw.) Steud.	512;695	var. pubescens (N.E. Br.) S. Carter	166
Eulophia cuculata (Sw.) Steud.	512;695	var. schimperiana	166;724
Eulophia galeoloides Kraenzl.	513;730	var. velutina N.E. Br.	166
Eulophia guineensis Lindl.	513;724	Euphorbia sp.	167
Eulophia latilabris Summerh.	513	<i>Euphorbia sp. aff. E. thi</i> Schweinf. sensu	
Eulophia livingstoniana (Rchb. f.) Summerh.	514;695;724	Eggeling	166
Eulophia montis-elgonis Summerh.	514;724	Euphorbia teke Schweinf. ex Pax	166;703
Eulophia odontoglossa Rchb. f.	514;724	Euphorbia venenifica Kotschy	167;713
Eulophia orthoplectra (Rchb. f.) Summerh.	514;724	Euphorbia welbyi N.E. Br.	167
<i>Eulophia paivaeana</i> (Rchb. f.) Summerh.	515	var. glabra S. Carter	167
subsp. borealis Summerh.	515	Euphorbiaceae Juss.	154;609
Eulophia petersii (Rchb. f.) Rchb. f.	515;710	Euphorbiales Lindl.	154
<i>Eulophia quartimiana</i> A. Rich.	513	Evolvulus L.	417
<i>Eulophia shupangae</i> (Rchb. f.) Kraenzl.	514	Evolvulus alsinoides (L.) L.	417
Eulophia speciosa (Lindl.) Bolus	515;693	Exacum L.	402
Eulophia stachyodes Rchb. f.	515	Exacum oldenlandioides (S. Moore)	
Eulophia streptopetala Lindl.	515;695;730	Klackenb.	402;710
var. stenophylla (Summerh.) Cribb	515	<i>Exacum quinquenervium</i> auct. Afric., non	
var. streptopetala	515;695;730	Griseb.	402
		Exotheca Anderss.	564

- Exotheca abyssinica** (Hochst. ex A. Rich.) Anderss. 564;739;740;743
- F
- Fabaceae** Lindl. 179;612
 subfam. **Caesalpinioideae** DC. 179;612
 subfam. **Faboideae** 198;616
 subfam. **Mimosoideae** DC. 184;613
 subfam. *Papilionoideae* DC., nom. altern. 198
- Fabales** Bromhead 179
- Fadogia** Schweinf. 330
Fadogia agrestis Hiern 330
Fadogia cienkowskii Schweinf. 330
 var. **cienkowskii** 330
Fagara L. 277
Fagara chalybea (Engl.) Engl. 277
Fagara gillettii De Wild. 278
Fagara leprieurii (Guill. & Perr.) Engl. 278
Fagara macrophylla (Oliv.) Engl. 278
Fagara sp. aff. F. melanacantha (Planch.) Engl. 278
- Fagaropsis** Mildbr. ex Siebenl. 276
Fagaropsis angolensis (Engl.) Gardner 276;622; 701;729;733;734
- Fagopyrum** Mill. 93
Fagopyrum snowdenii (Hutch. & Dandy) S.-P. Hong 93;729
- Faidherbia albida* (Del.) A. Chev. 185
- Faurea** Harv. 113
Faurea rochetiana (A. Rich.) Pic. Serm. 113;601;715;722
Faurea speciosa Welw. 113
- Feretia** Del. 330
Feretia apodanthera Del. 330;712
 subsp. **apodanthera** 330;712
- Festuca** L. 565
Festuca africana (Hack.) W.D. Clayton 565;728;730;734
Festuca camusiana St. Yves 565
 subsp. *chodatiana* St. Yves 565
Festuca chodatiana (St. Yves) E.B. Alexeev 565
Festuca elgonensis E.B. Alexeev 565;743
- Festuca griidula* auct., non Steud., orth. mut. 565
Festuca rigidula auct., non Steud. 565
Festuca simensis Hochst. ex A. Rich. 565
Festuca sudanensis E.B. Alexeev 739;743;758
- Ficus** L. 253
Ficus abutilifolia (Miq.) Miq. 243;712
Ficus amadiensis De Wild. 243;618
Ficus asperifolia Miq. 243;618;702;710;717
Ficus brachylepis Welw. ex Hiern 619
Ficus brachypoda Hutch., nom. illeg. 246
Ficus capensis Thunb. 247
Ficus capraeifolia Del. 243;698
Ficus cordata Thunb. 244
 subsp. **salicifolia** (Vahl) C.C. Berg 244
Ficus cyathistipula Warb. 244;618;701
Ficus dawei Hutch. 246
Ficus dekdekena (Miq.) A. Rich. 248
Ficus dicranostyla Mildbr. 244;618;693
Ficus eriobotryoides Kunth & Bouché 246
Ficus exasperata Vahl 244;618;699;701;712
Ficus glumosa Del. 245;618;692;710;712
 var. *glaberrima* Martelli 245
Ficus gnaphalocarpa A. Rich. 247
Ficus ingens (Miq.) Miq. 245;618;701
Ficus ingentoides Hutch. 245
Ficus lutea auct., non Vahl. 245
Ficus lutea Vahl 245
Ficus macrosperma Mildbr. & Burret 619
Ficus mallotocarpa Warb. 247
Ficus mucoso Welw. ex Ficalho 246;618;701
Ficus natalensis Hochst. 619
Ficus ovata Vahl 246
Ficus platyphylla Del. 246;619
Ficus populifolia Vahl 246;710
Ficus pretoriae Burt Davy 244
Ficus quibeba Ficalho 245
Ficus riparia A. Rich. 247
Ficus salicifolia Vahl 244
Ficus sansibarica Warb. 619
 subsp. **macrosperma** (Mildbr. & Burret) C.C. Berg 619
Ficus saussureana DC. 246;619;701

- Ficus sp.** 249
Ficus storthophylla Warb. 243
Ficus sur Forssk. 247;619;699;701
Ficus sycomorus L. 247;619;709
 subsp. *gnaphalocarpa* (A. Rich.) C.C. Berg 247;715
Ficus thonningii Blume 248;620;701;729
Ficus ugandensis Hutch. 619
Ficus urceolaris Welw. ex Hiern 243
Ficus vallis-choudae Del. 248;620;698
Ficus variifolia Warb. 248;702
Ficus vasta Forssk. 249;718
Ficus verrucocarpa Warb. 245
Ficus verruculosa Warb. 620
Ficus vogelii (Miq.) Miq. 245
Filicales Dumort., nom. illeg. 35
Fimbristylis Vahl 539
Fimbristylis dichotoma (L.) Vahl 539;710
Fimbristylis diphyllus (Retz.) Vahl 540
Fimbristylis exilis (Kunth) Roem. & Schult. 523
Fimbristylis hispidula (Vahl) Kunth 523
Fimbristylis oligostachys A. Rich. 523
Flacourtia L'Hér. 116
Flacourtia indica (Burm. f.) Merr. 116;602;715;716
Flacourtiaceae Rich. ex DC. 115;602
Fleurya aestuans (L.) Miq. 252
Floscopa Lour. 480
Floscopa africana (P. Beauv.) C.B. Clarke 480
 subsp. **petrophila** J.K. Morton 480;702
Floscopa glomerata (J.A. & J.H. Schult.) Hassk. 480;730
 subsp. **glomerata** 480;730
Floscopa rivularis (A. Rich.) C.B. Clarke 480
Flueggea Willd. 167
Flueggea microcarpa Blume 167
Flueggea virosa (Roxb. ex Willd.) Voigt 167;661;692;712
Freesia Klatt 499
Freesia laxa (Thunb.) Goldblatt & J.C. Manning 499
 subsp. **laxa** 465
Fuirena Rottb. 540
Fuirena leptostachya Oliv. 540;697
Fuirena stricta Steud. 540;739
Fuirena umbellata Rottb. 540;697
Fumaria L. 75
Fumaria abyssinica Hammar 75;740
Fumariaceae DC. 75
Funtumia Stapf 317
Funtumia elastica (Preuss) Stapf 317;701
- G
- Galiniera** Del. 331
Galiniera coffeoides Del. 331
Galiniera saxifraga (Hochst.) Bridson 331;631;729;734;736;737
Galinsoga Ruiz & Pavon 366
Galinsoga parviflora Cav. 366
Galium L. 331
Galium apparine L. 331
 var. *spurium* auct., non (L.) Coss. & Germ. 331
Galium chloroionanthum K. Schum. 331;730
Galium simense Fresen. 331
Galium spurium auct., non L. 331
Gambeya albida (G. Don) Aubrév. & Pellegr. 304
Garcinia L. 136
Garcinia buchananii Bak. 136;701;716
Gardenia Ellis 332
Gardenia erubens Stapf & Hutch. 631
Gardenia ternifolia Schumach. & Thonn. 332;632;692;704;715
 subsp. **ternifolia** 332;692;704;715
Gardenia urcelliformis Hiern 345
Gardenia vogelii Planch. 332;703;704
Gelonium procerum Prain 173
Geniosporum Wall. ex Benth. 465
Geniosporum affine Gürke 469
Geniosporum angolense Briq. 469
Geniosporum paludosum Bak. 469
Geniosporum paniculatum Bak. 467
Geniosporum rotundifolium Briq. 468
Gentianaceae Juss. 402
Gentianales Lindl. 402
Geophila D. Don 332
Geophila herbacea (Jacq.) K. Schum. 332

<i>Geophila reniformis</i> D. Don	332	Gladiolus sp.	500
Geophila repens (L.) I.M. Johnston	332;702	Glenniea Hook. f.	286
<i>Geophila uniflora</i> Hiern	332	Glenniea africana (Radlk.) Leenh.	286;625;701;715;717
Geraniaceae Juss.	103	Globimetula Tiegh.	263
Geraniales Dumort.	101	Globimetula braunii (Engl.) Tiegh.	263;729
Geranium L.	103	Gloriosa L.	488
Geranium aculeolatum Oliv.	103;730	<i>Gloriosa abyssinica</i> A. Rich.	488
Geranium arabicum Forssk.	103;740	<i>Gloriosa carsoni</i> Bak.	488
subsp. arabicum	103;740	<i>Gloriosa simplex</i> L.	488
<i>Geranium favosum</i> A. Rich.	103	Gloriosa superba L.	488;696
var. <i>sublaeve</i> Oliv.	103	<i>Gloriosa virescens</i> Lindl.	488
<i>Geranium favosum</i> auct., non A. Rich.	103	<i>Glycine</i> L., pro parte	216
Geranium ocellatum Cambess.	103;730	<i>Glycine javanica</i> L.	223
<i>Geranium simense</i> A. Rich.	103	subsp. <i>pseudojavanica</i> (Taub.) Hauman	223
Gerbera L.	366	<i>Glycine wightii</i> (Wight & Arn.) Verdc.	223
<i>Gerbera abyssinica</i> Sch. Bip.	366	subsp. <i>pseudojavanica</i> (Taub.) Verdc.	223
<i>Gerbera pilloselloides</i> auct., non (L.) Cass.	366	subsp. <i>wightii</i>	223
Gerbera piloselloides (L.) Cass.	366;724	var. <i>longicauda</i> (Schweinf.) Verdc.	223
Gerbera viridifolia (DC.) Sch. Bip.	366	Glyphaea Hook. f.	139
subsp. viridifolia	366	Glyphaea brevis (Spreng.) Monachino	139;698
Gesneriaceae Dum.	432	<i>Glyphaea lateriflora</i> (D. Don) Hutch. &	
Girardinia Gaudich.	251	Dalziel	139
Girardinia bullosa (Steud.) Wedd.	251;734	<i>Gnaphalium auriculatum</i> A. Rich. (1847), non	
<i>Girardinia condensata</i> (Hochst. ex Steud.)		Lam. (1788)	377
Wedd.	251	<i>Gnaphalium marranum</i> Philipson	372
Girardinia diversifolia (Link) Friis	251;731;734	<i>Gnaphalium richardianum</i> Cufod.	377
<i>Girardinia heterophylla</i> (Vahl) Decne.	252	<i>Gnaphalium schultzei</i> Mendonca	370
Gisekia L.	91	Gnidia L.	110
Gisekia pharnaceoides L.	91;712	Gnidia glauca (Fresen.) Gilg	110;601;738;742
var. pharnaceoides	91;712	Gnidia involucrata A. Rich.	110;723
<i>Gisekia rubella</i> Moq.	91	Gnidia kraussiana Meisn.	110;722;736
Gladiolus L.	499	Gnidia lamprantha Gilg	110;23
<i>Gladiolus corneus</i> Oliv.	499	<i>Gnidia macrorrhiza</i> Gilg	110
Gladiolus dalenii Van Geel	499;723	Gnidia subcordata Meisn.	111
subsp. adongensis (Bak.) Goldbl.	499;723	<i>Gomphocarpus bisacculatus</i> Oliv.	323
subsp. dalenii	499;723	Gomphrena L.	100
Gladiolus dichrous (Bullock) Goldbl.	500;739	Gomphrena celosioides Mart.	100
<i>Gladiolus goetzei</i> Harms	499	Gouania Jacq.	267
<i>Gladiolus luteolus</i> Klatt	499	Gouania longispicata Engl.	267;725;729
<i>Gladiolus natalensis</i> Hook., nom. illeg., non		<i>Gramineae</i> Juss.	544
(Ecklon) Hook.	499	Grewia L.	139
<i>Gladiolus newii</i> Bak.	499	<i>Grewia betulaeifolia</i> Juss.	140
<i>Gladiolus psittacinus</i> Hook.	499	Grewia bicolor Juss.	139;712
<i>Gladiolus quartinianus</i> A. Rich.	499		

Grewia flavescens	712	<i>Gymnosporia serrata</i> (A. Rich.) Loes.	256
Grewia mildbraedii Burret	607	var. <i>niansaica</i> Loes.	256
Grewia mollis Juss.	139;607;692;713	<i>Gynandropsis</i> DC.	78
<i>Grewia populifolia</i> Vahl	140	<i>Gynandropsis gynandra</i> (L.) Briq.	78
<i>Grewia salvifolia</i> Roth	139	<i>Gynandropsis pentaphylla</i> DC.	78
Grewia similis K. Schum.	607	<i>Gynura crepidioides</i> Benth.	361
Grewia sp.	141;713	<i>Gynura vitellina</i> Benth.	362
Grewia sp. cf. G. similis K. Schum.	141		
Grewia stolzii Ulbr.	140;729	H	
Grewia tenax (Forssk.) Fiori	140;707	Habenaria Willd.	516
Grewia trichocarpa Hochst. ex A. Rich.	140;607	Habenaria bracteosa A. Rich.	516;741
Grewia velutina (Forssk.) Vahl	140;707	Habenaria chirensis Rchb. f.	516;723
Grewia villosa Willd.	140;607;712	<i>Habenaria filicornis</i> auct., non Lindl.	516
<i>Grumilea sp. cf. G. platyphylla</i> K. Schum.	344	<i>Habenaria hochstetterana</i> Kraenzl. ex Engl.	516
Guizotia Cass.	367	Habenaria humilior Rchb. f.	516
Guizotia arborescens Friis	367;732;739	Habenaria malacophylla Rchb. f.	516;730
Guizotia scabra (Vis.) Chiov.	367;696;724;725	Habenaria papyracea Schltr.	516;739
subsp. <i>scabra</i>	367;724	Habenaria peristyloides A. Rich.	517;740
<i>Guizotia schultzii</i> Hochst. ex Walp.	367	Habenaria petitiana (A. Rich.) T. Durand & Schinz	517;743
Gunnera L.	109	Habenaria quartiniana A. Rich.	517;739
Gunnera perpersa L.	109;740	Habenaria schimperiana Hochst. ex A. Rich.	517;723;739
Gunneraceae Meisn.	109	<i>Haemanthus</i> L., pro parte	498
Gutenbergia Sch. Bip.	367	<i>Haemanthus filiflorus</i> Hiern	498;683
Gutenbergia cordifolia Oliv.	367	<i>Haemanthus multiflorus</i> Martyn	498
var. <i>cordifolia</i>	367	<i>Haemanthus rupestris</i> Bak.	498
Gutenbergia rueppellii Sch. Bip.	368	Haemodorales Hutch.	506
var. <i>rueppellii</i>	368	Hagenia J.F. Gmel.	176
<i>Guttiferae</i> F.C.L. Spenner, nom. altern. [as order]	136	Hagenia abyssinica (Bruce) J.F. Gmel.	176;612;719;723;725;735;738;739;742
<i>Guttiferae</i> Juss. [as family]	136	<i>Hagenia anthelmintica</i> (Bruce) J.F. Gmel.	176
<i>Gymnema parvifolium</i> Oliv.	325	Halleria L.	425
Gymnospermae Lindl.	61	Halleria lucida L.	425;729
Gymnosperms	61	Hamamelidaceae R. Br.	237
<i>Gymnosporia atkaio</i> auct., non (A. Rich.) Loes.	256	Hamamelidales Griseb.	237
<i>Gymnosporia brevipetala</i> Loes.	257	<i>Haronga madagascariensis</i> Choisy	136
<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	257	Harpachne Hochst. ex A. Rich.	566
<i>Gymnosporia fasciculata</i> (Tul.) Loes.	258	Harpachne schimperii Hochst. ex A. Rich.	566
<i>Gymnosporia gracilipes</i> (Oliv.) Loes.	256	<i>Harpagocarpus</i> Hutch. & Dandy	93
var. <i>arguta</i> Loes.	256	<i>Harpagocarpus snowdenii</i> Hutch. & Dandy	93
<i>Gymnosporia lancifolia</i> (Thonn.) Loes.	258	Harrisonia A. Juss.	279
<i>Gymnosporia luteola</i> (Del.) Loes.	258	Harrisonia abyssinica Oliv.	279;622;712
<i>Gymnosporia maranguensis</i> (Loes.) Loes.	257		
<i>Gymnosporia senegalensis</i> (Lam.) Loes.	257		

- Harrisonia occidentalis* Engl. 623
Harungana Lam. ex Poir. 136
Harungana madagascariensis Lam. 136;606;698;699;700;716;732
Harveya Hook. 425
Harveya sp. 425
Haumaniastrum Duvign. & Plancke 465
Haumaniastrum cylindraceum (Oliv.) Cufod. 465
Haumaniastrum galeopsifolium (Bak.) Duvign. & Plancke 465
Haumaniastrum villosum (Benth.) Paton 465;718
Hebenstretia L. 456
Hebenstretia angolensis Rolfe 456;740;742
Hebenstretia bequaertii De Wild. 456
Hebenstretia dentata auct., non L. 456;457
Hedbergia Molau 425
Hedbergia abyssinica (Benth.) Molau 425;721
Heeria Meissn., pro parte 291
Heeria insignis (Del.) O. Kuntze 291
 var. *reticulata* Bak. f. 291
Heeria reticulata (Bak. f.) Engl. 291
Heinseniania K. Schum. 332
Heinseniania diervilleoides K. Schum. 332;632;729;734
Helichrysum Mill. 368
Helichrysum abyssinicum Sch. Bip. ex A. Rich. 372
Helichrysum antunesii auct., non Volkens & O. Hoffm. 371
Helichrysum argyranthum O. Hoffm. 368;742
Helichrysum coriaceum Harv. 368
Helichrysum cymosum (L.) Less. 369
 subsp. *fruticosum* (Forssk.) Hedb. 369
Helichrysum elegantissimum DC. 369
 var. *majus* DC. 369
Helichrysum foetidum (L.) Moench 368
 var. **microcephalum** A. Rich. 369
Helichrysum formosissimum (Sch. Bip.) Sch. Bip. ex A. Rich. 369;742;743
Helichrysum forskaohlii (J.F. Gmel.) Hilliard & Burt 369;742
Helichrysum fruticosum (Forssk.) Vatke 369
Helichrysum gerberifolium Sch. Bip. ex A. Rich. 370
Helichrysum globosum Sch. Bip. 370
Helichrysum glutinosum A. Br. 369
Helichrysum hochstetteri (Sch. Bip.) Hook. f. 371
Helichrysum maranguense O. Hoffm. 370
Helichrysum nudifolium (L.) Less. 370
Helichrysum odoratissimum (L.) Less. 370;725
Helichrysum oxyphyllum DC. 371
Helichrysum quartinianum A. Rich. 371
Helichrysum rhodolepis Bak. 371
Helichrysum schimperi (Sch. Bip. ex A. Rich.) Moeser 371;634;724;725
Helichrysum splendidum (Thunb.) Less. 372;740
Helichrysum undatum (J.F. Gmel.) Less. 371
Helichrysum velatum Moeser 368
Helictotrichon Schult. 566
Helictotrichon elongatum (Hochst. ex A. Rich.) C.E. Hubb. 566;739
Helictotrichon maitlandii C.E. Hubb. 566
Helictotrichon rigidulum (Pilg.) C.E. Hubb. 566
Helictotrichon thomasii C.E. Hubb. 566
Helictotrichon umbrosum (Steud.) C.E. Hubb. 566;741
Heliotropium L. 411
Heliotropium subulatum (Hochst. ex DC.) Vatke 412
Heliotropium zeylanicum (Burm. f.) Lam. 411
Heptapleurum abyssinicum (A. Rich.) Benth. & Hook. f. 296
Heracleum L. 298
Heracleum elgonense (Wolff) Bullock 298;740
Hesperantha Ker-Gawl. 500
Hesperantha petitiiana (A. Rich.) Bak. 500;742;743
 var. *volkensii* (Harms) R.C. Forster 500
Hesperantha volkensii Harms 500
Heteromorpha Cham. & Schlecht. 299
Heteromorpha arborescens auct., non (Spreng.) Cham. & Schlecht. 299
Heteromorpha trifoliata (Wendl.) Eckl. & Zeyh. 299;732;734
Heteropogon Pers. 566

- Heteropogon contortus** (L.) Roem. & Schult. 566;707
Heterotis canescens (Graham) Jacques-Félix 128
Heterotis decumbens (P. Beauv.) Jacques-Félix 128
Heterotis rotundifolia (Sm.) Jacques-Félix 128
Hewittia Wight & Arn. 417
Hewittia bicolor Wight & Arn. 417
Hewittia malabarica (L.) Suresh 417
Hewittia scandens (Milne) Mabberley 417
Hewittia sublobata (L.f) O. Kuntze 417
Hexalobus A. DC. 64
Hexalobus monopetalus (A. Rich.) Engl. & Diels 64;599;710;712
 var. **monopetalus** 64;599;710
Hexalobus senegalensis A. DC. 64
Hibiscus L. 148
Hibiscus acetosella Hiern 148
Hibiscus aponeurus Sprague & Hutch. 148
Hibiscus articulatus Hochst. ex A. Rich. 148
Hibiscus calyphyllus Cav. 149;703
Hibiscus cannabinus L. 149
Hibiscus corymbosus Hochst. ex A. Rich. 149
Hibiscus crassinervius Hochst. ex A. Rich. 149
Hibiscus ficulneus L. 147
Hibiscus grantii Mast. 150
Hibiscus ludwigii auct., non Eckl. & Zeyh. 149
Hibiscus macranthus A. Rich. 149
Hibiscus micranthus L. f. 150;703
Hibiscus sabdariffa L. 150
Hibiscus surattensis L. 150
Hillieria Vell. 95
Hillieria latifolia (Lam.) H. Walt. 95;702
Hippocratea L. 255
Hippocratea africana (Willd.) Loes. ex Engl. 255
 var. *richardiana* (Cambess.) N. Robson 255
Hippocratea graciliflora Welw. ex Oliv. 259
Hippocratea indica Willd. 259
Hippocratea loesneriana Hutch. & M.B. Moss 259
Hippocratea obtusifolia auct., non Roxb. 255
Hippocratea richardiana Cambess. 255
Hippocratea sp. 255;702
Holothrix Lindl. 517
Holothrix brongniartiana Rchb. f. 517;740
Holothrix puberula Rendle 517
Holothrix squamata (A. Rich.) Rchb. f. 517;743
Homalocheilos ramosissimus (Hook. f.) J.K. Morton 465
Hormogyne altissima A. Chev. 308
Hoslundia Vahl 465
Hoslundia opposita Vahl 465;665;712
Hugonia L. 101
Hugonia platysepala Welw. ex Oliv. 101;702
Huperzia Bernh. 31
Huperzia dacrydioides (Bak.) Pic. Serm. 31;729;734
Huperzia ophioglossoides (Lam.) Rothm. 32;734
Hyacinthaceae Batsch 486
Hydrocharitaceae Juss. 479
Hydrocotyle L. 299
Hydrocotyle americana L. 299
 var. *monticola* (Hook. f.) Hiern 299
Hydrocotyle asiatica L. 298
Hydrocotyle siphthorpioides Lam. 299;730
Hygrophila R. Br. 443
Hygrophila auriculata (Schumach.) Heine 443;697
Hygrophila spinosa T. Anderson 443
Hymenocardia Wall. ex Lindl. 168
Hymenocardia acida Tul. 168;611;692
Hymenocardia ulmoides Oliv. 168
Hymenocoleus Robbr. 333
Hymenocoleus hirsutus (Benth.) Robbr. 333;702
Hymenocoleus neurodictyon (K. Schum.) Robbr. 333;702
 var. **orientalis** (Verdc.) Robbr. 333;702
Hymenodictyon Wall. 333
Hymenodictyon floribundum (Hochst. & Steud.) B.L. Robinson 333;632;720;725
Hymenodictyon kurria Hochst. 333
Hymenodictyon parvifolium Oliv. 334
 subsp. **scabrum** (Stapf) Verdc. 334
 var. **scabrum** 334
Hymenodictyon scabrum Stapf 334
Hymenophyllaceae Gaudich. 36
Hyparrhenia Anderss. ex Fourn. 567
Hyparrhenia altissima Stapf 569

- Hyparrhenia anthistirioides** (A. Rich.) Stapf 567
Hyparrhenia bracteata (Willd.) Stapf 567;724
Hyparrhenia cymbaria (L.) Stapf 567;696;714;715;718;725;732;739
Hyparrhenia diplandra (Hack.) Stapf 567;696
Hyparrhenia dissoluta (Steud.) C.E. Hubb. 570
Hyparrhenia dregeana (Nees) Stent 568
Hyparrhenia figariana (Chiov.) W.D. Clayton 568
Hyparrhenia filipendula (Hochst.) Stapf 568;696;713;714
Hyparrhenia gazensis (Rendle) Stapf 568
Hyparrhenia madaropoda W.D. Clayton 568
Hyparrhenia phyllopoda Stapf 568
Hyparrhenia pilgeriana C.E. Hubb. 569;724
Hyparrhenia poecilotricha (Hack.) Stapf 569
Hyparrhenia pseudocymbaria (Steud.) Stapf 567
Hyparrhenia rufa (Nees) Stapf 569;696;707;708;714
Hyparrhenia ruprechtii Fourn. 570
Hyparrhenia schimperii (A. Rich.) Stapf 569
Hyparrhenia tamba (Steud.) Stapf 570
Hyparrhenia umbrosa (Hochst.) W.D. Clayton 570
Hyparrhenia variabilis Stapf 570
Hypericaceae Juss. 136
Hypericales Dum. 136
Hypericum L. 136
Hypericum lanceolatum Lam. 137
Hypericum leucoptycoides Steud. ex A. Rich. 137
Hypericum peplidifolium A. Rich. 136;730;740
Hypericum quartinianum A. Rich. 137;725;726
Hypericum revolutum Vahl 137;606;738;740;742;743
 subsp. *revolutum* 137;606
Hypericum roeperianum A. Rich. 137;735
Hyperthelia W.D. Clayton 570
Hyperthelia dissoluta (Steud.) W.D. Clayton 570;707;715;718
Hyphaene Gaertn. 504
Hyphaene compressa H. Wendl. 504
Hyphaene thebaica (L.) Mart. 504
Hypodematium sphaerostigma A. Rich. 348
- Hypoestes** Solander ex R. Br. 443
Hypoestes aristata (Vahl) Roem. & Schult. 443;734;737
Hypoestes consanguinea Lindau 443;730
Hypoestes forskoalii (Vahl) R. Br. 444;662;734;737
Hypoestes rosea auct., non P. Beauv. 444
Hypoestes sp. 444
Hypoestes triflora (Forssk.) Roem. & Schult. 444;737;740
Hypoestes verticillaris (L. f.) Solander ex Roem. & Schult. 443
Hypoxidaceae R. Br. 506
Hypoxis L. 506
Hypoxis angustifolia Lam. 506;730
Hypoxis multiflora Nel. 506
Hypoxis sp. (=Andrews 1892) 507;724
Hypoxis urceolata Nel. 506
Hypoxis villosa L. f. 506;724;740
Hyptis Jacq. 465
Hyptis spicigera L. 465
- I
- Iboza* N.E. Br. 473
Iboza riparia (Hochst.) N.E. Br. 474
Icacinaceae (Benth.) Miers 260;621
Ilex L. 254
Ilex capensis Harv. & Sond. 254
Ilex mitis (L.) Radlk. 254;620;728;729;734
 var. *mitis* 254
Ilysanthes Raf. 425
Ilysanthes parviflora (Roxb.) Benth. 426
Ilysanthes pulchella Skan 427
Ilysanthes schweinfurthii Engl. 427
Ilysanthes trichotoma (Oliv.) Urb. 427
Impatiens L. 105
Impatiens capensis auct., non Meerb. 105
Impatiens elegantissima auct., non Gilg 106
Impatiens ethiopica Grey-Wilson 105;730;734
Impatiens hochstetteri Warb. 105;730;734;739;740
 subsp. *hochstetteri* 105;730;734
Impatiens meruensis Gilg 106;740;741

- subsp. **septentrionalis** Grey-Wilson 106;740;741
Impatiens micrantha auct., non D. Don 105
Impatiens tinctoria A. Rich. 106;730;731;738;740
 subsp. **tinctoria** 106;730
Imperata Cyr. 571
Imperata cylindrica (L.) Raeuschel 571;695
Indigofera L. 216
Indigofera alboglandulosa Engl. 217
Indigofera ambelacensis Schweinf. 216
Indigofera andrewsiana Gillett 216
Indigofera arrecta A. Rich. 217;616;724
Indigofera atriceps Hook. f. 217; 724
 subsp. *alboglandulosa* (Engl.) Gillett 217
 subsp. **atriceps** 217;724
 subsp. **kassneri** (Bak. f.) Gillett 217
Indigofera colutea (Burm. f.) Merr. 217
Indigofera conjugata Bak. 218
Indigofera dendroides Jacq. 218
Indigofera emarginella A. Rich. 218;724
Indigofera garckeana Vatke 219;696
Indigofera hendecaphylla Jacq. 220
Indigofera hirsuta L. 219
Indigofera kengeleensis De Wild. 218
Indigofera polysphaera Bak. 219
Indigofera secundiflora auct., non Poir. 219
Indigofera secundiflora Poir. 219;710
 var. **rubripilosa** De Wild. 219
 var. **secundiflora** 219
Indigofera spicata Forssk. 220
Indigofera stenophylla Guill. & Perr. 220
Indigofera trita L. f. 220
 var. **scabra** (Roth) Ali 220
Indigofera viscosa Lam. 217
Indigofera volkensii Taub. 220
Indigofera welwitschii Bak. 220;710
 var. **welwitschii** 220;710
Inula L. 372
Inula decipiens E.A. Bruce 372
Inula macrophylla (Sch. Bip.) Sch. Bip.,
 nom. illeg., non Kar. & Kir. 372
Inula paniculata (Klatt) Burtt-Davy 372;724
Inversodicraea sp. sensu FPS 88
- Ipomoea** L. 417
Ipomoea amoena Choisy, nom. illeg., non
 Blume 418
Ipomoea amoenula Dandy 418
Ipomoea blepharophylla Hall. f. 417;696
Ipomoea cairica (L.) Sw. 418
Ipomoea cardiosepala Bak. & Wright 420
Ipomoea coptica (L.) Roem. & Schult. 418
Ipomoea digitata auct., non L. 419
Ipomoea dissecta Willd. 418
Ipomoea eriocarpa R. Br. 418
Ipomoea fragilis Choisy 419
Ipomoea fulvicaulis Hall. f. 418
Ipomoea heterotricha F. Didr. 418
Ipomoea hispida (Vahl) Roem. & Schult., nom.
 illeg., non Zucc. 418
Ipomoea involucrata P. Beauv. 419
Ipomoea magnifica Hall. f. 420
Ipomoea mauritiana Jacq. 419
Ipomoea obscura (L.) Ker-Gawl. 419
Ipomoea ochracea (Lindl.) G. Don 419;696
Ipomoea prismatosyphon Welw. 420
Ipomoea sinensis (Desr.) Choisy 420
 subsp. **blepharosepala** (A. Rich.)
 A. Meeuse 420
Ipomoea spathulata Hall. f. 420
Ipomoea stenobasis Brenan 420
Ipomoea tenuirostris Choisy 421
 subsp. **tenuirostris** 421
Ipomoea wightii (Wall.) Choisy 421
Iridaceae Juss. 498
Irvingia Hook. f. 279
Irvingia barteri Hook. f. 279
Irvingia gabonensis Baill. 279;623;701
Irvingia wombolu Vermoesen 279;701
Irvingiaceae (Engl.) Exell & Mendonça 279;623
- Isachne** R. Br. 571
Isachne aethiopica Stapf & C.E. Hubb. 571
Isachne mauritiana Kunth 571;730
Ischaemum L. 571
Ischaemum afrum (J.F. Gmel.) Dandy 571
Ischaemum brachyantherum Fenzl ex Hack. 571
Isoberlinia Craib & Stapf 686;688;689;690

- Isodon** (Schrad. ex Benth.) Spach 465
Isodon ramosissimum (Hook. f.) Codd 465;717
Isodon schimperi (Vatke) J.K. Morton 466;730
Isoglossa Oerst. 445
Isoglossa oerstediana Lindau 445
Isoglossa ovata auct., non E.A. Bruce 445
Isoglossa punctata (Vahl) Brummitt & Wood 445;717;730
Isoglossa somalensis Lindau 445;730;737
Isoglossa sp. near *I. ovata* sensu Jackson 445
Isolepis R. Br. 540
Isolepis costata A. Rich. 540;742
Isolepis fluitans (L.) R. Br. 540;739
Ixonanthaceae (Benth. & Hook. f.) Exell & Mendonça, pro parte 279
- J
- Jacquemontia** Choisy 421
Jacquemontia capitata (Desr.) G. Don 421
Jacquemontia tamnifolia (L.) Griseb. 421
Jasminum L. 313
Jasminum abyssinicum Hochst. ex DC. 313;729;734
Jasminum angustitubum Knobl. 314
Jasminum biflorum Knobl. 314
Jasminum bukobense Gilg 313
Jasminum bussei Gilg & Schellenb. 314
Jasminum dichotomum Vahl 313
Jasminum ellipticum Knobl. 314
Jasminum eminii Gilg 314
Jasminum gardenioidorum Gilg ex Bak. 313
Jasminum parvifolium Knobl. 314
Jasminum pauciflorum Benth. 313;702
Jasminum schimperi Vatke 314;702
Jasminum schweinfurthii Gilg 314
Jasminum stolzeanum Knobl. 314
Jasminum streptopus E. Mey. 314;630;696
Jasminum swynnertonii S. Moore 314
Jasminum ternifolium Bak. 313
Jatropha L. 168
Jatropha curcas L. 168
Jaundea Gilg 294
Jaundea baumannii (Gilg) Schellenb. 294
Jaundea monticola (Gilg) Schellenb. 294
Jaundea pinnata (P. Beauv.) Schellenb. 294
Juncaceae Juss. 521
Juncales Dumort. 521
Juncellus pustulatus (Vahl) C.B. Clarke 537
Juncus L. 521
Juncus bachitii Steud. 521
Juncus dregeanus Kunth 521;740
 subsp. **bachitii** (Steud.) Hedb. 521;740
Juncus oxycarpus Kunth 522;731
Juniperus L. 62
Juniperus procera Hochst. ex Endl. 62;599;669;719;736;737
Jussiaea abyssinica (A. Rich.) Dandy & Brenan 108
Jussiaea erecta L. 109
Jussiaea suffruticosa L. 109
 var. *breviseipala* Brenan 109
 var. *linearis* (Willd.) Oliv. ex O. Kuntze 109
 var. *pilosa-linearis* Brenan 109
Jussiaea villosa auct., non Lam. 109
Justicia L. 445
Justicia afromontana Hedrén 445;740;742;758
Justicia anselliana (Nees) T. Anderson 446
Justicia betonica L. 446;739
Justicia caerulea Forssk. 446
Justicia calcarata Hochst. ex C.B. Clarke, non Wall. 447
Justicia exigua S. Moore 446
Justicia extensa T. Anderson 446;702
Justicia flava (Vahl) Vahl 447
Justicia glabra Roxb. 448
Justicia insularis auct., non T. Anderson 447
Justicia kotschyi (Hochst.) Dandy 447
Justicia ladanooides Lam. 447;731
Justicia lithospermifolia Jacq. 447
Justicia matammensis (Schweinf.) Oliv. 447;710;730
Justicia nyassana Lindau 448;731
Justicia pinguior C.B. Clarke 448
Justicia scandens Vahl 448;702
Justicia schimperi (Hochst.) Dandy 447
Justicia tenella (Nees) T. Anderson 448
Justicia whytei auct., non S. Moore 445

K

- Kaempferia aethiopica* (Schweinf.) Ridl. 484
Kaempferia macrosiphon Bak. 484
Kaempferia rosea Bak. 485
Kalanchoe Adans. 86
Kalanchoe densiflora Rolfe 86;739
 var. **densiflora** 86
Kalanchoe glaucescens Britten 87;706
Kalanchoe laciniata (L.) DC. 87
Kalanchoe lanceolata (Forssk.) Pers. 87;693
 var. **lanceolata** 87;693
Kalanchoe petitiiana auct., non A. Rich. 86
Kalanchoe prittwitzii Engl. 87
Kedrostis Medic. 119
Kedrostis engleri Gilg 119
Kedrostis foetidissima (Jacq.) Cogn. 119
Keetia E. Phillips 334
Keetia gueinzii (Sond.) Bridson 334;702
Keetia venosa (Oliv.) Bridson 334
Keetia zanzibarica (Klotzsch) Bridson 334;702
 subsp. **gentilii** (De Wild.) Bridson 334
Khaya A. Juss. 282
Khaya anthotheca (Welw.) C. DC. 623
Khaya grandifoliola C. DC. 282;623;669;686;
 688;698;699;700;701;703;704;717
Khaya nyasica Bak. f. 623
Kigelia DC. 432
Kigelia aethiopica auct., non Decne. 433
Kigelia aethiopica Decne. 432
Kigelia aethiopum (Fenzl) Dandy 432
Kigelia africana (Lam.) Benth. 432;709
Kigelia moosa Sprague 433;701;717;738
Klainedoxa Pierre ex Engl. 279
Klainedoxa gabonensis Pierre ex Engl.
 279;623;701;710
Kleinia Mill. 372
Kleinia abyssinica (A. Rich.) A. Berger 372
 var. **abyssinica** 372
Kleinia schweinfurthii (Oliv. & Hiern)
 A. Berger 372
Kniphofia Moench 489
Kniphofia leichtlinii Bak. 489
Kniphofia pumila (Ait.) Kunth 489;739
- Koeleria** Pers. 571
Koeleria capensis (Steud.) Nees 571;739
Koeleria cristata (L.) Pers. 571
 var. *brevifolia* (Nees) C.E. Hubb. 571
Kohautia Cham. & Schlecht. 312
Kohautia coccinia Royle 312
Kosteletzkya Presl 142
Kosteletzkya adoensis (A. Rich.) Mast. 142;731
Kosteletzkya grantii (Mast.) Garcke 142;696
Kotschya Endl. 206
Kotschya aeschymenoides (Bak.) Dewit
 & Duvign. 206;724;742
Kyllinga Rottb. 541
Kyllinga appendiculata K. Schum. 538
Kyllinga bracheilema Steud. 528
Kyllinga chrysantha K. Schum. 529
 subsp. *decolorans* Kük. 529
Kyllinga cylindrica Nees 538
 var. *appendiculata* C.B. Clarke 538
 var. *major* C.B. Clarke 538
Kyllinga elatior Kunth 536
Kyllinga odorata Vahl 538
 var. *major* (C.B. Clarke) Chiov. 538
Kyllinga pulchella Kunth 528
Kyllinga sesquiflorus (Torr.) Mattf. & Kük. 538
 var. *major* (C.B. Clarke) Kük. 538
Kyllinga triceps Rottb. 539
Kyllingiella R. Haines & Lye 541
Kyllingiella ugandensis R. Haines & Lye
 541;758
- L
- Labiatae* Juss. 462
Lablab Adans. 221
Lablab purpureus (L.) Sweet 221
 subsp. **uncinatus** Verdc. 221;724
Lacnophylis compacta C.A. Sm. 311
Lacnophylis congesta (Fresen.) C.A. Sm. 311
Lacnosiphonium niloticum (Stapf) Dandy 328
Lactuca L. 373
Lactuca abyssinica Fresen. 373
Lactuca capensis Thunb. 373
 subsp. *parva* Stebbins 373

Lactuca glandulifera Hook. f.	373	<i>Lasiosiphon glaucus</i> Fresen.	110
Lactuca inermis Forssk.	373;724;740	<i>Lasiosiphon kraussianus</i> (Meisn.) Burttt Davy	110
Lagenaria Ser.	119	var. <i>villosus</i> Burttt Davy	110
Lagenaria abyssinica (Hook. f.) C. Jeffrey	119	<i>Lasiosiphon kraussii</i> Meisn.	110
Laggera Sch. Bip. ex Benth.	373	<i>Lasiosiphon lampranthus</i> Gilg	111
<i>Laggera alata</i> (D. Don) Sch. Bip. ex Oliv.	374	Lathyrus L.	221
Laggera crassifolia (A. Rich.) Sch. Bip. ex Oliv. & Hiern	373;724	Lathyrus hygrophilus Taub.	221;740
Laggera crispata (Vahl) Hepper & Wood	374	Launaea Cass.	374
Laggera elatior R.E. Fr.	374	Launaea cornuta (Oliv. & Hiern) C. Jeffrey	374
<i>Laggera pterodonta</i> Sch. Bip.	374	Launaea nana (Bak.) Chiov.	375;695
Lamiaceae Lindl.	462	Lauraceae Juss.	67;600
Lamiales Bromhead	457	Laurales Perleb	66
Landolphia P. Beauv.	317	Ledebouria Roth	487
Landolphia buchananii (Hall. f.) Stapf	317;734	Ledebouria revoluta (L. f.) Jessop	487;721
<i>Landolphia comorensis</i> (Bojer) K. Schum.	319	Leea L.	275
var. <i>florida</i> (Benth.) K. Schum.	319	Leea guineensis G. Don	275;698;717
<i>Landolphia florida</i> Benth.	319;631	Leeaceae (DC.) Dumort.	275
<i>Landolphia ugandensis</i> Stapf	317	Leersia Sw.	572
Lankesteria Lindl.	448	Leersia angustifolia Prod.	572
Lankesteria elegans (P. Beauv.) T. Anderson	448;702	Leersia hexandra Sw.	572;697
Lankea A. Rich.	289	Lefebvrea A. Rich.	299
Lankea barberi (Oliv.) Engl.	289;626;692;712	Lefebvrea abyssinica A. Rich.	299;731
Lankea fruticosa (A. Rich.) Engl.	289;713	<i>Leguminosae</i> Juss.	179
Lankea fulva (Engl.) Engl.	289;710	Lentibulariaceae Rich.	430
Lankea humilis (Oliv.) Engl.	290;713	Leonotis (Pers.) R. Br.	466
<i>Lankea kerstingii</i> Engl. & Krause	289	Leonotis nepetifolia (L.) R. Br.	466
Lankea schimperi (A. Rich.) Engl.	290;626;692;712	Leonotis ocymifolia (N.L. Burm.) Iwarsson	466;725;732;739
Lankea schweinfurthii (Engl.) Engl.	290;713	var. <i>raineriana</i> (Vis.) Iwarsson	466
var. <i>schweinfurthii</i>	290	<i>Leonotis raineriana</i> Vis.	466
Lantana L.	459	<i>Leonotis velutina</i> Fenzl	466
<i>Lantana mearnsii</i> Mold.	459	Lepidagathis Willd.	449
Lantana trifolia L.	459;696;724;726	<i>Lepidagathis collina</i> (Endl.) Milne-Redhead	449
Lantana viburnoides (Forssk.) Vahl	459;696	<i>Lepidagathis collina</i> auct., non (Endl.) Milne-Redh.	449
subsp. <i>viburnoides</i>	459	Lepidagathis diversa C.B. Clarke	449
<i>Lapeirousia</i> subgen. <i>Anomatheca</i> (Ker Gawl.) Bak.	499	Lepidagathis glandulosa A. Rich.	449;731
<i>Lapeirousia laxa</i> (Thunb.) N.E. Br.	499	Lepidagathis hamiltoniana Wall.	449
Laportea Gaudich.	252	subsp. <i>collina</i> (Endl.) J.K. Morton	449
Laportea aestuans (L.) Chew	252;702	Lepidotrichilia (Harms) Leroy	282
Lasiodiscus Hook. f.	267	Lepidotrichilia volkensii (Guerke) Leroy	282;624;729;731;734;736
Lasiodiscus mildbraedii Engl.	267;621;702;717	<i>Lepidoturus laxiflorus</i> Benth.	158
		Lepisanthes Blume	287

- Lepisanthes senegalensis** (Juss.) Leenh. 287;625;698;701;717
- Lepisorus** (J. Smith) Ching 44
- Lepisorus excavata** (Willd.) Moore 44;726;729
- Leptactina** Hook. f. 335
- Leptactina platyphylla** (Hiern) Wernham 335;702
- Leptadenia** R. Br. 322
- Leptadenia hastata** (Pers.) Decne. 322
- Leptadenia lancifolia* (Schumach.) Decne. 322
- Leptaspis** R. Br. 572
- Leptaspis cochleata* Thwaites 572
- Leptaspis zeylanica** Nees 572;702
- Leptaulus** Benth. 260
- Leptaulus daphnoides** Benth. 260;621;702
- Leptocarydion** Stapf 572
- Leptocarydion vulpiastrum** (De Not.) Stapf 572
- Leucas** R. Br. 466
- Leucas calostachys** Oliv. 466;711
- var. *schweinfurthii* (Guerke) Sebald 466
- Leucas deflexa** Hook. f. 467;731
- var. **deflexa** 467;731
- Leucas schweinfurthii* Guerke 466
- Lightfootia abyssinica* auct., non A. Rich. 408
- Lightfootia napiformis* A. DC. 408
- Liliales** Perleb 486
- Lililiopsida** Cronquist, Takht. & W. Zimm. 474
- Linaceae** DC. ex S.F. Gray 101
- Lindackeria** C. Presl 116
- Lindackeria schweinfurthii** Gilg 116;702
- Lindernia** All. 425
- Lindernia abyssinica** Engl. 425
- Lindernia debilis** Skan 426;711
- Lindernia exilis** Philcox 426;711
- Lindernia lobelioides* (Oliv.) Engl. 426
- Lindernia madiensis* Dandy 427
- Lindernia nummulariifolia** (D. Don) Wettst. 426;711;721
- Lindernia oliverana** Dandy 426
- Lindernia parviflora** (Roxb.) Haines 426
- Lindernia pulchella** (Skan) Philcox 427;711;721
- Lindernia schweinfurthii** (Engl.) Dandy 427;711
- Lindernia sudanica** Fischer & Hepper 427;711;721;758
- Lindernia whytei** Skan 428
- Linociera* Sw. ex Schrad. 313
- Linociera africana* (Knobl.) Knobl. 629
- Linociera angolensis* Bak. 629
- Linociera giordanoi* Chiov. 313
- Linociera johnsonii* Bak. 629
- Linociera latipetala* M.R.F. Taylor 313
- Linociera mildbraedii* Gilg & Schellenb. 629
- Lintonia** Stapf 572
- Lintonia nutans** Stapf 572
- Linum** L. 102
- Linum strictum** L. 102
- subsp. **corymbulosum** (Rchb.) Rouy. 102
- Linum volkensisii** Engl. 102;740
- Lipocarpha** R. Br. 541
- Lipocarpha argentea* (Vahl) R. Br. 542
- Lipocarpha chinensis* (Osborn) Kern 542
- Lipocarpha hemisphaerica** (Roth) Goetghebeur 541
- Lipocarpha isolepis* (Nees) Haines 541
- Lipocarpha nana** (A. Rich.) Cherm. 541;721
- Lipocarpha pulcherrima* Ridl. 541
- Lipocarpha senegalensis* (Steud.) Th. & H. Dur. 542
- Lippia** L. 460
- Lippia abyssinica** (Otto & Dietr.) Cufod. 460
- Lippia adoensis* Hochst. ex Schauer 460
- Lippia grandifolia* Hochst. ex Walp. 460
- Lippia woodii** Moldenke 460
- Lissochilus arenarius* Lindl. 512
- Lissochilus mediocris* Rendle 514
- Lissochilus oliverianus* Rchb. f. 515
- Lissochilus orthoplectrus* Rchb. f. 514
- Lissochilus purpuratus* Lindl. 512
- Lithospermum** L. 412
- Lithospermum afromontanum** H. Weim. 412;743
- Lithospermum officinale* auct., non L. 412
- Loasales* Bessey 75
- Lobelia** L. 406

- Lobelia dissecta** M.B. Moss in Chipp 406;731;743;758
 subsp. **dissecta** 406
 subsp. **humidulorum** Friis & Vollesen 406;731;758
- Lobelia flaccida** (Presl) A.DC. 406
 subsp. **granvikii** (Th.C.E. Fr.) Thulin 406
- Lobelia giberroa** Hemsl. 407;717;725;726;731;732;739
Lobelia heyneana Roem. & Schult. 407
 var. *inconspicua* (A. Rich.) E. Wimmer 407
- Lobelia inconspicua** A. Rich. 407;731
- Lobelia molleri** Henriques 407;731
- Lobelia trullifolia** Hemsl. 407
 subsp. **trullifolia** 407
- Lobeliaceae* R. Br. 405
- Loeseneriella** A.C. Sm. 255
- Loeseneriella africana** (Willd.) N. Hallé 255;729;734
 var. *richardiana* (Cambess.) N. Hallé 255
- Loganiaceae** R. Br. ex Mart. 311;629
- Loganiales** Lindl. 311
- Lomariopsidaceae** Alston 58
- Lonchocarpus** Kunth 222
- Lonchocarpus laxiflorus** Guill. & Perr. 222;616;692;699;715
- Lophira** C.F. Gaertn. 125
Lophira alata auct., non C.F. Gaertn. 125
- Lophira lanceolata** van Tiegh. ex Keay 125
- Loranthaceae** Juss. 263
Loranthus braunii Engl. 263
Loranthus constrictiflorus Engl. 264
Loranthus curviflorus Oliv. 264
Loranthus fischeri Engl. 263
Loranthus globiferus A. Rich. 264
Loranthus oehleri Engl. 263
Loranthus polycrypta F. Didr. 263
Loranthus usuiensis Oliv. 264
- Lotus** L. 222
- Lotus bequetii** Boutique 222;724;740
Lotus corniculatus auct., non L. 222
- Loudetia** Hochst. ex Steud. 573
- Loudetia arundinacea** (A. Rich.) Steud. 573;
 681;694;696;710;713;714;715;716;718;719;
 720;721;722;725;726;730;731
- Loudetia flavida** (Stapf) C.E. Hubb. 573
Loudetia pennata (Chiov.) C.E. Hubb. 573
- Loudetia simplex** (Nees) C.E. Hubb. 552;573;721
- Loxodera** Launert 574
- Loxodera ledermannii** (Pilg.) Launert 574
- Loxogramme** (Blume) C. Presl 44
- Loxogramme abyssinica** (Bak.) M.G. Price 44;726;729
Loxogramme lanceolata (Sw.) Presl 44
Loxoscaphe nigrescens (Hook.) T. Moore 50
Loxoscaphe theciferum (H.B.K.) T. Moore 53
- Ludwigia** L. 108
- Ludwigia abyssinica** A. Rich. 108;731
- Ludwigia erecta** (L.) Hara 109
- Ludwigia octovalvis** (Jacq.) Raven 109;697
 subsp. **brevisepala** (Brenan) Raven 109
- Luffa** Mill. 120
Luffa aegyptiaca Mill. 120
- Luffa cylindrica** (L.) M.J. Roem. 120
- Lychnodiscus** Radlk. 287
- Lychnodiscus cerospermus** Radlk. 287;625;701
- Lycopodiaceae** Rchb. 31
- Lycopodiales** Dumort. 31
- Lycopodiella** Holub 31
- Lycopodiella cernua** (L.) Pic. Serm. 31;728;731
- Lycopodium** L. 31
Lycopodium cernuum L. 31
- Lycopodium clavatum** L. 31;734;742
Lycopodium dacrydioides Bak. 31
Lycopodium mildbraedii auct., non Herter 31
Lycopodium ophioglossoides Lam. 32
- Lysimachia** L. 404
Lysimachia africana Engl. 404
- Lysimachia ruhmeriana** Vatke 404;740
- Lythraceae** J. St.-Hil. 106
- Lythrales** Caruel 106
- Lythrum** L. 107
- Lythrum rotundifolium** Hochst. ex A. Rich. 107;740

M			
<i>Maba abyssinica</i> Hiern		303	
<i>Maba buxifolia</i> auct., non (Rottb.) Juss.		304	
Macaranga Thouars		168	
Macaranga capensis (Baill.) Sim		168;611;728;731;733;736	
var. capensis		168	
var. kilimandscharica (Pax) Friis & M.G. Gilbert		168;611;728;733	
<i>Macaranga kilimandscharica</i> Pax		169	
Macaranga schweinfurthii Pax		169;703;731;736	
<i>Macrorungia</i> C.B. Clarke		450	
<i>Macrorungia pubinervia</i> (T. Anderson) C.B. Clarke		450	
Macrotyloma (Wight & Arn.) Verdc.		222	
Macrotyloma axillare (E. Mey.) Verdc.		222;729	
var. glabrum (E. Mey.) Verdc.		222;729	
Macrotyloma stenophyllum (Harms) Verdc.		223;711	
Maerua Forssk.		79	
Maerua angolensis DC.		79;693	
Maerua duchesnei (De Wild.) F. White		79;702	
Maerua oblongifolia (Forssk.) A. Rich.		79;693;706	
Maerua pseudopetalosa (Gilg & Bened.) De Wolf		80;693	
<i>Maerua sphaerocarpa</i> Gilg.		80	
Maerua triphylla A. Rich.		80	
var. calophylla (Gilg) De Wolf		80	
var. triphylla		80;710	
Maesa Forssk.		309	
Maesa lanceolata Forssk.		309;629;719;725;726;728;732;736	
var. mildbraedii (Gilg & Schellenb.) Lebrun		309	
<i>Maesa rufescens</i> A.DC.		309	
<i>Maesa schweinfurthii</i> Mez		310	
Maesa welwitschii Gilg		310;702	
<i>Maesa zenkeri</i> Gilg		310	
Maesopsis Engl.		267	
Maesopsis eminii Engl.		267;621;699;701	
subsp. eminii		267	
<i>Maesopsis sp.</i> sensu FS		267	
Magnoliophyta Cronquist, Takht. & W. Zimm.			63
Magnoliopsida Cronquist, Takht. & W. Zimm.			63
Majidea Kirk ex Oliv.			287
Majidea fosteri (Sprague) Radlk.			287;701
Malaxis Solander ex Sw.			518
Malaxis maclaudii (Finet) Summerh.			518;702
Mallotus Lour.			169
Mallotus oppositifolius (Geisler) Muell. Arg.			169;611;702
Malpighiaceae Juss.			154
Malpighiales Mart.			154
Malvaceae Juss.			147
Malvales Dumort.			147
Manilkara Adans.			305
Manilkara butugi Chiov.			305;628;701;716
Manilkara dawei (Stapf) Chiov.			628
Manilkara multinervis (Bak.) Dubard			306;692;713
subsp. schweinfurthii (Engl.) Hemsl.			306;692;713
<i>Manilkara schweinfurthii</i> (Engl.) Dubard			306
<i>Manilkara sp.</i> (= Eggeling 1512)			305
<i>Manilkara sp.</i> (= Myers 11,745)			305
Marantaceae Petersen			485
Marantochloa Brogn. ex Gris.			485
Marantochloa leucantha (K. Schum.) Milne-Redh.			485;703
Marattia Sw.			34
Marattia fraxinea Sm. ex J.F. Gmel.			34;731;738
var. salicifolia (Schrad.) C. Chr.			35
Marattiaceae Kaulf.			34
Marattiales Prantl			34
Margaritaria L. f.			169
Margaritaria discoidea (Baill.) Webster			169;611;699;703;715
var. fagifolia (Pax) A. Radcl.-Sm.			170;699
<i>Mariscus</i> Vahl			542
<i>Mariscus albo-sanguineus</i> (Kük.) Napper			527
<i>Mariscus alternifolius</i> Vahl			530
<i>Mariscus circumclusus</i> C.B. Clarke			536
<i>Mariscus coloratus</i> (Vahl) Nees			532
<i>Mariscus diurensis</i> (Boeck.) C.B. Clarke			532

- Mendoncia gilgiana** (Lindau) Benoist 450;702
Menisorus Alston 56
Menisorus pauciflorus (Hook.) Alston 56;702
Menispermaceae Juss. 71
Merremia Endl. 421
Merremia kentrocaulos (C.B. Clarke) Rendle 421
Merremia pterygocaulos (Choisy) Hall. f. 422
Metachlamydeae Engl. 302
Metarungia Baden 450
Metarungia pubinervia (T. Anderson) Baden 450;717
Meyna Link 335
Meyna tetraphylla (Hiern) Robyns 335;712
 subsp. **tetraphylla** 335
Micractis DC. 375
Micractis bojeri DC. 375
Microchloa R. Br. 575
Microchloa caffra Nees 575
Microchloa kunthii Desv. 575;721
Microglossa DC. 376
Microglossa pyrifolia (Lam.) O. Kuntze 376
Microglossa volubilis DC. 376
Microlepia C. Presl 37
Microlepia speluncae (L.) Moore 37;703
Micromeria abyssinica Benth. 471
Micromeria biflora (Buch.-Ham. ex D. Don) Benth. 472
Micromeria imbricata (Forssk.) C. Chr. 472
Micromeria punctata Benth. 472
 var. *purtschelleri* (Guerke) [authority not stated] 472
Mikania Willd. 376
Mikania capensis DC. 376
Mikania chenopodifolia Willd. 376
Mikania cordata auct., non (Burm. f.) B.L. Robinson 376
Mikania scandens auct., non (L.) Willd. 376
Mildbraediendron Harms 181
Mildbraediendron excelsum Harms 181;613;701
Milicia Sim 249
Milicia excelsa (Welw.) C.C. Berg 249;620;669;698;699;701;710
Milletia Wight & Arn. 617
Milletia dura Dunn 617
Mimosa L. 197
Mimosa asperata L. 197
Mimosa pigra L. 197;697
Mimosoideae DC. 184
Mimulopsis Schweinf. 450
Mimulopsis solmsii Schweinf. 450;715;737
Mimusops L. 306
Mimusops bagshawei S. Moore 306;628;701;716
Mimusops djurensis Engl. 306
Mimusops fragrans (Bak.) Engl. 306
Mimusops kummel A. DC. 306;628;701;703;715;738
Mimusops sp. 307;701;715
Minuartia L. 90
Minuartia filifolia (Forssk.) Mattf. 90;743
Mitracarpus Zucc. 336
Mitracarpus scaber Zucc. 336
Mitracarpus verticillatus (Schumach. & Thonn.) Vatke 336
Mitracarpus villosus (Sw.) DC. 336
Molana nemoralis Mart. 95
Molluginaceae Hutch. 91
Mollugo L. 91
Mollugo nudicaulis Lam. 91;712
Momordica L. 120
Momordica boivinii Baill. 120
Momordica charantia L. 120
Momordica cissoides Benth. 120;703
Momordica foetida Schumach. & Thonn. 121;692
Momordica mannii Hook. f. 121
Momordica morkorra A. Rich. 121
Momordica pterocarpa A. Rich. 121;729
Momordica runssorica Gilg. 121
Momordica sp. 703
Monanthotaxis Baill. 64
Monanthotaxis buchananii (Engl.) Verdc. 64;600;713
Monanthotaxis ferruginea (Oliv.) Verdc. 65;702

Monanthotaxis littoralis (Bagshawe & Bak. f.) Verdc.	599	Mucuna poggei Taub.	223;732
Monanthotaxis schweinfurthii (Engl. & Diels) Verdc.	65;729	var. pesa (De Wild.) Verdc.	223;732
var. schweinfurthii	65	Mucuna pruriens DC.	223;703;717;726
Mondia Skeels	322	var. pruriens	223
Mondia whitei (Hook. f.) Skeels	322	var. utilis (Wight) Burck	223
Monechma Hochst.	450	Mukia Arn.	121
<i>Monechma bracteatum</i> Hochst.	451	Mukia maderaspatana (L.) M.J. Roem.	121
Monechma ciliatum (Jacq.) Milne-Redh.	450	<i>Mukia scabrella</i> (L.) Arn.	121
Monechma debile (Forssk.) Nees	451	Multidentia Gilli	336
<i>Monechma hispidum</i> Hochst.	451	Multidentia crassa (Hiern) Bridson & Verdc.	336
Monimiaceae Juss.	66;600	var. crassa	336
<i>Monobothrium schimperii</i> Hochst.	403	Multidentia dichrophylla (Mildbr.) Bridson	336
Monocotyledones Juss., nom. altern.	474	Murdannia Royle	480
Monocotyledons	474	Murdannia simplex (Vahl) Brenan	480;697
Monodora Dunal	65	<i>Musa ensete</i> J.F. Gmel.	483
Monodora angolensis Welw.	65;702	Musaceae Juss.	483
<i>Monodora gibsonii</i> Burt Davy	65	Mussaenda L.	336
Monodora sp.	65	Mussaenda arcuata Poir.	336;702
<i>Monodora sp. nov. sensu</i> ITU	65	Mussaenda erythrophylla Schumach. & Thonn.	336;702
Monotes A. DC.	126	Myrianthus P. Beauv.	250
Monotes kerstingii Gilg	126;722	Myrianthus arboreus P. Beauv.	250;620;701;703
Monotheceum Hochst.	451	Myrica L.	238
Monotheceum aristatum (Nees) T. Anderson	451;703	<i>Myrica arborea</i> Hutch.	238
Monotheceum glandulosum Hochst.	451;731	Myrica humilis Cham. & Schlecht.	238;617;740;742;743
Moraceae Link	241;618	<i>Myrica salicifolia</i> Hochst. ex A. Rich.	238
Moraea L.	500	Myricaceae Blume	238;629
Moraea afro-orientalis Goldbl.	500;724	Myricales Engl.	238
<i>Moraea carsonii</i> auct., non Bak.	500	Myristicaceae R. Br.	68
<i>Moraea diversifolia</i> Bak.	501	Myrsinaceae R. Br.	309;629
Moraea schimperii (Hochst.) Pic. Serm.	501;724;740	Myrsinales Bromhead	309
Moraea stricta Bak.	501	Myrsine L.	310
<i>Moraea thomsonii</i> auct., non Bak.	501	Myrsine africana L.	310
<i>Moraea welwitschii</i> Bak.	501	Myrtaceae Juss.	126;604
<i>Moraea zambeziaca</i> Bak.	501	Myrtales Rchb. f.	126
Morus L.	249		
<i>Morus lactea</i> (Sim) Mildbr.	250		
Morus mesozygia Stapf	249;620;701		
<i>Moschosma polystachyon</i> (L.) Benth.	463		
<i>Moschosma riparium</i> Hochst.	474		
Mucuna Adans.	223		

N

<i>Nauclea</i> L., pro parte	347
<i>Nauclea latifolia</i> Smith	347
Nelsonia R. Br.	451
<i>Nelsonia campestris</i> R. Br.	451

- Nelsonia canescens** (Lam.) Spreng. 451
Nelsonia smithii Oerst. 451;703
Neoboutonia Muell. Arg. 170
Neoboutonia melleri (Muell. Arg.) Prain 170;611;717
Neohyptis J.K. Morton 467
Neohyptis paniculata (Bak.) J.K. Morton 467;697
Neonotonia Lackey 223
Neonotonia wightii (Wight & Arn.) Lackey 223
 subsp. **pseudojavanica** (Taub.) Lackey 223
 var. **pseudojavanica** 224
 subsp. **wightii** 224
 var. **longicauda** (Schweinf.) Lackey 224
Neorautanenia Schinz 224
Neorautanenia mitis (A. Rich.) Verdc. 224;692
Neorautanenia pseudopachyrhiza (Harms) Milne-Redh. 224
Nephrolepis Schott 46
Nephrolepis undulata (Afzel. ex Sw.) J. Sm. 46;703;731
Nervilia Commers. ex Gaud. 518
Nervilia abyssinica (Chiov.) Schltr. 518
Nervilia adolphi Schltr. 518
 var. **seposita** Hallé & Toilies 518
Nervilia kotschy (Rchb. f.) Schltr. 518
 var. **kotschy** 518
Nervilia subintegra Summerh. 518;703
Nervilia toillieziae Hallé 518
Nesaea Kunth 107
Nesaea cordata Hiern 107;711
Nesaea dinteri Koehne 107
 subsp. **elata** A. Fernandes 107
Neurotheca Salisb. ex Benth. 402
Neurotheca loeselioides (Progel) Baill. 402;711
Newtonia Baill. 615
Newtonia buchananii (Bak.) Gilb. & Bout. 615
Nidorella Cass. 376
Nidorella spartioides (O. Hoffm.) Cronquist 376
Nidorella stricta O. Hoffm. 376
Notholaena inaequalis Kunze. 40
Nothoperanema squamiseta (Hook.) Ching 59
Nuxia Comm. ex Lam. 311
Nuxia congesta R. Br. ex Fresen. 311;629;723;725;726;736
Nuxia floribunda Benth. 629
Nuxia mannii Gilg 311
Nuxia sambesina Gilg 311
Nyctaginaceae Juss. 111
Nymphaea L. 70
Nymphaea lotus L. 70;697
Nymphaea nouchali Burm. f. 71
 var. **coerulea** (Savigny) Verdc. 71
Nymphaeaceae Salisb. 70

O

Ochna L. 125
Ochna bracteosa Robyns & Lawalree 125;603;702
Ochna densicoma Engl. & Gilg 125
Ochna gilgiana Engl. 604
Ochna holstii Engl. 125;604;733;734;736
Ochna membranacea Oliv. 604
Ochna mossambicensis auct., non Klotzsch. 125
Ochna prunifolia Engl. 125
Ochna schweinfurthiana F. Hoffm. 126
Ochna sp. 126;731
Ochnaceae DC. 124;603
Ochrocephala Dittrich 377
Ochrocephala imatongensis (Philipson) Dittrich 377;724
Ocimum L. 467
Ocimum affine Hochst. 464
Ocimum americanum L. 467
Ocimum canum Sims 467
Ocimum gratissimum L. 468;724
 var. **gratissimum** 468;724
Ocimum knyanum auct., non Vatke 464
Ocimum suave Willd. 468
Ocimum viride Willd. 468
Ocotea Aubl. 67
Ocotea kenyensis (Chiov.) Robyns & Wilczek 67;600;729;733;734;736
Ocotea sp. nov. sensu ITU 67
Ocotea viridis Kosterm. 67
Odina barteri Oliv. 289

- Odina fruticosa* A. Rich. 289
Odina humilis Oliv. 290
Odina schimperi A. Rich. 290
Oenostachys Bullock 501
Oenostachys dichroa Bullock 500
Olacaceae Mirb. ex DC. 261;621
Olacales Benth. 261
Olax L. 261
Olax gambecola Baill. 261;702
Olax viridis Oliv. 261
Oldenlandia L. 337
Oldenlandia abyssinica (A. Rich.) Hiern 335
Oldenlandia corymbosa L. 337
Oldenlandia goreensis (DC.) Summerh. 337
 var. **goreensis** 337
Oldenlandia herbacea (L.) Roxb. 337;731
 var. **herbacea** 337;731
Oldenlandia heynei G. Don 337
Oldenlandia lancifolia (Schumach.) DC. 338
 var. **scabridula** Bremek. 338
Oldenlandia trinervia auct., non Retz. 337
Olea L. 314
Olea africana Miller 314
Olea capensis L. 315;630;662;719;720;722;
 727;728;729;730;732;733;734;735;736;
 737;738;740
 subsp. **hochstetteri** (Bak.) Friis &
 P.S. Green 315;630;662;719;728;729;733;
 734;735;736;737;738;740
 subsp. **welwitschii** (Knobl.) Friis &
 P.S. Green 315;630;733;734;736
Olea chrysophylla Lam. 314
Olea europaea L. 314;719;736
 subsp. *africana* (Mill.) P.S. Green 314
 subsp. **cuspidata** (Viv.) P.S. Green
 314;719;736
Olea hochstetteri Bak. 315
Olea mildbraedii (Gilg & Schellenb.) Knobl. 313
Olea welwitschii (Knobl.) Gilg & Schellenb. 315
Oleaceae Hoffmanns. & Link 313;629
Oleandra Cav. 47
Oleandra distenta Kunze 47;729
Olinia Thunb. 108
Olinia aequipetala (Del.) Cufod. 108
Olinia rochetiana A. Juss. 108;601;733;738
Olinia usambarensis Gilg 108
Oliniaceae Harv. & Sond. 108;601
Olyra L. 576
Olyra latifolia L. 576;703
Onagraceae Juss. 108
Oncinotis Benth. 318
Oncinotis inandensis J.M. Wood & Evans 318
Oncinotis pontyi Dubard 318;702
Oncinotis tenuiloba Stapf 318;729
Oncoba Forssk. 117
Oncoba routledgei Sprague 602
Oncoba spinosa Forssk. 117;602;692
Oncocalyx Tiegh. 263
Oncocalyx fischeri (Engl.) M.G. Gilbert
 263;722
Ophelia fimbriata Hochst. 403
Ophiocaulon cissampeloides (Planch. ex Benth.)
 Mast. 117
Ophioglossaceae Presl 34
Ophioglossales Newman 34
Ophioglossum L. 34
Ophioglossum costatum R. Br. 34;734
Ophioglossum reticulatum L. 34;734
Opilia Roxb. 262
Opilia amentacea Roxb. 262;692
Opilia celtidifolia (Guill. & Perr.) Walp. ex
 Engl. 262
Opiliaceae (Benth.) Valetton 262
Oplismenus P. Beauv. 576
Oplismenus compositus (L.) P. Beauv. 576;731
Oplismenus hirtellus (L.) P. Beauv.
 576;699;728;734
Orchidaceae Juss. 508
Orchidales Raf. 508
Oreacanthus Benth. 452
Oreacanthus sudanicus Friis & Vollesen
 452;703;758
Oreosyce Hook. f. 122
Oreosyce africana Hook. f. 122;729
Ormocarpum P. Beauv. 224
Ormocarpum trichocarpum (Taub.) Engl.
 224;617;693;712;713
Ornithogalum L. 487

Pandanales Lindl.	505	Paspalum L.	581
Pandanus L. f.	505	<i>Paspalum commersonii</i> Lam.	581
Pandanus chiliocarpus Stapf	505;703	<i>Paspalum orbiculare</i> G. Forster	581
<i>Pandanus</i> sp.	505	<i>Paspalum polystachyum</i> R. Br.	581
<i>Pandanus</i> sp. near <i>Pandanus ugandensis</i>	505	Paspalum scrobiculatum L.	581
Panicum L.	577	var. <i>commersonii</i> (Lam.) Stapf	581
Panicum atrosanguineum Hochst. ex A. Rich.	577	Passiflora L.	118
Panicum bambusiculme Friis & Vollesen	577;717;758	Passiflora edulis Sims	118
<i>Panicum baumannii</i> K. Schum.	580	Passifloraceae Juss. ex Kunth	117;603
Panicum brevifolium L.	577;703	Passiflorales Dumort.	117
Panicum calvum Stapf	577;731	Paullinia L.	288
Panicum chionachne Mez	578;732	Paullinia pinnata L.	288;699;703;712;717
Panicum coloratum L.	578	<i>Paulowilhelmia</i> Hochst.	452
var. minus Chiov	578	<i>Paulowilhelmia polysperma</i> Benth.	443
Panicum comorense Mez	578;703	<i>Paulowilhelmia speciosa</i> Hochst.	443
Panicum deustum Thunb.	578;696	Pavetta L.	338
<i>Panicum fulgens</i> Stapf	580	<i>Pavetta abyssinica</i> auct., non Fresen.	338
<i>Panicum glabrescens</i> Steud.	580	Pavetta abyssinica Fresen.	338;734
Panicum griffonii Franch.	579;711	var. abyssinica	338;734
Panicum hymeniocuilum Nees	579	<i>Pavetta albertina</i> S. Moore	340
Panicum infestum Peters	579	<i>Pavetta assimilis</i> Sond.	339
Panicum issongense Pilg.	579;703	Pavetta crassipes K. Schum.	339;722
<i>Panicum lindleyanum</i> Steud.	580	Pavetta gardeniifolia A. Rich.	339;692
<i>Panicum longijubatum</i> Stapf	580	var. gardeniifolia	339;692
Panicum maximum Jacq.	579;695	<i>Pavetta hochsteteri</i> Bremek.	339
Panicum monticola Hook. f.	580;725	var. <i>glaberrima</i> Bremek.	339
Panicum nervatum (Franch.) Stapf	580	Pavetta incana Klotzsch	339;702
Panicum pusillum Hook. f.	580;731;732	<i>Pavetta insignis</i> Bremek.	339
<i>Panicum snowdenii</i> C.E. Hubb.	579	var. <i>glabra</i> Bremek.	339
Panicum subalbidum Kunth	580;737	Pavetta molundensis K. Krause	339;632;702
Panicum tenellum Lam.	580;711	Pavetta oliveriana Hiern	340;632;717
Panicum trichocladum K. Schum.	581	var. oliveriana	340;717
Panicum weihei Renv.	581;732	Pavetta praelata Bremek. (ined.)	340
Papaverales Dumort.	75	<i>Pavetta saxicola</i> K. Krause	339
Parinari Aubl.	178	Pavetta sp. nov. near P. abyssinica Fresen.	338;729
Parinari excelsa Sabine	178;612;701	Pavetta subcana Hiern	340;706
subsp. holstii (Engl.) R. Graham	178	var. longiflora (Vatke) Bridson	340;706
<i>Parinari holstii</i> Engl.	178	Pavonia Cav.	151
Parkia R. Br.	197	Pavonia burchellii (DC.) R.A. Dyer	151
Parkia filicoidea Welw.	197;616;701	<i>Pavonia patens</i> (Andrews) Chiov.	151
Paropsia Thouars	603	<i>Pavonia patens</i> auct., non (Andrews) Chiov.	151
Paropsia guineensis Oliv.	603	Pavonia schimperiana A. Rich.	151
		var. <i>glabrescens</i> Ulbr.	151

- Pavonia urens** Cav. 151;732
 var. *glabrescens* (Ulbr.) Brenan 151
 var. *hirsuta* (Hochst.) Brenan 151
Pedaliaceae R. Br. 434
Peddiea Harv. ex Hook. 111
Peddiea fischeri Engl. 111;702;729
Peddiea longiflora Gilg 111
Peddiea zenkeri Gilg 111
Pellaea Link 41
Pellaea doniana Hook. 41;703
Pellaea longipilosa Bonap. 41;711
Pellaea quadripinnata (Forssk.) Prantl 41;731
Pellaea schweinfurthii Hieron. 41;712
Pellaea viridis (Forssk.) Prantl 42
Pennisetum Rich. 581
Pennisetum adoense Steud. 583
Pennisetum giganteum A. Rich. 581
Pennisetum glabrum Steud. 583
Pennisetum macrourum Trin. 581
Pennisetum polystachion (L.) Schult. 582
Pennisetum procerum (Stapf) W.D. Clayton 582
Pennisetum purpureum Schumach. 582;696;700;710;715;716
Pennisetum ramosum (Hochst.) Schweinf. 582
Pennisetum thunbergii Kunth 583
Pennisetum trachyphyllum Pilg. 583;715;717;737
Pennisetum unisetum (Nees) Benth. 583;696;714;715;718;732
Pentania Harv. 340
Pentania ouranogyne S. Moore 340
Pentas Benth. 340
Pentas carnea auct., non Benth. 341
Pentas decora S. Moore 340;724
 var. **decora** 340;724
Pentas globifera auct., non Hutch. 340
Pentas lanceolata (Forssk.) Deflers 341;724;726
 subsp. **lanceolata** 341;724
 subsp. **quartiniana** (A. Rich.) Verdc. 341;726
 var. **leucaster** (K. Krause) Verdc. 341
Pentas purseglovei Verdc. 342;724;758
Pentas schimperiana (A. Rich.) Vatke 342;724
 subsp. **schimperiana** 342;724
Pentastichis (Nees) Stapf 584
Pentastichis imatongensis C.E. Hubb. 584
Pentastichis pictigluma (Steud.) Pilg. 584;743
Peperomia Ruiz & Pavon 73
Peperomia abyssinica Miq. 73;729
 var. *stuhlmannii* (C. DC.) Duell. 73
Peperomia fernandopoiana C. DC. 73;729
Peperomia goetzeana Engl. 73
Peperomia holstii auct., non C. DC. 73
Peperomia molleri C. DC. 73;703
 subsp. **molleri** 73
Peperomia reflexa (L. f.) A. Dietr., nom. illeg. 74
Peperomia stuhlmannii DC. 73
Peperomia tetraphylla (Forst.) Hook. & Arn. 74;729
Peponia vogelii Hook. f. 122
Peponium Engl. 122
Peponium cienkowskii (Schweinf.) Engl. 122;724
Peponium vogelii (Hook. f.) Engl. 122;703
Pergularia L. 323
Pergularia daemia (Forssk.) Chiov. 323;703
Periploca L. 324
Periploca linearifolia Dill. & A. Rich. 324;725;726
Peristrophe Nees 452
Peristrophe bicalyculata (Retz.) Nees 452
Peristrophe paniculata (Forssk.) Brummitt 452
Peristrophe pumila (Lindau) Lindau 441
Peristrophe usta C.B. Clarke 441
Peristylus petitianus A. Rich. 517
Perotis Aiton 584
Perotis patens Gand. 584
Persea Gaertn. 67
Persea americana Mill. 67
Persea gratissima Gaertn. 67
Persicaria (L.) Mill. 93
Persicaria decipiens (R. Br.) K.L. Wilson 93;697
Persicaria salicifolia (Willd.) Assenov, nom. illeg., non S.F. Gray 93
Persicaria setosula (A. Rich.) K.L. Wilson 93;697;737
Personales Benth. 422

<i>Personatae</i> Lindl.	422	Phyllanthus sepialis Muell. Arg.	172
Peucedanum L.	300	Physalis L.	413
<i>Peucedanum araliaceum</i> (Hochst.) Benth.	301	Physalis peruviana L.	413
Peucedanum dispersum C.C. Townsend		Phytolacca L.	95
	300;740	Phytolacca dodecandra L'Hér.	95;601;717;725
<i>Peucedanum fraxinifolium</i> Hiern	301	Phytolaccaceae R. Br.	95;601
Peucedanum linderi Norman	300; 741	Pilea Lindl.	252
<i>Phaseolus schimperi</i> Taub.	235	Pilea angolensis Rendle	252;711
<i>Phaseolus stenocarpus</i> Harms	235	subsp. angolensis	252;711
Phaulopsis Willd.	452	<i>Pilea ceratomera</i> Wedd.	252
Phaulopsis imbricata (Forssk.) Sweet	452;731	Pilea johnstonii Oliv.	252;731
subsp. imbricata	452;731	subsp. johnstonii	252;731
subsp. poggei (Lindau) Manktelow	452	Pilea rivularis Wedd.	252;734
<i>Phaulopsis parviflora</i> auct., non Willd.	452	Pilea tetraphylla (Steud.) Blume	253;731;734
<i>Phaulopsis poggei</i> (Lindau) Lindau	452	Piliostigma Hochst.	181
Phoenix L.	504	<i>Piliostigma reticulata</i> (DC.) Hochst.	181
Phoenix reclinata Jacq.	504;698;717;722	Piliostigma thonningii (Schumach.) Milne-Redh.	181;613;692;713
Phragmanthera Tiegh.	263	<i>Piloselloides hirsuta</i> (Forssk.) C. Jeffrey	366
Phragmanthera polycrypta (F. Didr.) Balle		Pimpinella L.	300
	263;729	Pimpinella hirtella A. Rich.	300;731
subsp. subglabriiflora Bally	263;729	Pimpinella oreophila Hook. f.	300;742;743
Phragmanthera usuiensis (Oliv.) M.G. Gilbert		<i>Pimpinella peregrina</i> auct., non L.	300
	263;726	Pinales Dumort.	61
Phragmites Adans.	584	Piper L.	74
Phragmites karka (Retz.) Steud.	584;697	Piper capense L. f.	74;731
<i>Phragmites mauritianus</i> auct., non Kunth, pro parte	584	Piper guineense Schumach. & Thonn.	74;703
Phyllanthus L.	170	Piper umbellatum L.	74;703;717
Phyllanthus amarus Schumach. & Thonn.	170	Piperaceae C. Agardh	73
Phyllanthus boehmii Pax	170;731	Piperales Dumort.	73
<i>Phyllanthus capillaris</i> Schumach. & Thonn.	172	<i>Piptadenia buchananii</i> Bak.	616
<i>Phyllanthus discoideus</i> Baill.	170	Pisonia L.	112
Phyllanthus fischeri Pax	170;743	Pisonia aculeata L.	112;702
<i>Phyllanthus guineensis</i> Pax	172	Pittosporaceae R. Br.	115;602
Phyllanthus inflatus Hutch.	171	Pittosporales Lindl.	115
<i>Phyllanthus lalambensis</i> Schweinf.	172	Pittosporum Banks ex Solander in Gaertn.	115
Phyllanthus leucanthus Pax	171;711	<i>Pittosporum mannii</i> Hook. f.	115
Phyllanthus limmuensis Cufod.	171;702	Pittosporum viridiflorum Sims	115;602;734
Phyllanthus maderaspatensis L.	171	Plantaginaceae Juss.	405
Phyllanthus muellerianus (O. Kuntze) Exell		Plantaginales Lindl.	405
	171;699;703;712	Plantago L.	405
Phyllanthus nummularifolius Poir.		Plantago palmata Hook. f.	405;734;739
	172;611;718;724	Platostoma P. Beauv.	465;468
Phyllanthus ovalifolius Forssk.	172;611;717	Platostoma africanum P. Beauv.	468

- Platostoma rotundifolium** (Briq.) A.J. Paton 468;724
- Platycerium** Desv. 45
Platycerium angolense Welw. ex Bak. 45
- Platycerium elephantotis** Schweinf. 45;692;702
- Platycoryne** Rchb. f. 519
- Platycoryne crocea** (Schweinf.) Rolfe 519;724
 subsp. **montis-elgon** (Schltr.) Summerh. 519;724
- Plectranthus** L'Hér. 469
- Plectranthus alpinus** (Vatke) Ryding 469;732
Plectranthus assurgens (Bak.) J.K. Morton 469
- Plectranthus caninus** Roth 469;696
- Plectranthus cyaneus** Guerke 469;724
- Plectranthus defoliatus** Hochst. ex Benth. 469;725
- Plectranthus glandulosus** Hook. f. 470;703
- Plectranthus gracillimus** (T.C.E. Fr.) Hutch. & Dandy 470;711
- Plectranthus grandicalyx** (E.A. Bruce) J.K. Morton 470;742
Plectranthus hylophilus Guerke 470
- Plectranthus lactiflorus** (Vatke) Agnew 470;720;724
- Plectranthus longipes** Bak. 471
Plectranthus paniculatus Baker 467
Plectranthus porpeodon Bak. 473
Plectranthus ramosissimus Hook. f. 465
Plectranthus schimperi Vatke 466;739;740
Plectranthus urticoides Bak. 470
Plectronia dichrophylla Mildbr. 336
- Pleopeltis** Humb. & Bonpl. ex Willd. 45
Pleopeltis excavata (Willd.) Stedje 44
- Pleopeltis macrocarpa** (Willd.) Kaulf. 45;729;740
Pleopeltis nicklesii (Tardieu) Alston 44
Pleopeltis preusii (Hieron.) Tardieu 44
- Plicosepalus** Tiegh. 264
- Plicosepalus curviflorus** (Oliv.) Tiegh. 264;729
- Plumbaginaceae** Juss. 404
- Plumbago** L. 404
- Plumbago zeylanica** L. 404
- Pneumatopteris** Nakai 56
- Pneumatopteris afra** (Christ) Holttum 56;703
- Pneumatopteris unita** (Kunze) Holttum 56;734
- Poa** L. 584
Poa leptoclada auct., non Hochst. ex A. Rich. 584
- Poa schimperiana** A. Rich. 584;725
- Poaceae** Barnh. 544
- Poales** Small 544
- Podocarpaceae** Endl. 61;599
- Podocarpus** L'Hér. ex Pers. 61
- Podocarpus falcatus** (Thunb.) Mirb. 61;599;669;736
Podocarpus gracilior Pilg. 61;599
- Podocarpus latifolius** (Thunb.) Mirb. 61;599; 662;663;668;669;719;720;722;725;726;727; 728;729;730;732;733;734;735;736;737;738; 739;740;741
Podocarpus milanjanus Rendle 61
- Podostemaceae** Rich. ex C. Agardh 88
- Podostemales** Lindl. 88
- Poecilostachys** Hack. 553;585
- Poecilostachys oplismenoides** (Hack.) W.D. Clayton 585;734
- Pollia** Thunb. 481
- Pollia condensata** C.B. Clarke 481;703
- Pollia mannii** C.B. Clarke 481;703
- Polycarpaea** Lam. 90
Polycarpaea corymbosa auct., non Lam. 90
- Polycarpaea corymbosa** Lam. 90
- Polycarpaea eriantha** A. Rich. 90
- Polygala** L. 83
- Polygala abyssinica** R. Br. ex Fresen. 83;740
- Polygala albida** Schinz 84;721
 var. **angustifolia** (Chod.) Exell 84;721
- Polygala erioptera** DC. 84;695
- Polygala persicariifolia** DC. 84
- Polygala petitiana** A. Rich. 84;724
 subsp. **parviflora** (Exell) J. Paiva 84;724
- Polygala quartiniana* A. Rich. 85
- Polygala sphenoptera** Fresen. 85
Polygala stanleyana Chod. 84
Polygala triflora auct., non L. 84
- Polygalaceae** R. Br. 83;601
- Polygalales** Dumort. 83
- Polygonaceae** Juss. 93

Polygonales Dumort.	93	<i>Popowia djurensis</i> Engl. & Diels	64
<i>Polygonum</i> L. pro parte	93	<i>Popowia ferruginea</i> (Oliv.) Engl. & Diels	65
<i>Polygonum aculeatum</i> Kunth, sphalm.	93	<i>Popowia littoralis</i> Bagshawe & Bak. f.	599
<i>Polygonum acuminatum</i> auct., non H.B.K.	93	<i>Popowia schweinfurthii</i> Engl. & Diels	65
<i>Polygonum acuminatum</i> auct., non Kunth	93	Popowia sp.	65
<i>Polygonum barbatum</i> auct, non L.	93	Portulaca L.	92
<i>Polygonum decipiens</i> R. Br.	83	Portulaca oleracea L.	92
<i>Polygonum glabrum</i> auct., non Willd.	93	Portulaca quadrifida L.	92
<i>Polygonum salicifolium</i> Willd.	93	Portulacaceae Juss.	92
<i>Polygonum senegalensis</i> auct., non Meisn.	94	<i>Potamogeton javanicus</i> auct., non Hassk.	475
<i>Polygonum serrulatum</i> Lag.	93	Potamogeton L.	475
<i>Polygonum setosulum</i> A. Rich.	93	Potamogeton octandrus Poir.	475;697
<i>Polygonum setulosum</i> A. Rich., orth. mut.	93	Potamogetonaceae Dumort.	475
Polypodiaceae S.F. Gray	44	Pouteria Aubl.	307
Polypodiales A.B. Frank	35	Pouteria adolfi-friederici (Engl.) A. Meeuse	307;628;716;736;738
<i>Polypodium mildbraedii</i> auct., non Hieron.	44	subsp. adolphi-friederici	307
<i>Polypodium phlebodes</i> auct., non Kunze	44	Pouteria altissima (A. Chev.) Baehni	307;628;701;715;716
Polyscias J.R. & G. Forster	296	Pouzolzia Gaudich.	253
<i>Polyscias ferruginea</i> (Hiern) Harms	296	Pouzolzia guineensis Benth.	253
Polyscias fulva (Hiern) Harms	296;627;717;726;728;731;736;738	Pouzolzia parasitica (Forssk.) Schweinf.	253;731
Polyspatha Benth.	481	Premna L.	460
Polyspatha paniculata Benth.	481;703	Premna angolensis Guerke	460;701
Polysphaeria Hook. f.	342	Premna schimperi Engl.	460;722
Polysphaeria parvifolia Hiern	342	Primulaceae Vent.	403
Polystachya Hook.	519	Primulales Dumort.	403
Polystachya benetiana Rchb. f.	519	Pristimera Miers	259
Polystachya cultriformis (Thou.) Spreng.	519;729	Pristimera graciliflora (Welw. ex Oliv.)	
Polystachya eurychila Summerh.	519	N. Hallé	259;729
<i>Polystachya nigrescens</i> Rendle	519	subsp. graciliflora	259
<i>Polystachya rendlei</i> Rolfe	519	Protea L.	113
Polystachya sp.	520	<i>Protea abyssinica</i> Willd.	113
Polystachya steudneri Rchb. f.	519	Protea gagedi J.F. Gmel.	113;716;719;722;725;726
<i>Polystachya stricta</i> Rolfe	519	Protea madiensis Oliv.	114;601;716;718;722
Polystachya transvaalensis Schltr.	519;743	Protea sp.	114
Polystichum Roth	59	Proteaceae Juss.	113;601
<i>Polystichum fuscopaleaceum</i> Alston	59	Proteales Dumort.	113
Polystichum setiferum (Forssk.) Woynar	59;724;758	Prunus L.	176
var. fuscopaleaceum (Alston) Schelpe	59;734;739	Prunus africana (Hook. f.) Kalkm.	176;612;716;733;736
Popowia Endl.	65	Pseudarthria Wight & Arn.	225
<i>Popowia buchananii</i> (Engl.) Engl. & Diels	64		

- Pseudarthria confertiflora** (A. Rich.) Bak. 225;724
- Pseudarthria hookeri** Wight & Arn. 225;696
var. *confertiflora* (A. Rich.) Schindl. 225
- Pseudechinolaena** Stapf 585
- Pseudechinolaena polystachya** (Kunth) Stapf 585;731
- Pseuderanthemum** Radlk. 453
- Pseuderanthemum ludovicianum** (Buettn.) Lindau 453;703;717
- Pseuderanthemum tunicatum** (Afzel.) Milne-Redh. 453;703
- Pseudobromus* K. Schum. 585
- Pseudobromus sylvaticus* K. Schum. 565
- Pseudocedrela** Harms 283
- Pseudocedrela kotschyi** Harms 283;693
- Pseudoeriosema** Hauman 225
- Pseudoeriosema adongense** (Bak.) Hauman 225
subsp. *adongense* 225
- Pseudognaphalium** Kirp. 377
- Pseudognaphalium richardianum** (Cufod.) Hilliard & Burt 377
- Pseudomussaenda** Wernham 342
- Pseudomussaenda flava** Verdc. 342;665;692;699;712
- Pseudospondias** Engl. 291
- Pseudospondias microcarpa** (A. Rich.) Engl. 291;626;698;703;716
- Psilanthus** Hook. f. 342
- Psilanthus leroyi** Bridson 342;706;758
- Psilotrichum** Blume 100
- Psilotrichum elliotii** Bak. 100;696
- Psilotrichum ovatum* (Moq.) Hauman 100
- Psoralea adongense* Bak. 225
- Psorospermum** Spach. 138
- Psorospermum febrifugum** Spach 138;692;693
var. *ferrugineum* (Hook. f.) Keay & Milne-Redh. 138
- Psychotria** L. 343
- Psychotria capensis** (Eckl.) Vatke 343
subsp. *riparia* (K. Schum. & K. Krause) Verdc. 343
- Psychotria cristata* Hiern 328
- Psychotria kirkii** Hiern 343;717
var. *mucronata* (Hiern) Verdc. 343;717
- Psychotria latisejala* sensu Jackson 344
- Psychotria mahonii** C.H. Wright 343;345;632;729;734
- var. *puberula* (Petit) Verdc. 343;729
- var. *pubescens* (Robyns) Verdc. 343
- Psychotria megistosticha* (S. Moore) Petit 343
- var. *imatongensis* Petit 343
- Psychotria mucronata* Hiern 343
- Psychotria orophila** Petit 343;345;632;734
- Psychotria peduncularis** (Salisb.) Steyererm. 344;703
var. *ciliato-stipulata* Verdc. 344;703
- Psychotria riparia* (K. Schum. & K. Krause) Petit 343
subsp. *riparia* 343
- Psychotria robyniana* Petit 343
var. *paucionervata* Petit 343
- Psychotria schweinfurthii** Hiern 344;703
- Psychotria** sp. 344;734
- Psychotria** sp. ?nov. 345
- Psychotria triflora* Thonn. 329
- Psydrax** Gaertn. 345
- Psydrax parviflora** (Afzel.) Bridson 345;632;698
subsp. *parviflora* 345;632;698
subsp. *rubrocostata* (Robyns) Bridson 345
- Pteridium** Scop. 37
- Pteridium aquilinum** (L.) Kuhn 37;715;717;726
- Pteridophyta** Engl. 31
- Pteridophytes 31
- Pteris** L. 42
- Pteris acanthoneura* Alston 42
- Pteris atrovirens** Willd. 42;703
- Pteris biaurita* auct., non L. 42
- Pteris catoptera** Kunze 42;703;734;741
- Pteris cretica** L. 43
- Pteris dentata* Forssk. 43
- Pteris prolifera* auct., non Hieron. 42
- Pteris pteridioides** (Hook.) F. Ballard 43;731
- Pteris quadriaurita* auct., non Retz. 42
- Pteris serrulata** Forssk. 43;741
- Pteris spinulifera* Schum. 42

- Pterocarpus** Jacq. 225
Pterocarpus abyssinicus Hochst. ex A. Rich. 225
Pterocarpus lucens Guill. & Perr. 225;617;693;712
Pterodiscus Hook. 434
Pterodiscus ruspolii Engl. 434
Pterolobium R. Br. ex Wight & Arn. 182
Pterolobium exosum (J.F. Gmel.) Bak. f. 182
Pterolobium stellatum (Forssk.) Brenan 182;726
Pterygota Schott & Endl. 608
Pterygota macrocarpa auct., non K. Schum. 608
Pterygota mildbraedii Engl. 608
Pterygota sp. nov. sensu ITU 608
Pupalia Adans. mut. Juss. 101
Pupalia atropurpurea (Lam.) Moq. 101
Pupalia grandiflora Peter 101
Pupalia lappacea (L.) Juss. 101
 var. *velutina* (Moq.) Hook. f. 101
Pycnanthus Warb. 68
Pycnanthus angolensis (Welw.) Exell 68;701
 subsp. *schweinfurthii* (Warb.) Verdc. 68
Pycnanthus schweinfurthii Warb. 68
Pycnostachys Hook. 471
Pycnostachys batesii Bak. 471;703
Pycnostachys meyeri Guerke 471;725;731
Pycreus P. Beauv. 542
Pycreus aethiops (Welw. ex Ridl.) C.B. Clarke 527
Pycreus angulatus Nees 539
Pycreus capillifolius (A. Rich.) C.B. Clarke 529
Pycreus elegantulus (Steud.) C.B. Clarke 533
Pycreus flavescens (L.) Rchb. 534
Pycreus globosus Rchb. 539
 var. *nilagirica* C.B. Clarke 539
Pycreus lanceolatus (Poir.) C.B. Clarke 535
Pycreus macrostachyos (Lam.) J. Rayn. 535
 subsp. *tremulus* (Poir.) K. Lye 535
Pycreus nigricans (Steud.) C.B. Clarke 535
Pycreus nuerensis (Boeck.) Hooper 539
Pycreus propinquus Nees 535
Pycreus testui Cherm. 539
Pycreus tremulus (Poir.) C.B. Clarke 535
Pycreus unioloides (R. Br.) Urban 539
Pygeum africanum Hook. f. 176
Pyrenacantha Hook. ex Wight 260
Pyrenacantha sylvestris S. Moore 260;702
Pyrosia Mirb. 45
Pyrosia mechowii (Hieron.) Alston 45
Pyrosia schimperiana (Mett. ex Kuhn) Alston 45
 R
Ramphicarpa recurva auct., non Oliv. 424
Ramphicarpa recurva Oliv. 424
Ranales Lindl. 68
Randia dumetorum auct., non (Retz.) Lam. 328
Randia maculata DC. 345
Randia malleifera (Hook.) Hook. f. 346
Randia nilotica Stapf 328
Randia urcelliformis (Hiern) Eggeling 345
Ranunculaceae Juss. 68
Ranunculales Dumort. 68
Ranunculus L. 69
Ranunculus multifidus Forssk. 69;731;737;740
Ranunculus oreophytus Del. 70;740
 var. *lanuriensis* De Wild. 70
 var. **oreophytus** 70;740
Ranunculus pinnatus auct., non Poir. 69
Ranunculus pubescens Thunb. 69
Rapanea Aubl. 310
Rapanea melanophloeos (L.) Mez 310;629;738;741
Rapanea neurophylla (Gilg) Mez 310
Rapanea pellucido-striata Gilg & Schellenb. 310
Rapanea pulchra Gilg & Schellenb. 310
Rapanea rhododendroides (Gilg) Mez 310
Rapanea runssorica (Gilg) Mez 310
Raphia P. Beauv. 505
Raphia farinifera (Gaertn.) Hylander 505;716
Raphia monbuttorum auct., non Drude 505
Raphia sp. 505
Rauvolfia L. 318
Rauvolfia caffra Sond. 318;631;698;701;715
Rauvolfia oxyphylla Stapf 318
Rauvolfia vomitoria Afzel. 318;631;710
Rawsonia Harv. & Sond. 117
Rawsonia lucida Harv. & Sond. 117;602

- Rawsonia ugandensis* Dawe & Sprague 117
Reissantia Hallé 259
Reissantia indica (Willd.) N. Hallé 259;712
 var. **indica** 259
 var. **loesneriana** (Hutch. & M.B. Moss)
 N. Hallé 259;712
Reinealmia L. f. 484
Reinealmia sp. 484
Resedaceae DC. ex S.F. Gray 83
Rhamnaceae Juss. 266;621
Rhamnales Dumort. 266
Rhamnus L. 268
Rhamnus prinoides L'Hér.
 268;622;725;734;739
Rhamphicarpa Benth. 428
Rhamphicarpa fistulosa (Hochst.) Benth. 428
Rhamphicarpa tenuisecta Standl. 424
Rhaphiostylis Planch. ex Benth. 261
Rhaphiostylis beninensis (Planch.) Benth.
 261;717
Rhaponticum Ludw., pro parte 377
Rhaponticum imatongense (Philipson) Soják 377
Rhizophoraceae R. Br. 135;605
Rhoadales F.C.L. Spenner 75
Rhus L. 292
Rhus insignis (Del.) Oliv. 291
Rhus natalensis Krauss 292;626;713
Rhus ruspolii Engl. 292;732
Rhus vulgaris Meikle 292;626;722
Rhynchelytrum Nees 585
Rhynchelytrum grandiflorum Hochst. 575
Rhynchelytrum repens (Willd.) C.E. Hubb. 574
Rhynchelytrum roseum (Nees) Bews. 574
Rhynchelytrum villosum (Parl.) Chiov. 575
Rhynchocharpa foetida Schrad. 119
Rhynchosia Lour. 226
Rhynchosia caribaea auct., non (Jacq.) DC. 227
Rhynchosia densiflora (Roth) DC. 226;703
 subsp. **debilis** (G. Don) Verdc. 226;703
Rhynchosia elegans A. Rich. 226;739
Rhynchosia memnonia auct., non (Del.) DC. 226
Rhynchosia minima (L.) DC. 226
 var. **nuda** (DC.) O. Kuntze 226
 var. **prostrata** (Harv.) Meikle 226
Rhynchosia nyassica Bak. 227
Rhynchosia orthobotrya Harms 227
Rhynchosia resinosa (A. Rich.) Bak.
 223;227;729
Rhynchosia sublobata (Schumach.) Meikle 227
Rhynchosia tricuspida Bak. f. 227;724;758
 subsp. **imatongensis** Verdc. 227;724;758
Rhynchospora Vahl 542
Rhynchospora corymbosa (L.) Britt. 542;697
Ricinodendron Muell. Arg. 172
Ricinodendron africanum Muell. Arg. 173
Ricinodendron heudelotii (Baill.) Heckel
 172;173;611;701
 subsp. **africanum** (Muell. Arg.) J. Léonard
 173;701
Ricinus L. 173
Ricinus communis L. 173
Rinorea Aubl. 82
Rinorea brachypetala (Turcz.) O. Kuntze
 82;702;729
Rinorea ilicifolia (Oliv.) O. Kuntze 82;702
Rinorea oblongifolia (C. H. Wright) Chipp
 82;702
Rinorea poggei Engl. 82
Ritchiea R. Br. ex G. Don 81
Ritchiea albersii Gilg 81;600;702;729;734;738
Ritchiea duchesnei (De Wild.) Keay 79
Ritchiea pentaphylla auct., non Gilg & Bened. 81
Romulea Maratti 501
Romulea camerooniana Bak. 501
Romulea fischeri Pax 501;743
Rosaceae Juss. 175;612
Rosales Perleb 175
Rothmannia Thunb. 345
Rothmannia longiflora Salisb. 345;702
Rothmannia urcelliformis (Hiern) Bullock
 ex Robyns 345;632;702
Rothmannia whitfieldii (Lindl.) Dandy 346;702
Rottboellia L. f. 585
Rottboellia cochinchinensis (Lour.)
 W.D. Clayton 585
Rottboellia exaltata L.f. (1781), non (L.)
 L.f. (1779) 585
Rourea Aubl. 294

- Rourea thomsonii** (Bak.) Jongkind 294;702;717
- Rubia** L. 346
- Rubia cordifolia** L. 346
subsp. **conotricha** (Gand.) Verdc. 346
- Rubiaceae** Juss. 326;631
- Rubiales** Dumort. 326
- Rubus** L. 177
- Rubus apetalus** Poir. 177;732
- Rubus pinnatus** Willd. 177;724;758
var. **afrotropicus** (Engl.) C.E. Gust. 177;729;732
- Rubus rigidus* Sm. 177
- Rubus** sp. 717;743
- Rubus steudneri** Schweinf. 177;612;725;726;732;734;737;739
var. **aberensis** Schweinf. 177;732;734
- Ruellia** L. 453
- Ruellia bignoniiflora** S. Moore 453
- Ruellia megachlamys* S. Moore 453
- Ruellia patula** Jacq. 453
- Ruellia prostrata** Poir. 453;695
- Ruellia** sp. 454
- Ruellia sudanica* (Schweinf.) Lindau 453
- Rumex** L. 94
- Rumex abyssinicus** Jacq. 94;731
- Rumex bequaertii* De Wild. 94
- Rumex nepalensis** Spreng. 94;731
- Rungia** Nees 454
- Rungia buettneri** Lindau 454;703
- Rungia grandis** T. Anderson 454;703
- Ruspolia** Lindau 454
- Ruspolia decurrens** (Nees) Milne-Redh. 454
- Rutaceae** Juss. 275;622
- Rutales** Perleb 275
- Rytigynia** Blume 346
- Rytigynia beniensis** (De Wild.) Robyns 632
- Rytigynia bugoiensis** (K. Krause) Verdc. 633
- Rytigynia butaguensis* (De Wild.) Robyns 633
- Rytigynia neglecta** (Hiern) Robyns 346;729
var. **neglecta** 346;729
- Rytigynia ruwenzoriensis** (De Wild.) Robyns 633
- Rytigynia* sp. near *umbellulata* (Hiern) Robyns 347
- Rytigynia umbellulata** (Hiern) Robyns 347;702
- S
- Saba** (Pichon) Pichon 319
- Saba comorensis** (Bojer) Pichon 319;631;698;699;702;703;712
var. **florida** (Benth.) K. Schum. 319;631;698;699;702;703;712
- Saba florida* (Benth.) Bullock 319;631
- Sacciolepis** Nash 586
- Sacciolepis auriculata* Stapf 586
- Sacciolepis indica** (L.) Chase 586;711
- Sagina** L. 90
- Sagina abyssinica** Hochst. ex A. Rich. 90;742
- Salacia** L. 259
- Salacia cerasifera** Welw. ex Oliv. 259;702
- Salacia elegans* auct., non Welw. ex Oliv. 259
- Salicaceae** Mirb. 237
- Salicales** Lindl. 237
- Salix** L. 237
- Salix mucronata** Thunb. 237
- Salix safsaf* Forssk. 237
- Salix subserrata* Willd. 237
- Salvia** L. 471
- Salvia nilotica** Juss. ex Jacq. 471;740
- Sanicula** L. 301
- Sanicula elata** Buch.-Ham. ex D. Don 301;731
- Sanicula europaea* auct., non L. 301
- Sanicula europaea* L. 301
var. **elata** (Buch.-Ham. ex D. Don) Wolff 301
- Sansevieria** Thunb. 503
- Sansevieria ehrenbergii** Schweinf. 503
- Sansevieria nilotica** Bak. 504;703
- Santalaceae** R. Br. 265
- Santales** Dumort. 263
- Sapindaceae** Juss. 285;624
- Sapindales** Dumort. 285
- Sapium** P. Browne 173
- Sapium ellipticum** (Hochst. ex Krauss) Pax 173;612;717

<i>Sapium mannianum</i> (Muell. Arg.) Benth. ex Pax	173	Schizachyrium Nees	586
Sapotaceae Juss.	304;627	Schizachyrium brevifolium (Sw.) Büse	586
Sarcocephalus Afzel. ex Sabine	347	var. <i>flaccidum</i> (A. Rich.) Stapf	586
<i>Sarcocephalus esculentus</i> Afzel. ex Sabine	347	<i>Schizoglossum angustissimum</i> K. Schum.	319
Sarcocephalus latifolius (Smith) E.A. Bruce	347;692	<i>Schizoglossum eximium</i> Schltr.	323
<i>Sarcocyphula gerrardii</i> Harvey	321	Schizostephanus Hochst. ex Benth. & Hook. f.	325
Sarcostemma R. Br.	324	Schizostephanus alatus K. Schum.	325;712
Sarcostemma viminale (L.) R. Br.	324;710	<i>Schmidelia rubifolia</i> A. Rich.	285
Sarraceniales Bromhead	88	Schoenoplectus Palla	542
Satureja L.	471	Schoenoplectus corymbosus (Roem. & Schult.) J. Raynal	542;740
Satureja abyssinica (Benth.) Briq.	471;724	var. brachyceras (Hochst. ex A. Rich.) Lye	542;740
<i>Satureja biflora</i> (Buch.-Ham. ex D. Don) Benth.	472	Schoenoplectus senegalensis (Steud.) J. Raynal	542
Satureja imbricata (Forssk.) Briq.	472;724;725;740;742;743	Schrebera Roxb.	315
<i>Satureja punctata</i> (Benth.) Briq.	472	Schrebera alata (Hochst.) Welw.	630
Satureja simensis (Benth.) Briq.	472;742	<i>Schrebera arborea</i> A. Chev.	315
Satureja sp.	472	Schrebera golungensis Welw.	315;630;701
Satyrium Sw.	520	<i>Schrebera macrantha</i> Gilg & Schellenb.	315
<i>Satyrium acutirostrum</i> Summerh.	520	<i>Scilla hyacinthina</i> (Roth) Macbr.	487
<i>Satyrium altherstonii</i> Rchb. f.	521	<i>Scilla indica</i> Roxb.	487
Satyrium carsonii Rolfe	520;724	<i>Scirpus</i> L., pro parte	540;542
<i>Satyrium coriophoroides</i> auct., non A. Rich.	520	<i>Scirpus brachyceras</i> Hochst. ex A. Rich.	542
Satyrium fimbriatum Summerh.	520;743	<i>Scirpus corymbosus</i> L.	542
<i>Satyrium occultum</i> Rolfe	521	<i>Scirpus corymbosus</i> (Roem. & Schult.) Heyne ex Roth, non L.	542
Satyrium sacculatum (Rendle) Rolfe	520;724	<i>Scirpus costatus</i> (A. Rich.) Boeck.	540
Satyrium sceptrum Schltr.	520;740	<i>Scirpus fluitans</i> L.	541
Satyrium sp.	521	<i>Scirpus inclinatus</i> (Del.) Aschers. & Schweinf.	542
Satyrium trinerve Lindl.	521;724	<i>Scirpus isolepis</i> (Nees) Boeck.	541
Satyrium volkensii Schltr.	521;724	Scleria Berg.	543
Saxifragales Dumort.	85	Scleria bulbifera A. Rich.	543
<i>Saxymolbium heudelotianum</i> (Decne.) Bullock	326	Scleria distans Poir.	543;731
Scadoxus Raf.	498	Scleria foliosa Hochst. ex A. Rich.	543;696
Scadoxus multiflorus (Martyn) Raf.	498;683;695	<i>Scleria hirtella</i> auct., non Sw.	543
subsp. multiflorus	498;683;695	Scleria hispidior (C.B. Clarke) Nelmes	543
Scadoxus puniceus (L.) Nordal & Friis	498;734	Scleria melanotricha Hochst. ex A. Rich.	543;711
Schefflera J. R. & G. Forster	296	<i>Scleria nutans</i> Willd. ex Kunth	543
Schefflera abyssinica (Hochst. ex A. Rich.) Harms	296;627;716;728;736;738	Scleria racemosa Boj.	544;696
Schefflera polysciada Harms	297	Scleria tessellata Willd.	544

Sclerocarya Hochst.	292	Selaginella molliceps Spring.	33;703
Sclerocarya birrea (A. Rich.) Hochst.	292;293;626;706;713	<i>Selaginella njamnjamensis</i> auct., non Hieron.	32
subsp. birrea	293;706;713	Selaginella njamnjamensis Hieron.	33;710;720
Scolopia Schreb.	117	Selaginella phillipsiana (Hieron.) Alston	34
Scolopia rhamniphylla Gilg	602	Selaginella sp.	34
Scolopia theifolia Gilg.	117	Selaginellaceae Mett.	32
Scrophulariaceae Juss.	422	Selaginellales Prantl	32
Scrophulariales Lindl.	422	Senecio L.	377
Scutellaria L.	472	<i>Senecio abyssinicus</i> A. Rich.	365
<i>Scutellaria paucifolia</i> Bak.	472	<i>Senecio bojeri</i> DC.	378
Scutellaria schweinfurthii Briq.	472;695	<i>Senecio denticulatus</i> auct., non Engl., nom. illeg.	377
subsp. paucifolia (Bak.) Paton	472	<i>Senecio discifolius</i> Oliv.	365
Scutia (DC.) Comm. ex Brongn.	268	<i>Senecio emilioides</i> Sch. Bip.	365
Scutia myrtina (Burm. f.) Kurz	268;702;737	<i>Senecio gabonicus</i> Oliv. & Hiern	378
Sebaea Soland. ex R. Br.	402	<i>Senecio mannii</i> Hook. f.	378
Sebaea pumila (Bak.) Schinz	402;711	<i>Senecio multicorymbosus</i> Klatt.	378
Secamone R. Br.	325	Senecio myriocephala Sch. Bip. ex A. Rich.	377;741
Secamone africana (Oliv.) Bullock	325;710	Senecio pachyrhizus O. Hoffm.	377
<i>Secamone mombasica</i> N.E. Br.	325	Senecio ragazzii Chiov.	377;742
Secamone parvifolia (Oliv.) Bullock	325	Senecio ruwenzoriensis S. Moore	378
<i>Secamone platystigma</i> K. Schum.	325	<i>Senecio subscandens</i> Hochst. ex A. Rich.	378
<i>Secamone schweinfurthii</i> K. Schum.	325	Senecio subsessilis Oliv. & Hiern	378
<i>Secamone zambeziaca</i> Schltr.	325	<i>Senecio trichopterygius</i> auct., non Muschl.	377
Securidaca L.	85	Senna Miller	182
Securidaca longipedunculata Fresen.	85;601;692	Senna bicapsularis (L.) Roxb.	182
Securidaca welwitschii Oliv.	85;717	Senna didymobotria (Fresen.) Irwin & Barneby	182;613;692
<i>Securinega</i> Commers. ex Juss.	167	Senna obtusifolia (L.) Irwin & Barneby	182
<i>Securinega virosa</i> (Roxb. ex Willd.) Baill.	167	Senna occidentalis (L.) Link	183
Seddera Hochst.	422	Senna petersiana (Bolle) Lock	183;698;722
Seddera bagshawei Rendle	422	Senna singueana (Del.) Lock	183;613
Sedum L.	88	Sericostachys Gilg & Lopr.	101
Sedum ruwenzoriense Bak.	88;741	Sericostachys scandens Gilg & Lopr.	101;729
Sehima Forssk.	586	Sesamum L.	435
Sehima nervosum (Rottler) Stapf	586;708;709	Sesamum angustifolium (Oliv.) Engl.	435
Selaginaceae Choisy	456	<i>Sesamum indicum</i> L.	435
Selaginella P. Beauv.	32	Sesamum orientale L.	435
Selaginella abyssinica Spring.	32;731	Sesbania Scop.	228
Selaginella cafferorum (Milde) Hieron.	32	<i>Sesbania hirticalyx</i> Cronq.	228
<i>Selaginella goudotiana</i> Spring	32	Sesbania macrantha Phil. & Hutch.	228
var. <i>abyssinica</i> Spring	32	var. macrantha	228
Selaginella kraussiana (Kunze) A. Br.	33;734		
Selaginella mittenii Bak.	33;703		

<i>Sesbania pachycarpa</i> auct., non DC., sensu str. 228		Sida paniculata L.	152
Sesbania rostrata Brem. & Oberm.	228	Sida rhombifolia L.	153
Sesbania sesban (L.) Merr.	228;617	<i>Sida spinosa</i> auct, non L.	152
var. nubica Chiov.	228	<i>Sida veronicifolia</i> auct., non Lam.	152
Sesbania tetraptera Bak.	228	<i>Sideroxylon brevipes</i> Bak.	308
Setaria P. Beauv.	586	<i>Sigesbeckia</i> L.	378
Setaria atrata Hack.	586;740	<i>Sigesbeckia abyssinica</i> (Sch. Bip.) Oliv. & Hiern	375
<i>Setaria aurea</i> A. Br.	589	Silene L.	90
Setaria barbata (Lam.) Kunth	587	Silene burchellii Otth ex DC.	90;742
<i>Setaria candula</i> Stapf	588	<i>Silene chirensis</i> A. Rich.	90
<i>Setaria chevalieri</i> Stapf	588;732	Simaroubaceae DC.	278;622
<i>Setaria ciliolata</i> Stapf & C.E. Hubb.	587	Simirestis N. Hallé	260
Setaria homonyma (Steud.) Chiov.	587	Simirestis brianii H. Hallé	260
Setaria incrassata (Hochst.) Hack.	587;708	<i>Simirestis graciliflora</i> (Oliv.) Wilczek	259
Setaria kagerensis Mez	587;697	Sinarundinaria Nakai	548;590
<i>Setaria kialaensis</i> Vanderyst	587	Sinarundinaria alpina (K. Schum.) Nakai	590;662;738;741
<i>Setaria lancea</i> Massey	587	Siphonochilus Wood & Franks	484
Setaria longiseta P. Beauv.	587	Siphonochilus aethiopicus (Schweinf.) B.L. Burt	484;695
<i>Setaria lynesii</i> Stapf & C.E. Hubb.	587	Siphonochilus brachystemon (K. Schum.) B.L. Burt	484;702
Setaria megaphylla (Steud.) T. Durand & Schinz	588;717;732	Siphonochilus kirkii (Hook. f.) B.L. Burt	485;695
<i>Setaria pallide-fusca</i> (Schumach.) Stapf & C.E. Hubb.	588	Smilacaceae Vent.	494
<i>Setaria plicatilis</i> (Hochst.) Engl.	588	Smilax L.	494
Setaria poiretiana (Schult.) Kunth	588;731	Smilax anceps Willd.	494;725;729
Setaria pumila (Poir.) Roem. & Schult.	588	<i>Smilax kraussiana</i> Meisn.	494
Setaria sagittifolia (A. Rich.) Walp.	589	Smithia Aiton	229
Setaria sphacelata (Schumach.) Moss 589;590;695;724;739;740		Smithia elliotii Bak. f.	229
var. aurea (A. Br.) W.D. Clayton	589	var. elliotii	229
var. sericea (Stapf) W.D. Clayton	589;724	<i>Smithia volkensii</i> Taub.	221
var. splendida (Stapf) W.D. Clayton	590	Solanaceae Juss.	412
<i>Setaria splendida</i> Stapf	590	Solanales Dumort.	412
<i>Setaria trinervia</i> Retz.	589	Solanecio (Sch. Bip.) Walp.	378
Setaria verticillata (L.) P. Beauv.	590	Solanecio angulatus (Vahl) C. Jeffrey	378
<i>Shuteria africana</i> Hook. f.	200	Solanecio mannii (Hook. f.) C. Jeffrey 378;634;717;737	
Sida L.	152	Solanum L.	413
Sida alba L.	152	Solanum aculeastrum Dunal	413;729
Sida cordifolia L.	152	Solanum aculeatissimum Jacq.	413
<i>Sida grewioides</i> Guill. & Perr.	152	Solanum americanum Mill.	413
<i>Sida humilis</i> auct., non Cav.	152	Solanum anguivi Lam.	414
Sida javensis Cav.	152;703		
Sida ovata Forssk.	152		

Solanum campylacanthum Hochst. ex A. Rich.	414	Spathodea campanulata P. Beauv. 433;699;703;716;717	
Solanum coagulans Forssk.	414	subsp. nilotica (Seem.) Bidgood	433;716
Solanum dasyphyllum Schumach. & Thonn.	414	<i>Spathodea nilotica</i> Seem.	433
<i>Solanum dubium</i> Fresen.	414	Spergula L.	601
<i>Solanum duplosinuatum</i> Klotzsch	414	Spergula arvensis L.	601;739
Solanum giganteum Jacq.	414;717	<i>Spergula fallax</i> sensu Andrews in FPS, non (Lowe) E.H.L. Krause	601
Solanum incanum L.	415	Spermacoce L.	347
<i>Solanum indicum</i> L., nom. rej.	414	Spermacoce chaetocephala DC.	347
subsp. <i>distichum</i> (Thonn.) Bitter	414	<i>Spermacoce hebecarpa</i> (A. Rich.) Oliv.	347
Solanum nigrum L. (sensu latior)	415	var. <i>major</i> Schweinf.	347
<i>Solanum nodiflorum</i> Jacq.	415	<i>Spermacoce kotschyana</i> Oliv.	347
<i>Solanum senegambicum</i> Dunal	414	Spermacoce minutiflora (K. Schum.) Verdc.	347
Solanum terminale Forssk.	415	Spermacoce ocymoides Burm. f.	348
subsp. <i>welwitschii</i> (C.H. Wright) Heine	415	Spermacoce princeae (K. Schum.) Verdc.	348
Solanum welwitschii C.H. Wright	415	var. princeae	348
var. <i>strictum</i> C.H. Wright	415	Spermacoce pusilla Wall.	348;724
Solenostomon Thonn.	473	Spermacoce sphaerostigma (A. Rich.) Vatke	348
Solenostomon autranii (Briq.) J.K. Morton	473;731;742	Sphaeranthus L.	379
Solenostomon latifolius (Benth.) J.K. Morton	473;717	Sphaeranthus randii S. Moore	379
Solenostomon porpeodon (Bak.) J.K. Morton	473;711	var. randii	379
Sonchus L.	379	Sphaeranthus suaveolens (Forssk.) DC.	379
Sonchus angustissimus Hook. f.	379	Sphaeranthus ukambensis Vatke & O. Hoffm.	380
Sonchus bipontini Asch.	379	Sphaerocodon Benth.	325
var. <i>glanduligerus</i> (R.E. Fr.) Robyns	379	Sphaerocodon caffrum (Meisn.) Schltr.	325;724
<i>Sonchus cornutus</i> Oliv. & Hiern	374	<i>Sphaerocodon obtusifolium</i> Benth.	325
<i>Sonchus elliotianus</i> Hiern	375	Sphaerothylax Bisch. ex Krauss	88
<i>Sonchus exauriculatus</i> (Oliv. & Hiern) O. Hoffm.	374	Sphaerothylax abyssinica (Wedd.) Warming	88
<i>Sonchus schweinfurthii</i> Oliv. & Hiern	379	<i>Spilanthes</i> Jacq., pro parte	380
Sopubia Buch.-Ham. ex D. Don	428	<i>Spilanthes acmella</i> auct., non L.	351
Sopubia ramosa (Hochst.) Hochst.	428;724;740	<i>Spilanthes caulirhiza</i> (Del.) DC.	351
Sorghum Moench.	591	<i>Spilanthes mauritiana</i> (L. C. Rich. ex Pers.) DC.	351
Sorghum arundinaceum (Desv.) Stapf	591	<i>Spondias microcarpa</i> A. Rich.	291
Sorghum purpureo-sericeum (A. Rich.) Asch. & Schweinf.	591	Sporobolus R. Br.	591
Sparrmannia L. f.	141	Sporobolus africanus (Poir.) Robyns & Tournay	591
Sparrmannia ricinocarpa (Eckl. & Zeyh.) O. Kuntze	141;153;739	Sporobolus angustifolius A. Rich.	591
Spathodea P. Beauv.	433	Sporobolus centrifugus (Trin.) Nees	591;720

- Sporobolus consimilis** Fresen. 592
Sporobolus cordofanus (Steud.) Coss. 592
Sporobolus festivus A. Rich. 592;721
Sporobolus fimbriatus (Trin.) Nees 592
Sporobolus helvolus (Trin.) T. Durand & Schinz 593;708
Sporobolus humifusus (Kunth) Kunth 592
var. *cordofanus* (Steud.) Massey 592
Sporobolus ioclados (Trin.) Nees 593;709
Sporobolus marginatus Hochst. 593;709
Sporobolus microprotus Stapf 593
Sporobolus olivaceus Napper 593;724
Sporobolus panicoides A. Rich. 593
Sporobolus pectinellus Mez 593;711
Sporobolus piliferus Kunth 593
Sporobolus pyramidalis P. Beauv. 594
Sporobolus robustus auct., non Kunth 592
Sporobolus scabriflorus Massey 593
Sporobolus scitululus W.D. Clayton 594
Sporobolus stapfianus Gand. 594
Stanfieldiella Brenan 482
Stanfieldiella imperforata (C.B. Clarke) Brenan 482;703
var. *glabrisepala* (De Wild.) Brenan 482;703
Steganotaenia Hochst. 301
Steganotaenia araliacea Hochst. 301;627;692;712
Steganthus welwitschii (Knobl.) Knobl. 315
Stegnogramma Blume 56
Stegnogramma pozoi (Lagasca) K. Iwats. 56;734
Stellaria L. 91
Stellaria mannii Hook. f. 91;703
Stemodiopsis Engl. 429
Stemodiopsis humilis Skan 429
Stemodiopsis rivae Engl. 429;711
Stenandriopsis S. Moore 454
Stenandriopsis guineensis (Nees) Benoist 454
Stenandrium Nees 454
Stenandrium guineense (Nees) Vollesen 454;703
Stephania Lour. 72
Stephania abyssinica (Dill. & A. Rich.) Walp. 72;726;729
Stephania cyanantha Welw. ex Hiern 72
Sterculia L. 146
Sterculia setigera Del. 146;608;712;713
Sterculia tomentosa Guill. & Perr. 146
Sterculiaceae (DC.) Bartl. 143;608
Stereospermum Cham. 434
Stereospermum kunthianum Cham. 434;692;693;714;715;718
Stictocardia Hall. f. 422
Stictocardia beraviensis (Vatke) Hall. f. 422;717
Stolzia Schltr. 521
Stolzia repens (Rolfe) Summerh. 521;734
Stomatanthes King & Robinson 366;380
Stomatanthes africana (Oliv. & Hiern) King & Robinson 380;721
Streblochaete Hochst. ex A. Rich. 594
Streblochaete longiarista (A. Rich.) Pilg. 594;734;739
Streptocarpus Lindl. 432
Streptocarpus elongatus Engl. 432;703
Streptogyna P. Beauv. 595
Streptogyna crinita P. Beauv. 595;703
Streptogyna gerontogea Hook. f. 595
Striga Lour. 429
Striga gesnerioides (Willd.) Vatke 429
Striga hermonthica Benth. 429
Striga orobanchoides (R. Br.) Benth. 429
Strombosia Blume 261
Strombosia grandifolia Hook. f. 261;701;717
Strombosia scheffleri Engl. 261;621;729
Strychnos L. 312
Strychnos gracillima Gilg 312
Strychnos henningsii auct., non Gilg 312
Strychnos holstii Gilg 312
Strychnos innocua Del. 312;629;693;694;713;714;715
Strychnos mitis S. Moore 312;629;701;734
Strychnos penduliflora Bak. 312
Strychnos spinosa Lam. 312;629;692
var. *pubescens* Bak. 312
Strychnos xerophila Bak. 312
Styasasia africana (S. Moore) S. Moore 436
Stylochaeton Lepr. 496

- Stylochaeton lancifolius** Kotschy & Peyr. 496
Stylosanthes Sw. 229
Stylosanthes bojeri Vogel 229
Stylosanthes flavicans Bak. 229
Stylosanthes fruticosa (Retz.) Alston 229
Stylosanthes mucronata Willd. 229
Suregada Roxb. ex Rottler 173
Suregada procera (Prain) Croizat 173;612;701;729
Swertia L. 403
Swertia eminii Engl. 403
Swertia fimbriata (Hochst.) Cufod. 403
Swertia schimperii (Hochst.) Griseb. 403;743
Swertia sp. cf. S. schimperii 403
Symphonia L. f. 606
Symphonia gabonensis (Vesque) Pierre 607
Symphonia globulifera L. f. 606
Synadenium Boiss. 173
Synadenium grantii Hook. f. 174
Synsepalum (A.DC.) Daniel 308
Synsepalum brevipes (Bak.) Pennington 308;628;701
Syzygium Gaertn. 126
Syzygium cordatum Hochst. ex Sond. 604
Syzygium guineense (Willd.) DC. 126;127;604;698;703;719;720;722;725;727;728;729;730;732;734;733;735;736;737
 subsp. **afromontanum** F. White 127;604;719;725;728;729;734;735;736;737
 subsp. **guineense** 126;604;698;703;725
 var. *guineense* 127
Syzygium owariense Benth. 604
- T
- Tabernaemontana** L. 319
Tabernaemontana holstii (K. Schum.) Engl. 319
Tabernaemontana pachysiphon Stapf 319;701
Tacazzea Decne. 326
Tacazzea conferta N.E. Br. 326;729
Tacazzea galactogoga Bullock 326
Tacazzea tomentosa E.A. Bruce 320
Tacca Forst. 507
Tacca leontopetaloides (L.) O. Kuntze 507;696
Tacca pinnatifida J.R. & G. Forst. 507
Taccaceae Dumort. 507
Tagetes L. 380
Tagetes minuta L. 380
Talinum Adans. 92
Talinum cafferum (Thunb.) Eckl. & Zeyh. 92;693
Talinum cuneifolium Willd. 92
Talinum portulacifolium (Forssk.) Schweinf. 92;693
Tamarindus L. 183
Tamarindus indica L. 183;613;707;713
Tapinanthus (Blume) Rchb. 264
Tapinanthus constrictiflorus (Engl.) Danser 264;734
Tapinanthus globiferus (A. Rich.) Tiegh. 264;710;723
Tapura Aubl. 178
Tapura fischeri Engl. 178;612;702
Tarenna Gaertn. 348
Tarenna graveolens (S. Moore) Bremek. 348;633;712
 var. **graveolens** 348;712
Tarenna pavettoides (Harv.) Sim 349;633;734
 subsp. **gillmanii** Bridson 349;734
Tarenna sp. 349
Teclea Del. 276
Teclea grandifolia Engl. 276
Teclea nobilis Del. 277
Tectaria Cav. 60
Tectaria angelicifolia (Schumach.) Copel. 60
Tectaria gemmifera (Fée) Alston 60;703;731
Tectaria nigrescens (Mett.) C. Chr. 60
Tephrosia Pers. 229
Tephrosia atrovioleacea Bak. f. 230
Tephrosia bracteolata Guill. & Perr. 229
Tephrosia dichroocarpa A. Rich., pro parte. 229
Tephrosia discolor E. Mey. 230
Tephrosia interrupta Engl. 229;230;617;725;729;738;739
 subsp. **interrupta** 229;729
 subsp. **mildbraedii** (Harms) Gillett 230
Tephrosia lebrunii Cronquist 230
Tephrosia linearis (Willd.) Pers. 230

<i>Tephrosia longipes</i> auct., non Meisn.	230	<i>Thelypteris bergiana</i> (Schlechtend.) Ching	54
<i>Tephrosia mildbraedii</i> Harms	230	<i>Thelypteris chaseana</i> Schelpe	55
<i>Tephrosia pulchella</i> Hook. f.	230	<i>Thelypteris dentata</i> (Forssk.) E. St. John	55
Tephrosia pumila (Lam.) Pers.	230;711	<i>Thelypteris gueinziana</i> (Mett.) Schelpe	55
var. pumila	231;711	<i>Thelypteris madagascariensis</i> (Fée) Schelpe	56
Tephrosia vogelii Hook. f.	231	<i>Thelypteris pozoi</i> (Lagasca) Morton	56
Teramnus P. Browne	231	<i>Thelypteris quadrangularis</i> (Fée) Schelpe	55
Teramnus micans (Bak.) Bak. f.	231	<i>Thelypteris striata</i> (Schumach.) Schelpe	56
Teramnus uncinatus (L.) Sw.	231	<i>Thelypteris totta</i> (Thunb.) Schelpe.	56
Terminalia L.	133	Themeda Forssk.	595
Terminalia brownii Fresen.		Themeda triandra Forssk.	595;708;709
	133;605;694;712;713;715	var. <i>hispida</i> Stapf	595
<i>Terminalia glaucescens</i> Planch.	134;689	Thesium L.	265
Terminalia laxiflora Engl. & Diels	134;605;712	Thesium schweinfurthii Engl.	265;724
Terminalia macroptera Guill. & Perr.	605	Thesium sp.	266
Terminalia mollis Laws.	134;693	Thesium sp. cf. T. leucanthum Gilg	266;724
Terminalia schimperiana Hochst.		Thesium stuhlmannii Engl.	266
	134;605;692;693;699	Thesium ussanguense Engl.	266
<i>Terminalia schweinfurthii</i> Engl. & Diels	134	Thonningia Vahl	266
Terminalia spinosa Engl.	135;692;706	Thonningia sanguinea Vahl	266;703
<i>Terminalia torulosa</i> F. Hoffm.	134	<i>Thonningia ugandensis</i> Hemsl.	266
Tetracera L.	114	Thunbergia Retz.	455
<i>Tetracera alnifolia</i> auct., non Willd.	114	<i>Thunbergia affinis</i> auct., non S. Moore	456
<i>Tetracera potatoria</i> auct., non Afzel. ex Don	114	Thunbergia alata Sims	455;729
Tetracera stuhlmanniana Gilg	114;702	Thunbergia battiscombei Turrill	455;695
Tetradenia Benth.	473	Thunbergia fasciculata Lindl.	455
Tetradenia riparia (Hochst.) Codd	473	Thunbergia vogeliana Benth.	456;702;729
Tetrapleura Benth.	198	Thymelaeaceae Juss.	110;601
Tetrapleura tetraptera (Schumach. & Thonn.)		Thymelaeales Willk.	110
Taub.	198;616;701	Tiliaceae Juss.	138;607
<i>Tetrapleura thonningii</i> Benth.	198	Tiliacora Colebr.	72
Tetrapogon Desf.	595	Tiliacora funifera (Miers) Oliv.	72;729
Tetrapogon cenchriformis (A. Rich.)		Tiliales Caruel	138
W.D. Clayton	595	<i>Tillaea alsinoides</i> Hook. f.	86
<i>Tetrapogon spathaceus</i> (Steud.) T. Durand &		Tinnea Hook. f.	474
Schinz	595	Tinnea aethiopica Hook. f.	474;692;712
Thalictrum L.	70	subsp. aethiopica	474;692
Thalictrum rhynchocarpum Dill. & A. Rich.		Tinospora Miers	72
	70;725;726;731	Tinospora caffra (Miers) Troupin	72;692
Theales Lindl.	124	Toddalia Juss.	276
Thelepogon Roem. & Schult.	595	<i>Toddalia aculeata</i> Pers.	276
Thelepogon elegans Roem. & Schult.	595	Toddalia asiatica (L.) Lam.	276;622;717;725;726;729
Thelypteridaceae Ching	54	<i>Toddalia nobilis</i> (Del.) Hook. f.	277
<i>Thelypteris afra</i> (Christ) Reed	56		

- Tolpis** Adans. 380
Tolpis capensis (L.) Sch. Bip. 380
Torenia L. 429
Torenia thouarsii (Cham. & Schlechtend.)
 O. Kuntze 429
Torilis Adans. 301
Torilis arvensis (Huds.) Link 301;731
 subsp. **heterophylla** (Guss.) Thell. 301;731
Trachypogon Benth. 485
Trachypogon braunianum (K. Schum.)
 Bak. 485;703
Trachypogon Nees 596
 Trachypogon plumosus Nees 596
Trachypogon spicatus (L. f.) O. Kuntze 596;720
Tragia L. 174
Tragia brevipes Pax 174;703
 Tragia natalensis Sond. 175
Tragia tenuifolia Benth. 174;703
Tragia volubilis L. 174;703
Tragiella Pax & K. Hoffm. 175
Tragiella natalensis (Sond.) Pax &
 K. Hoffm. 175
Tragus Haller 596
Tragus berteronianus Schult. 596
Trema Lour. 240
 Trema guineensis (Schumach.) Ficalho 241
Trema orientalis (L.) Blume
 240;618;703;710;729;738
Tribulus L. 102
Tribulus terrestris L. 102
Tricalysia A. Rich. ex DC. 349
 Tricalysia djurensis Hiern 349
Tricalysia niamniamensis Hiern 349;717;758
 var. **djurensis** (Hiern) Robbr. 349;717;758
 var. **niamniamensis** 349;717
Trichilia P. Browne 283
Trichilia dregeana Sond. 283;624;701
Trichilia emetica Vahl 283;706;709
 subsp. **emetica** 283
Trichilia prieuriana A. Juss. 284;698;701;717
 Trichilia roka Chiov. 283
Trichilia rubescens Oliv. 624
 Trichilia splendida A. Chev. 283
 Trichilia volkensis Guerke 282
Trichocladus Pers. 237
Trichocladus ellipticus Eckl. & Zeyh.
 237;729;734;738
 subsp. **malosanus** (Bak.) Verdc.
 237;729;734;738
Trichocladus malosanus Bak. 237
Trichodesma R. Br. 412
Trichodesma physaloides (Fenzl) A. DC.
 412;695
Trichodesma zeylanicum (Burm. f.) R. Br. 412
 Tricholaena rosa Nees 574
 Tricholaena sphacelata Benth. 574
Trichomanes L. 36
 Trichomanes africanum Christ 36
 Trichomanes melanotrichum Schlechtend. 36
Trichomanes pyxidiferum L. 36;729;734
 var. **melanotrichum** (Schlechtend.)
 Schelpe 36;729;734
Tricliceras Thonn. ex DC. 75
Tricliceras lobatum (Urb.) R. Fernandes
 75;696
Tridax L. 381
Tridax procumbens L. 381
Trifolium L. 231
Trifolium elgonense Gillett 231;742;743
Trifolium multinerve A. Rich. 231;721;743
Trifolium polystachyum Fresen. 232;740;743
Trifolium rueppellianum Fresen. 232;740
Trifolium simense Fresen. 232;740
Trifolium usambarense Taub. 232
Trilepisium Thouars 250
Trilepisium madagascariense DC. 250;620;701
Trimeria Harvey 603
Trimeria grandifolia (Hochst.) Warb. 603
 subsp. **tropica** (Burkill) Sleumer 603
Tripogon Roem. & Schult. 596
Tripogon major Hook. f. 596;743
 Tripogon snowdenii C.E. Hubb. 596
Tristichia Thouars 88
 Tristichia hypnoides (St.-Hil.) Spreng. 88
Tristichia trifaria (Bory ex Willd.) Spreng. 88
Triumfetta L. 141
Triumfetta annua L. 141

- Vangueria volkensii** K. Schum. 350;722
 var. **volkensii** 350;722
Vellozia sp. 507
Velloziaceae Endl. 507
Vepris Comm. ex A. Juss. 276
Vepris glomerata (F. Hoffm.) Engl. 276;693
 var. **glabra** Kokwaro 276;693
Vepris grandifolia (Engl.) Mziray 276;701
Vepris nobilis (Del.) Mziray 277;622;701;712;715;717;734;736
Verbascum L. 430
Verbascum brevipedicellatum (Engl.)
 Hub.-Mor. 430;724
Verbascum schimperi Skan 430
Verbascum scrophulariaefolia (A. Rich.)
 Hub.-Mor. 430;743
Verbenaceae Jaume St-Hill. 457
Vernonia Schreb. 381
Vernonia adoensis Sch. Bip. ex Walp. 381;634;725
Vernonia ampla O. Hoffm. 383
Vernonia amygdalina Del. 381;634;692;712;726;732
Vernonia auriculifera Hiern 634
Vernonia biafrae Oliv. & Hiern 382;729
Vernonia campanea S. Moore 382
Vernonia cistifolia O. Hoffm. 382
Vernonia duemmeri S. Moore 384
Vernonia glabra (Steetz) Vatke 382
 var. *hillii* (Hutch. & Dalziel) D. Adams 382
Vernonia hochstetteri Sch. Bip. 382;696
 var. **hochstetteri** 382
Vernonia infundibularis Oliv. & Hiern 634
Vernonia inulifolia Steud. 384
Vernonia ituriensis Muschl. 382;729
Vernonia jugalis Oliv. & Hiern 382
Vernonia karaguensis Oliv. & Hiern 382;696;724;725
Vernonia lasiopus O. Hoffm. 383
 var. **lasiopus** 383
Vernonia leptolepis O. Hoffm. 382
Vernonia myriantha Hook. f. 383;726;732
Vernonia myriocephala A. Rich. (1847), non
 DC. (1836) 385
Vernonia perrottetii Sch. Bip. ex Walp. 383
Vernonia podocoma Sch. Bip. ex Vatke. 383
Vernonia pumila Kotschy & Peyr. 383;695
Vernonia purpurea Sch. Bip. ex Walp. 384;696;724;725
Vernonia richardiana (O. Kuntze.) Pic. Serm. 385
Vernonia sassureoides Hutch. 634
Vernonia schweinfurthii Oliv. & Hiern 384
Vernonia seretii De Wild. 385
Vernonia smithiana Less. 384;696
Vernonia sp. 386
Vernonia sp. aff. **V. adolfi-friderici** Muschl. 725
Vernonia stipulacea Klatt. 383
Vernonia subuligera O. Hoffm. 383
Vernonia syringifolia O. Hoffm. 385
Vernonia theophrastifolia Schweinf. ex
 Oliv. & Hiern. 385;696;726
Vernonia thomsoniana Oliv. & Hiern.
 ex Oliv. 385
Vernonia tufnelliae S. Moore 382
Vernonia turbinata Oliv. & Hiern 385
Vernonia wollastonii S. Moore 386;729
Veronica L. 430
Veronica abyssinica Fresen. 430;739
Vicia L. 233
Vicia hirsuta (L.) S.F. Gray 233;743
Vicia sativa L. 233;743
 var. **angustifolia** L. 233;743
Vigna Savi 233
Vigna ambacensis Bak. 233;711
Vigna comosa Bak. 233;724
Vigna esculenta (De Wild.) De Wild. 234
Vigna fragrans Bak. f. 234
Vigna frutescens A. Rich. 234;696;724;758
 subsp. **frutescens** 234;696
 var. **frutescens** 234;696
 subsp. **kotschyi** (Schweinf.) Verdc. 234;724;758
Vigna heterophylla A. Rich. 234
Vigna kotschyi Schweinf. 234
Vigna luteola (Jacq.) Benth. 234;724
Vigna macrorhyncha (Harms) Milne-Redh. 235
Vigna membranacea A. Rich. 235

<i>Wissadula amplissima</i> (L.) R.E. Fr.	153	Xyris capensis Thunb.	482;740
var. <i>rostrata</i> (Schumach. & Thonn.)		<i>Xyris</i> sp., sensu FPS	482
R.E. Fr.	153	Xyris straminea Nilss.	482;721
<i>Wissadula hernandioides</i> (L'Hér.) Garcke	153	Xysmalobium R. Br.	326
var. <i>rostrata</i> (Schumach. & Thonn.)		Xysmalobium heudelotianum Decne.	326
R.E. Fr.	153	<i>Xysmalobium reticulatum</i> N.E. Br.	326
Wissadula rostrata (Schumach. & Thonn.)			
Hook. f.	153;703		
Withania Pauq.	416		
Withania somnifera (L.) Dunal	416		
<i>Wormskjoldia</i> Thonn. in Schumach. &			
Thonn.	75		
<i>Wormskjoldia lobata</i> Urb.	75		
Wurmbea Thunb.	488		
Wurmbea tenuis (Hook. f.) Bak.	488;739		
subsp. <i>hamiltonii</i> (Wendelbo) B. Nord.	488;739		
	X		
<i>Xeromphis nilotica</i> (Stapf) Keay	328		
Xerophyta Juss.	507		
Xerophyta simulans L.B. Smith & Ayensu			
	507;710		
Ximenia L.	262		
Ximenia americana L.	262;621;712		
var. <i>americana</i>	262		
var. <i>caffra</i> (Sond.) Engl.	262		
<i>Ximenia caffra</i> Sond.	262		
var. <i>caffra</i>	262		
Xylopia L.	66		
<i>Xylopia antunesii</i> Engl. & Diels	66		
var. <i>shirensis</i> Engl. & Diels	66		
<i>Xylopia holtzii</i> Engl.	66		
Xylopia parviflora (A. Rich.) Benth.			
	66;698;717		
<i>Xylopia vallottii</i> Hutch. & Dalziel	66		
Xymalos Baill.	66		
Xymalos monospora (Harv.) Baill. ex Warb.			
	66;600;734		
Xyridaceae C. Agardh	482		
Xyridales Lindl.	482		
Xyris L.	482		
		Z	
		<i>Zamiaceae</i> Rchb.	61
		Zanha Hiern	288
		Zanha golungensis Hiern	288;625;698;701
		Zanthoxylum L.	277
		<i>Zanthoxylum</i> ? <i>macrophyllum</i> Oliv., non Miq.	278
		Zanthoxylum cf. <i>gilletii</i>	716
		Zanthoxylum chalybeum Engl.	277;693
		var. <i>molle</i> Kokwaro	277
		Zanthoxylum gilletii (De Wild.) Waterm.	
			278;622;734
		Zanthoxylum leprieurii Guill. & Perr.	278
		Zanthoxylum sp.	278;701;731
		Zehneria Endl.	123
		<i>Zehneria micrantha</i> Hook. f. (1871), non	
		F. Muell. (1860)	123
		Zehneria minutiflora (Cogn.) C. Jeffrey	123
		Zehneria scabra (L. f.) Sond.	123
		Zehneria thwaitesii (Schweinf.) C. Jeffrey	
			123;692
		Zingiberaceae Lindl.	483
		Zingiberales Griseb.	483
		Ziziphus Mill.	268
		Ziziphus abyssinica Hochst. ex A. Rich.	
			268;622;692;712
		Ziziphus mauritiana Lam.	269
		Ziziphus mucronata Willd.	622
		subsp. <i>mucronata</i>	622
		Ziziphus pubescens Oliv.	269;693
		Zornia Gmel.	236
		<i>Zornia diphylla</i> auct., non (L.) Pers.	237
		Zornia glochidiata DC.	236
		Zornia pratensis Milne-Redh.	237
		subsp. <i>pratensis</i>	237
		Zygophyllaceae R. Br.	102

General guidelines

The Academy invites original papers that contribute significantly to research carried on in Denmark. Foreign contributions are accepted from temporary residents in Denmark, participants in a joint project involving Danish researchers, or those in discussion with Danish contributors.

Instructions to authors

Manuscripts from contributors who are not members of the Academy will be refereed by two members of the Academy. Authors of papers accepted for publication will receive galley proofs and page proofs; these should be returned promptly to the editor. Corrections other than of printer's errors will be charged to the author(s) insofar as the costs exceed 15% of the cost of typesetting.

Authors receive a total of 50 free copies. An order form, quoting a special price for additional copies, will accompany the page proofs. Authors are invited to provide addresses of up to 20 journals to which review copies could profitably be sent.

Manuscripts can be returned, but only upon request made before publication of the paper. Original photos and artwork are returned upon request.

Manuscript

General. – Manuscripts and illustrations must comply with the details given below. The original manuscript and illustrations plus one clear copy of both should be sent to the editor of the series. Manuscripts on digital media are accepted; contact the editor in advance, giving technical specifications.

A manuscript should contain no less than 48 printed pages. This also applies to the *Mat.fys.Medd.* where contributions to the history of science are welcome.

Language. – Manuscripts in Danish, English, German and French are accepted; in special cases other languages too. Linguistic revision may be made a condition of final acceptance.

Title. – Titles should be kept as short as possible, preferring words useful for indexing and information retrieval.

Abstract, Summary. – An abstract in English is required. It should be of 10-15 lines, outline main features, stress novel information and conclusions, and end with the author's name, title, and institutional and/or private postal address. – Papers in Danish must be provided with a summary in another language as agreed between author and editor.

Manuscript. – Page 1 should contain title, author's name and the name of the Academy. Page 2: Abstract, author's name and address. Page 3: Table of contents if necessary. Consult a recent issue of the series for general layout. Indicate the position of illustrations and tables. A printout must accompany manuscripts submitted electronically.

Figures. – All illustrations submitted must be marked with the author's name. It is important that the illustrations are of the highest possible quality. Foldout figures and tables should be avoided.

References. – In general, the editor expects all references to be formally consistent and in accordance with accepted practice within the particular field of research. Bibliographical references should be given in a way that avoids ambiguity.

Det Kongelige Danske Videnskabernes Selskab
The Royal Danish Academy of Sciences and Letters
Priser ekskl. moms/Prices excl. VAT

Biologiske Skrifter, BS
Biol.Skr.Dan.Vid.Selsk.

Vol.		DKK	Vol.		DKK
46	ANDERS S. BARFOD & LARS PETER KVIST: <i>Comparative Ethnobotanical Studies of the Amerindian Groups in Coastal Ecuador</i> . 1996. 166 p.	300.-	51:2	IB FRIIS: <i>Flora of the Sudan-Uganda border area east of the Nile</i> . 2005. Vol. 2. 466 pp.	600.-
47	BERTEL HANSEN, KAI LARSEN & SVEN-ERIK SANDERMANN OLSEN: <i>Protologues in seed catalogues from Botanic Garden Copenhagen 1843-1875</i> . 1997. 52 pp.	90.-	52	BENT CHRISTENSEN & KLARA DOZSA-FARKAS: <i>The Enchytraeid Fauna of the Palearctic Tundra</i> . 1999. 48 pp.	80.-
48	MICHAEL HANSEN: <i>Phylogeny and classification of the staphyliniform beetle families (Coleoptera)</i> . 1997. 339 pp.	600.-	53	JØRGEN OLESEN: <i>External morphology and larval development of Derocheilocaris remanei Delamare-Deboutteville & Chappuis, 1951. (Crustacea, Mystacocarida) with a comparison of crustacean segmentation and tagmosis patterns</i> . 2000. 60 pp.	100.-
49	<i>In Search of a New Biomembrane Model</i> . An International Symposium, The Royal Danish Academy of Sciences and Letters, August 13-16, 1997. Edited by Ole G. Mouritsen and Olaf Sparre Andersen. 1998. 214 pp. 50 figures	200.-	54	<i>Biodiversity Research in the Horn of Africa Region</i> . Proceedings of the Third International Symposium on the Flora of Ethiopia and Eritrea at the Carlsberg Academy, Copenhagen, August 25-27, 1999. Edited by Ib Friis and Olof Ryding. 2001. 439 pp.	500.-
50	NILS MØLLER ANDERSEN: <i>Water Striders from the Paleogene of Denmark with a review of the fossil record and evolution of semiaquatic bugs (Hemiptera, Gerromorpha)</i> . 1998. 157 pp. 123 fig.	200.-	55	<i>Plant Diversity and Complexity Patterns. Local, Regional and Global Dimensions</i> . Proceedings of an international symposium held at the Royal Danish Academy of Sciences and Letters in Copenhagen, Denmark, 25-28 May, 2003. Edited by Ib Friis and Henrik Balslev. 2005. 603 pp. 174 fig.	600.-
51:1	IB FRIIS: <i>Flora of the Sudan-Uganda border area east of the Nile</i> . 1998. Vol. 1. 389 pp.	600.-			