

THE DISTRIBUTION WITHIN DENMARK OF THE HIGHER PLANTS

RESULTS OF THE
TOPOGRAPHIC-BOTANICAL INVESTIGATION

II. THE DISTRIBUTION OF THE PAPILIONACEÆ WITHIN DENMARK

WITH NINE PLATES

BY

KNUD JESSEN

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When the Committee of the Topographic-Botanical Investigation of Denmark is now going to commence the publication of the plant-geographical material collected in its registers, the aim is twofold. First and foremost these papers should serve to deepen and render clear our conceptions of the distribution of the higher plants within the boundaries of the country, and the *Papilionaceæ* have been chosen as the first group to be dealt with, because the most extreme types of distribution in Denmark together with several transitional types are to be found within this family. But in addition the publication of a large number of maps showing the distribution of the various species in Denmark is intended to supply plant-geographers in other countries with a material which will be of importance in connection with the already existing or future mapping of the distribution of the species in the other European countries.

The number of species included here is about the same as that found in C. RAUNKJÆR, Dansk Ekskursionsflora 1922, certain cultivated species of the genera *Pisum* and *Vicia* having, however, been left out. The genera as well as the species within each genus have been arranged alphabetically. The descriptions of the geographical conditions of the various species have been uniformly subdivided. After the systematical and Danish names follows a brief statement of the literature used for the description. Here especially the principal floristic works containing information of the distribution of the species have been enumerated; the copious Danish special floristic literature has, as regards its statements of localities, been utilised in the registers of the Topographic-Botanical Investigation, and the localities have been inserted on the maps; so of this literature only the works that have been specially used are cited in each case. Under the heading "Geographical Distribution" the total distribution of the species is first given, and then, more particularly, its occurrence in our neighbouring countries. Under "Occurrence in Denmark" the distribution of the species in our country and the nature of its habitats are stated. If the species occurs in special forms, these are mentioned, particularly if they present facts of plant-geographical interest. As finds of fossils belonging to the family here under consideration have not been made in Denmark, conclusions as to the ways and time of the migration of the species can only be based on plant-geographical data.

In the introduction Professor C. H. OSTENFELD has given an account of the various ways in which the material of the Topographic-Botanical Investigation has

been procured. It can hardly be otherwise than that a part of this material, particularly that based on the flora lists sent in by amateurs, has occasionally been encumbered with errors which it has not always been easy to avoid. Thus the statements as to the degree of frequency are widely discordant, and the conception as to whether a species is wild, may be uncertain. On the whole, however, the large amount of freely contributed work, to which the application of the Committee has given rise all over the country, has increased our knowledge of the distribution of the higher plants to such an extent that, without it, it would have been unsatisfactory to attempt to carry through the work now commenced, viz. the mapping of all the species unequally distributed in our country. However, our knowledge of the distribution of several species, not only the critical ones, is still deficient in various parts of the country, and the continued collecting of notes on the localities of the species will be necessary.

The value of this series of publications will in the first instance depend on the maps. Through these maps our conception of the distribution of the species within Denmark should find the most precise expression hitherto given to it, and it is to be expected that as they increase in number, and the mapping of the distribution of the higher plants proceeds in our neighbouring countries also, the maps will become aids by means of which we may gain a more thorough understanding of the factors conditioning the distribution of the species.

I wish here to express my best thanks to Mr. WIINSTEDT, Curator of the Botanical Museum for much valuable information given me during the preparation of this paper.

Anthyllis vulneraria L. — Gul Rundbælg.

J. LANGE 1886—88, 824. RAUNKJER 1922, 191. MÖLLER-HOLST V, 1882, 101. JESSEN & LIND 1923, 175, 121. STEFÁNSSON 1924, 158. ASCHERSON & GRAEBNER 1906—1910, 620. HEGI IV, 3, 1355. BLYTT 1906, 454. LINDMANN 1926, 382. ANDERSSON & BIRGER 1912, 337, map. 8. HJELT. 1919, 282 f.

Geographical Distribution. European, West Asiatic, North African perennial herb. Occurs almost throughout the whole of Europe with the exception of the extreme northern regions, is found in Iceland, but not on the Faroes; extends eastward to the Caucasus and western Asia, southward to the Sahara and Abyssinia. — In Norway it extends from the sea some way into the birch belt to 70° N. lat.; in northern Sweden it is found scattered on mountain sides exposed toward the south, "Sydberg", and further in places where it is possibly anthropochorous; in Finland it (including *f. affinis*) extends northeastward to 67° 45' N. lat.

Occurrence in Denmark. It is found in all districts of the country, generally it is common, though somewhat less frequent in the eastern tracts on moraine clay. It grows particularly on dry and sandy hills and fields, where the cover of vegetation is not too dense, and on grey dunes. Further it is rather commonly sown

in fields laid down in grass. The cultivation of it in this country was commenced shortly before the middle of last century.

Anthyllis vulneraria occurs in several forms. In the dunes there are found very hairy forms, especially *f. maritima* SCHWEIGG., with pale yellow flowers, known e. g. from the west coast of Jutland, Læsø, Tisvilde, and Kikhavn. Further, *f. coccinea* L. (= *rubriflora* D. C.), which has a deep red corolla; it is known in this country from the east coast of Bornholm only, in the region between Gudhjem and the Randkløveskaar; otherwise e. g. from Oeland, Gothland, Sild, and Great Britain.

The species has probably immigrated into Denmark in early post-glacial time.

Astragalus danicus Retz. — Dansk Astragel.

J. LANGE 1886—88, 854. RAUNKJÆR 1922, 191. ASCHERSON & GRAEBNER 1906—1910, 774. HEGI IV, 3, 1410 (map), 1428. BENTHAM & HOOKER 1920, 117. LINDMAN 1926, 383. SEGERSTAD 1924, 150.

Geographical Distribution. A West Asiatic, East and Central European perennial herb, also found in Great Britain, and recorded from North America. More precisely it extends from the Baikal area and Dzungaria in Asia southward to the Caucasus, and thence sporadically through Central Europe, as for instance Hungary, Poland, Bohemia, Germany, the southwestern Alps (Dauphiné and Provence); northward it occurs in Ingria, the Onega Valley (absent from Finland), Esthonia and Oesel, Gothland, Scania, Denmark, southern Scotland, eastern and northern England, and occasionally on the west coast of Ireland.

In northern Germany it grows on sunny hills, in light forests, and along the roadsides; in the Rhine area almost as far north as Coblenz; in the Elbe area in the region round Magdeburg; and along the Oder, especially along its lower course; further very sporadically in East and West Prussia, where it is assumed to have been introduced with clover seeds from America. In no part of Germany does it extend to the Baltic.

In Sweden *Astragalus danicus* is found in littoral meadows at Kalmar and between Malmö and Lomma on the west coast of Scania, where it has been known for more than half a century; further on Varvsholmen at Klintehamn on Gothland, and in ruderal habitats near Falkenberg in Halland.

Occurrence in Denmark. (Fig. 33, Pl. X). Its area in Denmark chiefly comprises the regions round the southern part of the Cattegat, the tract from Djursland across Samsø to North Funen; on the north coast of Seeland as far as Tisvilde, whence it spreads towards the south along the west coast of Seeland to Basnæs, as also inland along the Isefjord and the Roskilde Fjord, where it approaches the localities round Copenhagen and the locality at the Korporalskro at Køge Bay known from earlier times. A find, not confirmed in recent times, is HYBERTZ' record of it on the Skovbrink on Ærø. This species nearly always grows in the vicinity of the sea, most frequently on littoral pastures and uncultivated hills and slopes,

but may also be met with at some distance from the coast, thus for instance on the hills at Jyderup and Bjergsted and in other places in Seeland; it is then not actually halophilous, but very tolerant of the presence of salt; in Central Europe it is often associated with calcareous, gypsiferous, and saline soil.

In Central Europe the species is very unequally distributed, and occurs in more or less isolated areas, of which the Danish-Scanian is the most northerly. Presumably the species has immigrated from the south, most probably from the region round the mouth of the river Oder, but it is a remarkable fact that it is almost entirely absent from our southern islands. Possibly it has had a more continuous distribution in the post-glacial period of warmth, and now only remains in particularly favourable localities (cfr. p. 68). HEGI states that it frequently fructifies poorly near the boundaries of its area of distribution; among the specimens from Denmark kept in the herbarium of the University of Copenhagen, there are two with well-developed husks and seeds, namely from Bederslev (district 29¹) and from Basnæs (district 41) respectively, both collected in the month of July, while nearly all the other specimens have been collected in June.

Astragalus glycyphyllus L. — Söd Astragel.

J. LANGE 1886—88, 856. RAUNKJÆR 1922, 191. ASCHERSON & GRAEBNER 1906—1910, 760. HEGI, IV, 3, 1420. BENTHAM & HOOKER 1920, 117. LINDMAN 1926, 383. SEGERSTAD 1924, 87, 88 (map of South Sweden). ANDERSSON & BIRGER 1912, 91, 343 (map 11, North Sweden). BLYTT 1906, 463.

Geographical Distribution. West Asiatic, European perennial herb, occurring in the greater part of Europe, but rare in the Mediterranean region, where it is restricted to the mountains; it is absent from the southern part of the Balkan Peninsula, the Italian islands, and Ireland, and is uncommon in England and Scotland; extends northward as far as Trondhjem Fjord (63° 37' N. lat.) and Jemtland (64° N. lat.), Oesel, Esthonia, and Ingria (absent from Finland); in western Asia to Altai, Dzungaria, the countries round the Caucasus, and Asia Minor.

In northern Germany the species is usually rather common in light forests, especially below oak-trees, in meadow-scrubs, hedgerows, and the edges of woods, but is rare in the northwestern part of the lowland, and is absent from the islands of the North Sea. SEGERSTAD has mapped its distribution in southern Sweden, where it is fairly common on shrubby hills, particularly below oak-trees and in meadows; it is, however, absent over wide stretches of the interior of the country, in the most oligotrophic regions. In Norway the species is rather common east of the mountains as far as Slidre and Lillehammer, but is of rare occurrence along the south coast to Jæderen; west of the mountains northward to Trondhjem Fjord it is only found occasionally. In Norway as in northern Sweden

¹) As to the position of the districts see C. H. OSTENFELD: A brief historical survey of the investigation, this volume III, 1, p. 9—15, Plate I.

(see map by ANDERSSON & BIRGER) the species thus chiefly occurs in the interior far from the coast.

Occurrence in Denmark. (Fig. 13, Pl. V). In the east of Denmark it is usually rather common in coppices and light woods, along fences and in roadside ditches. It is its demand for not excessively meagre or acid soil and suitable illumination that conditions its distribution and occurrence in this country. Thus it is entirely absent, or very rare, in the western and northern parts of Jutland, not even in the oak scrubs does it feel at ease, and only in the regions with a more fertile soil by the western part of the Limfjord and in northern Vendsyssel does it occur in a number of localities.

The plant has big and heavy seeds, which are apparently not suitable for dispersal over great distances. Its immigration into Denmark may be assumed to have taken place from the south and southeast, partly along the east coast of the peninsula and partly across the valley of the Baltic during the maximum of the post-glacial uplift.

Coronilla emerus L. — Koronille-Busk.

RAUNKJÆR 1922, 192. O. G. PETERSEN 1916, 317. ASCHERSON & GRAEBNER 1906—1910, 858. HEGI IV, 3, 1467, map of the distribution in Central Europe, fig. 1506. LINDMAN 1926, 385. BLYTT 1906, 474.

Geographical Distribution. West Asiatic, South and Central European shrub, which extends northward to southwestern Germany, the Alpine regions, and the Carpathians; further cultivated here and there as an ornamental plant, and sometimes growing as wild in more northerly regions as far as southern Scandinavia. Thus it is occasionally met with on limestone cliffs on Oeland and Gothland, as also at Kragerø and in Bamle in southern Norway, growing in dry coppices and screes, in places very abundantly.

Occurrence in Denmark. The plant has been found in some few places in Seeland, viz. in the forests of Frederiksdal (1841), of Gjorslev (1867), and of Tisvilde (1892), in ruderal habitats near Copenhagen (1928), and finally in the southeastern part of Funen in hedges at the Bjørnemose (1905). Presumably it has escaped to these places from gardens, where it is occasionally cultivated as an ornamental shrub.

Coronilla varia L. — Broget Kronært.

RAUNKJÆR 1922, 192. ASCHERSON & GRAEBNER 1906—1910, 855. HEGI IV, 3, 1473, map of the distribution in Central Europe, fig. 1506. PRAHL 1890, 43. BLYTT 1906, 474.

Geographical Distribution. West Asiatic and South and eastern Central European perennial herb, extending northward to northern France and northern Germany; in Belgium, Holland, northwestern Germany and in the countries north of the Baltic it is very rare and only anthropochorous; also in the Mediterranean

area proper the species is rare; naturalised in North America. In Central Europe its northern limit runs from the Loraine Jura Mountains through Wesel at the Lower Rhine, Westphalia, the Harz, the western part of Mark Brandenburg (Neuhaldensleben), Schwerin, Stettin, and onward along the coast of the Baltic, which, however, it fails to reach. In northern Germany the species grows in coppices and along the edges of woods and roadsides, but is frequently sown with grass-seeds and, more particularly, with Red Clover seed on cultivated fields, railway slopes, and in waste places, and at the present time is spreading rapidly; here it is perhaps not indigenous too. It is not mentioned in the Swedish floras, but is recorded from Oslo and Bergen as having been casually introduced.

Occurrence in Denmark. The plant has occasionally been collected in ruderal habitats in the Copenhagen Free Port (1900, 1921), in Odense harbour (1915), and at Esbjerg (1916); further it has been found in several places in woods, thus in the region round Langesø near Odense, where it had maintained itself for 20 years, in Hunderup Wood at Odense (1906), and in Højen Wood near Vejle, where it was growing among firs (1917); in all these places, however, its occurrence is probably due to the activity of man.

Cytisus elongatus W. et Kit.

J. LANGE 1886—88, 882. C. RAUNKJÆR 1922, 185. O. G. PETERSEN 1916, 307. ASCHERSON & GRAEBNER 1906—1910, 325.

Geographical Distribution. Shrub, growing wild on rocks and in coppices in southern France (possibly only escaped from cultivation) and in Ungarn, i. e. in parts of the area of the main species (*C. hirsutus* L.). Otherwise it is frequently cultivated in gardens for ornament.

Occurrence in Denmark. About the same as that of *C. supinus*; specimens run wild have been found e. g. in the woods at Corselitze on the island of Falster in 1862, in Ebberup Kohave on Funen, and at Farum in 1863.

Cytisus laburnum L. — Almindelig Guldregn.

(*Laburnum vulgare* GRISEB.).

J. LANGE 1886—88, 821. RAUNKJÆR 1922, 185. O. G. PETERSEN 1916, 304. ASCHERSON & GRAEBNER 1906—1910, 271. HEGI IV, 3, 1162.

Geographical Distribution. Tree, growing wild in light woods in the Central European mountain regions from the French Jura Mountains to Herzegovina, Servia, and Bulgaria; moreover frequently met with planted and run wild as far as southern Sweden.

Occurrence in Denmark. Generally planted in gardens, parks, and hedges; occurs in nearly all districts, most commonly in the fertile parts of the country; may also be observed escaped from cultivation.

Cytisus supinus L.*(C. capitatus* JACQ.).

J. LANGE 1886—88, 821. RAUNKJÆR 1922, 185. O. G. PETERSEN 1916, 307. ASCHERSON & GRAEBNER, 1906—1910, 327. HEGI IV, 3, 1175, map of the distribution in Central Europe, fig. 1322.

Geographical Distribution. Pontine shrub, extending from the regions round the Black Sea, Asia Minor included, through nearly the whole area along the Danube, the northern Balkan States, and South Russia to Poland, the upper parts of the rivers Oder and Elbe, and the southern Alps to France. In northern Germany it occurs both planted and as a fugitive from cultivation.

Occurrence in Denmark. It is more rarely planted in gardens than *C. laburnum*, and is very rarely observed running wild, yet it has been found e. g. in Riis Skov (1869) and in some few places in northern Funen.

Genista anglica L. — Engelsk Visse.

J. LANGE 1886—88, 820. RAUNKJÆR 1922, 186. MENTZ 1906, 177. WARMING 1919, 142. HORNE-MANN 1806, 656. FERDINANDSEN 1918, 71. ASCHERSON & GRAEBNER 1906—1910, 246. HEGI IV, 3, 1209, 1195, map. fig. 1338. HANNIG 1926, map. 10. BENTHAM & HOOKER 1920, 103. LINDMAN 1926, 376. MÖRNER, 1922, 356.

Geographical Distribution. Atlantic dwarf shrub, extending from Jutland to Scotland and England, thence over Northwest Germany with the Friesian Islands, the Netherlands, Belgium, nearly the whole of France, except the eastern and southern districts, and the northwestern part of the Iberian Peninsula; in addition, it occurs in some small isolated areas, especially in southern Halland in Sweden on dry hills and heather moors, in the Black Forest, on Calabria, and on the northwest coast of Marocco. In Northwest Germany, where the species is of common occurrence, preferably in somewhat damp heaths, its southeastern limit may be drawn from Ribnitz in northeastern Mecklenburg, through Neuahaldensleben, Goslar at the Harz, and Brunswick to Achen.

Occurrence in Denmark. (Fig. 4, Pl. II). *G. anglica* is rather common in the greater part of Jutland south of the Limfjord, where it is chiefly associated with the *Calluna* heath. But it has also proved common in several tracts north of the Limfjord, thus e. g. in Thy, East Hanherred and West Hanherred, and in the southern portion of Vendsyssel, while it has not been noticed in the most northerly regions of this part of the country. Here the northern limit of the species must be drawn. It is far more common in the eastern tracts of the peninsula than *G. pilosa*, but like the latter it is absent from the island of Als. Just like *G. tinctoria* it has spread to Funen, where it has been known, since the days of HORNEMANN (1806), from Vissenbjerg and Verninge, and from the northwestern part of the island, in the vicinity of Middelfart and Hindsgavl, since 1847; further it has been known from Svendborg since 1876. It grows both on hilly heathland and on the heath-plains, and soon makes its appearance on the young dune heaths. Like the other heath plants

it shuns lime, and is modest in its demand for nourishment. C. FERDINANDSEN designates it as acidophilous. In this country it seems to grow in drier soil than in Northwest Germany (MENTZ).

It may be stated with certainty that the immigration of this plant has taken place from the south and southwest, probably in late post-glacial time.

Genista germanica L. — Tysk Visse.

J. LANGE 1886—88, 820. RAUNKJÆR 1922, 186. MENTZ 1906, 174. ASCHERSON & GRAEBNER, 1906—1910, 244. ASCHERSON & GRAEBNER, 1899, 428. HEGI IV, 3, 1210. PRAHL 1890, 39. W. CHRISTIANSEN 1926, 146, 205, map. fig. 70. LINDMAN 1926, 376.

Geographical Distribution. Principally a Central European dwarf shrub, which occurs from the Volga (the governments of Saratow and Nijni Novgorod) northward across Grodno and Graduenz in Poland, and southwestern Sweden to the southern part of Jutland; further in Germany, South Holland, the eastern and central parts of France (very doubtful in the Iberian Peninsula), and southward across northern Italy and the Balkan Peninsula.

In Central Europe it grows in dry woods and on sunny, grassy slopes; it is absent i. a. in northwestern Hanover, on the North Sea islands, and along the Baltic coast eastward from Wollin; in Holstein it occurs sporadically in woods and coppices, in German Schleswig in one single locality only south of the town of Schleswig; in Sweden it is very uncommon, still it may be found on dry hills and heaths in northern Scania, southern Halland, and in Dalsland.

Occurrence in Denmark. (Fig. 1, Pl. II). *G. germanica* has been noted from about 20 localities in southern Jutland, but in several of these it has not been observed in recent years. It is not so closely associated with the *Calluna* heath as *G. anglica* and *G. pilosa*, in its choice of habitat it is more like *G. tinctoria*, growing principally in the scrub of the heath-clad hills. Like our other species of *Genista*, it must have immigrated from the south through Holstein and Schleswig, doubtless in late post-glacial time.

Genista pilosa L. — Haaret Visse.

J. LANGE 1886—88, 821. RAUNKJÆR 1922, 186. MENTZ 1906, 167. WARMING 1919, 142. ASCHERSON & GRAEBNER 1906—1910, 265. HEGI IV, 3, 1203. BENTHAM & HOOKER 1920, 103. NEUMAN 1901, 342. LINDMAN 1926, 376.

Geographical Distribution. A western Central (and South) European dwarf shrub, occurring from southwestern Sweden across Jutland to South England (rare), Southwest Europe to Portugal and Central Spain, and to North and Central Italy, the northern part of the Balkan countries, Northwest Galicia, Southwest Poland, and Posen (very rare). In the North German lowlands, where it grows in pine forests, on heaths, and hills exposed to the sun, it decreases in number towards the east. It is very rare in Mecklenburg (the Rostock heath) and Anterior Pomerania

(Wolgast), is rather widely distributed in Further Pomerania as far as the Oder, but is absent from West and East Prussia (formerly observed at Osterode). In Sweden it occurs on moors in the western part of the country, viz. northern Scania, southern Halland, and western Smalandia, but is rather uncommon. In Norway it is entirely absent.

Occurrence in Denmark. (Fig. 3, Pl. II). *G. pilosa* has been found in Jutland only. North of the Limfjord it is rare, and in the West Hanherred, Thy, and Mors it has only been collected in some few localities. In Salling and large parts of Himmerland the species is likewise very rare, and in the whole region rich in moraine clay in the east of Jutland, from Randers Fjord to the southern boundary of Denmark, it is almost entirely absent. Its main area is thus the western and central portions of the peninsula. Here it is closely associated with the heaths; it occurs both on hilly moorland and on the heath-clad late-glacial plains, it being very modest in its demands on the content of nutrient substances in the soil.

The species has no doubt immigrated from the southwest and spread over the peninsula from the south in late post-glacial time. Its absence in East Jutland is no doubt due to edaphic factors, at any rate it does not seem to have any connection with climatic conditions.

Genista tinctoria L. — Farve-Visse,

J. LANGE 1886—88, 820. RAUNKJÆR 1922, 185. MENTZ 1906, 163. WARMING 1919, 143. HORNE-MANN 1806, 655. ASCHERSON & GRAEBNER 1906—1910, 255. ASCHERSON & GRAEBNER 1899, 428. HEGI IV, 3, 1200. WITTICH 1889, 90, Taf. III, fig. 10. BENTHAM & HOOKER 1920, 103. NEUMAN 1901, 342. HARTMAN 1879, 314. A. BLYTT 1906, 452.

Geographical Distribution. A South and Central European undershrub, occurring from Asia Minor, the Caucasus, and Ural, across southern and Central Europe (with the exception of Portugal and the islands of the Mediterranean) to England, South Scotland, and Ireland (rare); northward to Denmark, Norway (a single locality), Southwest Sweden, Germany, in Poland northward to Grodno. A very closely allied form, *G. sibirica* L., is found in southwestern Siberia.

In the North German lowlands, where it grows in dry meadows, in foliferous and coniferous woods, and in coppices, it decreases in frequency towards the east, and even in Pomerania it is almost absent in the vicinity of the Baltic coast (Rügen, Usedom, and Wollin), but extends eastward to Dirschau at Danzig. Among the German North Sea islands it is only present on Sild.

In Sweden it occurs along the west coast on "dry grass fields" (pastures). It is common in the region round Halmstad, in some places in western Gothland, and in Scania, where it is both cultivated and run wild. It is the only species of *Genista* represented in Norway, where it is only found in the most southerly part of the country, thus among ling in pine woods at Brevik.

Occurrence in Denmark. (Fig. 5, Pl. III). It occurs almost exclusively in Jutland. It is rather uncommon in Vendsyssel and in the two Hanherreder as well as in

certain tracts in the interior of Jutland, viz. on the late-glacial heath-plains and in the sand dune area along the west coast, but may otherwise often be rather common. This has some connection with the fact that it is not quite unpretentious on the nutrient substances of the soil. It prefers the "better" heaths where hard-pan is absent or slightly developed, and attains its greatest frequency on hills where heath alternates with wood and scrub. It thrives best in the outskirts of woods and coppices, but is also frequently found by the roadsides. As a spontaneous plant it is known from the islands from some few localities in western Funen only, viz. at Hindsgavl, and at Vissenbjerg, where it has been known since 1806. Furthermore it grows in the Vejlbj wood, at Strib, and on Fænø and Brandsø in the Little Belt, but is apparently absent from the island of Als.

In eastern Denmark there has occasionally been found a form of *G. tinctoria*, which K. WINSTEDT has referred to *v. Delarbrei* Coss., indigenous in Central and southern France and in the Pyrenees. The Danish localities, where the form is doubtless anthropochorous, carried in with grass seed, are Fakse Ladeplads (1899), a railway slope at Masnedsund in the south of Seeland (1928), and Galløkken at Rønne on the island of Bornholm (1926).

The northern limit of the species, as regards its general distribution, runs across northern Jutland, and it may be assumed with certainty to have immigrated into the peninsula from the south, probably rather late. Its absence in the east of Denmark is singular, since suitable soil can hardly be lacking there.

Lathyrus aphaca L. — Bladlös Fladbælg.

J. LANGE 1886—88, 849. J. LANGE 1896, 286. RAUNKLER 1922, 194. ASCHERSON & GRAEBNER 1906—1910, 1020. HEGI IV, 3, 1590. PRAHL 1890, 45. NEUMANN 1901, 313.

Geographical Distribution. An annual herb, assumed to be originally indigenous in the Orient, from Balkan to Afghanistan, and Egypt, where it occurs chiefly as a weed among the grain; thence it has been carried to the whole area of the Mediterranean and to Central and western Europe, where it has occasionally become naturalised (archæophytic). In North Germany and the North it is ephemero-phytic, and principally occurs in ruderal habitats. It has occasionally been noted in Sweden, but seems to be unknown in Norway.

Occurrence in Denmark. According to M. T. LANGE, KYLLING mentions it from Falster in 1648. According to J. LANGE it occurred at Odense in the years 1835—37, and was collected in 1840 on the dam by Næsbyhoved wood, likewise at Odense. Then it was observed in 1897 at the harbour of Svendborg, and has later been collected near several towns, *e. g.* Randers, Aarhus, Vejle, Fredericia, Kolding, Nykøbing Sj., and Copenhagen, everywhere round harbours and in ruderal habitats. At Kristiansminde near Svendborg it has further been found in 1906, growing in coppices, and at Skovsbo (likewise district 32) it was found in 1925,

richly fructifying on railway slopes, here, as at Odense in 1840, presumably sown with grass seed, as done in Sweden, according to NEUMAN. It seems as if its seed cannot normally ripen in our country.

Lathyrus heterophyllus L. — Vinge-Fladbælg.

J. LANGE 1886—88, 852. RAUNKJÆR 1922, 195. E. ROSTRUP 1864, 40. KYLLING 1648, 82. ASCHERSON & GRAEBNER 1906—1910, 1017. HEGI IV, 3, 1599. LINDMAN 1926, 388. HARTMAN 1879, 295. STERNER 1922, 304, 307, 326, Pl. 4.

Geographical Distribution. This eastern Central European, perennial herb, which is closely related to *L. silvester*, is distributed from Southeast France and Piedmont to Central Russia (not found on the Balkan Peninsula, doubtful in the Iberian Peninsula). In the North German lowlands it is very rare, and is only recorded from some few localities in Posen, West Prussia, and East Prussia. It is most frequent in mountain regions, growing on dry and warm slopes where the soil is rich in lime, chiefly in hazel- and oak-scrub; it seems never to have been cultivated to any great degree (HEGI). In Sweden it is not rarely seen, especially in Smalandia and West Gothland, but also in southern Scania; extends northward as far as Nerke.

Occurrence in Denmark. KYLLING is thought to have known it from Lolland, and E. MÖLLER-HOLST found it on fences at Raahave on the same island about the middle of last century, but later it has not been observed there. C. H. OSTENFELD collected it at Hindsgavl about 1900; however, since then it has not been found in Denmark. In the said localities the plant has presumably escaped from occasional cultivation in gardens. It is a species native to more southerly and easterly regions, and can hardly persist in our climate.

Lathyrus maritimus (L.) Bigelow — Strand-Ært.

J. LANGE 1886—88, 850. RAUNKJÆR 1922, 194. J. SCHMIDT 1899, 145 f. O. ROSTRUP 1902, 37. ASCHERSON & GRAEBNER 1906—1910, 1032. HEGI IV, 3, 1585. W. CHRISTIANSEN 1926, 187. BENTHAM & HOOKER 1920, 126. DRUCE 1908, 19. MURATOVA 1926, a, Pl. I. HARTMAN 1879, 297. ARESCHOUG 1881, 324. NEUMAN 1901, 312. LINDMAN 1926, 389. NORMAN 1895, 218. BLYTT 1906, 468.

Geographical Distribution. Circumpolar, perennial herb, distributed in South Alaska and Canada, along the seashores and by the large lakes in Canada; present in South Greenland, where it occurs from the sea to about 530 meters altitude, further in Iceland, northern Europe, and East Asia from Kamtschatka to Korea and Japan; recorded from South Chile.

Its sub-Arctic — Atlantic — Baltic area of distribution within Europe is more precisely defined: the Shetland Isles, Kerry in Ireland and some few places on the coasts of southern and eastern England, the eastern part of the French Channel-coast, the coasts of Belgium and Holland (introduced in recent times), the German and Jutlandish North Sea coasts and islands, sporadic localities along the south

and east coast of the Baltic eastward from Mecklenburg (Boltenhagen, Warnemünde) — recently, however, it has immigrated to the east coast of Holstein and German Schleswig —, Rügen and Usedom in Pomerania, West and East Prussia (more frequent), the coasts of the Baltic states (scattered), the Gulf of Finland and both sides of the Gulf of Bothnia to Södermanland, Oeland, Gotland, Sandö, the south and west coasts of Scania, Hveen, the Danish islands, sporadic localities along the coasts of Halland, Bohuslen, and southern Norway from Hvalöerne to Jæderen, further it occurs at Ranen, but is more common in the district of Tromsö, West and East Finmark, particularly along the shores, but also on dry hills farther inland to an altitude of 520 meters above sea-level; common farther on along the Polar Sea and the White Sea, at Ladoga and Onega.

Occurrence in Denmark. (Fig. 10, Pl. IV). Along the west coast of Jutland from the Emmerlev Cliff across Romö, Fanö, and Skallingen to the Scaw it is generally not rare on sandy shores, in direct continuation of its area along the German North Sea coast. It grows in several places along the western part of the Limfjord as far as Salling (district 9). Further it occurs sporadically in Seeland, on the coasts along the Cattegat, and on Sejrö as well as from Köge Bay across Möen to Falster, on the east coast of which it is rather common; to the west hereof it is present in three places only, viz. Kramnitze on Lolland, Erikshale on Ærö, and on Basnæs. On Bornholm it is rather common.

The peculiar form *f. acutifolius* BAB. is in Denmark mainly restricted to the west coast of Jutland, where the chief form seems to be rare (Skallingen), and to the Limfjord; in the east of Denmark it is known from Basnæs. Further it is recorded e. g. from Bohuslen, Helsingland, and the Shetland Isles. JOHNS. SCHMIDT'S investigations of the anatomy of the leaves of *L. m.* might suggest that at any rate one of the characters of the "North Sea type", i. e. of *f. acutifolius*, viz. the isolateral structure of the leaves, has been produced by external conditions, more particularly by the salineness of the soil and intense illumination, but it is still a matter of doubt whether *f. acutifolius* can on this basis alone be considered as a mere local adaptation to the conditions of the locality, as long as it can be found on the slightly saline coasts of the Baltic, and its chief form may be met with even on Skallingen.

It is stated by several authors that the seeds of *L. m.* may remain floating on the water for a long space of time, up to 10 months. J. SCHMIDT states that seeds of *L. maritimus* had driven ashore on some small sandy islets without phanerogamic vegetation lying abt. 15 km west of Falster, and it appeared from an examination made by NORMAN that 59 per cent of the seeds could float on sea water, while 41 per cent sank; O. ROSTRUP has shown that after having remained for 36 days in 3.5 per cent salt water, the power of germination of the seeds is only very little reduced. The species is therefore no doubt distributed along the coasts by the action of the sea, cfr. for instance its migration along the western part of the Baltic (CHRISTIANSEN); its unequal distribution, e. g. on the Danish coasts, thus its entire absence

from the east coast of Jutland and Funen, must probably have some connection with the course of the currents in our inland seas during the time, i. e. autumn and winter, when the seeds of *L. m.* that are capable of germinating may be supposed to float in the sea; for these long stretches of coast are not entirely devoid of suitable localities for this species.

No finds of fossils of *L. m.* have been made, but it must be assumed that as a circumpolar species it is at any rate older than the latest glaciation and that it spread northward during the melting of the inland ice, when the coasts afforded suitable localities for it. Possibly it has persisted in our degrees of latitude since the time of the melting of the ice, and might very well have found suitable life-conditions on the coasts of the North Sea and the Cattegat throughout the post-glacial period. The migration of the species to the Baltic and the Gulf of Bothnia may be assumed to have taken place by two routes and at different times, partly in late glacial time from the White Sea through the strait possibly existing at that time to the Finnish Gulf — its occurrence at Ladoga and Onega may perhaps be considered as a relict from that time — partly in and after the Littorina period, when the subsidence of the land had given admittance to the sea through the Sound and the Belts to the Baltic basin. The distribution of the species along the Swedish coast of the Cattegat and along both the coasts of the Sound probably indicates its Littorinal, or post-Littorinal, road of migration to the Baltic.

Lathyrus montanus Bernh. — Krat-Fladbælg.

(Syn. *Orobus tuberosus* L. — Knoldet Glatbælg).

J. LANGE 1886—88, 853. RAUNKJÆR 1922, 195. ASCHERSON & GRAEBNER 1906—1910, 1060. HEGI IV, 3, 1581. LINDMAN 1926, 389. BLYTT 1906, 467. CEDERCREUTZ 1927, 124, maps 5 and 53.

Geographical Distribution. European perennial herb, distributed from Ireland, Scotland, the Shetland Isles, and southern Fennoskandia eastward across Central and southern Russia; absent from the greater part of the Danube countries, and doubtful on the Balkan Peninsula; extends, however, southward to Dalmatia (rare), Italy, France, and the Iberian Peninsula. It prefers soil poor in, or destitute of lime, and may be very common, especially in heaths, pastures, and in dry and open woods, but is absent over wide stretches, e. g. in the greater part of the North German lowlands, and among the North Sea islands it is only found on Sild.

In the Scandinavian Peninsula it is generally of common occurrence on heather moors, pastures, and in coppices; in Norway as far as Kristianssund (63° N. lat.) and isolated on Lekö (65° 4—6' N. lat.), in a single place extending into the birch belt; in Sweden it extends northward to Dalarne and Ångermanland; in Finland it is only found in the southwestern part, including the Aland Isles (see CEDERCREUTZ, maps 5 and 53).

Occurrence in Denmark. (Fig. 7, Pl. III). The species is spread over the greater part of the country, and is common on pastures, grassy slopes, and heaths, in light and dry woods and coppices, particularly in the more meagre regions, whereas it does not thrive quite so well in neutral or basically reacting ground, and in regions where moraine clay is the principal surface formation it either occurs more rarely or may be entirely absent. This is the case over wide stretches in the southern part of the country, as for instance portions of South and West Seeland, Møen, Falster, Lolland, Langeland (except at Guldstav and Kjeldbjerg), Funen (with the exception of its northern part and Helnæs), Als, and Samsø. It is likewise absent from the meadows and marshy tracts of western South Jutland, on our North Sea islands, probably also in the sand dune area along the west coast as far as the Limfjord, and on Læsø and Anholt.

***Lathyrus niger* (L.) Bernh. — Sort Fladbælg.**

(Syn. *Orobus niger* L. — Sort Glatbælg).

J. LANGE 1886—88, 853. RAUNKJÆR 1922, 195. ASCHERSON & GRAEBNER 1906—1910, 1051. HEGI IV, 3, 1572. PRAHL 1890, 46. BENTHAM & HOOKER 1920, 126. HARTMAN 1879, 298. LINDMAN 1926, 389. BLYTT 1906, 468. HJELT 1919, 194.

Geographical Distribution. European perennial herb, extending over nearly the whole continent—except the most northerly regions, Great Britain (but present in two localities in Scotland), Holland, northern Belgium, and the North German lowlands. Here the northwestern limit of the species runs from Metz over Siegen in Westphalia to Bielefeld, Hannover, Neuwaldenleben at Magdeburg, to Ratzeburg at Lübeck; in the province of Schleswig-Holstein it occurs in scattered growths in the eastern part only; it is met with everywhere in light woods, chiefly in oak woods, on hills, and in coppices. The species extends eastward to the Caucasus and southward to Algeria, where it is rare.

In the Scandinavian Peninsula the species is rather uncommon, but may occur in woods, coppices, and on screes, in Sweden northward to Helsingland and Dalarna; in eastern Norway northward to Nordre Land and Ringsaker, but it is rarer west of the mountains, and likewise north of the Dovre to Leksvigen on the north side of Trondhjem Fjord (63° 40' N. lat.); in Finland only in the extreme southwestern regions.

Occurrence in Denmark. (Fig. 16, Pl. V). J. LANGE's statement that the plant occurs occasionally in all provinces, is further illustrated by the map. On Bornholm, Seeland, and Funen it has been found in a fairly great number of localities, which, however, are somewhat irregularly distributed; thus groups of localities are found in South and Southwest Seeland along the coast, round Skarritsø, Alindemagle, and in the central parts of Northeast Seeland, as also, though more rarely, in the south and north of Funen. Further it is known from several, most frequently scattered, finds along the east coast of Jutland from Flensborg Fjord

to Mariager Fjord, principally in woods at or near the coast. In addition it has been observed sporadically from the area south of the Limfjord to the regions round Viborg and Buderupholm wood in Himmerland, in a single locality in Vendsyssel (Dal wood at Tolne), and in the western part of southern Jutland, viz. in coppices at Grimstrup, Oxevad, and Tevring.

The species prefers light woods and outskirts of woods, wooded slopes and coppices; it is most frequent in regions rich in moraine clay, but does not seem to be strictly eutrophic. Its East-Jutlandish area is a direct continuation of its area in eastern Schleswig-Holstein. No doubt a migration has taken place by this route to Jutland and Funen, but the species is very likely of such ancient origin in the North (its northern limit runs slightly north of that of the oak), that it still may have utilised the continental connection between northern Germany and the Danish Islands as well as between these latter.

Lathyrus paluster L. — Kær-Fladbælg.

J. LANGE 1886—88, 851. RAUNKJER 1922, 195. ASCHERSON & GRAEBNER 1906—1910, 1033. HEGI IV, 1582. PRAHL 1890, 46. BENTHAM & HOOKER 1920, 126. STEFÁNSSON 1924, 160. LINDMAN 1926, 389. SEGERSTAD 1924, 94, map fig. 119. BLYTT 1906, 469.

Geographical Distribution. A sub-Arctic, Central European perennial herb. It is distributed from northern Asia, across Russian and Finnish Lapland, the Finmark, and Iceland (rare), southward to the Iberian Peninsula, northern Italy, the northern part of the Balkan Peninsula, and Ukraine. It is absent from the Mediterranean region proper, is rare e. g. in western France, Belgium, England, and Ireland, and is doubtful in Scotland. It grows in marshes, meadows and boggy woods, and is equally distributed over northern Germany, in Holstein in the southwestern part, and in German Schleswig at Eckernförde, Langballeaa at Flensborg Fjord, and Træsø south of Flensborg. In the Scandinavian Peninsula it grows in wet meadows and occurs nearly throughout the whole of Sweden — its distribution in the south of this country has been mapped by SEGERSTAD —, in Norway it occurs, but rarely, east of the mountains from Tjömö to Hedemarken, in Vesteraalen on the Hadselø (68° 30' N. lat.), and here and there in the lowest parts of the Finmark from Alten to Varanger.

Occurrence in Denmark. (Fig. 15, Pl. V). J. LANGE records it from bogs and wet meadows in all Danish provinces; it is sporadic, and disappears intermittently in several places. The map in fig. 15 shows the known finds in Denmark, but in many of the localities one will now, no doubt, seek it in vain. It has been most frequently found in the southern part of Bornholm, Lolland, and Seeland, to which corresponds a relatively extensive distribution over Scania and southern Blekinge. From Funen finds are recorded from the northern part, and from Jutland from a number of localities, nearly always in the vicinity of the coast, so that the large central part of the peninsula is without finds. The plant seems to prefer regions

with calcareous soil (cfr. its distribution in southern Sweden), but is by no means restricted to these, since it is found in the north and west of Jutland in regions poor in lime, and is absent from several tracts markedly rich in moraine clay, e. g. large stretches of Funen, Als, etc., but it may always be found in marshes comparatively rich in nourishment and presumably only slightly acid, and does not occur in bogs of a more oligotrophic type.

Being one of the species extensively distributed in northern Europe, it has no doubt immigrated into Denmark early in post-glacial time, before the formation of the western part of the Baltic; its distribution in Central Europe renders it probable that it has migrated to this area from the east, and hence the conjecture that it has found its way into Denmark from the south and southeast, would seem reasonable.

Lathyrus pratensis L. — Gul Fladbælg.

J. LANGE 1886—88, 849. RAUNKJÆR 1922, 194. OLSEN 1921, 50 f. OSTENFELD 1901, 70. STEFÁNSSON 1924, 161. ASCHERSON & GRAEBNER 1906—1910, 1029. HEGI IV, 3, 1587. MURATOVA 1926, a, Pl. I. BLYTT 1906, 468. LINDMAN 1926, 389.

Geographical Distribution. European, Asiatic, North African perennial herb, distributed over nearly the whole of Europe to Iceland, where it is common in the south; further it occurs in the Faroe Islands (on homefields), and in northern Scandinavia; it is rare at high mountain levels and in the Mediterranean area; occurs in Russia as far as the Arctic Circle, in temperate Asia to Transbaikalia, southward to the Himalayas and Asia Minor; hardly native in Japan; found in North Africa southward to Abyssinia; naturalised in North America.

As in northern Germany, it is also common in Scandinavia, occurring in meadows and light coppices, in the mountains also on screes, as far north as Tromsø and South Varanger, often penetrating into the birch belt, but seldom reaching the northern limit of the birches.

Occurrence in Denmark. The species grows in meadows with a nearly neutral or basic reaction (P_H 6.0—7.9) or at the edge of ditches and in light woods; has been noted in all districts except No. 12 (Anholt), and in all of them the degree of frequency is common or rather common, except in some few western tracts, where it is apparently less frequent (districts Nos. 15, 16, 18, and partly 26 and 27). The highly down-haired form *villosus* DREJER has been collected in all parts of the country, scattered over dry and sunny places, thus on slopes or on grey dunes.

Lathyrus sativus L. — Spansk eller Indisk Ært.

RAUNKJÆR 1922, 195. ASCHERSON & GRAEBNER 1906—1910, 1003. HEGI IV, 3 1604. MURATOVA 1926, a, Pl. I.

Geographical Distribution. Annual herb and old cultivated plant, possibly originally indigenous in western Asia, viz. in the area between the Caucasus, the

Caspian Sea, and northern India, but since antiquity cultivated for its grain and as forage for cattle in the Mediterranean region and in the southern tracts of Central Europe, where it now lives as archæophyte in waste places and at roadsides. It is still cultivated in several places in the south of Germany, in Bohemia, and Austria, and easily runs wild. In northern Germany it only appears intermittently in waste places, e. g. at Hamburg and Berlin. Its seed is known from prehistoric tombs in Egypt, from the Neolithic station at Lengyel in Bosnia, and from Troja.

Occurrence in Denmark. Since the end of last century the species has been collected in waste places in several parts of the country, thus at the harbour of Odense, Skaarup Skovmølle, the harbours of Bandholm, Kalundborg, and Holbæk, and in a couple of places in the vicinity of Copenhagen 1891—1912. From 1891 a find of the plant is recorded from a clover-field at Vindehelsinge, near Slagelse, and in 1912 a specimen was found in a clover-field at Lyngø on Thyholm.

Lathyrus silvester L. — Skov-Fladbælg.

J. LANGE 1886—88, 851. RAUNKJER 1922, 195. ASCHERSON & GRAEBNER 1906—1910, 1014. ASCHERSON & GRAEBNER 1899, 453. HEGI IV, 3, 1593. W. CHRISTIANSEN 1926, 145, 173, map. 43. BENTHAM & HOOKER 1920, 124. BLYTT 1906, 469. HARTMAN 1879, 296. ANDERSSON & BIRGER 1912 84, 94. SEGERSTAD 1924, 94, map fig. 120. CEDERCREUTZ 1927, 123, map. 47. MURATOVA 1926, a, Pl. I.

Geographical Distribution. European perennial herb, distributed over nearly the whole of Europe, but absent from the most northerly regions, Iceland, and the Faroe Islands, the extreme southern parts of the Iberian Peninsula and the Balkan Peninsula; present in the Caucasus. — In northern Germany it is of scattered occurrence in dry woods and coppices; it has occasionally been cultivated as a forage-plant, and has run wild to great extent. According to CHRISTIANSEN'S map, it occurs sporadically in eastern Holstein from the area round Altona to Eckernförde, but only in a few places farther westward, and farther northward in South Jutland only along the east coast. In the Scandinavian Peninsula it extends northward to Trondhjem Fjord and Ångermanland; is rather uncommon, and grows in coppices, on dry grassy slopes, and on screes; within the northern area confined to southward-facing slopes. On SEGERSTAD'S map of its distribution in southern Sweden it is seen to avoid the central, more oligotrophic regions. In Finland, where it is specific to grove-meadows ("lövängar")¹⁾, it is found sporadically in the southern tracts as far north as 62° N. lat. (CEDERCREUTZ).

Occurrence in Denmark. (Fig. 14, Pl. V). It grows in woods, coppices, on fences, and on the edge of ditches. J. LANGE records it as not rare. This applies to most regions of the islands and the east coast of Jutland from the southern boundary to the southern part of Djursland, i. e. the regions of the country that are richest in moraine clay, but outside these areas it is of rarer occurrence, e. g.

¹⁾ Cf. e. g. STERNER 1922, 339.

round Randers and Mariager Fjords, in Himmerland, the western area of the Limfjord, and northern Vendsyssel; or it may be entirely absent, as in nearly the whole of central and western Jutland. It prefers slopes and broken ground, which offer it plenty of light and a dry and warm, not too poor soil; hence it is frequently found along the coast or in hilly, much fissured territory, as for instance in certain tracts in the north of Seeland. e. g. at Jyderup and in other places, further round Tolne in Vendsyssel, etc. Remarkable is its immigration into the West Jutlandish pine plantations at Husby and Ulfborg, where it was observed in 1914 on the grassy slopes of ditches.

L. silvestris varies chiefly with regard to the width of its leaves: *v. platyphyllus* (RETZ.), with elliptical leaflets, has occasionally been collected in waste places or on cultivated soil (Hessselvig Enggaard), but also in localities apparently not influenced by cultivation, presumably in highly nutrient soil. *v. stenophyllus* LGE. (*ensifolius* BUEK.), with linear-lanceolate leaflets, has been collected in various places in Vendsyssel, eastern Jutland, Funen, Seeland, Møen, and Bornholm.

Lathyrus sphaericus Retz. — Enblomstret Fladbælg.

J. LANGE 1886—88, 849. RAUNKJER 1922, 195. OSTENFELD 1914, 68. WINSTEDT 1924, 314. A. ANDERSEN 1909, 427. ASCHERSON & GRAEBNER 1906—1910, 1037. HEGI IV, 3, 1606. LINDMAN 1926, 389. ARESCHOUG 1881, 326, 571. FRISENDAHL 1924, 241 f.

Geographical Distribution. Mediterranean, Pontine annual herb, distributed on either side of the Mediterranean, eastward to the Caspian Sea, westward to Madeira and the Canary Islands. Its rather continuous area to the north extends to Switzerland, South Tyrol, Istria, Hungary, and the Crimea; further it is found in the Rhine Valley, and in occasional localities on Bornholm and in the south of Sweden. In southern Europe it lives in pastures "trockener Weiden", meadows, oak scrubs, vineyards, arable land, and at roadsides; it is regarded by HEGI as anthropochorous in the Rhine Valley and the Scandinavian localities.

In Sweden it was first observed in 1869 on a grass-clad, southward-facing slope at Kullen, where "the position of the locality makes it highly improbable that the occurrence here of this plant is due to human influence" (ARESCHOUG). The species has maintained itself here during subsequent years, and has been sown in other places on Kullen. In 1921 it was found on Brattö northeast of Marstrand, likewise on rock sides with a southerly exposure, in a quite natural association of plants; here, too, the species has maintained itself since. FRISENDAHL states that in Sweden propagation only takes place through seeds, which germinate in the spring, the embryo plants that appear in the autumn dying in the course of the winter.

Occurrence in Denmark. In 1884 E. ROSTRUP found *L. sphaericus* in great quantity on a steep, southward-exposed, grassy slope on the Hammershus cliff; since then it has repeatedly been collected there, the last time in 1927 (K. WINSTEDT), when it was quite common. It grows there in an abundant and varied company of

grasses, i. a. the more southerly species *Poa bulbosa*, and numerous perennial plants not visibly affected by cultivation; that is to say, in a similar way as in the Swedish localities. The species is further recorded by A. ANDERSEN from Næsbyhoved near Odense Canal, no doubt from waste places; however, the find has not been confirmed, so very likely there is a mistake here. On the whole the species is almost unknown in waste places in the North (FRISENDAHL 247 f.). The species can hardly be considered as anthropochorous in Scandinavia, but whether it is here a relict from the post-glacial warm period, during which it may have had a wider and more continuous northerly distribution than at the present day, or whether it has been spread to Bornholm and southern Sweden by birds of passage, one of whose routes runs along this stretch, can for the time being hardly be decided with certainty. FRISENDAHL, who has investigated the subject, regards the plant as a relict, since in its distribution and mode of occurrence it shows an obvious analogy with the South Scandinavian species, which doubtless in many cases grow isolated on the North Swedish "Sydberg", (southward-facing mountain slopes) as relicts from the post-glacial period of warmth, far to the north of their proper range.

Lathyrus tuberosus L. — Knoldet Fladbælg.

J. LANGE 1886—88, 850. RAUNKLER 1922, 195. M. T. LANGE 1859, 11, 14. SIMON PAULLI 1648, 243. JOHAN PAULLI 1761, 247. ASCHERSON & GRAEBNER 1906—1910, 1019. HEGI IV, 3, 1591. HARTMAN 1879, 296. LINDMAN 1926, 389. SEGERSTAD 1924, 197, map fig. 387.

Geographical Distribution. HEGI is of opinion that this tuberiferous plant is originally indigenous in western Asia and possibly also in the Lower Danube valley, but that as far back as prehistoric times it has spread over large stretches of Europe in association with cereal culture. At the present day it is spread over the greater part of Europe from the northern parts of the Mediterranean region (and Algeria) northward to southern England, northern Germany, southern Scandinavia, Poland, and Esthonia; in Asia it extends eastward to the Yenisei, Dzungaria, the Caucasus, and Syria.

The species is rather common in South and Central Germany as a neophyte in half-cultivated formations, on the outskirts of woods, and on pastures "Magerwiesen"; it is very rare in Northwest Germany and in eastern Prussia, but fairly common in Brandenburg, Further Pomerania, Posen, and western Prussia, especially in the river basins. In Sweden it grows as a weed in fields and gardens, as also in the meadows of large estates in Scania, East Gothland, and the landscapes round the Mälaren, where it has run wild since it was cultivated in the 18th century for the sake of its edible tubers.

Occurrence in Denmark. It is found in BURSER's herbarium (1625—39), collected at Bistrupgaard near Roskilde, where it survived to 1880. On the Kastelvolden in Copenhagen it was collected in 1848 (now disappeared), in waste places at Næsbyhoved near Odense in 1909, and at Lappen near Elsinore in 1927.

In this country, too, the plant has doubtless formerly been cultivated for its tubers. SIMON PAULLI, who calls it *Glandes terrestres*, pea-nut, heath-pea, writes that it occurs in several places, since it is cultivated in some gardens and grows wild "near shrubs" and even amidst rye and barley. The tuber, he says, is bigger than an acorn, but hardly one of twenty people knows these edible roots. Also other botanists of the 17th century mention the plant. KYLLING states it to be common, but has no doubt confused it with *L. montanus*; possibly this is also the case with SIMON PAULLI. In this country it has hardly been so commonly used as in several places in foreign countries (JOHAN PAULLI). Its relatively great frequency in Sweden may be due to the close alliance between the latter country and Germany in the 17th and 18th centuries.

Lathyrus vernus (L.) Bernh. — Vaar-Fladbælg.

(Syn. *Orobus vernus* L. — Vaar-Glatbælg).

J. LANGE 1886—88, 853. RAUNKLER 1922, 195. ASCHERSON & GRAEBNER 1906—1910, 1047. HEGI IV, 3, 1574. PRAHL 1890, 46. HARTMAN 1879, 297. LINDMAN 1926, 389. STERNER 1922, 240, 367, 409, Pl. 22. SEGERSTAD 1924, 94 (map fig. 121), 112, 115. BLYTT 1906, 467. HJELT 1919, 195.

Geographical Distribution. Sub-Arctic, Baltic, eastern Central and South European, West Asiatic perennial herb, absent e. g. from Great Britain, Ireland, Belgium, Holland (except Limburg), Northwest Germany, North and West France, the southern part of the Balkan Peninsula, and the Italian islands. To the east the species extends to West Siberia, the Caucasus, and Asia Minor. Its north-western limit in Germany follows the line Achen—Köln—Osnabrück—Braunschweig across Altmark to the eastern tracts of Holstein and Schleswig; in the western part of Holstein it is only found at Schwabstedt. For the rest it occurs sporadically in northern Germany, especially in foliferous woods. In Sweden it extends northward to Ångermanland and Jemtland, is not uncommon in the south of the country, particularly to the east, more infrequent to the north. In Norway it is fairly common east of the mountains, rare west of the mountains in the interior of the fjords, and occurs here and there north of the Dovre as far as Ranen (66° 15' N. lat.). In Finland it is rather frequent as far as 62° N. lat., but rarer northward to 67° N. lat.; also present on Kola along the White Sea. Occurs throughout Scandinavia and Finland in coppices and woods.

Occurrence in Denmark. (Fig. 23, Pl. VII). The plant grows in shady woods in fresh mould in the southeastern part of the country: northern Bornholm, Falster, Lolland (especially along Guldborg Sound), Møens Klint, Seeland (particularly in the western and central districts, but is absent e. g. in the northernmost of the three northerly peninsulas), Funen (chiefly in the south), eastern Jutland in the coastal tracts from Kollund wood by Flensborg Fjord to Mariager Fjord and Nørland woods in Himmerland, being most frequent in the central part of this tract. An old record of *L. v.* from Nykøbing Mors has never been verified. Its distribution

within Denmark is doubtless conditioned by its general easterly distribution and by its demand for a soil not too poor in nutrient substances.

Immigration from the south and southeast, probably at an early period of the Continental epoch.

Lotus corniculatus L. — Almindelig Kællingetand.

J. LANGE 1886—88, 840. RAUNKJÆR 1922, 191. JESSEN & LIND 1923, 125, 332. OSTENFELD 1901, 70. FERDINANDSEN 1918, 62. ASCHERSON & GRAEBNER 1906—1910, 676. HEGI IV, 3, 1367. BLYTT 1906, 462. LINDMAN 1926, 382.

Geographical Distribution. Euro-Asiatic perennial herb, extending over nearly the whole of Europe, temperate Asia southward to India, and North Africa; anthropochorous in Australia. — In the Scandinavian Peninsula it extends to 71° 5' N. lat., and in the mountains ascends into the willow belt, being common on hills, in meadows, sandy fields, and similar places. It is spontaneous on the Faroes. In Germany, too, the species is common in meadows and fields.

Occurrence in Denmark. Common in all districts of the country on soil poor in lime as well as on calcareous soil. It occurs partly as a spontaneous plant on dry hills, dikes, along roads, and on slopes, further on white as well as grey dunes, and on heaths, but in addition it is commonly cultivated in an introduced form under the name of "Bredbladet italiensk Kællingetand" (Broad-leaved Italian Bird's-foot Trefoil).

The species is very variable. The most conspicuous inland forms are *v. microphyllus* LGE., collected on dunes on the west coast of Jutland (Agger, Blaavand, and Esbjerg), by the Løgstør Channel, and on the shores at Fyns Hoved; and *v. villosus* THUILL., known from shores, dunes, gravel-pits, and dry hills at Kanegaard on Bornholm, Tiköb in the north of Seeland, Thunö, Anholt, Læsö, Aalborg, Tværsted in Vendsyssel, and Svinklöv in Western Hanherred.

Owing to its extensive northward distribution, it must be assumed that the species has immigrated in early post-glacial time, during the maximum of the elevation of the land-surface, doubtless from the south.

Lotus tenuis W. & Kit. — Smal Kællingetand.

J. LANGE 1886—88, 840. RAUNKJÆR 1922, 191. ASCHERSON & GRAEBNER, 1906—1910, 683. ASCHERSON & GRAEBNER 1899, 441. HEGI IV, 3, 1369. PRAHL 1890, 43, 285. LINDMAN 1926, 382. BLYTT 1906, 463.

Geographical Distribution. South and Central European, West Asiatic perennial herb. It extends over the greater part of Europe, northward to Denmark and southern Sweden (absent as a spontaneous plant in Norway, Finland, and northern Russia); eastward to Turkestan, Afghanistan, and Dzungaria; and southward to North Africa. It generally occurs very sporadically, preferring saline

and moist soil. — In northern Germany, where it is not common, it is chiefly found in littoral meadows, e. g. in the Dithmarsh, on the east coast of Schleswig-Holstein from Lübeck to the Slien and on Bæverö off the north coast of Angel; it is not recorded from Mecklenburg, and from the south coast of the Baltic it is only mentioned from the region round Putzig northwest of Danzig, but may have been overlooked or confused with the allied form *L. corniculatus*. In Sweden, too, it is found in littoral meadows, but rather rarely, viz. in Scania, Halland, and southern Smalandia.

Occurrence in Denmark. (Fig. 27,¹) Pl. VIII). In regions where *L. tenuis* occurs unaffected by cultivation, it is only found in littoral meadows and similar situations near the shore. It is not uncommon on Bornholm, and is met with here and there in suitable localities, on the coasts of the other islands. The absence of such localities, e. g. in the north of Seeland, explains that the species has not been recorded from this region. In Jutland the species is much rarer, but is recorded from some few places on the east coast between Hejls and Kalö, in the area of the Limfjord at Venö Bay and at Birkelse ("singly and rare"), from the meadows of S. Farup near Ribe, and from Fanö. These southwestern localities of the species must be considered as a northerly continuation of its area in the Dithmarsh. Its northern limit runs through Denmark and southern Sweden.

A form of this species, viz. "Smalbladet italiensk Kællingetand" (Narrow-leaved Italian Bird's-foot Trefoil), is cultivated together with clover, but is less-constant than the corresponding form of *L. corniculatus*.

Here, near its northern limit, *L. tenuis* is largely confined to saline soil, and its distribution along the southern Danish coasts must then probably at the earliest have taken place in Littorinal time. At it is a warmth-demanding species, its advance towards the north must have been favoured during the post-glacial optimum of warmth.

Lotus uliginosus Schrank. — Sump-Kællingetand.

J. LANGE 1886—88, 839. RAUNKJÆR 1922, 191. ASCHERSON & GRAEBNER 1906—1910, 674. HEGI IV, 3, 1372. HARTMAN 1879, 306. SEGERSTAD 1924, 78, 86, 213. BLYTT 1906, 463.

Geographical Distribution. West Asiatic, Central and West European, Mediterranean perennial herb. Extends from Tibet, Armenia, and the Caucasus northward through Central Russia to Latvia, the most southerly districts of Sweden and Norway, and Great Britain; southward across the countries on either side of the Mediterranean to Spain, except the southern part of the Balkan Peninsula and the Italian islands; is further found on Madeira. It is common in northern Germany in moist meadows, and occurs in similar places in southern Sweden, viz. in about fifty localities especially within the southwestern districts: Scania,

¹) On the map the localities from grassy fields and waste places has been left out.

Halland, and Blekinge, and more rare in Bohuslen, East Gothland, Smalandia, and on Store Carlsö by Gothland, partly spread with seed sown in grass fields. As regards Norway, it is only recorded from the southernmost tracts: Vaale in Jarlsberg, Brevik, and Romsdalen.

Occurrence in Denmark. (Fig. 8, Pl. III). The species is not uncommon in wet meadows and bogs, being characteristic of spring-bogs, in most tracts of Jutland, Funen, certain parts of Seeland, and Bornholm, while it is apparently quite absent, or very rare, in the extreme north of Jutland, the northern regions of Seeland, and on Møen, Lolland, Falster, and Langeland. It is not recorded from districts 2, 12, 34, 38, 45 b, and 46.

Within Denmark the form *villosus* LAMOTTE (*vestitus* LGE.) is known from Römø, Fanø, and boggy moors at Ulfborg; it is a southerly form, chiefly met with in dry localities in southern Europe, but also e. g. near Vienna; farther northward, besides in Denmark, it is found on the islands Sild and Föhr. *L. uliginosus* has doubtless immigrated from the south, probably in relatively late post-glacial time.

Lupinus angustifolius L. — Smalbladet Lupin.

RAUNKJÆR 1922, 185. ASCHERSON & GRAEBNER 1906—1910, 231. HEGI IV, 3, 1158.

Geographical Distribution. Annual herb, growing wild throughout the Mediterranean area from the Iberian Peninsula to Syria, otherwise occurring both cultivated and wild in South and Central Europe, and particularly in eastern Europe. It was introduced into Germany from Spain, it would seem in the sixteenth century; it is seldom cultivated to any great extent.

Occurrence in Denmark. In this country it is cultivated like the Yellow Lupine, but more rarely, and is inconstant like the latter.

Lupinus luteus L. — Gul Lupin.

RAUNKJÆR 1922, 185. MÖLLER-HOLST 1881, IV, 204. SIMON PAULLI 1648, 80. ASCHERSON & GRAEBNER 1906—1910, 228. HEGI IV, 3, 1157.

Geographical Distribution. Annual herb, a native of the western parts of the Mediterranean area, probably especially of the Iberian Peninsula; is said to have been introduced into southern Italy and southern France, where it has now run wild; as a cultivated plant it also occurs in more remote regions, thus as far as southern Scandinavia and Russia. In Germany it has been cultivated as an ornamental plant at any rate since 1560, but as green manure only to any great extent since about 1850.

Occurrence in Denmark. It is frequently cultivated in sandy fields as a nitrogenous plant for ploughing into the soil, more rarely as a fodder plant, and is most frequent in Jutland. The employment of Yellow Lypine in agriculture was

commenced in the seventies of last century; it often grows wild in the vicinity of the fields, but it is very sensitive to frost, and is inconstant. SIMON PAULLI records it as cultivated in gardens for medicinal purposes.

Lupinus polyphyllus Lindl. — Mangebladet Lupin.

RAUNKJÆR 1922, 185. ASCHERSON & GRAEBNER 1906—1910, 223. HEGI IV, 3, 1154.

Geographical Distribution. Perennial herb, a native of western North America, and introduced into Europe as a green manure, or as a fodder and ornamental plant; in recent time it is also used as fodder for game. It easily runs wild, and is apparently quite naturalised e. g. in many parts of the North German plain.

Occurrence in Denmark. In this country, too, it is cultivated in gardens as an ornamental plant, and is used here and there in woods as a fodder plant for pheasants and roedeer. It may run wild and may then occasionally be met with in great abundance in such places, e. g. in open patches in Priis Wood on Lange-land and in Graasten park.

Medicago falcata L. — Segl-Sneglebælg.

J. LANGE 1886—88, 837. RAUNKJÆR 1922, 187. FERDINANDSEN 1918, 73. HORNEMANN 1821, 790. KYLLING 1688, Nr. 1021. ASCHERSON & GRAEBNER 1906—1910, 398. HEGI IV, 3, 1259. A. CHRISTIANSEN 1913, 18. W. CHRISTIANSEN 1926, 138, 175. BENTHAM & HOOKER 1920, 106. KOUSNETZOFF 1926, fig. 5. LINDMAN 1926, 378. BLYTT 1906, 455.

Geographical Distribution. Asiatic, South and Central European perennial herb, distributed in temperate Asia from China and southward to Persia, over most of Europe, extending northward to Perm, Nijni-Novgorod, Esthonia, southern Scandinavia, Denmark, and the eastern tracts of England, where it is rare. In Central Europe it grows on sunny, particularly stony, slopes and hillsides, along roads, and in waste places; it decreases in number towards the northwest, viz. in Belgium and northwestern Germany, where it is hardly indigenous. In Holland it is occasionally found in the eastern tracts, growing on hills, and further here and there in waste places in towns. As a spontaneous species within Europe it is mainly an Eastern Central European and Mediterranean plant.

In Sweden *M. falcata* is met with in similar situations as in Central Europe, thus in the south of the country from Scania to Vestmanland and Upland, and is rather common in several places; in Norway it is only found as an anthropochore in the southern part of the country.

Occurrence in Denmark. (Fig. 19, Pl. VI). *M. falcata* grows in this country partly in waste places, e. g. by the harbours of many of our towns or near large mills, partly by roadsides and, more rarely, on dry hillsides and in similar places, more particularly in the fertile regions. It thrives especially well on calcareous soil

(e. g. Möens Klint, Dybdal at Aalborg, Mönsted), but is by no means confined to it. C. FERDINANDSEN refers it to the plants preferring alkaline soil. As will appear from the map, it has been found rather scattered on the islands and in the eastern part of the peninsula as far as Frederikshavn. Its absence in the west of Jutland (except by the harbour of Esbjerg and in the surrounding waste places) and in southern Jutland as well must be viewed in connection with its very sporadic occurrence in the Northwest German lowlands. Here as there it will probably be best to regard it as an archæophyte and a neophyte. It is mentioned by KYLLING, and seems to have been rather widely distributed in the country at the time of HORNE-MANN. It has not hitherto been used for cultivation, but its seeds are occasionally sown together with other seeds, especially Lucerne, and from the fields with Lucerne *M. falcata* may migrate to the edges of ditches and to hill slopes.

M. falcata v. *gracilis* URBAN grows in localities similar to those of the chief form, and has a similar distribution.

Medicago falcata × *sativa* Rchb. — Sand-Lucerne.

(*M. media* PERS. — *M. varia* MARTYN).

J. LANGE 1886—88, 837. RAUNKJER 1922, 187. MÖLLER-HOLST 1882, V, 309. ASCHERSON & GRAEBNER 1906—1910, 401. HEGI IV, 3, 1264. O. HAGEM 1919, 149.

Geographical Distribution. Transitional forms between *M. sativa* and *M. falcata* occur within the areas where both these species are found, and in addition not infrequently in company with only one of them. The hybrid does not, however, seem to have been observed in Norway.

Occurrence in Denmark. This hybrid has been collected in about half a score localities in the east of Jutland, viz. from Aalborg to Aabenraa, further in Vendsyssel and East Hanherred, viz. in districts 1, 6, 11, 13 a, 21, 22 a, 25, and 48; in addition it is known from Samsø, some few places on Funen (districts 28, 29, 31, and 32), Langeland, Möen, and, scattered, from most districts of Seeland (39 a, 42 to 46), being apparently commonest in districts 42 and 45 b. On Bornholm it is rather common at Hammershus and along the Hammer railroad. It grows chiefly in waste places and in similar situations in the environment of towns and along roadsides. It must be assumed that its presence is in some degree due to hybridisation between the two parent species, since it has been established through several experiments (HAGEM a. o.) that such a crossing very easily takes place, by which our plant, in some degree prolific itself, is produced; but the latter may also have been introduced directly from abroad together with seed, e. g. of Lucerne. The mixing of this hybrid in grass fields on the German model has previously been attempted in this country. It made far less demands on the content of nutrient substances in the soil than Lucerne, but nevertheless it has not been much used in our country.

Medicago hispida Gaertner.

RAUNKJÆR 1922, 187. ASCHERSON & GRAEBNER 1906—1910, 428. ASCHERSON & GRAEBNER 1899, 433. HEGI IV, 3, 1270. NEUMAN 1901, 332. LINDMAN 1926, 378. BLYTT 1906, 456. HJELT 1919, 246.

Geographical Distribution. Southwest Asiatic, Mediterranean annual herb, distributed from India to the West African islands; naturalised along the west coast of Europe from Portugal to the British Isles; anthropochorous in northern Europe, as an ephemerophyte, in America, South Africa, and East Asia.

In the North German lowlands it is rare as an anthropochorous plant on arable land; particularly in earlier times it was introduced in ballast to Swedish harbours as far as southern Norrland; known from similar places in the south of Norway and Finland; has also been found as a weed on arable land in Sweden.

Occurrence in Denmark. The species was observed for the first time in 1845 at Thorvaldsens Museum in Copenhagen (introduced in packing material from Italy). Towards the end of the century it was collected at Brede Ladegaard (district 45 a), whence it spread to the neighbourhood as a weed in clover fields. From this century it is hardly known in Denmark except as a ruderal plant, and has been found as such e. g. at Nørresundby, Aalborg, Randers, Horsens, Vejle, Fredericia, Nakskov, Copenhagen, and on Amager. At Öxnebjerg on Funen it was found on arable land in 1925, having been brought there with rubbish from a mill. It is a highly variable plant, which in this country, too, exhibits several forms, thus for instance *v. apiculata* (WILLD.) and *v. confinis* KOCH.

Medicago lupulina L. — Humle-Sneglebælg.

J. LANGE 1886—88, 838. RAUNKJÆR 1922, 187. FERDINANDSEN 1918, 63. OLSEN 1925, 11. GRÖNTVED 1929, 63. JESSEN & LIND 1923, 341. ASCHERSON & GRAEBNER 1906—1910, 393. HEGI IV, 3, 1255. KOUSNETZOFF 1926, fig. 5. NEUMAN 1901, 331. BLYTT 1906, 456. SEGERSTAD 1924, 33, 35, 213.

Geographical Distribution. Euro-Asiatic perennial herb distributed over temperate Asia, the whole of Europe except the most northerly regions, and North Africa; anthropochorous in North America. In northern Germany it is common on arable land, in grass fields, meadows, and along roads; the same is the case in Sweden, where it particularly grows in regions rich in nutritive substances and closely built over, as far as southern Norrland. It is recorded to be rather common in Norway east of the mountains from Mandal to Romedal, where it occurs in low-lying tracts, most frequently as an anthropochorous plant, but also appearing under conditions which might suggest that it is possibly spontaneous, while west and north of the mountains it is very rare and no doubt anthropochorous.

Occurrence in Denmark. In Denmark, too, the species is largely confined to arable land, grass fields, stubble fields, waste places, etc., and is classed by FERDINANDSEN as a plant living on alkaline soil (cfr. CARSTEN OLSEN 1925); but it is also met with in high-lying meadows and on uncultivated hillsides and, more

rarely, on grey dunes. It is rather equally distributed and fairly common throughout the country. Perhaps it is originally a native in our flora, but since the seventies of last century it has been rather largely cultivated in grass fields, and was formerly also introduced with seeds. It is found in BURSER's herbarium, and is mentioned by KYLLING.

The species varies greatly, and frequently occurs in this country, in company with the chief form, *var. glandulosa* MERTENS & KOCH (= *v. Willdenowii* BOENN.), where the plant is often more hairy, and the fruits, frequently also the fruit stalks and leaflets, are covered with glandular hairs.

Medicago minima (L.) Bartalini. — Liden Sneglebælg.

J. LANGE 1886—88, 838. RAUNKLER 1922, 187. ASCHERSON & GRAEBNER, 1906—1910, 437. HEGI IV, 3, 1273. A. CHRISTIANSEN 1913, 18. W. CHRISTIANSEN 1926, 138, map 26. BENTHAM & HOOKER 1920, 107. LINDMAN 1926, 378. STERNER 1922, 291, 300, 327, 397.

Geographical Distribution. Southwest Asiatic, Mediterranean, eastern Central European annual herb, extending from India and western Asia across the Mediterranean countries northwestward to France, and onward to the southeastern parts of England (rare), Belgium, and Holland (mainly anthropochorous); its northwestern limit in Germany runs from the Rhine province through the regions round the lower Main — Wetzlar — S. E. Harz — Neuahaldensleben — Tangermünde — Neustrelitz — Neubrandenburg — Malchin — Bützow — Unter-Trave — Rügen; its limit to the north and east runs through the Danish islands, southern Sweden, the region round the Lower Vistula to southern Russia and the Caucasus.

In Germany it is characteristic of sunny, dry diluvial hills, on calcareous as well as on sandy soil. According to W. CHRISTIANSEN it occurs sparsely at Unter-Trave, and is on the whole rare in the vicinity of the Baltic. In Sweden, where the species is rare, it is met with in dry, sandy pastures in Scania and Halland, Oeland and Gotland. Not recorded from Norway.

Occurrence in Denmark. (Fig. 32, Pl. IX). Within Denmark *M. minima* grows on dry, usually sandy hills and cliffs in the southeastern part of the country, viz. on the southwest and northwest coasts of Bornholm, on the cliffs of Møen, in scattered localities in western Lolland and southern Seeland, a good many localities along the coast of northwestern Seeland, on Samsø and some islands in Stavnsfjord, Vejrø, and Anholt, with which the only Jutlandish locality of the species, viz. the Jernhatt at Ebeltoft, falls into line; finally some few finds have been recorded from the north of Funen. In several of the localities mapped, the species has, however, not been observed in recent years. It shows no tendency to select soil affected by cultivation, and must be considered as a southerly species, spontaneously immigrated from the southeast, and whose northwestern limit runs from Halland across Anholt, the southeastern part of Djursland, and North Funen to Travemünde.

Medicago sativa L. — Foder-Lucerne.

J. LANGE 1886—88, 837. RAUNKJÆR 1922, 187. K. HANSEN 1907. OLSEN 1925, 9. JESSEN & LIND 1923, 342. ASCHERSON & GRAEBNER 1906—1910, 397. HEGI IV, 3, 1260. KOUSNETZOFF 1926, fig. 5.

Geographical Distribution. Asiatic, South and Central European perennial herb, spread over Europe as far as southern Scandinavia and Esthonia; in temperate Asia from East Asia southward to Tibet and India; North Africa; and North America (anthropochorous). Since antiquity Lucerne has been cultivated in the lands round the Mediterranean, and after the Middle Ages in Central Europe, where it has consequently been naturalised to a rather great extent; probably it was originally growing wild only in southern Russia, Asia, and North Africa (ASCHERSON & GRAEBNER, cf. also KOUSNETZOFF).

Occurrence in Denmark. The first attempts at cultivating Lucerne in Denmark date back to the middle of the 18th century, but it was only in the course of the latter half of the 19th century and in subsequent years that this cultivated plant gained a more considerable distribution in our country. Lucerne spreads easily from the fields to the edge of ditches, grassy slopes, and gravel-pits, and in places where the competition is not too excessive, it may persist for several years. It is often designated as a calcicolous plant, and according to CARSTEN OLSEN it thrives best on soil whose P_H value is about 6.5—7.0. It has been recorded, cultivated as well as run wild, from nearly all districts of Denmark, but it is only in the more fertile regions of the country with a clayey soil that it is of rather frequent occurrence.

Melilotus albus Desr. — Hvid Stenkløver.

J. LANGE 1886—88, 834. RAUNKJÆR 1922, 187. KYLLING 1688, No. 649, p. 96. ASCHERSON & GRAEBNER 1906—1910, 449. HEGI IV, 3, 1245. A. CHRISTIANSEN 1913, 18. BENTHAM & HOOKER 1920, 108. LINDMAN 1926, 379. NEUMAN 1901, 333. BLYTT 1906, 457. HJELT 1919, 253.

Geographical Distribution. West Asiatic, European biennial herb, which is only adventitious, at any rate in the northernmost parts of Europe, but which, according to HEGI, seems to have become naturalised in western Europe early in historic times (about 1500 at the least) even if it gives the impression of being spontaneous in many places. It is absent or rare e. g. in Belgium and Great Britain. It is of scattered occurrence all over northern Germany, Holstein and Schleswig included, growing especially by the roadside, along fields, and on sunny hills covered with coppice; it is, however, considered as not indigenous within this area, though with the exception e. g. of the localities along the Elbe in Holstein (ASCHERSON & GRAEBNER). In Sweden it is rare, but may be found on cultivated soil, along railroads, near towns and harbours, and in waste places northward to southern Norrland; in Norway it is found in similar situations in the southern part of the country; likewise in Finland. The species extends southward to Spain,

Central Italy, and Greece; in the southernmost localities, too, it is only sporadic and adventitious. To the east it extends to West Siberia, Tibet, and India. Anthropochorous in America and Australia.

Occurrence in Denmark. The species is represented in most of the districts, but is commonest in the eastern fertile parts of the country, and rare in the northern and western tracts of Jutland, not being recorded e. g. from districts 6, 8, 16, 17, 18, and 51; further it is not mentioned from Læsø and Anholt. It is almost everywhere associated with soil more or less affected by cultivation; thus it is principally to be found in grass fields and clover fields, where it has been sown as an impurity in seed, and in waste places in the neighbourhood of towns and harbours; from such places it may spread along the shore, where it is recorded from several places, e. g. Bornholm and the north of Seeland. It may also persist for some time on uncultivated, grass-clad slopes, and loves places where the lime is exposed in the surface of the soil, especially in limestone quarries, thus in the limestone area north of Grenaa and at Mönsted.

M. albus is probably not spontaneous north of the Baltic, but it has early been introduced into Denmark, and is constantly being introduced, with grain and seed. KYLLING mentions it in 1688.

Melilotus altissimus Thuill. — Høj Stenklöver.

(Syn. *Melilotus officinalis* WILLD).

J. LANGE 1886—88, 835. RAUNKJÆR 1922, 188. M. T. LANGE 1859, 12. JESSEN & LIND 1923, 126. ASCHERSON & GRAEBNER 1906—1910, 445. HEGI IV, 3, 1241. PRAHL 1890, 41. A. CHRISTIANSEN 1913, 19. BENTHAM & HOOKER 1920, 107. NEUMAN 1901, 333. LINDMAN 1926, 379. LINDQUIST 1925, 153 f. (2 maps). BLYTT 1906, 457. HJELT 1919, 253.

Geographical Distribution. Asiatic, Central and South European biennial herb, extending from Japan through Siberia and Armenia, and the greater part of Europe, northward to Ingria, Esthonia, and southern Scandinavia. In northern Germany it grows in meadows and moist copsewoods, along ditches, generally on soil rich in salts and nutritive substances, hence mainly on the seashore, in saline spots, on the banks of lakes and rivers, and in waste places. Within Schleswig-Holstein it is stated to be distributed over the banks of the Elbe and the shores of the Baltic, and at Oldesloe Saline. In Sweden it occurs i. a. in waste places near towns and harbours as far as southern Norrland, but in a number of localities along the coasts of Bohuslen, western Scania, and on Gotland it must, according to LINDQUIST, be assumed to be spontaneous (see his fig. 2, p. 167), and NEUMAN describes a variety, *var. paluster* (KIT.) SCHULT, that lives on the seashore and in moist places in southern Sweden. Similarly, in the southwestern and most low-lying parts of Norway the species may be found here and there by the roadside and on the seashore from Flekkefjord to Oslo and Ringerike, but appears occasionally on wharves as far as Trondhjem. In Finland it has only been found

as an anthropochorous plant. In Great Britain, too, where it is not common, it is generally adventitious, but seems to be spontaneous in the south of England and on the east coast of Ireland.

Occurrence in Denmark. (Fig. 17, Pl. VI). During the preparation of the map, the available statements concerning *M. altissimus* in the literature and the flora lists have, as far as possible, been sifted, regard having been paid to the obvious possibility of confusion with *M. officinalis*, so that all uncertain statements as to its occurrence on cultivated soil and in waste places have been omitted. The species then proves to have a southeastern distribution, being most frequent on the islands, in particular Seeland, Falster, and Funen, and along the southern part of the east coast of Jutland almost as far as Aarhus, but it is also met with in the southern part of Himmerland and along the Limfjord. It grows on bluffs by the shore and on high-lying beaches as well as, more rarely, on steep uncultivated slopes farther inland, on dikes and along roads (e. g. in district 41). Further it may be found as an anthropochorous plant in waste places, but far less frequently than *M. officinalis*; this no doubt has some connection with the fact that it is much less frequently sown with clover seed in grass fields than the species just mentioned. It is present in SCHUMACHER's herbarium, collected "ad vias et littoribus" at Springforbi (district 45 a), probably about the year 1800, and according to M. T. LANGE it is mentioned by Danish botanists of the 17th century.

Within Denmark *M. altissimus* is apparently a spontaneous plant, associated with coast bluffs and similar places, and its distribution would seem to suggest that it has immigrated from the south and southeast.

Melilotus dentatus (W. & K.) Pers. — Strand-Stenklöver.

J. LANGE 1886—88, 836. RAUNKJER 1922, 188. ASCHERSON & GRAEBNER 1906—1910, 443. HEGI IV, 3, 1239. PRAHL 1890, 40. CHRISTIANSEN 1913, 18. LINDMAN 1926, 379. LINDQUIST 1925, 166.

Geographical Distribution. West Asiatic, Pontine, South Baltic, halophilous annual or biennial herb, extending from West Siberia, Turkestan, and Asia Minor through southern Russia, the area of the Lower Danube, Austria, and Poland to Esthonia, Germany, southern Sweden, and southeast Denmark. In northern Germany it is usually rather uncommon, is absent in East Prussia, but occurs on the coast of Rügen, at Stralsund, in several places in Mecklenburg, e. g. near Warnemünde, at Sulsdorf on Femern, from Heiligenhafen to Grossenbrode in the circuit of Oldenburg in Holstein, and on the west coast of the southern and northern Dithmarshes; on the whole it is scattered all over Germany, chiefly in Thuringia, Saxony, the Elb Valley, Brandenburg, Pomerania, West Prussia, and Posen, westward to Lüneburg, Hessen and the plain of the Rhine between Oppenheim and Baden. Throughout its area of distribution it grows on salt steppes, in saline meadows, littoral meadows, or, occasionally, on river banks.

In Sweden the species has been found since 1814 in about half a score localities in littoral meadows in western Scania, but in several of these it has later disappeared. LINDQUIST assumes that it has immigrated to Scania from Seeland.

Occurrence in Denmark. (Fig. 29. Pl. IX). Within Denmark it is a southeasterly species, exclusively confined to littoral meadows and clayey, miry seashores, especially along the smaller waters south of Seeland and Funen; further it is of scattered occurrence along the west coast of Seeland to Saltbæk Vig, in the southern parts of the Issefjord, at Frederikssund, and round Copenhagen, where it has geographical connection with the Scanian area; further it is found on the north coast of Funen and at Stavnsfjord on Samsö. Records of finds from Gamborg Fjord (district 28) and the old statement from Haderslev require confirmation. — The northwestern limit of the species within the area here considered may then be drawn from western Scania through the north of Seeland, Samsö, and Funen to the Dithmarsh. Curiously enough, positive finds are lacking from the east coast of the peninsula north of the circuit of Oldenburg in Holstein.

Everywhere in Denmark, as in Sweden and Germany, *M. dentatus* is confined to absolutely natural associations; in Denmark it is an obligatory halophyte, and there are no reasons for considering it, with HEGI, as anthropochorous. It is doubtless spread by the aid of water, since, according to LINDQUIST, the pod, which continuously encloses at any rate part of the seeds, has considerable floating power, and may remain floating on the water for several days, while the seeds themselves almost instantly sink. How its migration across the European continent has taken place, is not known, but in the Baltic area it has probably been spread by the currents of the sea; this cannot, however, have taken place until the Littorina time, at the earliest, when the salt water penetrated into the Baltic, and the warm summer climate favoured the advance towards the north of this southern species. Its immigration into northern Europe must have taken place from the southeast.

Melilotus indicus (L.) All. — Indisk Stenklöver.

RAUNKJER 1922, 188. ASCHERSON & GRAEBNER 1906—1910, 2, 461. HEGI IV, 3, 1247. LINDMAN 1922, 379. BLYTT 1906, 457.

Geographical Distribution. Southwest Asiatic, Mediterranean annual herb, extending eastward to India, and introduced over wide stretches of northern Europe and South Africa, North and South America, southern Asia, and Australia.

In Germany it is chiefly found in the seaport towns Bremen, Hamburg, Kiel, Eckernförde, and in addition e. g. in several places in Brandenburg. In Sweden and Norway it is only known as a casual visitor in waste places.

Occurrence in Denmark. A ruderal plant, observed for the first time in 1892 on Kløvermarksvej by Copenhagen and at Örritslevgaard in northern Funen; since then it has constantly appeared, only to disappear again shortly afterwards,

in a large number of localities, most frequently in seaport towns, thus in Aalborg, Hobro, Aarhus, Vejle, Esbjerg, Assens, Odense, Svendborg, Nysted, Kalundborg, Nykøbing S., Elsinore, Copenhagen, and at Lyngby.

***Melilotus officinalis* (L.) Lam. — Mark-Stenklöver.**

(*M. arvensis* WALLR.).

J. LANGE 1886—88, 835. RAUNKJER 1922, 188. JESSEN & LIND 1923, 347. ASCHERSON & GRAEBNER, 1906—1910, 452. HEGI IV, 3, 1243. BENTHAM & HOOKER 1920, 108. LINDMAN 1926, 379. LINDQUIST 1925, 161. BLYTT 1906, 457. HJELT 1919, 250.

Geographical Distribution. West Asiatic, European annual or biennial herb. Within Europe it is widely spread with cultivation, but is absent e. g. in the southern parts of Italy and the Balkan Peninsula as well as in the sub-Arctic regions; within Great Britain it only occurs in some of the most easterly counties of England.

In northern Germany it grows along the roads, in fields and waste places, more rarely in dry meadows and on hills (pastures); it is not always constant and in northwestern Germany, in particular, it has not become naturalised. In Sweden the species flourish in waste places and grass fields, most frequently to the south, where it tends to become naturalised, but it is introduced even as far north as 67° 50' N. lat. It was first noticed in 1847, evidently introduced with foreign seed, and spread rapidly during the end of the seventies and the beginning of the eighties, probably in connection with the development of the railway net. In Norway it has been observed as an anthropochorous plant in several places in the southern part of the country from Oslo to Trondhjem. In Finland, too, it is adventitious.

Occurrence in Denmark. The species was not reported with certainty from Denmark until 1852, when it was found in a field south of Aalborg, but during the immediately subsequent time it became rapidly known from a number of localities, nearly always growing in clover and grass fields, and gradually as the cultivation of grass fields was extended, the finds of *M. officinalis* increased in number. It is now recorded from nearly all districts of the country (except Nos. 3, 17, 19, and 22 b), and is stated to be rather common within several of the most easterly districts. From the fields, or directly from foreign countries, it may spread to the waste places of towns, where it may attain an exceptionally vigorous growth. It shows no particular tendency to migrate to soil little affected by cultivation.

***Melilotus wolgicus* Poir. — Russisk Stenklöver.**

RAUNKJER 1922, 188. ASCHERSON & GRAEBNER 1906—1910, 451. HEGI IV, 3, 1238. LINDMAN 1926, 379.

Geographical Distribution. South Russian biennial herb, introduced with Russian grain into several other countries. It is inconstant within the northern

tracts of Europe, is known from northern Germany since 1885, from southern Sweden, growing in waste places, since 1904, from Oslo, and from Denmark.

Occurrence in Denmark. The species has repeatedly been noticed in waste places near towns, thus in the period from 1907 to 1917 at Horsens, Vejle, Esbjerg, Odense, Assens, Svendborg, and Copenhagen. Since 1917 it has only been found at Aalborg, in 1927. The species can hardly withstand winter in Denmark, and when its importation into Denmark has almost ceased since 1917, this is doubtless a consequence of changes in the Russian market.

Onobrychis viciifolia Scop. — Foder-Esparsette.

(*O. sativa* LAM.).

J. LANGE 1886—88, 856. RAUNKJÆR 1922, 192. MÖLLER-HOLST I, 1877, 564. OSTENFELD 1918, 321. C. CHRISTENSEN 1922, 430. ASCHERSON & GRAEBNER 1906—1910, 877. HEGI IV, 3, 1488. BENTHAM & HOOKER 1920, 122. LINDMAN 1926, 385.

Geographical Distribution. West Asiatic, Central European and Mediterranean perennial herb, distributed from Transbaikalia, Persia, and Asia Minor, through eastern Europe to Ladoga and Onega; to the north it still occurs as a spontaneous plant in South, Central, and East Germany, and probably in the eastern and southern parts of England; in more northerly regions as far as Stockholm it is only found cultivated or as escaped from cultivation; absent from the southern part of the Balkan Peninsula, and recorded as cultivated and escaped from cultivation from Sicily, Sardinia, and North Africa; the same applies to North America.

Occurrence in Denmark. Cultivation on a small scale of *O. viciifolia* has repeatedly been attempted in Denmark since the middle of the 18th century and up to the present day (the earliest known attempt is recorded from Bornholm 1769), and it is no doubt by escaping from such attempts at cultivation, or after having been sown as an impurity in clover seed, that the plant has made its way into the more or less natural pasture like plant communities, where it may occasionally be found. Thus it has been observed by roadsides, on railway slopes, and on grassy, uncultivated hills, altogether in about half a score localities chiefly in the east of Jutland as far north as to Himmerland, further on Funen, Langeland, Seeland, and Møen. It is best known from its occurrence on the chalk down Graaryg on Møen.

Ononis arvensis L. — Stinkende Krageklo.

(*O. hircina* JACQ.).

J. LANGE 1886—88, 823. RAUNKJÆR 1922, 186. ASCHERSON & GRAEBNER 1906—1910, 343. ASCHERSON & GRAEBNER 1899, 431. A. CHRISTIANSEN 1913, 18. LINDMAN 1926, 377. STERNER 1922, 240, 363, 375, Pl. 19. A. BLYTT, 453. HJELT 1919, 280.

Geographical Distribution. Pontine, Baltic undershrub or perennial herb, extending from southern Russia and the northern part of the Balkan countries,

across eastern Central Europe, parts of Denmark, and the southern districts of the Scandinavian Peninsula. In eastern Europe it has its main distribution in the steppes, where it is chiefly restricted to the river meadows, and grows in company with many species characteristic of our meadows, e. g. *Festuca pratensis*, *Phleum pratense*, and *Alopecurus pratensis* (STERNER p. 363).

In the eastern part of the North German lowlands the species grows in meadows and pastures ("Triften"), along roads, and in similar places; it is still rather common in Further Pomerania and Posen, but is doubtful as a spontaneous plant west of the Oder. From Holstein only a single locality is recorded (viz. Jenfeld in Stormarn). In Sweden the plant occurs in dry meadows and along field borders within the southern districts from Scania to Värmland and Upland, but is absent from the interior of the South Swedish highland; lives in Norway in similar places and on sea-shores in the lowest tracts in the east of the country northward as far as Valdres and the region round Mjösen, and is further met with, though more rarely, west of the mountains northward to Lysöen in the county of Nordre Trondhjem ($64^{\circ} 57'$ N. lat.). According to STERNER, its extensive distribution in southern Scandinavia is mainly due to human agency, even if it may perhaps also be spontaneous within those regions, e. g. on Oeland and on Gottska Sandöen. The species is found in some few places on the shore within the Nyland district in the south of Finland.

Occurrence in Denmark. (Fig. 22, Pl. VII). Within our country the plant is met with in localities similar to those of Germany and Sweden, viz. in grassy meadows and along fences, and has, it would seem, a remarkable distribution in two fairly distinct main areas, a southeasterly and a northwesterly area. Thus positive finds of it are recorded from Bornholm, Lolland, Seeland, where it seems to be most frequent in the northern part, from Funen, and Samsö; it is unknown throughout the southern part of Jutland as far as the region round Aarhus, where it is very rare; it would be desirable that some few records of it from the southern part of Himmerland should be confirmed by herbarium specimens; It occurs again rather commonly in the northern and western parts of Vendsyssel, on Læsö, and round the western part of the Limfjord.

The western limit of the species in northern Europe thus runs from western Norway, through northern Jutland, Funen, and Lolland almost to the mouth of the Oder; its Baltic-Scandinavian range thus presents a singular expansion towards the Atlantic of the area of this otherwise East European continental species. Apparently no certain data are available which might give support to the conjecture that it is not an apophyte in Denmark. The immigration must have taken place from the south-east or east.

Ononis repens L. — Mark-Krageklo.

(*O. procurrans* WALLR.).

J. LANGE 1886—88, 823. RAUNKJER 1922, 186. OLSEN 1921, 91. ASCHERSON & GRAEBNER 1906—1910, 344. ASCHERSON & GRAEBNER 1899, 431. HEGI IV, 3, 1225. LINDMAN 1926, 377. SEGERSTAD 1924, 158, fig. 285. BLYTT 1906, 453.

Geographical Distribution. South and West-Central European undershrub, which to the southeast and east extends to the northern part of the Balkan Peninsula, Poland, Lithuania, Esthonia, and Oesel, northward to the southern part of Scandinavia. In northern Germany it generally decreases towards the east, where it is chiefly restricted to the regions near the Baltic; it grows in dry meadows, pastures ("Triften"), at roadsides, and on the outskirts of woods; is also found on the North Sea islands. In Norway it is confined to the most southerly and low-lying stretches along the coast from Mandal and Hvaløerne to Oslo and Ringerike, growing on dry hills and sea-shores; in Sweden it is likewise chiefly a seaside plant, distributed along the coast of the Cattegat, more frequent in Scania and Blekinge, and on Oeland and Gotland; extends northward to Nordbotten.

Occurrence in Denmark. (Fig. 12, Pl. IV). *O. repens*, our commonest Restharrow, has been observed in almost all districts (except 3, 18, and 50); it is, however, not quite equally distributed, being common, or fairly common, on the islands and throughout eastern Jutland to and including Himmerland, and in parts of the two Hanherreder, while from other regions, more especially parts of Vendsyssel, Thy, and the central and western tracts of Jutland only very desultory notes are at hand. It grows mainly in pastures, along roads, fences, and on the outskirts of woods, and show the most luxuriant growth on soil not too poor in nutrient substances and with a neutral or basic reaction. During the primitive agricultural conditions of earlier times the plant has been much favoured, since extensive perennating grassy areas arose at the sacrifice of woods. After the close of the latest glaciation it probably spread over Central Europe from the west and southwest, and must be assumed to have invaded Denmark from the southwest and south.

Ononis spinosa L. — Strand-Krageklo.

(*Ononis campestris* KOCH).

J. LANGE 1886—88, 822. RAUNKLER 1922, 186. ASCHERSON & GRAEBNER 1906—1910, 351. ASCHERSON & GRAEBNER 1899, 431. PRAHL 1890, 39. LINDMAN 1926, 377. SEGERSTAD 1923, 378. BLYTT 1906, 454.

Geographical Distribution. West Asiatic, South and Central European undershrub, extending eastward to Central Asia, the Caucasus, and Asia Minor. In northern Germany it occurs in pastures ("Triften") and dry meadows, along roads, and on the outskirts of woods, decreasing in frequency towards the east; in western Prussia only in the neighbourhood of the Vistula; in Holstein and Schleswig it may be frequent in patches along the Elbe and the coasts. The species is rare in Sweden, occurring only in Scania, a single locality in Blekinge, and on Gotland; in Norway it is only known from a couple of places in the vicinity of Oslo, growing in woodland meadows with calcareous soil.

Occurrence in Denmark. (Fig. 26, Pl. VIII). The map only gives such finds as can be checked by herbarium specimens, or have been mentioned by experienced

florists, and the species has presumably a wider distribution within the dotted area than indicated on the map. Within Denmark it is almost exclusively found in close association with the shore, in dry littoral meadows or pastures, and may occasionally be met with along the coasts of all the waters south of a line drawn from Hjerding across Samsø, the northern part of Hornsherred, to Copenhagen, and this northern limit continues eastward through Scania and Blekinge, whence it bends northeastward to Gotland. It is, however, absent from Bornholm. Beyond this northern limit of continuous distribution, the species, as already mentioned, occurs at Oslo, where it prefers calcareous soil like so many other southern species in their most northerly habitats. It has presumably immigrated to Denmark from the south in late post-glacial time.

Ornithopus perpusillus L. — Liden Fugleklo.

J. LANGE 1886—88, 857. RAUNKJER 1922, 191. FERDINANDSEN 1918, 68. JESSEN & LIND 1923, 126, 356. ASCHERSON & GRAEBNER 1906—1910, 839. HEGI IV. 3, 1477. P. KNUTH 1895, 54. LEHMANN 1895, 426, 549. LEDEBOUR I, 1842, 696. LINDMAN 1926, 384.

Geographical Distribution. Sub-Atlantic, West-Central European annual herb, which extends from western Italy through northern Spain, France, north-western Switzerland, and Germany to Ireland, Scotland, Denmark, and Scania; not spontaneous east of the Vistula (rare), in Poland, Bohemia, Austria, or Hungary, and the same is presumably the case with its occurrence near Moscow and Tver (LEDEBOUR).

In Germany, where it grows in sandy fields, on inland downs, in pine woods, and on heaths, more particularly along the heath roads, it is especially common in the sandy regions along the Rhine, the Elbe, and the Oder, but may otherwise be absent over wide stretches. In Sweden it is only found in the south of Scania, on sandy fields near the sea; it is, however, very rare, and has now almost disappeared.

Occurrence in Denmark. (Fig. 6, Pl. III). The species has its headquarters in the western part of Jutland south of the Limfjord, where it grows in old sandy grass fields, in gravel-pits, and in similar places, principally on acid soil (FERDINANDSEN). In Vendsyssel and the Hanherreder it is entirely absent. It is rare in Thy and the northern part of eastern Jutland, but is somewhat more frequent farther southward in eastern Jutland. Among the Jutlandish districts it has not been observed in Nos. 1—6, 11, 12, 13 a, 21, 22 a, and 23.

The species is not uncommon on Funen, especially in the western and southern parts; it is further found on Taasinge and Langeland, while east of the Great Belt it has only been collected in about ten localities, chiefly in Southwest Seeland.

Within Denmark *O. perpusillus* bears hardly the mark of originality which it exhibits in its choice of habitats in northern Germany, and it has, at any rate, been greatly favoured by the cultivation of the land, which has given it far greater

possibilities of finding suitable localities, with open, dry, and warm soil and only slight competition, though even prior to the cultivation of the country it may doubtless have found means of maintaining itself on open, shrubby hills, slopes, and dry grassy plains, especially in Jutland. Its northeastern limit runs from north-western Jutland across Seeland to Scania, and it may be assumed to have immigrated into the country in late post-glacial time, having penetrated from the south through Holstein and Schleswig to Jutland, whence it has spread to the islands.

Ornithopus sativus Brotero. — Serradella.

Ornithopus roseus DESF.

J. LANGE 1886—88, 857. RAUNKJÆR 1922, 192. MÖLLER-HOLST V, 1882, 183. ASCHERSON & GRAEBNER 1906—1910, 842. HEGI IV, 3, 1478. LINDMAN 1926, 384.

Geographical Distribution. Westerly Mediterranean annual herb indigenous in Spain and Portugal; its originality in South and West France and in North-west Africa is perhaps doubtful; since the nineteenth century it has been cultivated in the sandy tracts of Central Europe, particularly in the North German and the Dutch lowlands; is further cultivated in Denmark and Sweden, where it occasionally runs wild.

Occurrence in Denmark. *O. sativus* is not infrequently cultivated in sandy fields in Denmark as a forage plant; it is sown either separately or in maslin, and is further frequently sown in rye fields in the spring. The cultivation of the species in this country was not commenced to any great extent until after 1874. It often escapes from cultivation, and may persist in the fields for several years; as a plant that has run wild it is thus especially common in the south of Jutland.

Sarothamnus scoparius (L.) Wimm. — Gyvel.

J. LANGE 1886—88, 819. O. G. PETERSEN 1920, 388. WARMING 1919, 118, 141. FERDINANDSEN 1918, 72. MENTZ 1906, 185. OPPERMAN 1928, 9. HORNEMANN 1837, 229. KYLLING 1688, 52. ASCHERSON & GRAEBNER 1906—1910, 289. HEGI IV, 3, 11, 82. PRAHL 1890, 39. LINDMAN 1926, 377. SEGERSTAD 1924, 160, map fig. 289. BLYTT 1906, 452.

Geographical Distribution. West-Central and South European shrub, extending from western Europe northward to the most southerly part of the Scandinavian Peninsula; southward to the Iberian Peninsula, Italy, and the northern part of the Balkan Peninsula; eastward to Hungary (very rare), Central and southern Poland; in Lithuania it is presumably planted. The southern and eastern limits of its area as an indigenous plant are very difficult to draw, since plantings cannot always be distinguished from isolated localities with spontaneous plants. Outside Europe it is found growing wild on Madeira and Teneriffa, and planted in Ural-Siberia, Japan, and India.

In Germany it occurs as a spontaneous plant, probably rather unequally distri-

buted. It is characteristic of heaths and other soil poor in lime, dry and sandy hills, open pine woods, and is especially common e. g. within the greater part of the area of the Elbe from Bohemia to the Lüneburg Heath, in the Havel region, the region of the Upper and the Lower Oder, and in parts of the Schleswig-Holstein heaths; otherwise it is rare in the North German lowland as far as East Prussia, where it has possibly been planted.

In Sweden *S. scoparius* occurs chiefly in the coast stretches of Scania, Blekinge, and Halland, possibly originally wild in the sandy areas (SEGERSTAD), widely dispersed by cultivation in eastern Smalandia and as far as Upland, and on Oeland and Gotland. In Norway it is found in the low-lying southern regions, thus on heathland at Kristianssand, Mandal (probably escaped from cultivation), and Grimstad.

Occurrence in Denmark. *S. scoparius* grows in all parts of the country, chiefly in acid soil (FERDINANDSEN), but under somewhat different conditions. It is most frequent in the meagre and heathery tracts of Jutland, where it prefers the highly broken heathy ground, and is also often common on the older dunes along the west coast. It shuns, however, heaths with well-developed hard-pan as well as the wet heath. In the east of Jutland, from Djursland westward to the area round Skanderborg and west of the fjords, it is of far more scattered occurrence, and it is not known from Als. Even if the species has been much spread with cultivation, it may no doubt be considered as originally wild in Jutland in the area south of the Limfjord. North of this fjord it is perhaps otherwise; HORNEMANN was of opinion in 1837 that its northern limit must be drawn along the fjord. However, when the species is now common in several regions in Vendsyssel, the two Hanherreder, Thy, and Mors, this has doubtless some connection with the fact that during the last century it has been planted and sown in numerous places in plantations, on heaths, and along hedges, and from such localities it has been able to spread itself rapidly.

It must be taken for granted that *S. scoparius* has in a similar way spread to several more easterly tracts of Denmark. Thus it is often sown on railway slopes, and has at any rate previously been cultivated as a fodder-plant for wild animals (hares). On Funen *S. scoparius* is rather common in the west and south, on hills, heaths, and the outskirts of woods, while it is rare throughout the remaining part of this island, as well as in the majority of the other districts of the islands, yet rather common e. g. in northeastern Seeland, where from it was known already in the 17th century. Is not recorded from districts 23, 33, 34, 46, and 53. It is fairly common on Bornholm, where it seems only to be cultivated, or to have escaped from cultivation. The cultivated forms in Denmark belong mainly to a southwesterly race, which do not tolerate the climate here so well as the danish race. —

Tetragonolobus siliquosus (L.) Roth. — Kantbælg.

J. LANGE 1886—88, 841. RAUNKJÆR 1922, 191. HORNEMANN 1821, 788. ASCHERSON & GRAEBNER 1906—1910, 691. ASCHERSON & GRAEBNER 1899, 441. HEGI IV, 3, 1373. ROUY 5, 1899, 155. LINDMAN 1926, 383. HARTMAN 1879, 306.

Geographical Distribution. Pontine, Mediterranean, Central and Southwest European perennial herb, occurring in the south of Europe (except southern Italy), North Africa, nearly the whole of France (in Belgium, according to CRÉPIN, only anthropochorous); it extends northward to Holland, Denmark, southern Sweden, Oesel, and Esthonia (at Werder); eastward to Poland, Central Russia, Crimea, the Caucasus, and Asia Minor.

In northern Germany it is only found — very scattered — between the Elbe and the Oder, and only at Swinemünde and in several places on Rügen does it reach the Baltic. It is absent in Schleswig, Holstein and Mecklenburg and in the west and east of Prussia, but was formerly found at Thorn; farther south, however, e. g. in Austria, Switzerland, and several tracts of southern Germany, it is rather widely distributed. Its habitats in Germany and other parts of Central Europe are fertile meadows, mainly with saline soil; in France it is recorded from moist meadows, the edges of ditches, and from littoral meadows and the sandy shores of the Mediterranean (*f. maritimus*).

In Sweden the species is fairly common on sea-shores in Scania, Blekinge, and eastern Smalandia, on Oeland and Gotland, and in places it may also be found at some distance from the coast, growing on moist ground.

Occurrence in Denmark. (Fig. 34, Pl. X). Within Denmark the species has two main areas of distribution: Bornholm, where it forms a connecting link between the Southeast-Swedish localities and those of Rügen and the west and southwest coasts of Seeland. Its most northerly locality, where it grows somewhat isolated, is on Gniben; it has previously been collected at Orehoved on Falster, and at Bjerremark on Lolland, and is recorded by ancient florists, most recently by M. T. LANGE (1857) from Marstal on Ærø, and by KJÆRBÖLLING from Horne Næs on Funen (1738); however, in these southernmost localities it has now doubtless disappeared. A record by HORNEMANN of *T. siliquosus* from Lökken at Skager Rack is probably due to a mistake.

Within Denmark the species is largely associated with the coasts; thus on Seeland, and formerly on Falster and Lolland, it grows in littoral meadows, while on Bornholm, where true littoral meadows are quite diminutive, it often grows on the rocky shores. It is further occasionally found some way inland in moist meadows or in bogs; farthest from the coast it has been collected at Aasedammen in Almindingen on Bornholm, and at Lundby, Bøgelunde, and Fuirendal in the southwest of Seeland. The species is not decidedly halophytic, but tolerates the presence of salt in the soil very well.

The commonest form in Central Europe, viz. *genuinus* GREN. & GODR., which is more or less hairy and has thin, not fleshy leaves, is not known in Denmark; the form growing in our country is the *maritimus* SER., which is smooth and has fleshy leaves.

Rügen and Swinemünde being the only localities of the species along the south coast of the Baltic, the immigration into Denmark of this southerly species

may perhaps best be assumed to have originated from these regions, presumably by dispersal by the currents of the sea, as is the case for instance with *Lathyrus maritimus*. The time of immigration is probably Littorinal.

Trifolium agrarium L. — Humle-Klöver.

J. LANGE 1886—88, 827. RAUNKJER 1922, 189. JESSEN & LIND 1923, 128, 430. GRAEBNER 1904, 35. PRAHL 1890, 42. A. CHRISTIANSEN 1913, 19. ASCHERSON & GRAEBNER 1906—1910, 481. HEGI IV, 3, 1293. NEUMAN 1901, 336. SEGERSTAD 1924, 135, 137. BLYTT 1906, 458. HJELT 1919, 274. CEDERCREUTZ 1927, 122, fig. 12.

Geographical Distribution. Pontine, South and eastern Central European, and Baltic annual herb, absent over wide stretches in western Europe; in North Germany its western limit runs from Lingen through Bassum south of Bremen to the region round Harburg. In the Central German highland it grows in meagre meadows and in light foliferous and coniferous woods, and is more common here than in the lowlands. In Holstein and Schleswig it occurs sporadically, mostly singly, on grassy ground, and is considered as anthropochorous. It extends northward to southern Norway, where it is fairly common east of the mountains from Hvaløerne and Kristianssand to Slidre and Froen, growing on dry hills and mountains sides (up to 300—470 meters above the sea); west of the mountains it is very rare, but may be found as far north as Trondhjem and Stenkjær. In Sweden it extends to southern Norrland, growing in similar situations as in Norway and in addition in fields, but its distribution is much affected by cultivation, more especially the cultivation of grass fields, so that it would be very difficult to delimit its original area (SEGERSTAD). In Finland it reaches northward to 62° 50' N. lat., and is found in meadows and on cultivated soil; is considered by CEDERCREUTZ to be anthropochorous.

Occurrence in Denmark. (Fig. 20, Pl. VI). The plant is chiefly found on the islands and in the east of Jutland as well as in the areas along the Limfjord, but with unequal frequency within the various districts, so that it may be unknown over wide stretches immediately adjacent to areas exhibiting many finds of it. The species does not make special demands on the fertility of the soil, and is met with both on moraine clay and on sandy soil, most frequently on, or very near, arable land, e. g. along roads. No doubt it is extensively spread by the sowing of grass seed, and when so few finds of it are recorded from the western regions of Jutland, one of the reasons may be that the cultivation of grass fields has been least developed here. It generally occurs isolated, or in small numbers, and has no great independent power of dispersal under the conditions prevailing in our country; presumably it is not indigenous in our flora, but has been introduced with cultivation. BURSER discovered it about the year 1630 near Sorö, along the margins of fields, and KYLLING records it in 1688 from fields, growing among the corn.

Trifolium alpestre L. — Skov-Klöver.

J. LANGE 1886—88, 834. RAUNKJER 1922, 190. ASCHERSON & GRAEBNER 1906—1910, 575. HEGI IV, 3, 1344. W. CHRISTIANSEN 1926, 138, 152, 200, 203, map 34. STERNER 1922, 239, 329, 332, 334, Pl. 6. HARTMAN 1879, 313.

Geographical Distribution. East, South, and eastern Central European perennial herb, common in southern Europe, though absent from the majority of the Mediterranean islands and e. g. in the most southerly part of Greece. Towards the west and north it extends to Spain, in Central France to Lorraine, through the southern Rhine-lands to Osnabrück, Braunschweig, Lüneburg, and eastern Holstein, thence to the southeasterly parts of Denmark, including Bornholm, and onwards across Oesel and Esthonia to Ural; southeastward to the Caucasus region. In northern Germany it is of scattered occurrence east of the limit just mentioned, growing in dry woods, coppices, and dry meadows, often in company with *T. montanum*. In Scania it has been found by ELIAS FRIES near Harlösa, and is recorded from Kullaberg and Roslätt, but has not been observed since the middle of last century.

Occurrence in Denmark. (Fig. 35, Pl. X). *T. alpestre* has been noted in a considerable number of localities in the east of Seeland, growing in high-lying dry woods, on wooded slopes, tumuli, and similar places, from Lystrup Wood near Frederikssund in the north to Gjorslev Wood in the south, and from the Hornsherred coast of Issefjord in the west to a wooded hill situated between Nymölle and Stampen in the east. As collected outside this area, the species is only represented in the herbarium from Bederslev Dale in the north of Funen (1897), but is further recorded in the literature from some few other localities, thus from Stjernebjerg at Langesö west of Odense (ANTON ANDERSEN 1889, 1909), Möens Klint (KAMPHÖVENER 1835), and Rønne on Bornholm (BAAGÖE 1866). Even if these lastmentioned records have not been confirmed, the geographical position of the localities may to some extent lend support to the assumption that the determination is correct. More difficult in this respect is the matter with regard to the three old records of the species from northern Jutland, viz. from the area round Aalborg by M. T. LANGE, Aarslev (by Aarhus or by Randers) by HORNEMANN, and Understed¹⁾ in Vendsyssel by C. JENSEN (1881). One cannot here disregard the possibility that a confusion has taken place with a narrow-leaved form of *T. medium*.

In Denmark the species is near its northwestern limit, and the absence of this eastern species from Oeland, Gotland, Bornholm, and southern Sweden — apart from the few localities whence it has now disappeared — is a singular fact. Another peculiarity meets us in its distribution in Denmark, in that its main area lies isolated in the north of Seeland, although the species must have immigrated into Denmark from the south or southeast. It is probable, in this as in other

¹⁾ Mr. K. WIINSTEDT has informed me that he has repeatedly searched for *T. alpestre* on the hills at Understed, but without finding it.

cases, that during the post-glacial optimum of warmth, especially during the more continentally marked sub-boreal period, the species has had a more continuous distribution here near its northwestern limit. A concurrent factor in the interruption of such a more continuous area has perhaps been the sub-Atlantic deterioration of the climate, in connection with the constantly increasing cultivation of the localities suitable for the growth of the species. In several of the habitats in northern Seeland previously known it has now been ousted by cultivation.

Trifolium arvense L. — Hare-Klöver.

J. LANGE 1886—88, 831. RAUNKJÆR 1922, 190. FERDINANDSEN 1918, 68. JESSEN & LIND 1923, 128, 431. ASCHERSON & GRAEBNER 1906—1910, 530. HEGI IV, 3, 1322. LINDMAN 1926, 382. STERNER 1922, 289. BLYTT 1906, 461. HJELT 1919, 261.

Geographical Distribution. West Asiatic, European annual herb, extending southward to North Africa and the Canary Islands. It is common in northern Germany, growing on sandy fields and in dry, grassy areas with noncalcareous soil (dunes and heaths). It is rather common in similar situations in South and Central Sweden, rarer in southern Norrland and in Norway, where it occurs along the coast in the south of the country (from Jæderen to Svinesund); still farther northward it is very rare, but occurs at Trondhjem. In Southwest Finland it extends to 61° 40' N. lat.

Occurrence in Denmark. This plant, an inhabitant in particular of acid soil, is recorded from all the districts as common or fairly common. It attains its greatest frequency in the sandy tracts of Jutland as well as on the islands, and may be one of the characteristic plants of sandy pastures poor in nutritious elements, e. g. littoral plains, and may otherwise be found on dunes, on the shore, and on coast cliffs, further in sandy fields, cultivated heaths, and along roads. It has hardly ever been cultivated, but has been much favoured by the cultivation of the country, which has brought about an interruption of the continuous covering of vegetation, such as those of the heath and the woods. No doubt it has immigrated independently of man, and might always have been able to find suitable localities along the shore, on dunes, and on sands.

Trifolium elegans Savi.

J. LANGE 1886—88, 829. RAUNKJÆR 1922, 189. JESSEN & LIND 1923, 433. ASCHERSON & GRAEBNER 1906—1910, 496. NEUMAN 1901, 338. BLYTT 1906, 460.

Geographical Distribution. About the same as that of *T. hybridum*, to which it is very closely allied. It grows in similar situations as *T. hybridum*, but is generally rare within the northern parts of its area of distribution. From Belgium

it is only recorded as anthropochorous. Most likely *T. elegans* has often been overlooked, or has not been distinguished from *T. hybridum*; this has most likely taken place in Sweden. In Norway there occurs the form *T. hybridum f. prostratum* SOND., which is at any rate closely related to *T. elegans*.

Occurrence in Denmark. *T. elegans* has occasionally been found in clover fields in the southeastern part of the country, thus in the north of Seeland, on Lolland, Ærø, the eastern part of Funen, and further in a few places in Vendsyssel, most frequently in the period from 1865 to 1869. The earliest find was made at Klingstrup in the southeast of Funen in 1865. In addition it has been collected a couple of times in waste places in the neighbourhood of Copenhagen, most recently in 1927.

Trifolium filiforme L. — Spæd-Kløver.

(*T. micranthum* VIVIANI).

J. LANGE 1886—88, 825. RAUNKJER 1922, 188. WINSTEDT 1908, XXXV. ASCHERSON & GRAEBNER 1906—1910, 479. HEGI IV, 3, 1290. PRAHL 1890, 43. BENTHAM & HOOKER 1920, 115. DRUCE 1908, 18. BLYTT 1906, 459.

Geographical Distribution. Pontine, Mediterranean, Atlantic annual herb, extending from the Caucasus regions through the South European countries and North Africa to the Canary Islands; thence towards the north along the west coast of Europe from Portugal to Belgium; is further present in Great Britain northward to Roxburghshire, in Denmark, and in southern Norway (coast cliffs at Kristianssand). Everywhere it prefers sandy and stony ground, dry meadows, and other uncultivated soil, particularly in the vicinity of the coasts.

Occurrence in Denmark. (Fig. 28, Pl. VIII). The plant is of rather scattered occurrence within a continuous area comprising the coasts of our southern waters, viz. South Lolland, Southwest Seeland, Funen, and the islands south thereof, as well as the east coast of Jutland from Flensborg Fjord to Horsens Fjord. Several of the finds are of ancient date, and have not been confirmed in recent times; this applies chiefly to those made farthest to the southwestward. It always grows in littoral meadows, principally in the somewhat high-lying stretches away from the sea, and is hardly an obligatory halophyte.

In view of its distribution in Europe as a whole, it must in our country be considered as a southerly, Atlantic form. Its areas in the south of Central Denmark and at Kristianssand in the south of Norway are isolated localities far from its main area in the west and southwest (it is entirely absent along the stretch Flensborg Fjord to Belgium), and it occurs in those parts of Denmark which have the mildest climate. From this point of view its occurrence in this country may perhaps be seen as a relict, and it is conceivable that during the warm Atlantic period the species had a wider distribution in northwestern Europe.

Trifolium fragiferum L. — Jordbær-Kløver.

J. LANGE 1886—88, 830. RAUNKJÆR 1922, 189. J. ANDERSEN & H. ÖDUM 1930, 74. ASCHERSON & GRAEBNER 1906—1910, 524. HEGI IV, 3, 1316. BENTHAM & HOOKER 1920, 113. KOUSNETZOFF 1926, fig. 2. HARTMAN 1879, 311. SEGERSTAD 1924, 58, fig. 16. BLYTT 1906, 460.

Geographical Distribution. West Asiatic, Central and South European, North African perennial herb. In Northwest Europe its northern limit is found along the seashores, running from the Baltic states across the Åland Isles, Upland (an advanced post at Sundsvall in Medelpad), Westmanland, bending round the South Swedish coasts to Norway, and onward along the south coast of this country to Lister; occurs only locally in Scotland and Ireland, while it is common in England; extends southward to Abyssinia, Madeira, and the Canary Islands; eastward to Asia Minor, Syria, Persia, and Turkestan.

The species is halophilous, though not decidedly halophytic, and is especially associated with the seashore. It may, however, also be found commonly distributed far from the shore, e. g. south of the Baltic, and then grows partly in saline soil ("Salzstellen"), thus in several places in Germany in association i. a. with *Juncus compressus*, *Atropis distans*, *Lotus tenuis*, *Erythraea pulchella*, partly in moist perennial pastures in company with *Lolium perenne*, *Potentilla anserina*, *Trifolium repens*, *Plantago major*, etc., and together with these species it grows along the edges of roads, even in rather dry but rich and calcareous clayey soils. Common to all the normal localities of the species is apparently a high osmotic pressure of the solution of nutrient substances in the soil, no matter what combination has produced it.

Occurrence in Denmark. (Fig. 9, Pl. IV). Within Denmark *T. fragiferum* is principally found in littoral meadows, and is common almost everywhere in the country where such are found, even when they are quite diminutive, as along the coasts of Bornholm. The map shows that it has most frequently been found along the shores of the islands except e. g. the coast of northern Seeland, which is devoid of littoral meadows, and further in certain tracts of the east coast of Jutland, along the Limfjord, Nissum Fjord, and the southern part of the west coast (in meadows between the dunes and in the marsh). In Vendsyssel, near the northern limit of the species, it is recorded from scattered localities only.

Besides on the coasts *T. fragiferum* also occurs in several places inland. This seems especially to be the case on Seeland and Lolland-Falster. At Rislev north of Næstved, in Mullerup Bog, at Gjedsebjerg west of Nyborg, and possibly in other places, the presence of the species, together with a series of other halophilous species, is due to the presence of salt-springs. In other cases it is found on the banks of lakes and in meadows where the presence of salt has not been ascertained.

During the maximum of the post-glacial uplift, when most of the Danish coasts extended far outside their present position, *T. fragiferum* may at any rate have been rare within the present area of the country, except perhaps in the neighbourhood of some streams or salt-springs. Considering the southerly distribution

of the species in Scandinavia, it is perhaps even possible that it has not immigrated until the Littorina time. At any rate it was not until this and later times that the littoral meadows, where it now abounds, came into existence. An immigration from the south seems most probable.

Trifolium hybridum L. — Alsike-Kløver.

J. LANGE 1886—88, 829. RAUNKJÆR 1922, 189. JESSEN & LIND 1923, 433. ASCHERSON & GRAEBNER 1906—1910, 495. HEGI IV, 3, 1929. COSTE I, 1901, 343. BENTHAM & HOOKER 1920, 114. KOUSNETZOFF 1926, fig. 2. LINDMAN 1926, 381. BLYTT 1906, 460.

Geographical Distribution. Pontic European perennial herb, extending from Asia Minor, Caucasia, and Transcaucasia through the greater part of Europe except, particularly, the extreme northern parts. HEGI considers it to be originally indigenous probably in Atlantic Europe only, but its distribution is influenced by cultivation to such a great extent, that it would be difficult to define clearly the original area of distribution of the species. In the Mediterranean countries it is generally rare, and it is doubtful whether it is indigenous; in western Europe it is found along the coasts and in river valleys, and in the mountainous regions of France in fertile meadows, fields, and on the outskirts of woods, but it is recorded as naturalised e. g. from Normandy and England; it is likewise widely distributed in Central Europe, especially in meadows, but is assumed to have been introduced, intentionally or unintentionally, during the latest centuries.

The species was hardly common in Sweden when LINNÉ discovered it in the parish of Alsike in Upland; but after that at his inducement it was cultivated in grass fields, it has become commonly distributed in meadows and grass fields from Scania to Norrland. In Norway it is met with in cultivated meadows, where it is rather common, though not originally wild, in the most low-lying, southern parts of the country as well as west and north of the mountains as far as 63° 51' N. lat.; farther northward it is scarce, and probably only of casual occurrence. HJELT considers it as belonging to the spontaneous flora of Finland; it has, however, now become the species of clover that it most commonly cultivated in the country. In Finland it extends northward to 64° N. lat.

Occurrence in Denmark. The species is recorded to be fairly common or common, cultivated as well as escaped from cultivation, in the majority of districts of the country; exceptions are, besides Læsø and Anholt, some West and Central Jutlandish districts (16, 17, and 26), where it has been less extensively cultivated. The species easily escapes from the fields, and is frequently found on the edges of ditches, in high-lying meadows, and in similar uncultivated places near the cultivated ground. — The earliest record of *T. hybridum* from Denmark is due to O. F. MÜLLER (1767), who thought he had found it in abundance at Køge Inn. However, later authors do not mention this find, and possibly it is a case of erroneous determination; it is not until about 1840 that it is recorded as cultivated from this

country, and in the following years it was observed in several places as escaped from cultivation, and soon became of more common occurrence.

Trifolium incarnatum L. — Blod-Kløver.

J. LANGE 1886—88, 834. RAUNKJÆR 1922, 190. JESSEN & LIND 1923, 128, 434. ASCHERSON & GRAEBNER 1906—1910, 544. HEGI IV, 3, 1328. BENTHAM & HOOKER 1920, 110. LINDMAN 1926, 382

Geographical Distribution. Mediterranean, Atlantic annual herb, extending over southern Europe from the Iberian Peninsula to the Balkan Peninsula and Hungary, southward to Algeria, northward to France and southwestern England (Lizard Point). The wild form is *var. Molinerii* (BALB.) DC., which is only seldom introduced with grass seed into Central Europe; among the cultivated forms *f. elatius* GIB. & BELLI is the commonest, and is cultivated in Central and northern Europe, where it easily escapes to grassy ground of different kinds, but is only intermittent. In Sweden, too, the species may occasionally be found, cultivated as well as run wild.

Occurrence in Denmark. As might be expected from a plant occasionally sown in fields set out to grass, *T. incarnatum* is recorded from nearly all districts of Denmark. Sometimes it may be found as an escape from cultivation on the edges of ditches and in similar situations as also in waste places, but it is not constant in our climate, being killed by frost. — In the run wild state the species was observed for the first time in Denmark in 1842 by Thorvaldsens Museum, directly introduced from Italy, but had previously been cultivated as an ornamental plant. It was, however, not until about 1860, when the cultivation of it in grass fields was occasionally commenced, that it became more commonly distributed in the country.

Trifolium medium L. — Bugtet Kløver.

J. LANGE 1886—88, 833. RAUNKJÆR 1922, 190. FERDINANDSEN 1918, 70. ASCHERSON & GRAEBNER 1906—1910, 566. HEGI IV, 3, 1342. KOUSNETZOFF 1926, fig. 3. HARTMAN 1879, 312. BLYTT 1906, 462. HJELT 1919, 259. CEDECRREUTZ 1927, 122.

Geographical Distribution. West Asiatic, European perennial herb, occurring throughout Europe except in the most northerly regions and southern Italy, Greece, and Dalmatia. It is of scattered occurrence all over northern Germany in woods, dry meadows, and along roads, but avoids cultivated ground. In Sweden it extends northward to Ångermanland and Jemtland. In Norway, where it is of common occurrence east of the mountains and in the interior of the fjords, but rarer along the coast, it extends to the regions round Trondhjem; east of the mountains it may sometimes extend beyond the limit of the birch belt, and in this country it is recorded from dry hills and mountain sides, while in Sweden and Finland, where it extends northward to 63° 12' N. lat., it inhabits meadows and grove-meadows.

Occurrence in Denmark. The species is recorded from all districts except No. 12 (Anholt). In nearly all of them it is common, only in the most heathery tracts in the west of Jutland it is more infrequently met with. It grows on uncultivated hills, pastures, the outskirts of woods, and along ditches and hedges, mainly in acid soil, and here, too, it avoids cultivated ground.

The species may vary, having sometimes more erect stems and narrower leaflets (*f. strictum* HARTM.), or it may be low with prostrate or pendulous branches and dark red flowers in somewhat bigger flower heads (*f. humile* LGE.). In our country both forms seem to have about the same distribution as the main species.

Trifolium minus Relhan. — Fin Klöver.

J. LANGE 1886—88, 826. RAUNKJÆR 1922, 188. JESSEN & LIND 1923, 128, 435. GRÖNTVED 1927, 18, 39. ASCHERSON & GRAEBNER 1906—1910, 277. HEGI IV, 3, 1288. LINDMAN 1926, 381. BLYTT 1906, 459.

Geographical Distribution. A Central and South European and Caucasian annual herb, whose northern limit runs through Latvia (Riga — Vindau), the extreme southwestern part of Finland (anthropochorous), southern Sweden to Smalandia and Bohuslen, and the Norwegian coastal regions as far as Bergen.

Occurrence in Denmark. The species has about the same distribution within the country as *T. procumbens*, but is probably often still more common. It grows in similar localities as the species just mentioned, and is sown together with it as weed in the grass fields but is apparently more common in uncultivated pastures. It is perhaps indigenous in our flora.

Trifolium montanum L. — Bjærg-Kløver.

J. LANGE 1886—88, 828. RAUNKJÆR 1922, 189. WINSTEDT 1925, 300. ASCHERSON & GRAEBNER 1906—1910, 505. HEGI IV, 3, 1310. PRAHL 1890, 42. W. CHRISTIANSEN 1926, 138, map 34. LINDMAN 1926, 381. STERNER 1922, 301 (fig. 6), 332, 401. BLYTT 1906, 461. KOUSNETZOFF 1926, fig. 2.

Geographical Distribution. West Asiatic, Pontine, East and Central European perennial herb. Within Europe its northern limit runs through Central Perm, Petrograd, southern Finland, eastern Sweden south of Gefle, to an isolated locality on Hovedø near Oslo; westward it extends through Scania, Seeland, eastern Holstein, thence along a line from Warnemünde through Hanover, the Rhine province to southeastern Belgium, and onwards through the eastern parts of France to Central Spain; it is absent from South Europe proper, i. e. from South Italy and the southern part of the Balkan Peninsula.

In the North German lowlands, east of the limit stated above, *T. montanum* occurs in scattered growth in dry meadows, in foliferous woods, on hills, and along roads. In eastern Sweden it is rather common in pastures rich in herbaceous plants and with calcareous soil ("meadow steppes", STERNER), and near Oslo it occurs in low coppices on calcareous mountains.

Occurrence in Denmark. (Fig. 36, Pl. X). The species is not rare in the southeastern part of Bornholm, where it is met with on the edges of meadows and bogs, growing on fairly dry soil with abundant herbaceous vegetation, while in the remaining part of Denmark it has apparently only survived on Hessel Bakker, i. e. pasture hills, partially covered with copse, on the southern outskirts of Ganløse Egede. Formerly, however, the species has had a somewhat greater distribution in Seeland. In the herbarium we thus find specimens collected in the neighbourhood of the Flaskekro southwest of Copenhagen in the period from 1823 to 1866, partly "on a hill behind the Flaskekro", and partly "east of the Flaskekro in the vicinity of the field well", as well as specimens collected on the Vesterfælled at Copenhagen in 1841. MARTIN VAHL found it on the littoral pasture between the Skillingskro and Køge Inn (Fl. Dan. 1172), and HANS MORTENSEN records it in 1872 from Ny-mølle; possibly it has also grown on Hesselö (see LYNGBY's manuscript).

Geographically the localities of *T. montanum* on Seeland and Bornholm are closely connected with its Scanian area, where it is fairly common. This southeasterly, continentally marked species must have immigrated into Scandinavia from the east and southeast, probably at the time when the climate was least under the influence of the Atlantic, since throughout northern Europe it avoids the western coastal tracts most exposed to this influence. Possibly it is a sub-boreal immigrant in Scandinavia.

Trifolium pratense L. — Röd Klöver.

J. LANGE 1886—88, 832. RAUNKJER 1922, 190. OLSEN 1921, 50. JESSEN & LIND 1923, 128. GRØNTVED 1927. STEFÁNSSON 1924, 162. ASCHERSON & GRAEBNER 1906—1910, 547. HEGI IV, 3, 1331. KOUSNETZOFF, 1926, fig. 2. LINDMAN 1926, 382. BLYTT 1906, 461. HJELT 1919, 256.

Geographical Distribution. Euro-Asiatic perennial herb, occurring in western Asia as far as Altai, Balkal, Cashmere, and Garwall in India; wild as well as cultivated throughout Europe except in the extreme northerly regions; present in Algeria; completely naturalised in North and South America and on New Zealand.

In Central Europe it grows wild in meadows, pastures ("Triften"), and coppices. In Sweden it occurs in similar situations almost all over the country. In Norway it is common in dry meadows and on hills as far north as Tromsö and Kvænangen (69° 48' N. lat.); still farther northward it is only occasionally met with; it extends from the sea some way into the birch belt, at times even beyond the limit of the birches. In Finland the cultivated form has its northern limit at Kemi, while the wild form extends to 69° 10' N. lat. In Iceland it is anthropochorous.

Occurrence in Denmark. After *T. pratense* since the middle of the 18th century, and in an increasing degree since the middle of last century, has been cultivated in Denmark, it is now one of the commonest plants of the country, and occurs in

all districts, most commonly in cultivated and semi-cultivated formations. No doubt, however, the species was frequent in the more fertile parts of the country even before the cultivation of grass fields was commenced, and certainly even before the introduction of agriculture in to Denmark. Humous meadows, pastures with clay or sand in the sub-soil and with a neutral or slightly acid reaction, and copse-clad hills and cliffs are the localities where the species may be met with as a spontaneous plant.

T. pratense is highly variable. Among the wild forms occurring in this country, *var. spontaneum* WILLK., encountered in meadows and coppices, and *var. villosum* WAHLB. (= *var. depressum* J. P. JACOBSEN), growing on dunes, sandy pastures, coast cliffs, and hillsides, may especially be separated. *V. sativum* SCHREB. is common everywhere, cultivated and run wild, in meadows, on the edges of ditches, and in similar situations; it is possibly a South European form which has been introduced by cultivation into more northerly regions. Finally, *v. expansum* HAUSSKN. (= *v. americanum* HARZ) has been introduced into our country with American seed, but is presumably originally indigenous in Hungary and Dalmatia; this form, too, grows as a run wild plant in this country on the edges of ditches and in waste places.

Owing to the common distribution of the species within subarctic Fennoscandia, it seems reasonable to assume that it belongs to our earliest post-glacial immigrants.

Trifolium procumbens L. — Udstrakt Klöver.

J. LANGE 1886—88, 826. RAUNKJÆR 1922, 188. FERDINANDSEN 1918, 68. JESSEN & LIND 1923, 128, 435. BENTHAM & HOOKER 1920, 114. ASCHERSON & GRAEBNER 1906—1910, 476. HEGI IV, 3, 1289. BLYTT 1906, 459. NEUMAN 1901, 336. HJELT 1919, 277.

Geographical Distribution. West Asiatic, European annual herb, which in Fennoscandia is spread over western Finland (anthropochorous), Sweden as far as Norrland, and the southernmost low-lying parts of Norway, more especially from Oslo to Jæderen. In Scandinavia, Germany, as well as in other regions, it lives in meadows, grass fields, on grassy hills, the edges of ditches, lawns, etc., extensively distributed by cultivation.

Occurrence in Denmark. *T. procumbens* is mentioned from all the districts of the country, and is no doubt common in all of them. It is acidophilous, and is most frequently found on grassy soil, especially in associations much influenced by cultivation; it is generally sown as an impurity in clover and grass seeds, which circumstance has doubtless contributed considerably to its extensive distribution in the country, still it may also occur e. g. on pastures. It seems uncertain whether it can be considered as originally belonging to our flora.

Trifolium repens L. — Hvid Klöver.

J. LANGE 1886—88, 829. RAUNKJÆR 1922, 189. FERDINANDSEN 1918, 66. JESSEN & LIND 1923, 128, 436. STEFÁNSSON 1924, 161. ASCHERSON & GRAEBNER 1906—1910, 497. HEGI IV, 3, 1302. KOUSNETZOFF 1926, fig. 3. NORMAN 1895, 198.

Geographical Distribution. West Asiatic, European perennial herb, extending beyond the Polar and Alpine limits of the trees, and southward to North Africa; it is found, though probably only as anthropochorous, on Madeira and the Azores, in the Cape Colony, North and South America, and East Asia.

The species is principally met with in meadows, pastures, grass fields, on lawns, and at roadsides, and is of common occurrence throughout Central and northern Europe. Its great frequency has some connection with the fact that it is not very exacting with regard to the content of nutrient substances in the soil, and that it is extensively cultivated and very easily spread with cultivation; it thrives best in soil requiring lime.

Occurrence in Denmark. *T. repens* is common in all districts of the country. The cultivation of the species was commenced in Denmark as early as about the middle of the 18th century, but even prior to that time it had been spread by cultivation, thus for instance by farm animals, as it obviously has taken place e. g. in northern Norway. *T. repens* has, however, doubtless lived in the North prior to the introduction of agriculture and the rearing of cattle, e. g. on patches of meadows in woods and in similar places, and considering its present extensive distribution towards the north, it seems very likely that it has immigrated at an early date.

Trifolium spadiceum L. — Brun Klöver.

J. LANGE 1886—88, 827. RAUNKJÆR 1922, 189. WINSTEDT 1928, 225. W. CHRISTIANSEN 1926, 176, map 85. PRAHL 1890, 42. ASCHERSON & GRAEBNER 1906—1910, 484. HEGI IV, 3, 1294. STERNER 1922, 360, 407. BLYTT 1906, 458. HJELT 1919, 271.

Geographical Distribution. East and eastern Central European annual herb, which extends from northern Perm, Shenkursk in Archangel, and Finland from 65° 20' N. lat. in the north, and from Orenburg and Podolien in the south, across the Central European highland to the Rhine province and the mountains of southern France and northern Spain; it is rare along the Apennines as far as Calabria, and is present in Servia and Bulgaria; it further occurs, mainly as a colonist, at roadsides and in meadows, scattered over Central Sweden and southern Norrland, on Oeland (probably spontaneous (STERNER)), in the south of Norway, and in the Baltic lowlands.

Occurrence in Denmark. The species was first observed in this country in 1892 in a bog a Ruds Vedby on Seeland (district 42), where it has survived at any rate till about the year 1900. In 1927 it was found, growing abundantly in a small meadow south of Kolding, at the boundary between the moist meadowland

and the higher-lying arable land. These two Danish localities, in connection with the habitats of the species in eastern Holstein, mapped by CHRISTIANSEN, and its very few localities in the remaining part of the North German lowlands east of Hanover, fill up the gap between the area of the species in eastern Sweden and in the Rhine province and Thuringia. As in Holstein, and on the whole in northern Germany, where the species is not regarded as originally indigenous, it may be anthropochorous in the two Danish localities.

Trifolium striatum L. — Stribet Klöver.

J. LANGE 1886—88, 831. RAUNKJÆR 1922, 190. GRÖNTVED 1929, 20 f. O. ROSTRUP 1900, 147. JESSEN & LIND 1923, 128. ASCHERSON & GRAEBNER 1906—1910, 527. HEGI IV, 3, 1324. PRAHL 1890, 42. KRAUSE 1893, 127. LINDMAN 1926, 381. SEGERSTAD 1924, 162, 163, fig. 295.

Geographical Distribution. Pontine, Mediterranean, and West European annual herb, extending from Caucasia and the Crimea, through southern Europe, to Northwest Africa and Madeira; in western Europe from Portugal to England, southern Scotland, Ireland (very rare) and southern Scandinavia; in Central Europe, where it is of very scattered occurrence, it extends eastward to the Oder and southern Russia.

In northern Germany the species is generally rare and frequently inconstant; it is most frequent in Neuvorpommern and on Rügen, is recorded from Mecklenburg as a migratory plant that has made its appearance in several places in the course of the last few generations; it is rather commonly distributed in Schleswig-Holstein, but according to PRAHL probably originally introduced. Its distribution in Sweden has been mapped by SEGERSTAD, according to whom it occurs in sandy fields, on hillsides, and in waste places in the vicinity of the coast along the stretch from Gotland and Oeland through southern Blekinge to the southern and western parts of Scania, and thence sporadically along the coast of Halland to some distance south of Gothenburg. It is absent in Norway.

Occurrence in Denmark. (Fig. 21, Pl. VII). The species is generally fairly common on the islands — the absence of dots in Central Seeland is possibly due to incomplete investigation — and in the east of Jutland almost as far as Randers, and is further recorded from a number of localities round the western part of the Limfjord. It seems to be almost entirely absent from Himmerland, Vendsyssel, and the southwest of Jutland; its northern limit runs through the northern part of the peninsula. It prefers localities where the plant covering is not quite close, growing especially in gravel-pits, in dry, sandy or gravelly grass fields, on dikes and slopes, in pastures, and waste places, and thrives best on acid or neutrally reacting "warm" soil, probably mainly in soil not too poor in nutrient substances.

The species varies greatly within the Mediterranean region, while in northern Europe it is almost exclusively represented by the form *var. genuinum* LGE.; this, however, appears in a couple of forms dependent on the nature of the habitat, viz.

f. strictum DREJ., occurring where *T. striatum* grows in tall vegetation, e. g. in fields; and *f. prostratum* LGE., encountered in warm localities exposed to the sun and with a low and open vegetation.

T. striatum is much spread by cultivation in different ways, and also as an impurity in grass seed sown in fields laid down in grass. From the fields it may migrate to uncultivated soil in the neighbourhood, where it is apparently able to exist independently of cultivation, as a naturalised plant, but is probably no more than in northern Germany originally a native of the Danish flora. It was known to Danish botanists in the 17th century.

Trigonella coerulea (L.) Seringe — Mölurt.

(*Melilotus coeruleus* DESR.)

RAUNKJÆR 1922, 186. ASCHERSON & GRAEBNER, 1906—1910, 379. HEGI IV, 3, 1233.

Geographical Distribution. Southeast European annual herb which has spread by human agency to vast areas of Central Europe, since in earlier times it was cultivated as a medicinal plant, or, owing to its perfume, reminiscent of that of *Trifolium foenum græcum*, was used as an admixture in cheese or bread. In recent times it has been introduced in several places as a ruderal plant.

Occurrence in Denmark. In this country the plant is known from cultivation in a few places, viz. from a garden at Marienborg west of Hadsund (1871) and from a farm by Frederiksværk (1883), where it was employed as an admixture in cheese. Further it has been collected in waste places near Aarhus in 1895, near Benzon's chemical factories at Copenhagen in 1887—95, and at Kastrup Mill and in other waste places on Amager in 1893—99.

Trigonella ornithopodioides D. C. — Fugleklo-Bukkehorn.

J. LANGE 1886—88, 836. RAUNKJÆR 1922, 186. HORNEMANN, 1821, 779. ASCHERSON & GRAEBNER 1906—1910, 510. HEGI IV, 3, 1279. BENTHAM & HOOKER 1920, 108. DRUCE 1908, 16.

Geographical Distribution. Atlantic, West Mediterranean annual herb, known from the western part of the Mediterranean region (South Italy, Corsica, the Iberian Peninsula, North Africa),* the west coast of Europe as far as Holland, and from coastal tracts in several parts of England, South Scotland, and Ireland; it is recorded from dunes on the island of Sild in 1768, but has not been observed since that time, probably it has been adventitious in that locality; it has — at any rate — been present on Læsø and Bornholm. — It grows mainly on bare slopes and along roads, usually in the vicinity of the coast.

Occurrence in Denmark. HORNEMANN found the plant in the period from 1806 to 1821, growing abundantly on the eastern side of Christiansø at Bornholm, but later it has been searched for in vain in this locality. In 1885 it was observed on an

old alluvial beach south of Nexö, near the shooting ground, in the neighbourhood of which there are some waste places, and was also collected here in 1887; and as late as 1890 it was found in nearly the same place (viz. the shore south of Ferskesö), where it occurred rather plentifully. J. P. JACOBSEN records *Trigonella ornithopodioides* from Læsö in 1870, and J. LANGE confirms the correctness of the determination; the nature of the habitat is unknown. In 1892 P. NIELSEN discovered the plant among mangolds at Tystofte Experimental Station in the south of Seeland. Later the species has not been recorded from Denmark.

Perhaps *T. ornithopodioides* on Bornholm, Christiansö, and Læsö may best be considered as having been introduced in the ballast of sailing vessels from West European ports.

Ulex europæus L. — Tornblad.

J. LANGE 1886—88. 819. RAUNKJÆR 1922, 186. MÖLLER-HOLST VI, 1883, 52. WARMING 1919, 118. HORNEMANN 1821, 756. KYLLING 1688, 53, No. 386. ASCHERSON & GRAEBNER 1906—1910, 284. HEGI IV, 3, 1190. LINDMAN 1926, 377. BLYTT 1906, 452.

Geographical Distribution. West European shrub, which has been introduced from the Iberian Peninsula, France, Belgium, Holland, and the British Isles, into more easterly regions; thus it occurs, planted as well as wild, in Denmark, near Mandal in the south of Norway, in southern Sweden (Scania, Bohuslen, Smalandia, Oeland, and Gotland), in Central Europe as far as the Sudetic Mountains, and in the Balkan Peninsula. It is frequently anthropochorous in the North German lowlands and in the neighbourhood of the Baltic, in several places apparently naturalised, chiefly on railway embankments, on sunny outskirts of woods, and in similar situations. In the more easterly regions it often dies down to the ground in the winter.

Occurrence in Denmark. *Ulex europæus* occurs in all parts of the country, but is not equally common in all of them, being much more frequent (frequency here and there) in most regions of the islands and eastern Jutland as far as the Limfjord than in the area north of this fjord or in the heathy tracts of western Jutland. It is not recorded from districts 3, 12, 39 a, 46, and 51. In several places it is planted as a hedge plant, or is sown in order to protect, or serve as food for, the game, and is able to propagate itself, mainly in sandy tracts, where it may be found along roads, on the outskirts of woods, and on pastures, forming small scrubs; or it may migrate to the shore, as it has done by Vivild in Djursland. The reason why *U. europæus*, although it thrives best on sandy soil, is comparatively rare in the west of Jutland, must probably be sought in the circumstance that these regions have only recently been cultivated to any great extent; KYLLING records it from Ribe, and HORNEMANN knew it from some few localities on Als, in Jutland, Funen, and Bornholm.

On the whole the behaviour of the species in this country shows that it is

not originally wild; moreover it does not always endure our climate, and in severe winters dies down to the ground.

Vicia angustifolia Roth. — Smal Vikke.

J. LANGE 1886—88, 846. RAUNKJER 1922, 194. JESSEN & LIND 1923, 453. ASCHERSON & GRAEBNER 1906—1910, 971. HEGI IV, 3, 1547. MURATOVA 1926, b, Pl. I. PRAHL 1899, 44. LINDMAN 1926, 387. SEGERSTAD 1924, 36, 102, 112. BLYTT 1906, 473. HJELT 1919, 212.

Geographical Distribution. West-Asiatic, European annual herb, extending over nearly the whole of Europe with the exception of the extreme northern regions. It is everywhere extensively distributed as a field weed, more particularly the form *segetalis* (THUILL.) KOCH, but is also found — e. g. in northern Germany — in coppices and open woods, on pastures and dunes; this is especially the case with *f. Bobartii* KOCH, which e. g. within Holstein and Schleswig is met with in »dry meadows« (pastures) and on sandy hills, mainly near the coast. In Scandinavia, too, the species occurs on cultivated soil and — as *f. Bobartii* — in natural associations, or associations only slightly affected by cultivation, on dry hills (pastures), in coppices, and on sea-shores. In Sweden *f. Bobartii* hardly extends as far northward as the oak, but as an adventitious plant the species may be found as far as Norrboten. In Norway the species is rare, and is only found in the most low-lying tracts as far as Skedsmo and Bergen. In Finland it extends northward to 65° N. lat., but only in fields, *f. Bobartii* is absent.

Occurrence in Denmark. *V. angustifolia* is distributed nearly throughout the whole of the country, and is probably almost equally frequent in the west and the east. Still it is not recorded from district No. 17 and within district No. 18 from Holstebro only, while both north and south thereof, viz. in districts 16 and 26—27, it is recorded to be common or fairly common. Nor is it recorded from Ærø. — Its extensive distribution in the country is no doubt essentially conditioned by the fact that it is common as a weed among the corn; this is especially true of the form *segetalis*, whereas *f. Bobartii* in this country, too, is found in more natural associations, chiefly in coppices, along hedgerows, on pastures, grey dunes, and dune heaths, and may probably be considered as spontaneous within Denmark. The distribution of this form deserves a closer investigation, it being probably more unequally distributed than the chief species. The specimens of this form kept in the Herbarium (about 30 sheets) are derived from districts within the eastern and southern parts of the country, to which must be added some few finds from districts 1, 3, 8, 12, and 19. By far the greater number of the finds originate from localities situated near the coast.

Vicia cassubica L. — Kassubisk Vikke.

J. LANGE 1886—88, 842. RAUNKJER 1922, 193. ASCHERSON & GRAEBNER 1906—1910, 923. HEGI IV, 2, 1523. W. CHRISTIANSEN 1926, 147, 177, 183, map. 84. LINDMAN 1926, 386. STERNER 1922, 304, 346 (fig. 24), 349, 403. BLYTT 1906, 472.

Geographical Distribution. Pontine, Mediterranean, eastern Central European perennial herb, extending over South and Central Russia from Saratow, Simbirsk, and Orenburg through Vitebsk, Livonia, southwestern Esthonia, Oesel, and southern Sweden to the south of Norway and Denmark; thence through North and Central Germany, Southwest France to Central Spain, and onwards to the south across Italy, the Balkan Peninsula (except the southern part of Greece), Bessarabia, the Crimea, Asia Minor, Armenia, Syria, and the Caucasus.

In northern Germany *V. cassubica* is commonest to the east, in dry woods and on hills, and reaches its northwestern limit along a line drawn from Flensburg through the southern Ditmarshes, Hamburg, Lauenburg, Lüneburg, Celle, Hildesheim, the Harz, Hessen, and Pfalz; (it is absent in southeastern France, Alsace-Lorraine, Baden, Württemberg, South Bavaria, Switzerland, North Tyrol, Carinthia, Salzburg, and Upper Austria). The distribution of the species within Holstein and German Schleswig is shown on a map by W. CHRISTIANSEN. In certain tracts of Sweden it is especially common on rocks and dry wooded hills; according to STERNER, who has mapped its distribution in that country, it extends northward to Stockholm, and is especially common in the eastern part of southern Sweden, in Scania, and along the west coast to Gothenburg; its northernmost localities in western Sweden lie between the frontier and lake Wener. Within Norway it occurs in similar localities as in Sweden, thus on the south coast between Lyngör and Christianssand, but is absent from the area round Oslo. According to information furnished by KJELL KOLTHOFF to STERNER it is widely spread within restricted areas of Sweden because birds of prey devour gallinaceous birds which have its seeds in their craws.

Occurrence in Denmark. (Fig. 18, Pl. VI). As regards the distribution of the species in this country, three areas may be distinguished, viz. Bornholm, northern Seeland, and scattered localities in Jutland and Funen. It is fairly common on Bornholm. The finds of it in Seeland are mainly centred in the region north of Copenhagen, where, however, it is now very rare, even if it has not quite disappeared, and in the region round the Isefjord. While the Seeland areas of the species correspond to the Scanian, its widespread localities in Jutland, from Apenrade and Bramminge to Agdruplund in Vendsyssel, must be regarded in connection with the West Swedish and South Norwegian as well as with the German localities in southern Schleswig and Holstein. The northern part of the western limit of the species runs through Jutland. In several of the localities in Jutland and Funen it has not been observed since the first half of the last century, so it has possibly disappeared there. On the whole it has probably been largely ousted during the last few generations owing to destruction of its habitats by cultivation or the clearing of forests. It prefers high, dry, and wooded hills, coppices, or heathery hills. Possibly it has also been ousted from some localities during the sub-Atlantic deterioration of the climate, since here near its northwestern limit the sub-boreal

warm and continentally marked climate must especially have favoured the growth of this southeasterly species. The immigration must have taken place from the east or southeast, probably during the post-glacial optimum of warmth.

Vicia cracca L. — Muse-Vikke.

J. LANGE 1886—88, 843. RAUNKJER 1922, 193. STEFÁNSSON 1924, 159. OSTENFELD 1901, 71. FERDINANDSEN 1918, 67. JESSEN & LIND 1923, 129, 454. ASCHERSON & GRAEBNER 1906—1910, 929. HEGI VI, 3, 1529. MURATOVA 1926, b, Pl. I. LINDMAN 1926, 387. BLYTT 1906, 472.

Geographical Distribution. European, Asiatic perennial herb, distributed over Asia from China and Kamschatka, throughout Europe, Iceland (growing in dry meadows and on cultivated soil), the Faroes (in the home-fields only); it is further found in Northwest Africa, in North America (possibly anthropochorous), and by the ancient Norse house ruins at Igaliko in South Greenland. In Central and North Europe it is common in meadows and pastures, coppices and woods, along the seashores, in fields, and on other soil influenced by cultivation; in the Scandinavian mountains it ascends into the birch belt, but rarely beyond the limit of the birch.

Occurrence in Denmark. The species is common within all districts of the country, growing on fences, along roads, in coppices, in meadows, on the seashore, on dunes, and in cultivated fields, mainly on soil not requiring lime. *V. cracca* varies greatly; some dominant forms are *f. latifolia* COOS. & GODR., occurring chiefly in woods, coppices, and along hedgerows, *f. sericea* PETERM. (= *f. humilis* NEUM.) and near to this *f. leptophylla* FR., which are largely attached to the dunes and the sea shores.

Vicia dumetorum L. — Krat-Vikke.

J. LANGE 1886—88, 844. RAUNKJER 1922, 192. ASCHERSON & GRAEBNER 1906—1910, 917. HEGI IV, 3, 1521. PRAHL 1890, 44. KRAUSE 1893, 130. LINDMAN 1926, 386.

Geographical Distribution. Siberian, eastern Central European perennial herb. Within Europe it extends from Central and South Russia to the northern Balkan countries, northern Italy, and the Pyrenees, through the south and east of France, southern Belgium (very rare), Germany (except the northwestern part), and southeastern Denmark to South Sweden. In Germany its northwestern limit runs from the Main through Thuringia, southern Hanover, Neuahaldensleben near Magdeburg to the eastern part of Mecklenburg; it is rare in Uckermark and Pomerania (is mainly found in the Oder Valley), in West Prussia it is only found in the area of the Vistula, and in East Prussia it is much scattered; its northern limit runs through Vilna. In Sweden it is of rare occurrence, but may be found in

groves in southern Scania, Halland, eastern Smalandia, East Gothland, northward to Stockholm.

Occurrence in Denmark. (Fig. 31, Pl. IX). It is a southeasterly species, met with, though very rarely, in woods and coppices. In the last generation it has only been observed in Ganløse Ore in the north of Seeland and further in the wood on Helnæs and in the Skovkrog by Assens (district 28). In several of the localities indicated on the map it has now probably disappeared. This is doubtless true of the two old finds in the north of Jutland (viz. by GÖTSCHKE and KAMP-HÖVENER) — which correspond to the localities in Halland, — as well as to HORNE-MANN'S find of it at Esbønderup in northern Seeland. A part of the northwestern limit of the species runs through Denmark, to which it has no doubt immigrated from the southeast. It may be assumed that during the post-glacial optimum of warmth it had the conditions for a wider and more continuous distribution within the areas where its northern limit is to be found at the present day.

Vicia hirsuta (L.) Koch. — Laadden Vikke.

J. LANGE 1886—88, 847. RAUNKJER 1922, 192. JESSEN & LIND 1923, 129, 455. ASCHERSON & GRAEBNER 1906—1910, 906. HEGI IV, 3, 1515. MURATOVA 1926, b, Pl. I. LINDMAN 1926, 386. BLYTT 1906, 470. HJELT 1919, 219.

Geographical Distribution. Euro-Asiatic annual herb, extending over temperate Asia and nearly the whole of Europe except the most northerly tracts of Scandinavia, southward to North Africa; it is anthropochorous in North and South America, Australia, New Zealand, and Polynesia. It is common in northern Germany, growing on arable land, along roads, and in coppices and hedges. In Sweden it extends northward to southern Lappland, and in Norway to 64° 5' N. lat., being anthropochorous at any rate in the northernmost tracts. Within Scandinavia it grows, besides on arable land, on dry, uncultivated hills, on rocks, screes, and in coppices. It is rather common in the south of Finland as far as 66° N. lat., probably solely as an adventitious plant. PALMGREN thinks it quite possible that the species is indigenous on the Aland Isles.

Occurrence in Denmark. The species is distributed nearly throughout the whole country, being generally common on the islands and in the east of Jutland, but evidently rarer and absent in patches north of the Limfjord and in the west of Jutland. It is not recorded from Læsø (3), Vester Hanherred (6), and the West Jutland districts 16, 17, and 18 (except the region round Holstebro). Its habitats are mainly to be sought on fences, along roads, in gravel-pits, on dry grassy hills, in sandy fields, on seashores, dunes, and cliffs, among the corn, and in waste places. Even if its distribution in this country, and on the whole in northern Europe, is much affected by cultivation, it chiefly gives the impression of being indigenous in Denmark.

Vicia lathyroides. L — Vaar-Vikke.

J. LANGE 1886—88, 846. RAUNKJÆR 1922, 194. FERDINANDSEN 1918, 70. JESSEN & LIND 1923, 456. GRÖNTVED 1929, 20 f. ASCHERSON & GRAEBNER 1906—1910, 959. HEGI IV, 3, 1541. BENTHAM & HOOKER 1920, 123. LINDMAN 1926, 387. SEGERSTAD 1924, 62, fig. 27. BLYTT 1906, 474. HJELT 1919, 215.

Geographical Distribution. Pontine, Mediterranean, and West-Central European annual herb, which is not uncommon in England and Scotland, but very rare in Ireland, and to the north, in Fennoscandia, extends to southern Norway (viz. Kristianssand, Grimstad, Kragerø, and Hvaløen), West Gothland, Upland, and the Aland Isles (rare, and not noticed prior to 1890), and extends eastward to Libau, East Prussia, Southwest Poland, the Crimea, the Caucasus, Asia Minor, and Lebanon; southward to the Mediterranean and the Atlas range, but in the Mediterranean region it is much rarer than farther northward, and is entirely absent over wide stretches; it is likewise absent from the calcareous areas between the Black Forest and the Bohemian Forest. In northern Germany it is of common occurrence mainly on sandy and warm soil, thus in pastures ("trockne Grasplätze", "trockne Hügel"), in open woods, along roadsides, and in fallow-fields. Within Scandinavia it is found in similar situations as also on rocks. In Norway as well as in Sweden it is chiefly restricted to a narrow belt along the coast, a circumstance which, since the species is here near its northern limit, is probably due to its heat demand in the spring time.

Occurrence in Denmark. The plant is found in all parts of the country, mainly in sandy, preferably acid soil, thus on pasture hills, coast bluffs, littoral pastures, alluvial beaches, grassy downs, roadside slopes, grass fields, and similar places. As it flowers early in the spring (April—May) and withers immediately after maturation of the seed, it has doubtless frequently been overlooked, so that its distribution within Denmark cannot be determined in details on the basis of the available material. It is recorded to occur rather commonly or here and there in several tracts of the islands as well as in the east and north of Jutland south of the Limfjord. It is only sparsely recorded from the area north of this fjord, and seems to be entirely absent from certain parts of central and western Jutland. It is often frequent near the coast, but by no means restricted to it, as in Sweden and Norway. The situation and extent of the country no doubt ensures to it a sufficiently mild spring everywhere, but its partiality for sandy soil has perhaps some connection with the fact that this is warmer in the spring than the clayey soil.

J. LANGE distinguishes *f. cirrhata* as a separate form having its leaves elongated into tendrils; it has the same distribution in this country as the chief form.

The species has probably immigrated from the southwest rather late in post-glacial time.

Vicia orobus D. C. — Lyng-Vikke.

J. LANGE 1886—88, 841. RAUNKJER 1922, 193. DREJER 1838, 244. ASCHERSON & GRAEBNER 1906—1910, 920. HEGI IV, 3, 1525. W. CHRISTIANSEN 1917, 43. BENTHAM & HOOKER 1920, 122. K. TROLL 1925, 310 (fig. 1). BLYTT 1906, 471.

Geographical Distribution. Atlantic perennial herb. A map by K. TROLL shows, somewhat uncritically as to details, a series of more or less isolated areas, within which the species grows in foliferous woods, on heaths, and in pastures, viz. northern Spain, the Pyrenees, Southwest and Central France, the Jura Mountains in Switzerland, occasional localities along the central part of the Rhine, e. g. in Spessart, 37 localities within England-Scotland (chiefly in Devonshire, Wales, the Isle of Man, southern Scotland, and the island Skye in $57\frac{1}{2}^{\circ}$ N. lat.), 4 localities in Ireland, further Jutland, and southwestern Norway, where it is fairly common on dry hills and in coppices within the most low-lying tracts along the sea from Farsund and Lister to Söndmöre (the *Ilex* region).

Occurrence in Denmark. (Fig. 2, Pl. II). Now solely a Jutlandish species, which has been found in the heathery tracts of the peninsula, mostly in the central parts, avoiding the areas with moraine clay, in about half a hundred localities, growing on heathery hills and on the outskirts of coppices; it is absent along the east coast except between Randers Fjord and the Limfjord as well as in the western coastal tracts; north of the Limfjord it has been observed in a few localities only. It is further recorded from earlier times as having been found in the north of Seeland between Lyngby and Frederiksdal (undated specimens in HORNEMANN's herbarium have been taken by the finder to be *V. cassubica*), and, according to a statement by DREJER on Brede Bakker and near Roskilde. These finds have, however, never been verified, and the possibility of confusion with *V. cassubica* or of an interchange of the labels cannot probably be rejected; this last-named species has been known from Frederiksdal and Brede since the first half of last century.

Among the numerous isolated areas of the species, Jutland is one of those within which it is most frequent, and moreover it has doubtless been exterminated in several places owing to the cultivation of the locality. Possibly *V. orobus* has had a more continuous distribution in western Europe in Atlantic time, but in view of the present distribution of the species it seems most natural to assume that the Jutlandish and the West Norwegian areas have received the species from Britain. As to the dispersal of seeds, nothing is known.

Vicia pannonica Crtz. — Ungarsk Vikke.

RAUNKJER 1922, 194. ASCHERSON & GRAEBNER 1906—1910, 981. ASCHERSON & GRAEBNER 1899, 452. HEGI IV, 3, 1552. MURATOVA 1926, D, Pl. I. PRAHL 1890, 44.

Geographical Distribution. Annual herb, considered to be originally spontaneous in the Lower Danube countries only, but as a fully naturalised archæo-

phyte it is at any rate distributed in the Mediterranean countries from Spain and Oran in Algeria to the Caucasus and Persia. In Central Europe it seems to be spreading rapidly in recent years, being introduced with grain, and migrating from fields and waste places to roadsides, railway embankments, etc. In southern Germany it has been spreading since the end of last century, in Bavaria since 1875, at Mannheim since 1880, and in Alsace after 1900. In northern Germany it is still rare, but was observed near Hamburg in 1883.

Occurrence in Denmark. *V. pannonica* has been obtained from 7—8 different localities, chiefly waste places or building sites in seaports, viz. from Randers, Horsens, Svendborg, Kalundborg, and several places in Copenhagen; it has further been collected near Staby in district 16, in a field with rye and vetches, and in a young wood at Christiansminde near Svendborg it was found run wild in abundance in 1905. It was first discovered in a waste place, Klövermarken, on Amager in 1885; most recently it has been collected in the Free Port at Copenhagen (1921), probably introduced with fruit. On the whole its occurrence in this country seems to indicate that it has particularly been introduced with vetch seed as fodder for horses.

In several of the localities there has further been found *var. striata* (MB.) GRISEB. (= *v. purpurascens* D. C.). with dark purple petals, while the chief form has yellow flowers.

Vicia sepium L. — Gærde-Vikke.

J. LANGE 1886—88, 845. RAUNKJER 1922, 193. OLSEN 1921, 67. ASCHERSON & GRAEBNER 1906—1910, 953. HEGI IV, 3, 1538. MURATOVA 1926, b, Pl. I. LINDMAN 1926, 386. SEGERSTAD 1924, 106, fig. 161. BLYTT 1906, 473. HJELT 1919, 207. CEDERCREUTZ 1927, 123. STEFÁNSSON 1924, 159.

Geographical Distribution. West Asiatic, European perennial herb, widely distributed towards the north; it is common in Finland — being specific to grove-meadows — as far as 63° N. lat., but may be found northward to 67° N. lat.; in the Scandinavian Peninsula it is common on the west side as far as 67° 56' N. lat., but is found even as far as Tromsø (69° 30' N. lat.), and extends from the sea up into the birch belt, rarely slightly beyond the limit of the birch; it grows in meadows, on copse-clad hills, and at roadsides. In Iceland it occurs in some few places. In northern Germany, Holstein and Schleswig included, it is fairly common in similar localities as in Scandinavia, but is absent from the North Sea islands. Within the Mediterranean region proper, e. g. Greece, it is absent or very rare. It extends eastward to Armenia, the Caucasus, Cashmere, and the Baikal Lake.

Occurrence in Denmark. (Fig. 11, Pl. IV). It grows in woods and coppices, and thrives best in fresh soil rich in nutrient elements and with almost neutral reaction, but is not so commonly distributed as recorded by J. LANGE, being rare or absent over large areas in the western part of the peninsula where woods are

scarce. From Læsø and Anholt it has not been recorded either. It is, however, common on the islands and in the east of Jutland, growing in moraine clay and other not too thoroughly washed soil, chiefly inside the limits of the latest glaciation. When it is stated to be fairly common as far westward as in district 49, this has probably some connection with the fact that woods are more frequent here than in the other tracts of western Jutland, where it is not common in the oak scrubs.

V. sepium may occur in a variety with whitish yellow flowers, *f. ochroleuca* BAST, collected in several parts of the country; a peculiar form is *f. montana* KOCH with much elongated, acute leaves and fewer flowers in the clusters; according to K. WIINSTEDE it flowers considerably later than the main form, and has been collected in some few places in Seeland and eastern Jutland.

Vicia silvatica L. — Skov-Vikke.

J. LANGE 1886—88, 842. RAUNKLER 1922, 192. ASCHERSON & GRAEBNER 1906—1910, 925. HEGI IV, 3, 1526. PRAHL 1890, 45. BENTHAM & HOOKER 1920, 122. MURATOVA 1926, b, Pl. I. LINDMAN 1926, 386. SEGERSTAD 1924, 102, 103 (map), 113, 115. ANDERSSON & BIRGER 1912, 45, 162, maps pp. 46 and 391. HJELT 1919, 199. BLYTT 1906, 471.

Geographical Distribution. Euro-Asiatic perennial herb which is spread from western Asia (Transbaikalia) over sub-Arctic, Central and western Europe; it extends northward to the southern part of the Kola Peninsula (67° N. lat.), Ångermanland, and Jemtland, along the west coast of Norway to $67^{\circ} 56'$ N. lat. Within Fennoscandia it is to be found in woods, grove-meadows, and on scree, and but rarely extends beyond the limit of the conifers. The map by SEGERSTAD shows it to be represented in southern Sweden, most frequently in the eutrophic regions, e. g. in Scania; in the north of Sweden it is almost exclusively found on calcareous soil. It is rather common in the British islands, and extends southwards to southern France, northern Italy (rare), and the northern part of the Balkan Peninsula.

In northern Germany it lives in shady woods, chiefly beech woods; it decreases in frequency towards the west, is absent from the Hanoverian plain as well as Holland and Belgium, and the western part of Holstein and Schleswig, but occurs sporadically in the east of the two latter provinces.

Occurrence in Denmark. (Fig. 24, Pl. VII). A southeastern species, occurring here and there on the islands and in the east of Jutland, but unequally distributed. Thus it is rare on Bornholm, is not recorded from Lolland, Langeland, and Samsø, and seems to be rare e. g. in the north of Seeland. In Jutland, where it is rather equally distributed on the east coast, it occurs from the southern boundary to Randers. It has further occasionally been found in oakscrubs in the west and north of the peninsula, thus in Nörbölling and in Tirslund Coppices (district 26), at Borris (district 17), in the coppices by Bratskov (district 5), and at Linderumgaard

(district 2). It is mainly associated with soil rich in nutritive substances, and occurs principally in foliferous woods, growing on high-lying chasmy ground or on copse-clad slopes. The limits for its distribution within Denmark are no doubt conditioned by edaphic factors.

Considering its extensive distribution towards the north, it seems very likely that it has immigrated into Denmark in early post-glacial time, probably from the south or southeast.

The form *maritima* LGE., with a more dense growth and smaller leaflets, has occasionally been found in the southern part of Djursland, growing on stony raised beaches.

Vicia tenuifolia Roth. — Langklaset Vikke.

J. LANGE 1886—88, 843. RAUNKJER 1922, 193. ASCHERSON & GRAEBNER 1906—1910, 934 HEGI IV, 3 1533. W. CHRISTIANSEN 1926, 147, 173, map. 85. LINDMAN 1926, 387. STERNER 1922, 239, 359, 404.

Geographical Distribution. West Asiatic, European, North African perennial herb. Its distribution within Europe is Pontine, East-, South-, and eastern Central-European; yet it occurs almost throughout the whole of France, but is absent in Great Britain; from Lorraine its northwestern limit in Germany runs through the Nahe and Lahn Valley, the Harz, Braunschweig, Neuahaldensleben north of Magdeburg, Havelberg at the lower bend of the Elbe, Grabow and Dassow in western Mecklenburg, Hamburg, and Altona to a few places in eastern Holstein (Neustadt and Oldenburg). Within the other part of Germany it is of very scattered occurrence, being most frequent in the vicinity of the large rivers, growing in coppices and light foliferous woods; it is found in similar situations in Sweden, where it occurs rarely or occasionally in Scania, southeastern Smalandia, East Gothland, Oeland, and Gotland, being more common on Oeland only. In eastern Europe its northern limit runs through Livonia, Grodno, Tula, Nijni Novgorod to southern Perm; in Asia it extends to Dzungaria and Armenia.

Occurrence in Denmark. (Fig. 30. Pl. IX). A southeasterly species, growing here and there on fences, in coppices, and on bluffs, principally on the islands. It is most frequent on Møen, in several places of Seeland, near the coast, and in the northeastern part of Funen. The northwestern limit of the species in Germany continues northward across Als (Mommarm), western Funen (Sønderby Klint by Assens, Gamborg), and Horsens (waste places) to Grenaa.

V. tenuifolia, which, according to STERNER, is characteristic of the South Russian steppes, reaches its extreme northwestern limit in Denmark; it has doubtless immigrated from the south or southeast, and during the post-glacial maximum of warmth it must have had the greatest chances for colonising in our country.

Vicia tetrasperma (L.) Moench — Tadder-Vikke.

J. LANGE 1886—88, 848. RAUNKJÆR 1922, 192. JESSEN & LIND 1923, 129, 456. ASCHERSON & GRAEBNER 1906—1910, 912. ASCHERSON & GRAEBNER 1899, 448. HEGI IV, 3, 1517. PRAHL 1890, 45. BENTHAM & HOOKER 1920, 121. LINDMAN 1926, 386. SEGERSTAD 1924, 102, 112. BLYTT 1906, 471. CEDERCREUTZ 1927, 123.

Geographical Distribution. Euro-Asiatic, North African annual herb, which extends from the Yenisei region in the north to southern Finland (62° N. lat.), Dalarne and Gestrikland in Sweden, and to 61° 15' N. lat. in Norway, mainly east of the mountains. In the south of Finland it is peculiar to the vegetation of grove-meadows, and is regarded by CEDERCREUTZ as apophytic; also in Sweden and Norway, where, besides on arable land, it occurs on dry hills, rocks exposed towards the south ("Sydberg"), and in coppices (*f. tenuifolia* FR.), it is considered as spontaneous. It is hardly indigenous in Scotland, very rare in Ireland, but fairly common in England. In northern Germany it is found in scattered growth on arable land as also in meadows and other grassy places, in coppices, and on dunes, being most frequent along the Vistula and the Elbe, and in the eastern part of Holstein; it is absent from the western part of Schleswig-Holstein and the North Sea islands. HEGI regards it as a neophyte, colonised within recent times in northern Germany, and as an archæophyte in the Central European agricultural regions, even if its presence there prior to the 16th century has not been ascertained.

Occurrence in Denmark. (Fig. 25, Pl. VIII). Within Denmark *V. tetrasperma* is decidedly a southeasterly species, which is commonest on Bornholm, Møen, Falster, Lolland, the southern parts of Seeland and Funen, and Als; in the remaining parts of the islands as also in the east of Jutland from the boundary to southern Djursland it is of more scattered occurrence; it has further been found in waste places near Randers, Hobro, Aalborg, and Esbjerg; finally it has been found growing in sandy fields near Viborg. Three uncertain finds recorded from districts 8, 9, and 11 have not been inserted on the map. It grows chiefly along fences and roads, on uncultivated hills, sandy fields, coast bluffs, coast cliffs on Bornholm, dunes, and seashores, and further in cleared patches in woods, in waste places, and among the corn.

If we compare the available data concerning the occurrence of the species in the countries east and south of Denmark, with its choice of habitats in this country, the possibility can hardly be rejected that *V. tetrasperma* is an apophyte, immigrated from the east or south east and widely spread by the activity of man.

Vicia villosa Roth. — Sand-Vikke, Dunhaaret Vikke.

J. LANGE 1886—88, 844. RAUNKJÆR 1922, 193. JESSEN & LIND 1923, 457. ASCHERSON & GRAEBNER 1906—1910, 940. HEGI IV, 3, 1534. MURATOVA 1926, b, Pl. I. LINDMAN 1926, 387. BLYTT 1906, 473.

Geographical Distribution. Annual herb, assumed to be originally native in the Mediterranean region and possibly in Southeast Europe also, but having been

introduced as a weed, chiefly in the corn-fields, and cultivated as a fodder plant, it has gradually spread to the greater part of Europe as well as to West Asia and North Africa. It has long been naturalised in northern Germany as a weed among the corn, being most frequent in the eastern tracts as far as Mecklenburg, and in Holstein. Since the eighties of last century it has been cultivated as a valuable forage plant, by which it has become further distributed; outside the fields, it occurs in waste places, on earthen banks, and in coppices as an escape from cultivation. In Sweden it is found in fields as far as southern Norrland; in Norway in the southern part of the country, between Oslo and Haugesund, and by Trondhjem.

Occurrence in Denmark. It is doubtful whether *V. villosa* has been distributed in Denmark prior to the middle of last century, but after that the first positive find of it was made in 1853, it was soon noticed in several other places. As late as twenty years afterwards, it was, however, hardly known outside Seeland, and it was only towards the end of the century that it became more common. This was caused by the fact that about 1885 the cultivation of it as a stall-fodder plant, or mixed with rye, was largely commenced. Even if it was a disappointment as a cultural plant, and is only seldom cultivated at the present day, it is still frequently met with in fields, growing among the corn, and in waste places, or, as escaped from cultivation, on the edges of ditches, since its seeds easily mature and buried in the soil may retain their power of germination for several years. It is recorded from the majority of the districts, occurring, with a frequency ranging from here and there to common, in sandy as well as in clayey tracts, but has not been mentioned from districts 7, 19, 33, 35, and 50—53. Within Denmark *V. villosa* may be considered as an anthropochorous species, which after having been cultivated for a series of years has become more widely distributed.

Survey of the Distribution of the Papilionaceæ in Denmark.

When in the following the various species of the *Papilionaceæ* will be grouped according to their distribution within Denmark, this will be done on purely geographical lines of division, and not until a larger number of plant families have been dealt with in a similar manner to this, will it be possible, on the basis of the material of the Topographic-Botanical Investigation, to take up a definite standpoint towards that division of Denmark into floristic provinces which has previously been attempted, thus especially by J. LANGE in 1849 and A. S. ØRSTED in 1871 (cfr. also EUG. WARMING 1904, pp. 99—106. The available material, however, invites an attempt to form ideas as to the roads and time of immigration of the species.

Judging from general systematical and plant-geographical relations, it may be assumed that at any rate the bulk of the species here considered are older than

the latest ice age, and that as the inland ice retreated northward for the last time and temperature conditions improved in northern Europe, they gradually pushed their way towards these regions from their glacial refuges. Where the latter are to be sought, appears in many cases from the present distribution of the species, the Atlantic species having doubtless survived the latest ice age in southwestern Europe, while, reversely, the area of now easterly species must be assumed to have extended in Glacial time across southeastern Europe and the adjoining tracts, in certain cases including western Asia. Also as regards species with a more extensive east-westerly distribution in Europe it must be supposed, after the analogy of the distribution of certain forest trees as to which conditions have been more fully elucidated by bog-finds, that it is the above-mentioned marginal zones of Europe, or in many cases probably also western Asia, that have served as glacial refuges. Regarding such species as show a markedly one-sided distribution over vast areas of the Northwest-European continent, it may then in general be assumed that on the basis of this distribution it will be possible, so far as the western, southern, or eastern species are concerned, to draw inferences as to the direction from which the species in question have immigrated into Denmark. As regards the immigration from the north, the case is somewhat different, since a northerly distribution of a species within Denmark may just as well be conceived to have resulted from a northward shifting of the southern limit of the species under the influence of the post-glacial optimum of climate, as from a late immigration from the north, e. g. during the post-glacial deterioration of the climate. Finds of fossils can alone settle this question, which is closely associated with the question of relicts, so frequently discussed. In other cases, too, changes in the distribution of certain species may perhaps have taken place, which would render uncertain our conclusions as to their roads of immigration.

No important finds of fossils of the *Papilionaceæ* having been made in the post-glacial deposits of northern Europe, we are confined to plant-geographical evidences only in our suppositions as to the time of immigration of these species (cfr. KNUD JESSEN and JENS LIND 1923, p. 60 f.). In this connection it seems of significance to note which of the species of our country extend to the sub-Arctic regions of Fennoscandia, since in case these are at the same time widely distributed within Europe, it is highly probable that they have immigrated into Denmark at an earlier date than those species whose northern limits lie essentially farther southward. It is stated how the northern limits of such species lie in relation to the northern limit of the oak, since within the range of advance of this tree we find the essential difference between the Central European—South Scandinavian flora of deciduous woods and the North Scandinavian flora of coniferous woods. A question, however, that is occasionally raised concerning some few species, whether their limits of distribution are conditioned by time, i. e. that they may not yet have succeeded in occupying all the regions where conditions are on the whole favourable to them, must for the present in reality be said to have reference to a large number of

spontaneous species, since as yet it has only been ascertained of a minority of species that their limits are determined by external conditions i. e. climate, soil conditions, and competition from other plants.

EUG. WARMING (1904, p. 83 f.) has studied the causes of the unequal distribution of the species within Denmark, and points out as specially important factors the way of immigration, the time of immigration, and the nature of the soil (herein included the influence of competing species). He recommends a comparative study of the floristics of the associations within the various parts of the country in order to throw light upon the history of immigration, "since as the same associations demand the same soil, this factor will consequently be eliminated".

On the other hand, EUG. WARMING only attaches little importance to the difference in climate between the various tracts of the country, his attention being here mainly directed towards the distribution of the so-called Atlantic species, that is to say, to the distance of their habitats from the shores of the North Sea. Later investigations undertaken by experts in forestry especially L. A. HAUCH and A. OPPERMANN, have, however, shown that certain climatological conditions formerly little noticed must be considered to be of material importance to the growth of certain forest trees, thus for instance the variations in the amount of precipitation and in the duration of the frost-free periods, which are dependent partly on the distance from the coast and the altitude above the sea, partly on the geographical position. The duration of the frost-free periods varies within the various regions of the country from less than 39 per cent to more than 61 per cent of the whole year; and that a protracted period of growth within the regions with warm summers is of vital importance to the distribution of certain herbaceous plants, seems to be evident from circumstances which will be touched upon in the following. In the discussion as to whether a southern species which has its northern limit in Denmark and is at the same time extensively distributed in Central Europe, is advancing, or whether it has perhaps formerly had a wider distribution towards the north, it is of importance to keep in mind what has been brought to light during the last decades by investigation of the post-glacial deposits, viz. that in northern Europe the optimum of warmth of the post-glacial climate was in the centuries before Christ succeeded by the so-called post-glacial deterioration of the climate, which brought about a considerable lowering of the summer temperature and more abundant precipitation. For it has been shown that in the warm period a great number of "southern" phanerogams have had a far more northerly distribution than at the present time. As regards the northward advance into Denmark of specially thermophilous species, this warm period has, climatologically, been the most favourable, and the assumption of a retreat of the northern limit of such species during the sub-Atlantic deterioration of the climate will correspond well with the geological results, and seems at the outset more likely than the conjecture that they should be advancing species. A closer investigation of the localities in which such southerly species thrive, would in this connection be of great value, more particularly as regards the exposure of the

habitats, since in our country, too, analogies to the North Swedish "sydberg", i. e. cliffs exposed toward the south, may very likely be found, on which lodge plant associations that compared with their surroundings exhibit a distinct southern character.

In the following the Danish species of *Papilionaceæ* will be divided into seven geographical main groups, according as they are found fairly equally distributed all over the country or only within certain areas. Under each of these groups will be added some comprehensive remarks on the general distribution of the spontaneous species, their immigration, and, in certain cases, the conditions that may be assumed to determine the limits of their distribution within this country.

I. Westerly Species.

A. Apophytes.

1) Occurring only, or almost exclusively in Jutland:

<i>Genista germanica</i> (Fig. 1. Pl. II)	<i>Genista anglica</i> (Fig. 4. Pl. II)
<i>Vicia orobus</i> (Fig. 2. Pl. II)	<i>Genista tinctoria</i> (Fig. 5. Pl. III)
<i>Genista pilosa</i> (Fig. 3. Pl. II).	

The species are ranged according to increasing frequency. *Genista germanica* has been found in about 20 localities in the southwest of Jutland; *Vicia orobus* and *Genista pilosa* occur within the same regions of Jutland, although with a considerable difference in frequency; they occur almost exclusively south of the Limfjord, where they are intimately associated with the sandy soil, and avoid the moraine clay of the east coast; as regards *Vicia orobus* on Seeland, see p. 61 *G. anglica* and *G. tinctoria* have a somewhat wider distribution north of the Limfjord, and may be found in most regions in the east of Jutland; *G. tinctoria*, which is most exacting, is most common here, whereas it avoids the meagre tracts in the west of Jutland; both species are represented in some few localities on Funen.

As regards their distribution within Europe, *Vicia orobus* and *Genista anglica* are purely Atlantic; *G. pilosa* is sub-Atlantic, *G. tinctoria* is Central and South European and has an extensive distribution towards the east, while *G. germanica* is an easterly Central European species. All four species of *Genista* occur, though for the most part rarely, in the west of southern Sweden, while only *G. tinctoria* is found in Norway, viz. in a single locality in the south. *Vicia orobus* occurs in southwestern Norway. Very probably it is chiefly the conditions of the soil which, in Denmark, have limited the species of *Genista*, the Atlantic as well as the more eastern species, almost exclusively to Jutland, even if it seems peculiar, especially as regards *G. tinctoria*, that it has not attained a wider distribution on the islands, where many localities would very likely present a suitable soil; but despite the fact that it is able to spread over wide distances, which is evidenced by

its occurrence in Sweden and Norway, it has evidently not been capable of spreading on Funen since the middle of the last century.

As to *Vicia orobus*, an immigration from the west may possibly be assumed. The *Genista* species must have invaded Jutland from the south, *G. anglica* e. g. having made its way from western Europe, *G. germanica* from eastern Europe. Among these species the latter is probably the one that has immigrated most recently; it is not possible to show that it is still spreading in the country, more probably it is threatened with extermination, e. g. on account of cultivation. All the species of *Genista* have doubtless immigrated during the latter part of post-glacial time.

2) Species mainly distributed in Jutland, more scattered on the islands, and decreasing in frequency towards the east.

Ornithopus perpusillus (Fig. 6. Pl. III)

Sarothamnus scoparius.

Both species prefer sandy soil, and may thrive in soil poor in nutrient substances. The former is chiefly found on dry, grassy hills and fields; it is absent from northeastern Jutland, is very rare on Seeland and the southerly islands, and extends eastward to southern Scania. It is a sub-Atlantic species, whose northeastern limit runs through Denmark and Scania. As a wild plant *S. scoparius* is chiefly restricted to the heaths of Jutland south of the Limfjord, but occurs, planted as well as run wild, in the north of Jutland and in several parts of the islands. Possibly it is also originally wild in southwestern Sweden and southern Norway. This species, too, has a sub-Atlantic distribution within Europe, and both species must have invaded Jutland from the south, having migrated from western Europe, evidently in the latter part of the post-glacial period.

B. Anthropochorous Species.

1. Mainly in Jutland:

Cultivated and run wild.

Ornithopus sativus.

II. Species distributed nearly all over the country.

A. Apophytes.

* <i>Anthyllis vulneraria</i>	<i>Trifolium medium</i>
<i>Lathyrus montanus</i> (Fig. 7. Pl. III)	* — <i>pratense</i>
* — <i>pratensis</i>	* — <i>repens</i>
* <i>Lotus corniculatus</i>	<i>Vicia angustifolia</i>
<i>Lotus uliginosus</i> (Fig. 8. Pl. III)	* — <i>cracca</i> .
<i>Trifolium arvense</i>	

The majority of these species are fairly equally distributed throughout the country. As regards some of the species, the circumstance that they are cultivated besides growing wild, may, however, to some extent have contributed to this. Thus this is doubtless the reason why *Anthyllis vulneraria* has been noted more frequently in the eastern clayey tracts than would otherwise have been the case, and *Trifolium pratense*, which seems to prefer soil with about neutral reaction, would presumably, were it not for the influence of cultivation, have been less frequent in the west of Jutland. The two species, *Lathyrus pratensis* and *Vicia angustifolia*, which likewise prefer neutrally or even basically reacting soil, are less common in certain parts of western Jutland, while such an unequal distribution is less conspicuous as to *Vicia cracca* which also prefers alkaline soil. The majority of the other species prefer either soil poor in lime, or are rather indifferent as to the reaction of the soil. The species within this group are mainly indigenous to heaths, coppices, dunes, meadows, and bogs, occurring most frequently in oligotrophic or mesotrophic plant associations.

All these species are widely distributed both in the west and east of Central Europe, most of them in southern Europe too; all of them, with the exception of *Lathyrus montanus*, are extensively distributed in the northern parts of Asia, and the six species marked with an asterisk are further found within the sub-Arctic regions of Europe. These may then probably have immigrated into Denmark even in early post-glacial time, or still earlier. The northern limits of the remaining five species within Fennoscandia almost coincide with the northern limit of the oak; they seem to require a somewhat higher summer temperature than the other species, and have presumably immigrated at a later period of post-glacial time.

To determine the direction whence these species have immigrated into Denmark, it would be necessary to know their glacial refuge, whence they pushed their way onwards after the close of the last ice-age. However, nothing certain is known in this respect, but considering the extensive distribution within Asia of the greater number of the species, it may be assumed that here, at any rate, these species have had a refuge during the glacial period; further the southeastern and southwestern parts of Europe must be taken into consideration in this respect; presumably the species of this group have followed easterly, southeasterly, or southwesterly roads of migration to Denmark.

B. Anthropochorous species, occurring more or less frequently throughout the country.

Archæophytes.

(*Medicago lupulina*)

(*Trifolium minus*).

(*Trifolium procumbens*)

Weeds in grass fields (ephemerophytes).

Melilotus officinalis.

Cultivated species, more or less frequently escaping from cultivation.

<i>Cytisus laburnum</i>	<i>Trifolium hybridum</i>
<i>Lupinus luteus</i>	— <i>incarnatum</i>
<i>Medicago sativa</i>	<i>Vicia faba</i>
<i>Pisum arvense</i>	— <i>sativa</i>
— <i>sativum</i>	— <i>villosa</i> .

Under this heading may also be mentioned *Cytisus elongatus*, *C. supinus*, *Lupinus angustifolius*, and *L. polyphyllus*, which are cultivated here and there, though it is uncertain whether this takes place all over the country; as escapes from cultivation they are very rare.

It may be doubtful whether the three species first mentioned should more properly be regarded as archæophytes, since they also occur outside the actually cultivated soil; they are, however, spread widely by cultivation, and all the three species are equally distributed throughout the country.

III. Strand-plants with a more common distribution.

Trifolium fragiferum (Fig. 9. Pl. IV)
Lathyrus maritimus (Fig. 10. Pl. IV).

The species first mentioned occurs almost everywhere along the coast where littoral meadows are found, and only exceptionally farther inland (see p. 46). Being a West Asiatic, Central and South European, North African halophilous species, which does not reach the northern limit of the oak in the north, it has presumably immigrated to the Danish coasts from the south or southeast, i. e. from Central Europe, where it is common on saline soil and in meadows with a rich soil. North of the Baltic it is everywhere associated with the seashore, so in southeastern Denmark, at any rate, it can hardly as a common plant date farther back than to the Littorina time. Considering its general northward distribution it seems equally improbable that a greater age can be assigned to it on our other coasts.

Concerning *Lathyrus maritimus*, see p. 14.

IV. Species, distributed on the islands and in the east of Jutland, more rarely in the north of Jutland, and very rare, or absent, in the west.

A. Apophytes.

<i>Vicia hirsuta</i>	<i>Lathyrus silvester</i> (Fig. 14. Pl. V)
— <i>lathyroides</i>	* — <i>paluster</i> (Fig. 15. Pl. V)
* — <i>sepium</i> (Fig. 11. Pl. IV)	— <i>niger</i> (Fig. 16. Pl. V)
<i>Ononis repens</i> (Fig. 12. Pl. IV)	<i>Melilotus altissimus</i> (Fig. 17. Pl. VI)
<i>Astragalus glycyphyllos</i> (Fig. 13. Pl. V)	<i>Vicia cassubica</i> (Fig. 18. Pl. VI)

The order in which the species have been arranged corresponds fairly well to their decreasing degree of frequency, so that, as regards distribution, the first-mentioned approach the species within group II, while e. g. *Melilotus altissimus* forms a connecting link with group VI. They are species which are mainly associated with the youngest diluvial deposits, in that they avoid the older, more washed surfaces. The two species first mentioned prefer an acidly reacting soil, while e. g. *Ononis repens* and *Vicia sepium* are at any rate very partial to localities with a nearly neutral reaction of the soil.

Five of the species within this group, viz. *Vicia sepium*, *Astragalus glycyphyllus*, *Lathyrus silvester*, *L. niger*, and *Vicia cassubica*, are more or less closely associated with woods and coppices, and their distribution within the country must thus be essentially dependent on the presence of such growth, while the other species are partial to localities of a more common distribution.

Vicia cassubica, *L. niger* and to a much less extent *Lathyrus paluster*, and *Astragalus glycyphyllus*, have an eastern distribution within Europe, being absent or rare i. a. in northwestern Germany, Holland, and the British Isles; as regards these species, an immigration into Denmark from the southeast or south may thus be assumed. *Vicia lathyroides* and *Ononis repens*, which have a sub-Atlantic distribution in Europe, must accordingly be assumed to be southwestern immigrants. The remaining species have a more common eastern and western distribution in Central Europe, and they may have spread to Denmark from their glacial refuges in Asia or in southeastern or southwestern Europe.

Vicia sepium and *Lathyrus paluster* extend farthest northward, and are distributed within the sub-Arctic regions of Fennoscandia; in accordance herewith they may have immigrated very early in post-glacial time, or still earlier. Incorporated at a somewhat later date in our flora are probably *Lathyrus niger*, *L. silvester*, *Astragalus glycyphyllus*, which in Fennoscandia extend slightly beyond the limit of the oak, as well as possibly *Vicia hirsuta* and the two sub-Atlantic species *Ononis repens* and *Vicia lathyroides*, and further *Vicia cassubica* and *Melilotus altissimus*, which do not extend as far northward as the said tree.

B. Anthropochorous Species.

(The islands, eastern Jutland, and the regions round the Limfjord).

Archæophytes.

Medicago falcata (Fig. 19. Pl. VI)

Trifolium agrarium (Fig. 20. Pl. VI)

Melilotus albus

— *striatum* (Fig. 21. Pl. VII).

(*Medicago falcata* × *sativa*)

Cultivated and escaped from cultivation.

Ulex europæus.

V. Species distributed on the islands and in the north of Jutland, but absent from southwestern Jutland.

Ononis arvensis (Fig. 22. Pl. VII).

The distribution of this species within Denmark is characterised by being almost as frequent in the western area of the Limfjord and northwestern Vendsyssel as on the islands, whereas positive finds in Jutland from the area south of the Limfjord are very rare. It is the type of distribution, to which also e. g. *Echium vulgare* and to some extent *Plantago media* belonged, until these species within recent times have been spread almost all over the country by the aid of cultivation.

The geographical distribution of the species from the river meadows of the Pontine steppes to the coasts of Atlantic western Norway viewed in connection with its absence from the northwestern part of the European continent seems very singular, but demonstrates with some weight that it is an eastern or southeastern immigrant.

VI. Species distributed on the islands and in the east of Jutland, but rare north of Djursland.

A. Apophytes.

* *Lathyrus vernus* (Fig. 23. Pl. VII)

* *Vicia silvatica* (Fig. 24. Pl. VII)

— *tetrasperma* (Fig. 25. Pl. VIII).

Like the species belonging to group IV, these are mainly associated with the eutrophic areas of the young-glacial diluvia, the two first-mentioned being peculiar to foliferous woods, the latter to pastures, sandy fields, fences, and similar situations, as well as to cultivated soil. The two former, which have an Euro-Asiatic — sub-Arctic distribution, but are absent from the northwestern part of the European continent — *Lathyrus vernus* from the British Isles also —, have doubtless immigrated into Denmark from the southeast. Possibly *Vicia tetrasperma* has immigrated spontaneously from the east, where it seems to be more independent of cultivation than in northern Germany. It extends almost as far north as the oak.

B. Anthropochorous Species,

(rare or very rare).

Ephemerophytes.

Lathyrus aphaca

Vicia pannonica

Medicago hispida

Trigonella coerulea.

Cultivated and run wild species.

Onobrychis viciifolia

(*Trigonella coerulea*).

VII. Southerly species, distributed on the islands including Samsö, rare in Jutland north of Horsens, or absent.

A. Apophytes.

1. Species distributed in the west as well as the east.

Ononis spinosa (Fig. 26. Pl. VIII)

Lotus tenuis (Fig. 27. Pl. VIII).

Both these species are spread over West Asia, Central- and South Europe. The northern limit of *L. tenuis* runs through Denmark and the southernmost part of Sweden. As to *O. spinosa* an advanced post in warm soil is recorded from the extreme south of Norway, but its northern limit of continuous distribution runs through the south of Denmark, Scania, Blekinge and Gotland. The immigration of these species must have taken place from the south.

2. Species distributed in southeastern Jutland and the western part of the islands.

Trifolium filiforme (Fig. 28. Pl. VIII).

This Mediterranean Atlantic species, which most easterly reaches southwestern Seeland and Guldborg Sound, occupies within Denmark a small isolated area like that near Kristianssand in southern Norway. An immigration from the southwest seems most probable.

3. Species occurring chiefly on the islands including Samsö.

Melilotus dentatus (Fig. 29. Pl. IX) *Medicago minima* (Fig. 32. Pl. IX)

Vicia tenuifolia (Fig. 30. Pl. IX). *Astragalus danicus* (Fig. 33. Pl. X).

Vicia dumetorum (Fig. 31. Pl. IX)

Melilotus dentatus, which is associated with littoral meadows, is most frequent in the southern parts of the islands, areas within which the four other species are almost entirely absent, or very rare. Within Europe the four first-mentioned species have a southerly and easterly, e. g. a Pontine-Mediterranean, Pontico-Sarmatian or eastern Central European distribution, and their northern and northwestern limits run through southernmost Sweden and Denmark. *Astragalus danicus*, which is absent from the Mediterranean region proper, exhibits some extension in the British Isles, but is not present in northwestern Germany; its northern limit lies in Denmark and the extreme south of Sweden. An immigration of these species into Denmark from the southeast is most probable.

4. Species absent or rare west of the Great Belt.

Tetragonolobus siliquosus (Fig. 34. Pl. X)

Trifolium alpestre (Fig. 35. Pl. X)

— *montanum* (Fig. 36. Pl. X).

Here must also be mentioned *Lathyrus sphaericus*, whose position within the flora is doubtful.

In Europe these species have a markedly southern and eastern — Pontine-Mediterranean and eastern Central European — distribution; they all of them occur in the south of Sweden, *T. montanum* in the south of Norway also, viz. near Oslo; their northern and northwestern limits run through Denmark. As to *T. montanum*, an immigration from the east seems most probable, while *Tetragonolobus siliquosus* and *Trifolium alpestre* must have invaded the country from the southeast, and *Lathyrus sphaericus* most likely from the south.

All the species mentioned under points 1, 2, and 3 as also *Tetragonolobus siliquosus* are almost exclusively found within the warmest regions of Denmark. Only very few localities of these species are found in tracts with a shorter duration of the frost-free period — i. e. the interval between the last frost in the spring and the first frost in the autumn — than 180 days (50 per cent of the year), and they are chiefly found within regions where the frost-free period comprises 200 to more than 220 days (55.6 to 61.1 per cent or more of the year), and where the mean temperature of July is not lower than 16° C. These regions are precisely the coasts and the islands of the southern part of the Cattegat and the Belts, the islands south of Funen, the coast stretches on the west, south, and east sides of Lolland-Falster, Møen, Amager, and Saltholm, the coast stretches of Bornholm, as well as coast stretches and islands within or near the southwestern part of Jutland¹⁾ (H. HANSEN 1919, p. 129 (map), 136. L. A. HAUCH 1919, fig. 10 p. 21 and 1930, fig. 3, p. 30). Thus it is seen that these species, nearly all of which have their northern limit in Denmark, occur in tracts where the period of growth is most prolonged and which have the warmest summer, only certain Jutlandish finds having been made in regions without these areas. In view of these facts it seems reasonable to assume that it is the climatological conditions, more especially the duration of the period of growth and the high summer temperature, which have fixed the limits for the distribution of these species in Denmark. I. a. it is species like these that may have benefited by the mild climate of the post-glacial warm period, and at that time may have reached a maximum of distribution which they have later had to give up under the influence of the deterioration of the climate, similarly to what has been the case with several relatively thermophilous species within Fennoscandia; seen from this point of view, the northern and more isolated localities of several of these species may perhaps be considered as relict localities.

B. Anthrochorous Species.

(All of them very rare).

1. Occurring in Jutland as well as on the islands.

Colonist: *Trifolium spadicum*.

¹⁾ As regards several of the localities, which according to the available, very summarily meteorological map lie outside the said tracts with the protracted frost-free period, it is very probable that a closer investigation would show that local conditions, particularly the exposure of the locality, cause a more favourable local climate than may prevail in the region as a whole.

Ephemerophytes:

*Coronilla varia**Melilotus indicus.**Melilotus wolgicus*

2. Occurring on the islands, not, or only exceptionally, in Jutland.

Colonist:

(Trigonella ornithopodioides).

Ephemerophytes:

*Lathyrus sativus**(Lathyrus tuberosus).*

Cultivated and run wild species:

*Coronilla emerus**Lathyrus tuberosus**Lathyrus heterophyllus**Trifolium elegans.*

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EXPLANATION OF THE PLATES

In the preparation of the maps showing the distribution of the higher plants in Denmark, hatching or fine-dotting of the areas of the species have been employed, as well as marking with circles of all the various localities whence the species are recorded, this being the best way of obtaining a cartographic reproduction of the available material.

An entirely filled out circle localises a find which has been checked by specimens kept in the Botanical Museum of the University of Copenhagen.

A circle with a dot in the centre localises a find either published in the literature, or recorded in the flora lists of the Topographic-Botanical Investigation.

A circle without a dot in the centre indicates that the species has not been found again in this locality within recent times, whence it has thus possibly, or doubtless, disappeared.

Hatching indicates that the species is found with the frequency "here and there", "rather common" or "common" within the hatched area. (A distinction between the various degrees of frequency by means of different hatching proved impracticable).

Marking with fine dots has been employed for strand-plants instead of hatching.

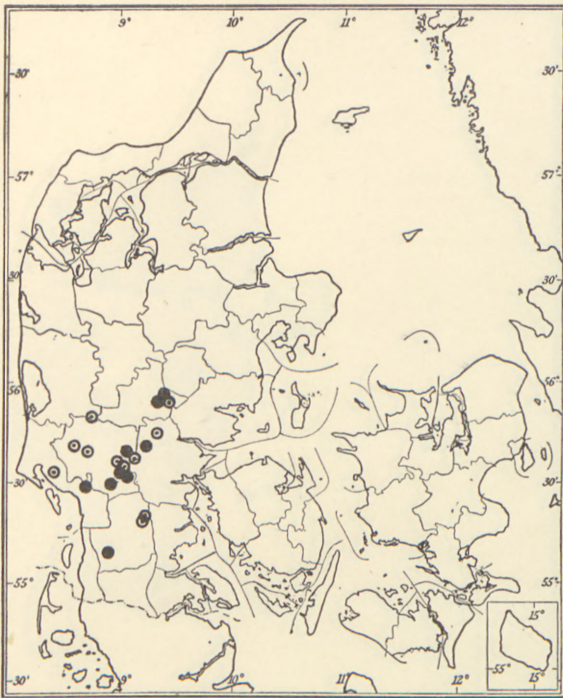


Fig. 1. *Genista germanica* L.

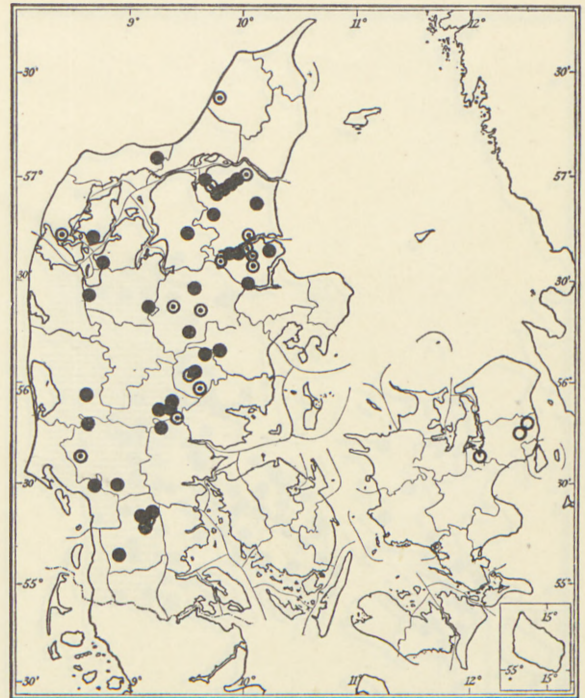


Fig. 2. *Vicia orobus* DC.

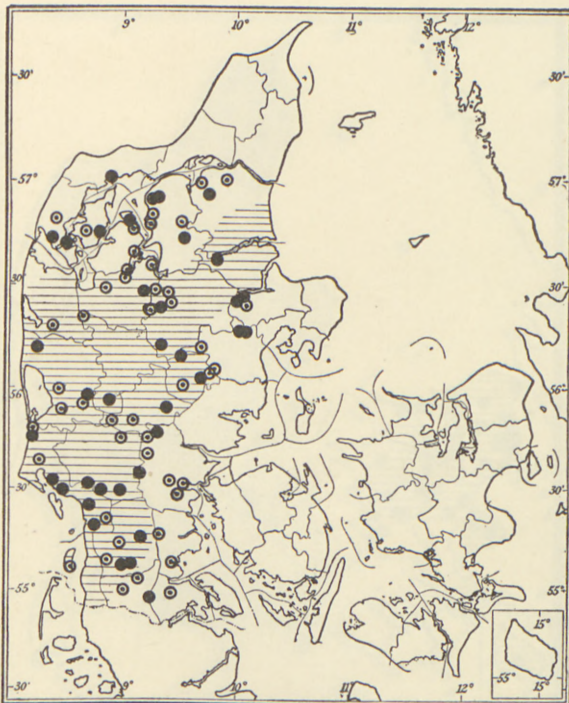


Fig. 3. *Genista pilosa* L.

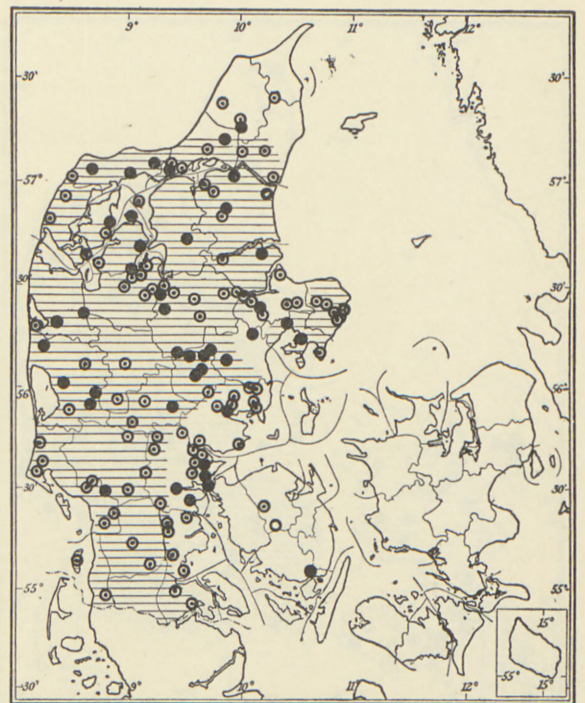


Fig. 4. *Genista anglica* L.

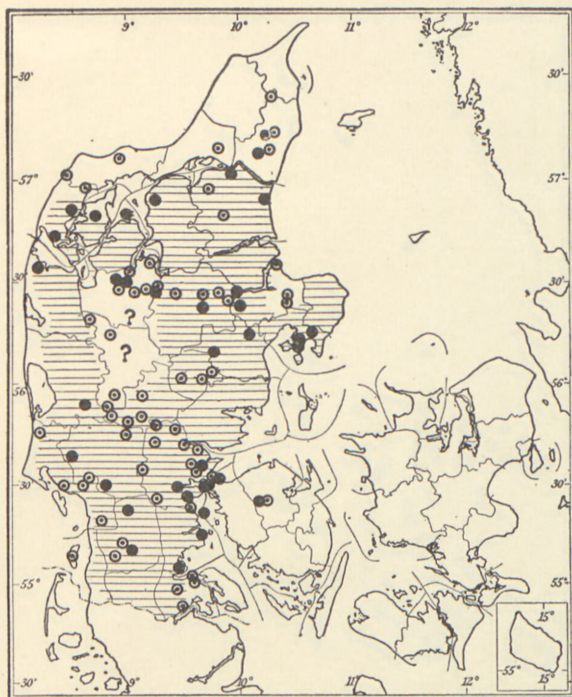


Fig. 5. *Genista tinctoria* L.



Fig. 6. *Ornithopus perpusillus* L.

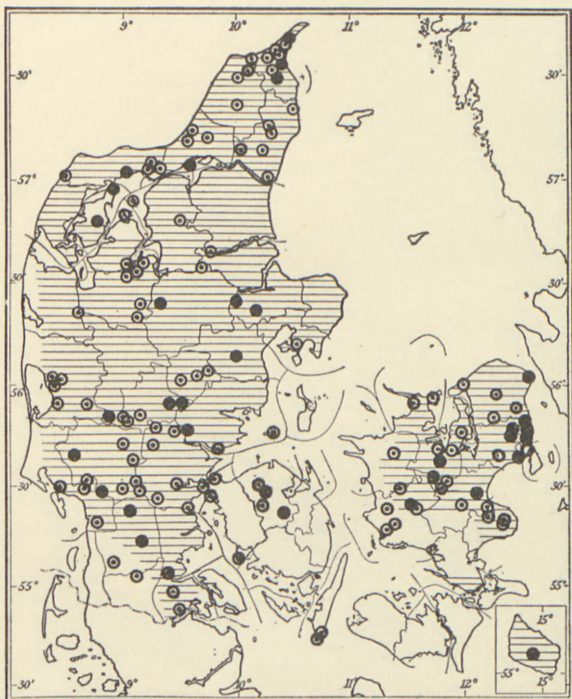


Fig. 7. *Lathyrus montanus* BERNH.

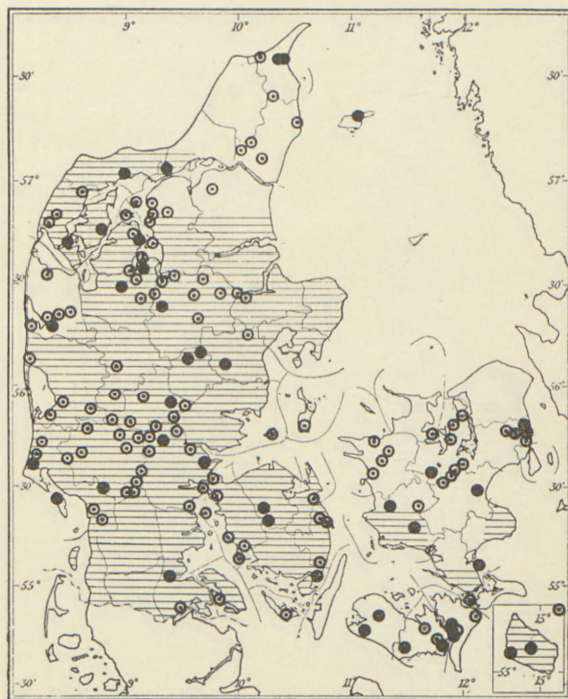


Fig. 8. *Lotus uliginosus* SCHRANK.



Fig. 9. *Trifolium fragiferum* L.

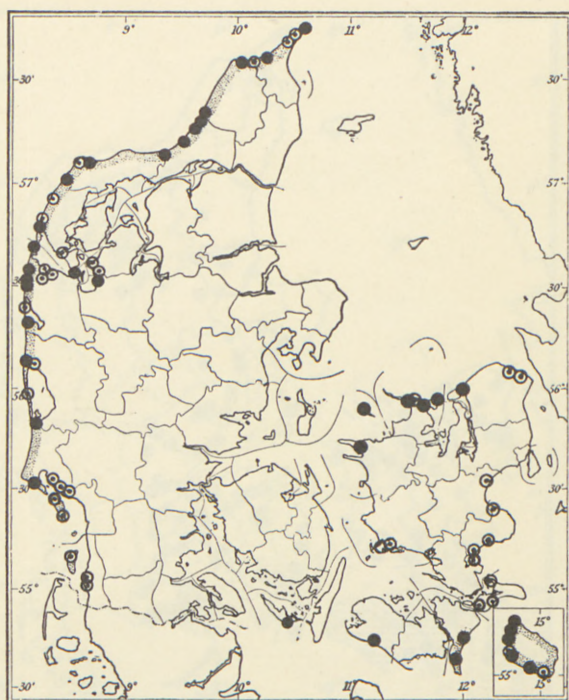


Fig. 10. *Lathyrus maritimus* (L.) BIGELOW.

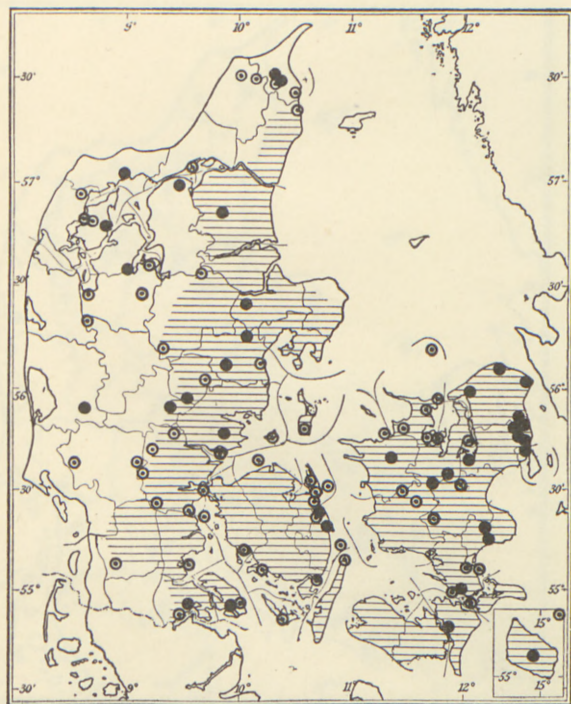


Fig. 11. *Vicia sepium* L.

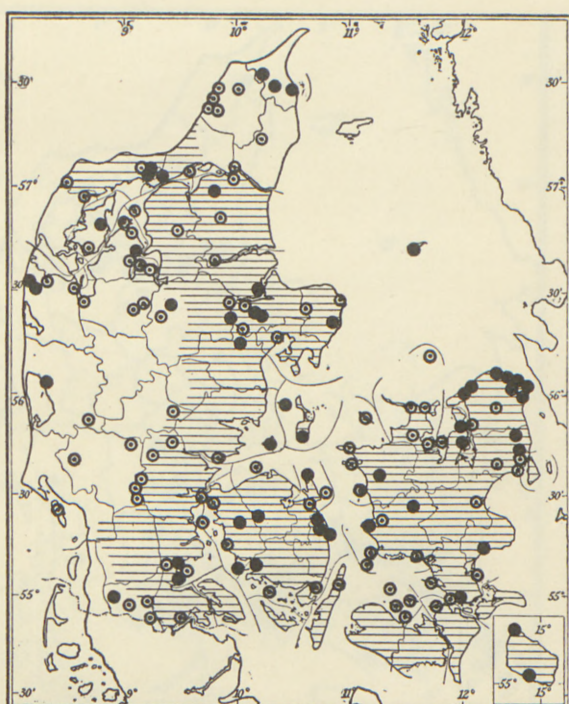


Fig. 12. *Ononis repens* L.

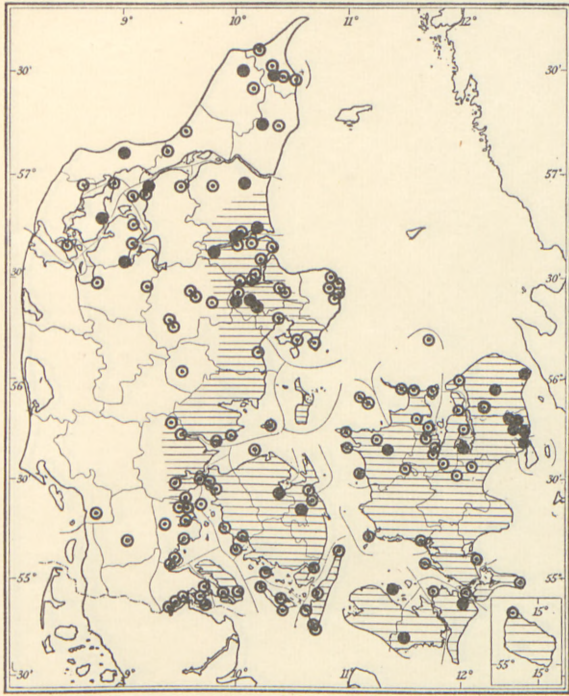


Fig. 13. *Astragalus glycyphyllus* L.

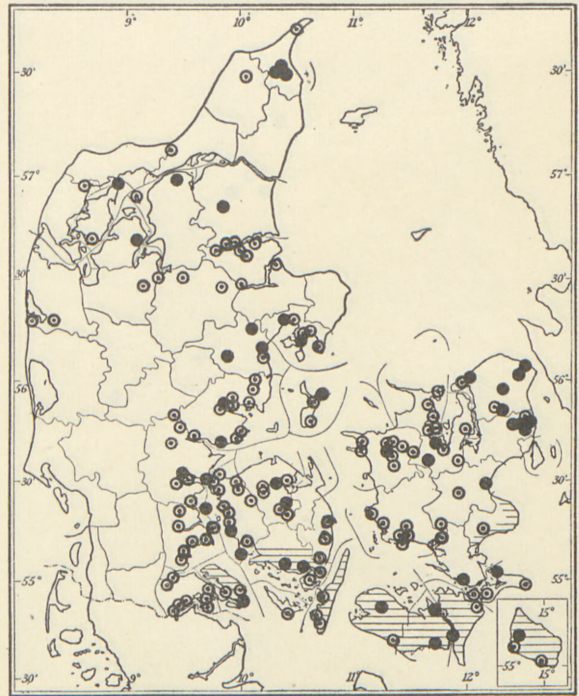


Fig. 14. *Lathyrus silvester* L.

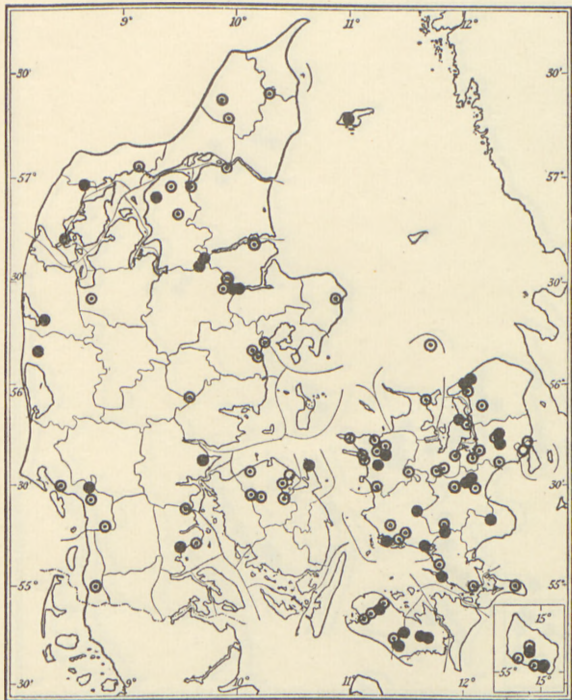


Fig. 15. *Lathyrus paluster* L.



Fig. 16. *Lathyrus niger* (L.) BERNH.

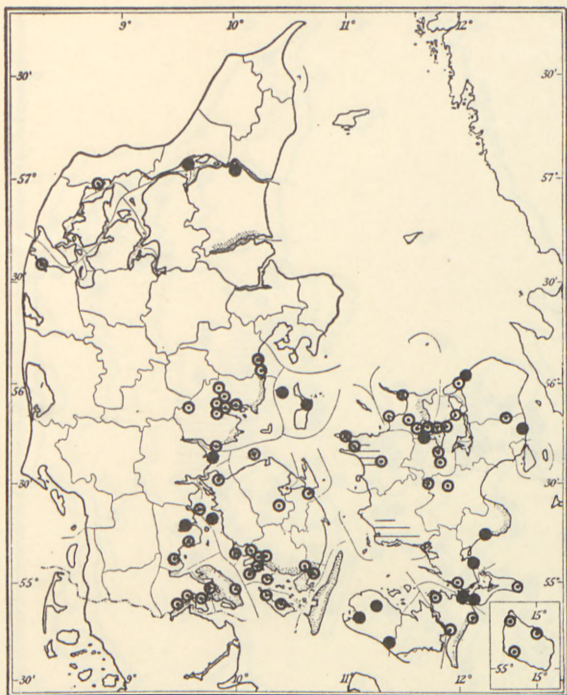


Fig. 17. *Melilotus altissimus* THUNBERG.



Fig. 18. *Vicia cassubica* L.

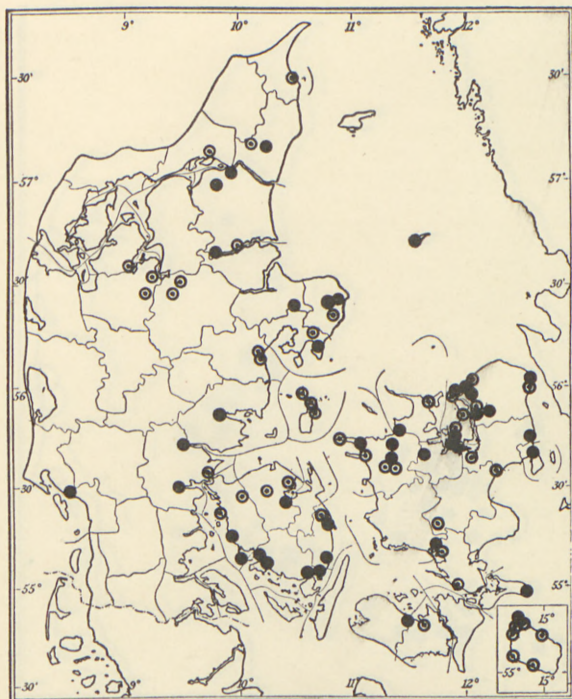


Fig. 19. *Medicago falcata* L.

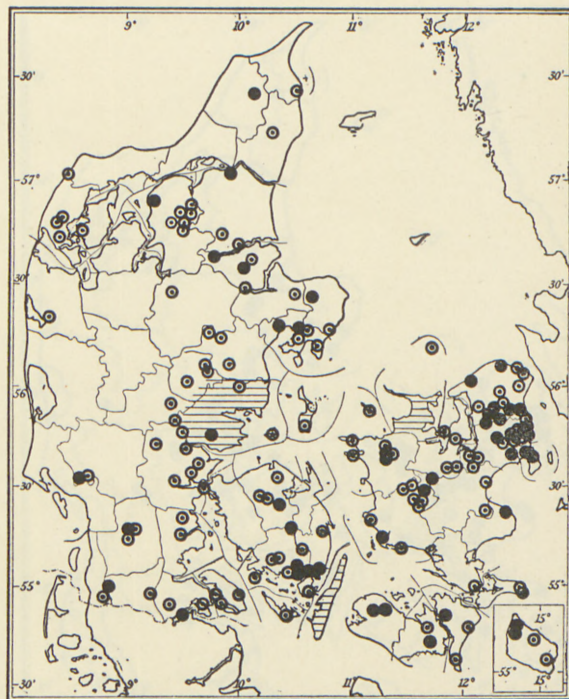


Fig. 20. *Trifolium agrarium* L.

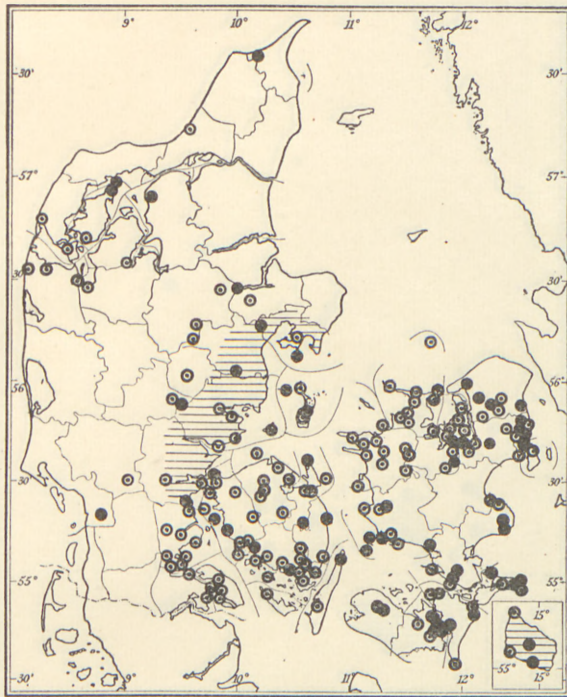


Fig. 21. *Trifolium striatum* L.

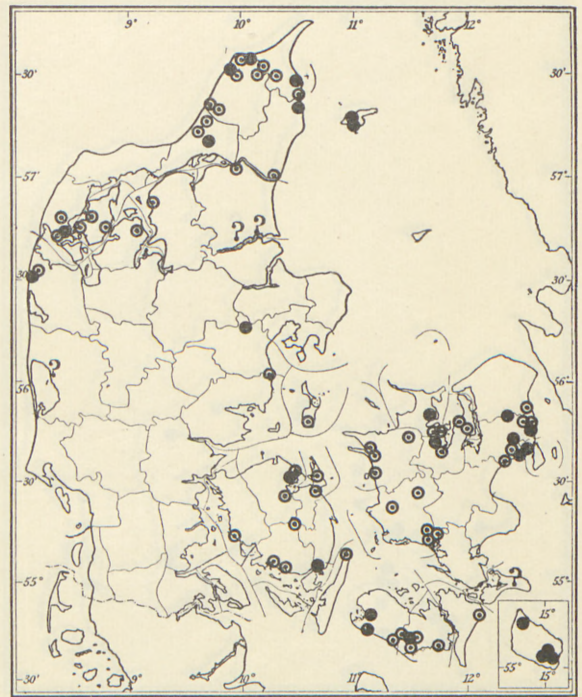


Fig. 22. *Ononis arvensis* L.

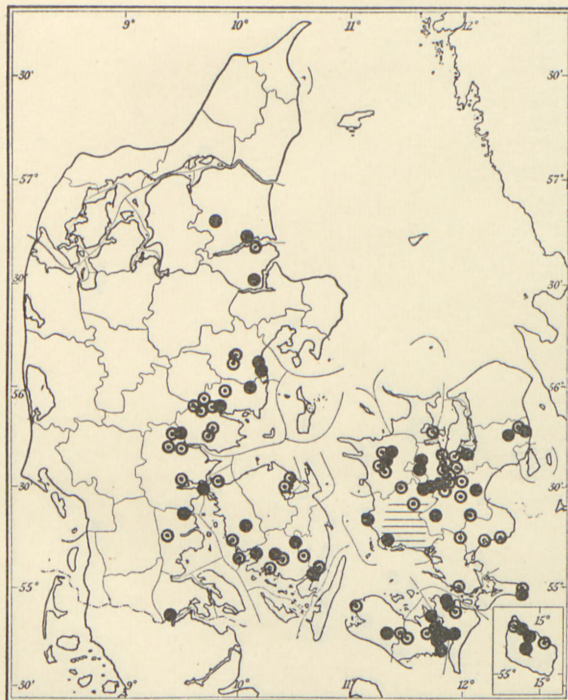


Fig. 23. *Lathyrus vernus* (L.) BERNH.

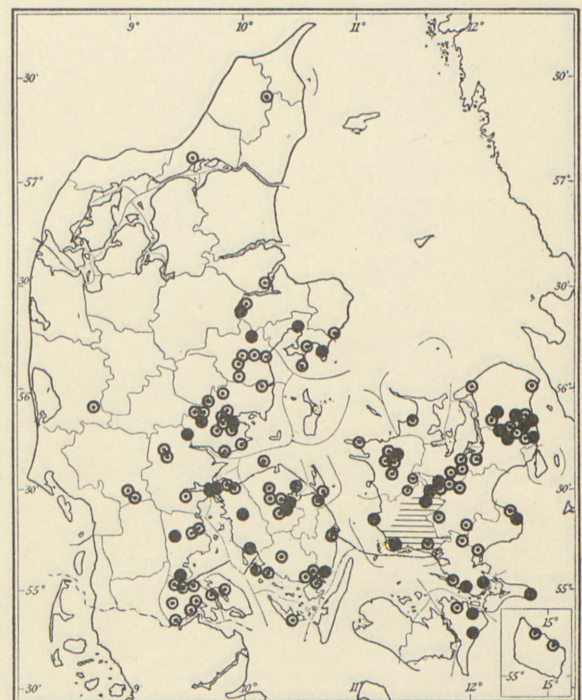


Fig. 24. *Vicia silvatica* L.

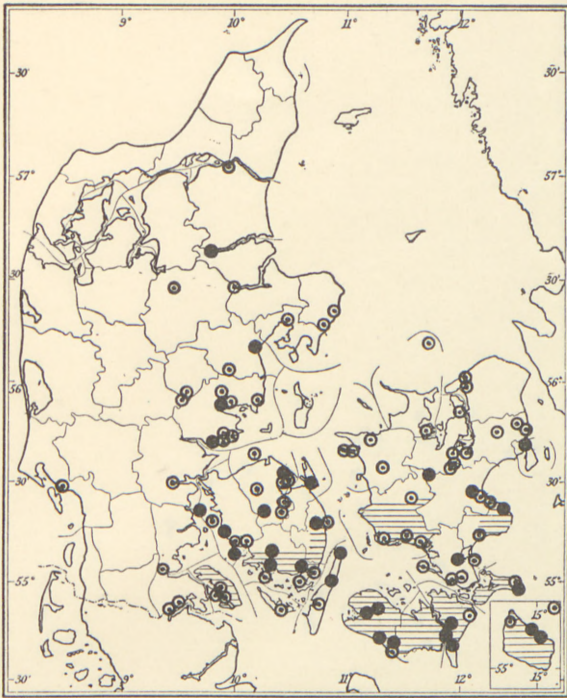


Fig. 25. *Vicia tetrasperma* (L.) MOENCH.

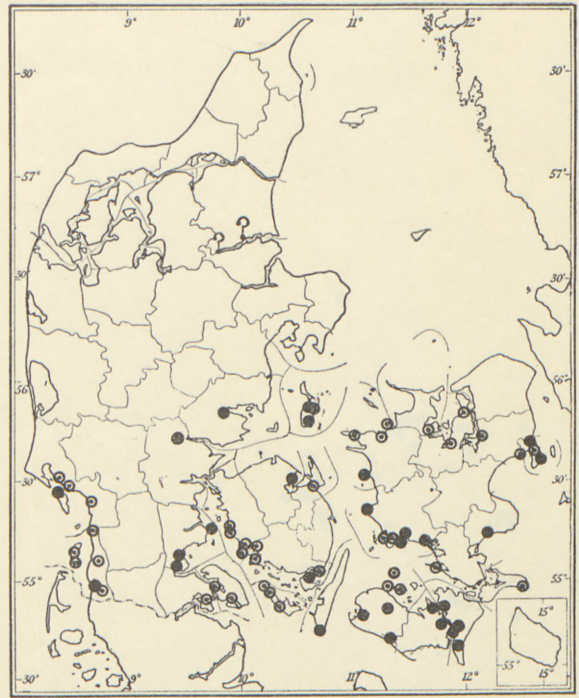


Fig. 26. *Ononis spinosa* L.

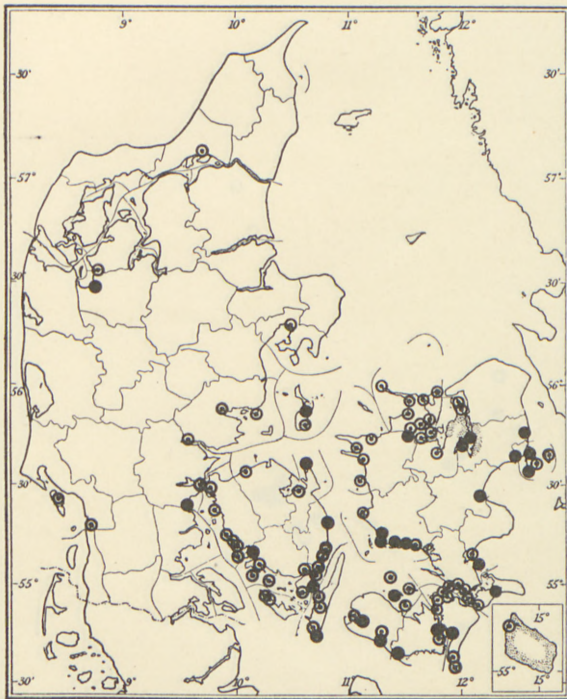


Fig. 27. *Lotus tenuis* W. & Kirt.

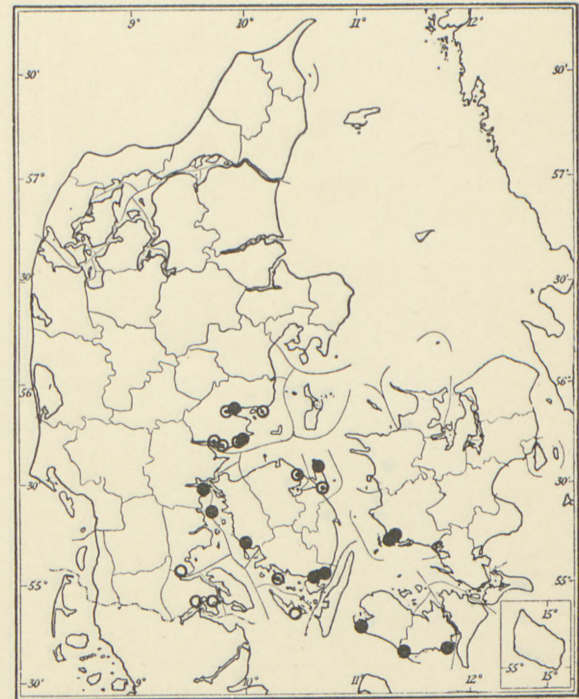


Fig. 28. *Trifolium filiforme* L.



Fig. 29. *Melilotus dentatus* (W. & Krr.) Pers.

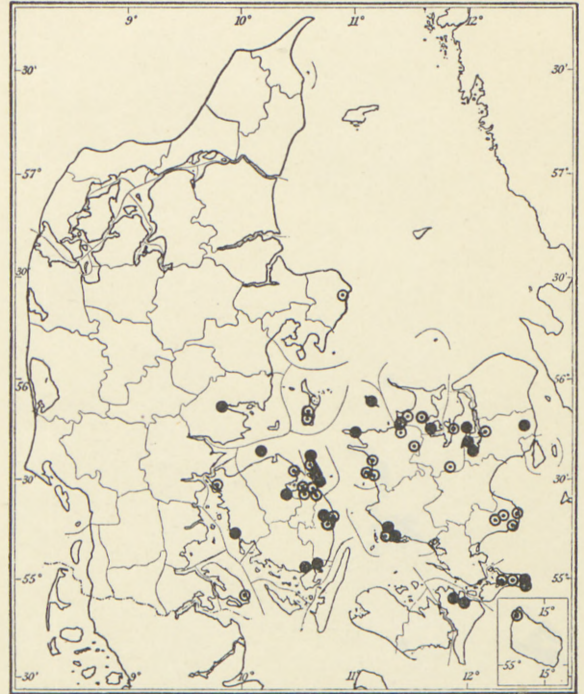


Fig. 30. *Vicia tenuifolia* ROTH.

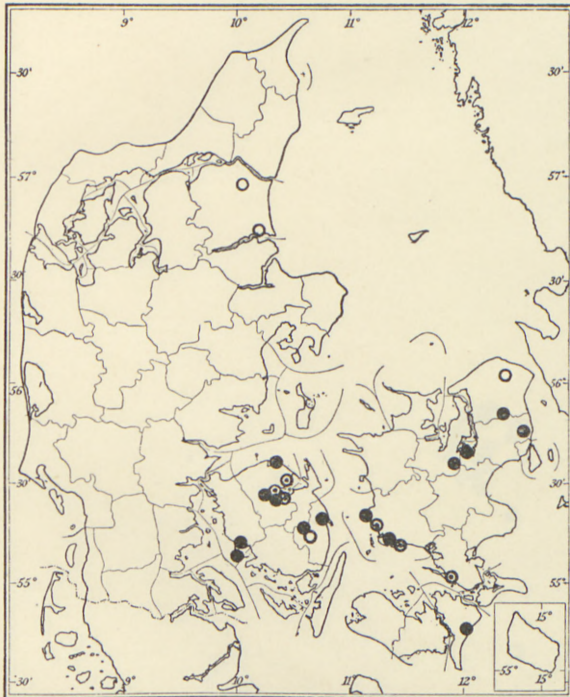


Fig. 31. *Vicia dumetorum* L.

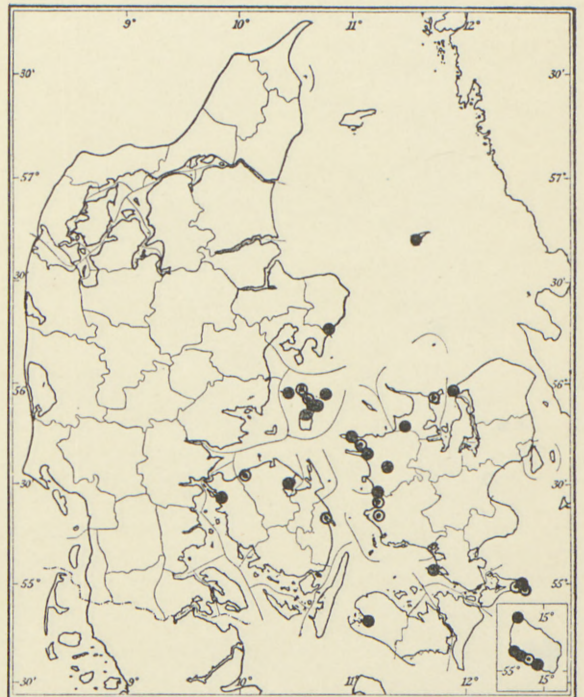


Fig. 32. *Medicago minima* (L.) BARTALINI.

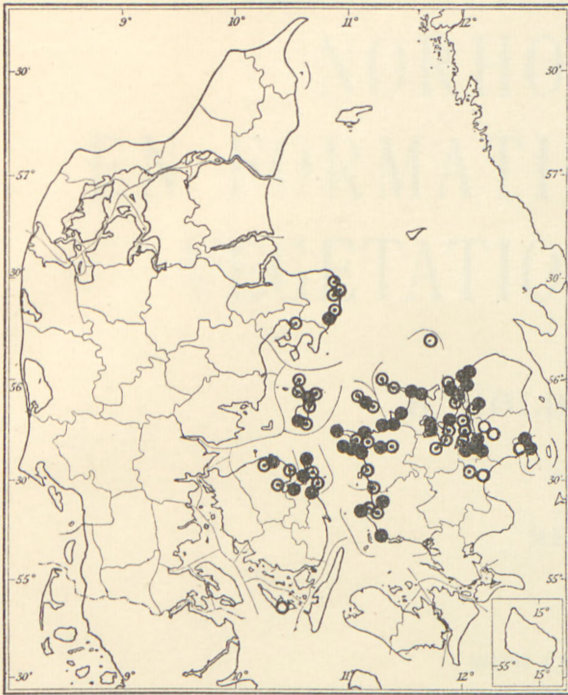


Fig. 33. *Astragalus danicus* RETZ.

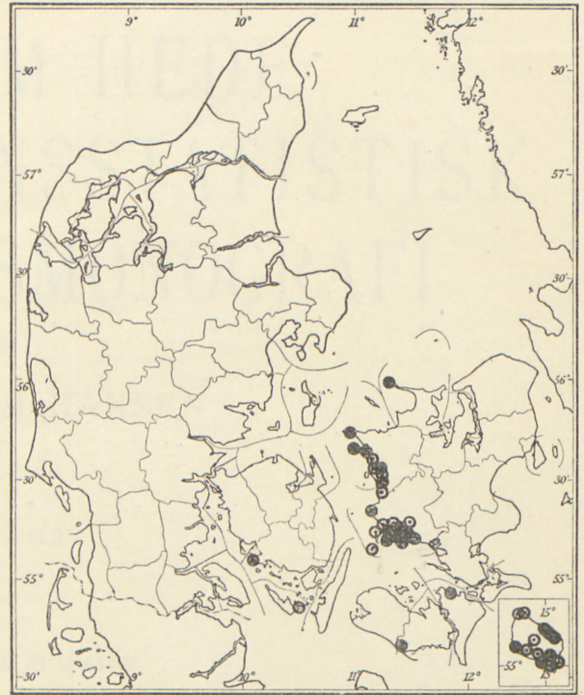


Fig. 34. *Tetragonolobus siliquosus* (L.) ROTH.

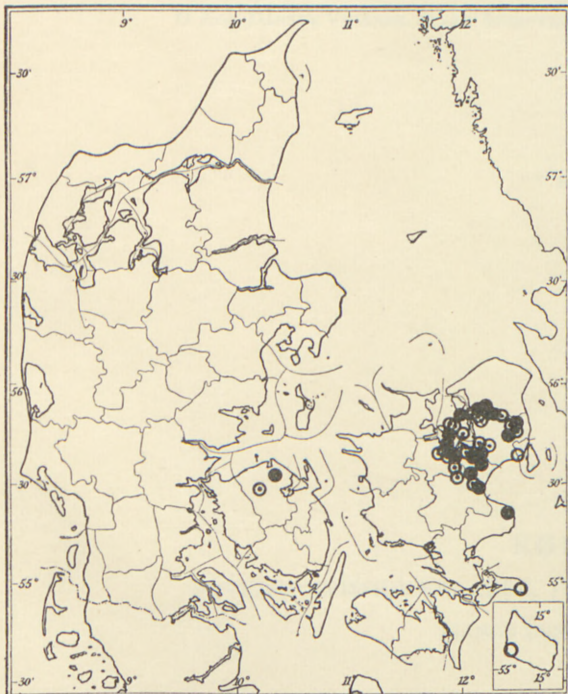


Fig. 35. *Trifolium alpestre* L.

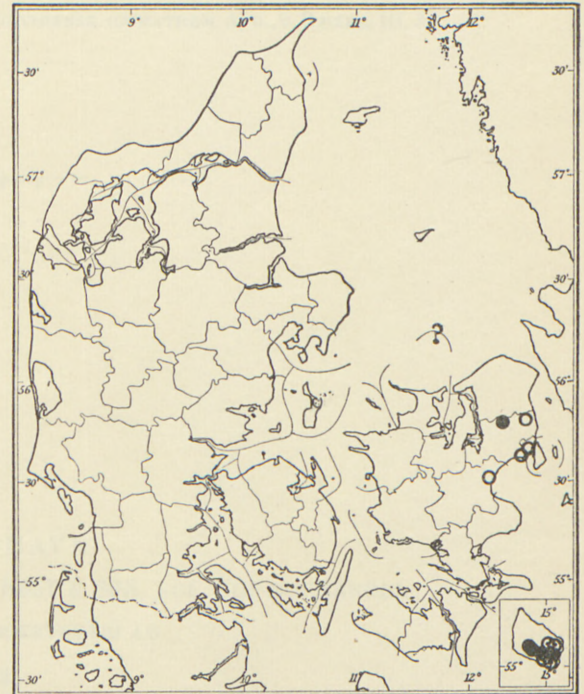


Fig. 36. *Trifolium montanum* L.