Denmark and Scotland: the cultural and environmental resources of small nations

Edited by GILLIAN FELLOWS-JENSEN

Historisk-filosofiske Meddelelser 82
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Denmark and Scotland: the cultural and environmental resources of small nations

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Joint symposium of the Royal Society of Edinburgh and the Royal Danish Academy of Sciences and Letters held in Copenhagen 15th-18th September 1999

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Abstract

The symposium entitled *Denmark and Scotland: the cultural and environmental resources of small nations* was held at the Royal Danish Academy 15th-18th September 1999 to mark the initiation of co-operation between the Academy and the Royal Society of Edinburgh. The multi-disciplinary membership of the two institutions resulted in an extremely wide-ranging programme of papers. In time these ranged from the development of the North Atlantic Ocean and the North Sea Basin millions of years ago to the opening of the Øresund bridge between Copenhagen and Malmö in the year 2000. In space the papers concentrated on Denmark and Scotland and their relationships with neighbouring lands around the North Sea.

After the introductory papers on the geological background, the topics treated ranged from the place-names and archaeological evidence for Norse settlement in Shetland, Danish place-names in central and south-western Scotland and Scottish personal names in Denmark, the recording and protection of antiquities, wood-based architecture in Shetland and the Faroes, Nordic-Celtic links in folk literature and the theatre as an agency of cultural exchange to environmental history, land management and rural development, hydrocarbon development, the environmental impact on the North Sea littoral of Scotland, soils as cultural resources and food webs and fish production in the North Sea. The conference closed with a few papers on national identity: Danish national identity expressed in art and literature through the ages and Scottish national identity as reflected in architecture and planning and in Scots law.

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Preface

On the evening of Wednesday 15th September the Danish participants in the symposium and a handful of Scottish participants who had arrived early in Copenhagen were assembled in the Royal Danish Academy anxiously awaiting news of the much-delayed plane that was to bring most of the Scottish participants to Copenhagen. The first news was that the plane should arrive in time for the planned reception to start one hour late and the time passed pleasantly enough in conversation and exchange of news. When the latest bulletin from the airport announced that the plane could not arrive at Kastrup before 11 p.m. at the earliest, the bonds of etiquette finally snapped and the Danish hosts and their few Scottish guests cast themselves avidly upon the prepared delicacies. The secretary of the Royal Society of Edinburgh, Dr William Duncan, then set off on his third trip to the airport to meet his flock and shepherd them to their hotel, while the Danish organisers returned home to an uneasy night's sleep, wondering how to hold a symposium without half the participants.

This unpropitious beginning, however, turned out to be the only unfortunate event of an otherwise successful symposium that augurs well for future cooperation. It is good to be able to report that a formal agreement on such cooperation was concluded between the two academies in Edinburgh earlier this month. The background for the holding of this first joint symposium is described by Henning Sørensen in his Prelude to this book. We are pleased that almost all the speakers wished to publish their contribution in the volume of proceedings and hope that this will be read with interest both in Scotland and in Denmark.

The organisers of the symposium would like to take this opportunity to extend their thanks to the following sponsors for their generous financial support: The Binks Trust, The British Council, Denmark, The Carlsberg Foundation, Copenhagen, The Gordon Cook Foundation, The Royal Danish Academy of Sciences and Letters and The Royal Society of Edinburgh.

We are also indebted to the Dean of Roskilde Cathedral, Jens Arendt, for conducting us around the Cathedral, explaining its history to us, and pointing out the sarcophagus of King Christian VIII, who had been a very active president of the Royal Danish Academy. A similar debt of gratitude is owed to the Viking Ship Museum in Roskilde. Its director,

Tinna Damgaard-Sørensen, gave us free access to the museum, the catering staff provided us with an excellent lunch and Ole Crumlin-Pedersen looked after us well from the moment we arrived until we left again for Copenhagen. We should also like to thank the Carlsberg Academy for allowing us to hold our closing reception in Pompeji and Svend Rasmussen and his staff for making our evening in these splendid surroundings such an enjoyable one for us all. It was particularly pleasant that the Danish Cultural Institute in Copenhagen generously arranged for Mette Bligaard of the Danish Cultural Institute in Edinburgh to fly over specially to hold an inspiring pre-prandial talk on cultural exchanges between Denmark and Scotland. The organisers are above all, however, indebted to the staff of the Royal Danish Academy for ensuring that everything ran smoothly while the symposium lasted.

The present volume has been published with the aid of a generous grant from the Carlsberg Foundation.

22nd May 2000 Gillian Fellows-Jensen

Prelude

HENNING SØRENSEN
PAST-PRESIDENT OF THE ROYAL DANISH ACADEMY

Contacts between the Royal Society of Edinburgh and the Royal Danish Academy of Sciences and Letters were in the past restricted to the exchange of publications and Danish participation in the celebration of the 200th anniversary of RSE in 1983. When I talked with Professor Malcolm Jeeves, the President of RSE, at a NATO Advanced Research Workshop in Athens in November 1996, we both found that there were good reasons for forming closer contacts between our two Academies. I was then the immediate Past President of RDA. We found that we are neighbours, separated only by the waters of the North Sea, an area for work and play for both Scotland and Denmark, and that Scotland and Denmark have much in common. We therefore discussed how we could strengthen the contact between the two Academies and found that joint symposia might be a good way of establishing closer relations between RSE and RDA.

On arrival home from Athens, Malcolm Jeeves presented this idea to the Council of the RSE and I did the same to the Presidium of the RDA. The idea was welcomed enthusiastically by both Academies and Professor Jeeves then invited the RDA to send a representative to Edinburgh in order to discuss how we should proceed. The RDA entrusted me with this task.

On May 23rd 1997 Professor Jeeves and some of the officers of the RSE hosted a meeting in the premises of the Society in Edinburgh. After brief presentations of the two Academies, we discussed the form and contents of the first meeting between RSE and RDA. It was decided that a joint symposium would be the appropriate way of initiating cooperation between the two Academies and it was recommended that the RDA should arrange one on the theme "historical connections between Denmark and Scotland" which I had brought with me as a proposal. This had been prepared by Gillian Fellows-Jensen.

The Presidium of the RDA subsequently offered to include the RSE-RDA symposium in its regular series of symposia supported by funding from the RDA and the Carlsberg Foundation. Gillian Fellows-Jensen was asked to organise the symposium, a task which she readily took

upon herself. The RSE appointed Professor John Laver, Vice-President with responsibility for international relations, to represent the RSE in the further planning of the symposium.

Professor Laver visited Copenhagen 2nd-3rd April 1998 and Gillian Fellows-Jensen Edinburgh 23rd November 1998 in order to prepare the programme of the symposium with the title "Denmark and Scotland: the environmental and cultural resources of small nations". On 27th November 1998 Gillian Fellows-Jensen sent out the invitation to the Scottish and Danish speakers.

The symposium was arranged by Gillian Fellows-Jensen and Pia Grüner, head of the Secretariat of the RDA. It took place 15th-18th September 1999.

The geological history of the North Atlantic Ocean

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The North Atlantic Ocean began to form about 130 million years (Ma) ago when sea-floor spreading, propagating from the south, caused Iberia and Newfoundland to separate. At that time, the crust beneath the region was stretching and subsiding to form sedimentary basins (including the North Sea). By ~105 Ma, sea-floor spreading had extended into one of these basins, the Rockall Trough, and this continued until ~84 Ma. Spreading started again further west to form the Labrador Sea at ~61 Ma, and then between Greenland and Scotland at ~56 Ma. Unlike the earlier rifting episodes, the final stage in the break-up of the North Atlantic region was accompanied by the widespread eruption of basaltic magma. Two phases of magmatism are recognised: the first (62-58 Ma) predating the separation of Greenland from NW Europe, and the second (56-52 Ma) accompanying it. The sudden onset of volcanism at 62 Ma was due to the initiation of a convective plume of hot mantle, now located beneath Iceland. The products of the two volcanic phases are preserved as thick sequences of basaltic lava flows outcropping over an area extending from Baffin Island in the west, through West and East Greenland and the Faeroes, to Scotland in the east. The second phase blanketed large parts of western Europe with volcanic ash layers that now form important stratigraphic marker horizons in the North Sea and surrounding areas, including Denmark and Great Britain.

Initiation of the Iceland mantle plume caused regional uplift and may have influenced the final stages of continental break-up. Uplift led to erosion of the continental margins and the deposition of hydrocarbon-hosting sand bodies in the North Sea, and is also responsible for shaping the landscape of the Atlantic margins.

Introduction

The idea that continents can move around the surface of the Earth was first proposed as a serious scientific theory by Wegener (1915). He used the striking similarity in the shape of coastlines on opposite sides of the Atlantic Ocean, coupled with an impressive body of geological and climatological evidence, to argue that the continents had been united, 200 million years (Ma) ago, into one supercontinent that he called *Pangaea*. Since this time, he argued, *Pangaea* has broken up and the continents have slowly drifted into their present configuration. Wegener's (1915) continental drift theory divided the geological world into followers and opponents who debated the issue until the 1970s. Opposition to the theory was based mostly on the lack of a viable mechanism for the movement of continents and on the belief that the Earth behaved as a rigid solid. A mechanism was offered by Holmes (1931) who proposed that continental drift is driven by convection currents in the mantle (that part of the Earth beneath the crust). He argued that heat from the decay of radioactive elements provided much of the energy to sustain mantle convection. Although the mantle is solid, it behaves as a viscous fluid and is capable of convection through the process of solid-state creep – the process that allows solid ice to flow in glaciers. Holmes (1931) was the first to suggest that continents ride passively on the mantle; earlier workers had assumed that the continents somehow ploughed their way across the ocean floors.

By the late 1950s the ocean basins had been mapped in enough detail to reveal the continuity and length of the mid-ocean ridges (e.g. Menard, 1958; Heezen *et al.*, 1959). Significantly, the Mid-Atlantic Ridge was shown to run down the centre of the Atlantic Ocean and parallel to the coastlines on either side (Heezen *et al.*, 1959). This led Hess (1962) to suggest that mid-ocean ridges represent the sites of convective upwelling of the Earth's mantle and that the ocean crust is spreading symmetrically away from the ridges, rather like pairs of conveyor belts. Proof of Hess's (1962) sea-floor spreading hypothesis was pro-

vided by Vine & Matthews (1963) through their interpretation of magnetic anomalies in the oceans, and this led to the establishment of plate tectonics as a unifying theory in the Earth Sciences.

The Earth's surface is made up of rigid plates, about 100 km thick, called the lithosphere. These plates are composed of crust and upper mantle and are underlain by a layer of ductile but solid mantle known as the asthenosphere. The plates move with respect to each other and are driven partly by convective motion of the asthenosphere. Estimates of the rate and direction of plate motion have allowed accurate reconstruction of the ocean basins and continents since the break-up of *Pangaea*. In this paper we shall give a brief geological history of the North Atlantic Ocean and show how its surrounding land masses acquired their present configuration and topography.

The formation of ocean basins

As lithospheric plates are pulled apart, the asthenosphere wells up to fill the space created and partially melts to produce basaltic magma. Some of this is erupted onto the sea floor, but most is injected as dykes (narrow, vertical, sheet-like intrusions) or remains at the base of the new crust to crystallise as gabbro (coarse-grained equivalent of basalt). Thus the ocean crust grows from the axis of the mid-ocean ridges as the plates move apart, and the unmelted residue of the upwelled asthenosphere cools, becomes rigid, and forms part of the new lithospheric plate as it spreads away from the ridge. Since the Earth's surface area is constant, oceanic lithosphere must be destroyed at the same rate as it is created, and this occurs when it is eventually returned to the deeper mantle at ocean trenches through a process known as subduction. Because the lithosphere is colder and more dense than the asthenosphere, the subduction process contributes to the forces that cause plate motion. Subduction ensures that the ocean crust is recycled back into the mantle on a time scale that is short in comparison with the age of the Earth, and the ocean crust is therefore very much younger than most of the continental crust. The oldest ocean crust on Earth (in the western Pacific Ocean) has been dated at about 180 Ma, whereas the oldest recorded continental rocks (in Arctic Canada) have ages of around 4000 Ma.

Although most aspects of Hess's (1962) sea-floor spreading hypothesis have become accepted, we now know that the mid-ocean ridges do not represent the rising limbs of deep-mantle convection cells, but

form as a passive response to the pulling apart of plates. The convective upwelling that helps to drive plate motion is largely independent of the global system of mid-ocean ridges and subduction zones and takes the form of plumes of hot mantle rising from deep within the Earth. One such plume is responsible for the Hawaiian island chain in the middle of the Pacific plate, and another coincides with the Mid-Atlantic Ridge to form Iceland.

Why continents break up to form new ocean basins is still the subject of debate, but it is widely believed that stresses imposed on the base of the continental lithosphere by the motion of the asthenosphere, combined with the pulling effect of subduction, can cause the lithosphere to stretch and ultimately break. In some cases, though, it is clear that mantle plumes can either trigger break-up or influence its progress. As we shall show later, the Iceland plume has had an important influence on the shaping of the North Atlantic Ocean.

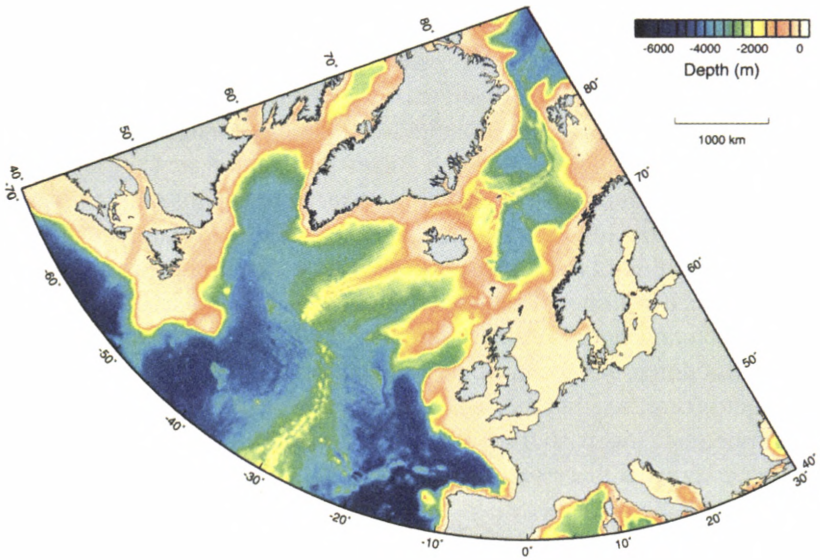

Figure 1. Bathymetry of the North Atlantic Ocean, based on the ETOPO5 (Earth Topography – 5 Minute) digital data base compiled by the U.S. Naval Oceanographic Office.

Bathymetry of the North Atlantic Ocean

Wegener (1915) was impressed by the way the coastlines around the Atlantic Ocean fit together, but coastlines are only transient features, the location of which depends on relative sea level. The outer edges of the continental shelves are the true margins of the continents. Figure 1 shows the bathymetry of the North Atlantic Ocean and it can be seen from this map that the continental shelves end on steep slopes where the ocean depth increases abruptly from <2000 m to >4000 m. Several other features seen on this map are important to an understanding of the geological development of the North Atlantic.

1. The continental shelf of north-west Europe does not always run parallel to the coastline, but contains several deep embayments. The most prominent of these is the Rockall Trough to the west of Scotland. Here, a continental fragment, Rockall Bank, appears to have broken away from the continental shelf. Jan Mayen (NW of Iceland) and the Faeroes lie on smaller continental fragments. Note also that the continental shelf around the Iberian Peninsula and south-west France is very narrow and that the Bay of Biscay is truly oceanic in its water depth.
2. The continental shelf of West Greenland is separated from that of Labrador and Baffin Island by a narrow strip of deep water (the Labrador Sea and Baffin Bay), showing that continental separation has occurred between Greenland and North America.
3. The Mid-Atlantic Ridge is seen as a prominent linear feature running the length of the ocean. The ridge is offset in several places by transform faults, the most prominent of which can be seen to the south of Spitsbergen and at about 52°N. It is the existence of these faults that provides evidence that the ridges are passive features and not the result of the rising limbs of convection cells from the deep mantle.
4. Iceland sits astride the Mid-Atlantic Ridge and is surrounded by a broad region of shallow ocean. This shallow zone forms a broad ridge extending across the ocean from Greenland to the Faeroes and is due to two effects of the Iceland plume. Firstly, upwelling of anomalously hot mantle plume material has the effect of uplifting the ocean floor. Secondly, the plume's proximity to the Mid-Atlantic Ridge, both now and over a large part of the history of the North Atlantic, has resulted in thicker-than-normal ocean crust. Normal

ocean crust has a very uniform thickness of ~7 km, whereas that on the Greenland-Iceland-Faeroes ridge is 20 to 35 km thick, comparable in thickness to continental crust (White, 1997; Darbyshire *et al.*, 1998).

Age of the North Atlantic Ocean

Vine & Matthews's (1962) explanation for oceanic magnetic anomalies led directly to a method for estimating the age of the ocean basins and for reconstructing past plate motions. The anomalies run parallel to, and are symmetrical about, the mid-ocean ridges and are caused by strips of ocean crust magnetised, alternately, in the same (normal) and opposite (reversed) direction to the Earth's present magnetic field. The magnetic field measured over the oceans is enhanced in places where the rocks on the ocean floor are normally magnetised and reduced where they are magnetised in a reversed direction. Magnetisation of the ocean crust is inherited from the Earth's contemporary magnetic field as the magma that forms new crust at mid-ocean ridges cools and crystallises. The direction of the Earth's field reverses on average every 500,000 years, although reversal intervals vary widely from tens of thousands to tens of millions of years. Continuous growth of the ocean floor, coupled with periodic reversals in the magnetic field, produces magnetic stripes that give an accurate record of the past position of the mid-ocean ridge. The magnetic anomalies thus record reversals in the magnetic field in much the same ways as tree rings record fluctuations in climate. Once the magnetic anomalies have been mapped, it is possible to reconstruct the history of an ocean basin by matching up magnetic stripes on either side of the mid-ocean ridge.

In order to assign absolute ages to the history of ocean basins deduced from magnetic anomalies, it is necessary to calibrate the reversal history of the Earth's magnetic field. This has been achieved by measuring the magnetic polarity and radiometric age of continuous volcanic successions on land (in Iceland, for example) and comparing this with the magnetic and fossil records preserved in deep ocean sediments. As a result of several decades of work, we now have a magnetic time scale extending back to about 165 Ma (e.g. Berggren *et al.*, 1995). The magnetic time scale can then be used to convert the magnetic anomaly map of the ocean basins into maps contoured by age. Figure 2 is such a map for the North Atlantic Ocean, and this map can be used to reconstruct

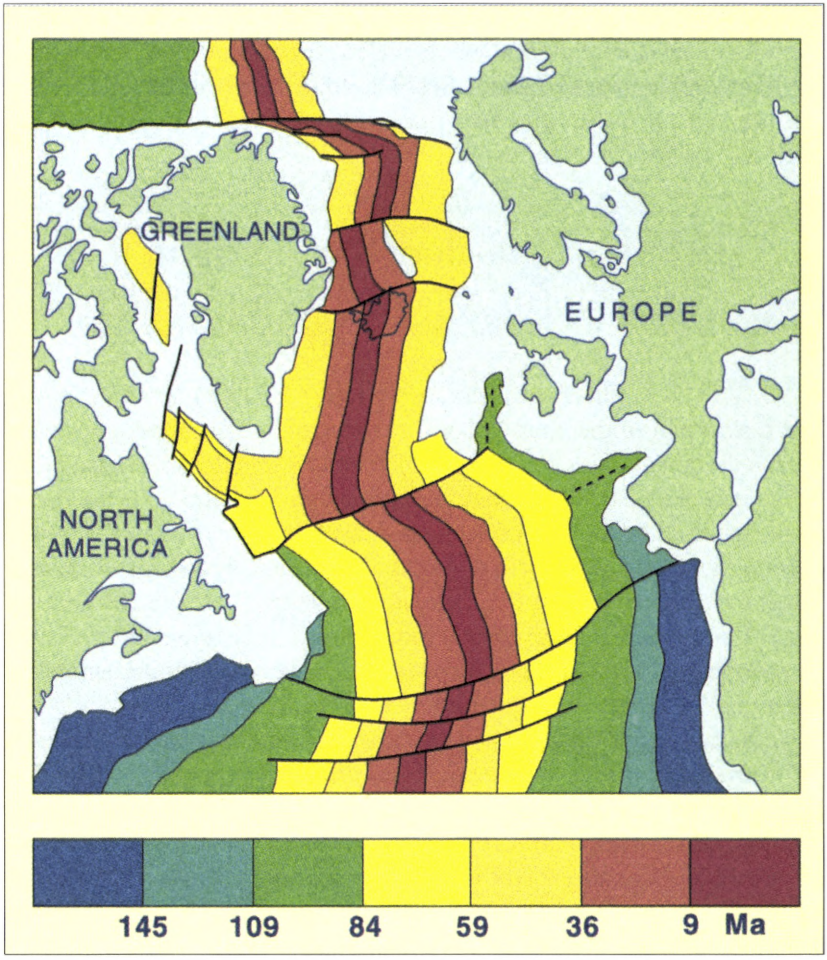

Figure 2. The age of the North Atlantic Ocean floor, based on magnetic anomalies. Broken lines in the Bay of Biscay and Rockall Trough represent short-lived spreading centres in these areas. After Ziegler (1989), with the area between Canada and Greenland modified after Whittaker *et al.* (1997) and T.C.R. Pulvertaft (personal communication, 1999).

the history of the ocean by sequentially removing age bands from the youngest to the oldest. At each stage, magnetic anomalies of the same age but on opposite sides of the Mid-Atlantic Ridge are juxtaposed to give the position of the ridge at the time the anomaly formed. Reconstructions of the North Atlantic Ocean, at six stages in its development,

are shown in Figure 3. In these maps the Mid-Atlantic Ridge (shown as a double line) is only plotted where its location can be clearly identified from matching magnetic anomalies. The edge of the continental shelf is represented by thick lines that mark the position of the present-day 2000 m contour for water depth.

History of sea-floor spreading in the North Atlantic region

The early phase (130 to 62 Ma)

The oldest part of the North Atlantic formed at about 130 Ma, when the Iberian Peninsula began to rotate anticlockwise and separate from Newfoundland (Fig. 3). At this time Europe, Greenland and North America were united as a single continent, although a narrow ocean to the south separated Africa from North America. The oldest ocean crust in the Atlantic Ocean is found off the eastern coast of the United States and the west coast of Africa (Fig. 2), and the ocean floor becomes progressively younger northwards. The crust beneath the North Atlantic region had been under tension for some time before break-up, and stretching and thinning of the crust had caused the subsidence that led to the formation of sedimentary basins such as the North Sea and Rockall Trough. The rotation of Iberia led to the opening of the Bay of Biscay and, at about 105 Ma, sea-floor spreading extended northwards into Rockall Trough. Ocean-floor formation in the Bay of Biscay and Rockall Trough stopped at about 84 Ma but the ocean continued to open between Britain and Newfoundland.

After the cessation of spreading in the Rockall Trough, the axis of break-up shifted westwards into the Labrador Sea. Although the crust between Greenland and Labrador had been stretching and subsiding since about 125 Ma (Balkwill, 1987), uncertainties in the interpretation of magnetic anomalies in the region have led to some debate over the timing of the initiation of active sea-floor spreading. Roest & Srivastava (1989) have suggested that this started as early as 84 Ma but Chalmers & Laursen (1995) have shown that the oldest unambiguous magnetic anomalies imply a much later start (61 Ma). However, it is clear that by 61 Ma, the Mid-Atlantic Ridge was propagating northwards between Greenland and Labrador (Fig. 3).

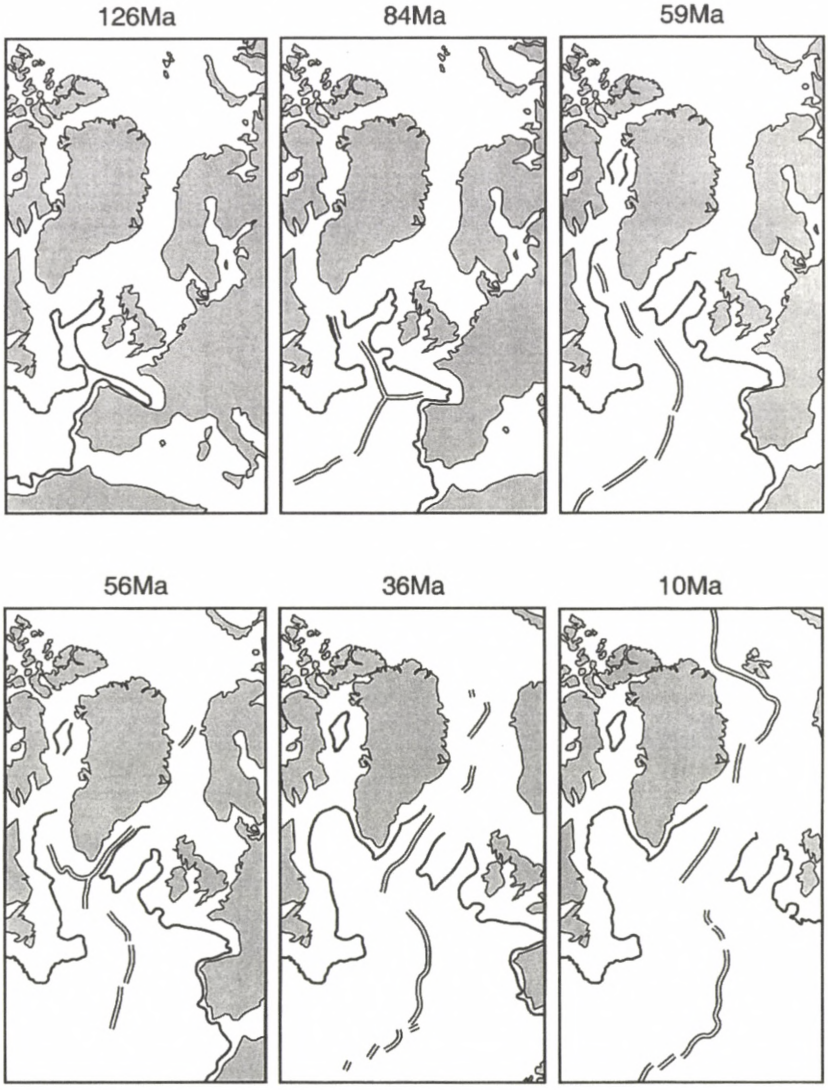

Figure 3. Reconstructions of the North Atlantic region, after Srivastava & Tapscott (1986). Present-day coastlines are shown for reference, and the edges of the continental shelves are represented by present-day 2000-m water-depth contours (thick lines). Sea-floor spreading ridges (double lines) are marked only where their positions are well constrained by magnetic anomalies.

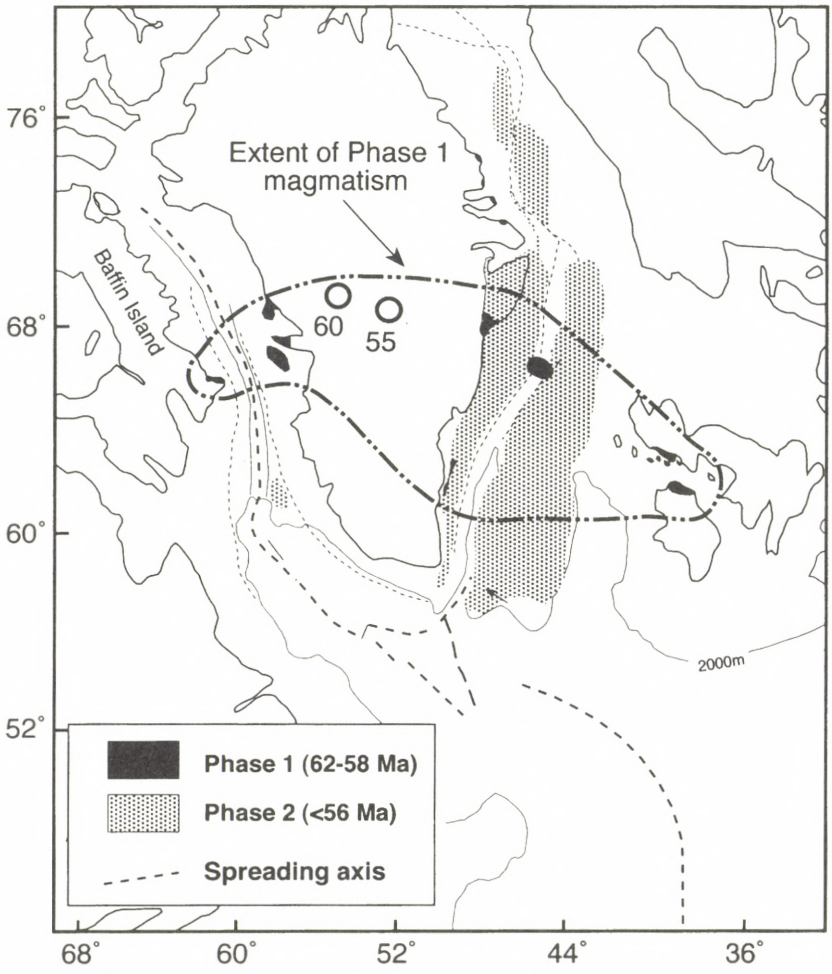

Figure 4. Reconstruction of the North Atlantic region at ~60 Ma showing the distribution of thick successions of volcanic rocks erupted at around that time. Phase 1 lava flows were erupted in response to the initiation of the Iceland mantle plume, and Phase 2 to the separation of Greenland from Western Europe. The circles labelled 55 and 60 show Lawver & Müller's (1994) calculated locations of the centre of the Iceland plume at 55 and 60 Ma respectively. After Saunders *et al.* (1997).

The later phase (62 Ma to the present)

A geological event occurred at ~62 Ma that was to change the course of history in the North Atlantic region, the effects of which had a lasting impact on the natural environment and economic development of north-

Figure 5. Eastern edge of the Palaeocene lava plateau on the Isle of Skye, Scotland. The photograph was taken looking southwards from Quirang. Horizontal basaltic lava flows of Phase 1 (Fig. 4) are exposed in escarpments formed by landsliding. (*Godfrey Fitton*)

west Europe. Up until this time the break-up of the continents had progressed from sedimentary basins to sea-floor spreading with volcanic activity confined to the actual spreading axes of the new ocean basins. But between 62 and 58 Ma the North Atlantic region saw a massive flare-up of volcanic activity across an area extending ~2000 km from Arctic Canada to Scotland (Fig. 4; Chalmers *et al.*, 1995). Flood basalts of this age are found in Baffin Island (Clarke & Upton, 1971), West Greenland (Clarke & Pedersen, 1976), East Greenland (Larsen & Saunders, 1998), Northern Ireland, and Scotland (Fig. 5; Emeleus & Gyopari, 1992). Volcanism on this scale requires a sudden increase in the temperature of the mantle beneath the region, and the most plausible reason for this is the initiation of the mantle plume now situated beneath Iceland.

Mantle plumes are the principal expression of convection from the deep mantle, and the resulting flow of shallow asthenosphere away from plume axes provides some of the force that moves the lithospheric plates. The plume beneath Iceland today has recently been imaged seismically and is seen to have a radius of ~150 km (Wolfe *et al.*, 1997)

and to originate at a depth of >660 km in the mantle (Shen *et al.*, 1998). At the time of its origin, however, the plume is likely to have developed a large mushroom-like head extending over a radius of ~1000 km (e.g. Richards *et al.*, 1989). Past positions of the plume axis with respect to the continents can be reconstructed from known plate motions, and it is likely to have been close to West Greenland at ~62 Ma (Lawver & Müller, 1994).

We can not be certain of the extent to which the plume influenced the break-up of the North Atlantic region, but sea-floor spreading started between Greenland and Norway soon after its arrival (Fig. 3). Spreading in the Labrador Sea continued at a reduced rate until ~36 Ma, but the main axis of plate separation moved to the east of Greenland at ~56 Ma. The separation of Greenland from north-west Europe was accompanied by a second and even more intense phase of magmatism (Saunders *et al.*, 1997), this time producing thick piles of flood basalt along the East Greenland coast (e.g. Larsen *et al.*, 1989; Fig. 6) and the Faeroes (Waagstein, 1988) and even thicker and more extensive successions of basalt offshore on the Rockall Plateau (Ritchie & Hitchen, 1996) and along the continental shelves of Greenland and Norway (Fig. 4). The international Ocean Drilling Program has recently sampled a

Figure 6. Plateau lavas (Skrænterne Formation) of Phase 2 in the area south of Scoresby Sund, East Greenland. (*Danish Lithosphere Centre*)

Figure 7. Layers of basaltic ash (black) in the mo-clay at Hanklit on the island of Mors, Jutland. The rocks exposed in this cliff section have been overturned in places through the action of advancing ice sheets during the Ice Age. (*Godfrey Fitton*)

transect across the submerged volcanic successions off south-east Greenland as part of a multidisciplinary research programme initiated by the Danish Lithosphere Centre (Larsen & Saunders, 1998; Fitton *et al.,* 2000).

Basaltic volcanism at mid-ocean ridges and above mantle plumes is rarely as explosive as the volcanic eruptions at destructive plate margins. This is because basaltic magma is less viscous and has a lower content of dissolved volatile material than does the more silica-rich magma typical of subduction zones. However, the post-break-up volcanism off East Greenland was an exception to this rule. Basaltic ash from this phase of volcanic activity blanketed large areas of western Europe and is preserved in the sedimentary record of the North Sea and adjacent areas (Knox & Morton, 1988). These ashes are best preserved in the mo-clay of northern Jutland (Fig. 7) where about 180 individual ash layers with a total thickness of several metres have been recorded (Bøggild, 1918). It seems likely that unusually vigorous eruption of basaltic magma at the time of continental separation, coupled with the interaction between these magmas and sea water, was responsible for this explosive volcanism. The mo-clay in which the Danish ashes occur

contains fossils that place the time of eruption precisely at the Palaeocene-Eocene boundary. Radiometric dating techniques can rarely be used to measure the ages of fossils and sedimentary rocks directly, but these can readily be applied to volcanic rocks. The Danish ashes have considerable stratigraphic value in providing the absolute age (55 Ma) of the Palaeocene-Eocene boundary used in the international geological time scale (Berggren *et al.*, 1995).

The cessation of sea-floor spreading in the Labrador Sea at ~36 Ma left only one spreading axis active during the final stages of opening of the North Atlantic Ocean. This axis propagated rapidly northwards between Greenland and Norway and into the Arctic Ocean after ~56 Ma and is still active today. Although the two halves of the North Atlantic Ocean are spreading symmetrically, the whole region is drifting slowly to the north-west with respect to the Iceland plume. The plume axis would have crossed the East Greenland coast at 40 to 35 Ma (Lawver & Müller, 1994) and reached the Mid-Atlantic Ridge at ~25 Ma (Vink, 1984). Since ~25 Ma, the ridge has remained locked over the plume axis, and Iceland has formed as a result of the interaction between the plume and the Mid-Atlantic Ridge. Hotter mantle leads to more extensive melting beneath the section of ridge affected by the plume and to thickened oceanic crust beneath Iceland. The spreading ridge system in Iceland continues to drift north-westwards with respect to the plume axis but is periodically recaptured by the plume (Hardarson *et al.*, 1997). As a result, the oldest rocks in Iceland (15 Ma) are exposed in the far north-west of the island.

Economic and environmental impact of the Iceland plume

Were it not for the initiation of the Iceland plume, the North Atlantic region would have been very different today. Clearly Iceland would not exist, and it is likely that the North Atlantic Ocean would have opened between Greenland and Labrador. Greenland would then have been attached to western Europe and separated from Britain and Norway by extensions of the North Sea. In addition to these effects on the geography of the region, the Iceland plume has had other significant but less obvious environmental and economic consequences. We can only speculate on the environmental effects of the massive volcanic eruptions accompanying the separation of Greenland from Scotland at the end of

the Palaeocene. These covered north-west Europe with volcanic ash and may have had a dramatic effect on the climate. Some idea of the magnitude of the environmental impact of these eruptions may be gained from the 1783 eruption of Laki, the largest historic eruption in Iceland. Volcanic gas and ash killed livestock throughout Iceland, with the consequent death by starvation of about one fifth of the Icelandic population, and the same eruption disturbed the climate of northern Europe and the eastern United States for the rest of the decade (Sigurdsson, 1982). The Late Palaeocene eruptions were very much larger and may have triggered climatic changes on a global scale. It may be significant that global climatic change and mass extinction of deep-water marine fauna at the end of the Palaeocene (Kennett & Stott, 1991) coincided exactly with the eruption of the ash layers preserved in north-west Europe.

Mantle plumes exert dynamic uplift on the overlying lithosphere, and the initiation of the Iceland plume caused widespread uplift of the North Atlantic region. Uplift leads to increased erosion and the resulting debris is ultimately deposited in sedimentary basins. The material eroded off Scotland in the Palaeocene, for example, was deposited in the North Sea and in the basins to the west of Shetland as laterally extensive sand bodies that acted as reservoir rocks for hydrocarbon deposits (White & Lovell, 1997). In addition to providing reservoir rocks, the Iceland plume may also have supplied some of the heat necessary for the maturation of hydrocarbon deposits (Green *et al.*, 1993)

Those parts of Greenland and Scotland uplifted during the initiation of the Iceland plume should have subsided rapidly as the continents drifted apart and moved away from the plume axis, but this is not so. The extra loading of up to 7 km of basalt in East Greenland (Pedersen *et al.*, 1997) ought to have depressed the pre-uplift land surface but instead this surface has remained elevated. Deep-marine Mesozoic sediments deposited in the basin between Greenland and Norway are exposed beneath the lava pile at several localities in East Greenland (Soper *et al.*, 1976), implying considerable uplift of the continental margin. In this context it should be noted that the highest point in Greenland, Gunnbjørn Fjeld, is close to the East Greenland coast. A similar situation exists in Scotland, where the highest ground is in the west and Mesozoic marine sediments are exposed beneath Palaeocene basaltic lava flows in the Hebrides. This permanent uplift of the continental margins of north-western Europe and East Greenland implies the emplacement of igneous rocks at the base of the crust that more than com-

pensate for the loading imposed by the eruption of basaltic lavas on the surface. There is good geophysical evidence for the existence of such material beneath both continental margins (White *et al.*, 1987; Larsen *et al.,* 1998). Although an enormous volume of magma was erupted during the final break-up of the North Atlantic region, a considerably larger volume cooled and crystallised at the base of the crust through a process known as underplating.

Uplift of continental margins through underplating of the crust with igneous material produces half-dome structures with radial drainage patterns that can survive for up to 200 million years after continental rupture (Cox, 1989). Such a half dome is apparent in the topography of Greenland when the ice is removed and the surface elevation corrected for the isostatic effects of ice loading (Letréguilly *et al.*, 1991). The resulting map shows an elongate elevated region extending along the whole of East Greenland and centred on that part of the continental margin where the Iceland plume passed from beneath the continent to the ocean (Lawver & Müller, 1994). Part of a complementary half dome can be seen on the other side of the North Atlantic in the topography of Scotland, with its spectacular western coast, and rivers that drain to the east. It is likely that the whole of Britain was tilted through underplating of north-western Scotland during the Palaeocene (Brodie & White, 1994). The activity of the Iceland plume ~60 million years ago was therefore instrumental in shaping the present landscape on both sides of the North Atlantic Ocean. But for the Iceland plume, Scotland would probably have no mountains today.

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'Fae da nort tae da suddart': Norse settlement in Shetland with special reference to Unst and Old Scatness

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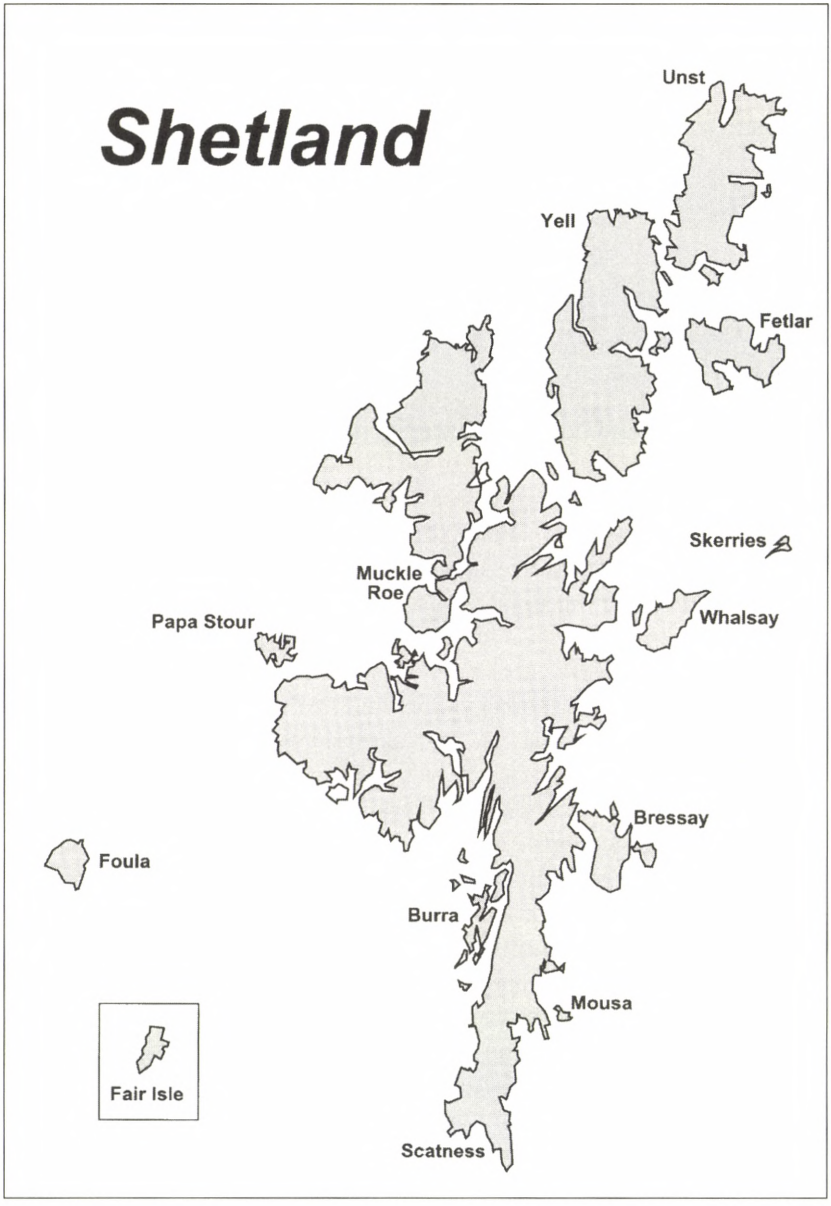
'Fae da nort tae da suddart' is what a Shetlander might say when describing travel from Unst in the north of Shetland towards Scatness in the south (Fig.1). Extremities are often the focus of interest, as Thomas Eliot said in an entirely different context in his poem *Gerontion*, when he noted that 'The end is where we start from'. In fact, the image of the end as merely another starting point can be further extended and applied to a Shetland place-name project, currently in its gestation period. In a sense, the embryonic project is at the end of something, in that the idea for it was inspired by the work done in Shetland by the Faroese scholar, Jakob Jakobsen, at the end of last century. Jakobsen did an immense service to the study of Shetland place names when he collected material for his book *The Place-Names of Shetland* (Jakobsen 1936), but his method was to list Old Norse elements followed by a few examples of Shetland place names which, in his opinion, contained these elements and, as a result, coverage of place names in his book is not exhaustive.

It is time for a more holistic approach and for a rigorous re-assessment of Jakobsen's work and it seems very appropriate, given his connection with the University of Copenhagen, that information should have been relayed at a conference held in Copenhagen, organised jointly by the Royal Danish Academy of Sciences and Letters and the Royal Society of Edinburgh, about the beginnings of a new research project, the aim of which is to collect detailed information, from both oral and written sources, on all Shetland place names currently in use or preserved in diverse written records, incorporating the numerous names of Norse origin along with all the names of other linguistic origin – principally Scots and English. The aim is to make this information available to all interested parties by entering it in a relational database.



The English translation of Jakob Jakobsen's study of *The Place-Names of Shetland,* first published in 1936 (Jakobsen 1936), was reprinted in 1993 and, as Gillian Fellows-Jensen noted in her introduction to the reprint:

> 'It was the Carlsberg Foundation in Denmark that gave this project the financial backing that made it possible for Jakobsen to spend three years collecting material (1892-95) and it was largely thanks to the same Foundation and the Danish state that he was able to spend the rest of his life preparing this material for publication.' (Jakobsen 1993 reprint, XVIII)

Little changes in terms of fund-raising: the Carlsberg Foundation is still generous in its funding and, in Shetland, the Shetland Amenity Trust is trying to raise money for the late-20th-century equivalent of Jakobsen's investigation of Shetland place names, also planned for three years in the first instance, although the study is very likely to extend beyond that period.

While application for funding for the larger project is in preparation, I have been employed by the Shetland Amenity Trust on place-name surveys at either end of Shetland, organised in tandem with archaeological excavations taking place in Unst and at Scatness. Both of these place-name surveys are still in progress, although, for the last two years, my work has concentrated on the area at the southern tip of Shetland, around Scatness in the parish of Dunrossness. Most of the work done thus far has been field work with informants who speak the dialect and who have lived either in Unst or the Scatness area most of their lives and have an extensive knowledge of local names and their locations.

It is generally accepted that the names of the Northern Isles of Unst, Yell and Fetlar may be pre-Norse (Fellows-Jensen 1984, 152; Stewart 1987, 20) but, these island names excepted, the 'Language Map of the Shetland Islands', which is the frontispiece of Jakobsen's book, illustrates clearly, through its plethora of place names of Norse linguistic origin, that his investigation of the fate of the Norse language was guaranteed to meet with considerable success in Shetland. Many of the Norse terms used in coining the place names on Jakobsen's map were still current in the local dialect of Scots at the end of the nineteenth century when Jakobsen visited Shetland and, to a lesser extent, that is still true at the end of the twentieth century. The extensive place-name vocabulary of Norse settlement in Shetland reflects the centuries of survival of Norn – 'the distinctive form of Scandinavian speech that developed in the Northern Isles' (Barnes 1998, 1). In fact, Michael Barnes, in his recent study of the Norn language of Orkney and Shetland, suggests that 'The time at which Norn died can be put at the middle of the eighteenth century in Orkney and perhaps as late as 1800 in Shetland –

in the sense that it was then that the last of the native speakers (those whose first language had been Norn) went to the grave' (Barnes 1998, 26).

In other words, the language died out approximately one century before Jakobsen arrived in Shetland but it left behind a substantial Norse substratum in the lexicon of Shetland Scots which is particularly evident in topographical place names. Norse habitative place-name elements, on the other hand, such as *staðir, bólstaðr* and *setr* all of which point to the establishment of homesteads – appearing in place names such as Baliasta, Ungirsta, Ulsta, Girlsta (*staðir*) and Nesbister, Wadbister, Fladdabister (*bólstaðr*) and Aithsetter, Mangaster, Hestinsetter and Dalsetter (*setr*) – are not understood by present speakers of Shetland Scots, although commonly occurring in Shetland place names.

Baliasta, to select an example of one of these habitative names, is one of the small number of Shetland place names which occur in the sagas; it is, unfortunately, rare to be able to date Shetland names with such certainty. The name appears as 'a Bollastøðum' in the Longer *Magnúss Saga* and A. B. Taylor, in his article entitled 'Shetland Place-Names in the Sagas', identifies it as Baliasta in Unst (Taylor 1954, 115). Taylor states that 'The name does not occur again until 1654 when it appears in Blaeu's map as *Balyesta*' (Taylor 1954, 116) but the name does, in fact, reappear in a document dated about a century before that in 1543-44, as 'Ballista' (Ballantyne & Smith 1999, 50) and as 'Balyeistay' in 1578-79 (Ballantyne & Smith 1999, 242). Its 'kirk' or 'church' also appears as the venue for a sheriff court (a court which has the jurisdiction to deal with most civil actions) on 20th March, 1571:

> 'Ane schiref court haldin at the kirk of Balyestay the xx day of Marche 1571 be ane honorabill man Arthuir Sinclar of Eisweck, schiref deput of Yetland for the time to ane mychtye and potent Lord Robert Stewart, feware and lyifrentar off the samin' (Ballantyne & Smith 1999, 144).

Ronald Cant identifies Baliasta, along with Lund and Norwick, as a major ecclesiastical site in medieval Shetland (Cant 1996,165).

That there was a general lack of understanding of Norse habitative generics was almost certainly true of the state of the language in Shetland at the end of the nineteenth century as well, when Jakobsen was collecting his evidence, although place-name generics which are recorded in combination with the English definite article in its Shetland dialect form 'da' [də] (Graham 1979, 16) may still have been on the

borderline between lexicon and onomasticon at the end of last century. An example could be 'Da Setters' in Unst which is the name a local informant gave for the site where the excavations undertaken by archaeologists and students from the University of Copenhagen, led by Steffen Stummann-Hansen and Anne-Christine Larsen, were taking place when I first began my field work in Unst in July, 1996. In fact, the informant took care to explain that 'Da Setters' was a place where cattle were put out to graze on the hill during the summer months, but he was using the past tense to describe a pastoral practice which is no longer followed. Thomas Edmonston from Buness, Unst, included *setter* in his 1866 glossary of Shetland and Orkney dialect words and commented that it was 'always indicative of good pasture for cattle' but he only noted examples of *setter* as 'common affixes to names of places in Shetland' (Edmonston 1866, 96). In other words, he no longer believed that *setter* was fully in use as a dialect word, beyond the narrowly onomastic context, in the mid-nineteenth century.

Garðr is another Norse element which, like *setr*, is found in quantity in all parts of Shetland and, also like *setr*, it can appear with the definite article 'da' and, sometimes, with English plural '-s'; as in '"de Gerts o' Scatness" (Dunrossness)' to which Jakobsen makes reference, saying that it 'may be either "garðr" or the derived form "gerði"' (Jakobsen 1993, 43). The outlying walled enclosure at Da Gerts o Scatness is very typical of a location where *garðr* would be used. Both of these habitative generics – *garðr* and setr – could have been coined at any point during the centuries when Norn was still in use in Shetland and their use does not necessarily indicate survival of the names in which they occur from the early period of Norse settlement. If such names do appear in early written record, the researcher is fortunate but, for the most part, they are difficult to identify because they are numerous and it is often difficult to distinguish between one Setter and another because the places to which they apply are generally insignificant and only appear in written record by accident of ownership or, more specifically, as a result of disagreement over territorial boundaries.

The other archaeological survey which is being conducted in Unst, Yell and Fetlar at present is, of course, the chapel-site survey described in this publication by Professor Chris Morris, which concentrates on a very specific aspect of Norse settlement – that of the adoption of Christianity. Evidence of religious activity can be gleaned from Norse placenames such as Kirkaby in Unst, although lack of early forms makes it very difficult to be certain of the antiquity of a name such as Kirkaby or

'church farm'. Cant assigns the chapel site at Kirkaby to the pre-Norse period (Cant 1975, 8) and the name could be as old as the ninth century when the first Norse settlers arrived but there is no documentary evidence, which, in itself, makes the antiquity of the name questionable. Gillian Fellows-Jensen has pointed out that, in the Danelaw, it is assumed that the Vikings gave names in *kirkju-bý* to settlements in which they found a church on their arrival, even before their own conversion (Fellows-Jensen 1984, 156), but the *bý*-names of Shetland generally refer to later, secondary settlement and, as Fellows-Jensen has also pointed out, 'seem most likely to contain *-bær* in a sense such as 'home-field', a meaning which is also recorded (by Matras 1932, 17) for *-bøur* in the Faroes' (Fellows-Jensen 1984, 157).

Superstition still preserved memory of Kirkaby as a religious site in the earlier years of this century, when Kirk Knowe, a field adjacent to Kirkaby, was called 'Bonüs' by local fishermen (Stewart, Shetland Archives, Lerwick)[1] rather than being referred to by its own name, because it was thought to be unlucky to refer directly to churches, and their appurtenances, when at sea. In the Faroes, the word *bønhús* was used for the smaller chapels of which there are only a few traces today (MacGregor 1984, 9). The sea-name for Kirkaby itself was 'Bo' [bu:] which is reminiscent of a place name 'Bowayre' [bu'ejər], recorded from Sand on the west mainland of Shetland, with reference to a fishing booth or 'bød' on a gravelly beach (ON *eyrr*) near the late medieval church (Waugh 1996, 250). There are five examples of the more common compound, Kirkabister (ON *bólstaðr*) in Shetland (MacGregor 1984, 10), but none of the five is located in Unst or Dunrossness.

In fact, the habitative generic *bólstaðr* itself is not common in Dunrossness names. There appears to be only one late example – Lunabister – which is something to ponder in the wider study of place names in the south of Shetland. In this short paper, however, having given a glimpse of some of the Norse habitative generics in Unst, I shall concentrate, in the southern part of Shetland, on one example of a place name with the Norse topographical generic *nes*, i.e. Scatness itself. There can be no doubt about the origin of the generic in Scatness but, thereafter, certain-

1 The information about the name 'Bonüs', spelt thus, appears in notes made by John Stewart during field work in Unst in the middle years of the twentieth century. The notes are now kept in the Shetland Archives, 44 King Harald Street, Lerwick, Shetland, and I am very grateful to the Stewart family in Whalsay for granting me permission to read them.

ty ends and the specific in the name has been the topic of much discussion since the start of the Old Scatness project; *Old* Scatness being the mode of reference used by some local informants for the area where the archaeological dig is taking place.

Jakobsen does not comment on Scatness, although, as previously indicated, he does include a reference to "de Gerts o' Scatness" (Jakobsen 1993, 43). The fact that he makes no comment on Scatness itself, probably points to his perception of it as a relatively minor topographical name. John Stewart, in his book *Shetland Place-Names* suggests derivation of the specific in Scatness from *skata*, f., 'a skate, which it resembles' (Stewart 1987, 219). It is possible to persuade the eye that it sees many things in the landscape but place-name references to fish more commonly relate to fish caught and consumed in the vicinity. Did the Norse, living at Scatness, consume skate in significant quantities? The middens excavated thus far do not substantiate this supposition and, indeed, the site is multi-period and reflects the habits of pre-Norse occupants as well, none of whom would appear to have eaten skate in any quantity.

At first view, the specific in Scatness might seem to be ON *skattr* 'tribute or tax' but tax was not generally levied on a 'ness' (ON *nes)* or headland, although early forms do not run counter to this suggestion:

Ballantyne & Smith 1999:
1506: '...xx markis, the quhilk I bocht fra hym in Scatness...', 26
1525: '... ane half mark land lyand in Scatnes callit Brendsowss ...', 35
1546: '...the vther thre mark land lyand in Scatnes in the parichin of Sanct Gregorii ...', 55
1578: '... 4 marks land in Skattisnes ...', 238

Register of the Great Seal:
1589-90: '...4 marc. in Skattisnes...', Vol. V, 590
1605: '...the 20 merkland of Scatnes...', Vol. VI, 607
1605: '...toggidder also with the pasturage of 20 wedderis within all the boundis of the Lokitnes of Scatnes...', Vol. VI, 608 (cf. Ballantyne & Smith 1994, below)

Ballantyne & Smith 1994:
1588-9: 'The 60 marks land in Sowndbroche, Skatnes and Ulsness in the parish of Dunrosnes...', 56

> 1589: '...91/2 marks land in Southhous in Scatnes, 12 marks land in Newhous (*rectius* Mewhous) in Scatnes, 16 marks land in Scollandis in Scatnes...', 66
> 1592: '...the 20 marks land, 6 pennies the mark, of Skaitness, in the parish of Dunrosnes...', 85
> 1592: '...together with the pasturage of 'twentie wodderis within all the boundis of the lokitnes of Skatnes...', 86 (cf. RMS, Vol. VI, above)

It is worth considering whether or not *skattr* might be the specific because 'scat' could have been collected from the arable portion of the 'ness' inside the dyke which walled off the outer grazing land stretching out to the Ness of Burgi, which is the name for the outermost point of the peninsula of Scatness. It is possible that the local distinction between Scatness, the inner part, and the Ness of Burgi, the outer part, might reflect a centuries-old distinction between the scatted and unscatted part of the ness. An 1873 Lerwick Sheriff Court document entitled 'Decree Arbitral by the Arbiter in Division of Scatness' would tend to confirm that the perception of division between the 'ness' of Scatness and the 'ness' of Burgi was current among the men engaged in the 1777 division of Scatness (D8/385/3/2), which was eventually finalised in the 1873 document, in which the following summative statement is made:

> 'Further I find that the total extent of the land forming the subject of division as finally settled in the course of the proceedings before me and including the whole arable and grass lands of the town of Scatness, the Ness of Scatness, the ness of Burgie or Bergie, and the separate property amounts to 383 acres, three roods 11 poles' (SC12 53/13).

None of this, however, amounts to solid proof that the specific in the name Scatness derives from ON *skattr*. The likelihood is that the specific in a topographical name will be descriptive of the land and a strong contender must be ON *skati* 'something long and thin, probably protruding' and thus most appropriate in naming a promontory. There is a difficulty in that the word only seems to be evidenced in Old Norse in the meaning 'man', but the examples are all from poetic language (e.g. a poem in *Egils Saga Skalla-Grímssonar*) and it is reasonable to assume that a similar word existed in the everyday language with a more gener-

al meaning, such as that suggested here. Various place names in *Norske Gaardnavne* have been suggested by the editors to contain the common noun *skati* in the sense of 'protruding part' (eg Skattum vol. IV,2, 70; Skaten vol. XI, 46; Skatland vol XI, 101) (Rygh, 1897). The personal byname, *Skati*, is based on the same likeness to something long, or tall, and thin, but it is unlikely that a personal name would be combined with a topographical element such as *nes*.

This single example will suffice to highlight the complications and uncertainties of topographical name study in Shetland, bedevilled always by lack of written records which could prove conclusively that a place name existed at a particular period in history. The most satisfactory aspect of research into local names is, in fact, the contact with present-day local informants who are invariably helpful in interview and who have a real interest in the way in which verbal identity tags, in the form of place names, have been attached to their environment by their predecessors – both immediate and distant. The observed distinction between north and south, which was mentioned in the abstract of this paper, relates to the collection of Shetland place names which have not been recorded previously on maps or in other documentary sources. Local informants from Unst can provide more previously unrecorded place names than their counterparts in the Scatness area, where the building and development of the airport has interfered, to some extent, with retention of local names, because the places to which they refer are now buried underneath the runways or because the outline of the land has been altered by airport construction. Since reading this paper at the conference in Copenhagen, however, I have interviewed an informant from the Scatness area whose knowledge of previously unrecorded local names was most impressive and I find myself in the paradoxically pleasing position of having to qualify my earlier statement. The satisfaction of finding a very knowledgeable informant is one of the great pleasures of place-name research.

It is to be hoped that the planned survey of Shetland place names 'fae da nort tae da suddart' will materialise and afford the opportunity to bridge the geographical gap between north and south, and to record and analyse the many local similarities and differences which undoubtedly exist, before it is too late. As a famous literary Dane once said, albeit in a very different mood and context:

"'Tis a consummation devoutly to be wish'd".

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Norse Settlement in Shetland: the Shetland chapel-sites project

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Introduction

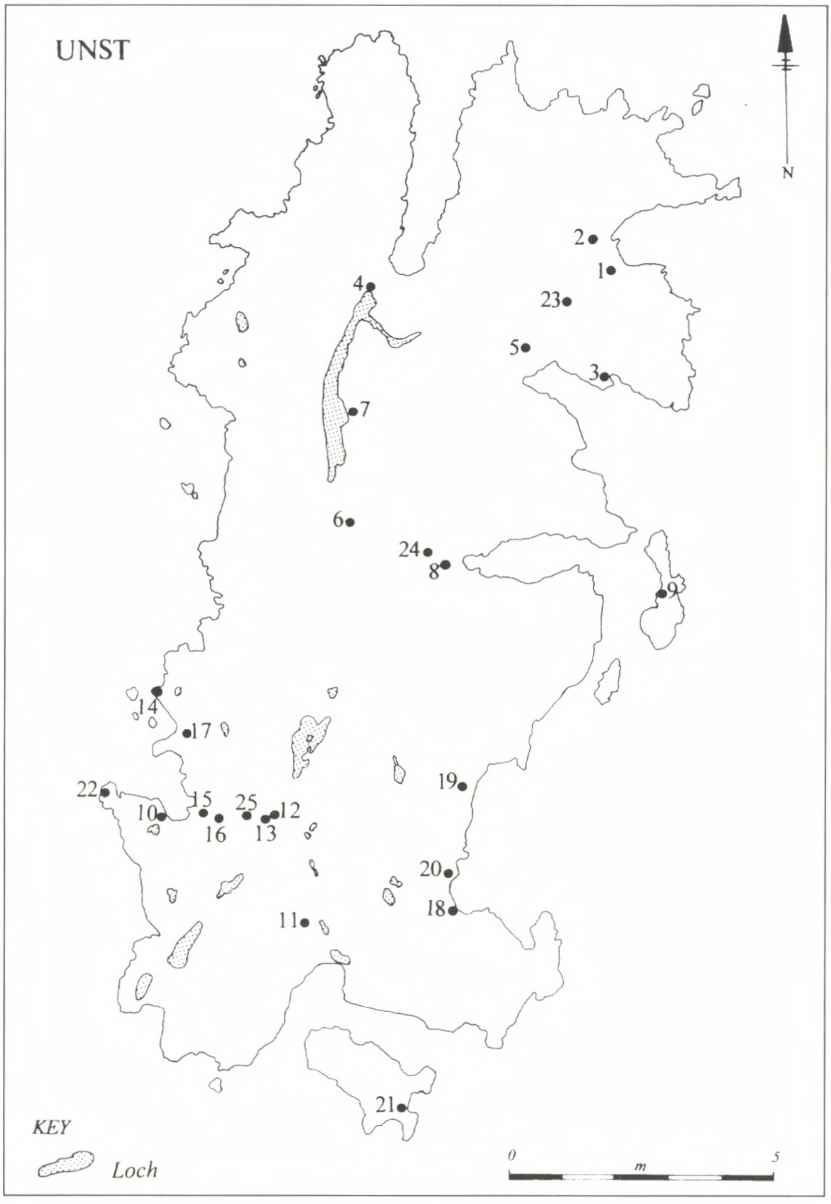
As Dr Doreen Waugh has described in the previous paper, both her work and that to be introduced below are new approaches to aspects of Norse settlement in Shetland, alongside an existing project on Viking settlement-sites in Unst undertaken under the auspices of the University of Copenhagen Institute of Archaeology (UCIA) and also a project of multi-period survey on Unst co-ordinated by the Shetland Amenity Trust (SAT). While looking at a more detailed consideration of one aspect of the Norse settlement, that of the adoption of Christianity, the paper delivered in Copenhagen in September 1999, nevertheless, took a relatively broad view of the issue. The first part considered the more general background of the Norse and pre-Norse (Pictish) church in Shetland (with some comparisons with the situation in Orkney), traditions of the Norse adoption of Christianity in these island-groups, general issues concerning chapel-sites in Orkney and Shetland, and a brief consideration of this in the broader perspective of Christianity within the Norse settlements across the North Atlantic region as a whole. The second part briefly described the inception of a new archaeological project by the Viking and Early Settlement Archaeological Research Project (VESARP: based in the Department of Archaeology, University of Glasgow), specifically to examine the broader issue through the evidence of Shetland Chapel-sites.

The first part was based upon material in complementary papers published elsewhere (Morris 1990; 1991b; 1996a; 1996b; forthcoming), and readers are referred to those papers for the broader issues and more general context for the VESARP project described herein. In sum, in my initial re-assessment of the evidence for Norse Christianity in the 'Northern Isles' of Orkney and Shetland, I hope I have demonstrated

that previous associations of a number of well-known chapel-sites with the so-called 'Celtic Monastery' as promulgated by Dr Ralegh Radford (1962; 1983) are no longer apposite. This group of sites, I believe, can be compared with similar examples in the North Atlantic from Faroe, Iceland and Greenland and the period of Norse control there and, therefore, I have proposed instead re-interpretation of them as Norse Christian chapels. It would be straightforward enough to suggest that these all relate to a post-1000 chronology, to fit in with our written accounts from the sagas etc. of the adoption of Christianity across the region as mentioned above. However, just as we have, in my opinion, been too obsessed with the recorded dates of formal recognition of the Scandinavian organisation of political control in the North Atlantic islands, so too I consider it to be likely that we have been obsessed with the AD 1000 date for the Scandinavian organisation of religious control. I have argued elsewhere for an 'informal' period of settlement in the Northern Isles preceding the formal recognition in the written sources. I would now like to propose that it is the same with the religious organisation. We can, in my opinion, expect Christian chapels well before AD 1000, especially in the context of the Norse equivalents of *eigenkirchen* or private chapels of chieftains, adjacent to their halls. The formal adoption in AD 1000 need, then, be no more than the official *de jure* recognition of a *de facto* situation with existing groups of Christians, rather than the act of a missionary church in a hostile religious environment – and may then be marked by further chapel-building (or re-building).

New work on chapel-sites in Shetland

Such at least is a hypothesis now to explore in practical terms, and this printed version of the paper will concentrate upon the content of the second part of that presentation, as VESARP has begun in the past three years in a modest way to address this question, through a programme initially of non-intrusive fieldwork, to be followed up in due course in the future by excavation at selected sites. Some of the foundations had already been laid, for instance by Dr Ronald Cant's historical studies (1972; 1975; 1984; 1996), both in mapping references and in identifying issues such as the relationship of these chapel-sites to land-units known as 'scattalds' in these islands. Of more direct archaeological relevance are Dr Christopher Lowe's more detailed field-surveys in Unst and Papa Westray (1988; 1991; forthcoming) and Dr Raymond Lamb's



work on some of the stack-sites of the North of Britain, which he has interpreted as Norse monasteries (1973; 1976). However, in overall terms and in some areas of Northern Britain, practically nothing has been undertaken on chapel-sites and buildings since the pioneering work of Sir

← **Caption for Unst map**

Sites identified by Lowe

1. St John's Church, Norwick	HP 6516 1411
2. Bartle's Kirk, Norwick	HP 6488 1463
3. Crosskirk, Clibberswick	HP 6503 12311
4. The Kirk, Burrafirth	HP 6078 1391
5. St Mary's Church, Bothen	HP 6357 1270
6. St John's Church, Baliasta	HP 6026 0959
7. Kirkamool, Cliff	approx. HP 603 115
8. Kirkhoull, Baltasound	HP 6197 0867
9. St Sunniva's Chapel, Balta	HP 6595 0809
10. St Olaf's Church, Lundawick	HP 5668 0412
11. Gletna Kirk, Uyeasound	HP 5922 0208
12. Kirk, Gunnister	HP 5873 0407
13. Kirkhoull, Gunnister	HP 5858 0400
14. Kirkaby, Westing	HP 5664 0640
15. Kirkamires, Underhoull	HP 5747 0415
16. Kirk, Underhoull	HP 5775 0406
17. Kirk Knowe, Westing	HP 5720 0567
18. Kirk of Millyskara, Sandwick	approx. HP 631 022
19. St John's Chapel, Colvadale	HP 6220 2453
20. St Mary's Chapel, Framgord	HP 6191 0293
21. Uyea Chapel	HU 6082 9854

Additional sites

- 22. Blue Mull (HP 5587 0425) and 23. Papil (HP 6454 1289): other sites identified as having potentially ecclesiastical associations.
- 24. Kirkton (HP 6126 0900) and 25. Crosbister (HP 5815 0390): potentially promising place-names on the OS map.

Henry Dryden in the 1860's and 1870's (1870) and that of other contributors to the overall survey of ecclesiastical sites in the 1890's by MacGibbon and Ross (1897).

This new programme has been concerned with desk-based assessments, walk-over surveys and more detailed surveys of sites in the three northern Shetlandic islands of Unst, Fetlar and Yell. In addition, a small-scale excavation project has taken place this summer at St Ninian's Isle in the south of Shetland, previously excavated in the 1950's and the site of the well-known Pictish silver treasure.

1. Unst Chapel-Sites Survey 1997

The survey of the northernmost Shetlandic island by the writer and Kevin Brady in 1997 was limited in its scope to an 'audit' of known chapel-sites: their state of preservation and their potential for future work. In particular, attention was paid to any changes since the last survey undertaken in 1982 by Christopher Lowe for part of the field-work of his PhD thesis (1988; 1991). Of the 21 sites Dr Lowe surveyed, 19 were re-assessed and four additional sites were examined; these were all described in the 'structures report' produced in 1998 (Morris & Brady 1998). Some additional information not recorded by Lowe was offered in the report as well as some minor revision of measurements, orientations and visible features. A comprehensive photographic record was taken of each site and this was listed in an appendix to the report. [However, this report was not a re-working of that earlier thesis, where more detailed information should for the moment be sought]. In addition, there was also an initial appraisal of the feasibility of further work that could be undertaken at a number of these sites.

2. Towards a project design

The information accumulated at the chapel-sites during the survey season on Unst in 1997 clearly showed the potential value of further, more intense commitment to these ecclesiastical monuments. It is our strong belief that these sites can yield still greater results when examined, at a number of different levels, in a controlled and well-defined, project over a number of years.

Five levels of work have been defined, ranging from further 'desk-top' research, through various stages of survey, clearance and small-scale trial investigation, up to full-blown, large-scale intervention. For the immediate future, this project could move comfortably and in well-planned stages from the general assessment of data about chapel-sites (Phase I), through an intermediate period of questioning of these data at targeted sites (Phase II), to the specifics of large-scale, detailed examination at individual sites (Phase III). (See Table)

Thus, in the following years, it was intended that more detailed survey and other work would be undertaken across the range of the twenty-five sites in Unst, including geophysical approaches and comprehen-

Table

Unst Chapel-Sites Survey Project Design

Phases of work that should be undertaken at the sites surveyed (showing the feasibility of such work and the potential of those sites).

Unst Chapel-Site	Desk Top	*PHASE I* Survey	Clear-ance	*PHASE II* Small-scale Inter-vention	*PHASE III* Large-scale Inter-vention	Archae-ological	Feasi-bility
St. John's Norwick		√		√		High	Good
Bartle's Kirk, Norwick			√			Low	Good
Crosskirk, Cibberswick	√	√	√	√	√	Very High	Excellent
The Kirk, Burrafirth	√			√		Low	Good
St. Mary's, Bothen		√		?√		?	Good
St. John's, Baliasta		√				High	Poor
Kirkamool, Cliff		√				Low	Poor
Kirkhoull, Baltasound		√	√	?√		Low	Good
St. Sunniva's, Balta		?√		√		High	Poor
St. Olaf's, Lundawick		√	√	√		High	Good
Gletna Kirk, Uyeasound		√	√	√	?√	?	Excellent
Kirk, Gunnister	√					Low	Poor
Kirkhoull, Gunnister				√		Low	Good
Kirkaby, Westing		√	√	√	√	Very High	Excellent
Kirkamires, Underhoull		√		√		Low	Good
Kirk, Underhoull	√	√		√		?	Good
Kirk Knowe, Westing		√		?√		?	Good
Kirk of Millyskara, Sandwick		√	√			?	Good
St. John's, Colvadale		√	√	√	?√	High	Poor
St. Mary's, Framgord		√	√	√	?√	High	Good
Uyea Chapel,		√	?	?	?	?	?
Blue Mull		√	√	√	?√	High	Poor
Papil	√					Low	Poor
Kirkton, Baltasound	√		√			Low	Poor
Crosbister, Underhoull	√					Low	Poor

sive photography, and structural survey where appropriate, supplementing Lowe's work from 1982. In addition, if funds were forthcoming, perhaps six or so sites would be selected for excavational intervention on a small-scale, trial basis during the first two excavation seasons, aimed primarily at characterisation and the addressing of particular structural and academic issues. This limited, but focused, fieldwork programme would form Phase II of the chapel-site project, with the intention that in Phase III probably a couple of sites would form the focus of detailed and comprehensive excavation over a further two or three seasons.

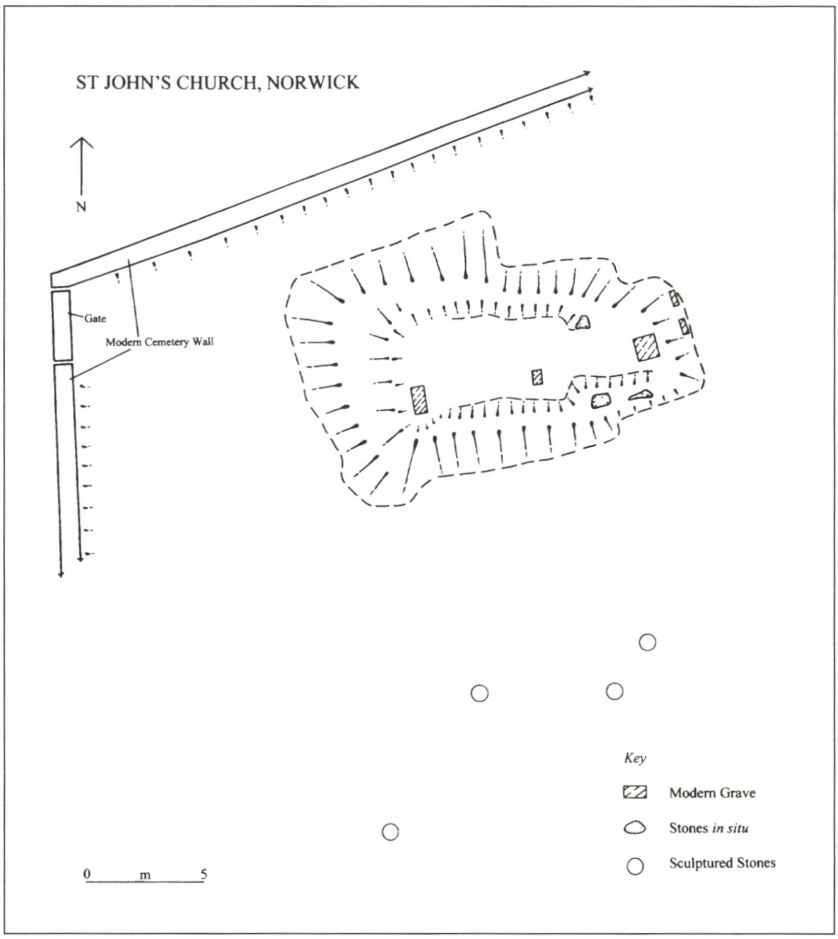
3. Unst Chapel-Sites Survey 1998

October and November 1998 saw the first phase of the recommendations of the 1997 Survey (Morris and Brady 1998, 67) initiated, when twelve of the sites were re-visited by Kevin Brady and Paul Johnson. Further, more detailed, assessment and survey on five sites were undertaken – work described in a subsequent 'structures report' (Brady & Johnson 1998).

Of the twenty-five sites visited in 1997, five were plane-table surveyed to produce detailed, scaled ground-plans during this latest phase of work. These five sites present an interesting cross-section of the problems VESARP are faced with when attempting to frame a more interventionist research project to answer the questions which arise concerning these sites.

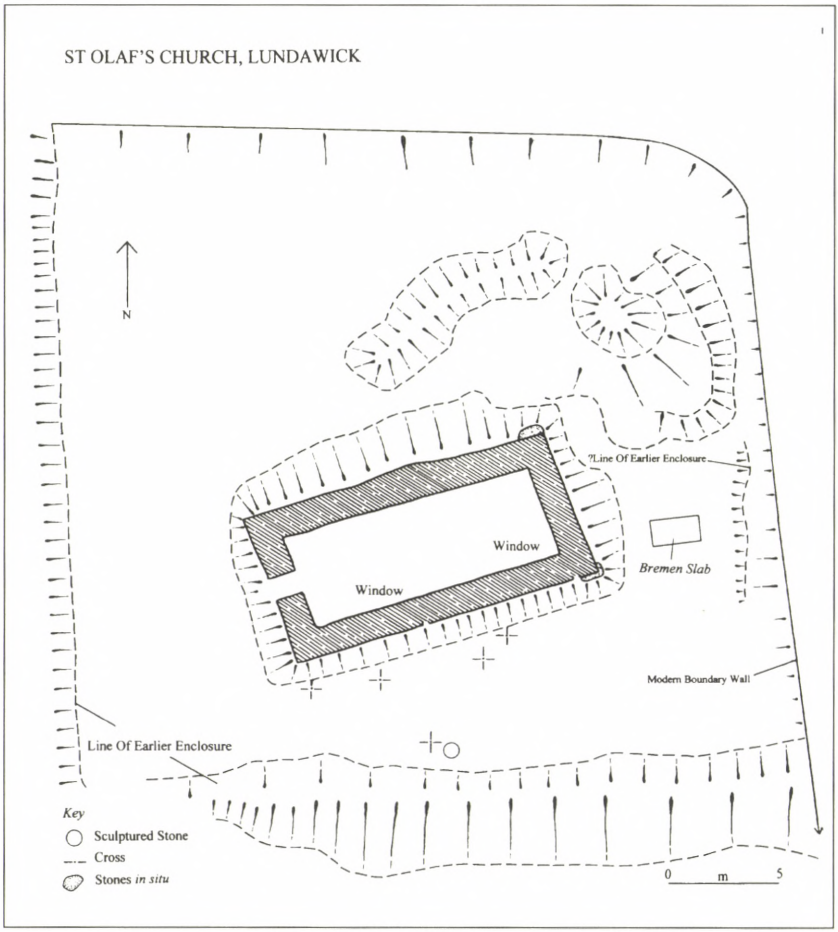
- **St John's at Norwick** (HP 6516 1411)
  This remains as little more than grassed mounds with the odd protruding stone. However, the chancel and nave are still clearly discernible as are parts of a surrounding bank which pre-dates that of the modern graveyard enclosure. The graveyard itself has seven pre-modern gravestones *in situ*, including two carved stone crosses. Large-scale, intrusive examination of the remains is, however, out of the question as the site is in continued use for burial. Any further work would have to concentrate on survey.

- **St Olaf's, Lundawick** (HP 5668 0412)
  The picture at St Olaf's, Lundawick is almost identical to that at Norwick. The dedication to the Norwegian saint is important and there is ample evidence within the graveyard to suggest features ear-



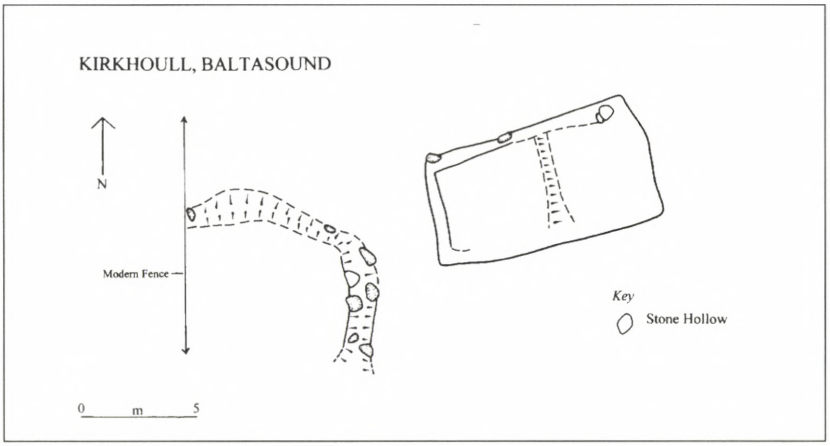
lier than the crumbling kirk which dominates the site now. Again, large-scale excavation is ruled out as the graveyard is still in use, but small-scale issues of structural sequence, for instance, might be addressed.

- **Kirkhoull, Baltasound** (HP 6197 0867)
  Kirkhoull in Baltasound presents an altogether different picture. The ephemeral structural remains associated with the place-name are clearly those of an agricultural outhouse from the Post-medieval period. Indeed the place-name remains the only evidence to date for there being any ecclesiastical connection with this site. On this basis



little further work can be planned within the parameters of this project, and questions arise about the nature of the relationship of sites and names.

- **Gletna Kirk, Uyeasound** (HP 5922 0208)
  Gletna Kirk at Uyeasound is a complex site including a bi-compartmental structure flanked by two enclosures. There is a third, large enclosure located some distance away to the north-west. Although orientated east-west, on surface examination this would not appear to be an ecclesiastical structure but the place-name remains obviously evocative. Unlike the sites listed above, this site has no logistical hin-

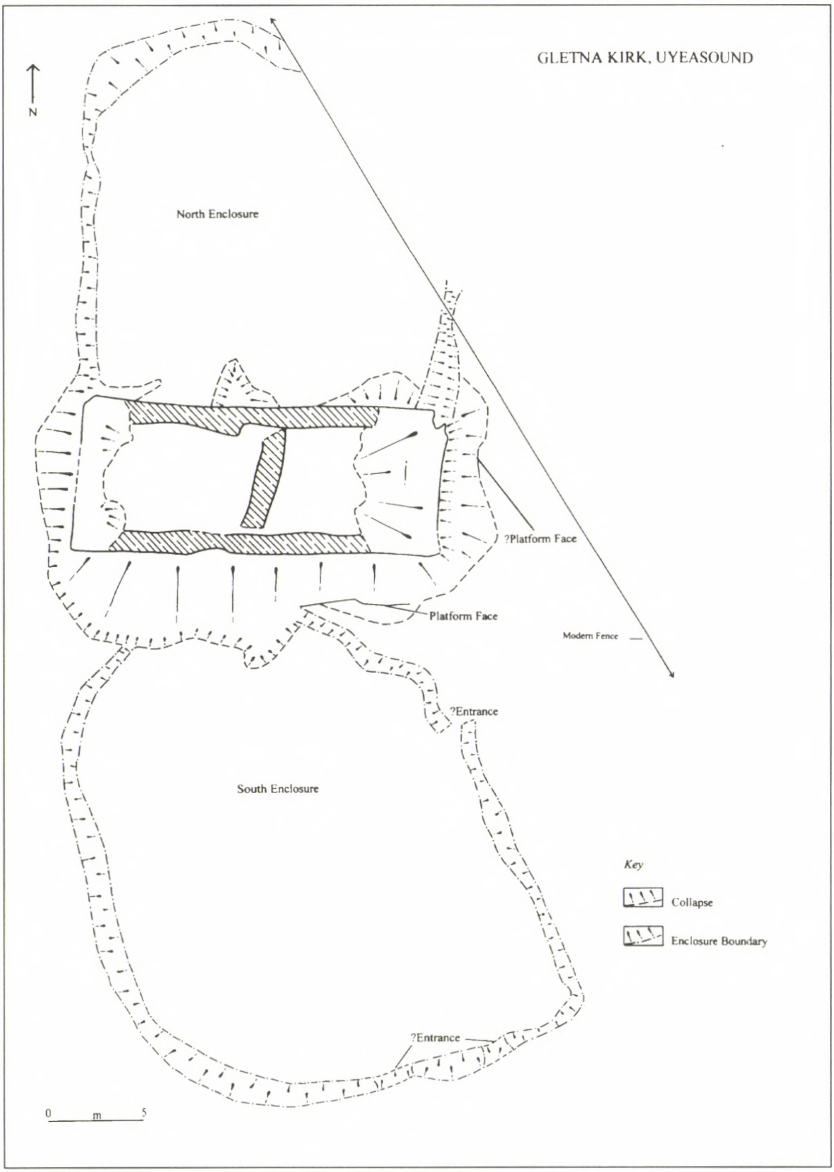


drances to being more exhaustively examined. Targetted excavation will hopefully solve the enigma presented by the apparent incompatibility of the place-name and the structural remains.

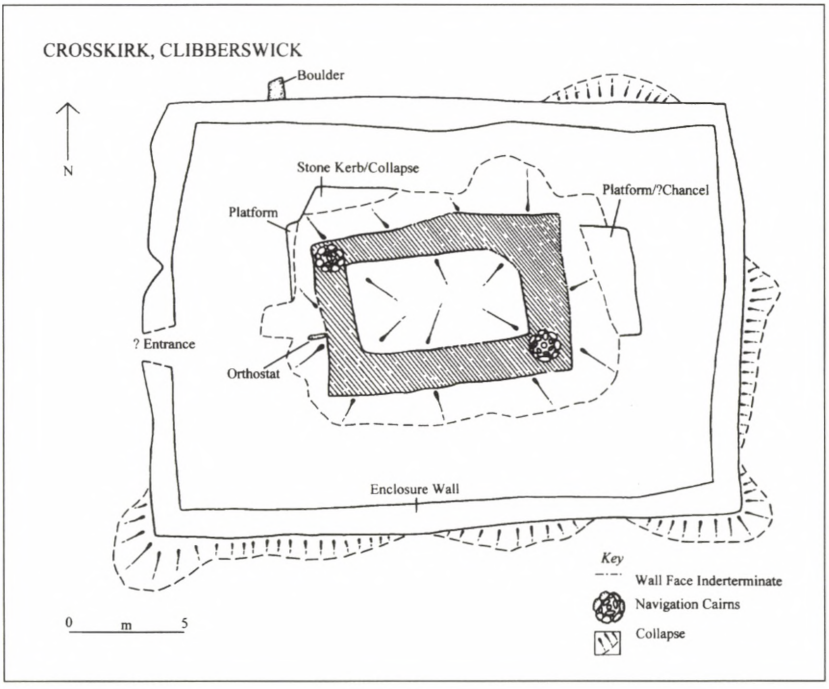
- **Crosskirk, Clibberswick** (HP 6503 1231)
  Crosskirk at Clibberswick is represented by a massive jumble of collapsed masonry within an enclosure. The site is aligned east-west and seems to be unicameral. There is little doubt from the structural remains that this once represented a church within an enclosing yard. There are no modern burials associated with this site and it is envisaged that this will be a focus of the excavation phase in this project.

In addition to these five chapel-sites, a further seven sites were visited during this season of work with a view to assessing their potential for geophysical prospection. These sites were:

- St Mary's Church, Bothen (HP 6357 1270)
- St John's Church, Baliasta (HP 6026 0959)
- Kirkaby, Westing (HP 5664 0640)
- Kirkamires, Underhoull (HP 5747 0415)
- Kirk, Underhoull (HP 5775 0406)
- Kirk Knowe, Westing (HP 5720 0567)
- St Mary's Chapel, Framgord (HP 6191 0293)



These sites again represent a mix of upstanding Post-medieval churches (e.g. Baliasta), the footings of seemingly Medieval chapels (e.g. Kirkaby) and place-names with no apparent ecclesiastical remains (e.g. Kirkamires). Five of these sites were considered to merit geophysical



surveying, and a third field campaign on the chapel-sites of Unst took place in late summer 1999 as a continuation of the Phase I non-intrusive survey at these sites, focusing upon geophysical survey directed by Paul Johnson and further topographic survey, co-ordinated by Kevin Brady (Brady & Johnson 2000).

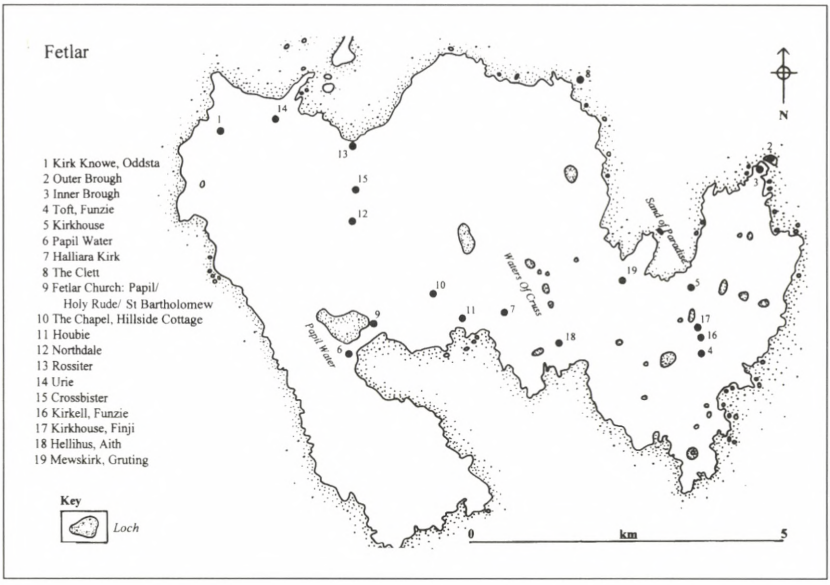
4. Fetlar and Yell

The early phases of the work on Unst in 1997 and 1998 quickly led to the realisation that the island should not be seen in isolation, but that there was a need to place the Unst material in a wider context. At the least, it was felt that the examination of potential chapel-sites should be broadened to encompass all three main islands at the north of Shetland: Unst, Fetlar and Yell. The initial extension of work from Unst to the neighbouring islands of Fetlar and Yell began in 1998, but, before even venturing out onto the ground, here we are having to undertake very basic documentary research to identify potential sites.

To this end, in the first instance, a desk-based study was undertaken by Kevin Brady in 1998 of the chapel-sites of Fetlar (Brady 1998). This was conducted in Edinburgh and, chiefly, in Lerwick: at the National Monuments Record for Scotland (NMRS); the Royal Commission for the Ancient and Historical Monuments of Scotland (RCAHMS); the National Library of Scotland (NLS); the Shetland Archives; the Shetland Room of the Library in Lerwick; the Shetland Museum; and through the Sites and Monuments Record (SMR) of the Shetland Archaeologist.

A total of nineteen potential sites for Fetlar,with grid-references, were gleaned from the above sources which have some evidence to suggest a potential ecclesiastical connection. The quality of the evidence varies greatly. Some of the sites are identified by place-name evidence alone, such as Kirkhouse, Finji (HU 662 904) or Crossbister (HU 607 923). Ten or eleven were noted from the 17th century onwards as the sites of pre-Reformation (or "Roman Catholic") chapels, only some of which now appear to have definite traces remaining (e.g. Kirkhouse, Strand HU 6591 9111 or Halliara Kirk HU 6302 9080). Other sites, such as Kirk Knowe (HU 5838 9381) or Papil Water (HU 6043 9013) have both suggestive place-names and traditions of earlier remains, even though more recent visitors have recorded that they were unable to locate any structural evidence to associate with these names. Other sites are Post-medieval with no reliable tradition of an earlier foundation e.g. Fetlar Church (HU 6075 9053). Some sites are presumed Norse monastic foundations e.g. the Inner (HU 670 930) and Outer (HU 671 931) Broughs at Strandibrough.

The next phase of work by Morris and Brady on these sites in Fetlar, walk-over survey fieldwork, has only just taken place in September 1999. This has involved a basic field assessment of the sites identified from the desk-top survey – indeed in many cases here identification on the ground has been the main problem! Unlike Unst, it seems that perhaps either agricultural practices may have removed the evidence of former chapels in several cases, or even that tradition of the association of scattalds with chapels has given rise to the tradition of the existence of remains. The results of this fieldwork will then determine the future direction of the chapel-sites project in this island. As with Unst, the report produced (Brady & Morris 2000) will present recommendations for further optical and geophysical survey where sites are identifiable on the ground, as well as also evaluating the potential for excavation at promising sites.



So far, for Yell, Kevin Brady has identified, from a further desk-based survey of similar sources earlier this year (Brady 2000), the preliminary number of over 30 sites to be investigated, of which 24 are supposed Medieval chapel and burial-grounds and three are alleged Norse monasteries. As with Fetlar, the first stage of walk-over survey by Morris and Brady in late September 1999 indicated that some will remain simply as place-names of adjacent farms, others will now no longer be recognisable (even though the location is known), and in others remains which can be investigated further will be encountered. it is intended to continue this fieldwork in the spring/summer of 2000.

5. Monuments

Originally, these chapels and associated churchyards would have had associated church furniture, fittings and burial monuments. An interesting and distinctive group of grave-markers, apparently associated with the Norse church in these islands, includes those from Norwick, Framgord and Lundawick on Unst (Morris & Brady 1998) and Kirkhouse on Yell. These appear to have a connection with similar monuments from SW Norway. Dr Ian Fisher of the RCAHMS has kindly agreed to assist VESARP in their work on this aspect of the surveys.

However, at a more general level, as Dr Robert Stevenson emphasised (1981), we do not have to see this sculpture as necessarily either pre-Viking (i.e. notionally pre-800 AD), or alternatively post-Olaf Tryggvason (i.e. notionally after AD 1000). He has suggested that we may perhaps now begin to see a Viking Age context in the 9th and 10th centuries for monuments such as the group from Papil and Bressay (Close-Brooks & Stevenson 1982, 34-5), Stevenson 1981, passim). This, in its turn, *may* lead to a re-assessment of other monuments.

6. Folk-traditions and place-names

It has to be added that in areas such as these islands, there are very strong folk-traditions, which are of considerable assistance. On Unst, for instance, the work of Jessie Saxby from the early 20th century was the primary source for identifying traditional sites of old chapels (Saxby 1905), and – as reported by Dr Margaret MacKay (1987) – even in the modern day there is an interesting relationship between the scattalds in Fetlar and social obligations in relation to burials.

As is clear from Dr Waugh's paper on the place-name heritage of these areas (see also Hansen & Waugh 1998), some names relate directly to chapel-sites. In addition to the obvious *kirkja*-names (Fellows-Jensen 1987, 299-300), she has identified in the documents a 'Bonüs' on Unst (as an alternative name for Kirk Knowe: no 17 above), presumably a 'prayer-house' or *Boen-hus* which is known elsewhere in the North Atlantic (MacGregor 1984, 9-10). Such evidence can give pointers to the earlier existence of an archaeological site, although the relationship need not necessarily have been a straightforward one.

Further, the known presence of a 'Papil' name on each of the three northerly Shetlandic islands is itself of considerable interest, as a linguistic relic of the church structure which the Scandinavians encountered on their arrival here (Lamb 1995, 15).

7. St Ninian's Isle

Earlier in 1999, VESARP (under Rachel Harry) undertook survey and a small evaluation re-excavation of the chapel-site at St Ninian's Isle. This was to assess both the state of survival of archaeological deposits here, and the extent of the archaeological site in spatial terms, as well as

providing a proposed strategy for managing the site and presenting it better to the many visitors who come to it (Harry 2000). These visitors come because of the spectacular Pictish silver treasure (O'Dell & Cain 1960; MacRoberts 1965; Wilson 1971; Wilson 1973) found there in 1958 (even though this is now in Edinburgh, rather than Shetland!). I hope that perhaps in the future, as well as defining and exploring the site as a whole, there will be an opportunity to examine any surviving evidence for the earlier church (and other features) below the standing building (Thomas 1971, 14-15; Small 1973, 5-7). Also, if we accept the possibility of an earlier Norse (rather than pre-Norse) chapel at St Ninian's Isle below the existing building (Morris 1990, 10-11), then it is not impossible even for the remains of a remarkable stone shrine to be Norse in date, if Pictish in concept: Stevenson even suggested it was "no earlier than mid-ninth century, rather than before 800" (Thomas 1973, 11-13; Thomas 1974, 12-16; Thomas 1974, 12-16; Thomas 1983; Stevenson 1981, 291).

Conclusion: the wider perspective

From a purely historical perspective, it will be important to attempt to relate the chapel-sites to the changing structures of church organisation: from the pre-Norse missionary and/or monastic situation (perhaps reflected in the Papil type of place-name: see Lamb 1995), through what may well be a private farm-church structure of the later Viking and Late Norse periods (perhaps reflected in the numerous small chapel-foundations and related to the land-units of the *scattalds*: see Smith 1984), through to the adoption of a full-blown parochial system, which resulted in the 12th and 13th centuries in the demise of many such private chapels and the abandonment of many in favour of concentration upon a few 'head-churches' as centres of the new parochial organisation (see Cant 1975; 1984; 1996). Inevitably, a different structure of landscape organisation developed (Smith 1984), some detailed aspects of which have been examined by Dr. William Thomson, for instance in relation to the island of Fetlar and the area of Norwick in Unst (Thomson 1970; 1998). Thus, this work marks the inception of a new stage in research conducted by VESARP on early chapel-sites in areas associated with the Scandinavian settlement in northern and western Britain.

Of course, this work needs to be put in a broader context, and therefore, concurrently with the project on the northern three islands of Shet-

land, there will be plans developed for a more comprehensive chapel-site project both within Shetland and more generally in the North of Britain. Providing funding can be secured, we intend to extend our survey-project to the mainland of Scotland (in Caithness and Sutherland), as well as to the *Suðreyjar* or Hebrides.

But it also needs to be seen in the broader North Atlantic context, and it will be vital to link this up with similar evidence in other areas of the North Atlantic (i.e. Faroe, Iceland and Greenland) and to exchange information with, if not collaborate with, colleagues in these other islands. This could then become a broader international, inter-disciplinary study of the North Atlantic region – a project hopefully both in the spirit of, and under the aegis of, the North Atlantic Biocultural Organisation (NABO: see McGovern 1994, 1996, 1997).

From an archaeological perspective, then, the only logical way forward for understanding the remarkable data-set for Norse chapels would seem to be both holistically within the islands of Unst, Fetlar and Yell, and multi-dimensionally more generally within North Britain and the North Atlantic region.

Notes

The terms 'Viking' and 'Late Norse' are used in the sense discussed and defined by Dr. Gerald F. Bigelow (1985, 104-5).

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Land management and rural development

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Introduction

Land management and rural development are intimately linked. Despite having very different proportions of land of good quality, Denmark and Scotland have developed their agricultural and forestry industries in similar ways though perhaps at different rates and intensities. In this paper Scotland has been used as the major source of information to demonstrate recent trends and to explore potential ways in which land use and management are likely to change in response to European and national policies for agriculture, forestry and the environment.

The land resource

The land in Scotland as we know it today is the result of processes that have been in progress, as they have in Denmark, for many millions of years. Scotland contains an unrivalled geological diversity, with rocks from periods of geological time represented in a relatively small area. The mountainous nature of Scotland contrasts markedly with the relatively low-lying character of much of Denmark. As in Denmark, however, the most significant and recent geological and climatic developments have taken place during and since the last Ice Age resulting from the southerly shifts in the Polar Front.

The geology, the climate and the retreat of the glaciers of the last Ice Age, together, have developed soils of great diversity in Scotland. Their development was initiated between 15000 and 10000 years ago at the end of the Ice Age. A largely barren land surface was gradually transformed as climatic conditions improved. The soils of Scotland

can be broadly divided into four main groups: peats, gleys, podzols and brown forest soils. These broad categories are further subdivided which, in combination with measures of climate, and a knowledge of the growth potential of a wide range of plants, provide the basis of the Land Classification for Agriculture (LCA) [MLURI 1991] and the Land Classification for Forestry, (LCF) [MLURI 1998] maps for Scotland. These classifications form the basis of our understanding of the potential of Scotland's land for agricultural crops and a wide range of forest trees and woodland. Only about 15% of the land is suitable for intensive arable agriculture compared to more than 50% in Denmark.

The land cover of Scotland is the result of the natural evolution of vegetation succession in response to soil development and climate change but in the last 2,500 years, land cover has been affected significantly by the activities of man. The land cover in Scotland as recorded in 1988 [MLURI 1993], is the result of centuries of natural and human induced processes but an analysis of the changes in land cover and land use that have taken place in recent times, provides a context in which future changes in land management in relation to rural development can be considered.

Analysis of change

Agriculture

For the last century at least, rural land use in the United Kingdom and in much of Europe has been dominated by agriculture. Historically, this has had much to do with the conviction that primary food production was essential for food security while also being, for much of the time, a worthwhile economic activity. Since the Second World War, and particularly since the introduction of the Common Agricultural Policy (CAP), the agricultural industry has received significant financial incentives to continue with this activity. The fact that this has now led to an oversupply of many primary food products, at a huge cost to the European taxpayer has, among other factors, brought current agricultural land use under close scrutiny. Because it is such a dominant land use, any change in agriculture is likely to have a significant impact on other land uses, not least forestry, and consequently on the economic, social and environmental fabric of rural areas.

AGRICULTURAL STRUCTURES – DENMARK & SCOTLAND							
	Land (m ha)	GDP (£b)	Holdings				Nos. Employed
			Total Nos	Av Size (ha)	Owned (%)	Leased (%)	
Denmark	3,000	5.9	61,900	43	91	<5	106,000
Scotland	5,500	1.0	33,000	157	69	31	25,000

The basic structure of the agricultural industry in Denmark and Scotland is given in Table 1. The main differences between the two countries reflect the differences in the quality of land available for agriculture and the number of intensive pig and dairy units which produces a six fold greater GDP from agriculture in Denmark as compared to Scotland. There are almost twice the number of agricultural holdings in Denmark but they are a third of the size of those in Scotland. Most Danish farms are free-hold and family-run farms in individual ownership which in part explains why there are a third more people directly engaged in agriculture as compared to Scotland. However, irrespective of these differences, because agriculture is such a dominant land use in both our countries, any change in agriculture is likely to have a significant impact on the economic, social and environmental fabric of rural areas. It is important, therefore, to examine a little more closely some of the more recent changes in land use that have occurred as a result of the European Common Agricultural Policy and agriculture's technical development and economic performance.

Since 1944 the area of tillage in Scotland has declined and the proportion of different crops grown has changed as new crops and crop varieties have been introduced and bred, and as consumer demand has changed. Whereas in 1944, there was a need to produce as much of our primary food supply as possible, now, in a situation of surplus, a considerable area is set-aside. Reductions in arable land have also occurred in Denmark, but as in Scotland the level of physical outputs have been largely maintained or increased indicating that both countries have successfully improved productivity over the period. This same level of improved efficiency and intensification is reflected in their pasture based livestock industries. In Scotland livestock numbers have been main-

tained even though a significant amount of land has been lost to forestry and urban infrastructure. Furthermore, as in Denmark, even though overall milk production has declined as the number of dairy cows have been reduced, the milk yield per cow has increased, thus partly compensating for the overall decline and again demonstrating the capacity of agriculture to continue to increase its productivity. In contrast to Scotland, however, Denmark has a large intensive pig industry that contributes significantly to the 65% of agricultural product that it exports. Most of Scotland's agricultural production is consumed within the UK. Whereas Denmark might expect to gain an increasing competitive advantage for its export-oriented products as prices move towards world market prices, Scotland is likely to be more vulnerable, particularly with respect to livestock products that are supported by significant amounts of subsidy.

Over and above the uncertainties of CAP reform and Agenda 2000 and the forthcoming GATT negotiations, agriculture in Scotland is faced currently with particular uncertainties and difficulties: a strong pound, low prices, falling incomes, competition from world markets, the continued controversy of BSE and GMOs, food safety, animal welfare, access to the countryside, and environmental damage, to name but a few. For example, the effect of reduced demand and prices for lamb and beef from livestock farms in the least favoured areas of Scotland, and the increasing proportion of their income that relies on EU and UK subsidies and the extent of their vulnerability is given in Tables 2 and 3. Although there are many factors that are likely to influence the way the agricultural industry will change in the future it is these underlying trends in the economic performance of primary food production that will determine the ultimate outcome.

McInerney (1999), in a recent analysis of the agricultural industry of the UK concluded that changes in the policy structures that have sur-

INDICES OF NET FARM INCOME BY FARM TYPE IN THE LESS FAVOURED AREAS IN SCOTLAND (Expressed in Real Terms)

SCOTLAND	1990/91	1996/97	1997/98	1998/99
SHEEP	96	133	78	43
MIXED CATTLE & SHEEP	92	127	54	9

Average of three years 1989/90 – 1991/92 = 100

TOTAL DIRECT LIVESTOCK SUBSIDIES AS A PERCENTAGE OF NET FARM INCOME IN THE LESS FAVOURED AREAS IN SCOTLAND			
	1996/97	1997/98	1998/99
SHEEP	140.9	215.6	433.9
MIXED CATTLE & SHEEP	175.8	349.8	1819.7

rounded agriculture for a long time are not the primary instruments that will determine future change in agriculture. Rather it is low growth in product demand and downward pressures on prices that will determine change. Such economic forces are 'inexorable and invariant; policy interventions may hasten or delay them along their path, disguise or divert them for a number of years, but in the end they will break out and catch up with where they were always going.' In Scotland we can see this continuing decline in the outputs from both the livestock and crop sectors. Despite there being significant year to year variation, the mean decline in output from crops is estimated to have been £5.5m per annum in real terms since 1973. The decline in livestock output in real terms over the same period has been much more consistent at £26.4m per annum.

As he points out, the crucially important fact for conventional agricultural production, is that the income elasticity of demand for food in the UK is now only about 0.2. Thus, even if consumers' incomes in real terms rise by 1.5% per annum over the next 10 years, as they have in the 90's, expenditure on food will increase by only 3% which converts to a demand for primary products from agriculture of 2.5%. The message for the agricultural sector is that if it does not adapt, its incomes will rise by 2-3% while everyone else's will go up by 15%. In order to retain the existing parity between the incomes of full-time farmers and those in the rest of the economy over the next 10 years, there would need to be an 11% reduction in the number of farmers which, as it turns out, is the same rate of reduction that has been taking place over the last 25 years within the UK. As we have observed there has also been a relentless increase in efficiency within the industry over the same period of around 2% per annum. In Scotland this has led to a reduction in the number employed in agriculture from120,000 in 1944, just prior to the end of the Second World War, to 50,000 in 1969 and about 25,000 in 1994. The trend as in the rest of Europe, including Denmark, indicates that fewer people will be employed directly in agriculture.

Thus, the conclusion for the longer term, irrespective of the policy changes that may arise from CAP reform and Agenda 2000, is that agriculture will be characterised by a low but highly selective growth in demand for its primary produce, downward pressure on prices, and higher resource productivity. There will be, therefore, less of a requirement for resources (land and labour) to sustain food supplies, fewer and bigger farms, and more part-time farming businesses. The consequences for land use change seem inevitable. There will be less land in conventional primary food production and there will be a change in the relative intensity that land is farmed, depending on farm size, farm type and land quality. The prospects of this land reverting to largely unmanaged countryside being converted to farm and amenity woodland and forestry seems high.

Forestry

In post-glacial time, the countryside in Scotland, as in much of Britain, was largely forest. With the arrival of man in neolithic times, the progressive and increasing utilisation of woodland began, initially for fuel, and timber for the construction of shelter, and then for the cultivation of crops and the grazing of livestock. From the sixteenth century until the advent of iron and steel production, there was also a significant demand for timber for shipbuilding. By 1860, however, it was clear that there would be no long-term future demand for oak for boats. It was also the case that the demand for wood for fuel declined rapidly during the latter part of the nineteenth century as alternatives and substitutes were found, (e.g. coal, gas and electricity for domestic heating). By the end of the century, North America and continental Europe had become the main sources of supply of timber for the UK and the forest area in Scotland had declined to 4.5% of the land surface area, as a consequence of inadequate replanting for many years (Mather 1993, Aldous 1997).

While there had been increasing concern expressed about the low levels of tree planting from a strategic point of view, for many years before the First World War, it was not until the crisis of wood shortage experienced during that war that any action was taken to ameliorate the problem. In 1919, a state forestry authority, the Forestry Commission was established. At that time Scotland's forests still represented less than 5% of the land area. Since then the woodland area has expanded steadily and in 1995 covered some 14-15% of the Scottish land area (D Roberts – personal communication). But, of course, the rationale for afforestation has changed in emphasis since the First World War, when

the primary purpose for afforestation was the establishment of a strategic reserve of timber for a period of three years. This was very quickly followed by a requirement that afforestation should also relieve unemployment and forest-worker holdings were created.

After the Second World War it became apparent that the policy objective of maintaining a standing reserve of timber for use during a period of war became irrelevant. The rationale for afforestation came to be based on commercial and social objectives. For example, in Scotland the planting targets during the 1960's were increased in three successive years, with a view to providing employment in the rural disadvantaged areas of the north and west of the country. During this period private land owners were given incentives to plant through planting grants and favourable treatment of investment in forestry under both income- and capital-tax arrangements (Aldous 1997).

In the late 1980's the grants and tax concessions that had encouraged widespread coniferous afforestation were removed. Since then, grant schemes have been introduced that encourage the planting of broadleaved woodlands on better quality land on farms and also are designed to encourage the regeneration of native woodlands. The changes that have taken place in the area and proportion of different forest types in Scotland demonstrate that an increasing proportion of new planting is broadleaved woodland. These changes represent an ascendancy of the conservation and recreational benefits of forestry and a relative decline in the weight placed on traditional or commercial objectives of forestry policy. It acknowledges that there is surplus agricultural production and less of a requirement of land in agriculture, an increasing public concern about landscapes, and a growing recognition of the ecological benefits of native woodlands. The historical changes in forest and woodland cover in Denmark, parallel almost exactly the rationale for change, over a similar period, in Scotland *viz.* a period of multiple-use and over-exploitation, (1600-1850), a period of single-use forestry dominated by the planting of conifers, (1850-1950), and then a return to forestry of multiple-use.

The continued decline in the value of output of agriculture and the requirement for less land for primary food production in combination with current afforestation policies will almost certainly lead to a continuation of the conversion of agricultural land to forest and woodland. But the social dimension of rural land use and management will also influence change. It is generally acknowledged that up to the present time, although rarely stated explicitly, much of the financial support that

has been deployed into agriculture and forestry has been as much to do with retaining a rural population and community infrastructure, as it has had to do with primary food and timber production. Yet as we have seen, while such financial support has perhaps slowed down the reduction of employed workers in agriculture in the UK it has not stopped it. Nor has it stemmed the reduction in aggregate farm incomes (the return to farmers and their spouses for their labour, management skills and own capital invested after providing for depreciation). Accepting that there have been significant year to year fluctuations, aggregate farm incomes have halved in real terms over the last 25 years. Also while the area of forestry has increased significantly, the number employed in forestry has declined. There is therefore an urgent need to develop alternative strategies to retain viable rural communities and infrastructures.

But social objectives extend beyond the goal of maintaining rural employment, communities and infrastructures. During the last three decades societies in Europe have become increasingly concerned about the quality of their rural environments and have developed changed perspectives on how they should be used.

The rural environment

In the UK since the 1970s, there has been increasing concern about the impact of the rural land use industries on the rural environment as well as the impact of anthropogenic pollution arising from urban based industrial and power generating activities. The passing of the Wildlife and Countryside Act in 1983 and the creation of the Scottish Natural Heritage and the Scottish Environmental Protection Agencies in the last decade, as well as the influence of European environmental policies have brought about a greater emphasis on the conservation and protection of the countryside in terms of land management and pollution control. As a consequence of research that has characterised the extent of vulnerability of our land to acid deposition, pollution abatement policies in line with international agreements have been put in place to reduce both sulphur and nitrogen emissions. Similarly, in response to some of the changes in land use features that have occurred since the Second World War as a consequence of intensifying agriculture (e.g. removal of hedgerows, increased stocking densities) and planting large tracts of land with conifers, there are incentives and legislation now being put in place to reverse these trends.

But reversing these trends is no longer just associated with a reaction to the extreme exploitation of land for production purposes. Countryside agencies and non-government voluntary bodies focus increasingly on environmental enhancement and proactive environmental management. This is because there is also a more explicit demand from the public for environmental goods and services associated with recreation, sport, tourism and a general enjoyment of the countryside. In Scotland, tourism has become a significant component of economic activity and rural policy development. Of the 11.2 million trips taken in Scotland in 1996, around 6.4 million trips can be regarded as being associated with rural tourism [Scottish Tourist Board, 1998]. These trips are estimated to represent £692m or 46% of the total expenditure on tourism in Scotland. But much of this tourism depends on ready access to the countryside and the Scottish Executive is under pressure to legislate for that right. Consequently, it is almost certain that land reform legislation and the reform of the CAP will lead to easier access and payments to land managers in some areas for the delivery of environmental goods where now they receive support for food production. These payments will be linked to more positive land management for wildlife and habitats, the planting of trees and hedgerows, and the creation of attractive landscape features and visual amenity. Countryside agencies will enter into partnership and provide financial support to facilitate access. Negative environmental impacts caused by agriculture and forestry will be increasingly tightly controlled. The requirement by the EU that all member states produce river catchment plans will also require that environmental objectives to maintain high levels of water quality are integrated fully into land management objectives.

Implications for rural development

What do these changes in the agriculture and forestry industries, and the requirements for more sensitive environmental management mean for land management and rural development in Scotland?

As far as agriculture in Scotland is concerned, large farms with land of good quality are increasingly likely to become intensive agri-businesses with the aim of achieving greater efficiency in production through optimising inputs and maximising the usable product to meet precise requirements. Medium sized businesses are likely to become increasingly diversified while smaller businesses will operate on a part-time basis. A

new attitude of entrepreneurship will develop, seeking both to add value to primary produce and to exploit environmental goods on the farm. That land will convert to other forms of use is certain if farm and estate businesses are to remain viable (Maxwell 1998). Current proposals towards integrating agriculture within the broader context of rural development and increasing the proportion of structural funds, at the expense of commodity support, should provide opportunities for the development of a range of farm and land based activities. These are likely to include, forestry, industrial biomass crops for local heat and electricity production, nature conservation management, sport and recreation, tourism and accommodation provision. The proposition is that, together with changes resulting from land reform, the increased availability of structural funds will encourage and facilitate down-stream processing, a greater diversity of employment by attracting new business into rural areas, and a greater degree of social and community infrastructural stability.

In relation to recent and current trends it is difficult to come to any other conclusion than that agriculture (defined as a primary food producing land use activity) will become of diminishing importance whilst forestry and woodland establishment will become of increasing importance. The rate of planting will be largely determined by the fortunes of the agricultural industry and the extent to which the state is prepared to support the financial incentives that will be required to encourage private land owners to increase the woodland area on their estates.

New demands from society will require that future rural land use will deliver multiple benefits in greater measure than they have done previously. These benefits will not be delivered by chance nor by default but rather by proactive decisions and management. The benefits can be classified as being economic, (e.g. incomes and contribution to GDP arising from agriculture, forestry and other non-food goods and services), social, (e.g. diversity of employment, provision of community services), and environmental (e.g. maintaining soil and water quality, biodiversity, landscape and other non-market goods and services). They must also be lasting, that is they must be sustainable. The benefits that we identify are very different, however, in their characteristics and it is not clear that in achieving one benefit we can necessarily achieve another. But this is what sustainable development is all about and represents the conceptual framework within which future land use and rural development will take place.

In Denmark the context in which sustainable development will take place will be different because of the greater reliance on agriculture as an export earning industry. The aim will probably be towards greater efficiency with pressure on farm restructuring within the national policy framework determining land ownership. But the issues in balancing economic, social and environmental objectives will be very similar.

Creating sustainable solutions for our land and for rural development

In creating sustainable solutions for our land and for rural development it has to be acknowledged that there are no absolutes in determining sustainability. Depending on their economic, social and environmental status, and the stage that they have reached in their development, what is regarded as being sustainable in one community may be regarded as unacceptable in another. Relatively poor communities will tend to concentrate on finding solutions that maximise economic growth and increase personal incomes. They will exploit natural and other resources and there will often be a trade-off between achieving economic benefits and creating a negative impact on the environment. This is something which both Scotland and Denmark have experienced in varying degrees over many years. On the other hand, rich communities that have disposable income will tend towards maintaining and enhancing the environment and conserving natural resources. In this case the ethical emphasis is less concerned with the interests of the contemporary human being and more to do with the well being of future generations, goals which both Scotland and Denmark have now the opportunity to pursue.

This is no mean challenge. Our national and local governments, their agencies, voluntary bodies, land owners and local communities will all have to find new ways of interacting and finding a common purpose. That there is evidence already in Scotland that partnerships of a variety of kinds are being successfully put in place augurs well for the future. However, success will not only depend on finding a common purpose; it will also depend on the extent and quality of the information and the knowledge that communities have about the resources about which they are concerned. That depends, at least in part, on the output from re-

search undertaken in our universities and research institutes throughout Europe. It will also require the sharing of experiences and a need to collaborate widely. This Symposium demonstrates that small countries like Denmark and Scotland are in a uniquely favourable position to share their experiences and benefit from further analyses of their cultures and recent tends in the development of their respective agricultural, forestry, environmental and rural policies. It is frequently claimed that we are 'knowledge rich' societies: it is important that we share our knowledge and use it to good effect.

Acknowledgements

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Vernacular architecture between environment and culture: the case of the "stock-stove" houses in Shetland

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This conference has a rather diverse content but the various papers are tied together by two sets of interrelationship: The one between Scots and Danes, and the other between environment and culture. In my lecture I intend to deal with both sets of interrelations. With the slight reservation, however, that in the first set Danes are replaced by Norwegians, in so far as I take my topic from Shetland, an area where Scots and Norwegians met and mixed five hundred years ago.

The problem I am going to discuss is the interplay between environment and culture in that particular field of human habitation which is usually called vernacular architecture. *Vernacular architecture* is a concept used by the classically educated British for what we in Denmark designate with a more "home-spun" national term: *folkelig byggeskik.*

Both terms refer to houses that in pre-industrial societies were built and used by common people in the countryside. Such usually rather simple houses were on the one hand seen as the result of an adaptation to a local environment, on the other as representations of a supposed age-old ethnic or national culture. This Romantic idea of building customs as expressions of "folk character" has very often been combined with a conception of a slow and gradual evolution through which the ethnically specific house form was developed from a simple "prototype" to more complex forms.

This is a model of interpretation that may still be come across in popular literature on vernacular architecture but which is of course totally out of step with modern research on houses. Vernacular architecture, however, must still be interpreted as an interplay between environment and culture.

For a modern study, the house must be perceived not only as some-

thing providing shelter from rain or wind and protection against cold or heat, but as an institution with a broad spectrum of economic and social functions, which vary geographically and over time. The dwelling house can be perceived as an important medium by which people communicate their cultural affiliation to others, while at the same time being a day-to-day means of affirming the identity of the inhabitants themselves. Through the arrangement of the dwelling and the rules governing its use, a cultural pattern is passed on to the next generation (Rapoport 1969; Stoklund 1980).

It is, however, important to stress that changes in such a cultural pattern are not the result of a gradual evolution – a development so-to-say in an empty space – but of a historical process in which periods of breaks and rapid change may alternate with more static periods. It is important to keep this in mind, not least when we are dealing with the Atlantic area, whose cultural history has often been conceived as one characterized by a high degree of continuity and a very slow development, resulting in the conservation of a great many archaic cultural features. Although a high degree of continuity *can* be found, especially in the field of technology, the general history of the Atlantic area in the millennium that has now come to an end has been one of radical political, economic and social changes. And if we want to understand the history of vernacular architecture in the Atlantic Islands, it must be considered not only as the result of an adaptation to local ecological conditions but also of cultural responses to shifting economic and social situations (Stoklund 1992).

After these more general remarks, let us turn to the case of the Shetland "stock-stove", which will be the topic of this lecture. As our point of departure, we can choose a Danish-Scottish scholarly encounter more than half a century ago. In 1931 the Danish architect and archaeologist Aage Roussell travelled in the Western and Northern Isles of Scotland in order to look for traces of Scandinavian building traditions (Stummann Hansen 1998). His Scottish colleagues, however, were sceptical with regard to the possibility of his finding what he was looking for, because they had the opinion – and I quote Roussell – that "the Norsemen always used wood as building material, and as every relic in Scotland is of stone and earth, it cannot be of Norse origin". According to Roussell, this idea was a mistake, for "whenever Norsemen penetrated into woodless regions they used the material that was at hand", in this case earth and stone (Roussell 1934, 8)

In accordance with this view, he interpreted the primitive houses

which he came upon during his expedition to the Scottish Isles as prehistoric relics or examples of an unbroken Scandinavian tradition: In the Hebridean so-called "black houses" he saw close relatives to the Iron-Age farms, recently excavated by archaeologists in South-West Norway. And he considered the vernacular architecture of the Northern Isles as a further development of a Scandinavian building tradition, with the Shetland houses as a kind of intermediary stage in the evolution of the more complex Orcadian farmhouses (Roussell 1934).

For half a century Roussell's view was accepted by most historians and archaeologists. Recent archaeological and historical research, however, has modified the picture, and interestingly enough the idea that the Norse immigrants built their houses of wood has experienced a kind of rehabilitation. We can now discern the outlines of a nearly forgotten use of wooden buildings, mainly thanks to an oral tradition about the so-called "stockstoves". The information from oral tradition and from a scanty historical source material was in 1980 collected and published by Brian Smith, the archivist at the Shetland Archives. The following is based on his article (B. Smith 1980) and on material that he has subsequently come across and kindly put at my disposal.

The tradition, which is restricted to the three northernmost islands of Shetland, Unst, Yell and Fetlar, informs us that in former days the wealthier among the farmers lived in wooden houses or rooms which were called "stock-stoves" and were said to have been imported "ready-made" from Norway. Obviously a few remnants of such houses still existed in the 19th century, but none of them has survived until today. Not a piece of their wooden construction has been saved, nor do we have any detailed description of it.

Since we do not have the object itself, then let us choose the concept as a starting point. The compound "stock-stove" consists of two Old Norse words: *stokkr*, a log of wood, and *stofa*, the main room in the dwelling-house. The word is known in Faroese in the form *stokkastova,* and when in the 1890's the philologist Jakob Jakobsen, himself a Faroeman, collected what was left of the old Shetland language, the so-called *Norn,* he was familiar with the word and its literal meaning: a house or room made of logs, a log-timbered house, what the Danes and the Germans call *blokhus /Blockhaus* and the Norwegians *laftehus* (fig. 1).

Jakob Jakobsen, however, also learned from his informants in Unst and Yell that this word could be used in another sense or rather in two other ways. I quote from his Etymological Dictionary: "Also (meaning) a) a house (room) with a timber framework, (and) b) framework of a

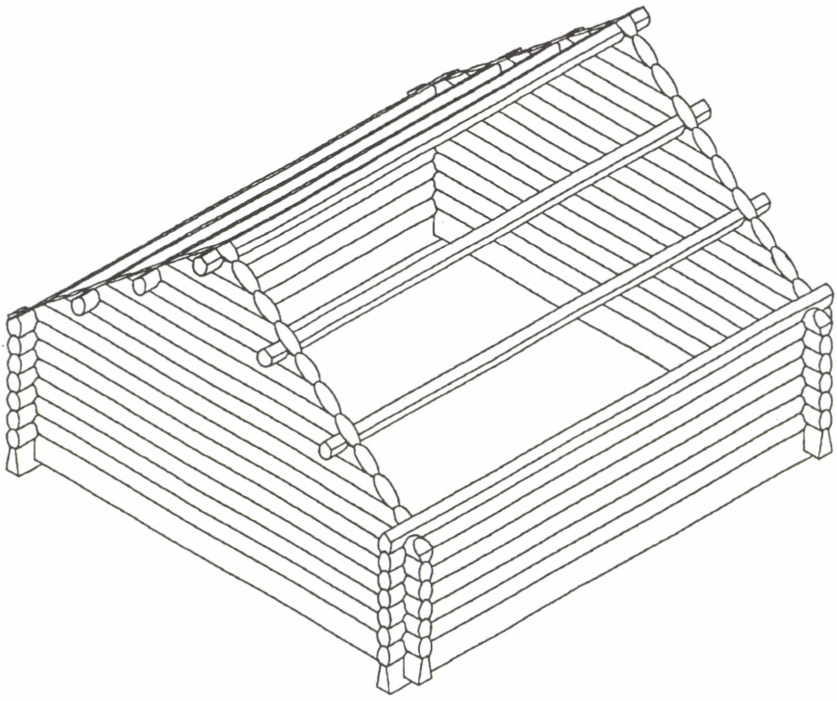

Fig. 1. The construction of a house in log-timbering.

house, esp. logs laid horizontally, forming ground-sill and tie-beam; these logs connect the corner-posts and are provided with grooves into which the wall-boards fit" (Jakobsen 1928-32, 900).

This last piece of information in Jakobsen's dictionary is interesting because it indicates that there have been houses or rooms in Shetland built according to the principle that we usually call *stave construction,* and which in the Faroe Islands was used for house building as late as the second half of the 19th century. To discover what is concealed behind the word "stock-stove", we consequently have to turn our attention to the traditional houses in that neighbouring island group.

In its exterior a Faroese house gives the impression of a building well adapted to the local environment, dominated as it is by stone and turf (fig. 2). But if you enter the house, you are met by a totally different view, one dominated by a lot of unpainted wood (fig. 3). A Faroese house, as a matter of fact, is a wooden construction surrounded by thick protection walls of stone and earth. And the inner wooden house has

Fig. 2. Farmhouse in Skálabotnur in Eysturoy, Faroe Islands. Photo from 1899 by Johs. Klein.

walls consisting of vertical boards, set in grooves in sill and beams, exactly as in the description given by Jakobsen of the Shetland "stock-stove" (fig 4).

Until recently, this wooden interior was considered to be a rather late addition to a house that originally only had naked walls of stone and earth. But that is a typically evolutionistic way of thinking – what we are dealing with is in fact the last surviving representative of the secular counterpart of the famous Norwegian stave churches. It is a method of construction that goes back at least to the Middle Ages.

The main construction in the Faroese house consists of two frames of horizontal beams, an upper and a lower, called respectively *yvir-* and *undirgrind.* These two frames are connected by four solid corner-posts or uprights and maybe with some smaller, secondary posts in between. In some of the oldest houses the corner-posts have cross-formed notches in both ends, and in these notches the sill and head beams are placed (fig. 4). This detail of the construction reappears in some early Norwegian buildings and has an interesting similarity with the corner-timbering of the log-houses. This has made me suggest that the fully developed stave house acquired its characteristic frame con-

Fig. 3. The *roykstova* in the house from Múli, now in the Open Air Museum at Sorgenfri near Copenhagen. Photo by Niels Elswing 1966.

struction under the influence of the log-timbering technique (Stoklund 1996, 1999).

If, with that in mind, we return for a moment to Jakobsen's dictionary, he continues the quoted description of the frame construction in the "stock-stove" with the following addition: "As these logs are partly called "pieces o' stokkstovs", and the framework or the logs partly "part o' a stokkstov", it may be concluded that stokkstov prop. has denoted a room built entirely of such logs". To this my comment would be, that the constructive relationship mentioned above should be sufficient to explain these expressions. This is supported by a verb, to *stokkstov*, recorded by Jakobsen in Unst and Yell, with the meaning: "To build up the framework, to place the (topmost and nethermost) beams into which

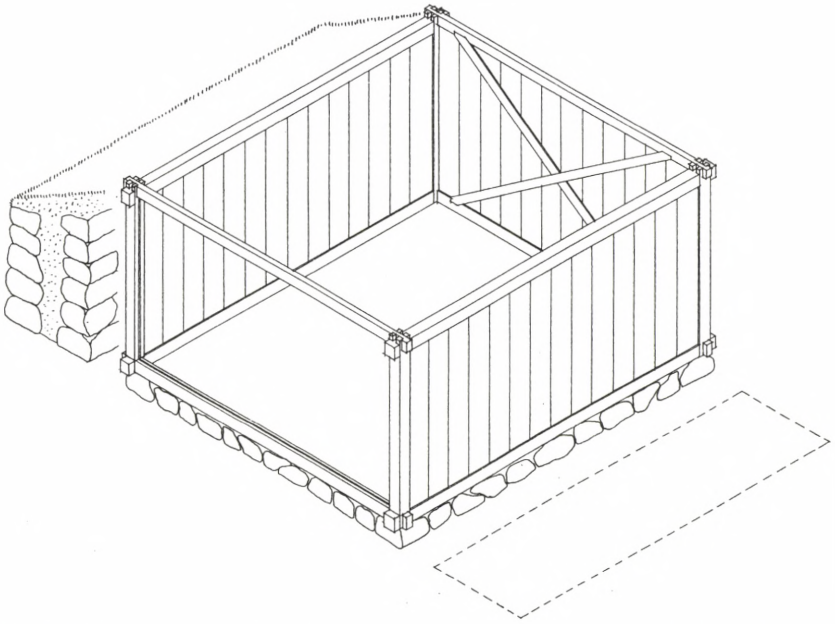

Fig. 4. The frame construction of a Faroese house in stave technique, showing the old form of corner joints.

the wall-boards are to be scarfed" (Jakobsen 1928-32, 900-901). To me, there is no doubt that the transference of the name "stock-stove" from a log-timbered to a stave-constructed building has to do with the old form of frame construction, shown on the drawing.

Before we leave the vernacular architecture of the Faroe Islands, we shall take a quick look at the layout of a typical house, represented by the one that in 1961 was transferred to the Open Air Museum in Copenhagen (fig. 5). There are two main elements, which may be interpreted as representatives of two stages in the cultural history of habitation. To the right is the so-called *roykstova* (literally smoke-room) with outer walls of stone and earth on both sides, and with a louvre in the ridge as the only source of light, originally also serving as an outlet for the smoke from the open fireplace.

While this room in its main features represents a medieval tradition, the so-called *glasstova* is an innovation that was introduced to West Norway after about 1600, reached the Faroes in the middle of the 17th century and was fully integrated there in the following century. The room has got its name from one of its novelties, glass windows in the

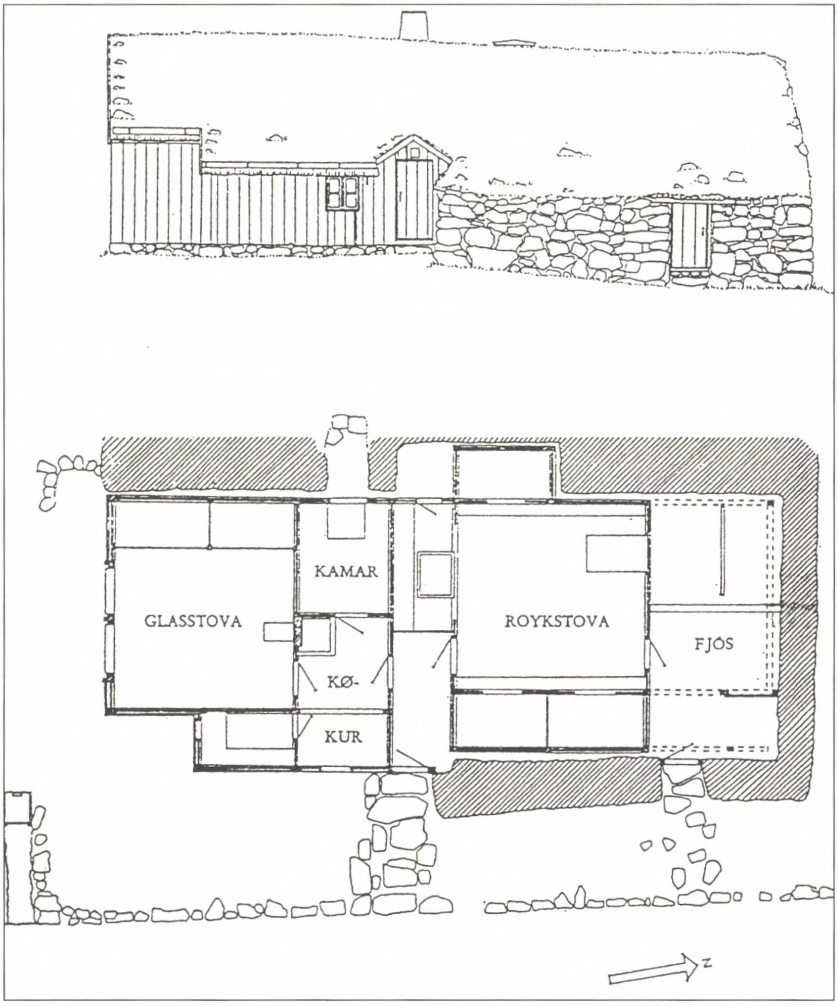

Fig. 5. Plan and elevation of the house from Múli, now in the Open Air Museum at Sorgenfri.

outer walls, where vertical boards have now replaced the old walls of earth and stone. The new windows made it possible to put in a horizontal ceiling, and a third innovation was the iron stove, stoked from a fireplace in a small kitchen. The *glasstova* was the Faroese best-room, while the *roykstova* was workplace as well as main dwelling-room. It got its name *roykstova,* when the *glasstova* was introduced. Before that it was named *sétstova* or just stova (Stoklund 1996).

In the discussion above we have tried to illuminate the constructive details that are hiding behind the first part of the compound "stock-stove". We will now turn to the second part, the concept of stova that we have so far met in the Faroe Islands and in Shetland.

The word *stova* denotes a phenomenon that all Danes will be familiar with, for people in Denmark have – like people in other parts of Central and Northern Europe – for centuries been living in a cosy, well heated and well insulated dwelling-room, carrying this name: in Denmark *stue,* in Sweden *stuga,* in Germany *Stube*. This stue or stova, however, never reached the British Isles – except for Shetland, as we have seen.

Most of the scholars who have been occupied by the early history of *Stube/stova* have subscribed to the view that the principal characteristic of this room was the stove, and that in the beginning it must have been a bath-room, used for taking steam baths. This bathroom then later developed into a dwelling-room, heated by a stove. In accordance with this, the etymology of the word was generally derived from words having to do with *tufus*, steam.

Later research, however, has shown that the opinion that the primary meaning of the word should be bathroom does not hold. And a re-examination of its etymology leads to the conclusion that it has nothing to do with the method of heating, but with the construction of the room, the fundamental meaning being something like "a closed room in log-construction" (Hähnel 1975).

As a matter of fact, it is only in the central parts of Europe that the stova is heated by a stove or an oven, while to the east and the north we find alternative ways of heating, with other kinds of fireplaces. In these areas, however, a correlation can be established between the new type of dwelling-room and the log-timbering technique. Walls of well-fitted horizontal logs are the best way to obtain the desired well-insulated dwelling-room. The technique, however, is restricted to geographical areas where the necessary straight logs of pine are available.

These geographical restrictions, however, can be overcome because a log-timbered house is easily dismantled and rebuilt, and therefore fit for exportation in "knocked down" form to outside the pinewood areas. Such log-timbered elements might be fitted into houses with another main construction, be it half-timbered or stone houses. This is a solution that is known in Central Europe as well as in Scandinavia. The same is the case with another alternative solution, used especially where oak instead of pine was available as building material: to transfer

the log-timbered stova into another technique, e.g. with walls made of horizontal or vertical boards (Stoklund 1993).

In the Faroe Islands we meet both solutions. There have been, and still are, a few log-timbered houses, the so-called *stokkastovur.* These houses must have been imported from Norway, but the majority of the traditional Faroese houses are – as we have seen – built in stave technique because this technique does not demand the same high quality of building materials, and such houses were made by local craftsmen. The necessary insulation of a stave-built stova was obtained by the use of substantial protecting walls of stone and turf.

The diffusion of the wooden stova in Norway and further out into the Atlantic settlements must be dated to the 12th and 13th centuries. It is one of the numerous political, social and cultural innovations in this period of "Europeanization", as I have suggested calling it (Stoklund 1992). The concept of the stova may be even older, but from the 13th century there are quite a few log-timbered stovas preserved in Norway (Berg 1989-95; Christensen 1995). From the same century is the oldest Faroese house, the famous *stokkastova* at the former bishop's seat of Kirkjubøur. The earliest traces of a stova in Shetland can be dated to the same period: the ducal *stofa* at Papa Stour, mentioned in the oldest document from Shetland 1299, and recently discovered by Barbara Crawford through her archaeological excavations (Crawford 1996, 1999). There is hardly any doubt that what has been found is the site of a wooden stova; whether it was log-timbered or stave-constructed is, however, an open question.

In the High Middle Ages the wooden stova must have been a precious and prestigeous innovation. It is not a mere coincidence, therefore, that the earliest stovas in the Faroes and in Shetland are found at the highest level of society. In the following centuries the new phenomenon spread gradually to the wealthier group of so-called *udallers* (Norwegian *odelsbønder*), the owner-occupiers among the farmers. This is especially revealed by documents from the 16th and 17th centuries referring to "stoves" or "stoik-stoves", but it is also supported by place-names containing the word stova (Stewart 1987). The source material confirms what the oral tradition revealed about houses fetched from Norway. In 1673 John Smith writes that as late as 1633 the people of Unst were sending a boat to Norway for "timber for houses, ready framed" (Fenton 1978, 111).

During the 17th century, however, the use of these wooden houses seems to have been abandoned. Some of the old buildings, of course,

might survive for another century or two, although with a reduced status. We have an interesting lawsuit from 1776 about a tenant in the township of Copister in South Yell who has demolished an old stock-stove in order to build a new house on the site. This very detailed case, by the way, confirms the interpretation given of the stock-stove as a stave-built construction (cf. Stoklund 1998, 87).

The medieval and early modern use of such wooden stovas in two island groups without the natural resources for the maintenance of a wood-based architecture can be considered an example where culture overcomes the physical restrictions. From the sparce source material, quoted above, one can discern the outlines of a cultural situation in Shetland when it was a must for every reasonably wealthy *udaller* to acquire a wooden room from Norway and to live in such a highly appreciated "stova". The use of the stock-stove in Shetland is clearly associated with the class of *udallers*, and it is characteristic that the 19th-century stock-stove tradition was recorded exactly where the *udallers* kept their position longest: in Unst, Yell and Fetlar. It is interesting, too, to note that the disappearance of the spoken Norn language and the abandonment of the stock-stove are parallel phenomena in time (cf. B. Smith 1996).

In the 17th century the inhabitants of the Faroe Islands – as we have seen – received a new wave of innovations in the field of dwelling: the *glasstova* with its windows in the wall and its iron stove. This wave never reached Shetland; at that time the udallers were "a dying breed", to quote Brian Smith (B. Smith 1980, 24). In the "laird-and-crofter" society that took shape in the following centuries Scottish cultural influence had definitively replaced that from Norway. At the same time the rural houses with their stone walls and minimal use of timber became better adapted to the local environment. It is in this context and against that background we should interpret the vernacular architecture of Shetland which to Aage Roussell represented an unbroken Scandinavian tradition.

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The environmental impact of changing uses on the North Sea littoral of Scotland

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The nature of the North Sea coastline of Scotland

Unlike the high, deeply indented and fragmented western coastline of Scotland with its two lines of large islands, the east or North Sea coast is lower and less intricate. It has almost no islands and is dominated by five major inlets i.e. the Forth, Tay, Inner Moray, Cromarty and Dornoch Firths. These estuaries, especially the Forth and Tay, provide the fundamental sub-divisions of the North Sea littoral. Although there are some excellent examples of bold cliffs normally with associated rock platforms, especially in Caithness, south of Aberdeen and at St Abbs north of Eyemouth, the North Sea coast is mainly low with extensive sand beaches and dunes and occasional shingle features, especially at the mouth of the River Spey. In relation to economic activities and consequent environmental impact the great firths which reach deeply into the interior continue to be the main areas for commerce, trade, industry and urban spread, including major ports. Historically, the North Sea coast provided the location for trade with Europe, including the Baltic countries. The fishing industry of Scotland, including the medium and distance-water trawler fleets, was also concentrated in small and great ports along this coast. Elsewhere developments tend to be scattered, especially at river mouths, and single-function, e.g. power station, oil platform fabrication facility.

Geological structure, inherited landforms and the consequent pattern of Ice Age movements contributed to processes of deposition rather than erosion, the legacies of which are coastal plains, rolling lowlands and fertile soils. There are also raised shorelines, some as high as 30m above sea level, but the most common platform dates from the post-glacial period and is normally less than 5m above sea level. These Ice

Age related sea level changes also include substantially lower sea levels and the indirect effects of base level changes on the hydraulic gradients of all the Scottish rivers, and therefore their associated landforms, have been equally profound, especially in the lower valleys of the firths, where evidence of high sea levels such as broad terraces, ancient flood plains, flat peaty carse lands and raised beaches co-exist with over-deepened but presently infilled river beds from periods when sea levels were lower and hydraulic gradients much steeper. These same valleys also provided the main axes for the vast meltwater discharges during inter-glacial and post-glacial warmer phases; events which deposited an abundance of sand and other materials nearshore, which would form the basis of modern beach and sand dune systems (Stapleton and Pethic, 1996 (a) and (b)). These changes therefore underpin the physical nature of the coastal and nearshore zone, and provide the basis, in a sense the resource base, for subsequent use and exploitation.

Although the North Sea has its own distinctive physical, chemical and biological characteristics, it is essentially a semi-enclosed extension of the Atlantic Ocean. Tapering southwards to the English Channel it receives its tidal flow and water mass exchanges from the Atlantic from the north but such is the size of the basin that it has its own system of two tidal gyres with the node which influences Scotland near the Danish coast. For a variety of physical reasons, especially related to winds, currents, the large influx of fresh water from peripheral drainage catchments and seasonal weather changes, it is also an area of mixing and turbulence which are vital to high levels of biomass production and therefore fish production. In fact the North Sea is one of the most biologically productive areas in the world. Occasional destructive tidal surges propagate southwards into the narrowing funnel of the southern North Sea and augment the damage of these storms but, in general, these are not severely destructive in Scotland. In general the sea bed near Scotland is not deep and is covered by heterogeneous sediments, usually of glacial and fluvio-glacial origin and exposed bedrock is rare except near the coast, especially between the Forth and Berwick. Reflecting the commercial interests of surrounding nations, the scientific knowledge base of the North Sea is very high and of long-standing and there is a vast scientific literature on its physical, chemical and biological characteristics. (e.g. Coastal Directives Project, JNCC, 1996 and 1997)[1] Sea water properties such as temperature and salinity are well-documented and reflect climate, latitude and

the fresh water discharges into the basin from some of the great rivers of North-western Europe.

By most standards it is a severely exploited marine basin. The normal marine activities, i.e. transport, fishing and recreation are augmented by intensive areas of sub-sea extraction of natural gas and crude oil. North Sea oil and gas extraction dominates the economic exploitation of this region but no production platforms are located nearshore and the most productive fields lie towards the middle of the basin. Considerable scientific research continues to be amassed on the impact of the production platforms on the sea bed and adjacent waters. The onshore and nearshore effects are less substantial and much less than predicted during the excitement of the early exploitation phases of the 1970's. Pipelines have come ashore unobtrusively at Nigg, St Fergus and Cruden Bay. There is a small terminal in the Cromarty Firth and a major gas receiving terminal at St Fergus (Ritchie and Kingham 1997), but Grangemouth in the Firth of Forth, which long pre-exists North Sea Oil, remains the main petro-chemical facility. Thus the environmental, physical, ecological and visual impact of North Sea oil and gas on the coastal zone has been small and will reduce through time. Such was, and is, the level of public interest in the oil industry, however, (an interest which is paradoxical, since the impact of "oil" compared with other land uses such as agriculture, pre-existing industry, urban expansion and, for the inshore waters, fishing is extremely small) that unprecedented quantities of environmental baseline and monitoring data were and continue to be gathered. The North Sea is also used for dumping, especially of capital and maintenance dredge spoil (SEPA, 1999), dilution of various types of discharges and, to a very limited extent, sand and gravel extraction – all of which can be regarded as creating environmental pressures both in the sea and along the coast, especially in the Firth of Forth.

The use of the coastline

Although the coastline of Britain is often regarded as densely settled, this is not true for most of Scotland. Although up to a quarter of the population of Scotland live near the North Sea coast, over one million

1 In the subsequent text three agencies are quoted extensively, these are JNCC (Joint Nature Conservancy Committee, SNH (Scottish Natural Heritage) and SEPA (Scottish Environmental Protection Agency).

occupy the three historic cities of Aberdeen, Dundee and Edinburgh. There are several medium-sized towns of various types and numerous small harbour villages but, in general, most of the coastal fringe is occupied by farmland, forest and extensive land uses such as golf courses, military installations and various types of conservational land uses. (Fletcher, 1998; Hansom and Black, 1996; Firth, Collins and Smith, 1997.) The absence of extensive constructional engineering works such as sea walls, esplanades and coastal protection devices such as groynes provides a useful index of the nature of coastal exploitation. In a survey based on a careful scrutiny of 1:50,000 maps which were supplemented by aerial photographs and some field work the following statistics were produced. (Table 1. Ritchie and McLean, 1988)

Table 1

Area	Coastal Protection, sea walls, embankments etc	Harbours by length	Piers and Jetties	Other
Duncansby Head to St Combs	62.4 km	12.5 km	31.4 km	12.3 km
St Combs to English border	58.8 km	40.8 km	29.0 km	32.7 km

Total length of this coastline is 1770 km. Note : The most important "other" categories are groyne fields to sustain beaches and capture sediment by arresting longshore drift. There are also 9.7 km of reclamation areas in the northern section and 31.9 km in the south, mainly in the Firth of Forth.

A re-examination of the same coastline in 1999 showed remarkably little change. There were a few additional local coastal protection works, often renewals rather than new-build, some older ports had been converted to allow for marina development and others were almost abandoned (Walker, 1997). Some of the more conspicuous industrial uses such as the coastal collieries of Fife have all but disappeared and, to some extent, with the exception of oil-related activity at Invergordon, Aberdeen and Peterhead, the general use of major ports such as Dundee and Leith has declined and the west side of the latter is currently being infilled to provide valuable space for recreational facilities. Indeed a recurring theme in coastal land use in this area, as elsewhere, is the grow-

ing relative importance of leisure and recreational uses of all types. Rosyth, a major naval base in the Firth Estuary, is much less important than in the recent past. Oil tankers ply directly to Grangemouth but elsewhere they load and discharge on dedicated jetties, notably in the Firth of Forth to the east of the Rail Bridge at Braefoot Bay and Hound Point.

Thus, although the perception of the North Sea coastline of Scotland might be dominated by human presence and there are images of busy ports, industrial locations such as the former coalfields in Fife, and oil terminals, pipelines, jetties and refineries – and in a few locations, power stations, the reality is different. The direct use of the coastline by industrial use is relatively small. Substantial areas are occupied by urban landscapes, especially in the Firth of Forth, but for the North Sea coast as a whole, obvious man-made features are absent or widely distributed.

Although difficult to quantify there can be little doubt that the coastal holiday trade, especially the post-war phenomenon of "trades holidays", which saw busy beaches, promenades, boarding houses and hotels, i.e. the traditional "seaside holiday", has been in severe decline since the advent of package holidays to southern Europe and beyond. Most long-stay holidays have now been replaced by short visits and towns have had to diversify into rather more specialist attractions which do not rely directly on the sand beach and related facilities. Coastal caravan sites are also common but planning restrictions have tended to prevent new developments at the coastline. Nevertheless, several large "caravan parks" remain, especially in Fife and along parts of the southern Moray Firth.

Thus for at least the last three decades the direct pressure on the North Sea coastline of Scotland has steadily and sometimes dramatically reduced. There have been some notable point developments, e.g. a nuclear power station at Torness, and high profile oil-related constructions such as oil and gas terminals, pipelines, fabrication and repair yards, and temporary pipe-stringing facilities at Sinclair's Bay and Morrich Mor. These are all relatively new developments and some might be temporary, especially if related to the oil industry. Nevertheless, the length of the coastline which has been affected by these changes is not great. At a local scale, the changes to the small harbours which originated in the early 20th century with the decline in herring fishing has now reached a stage where only a few small lobster and shellfish boats remain alongside various types of recreational vessels in most of these picturesque stone-built havens. These changes did not alter

the physical appearance of the coastline significantly, for the small harbours and fishing villages still exist, but the associated economic impact, including the decline in local support and ancillary industries, has been profound and irreversible.

The nature of environmental impacts on the coastal zone

Terrestrial impacts

As with any discussion of environmental impact, no account of the changing impacts on the North Sea littoral of Scotland can ignore natural changes, some of which might be cyclic and some of which might be responses to larger-scale trends such as sea level change, climatic effects and other global changes (Raven, 1991). Unfortunately long-term coastal changes – both physical and biological – are almost impossible to analyse since, with few exceptions, the evidence is derived from historical data sets typically of less than a century and few such records exist. A special example of the problem of trying to quantify coastal changes is exemplified by the use of historical maps. In the 1870's the Ordnance Survey produced excellent "6 inch" (1:10,560) maps of the coastline. Some investigators try to compare these maps with more modern 1:10,000 maps to measure coastline erosion. This is not possible, since the crucial lines High Water Mark Spring Tides were not measured in the 1870's but extrapolated and today, even with the use of infra-red aerial photography, the precise definition of this critical physical and legal boundary is extremely difficult to survey and to map (Ritchie 1991). Further, if the impact under consideration is some type of coastal erosion (normally an exaggerated problem in coastal zone management), it is not the movement of a tidal line which is material but shifts in the coastal edge which on most maps is not actually depicted in any way. Rightly, assessments have been made of the possibility of global sea level rise on Scotland but very few areas are at risk and these are only in the low margins of some inner parts of the estuaries. The timescale for change is long, and continuing isostatic rise along the North Sea littoral will probably compensate for such theoretical submergence.

For the landward areas most changes have been visual and aesthetic; new buildings, maturing forests and, on occasion, conspicuous

large buildings such as a power station or a flare stack have been constructed. For the most part, however, planning regulations now insist on very good standards of design and landscape awareness especially at highly visible, low profile locations. For the higher coastal areas, such as cliffs, there have been few if any changes to land use and appearance. Further, good environmental management now permeates developments at all levels – not only as statutory requirements within regulatory mechanisms but also in terms of public expectations. Direct conservational management applies to a large fraction of the North Sea coastline which is under Sites of Special Scientific Interest or similar designation and over 90 sites can be listed for the North Sea coastline (Ritchie, 1992; Dargie, 1992, 1994; SNH, 1999). Conservational management also has an expression in coastal parks for recreational purposes; several good examples, including forest areas under Forestry Commission ownership, exist along the North Sea coast. Over the last thirty years the single most important change which had its origin in the gathering swell of public opinion from the 1960's has been the cultural change towards a need to conserve and to enhance the quality of the environment – and regulations and official guidelines, Acts of Parliament and Government Directives, including increasingly from the EC (Bell, 1995), are only the explicit manifestations of growing public awareness and interest (although a cautionary point may need to be introduced to ensure that environmental concerns do not become too important and therefore inhibit equally important economic development).

Although there are still improvements to be made, the main body responsible for monitoring the quality of river and drainage to coastal and estuarine waters (SEPA) can record steady improvements since its inception in 1975. In its Annual Report (1999) on water quality, considerable improvements have been recorded and more will be achieved in the next decade.

Thus any re-examination of the terrestrial part of the North Sea coastal zone over the last 30 years would conclude that, with few exceptions, the coastline is cleaner (although some voluntary organisations report that beach debris, normally of plastic materials, is increasing), more scenic, better managed and aesthetically conserved. Conservational bodies would also agree that on the whole the ecological value of the habitats and wildlife populations are being maintained and in most areas enhanced.

Non-terrestrial impacts

The coastline consists of three elements – an indeterminate land area which is often defined as "as far inland as marine influences are important", an intertidal zone and a marine zone below low tidal level which also has indeterminate boundaries. To the coastal geomorphologist the seaward limit is wave base – the zone where typical waves become effective in bringing about physical changes along the coastline (usually a water depth of 10 to 20m); for coastal zone management old boundaries such as the Three-mile and the Twelve-mile limit still have some currency. Economic Zones extend much further seawards and in the North Sea Britain's interests are defined by treaty at specific geographical ownership boundaries, normally median lines as agreed by coastal states. These zones are criss-crossed by most forms of coastal and marine exploitation. Navigation is an example of a sea-use where ships approach the coast from open international waters and enter a tightly controlled and regulated port jurisdiction and, in so-doing, cross invisible legal and managerial boundaries, which have little correspondence with natural, physical or biological zones. Most impacts on coastal waters, however, begin on the land and extend differential distances both offshore and alongshore. The most common impact consists of aqueous discharges but there are also physical impacts, e.g. sludge and dredged materials which are taken offshore for dumping. Given the prevailing winds, aerial discharges from urban areas and industrial land uses from the North Sea coast are also carried towards the North Sea for variable distances.

Non-terrestrial impacts are substantially more difficult to measure; they are mainly unseen and become components of natural systems by variable pathways. For low, dynamic coastlines, normally some kind of beach, system boundaries are available as defined by sediment cells between headlands. From a scientific perspective, one welcomes the recognition by the Department of the Environment (1996) that these natural units might also become effective management zones (this concept was reviewed for Scotland in 1997 by Hydraulics Research, Wallingford, and Earth Sciences Branch SNH). Since 1997 the use of coastal cells for management purposes has been taken forward and Shoreline Management Plans (SMP) are being prepared as the basis for sustainable management of coastal erosion along specified lengths of coast (SNH, 1999 (a)). Further offshore, cause and effect relationships can only be detected where there is a clear point-source such as a pipeline outfall or an offshore dredge-spoil dump site. Complex tidal and other currents and variable wave actions contribute to diffusion

and, helpfully, massive dilution. Dispersion, diffusion and dilution are rapid in open coastal and offshore areas and measurement techniques to measure pollution levels need to be extremely sensitive. Again, however, there is a need to emphasise the differences between open coast and the semi-enclosed estuaries where the hydrodynamic systems are more constrained and complex due, for example, to the compounding effects of tidal and fluvial interchanges and the precise geometry of the estuarine basin. The estuaries of the Tay and Forth, the Moray Firth and smaller estuaries such as the Eden have been subjected to comprehensive studies including symposia by the Royal Society of Edinburgh (1986, 1987, 1988) and McLusky (1997) and most hydrodynamic and biological relationships are relatively well studied and understood. Both the Tay and Forth also have prediction models for surface oil movements in the event of a spill.

With the exception of point-sources which are related to offshore oil and gas production, most toxic pollution has a land-based origin, usually from natural and artificial drainage, sewage and industrial outfalls. For the North Sea coastline of Scotland the main sources of possible pollution relate to centres of population and, with few exceptions, most problems originate in the main estuaries especially the Forth and Tay (SEPA, 1999). For both these areas massive improvements have occurred as a consequence of the introduction of good practice, strict compliance standards and the availability of reliable measurements of a wide range of chemical and biological indicators (Scottish Office, SOAEFD, 1997). The discharge of untreated sewage and industrial waste has reduced substantially. Annual reports formerly from the River Purification Boards and now SEPA show substantial improvements, sometimes as a consequence of major capital investment in treatment capacity (Read, 1983) and the construction of relatively deep water outfalls (SEPA, 1999). A coastal waters classification scheme is in place (Table 2) and most coastal zones have or are close to achieving making A and B categories (SEPA 1999). Although contentious and unpopular it might be timely to raise questions about the extent to which discharges and dumping are necessarily "bad" for the marine environment. Although some inputs such as heavy metals are clearly toxic, many other inputs can be absorbed easily into marine ecosystems and, at certain levels, might be beneficial as nutrient sources. The level of knowledge and information on the North Sea Coast is probably now of sufficient quantity and quality that it would be a suitable area (and time) to test these and similar questions.

Table 2

Class/ Description	Use-related Description	Aesthetic condition	Biological condition	Bacteriological condition	Chemical condition
		and	and		
A Excellent	Fit for all defined uses	Near pristine, uncontaminated	Flora and fauna normal	Likely to meet quality standards no less stringent than the guideline standards for EC Designated shellfish and bathing waters	
		and	and		
B Good	Fit for all defined uses	Unpolluted but may show signs of contamination	Flora and fauna normal	Likely to meet quality standards no less stringent than the guideline standards for EC Designated shellfish and bathing waters	
		or	or	or	
C Unsatisfactory	Defined uses may be compromised by the occasional presence of sewage derived material or by moderate organic enrichment	Occasional observations or substantiated complaints of sewage solids, smell nuisance or oil	Flora and/or fauna modified by effluent discharged	Likely to fail to meet quality standards no less stringent than the mandatory standards for EC Designated bathing waters	Likely to meet all quality standards applied as a consequence of the EC Dangerous Substances Directive
		or	or	or	
D Seriously polluted	Defined uses compromised or prevented by the frequent presence of sewage derived material, or chemical pollutants	Frequent observation or substantiated complaints of sewage solids, smell nuisance or oil	Flora and/or fauna impoverished or absent	Likely to fail to meet quality standards no less stringent than the mandatory standards for EC Designated bathing waters	Likely to fail any one or more of quality applied as a consequence of the EC Dangerous Substances Directive

SEPA Coastal Waters Classification Scheme

In spite of these improvements, the complexity of the use of estuaries requires constant vigilance. In 1991 the Nature Conservancy Council produced a definitive report on British Estuaries which, on the whole,

showed the North Sea estuaries of Scotland to have the full range of functions but, with the exception of the Forth, these uses were less intensive and potentially less damaging. This report was designed to assess and to safeguard the conservational resources and noted substantial reductions and destruction of typical estuarine habitats and, in 1991, it identified threats, most of which related to likely economic and population pressures on the margins of major estuaries, including increasing leisure and recreational use. On the whole these adverse warnings were directed more at the estuaries of England and Wales and the more northern examples were not deemed to be at similar degrees of risk.

In 1999 some of these threats in Scotland have not materialised. The impact of population growth, new polluting industries and other threats to the coastal and marine ecosystems cannot be documented, whereas, conversely, improved management, scientific knowledge and effective legislation have grown substantially. Naturally some problems remain – some extensive shorelines remain classified as "seriously polluted", toxic discharges occur, habitats are damaged and, occasionally, destroyed, many species of wildlife continue to require conservational management and protection. Diffuse inputs of nitrates which might be associated with agricultural practices are also causing some concern with the area of most interest being the Ythan Estuary (Marsden *et al.,* 1999). There are also rare occurrences of health problems with local contamination of sea food but the general overview must be one of some satisfaction to those charged with monitoring the quality of these vital coastal estuarine environments in so far as some of the fears expressed in 1991 have not materialised.

The most obvious impact on the coastal marine resource of the North Sea littoral is on various types of fish populations and associated food webs. Political and economic decisions allied to technical changes have profoundly affected fish catches with consequent infrastructural implications to ports and harbours. An important change was the eventual repeal of the prohibition of trawling within three miles of the coast and in the firths. By the 1960's the curbs on the use of drag nets in inshore waters had been considerably relaxed to allow for the development of seine netting and prawn trawling, while there were now very few line fishermen who needed protection. Eventually in the 1980's the trawling ban was to be replaced by a system of protected static gear reserves in prescribed places, mainly to protect lobster and crab fisheries (Coull, 1996). A major relatively recent change along the North Sea coast has been relatively greater concentration on the

nearshore resource, especially high-value shellfish (Coull, 1997), but there has been little or no development of fish farming (mainly salmon), which has occurred almost entirely on the west coast and in the islands of Scotland, with its current controversy that some farms might be a source of pollution and disease. The complex environmental consequences of these major changes and shift in the nature of the North Sea fisheries of Scotland cannot be summarised adequately here but the ecological effects are substantial. The effects of commercial fishing on the biological, physical and chemical interactions in the highly productive North Sea area, including the nearshore and estuarine areas are substantial. One of the main reasons for monitoring marine and coastal pollution is in relation to possible effects on food chains and therefore on fish catches. Changes in fish productivity occur for natural reasons but technical changes in boats and gear, fishing rules and regulations, allowable quotas, by-catches, all of which are strongly affected by policies and decisions which to some extent lie outwith the control of those who operate from the remaining fishing ports of the Scottish coast, seem to be of greater relative importance. At this time there is substantial interest in monitoring the effects of contaminated land drainage and other discharges on marine ecology but the reciprocal effects of changes in the extent and nature of commercial fishing *on* marine and nearshore environments do not seem to have been given equal weight. There is, for example, evidence that trawling has substantial physical effects on seabed sediments and on benthic fauna. Given the history of change and the ubiquitous nature of fishing along the North Sea coast, the study of the environmental and ecological effects of the fishing industry on coastal and marine habitats should be given very high priority.

Integrated coastal zone management

In the Introduction to the book "The Development of Integrated Sea-Use Management", Smith (1991) identified global factors as exerting pressure for moves away from the traditional management of *individual* uses where natural management infrastructures were well developed to a more comprehensive approach. He argued that new pressures for mineral extractions, disposal of waste, pollution control, marine recreation and conservational management were creating forces which cut across the historical basis of individual, separate forms of

exploitation. National maritime agreements such as UNCLOS III, whilst essentially a comprehensive legal framework for marine affairs, clearly had coastal implications, as did Law of the Sea Conventions. It is important to stress however that such international policy and legal arguments have to be accepted and, subsequently, must be applied in the particular context of the nearshore jurisdiction of an individual nation state. To this end, political geography, maritime boundary definition and the locus of decision making become powerful factors in determining how the concept of Integrated Coastal Zone Management might apply (Cleator and Irvine, 1995). How this concept has developed for Scotland can be gleaned from two documents from the Scottish Office, the National Planning Policy Guideline (NPPG13, 1997) on Coastal Planning, and Scotland's Coasts : a discussion paper, 1996. Setting aside the high level of importance which these documents give to sustainable development, enhancing biodiversity, risks of erosion and flooding and, noting the useful division of the Scottish coast into three types – the Developed (mainly urban), the Undeveloped (small towns and villages, but mainly agricultural and low intensity use) – and this category is 88% of the total mainland coastline of Scotland, – and Isolated (effectively rare or undisturbed), – the document signals a significant policy shift towards co-ordinated, integrated planning. Two paragraphs can be quoted verbatim to emphasise this trend, i.e.

> "The interrelationships between human activities and these natural processes do not respect administrative boundaries – an example of this being the natural processes of erosion and deposition at work on the coast. These inter-relationships have already been recognised through the establishment of a number of Firths Fora and other local coastal fora where different interests have come together voluntarily to consider cross sectoral issues; this type of approach is one which the Government wishes to encourage. *Planning authorities should therefore consider whether there are additional areas where the need to work with other authorities and agencies to pursue a co-ordinated approach to issues arising on the coast.* Such issues are likely to range more widely than land use planning." And, –

> "The coast is not only a complex natural environment; it is also a complex policy area where a range of agencies with differing, but often overlapping, objectives, responsibilities and powers operate. The scope of land use planning is limited by statute and develop-

> ment plans cannot, therefore, deal with all the issues which arise on the coast; a range of organisations have to work together if an agreed overview of how the coast is to be used, managed and protected is to be reached. In Scotland the various Firths Initiatives which SNH has helped establish around the Clyde, Forth, Solway and Moray Firths have taken a lead in this field; a draft Management Strategy and Action Plan for the Cromarty Firth has recently been produced. The Government support this approach to coastal planning and see an important role for similar local coastal fora away from the major Firths. The establishment of a Scottish Coastal Forum was announced in November 1996 to provide a context for the work of such local fora, as well as a national focus for Coastal issues. It is envisaged that the Forum will play a part in the preparation of future national guidance relating to the coast and the dissemination of good practice on coastal zone management."

In theory these trends have to be welcomed but major problems remain in moving from a stage of talking and communicating issues which are concerned with the multiple use of the same physical space, especially when different legal and planning jurisdictions apply to the stage of implementation. Terminology such as "fora", "overview", "context", "national guidance" and "good practice" are to be welcomed but the real test is the next stage which must be to convert concepts and abstractions into operational reality. On the whole the North Sea littoral zone of Scotland is relatively unpolluted, well-managed and increasingly affected by good conservational (in the widest sense of the word) practice. SEPA and SNH are bringing a greater sense of overarching responsibility, which is backed by statutory powers.

There is also a wealth of scientific, economic, technical and policy documents including an excellent and thorough review of Scottish coastal issues which provides a comprehensive listing of data sources, agencies and their responsibilities and notes on legislation, designations and controls, which cascades from international level connections to local controls and voluntary agreements (Burbridge and Burbridge, 1994). An increasing convergence of interests with common managerial goals can be detected and there appears to be political will to marshal these hitherto individual and sectoral approaches to the exploitation of the coastal, estuarine and nearshore resources of the North Sea littoral into a more coherent structure. Conflicts of interest will continue to arise but there is some comfort in the knowledge that opportunities for dialogue appear to

be increasing. Equally important is the increasing scientific realisation that on the basis of careful monitoring of effects some environmental impacts can be shown to be less serious in reality than was perceived or implied at earlier stages. Historical problems remain, as illustrated by the recent survey of coastal pollution of its northern area by SEPA, where the satisfactory conditions of the entire coastline from Wick in the north to Montrose in the south contains references to very small pockets of poorer quality discharges, almost all of which emanate from older urban areas or small coastal towns, whereas the major urban areas now have higher quality offshore sewerage and wastewater schemes in place (SEPA 1999). No doubt in time these small scale problems can be overcome at commensurately relatively small cost. Thus as a preface to the general conclusion and summary as given below, there has to be a sense of optimism that the momentum of progress will continue on the basis of recognised need, political prioritisation and sufficient expertise, experience and knowledge in individuals and agencies to sustain the rapid progress that has been made over the last three decades.

Conclusion and summary

This overview of the changing types and amount of impacts on the North Sea coastal environments of Scotland over the last three decades can be summarised as follows:

1. There is widespread recognition that for both scientific and managerial reasons this coastline should be divided into major estuaries and open coastlines.
2. Only the Forth and to a lesser extent the Tay are subjected to a wide range of activities with consequent problems of multiple usage.
3. Almost 90% of the coastline is not used for intensive urban or industrial use other than at a number of "individual single function" sites.
4. The knowledge and information base relating to a wide spectrum of interests has grown extremely rapidly
5. The problems of conflicting legal, planning, natural and functional boundaries have been recognised and potential conflicts are being addressed.
6. This increase in information is mainly in response to the growing needs of specific agencies and interests, notably –

(i) Government and its agencies especially those with regulatory functions, specifically SEPA, SNH and planning agencies at national and regional levels.
(ii) Government departments and occupational groups with direct responsibility for the coastline, including the fishing industry.
(iii) Directives and other guidelines from EC.
(iv) The perceived impact of the North Sea oil and gas industry.
(v) A substantial increase in public awareness and concern about "environmental" matters.

7. Largely stimulated by SNH, the concept of Integrated Coastal Zone Management is gaining acceptance. This has been led by initiatives in the Forth, Tay and Moray Firth where mechanisms exist for a wide range of groups and agencies to discuss the interaction of relevant concerns. There are also long-standing British groups, e.g. National Coasts and Estuarine Advisory Group, which provides further impetus for similar and inclusive developments in Scotland. Although the statistical and regulatory baseline information is substantial, and although expert opinion may demur from this assertion, there is a sense of imbalance in that the impact of activities *on* fishing is not matched by the effects *of* fishing on marine and coastal ecology and environments.
8. On almost all criteria the coastal environment is cleaner, less damaged and less polluted. Very large tracts (in excess of 90 sites) are under conservational management. Arguably, there has been no reduction in visual quality. Apart from local problems of diffuse aqueous discharges most spot sources of pollution have been identified and are being corrected.
9. Significant environmental milestones have been (and are close to being) reached, e.g. cessation of offshore sludge dumping, and effective monitoring of specific discharge consents.
10. There is a welcome move to recognise and to use coastal systems as defined by natural boundaries for both formal and functional purposes. Eleven coastal sediment cells have been identified for parts of Scotland and are being actively used in two areas as the basis for coastal erosion studies. This "working with nature" approach is also notable at the local scale where soft solutions to coastal defences, to flood protection, and to general coastal management, are being preferred.

11. On a world-scale, population (and tourist/recreation) demands on the coastal zone are accelerating with consequent pressures and possible destruction of coastal habitats. This trend cannot be demonstrated as true for the North Sea coastline of Scotland. Population, industry, commerce and other traditional uses of the coastal zone are either static or reducing whereas, in contrast, environmental good practice both voluntary and regulatory is increasing steadily.

Note on sources of information

As described above, the quantity of information which is available for the North Sea and its coastline is vast. Little use has been made of the extensive data sets for the more distant offshore zones of the North Sea which relate both to oil and gas extraction and to the fishing industry. It is notable that most of the data has had to be accessed through reports from developers, agencies and several government officers, including international bodies and organisations. For the coastline there has been a relative decline in articles in refereed academic journals and a greater reliance on symposia, chapters in reports notably from SNH, SEPA and the JNCC with much of the material having been commissioned by these and other bodies. Management and Planning literature has three dimensions, European, British and Scottish with the Department of the Environment being the prime source of policy development. The reference list given below is extensive and reflects these sources. The substantial help of two main agency staff, including librarians, in SNH (Edinburgh) and SEPA (Edinburgh and Inverness) is gratefully acknowledged, especially in the provision of unpublished data sets and other information. Nevertheless the opinions and conclusions as given above are solely the responsibility of the author.

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Danish place-names in Scotland and Scottish personal names in Denmark: a survey of recent research

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Even with the best chauvinistic will in the world, it has been impossible for me to find any certain traces of the Danes in the place-names of the Northern and Western Isles. Jakob Jakobsen thought he had identified two names that referred to Danes, Danwall [danwəl] near Brandister (Grid Reference HU 440369), whose generic is *hóll* 'rounded hill' and Dainaberg in Sound near Lerwick (HU 471385), whose generic is *berg* 'hill' (Jakobsen 1936, 174). It would, however, be odd to find the word for 'Dane' compounded in stem-form *Dan-* with a topographical generic, as in Danwall, and I am more inclined to accept John Stewart's interpretation of the specific of this name as the Norse word *daunn* 'stink, bad smell' (Stewart 1987, 145). This is not, I hasten to say, because I have had an unpleasant experience while doing field-work in the neighbourhood. Dainaberg, on the other hand, is perhaps more likely to contain the word for 'Danes' but whether the hill was a look-out point against attack by the Danes or it was manned by Danes or how old the name is are questions that are impossible to answer.

I therefore turned to the place-names in *-bý* in Scotland to see whether I could find any trace of Danish influence there. The most characteristic type of Scandinavian place-name in the Danelaw is that consisting of a Scandinavian personal name and the generic *-bý*, for example Amotherby in Yorkshire (**Eymundar-bý*), with the genitive ending in *-ar* of the personal name surviving in fossilised form to the present day. There are three such place-names in Orkney: Trenabie (HY 4451) in Westray, Yesnaby (HY 2215) in Sandwick and Cattaby (c.HY 5804) in Deerness (Marwick 1952, 43, 157, 81), which may contain the personal names *Þrándr*, a completely inexplicable **Yesken*, and *Káti* respectively, although the specific of Trenabie could alternatively be the term for the inhabitants of the Trondheim area and that of Cattaby the common noun 'cat'. In Lewis the name Eoropie

(NB 5165) [jɔʀəbi] (Oftedal 1954, 371) may contain a compound personal name in *Jó-*, such as the feminine name *Jórunn*, while in Caithness, Canisbay (ND 344725) and Duncansby (ND 406732), probably contain a rare Pictish personal name or tribal name *Cano* and a Celtic personal name *Dungal* respectively (Waugh 1989, 147). The name Duncansby raises the interesting question as to whether the Celtic name *Dungal* was borne by a Pict who was living there when the Vikings arrived and who need not have been Celtic-speaking or whether it was borne by one of the post-Norse Gaelic settlers. It has no obvious connection with Denmark or the Danelaw, although it should not be forgotten that several place-names in *-bý* containing Celtic personal names are recorded in Northern England, for example Dubgilla [duvjilə] in Duggleby in Yorkshire.

It was not until I turned my attention to the Scandinavian place-names in South-West Scotland that I was struck by the clear links between this area and the Danelaw (Fellows-Jensen 1985). It had long been generally accepted that Scandinavian settlement in England could be divided into zones of Norwegian influence to the west of the Pennines and of Danish influence to the east. North-West England was thus considered to lie outside the legitimate stamping-grounds of a student of the Danelaw. I found, however, a complete absence not only in North-West England but also in South-West Scotland of names in *-setr* and *-bólstaðr* and a mere two possible instances of names in *-staðir*, Broxteth and Toxteth in southern Lancashire. This means that the name-types that characterise the Scandinavian settlements in Northern Scotland are not present in North-West England and South-West Scotland. There are admittedly many originally topographical names in these areas that have exact or close parallels in Orkney and Shetland but these names can just as well have been coined by Danes as by Norwegians. Although the place-names in *-skáli* 'shieling-hut' and *-sætr* 'shieling' in the Lake District, for example, have sometimes been taken as indicating Norwegian settlement, their evidence is not conclusive, for these generics do occur in Danish place-names, for example *skáli* in Løvskal in Jutland and *sætr* in Sædder in Sjælland (Jørgensen 1994, 190, 283). It is the local topography and the resulting agricultural practices and not necessarily a predominance of settlers of Norwegian origin that determine the more frequent occurrence in North-West England than in Denmark and the Danelaw of topographical names in *-dalr*, e.g. Patterdale 'Patrick's valley', and *-geil*, e.g. Skelgill 'ravine with a shieling-hut', and habitative names in *-skáli*, e.g. Portinscale 'the hut of the

town harlots', and *-sætr*, e.g. Ambleside 'the hut at the place known as "river sandbank"' (Fellows-Jensen 1985, 60, 152, 160, 210).

The really significant fact about the Scandinavian place-names in North-West England, however, is that the generic to occur most frequently here, as in all areas of Danish settlement in England is *-bý*. The names in *-bý* in North-West England are concentrated in the Eden valley, the Carlisle plain and the coastal plain of Cumberland and it can be seen that they also spread across the border into Dumfriesshire and some way up Annandale and Eskdale. In the light of my earlier work on the Scandinavian place-names to the east of the Pennines, I came to the conclusion that these *bý*s mark the arrival in Scotland of settlers from the Danelaw.

An interesting feature about the *bý*-names as a body in this region, however, is that many of them have as specifics a personal name which must be of Norman introduction, e.g. *Alain* in Allonby, *Wigan* in Wiggonby, *Lochard* in Lockerbie (NY 1381), and these are almost all found in and around Carlisle, in the coastal plain of Cumberland or in Dumfriesshire (Fellows-Jensen 1985, 22). It is clear that these twenty-eight *bý*s must be associated in some way with the plantation of Norman, Breton and Flemish settlers around Carlisle by William Rufus in 1092. The names have thus been considered to be evidence for the survival of *-bý* as a place-name-forming generic into the post-Conquest period. I argued, however, that they are more likely to represent partial adaptations of place-names in *-bý* that had originally been coined at the time when settlers from the Danelaw penetrated into Cumberland and Dumfriesshire (Fellows-Jensen 1985, 288). The distribution patterns of the *bý*s containing Nordic personal-names and those containing Norman ones show a negative correlation that in my opinion can best be explained as the outwards movement from Carlisle after 1092 of settlers with Norman names. Not everyone would agree with me. The philologist John Insley has pointed out that there is no firm evidence for the changing of place-names in southern Scotland (1986), while the geographer Brian Roberts considers that it is possible to detect visible elements of settlement morphologies that point to the development of villages as a post-1092 feature of the Eden valley (1989-90, 34-36).

I would nevertheless stand by my opinion that there is no reason to believe that the generic *bý* was used to coin names for completely new settlements in North-West England or South-West Scotland after the Norman Conquest. Geoffrey Barrow has pointed out that as the Norman settlers made their way up Annandale, they pushed beyond the concen-

tration of *bý*-names and came to a vill with an English name in *-tūn,* upon which they imposed a new specific *John* and transformed it into Johnstone (NT 2400) and not *Johnbie (Barrow 1980, 40 n. 37, 47). There are many settlement names in the Central Lowlands of Scotland which consist of a personal name of post-Conquest type and Old English *-tūn*, e.g. Stevenston (NS 2642). Barrow has argued that these names cannot all imply wholly new units of settlement but that many of them must be the result of partial or total renaming and I agree with him.

Some of the settlements may, of course, have been made on virgin land but I am more inclined to believe that settlements made on vacant land after clearing would have been given names in *-thveit*. This topographical generic, which originally denoted a 'clearing in woodland', would seem to have developed a quasi-habitative significance in England 'settlement in a clearing'. There are a few isolated occurrences in the Northern Isles, for example, Germatwatt (HU 244493) in Shetland and Twatt (HY 2724) in Orkney, but in mainland Scotland the generic *thveit* is almost only found in Dumfriesshire, where there are several instances in the hills and a cluster along the lower reaches of the Annan River. It seems likely to me that these *thveit*s reflect immigration from the Lake District and northern Yorkshire, in both of which regions *thveit*s are of common occurrence, for example Bassenthwaite 'Baston's clearing' in Cumberland, Husthwaite 'clearing with or for a house' in Yorkshire. The generic *thveit* occurs in both Norway and Denmark and we know that it was brought to England from Denmark early in the period of Viking settlement because of its occurrence in East Anglia, where there would not seem to have been new Danish settlement after 917 and where the corrupt surviving form of the name Crostwight in Norfolk suggests that the Nordic word soon dropped out of use in that county.

It was long believed that outside Dumfriesshire the only occurrence of a *thveit*-name in mainland Scotland was Moorfoot (NT 2952, *Morthwait* 1142) in Midlothian but Geoffrey Barrow has drawn my attention to an early spelling *Galtweied* of Galtway [gatta] (NX 7147) in Kirkcudbrightshire that seems to show that this name, too, contains the generic *thveit*. Both these names mark a movement outwards from Dumfriesshire of an element that had been introduced to this shire from the Lake District and northern Yorkshire, as suggested by the frequent parallels between the Dumfriesshire *thveit*-names and those in England.

There was also some dissemination of *bý*-names from Dumfriesshire

to Galloway. Seven such names are spread in a trickle along the lowlands: Bagbie (NX 492552), Bombie (NX 712502) and Mabie (NX 9470) in Kirkcudbrightshire, Applebie (NX 411409), Bysbie (NX 475359), Gribdae (*Gretby* 1356) (NX 7350) and Sorbie (NX 436408) in Wigtownshire (Fellows-Jensen 1991; Oram 1995). The settlements with these names show signs of having been squeezed in between pre-existing settlements. Many of the *býr*-names in Dumfriesshire and Galloway have parallels in England. These are Applebie, Bagbie, Bombay, two Bombies, Bysbie, Denbie, Esbie, *Gretby*, Newbie, Ouseby and two Sorbies. Richard Oram sees a linguistic divide between Mabie on the west side of the Nith estuary, marking the western limit of the Danish movement from the Vale of York, and the other Galloway *býr*s, which he thinks were more likely to have been introduced by Norse-speaking or Norse-influenced colonists arriving by sea (Oram 1995, 129-31). I would argue, however, that the many parallels to names in England point rather to the Danelaw and Cumbria as inspiration for all these names.

I also believe that it was at least in part from Dumfriesshire that the place-names in *-býr* spread to the Central Lowlands of Scotland (Fellows-Jensen 1989-90). This is not because their trail can be followed on the map. In fact, the only onomastic clue towards the route the names may have taken is the name Moorfoot in Midlothian. This name might seem to be very little on which to build a theory as to the route by which the Scandinavian place-names spread northwards but the only other possible land-route from the south, that along the coastal plains of Durham and Northumberland, can probably be ruled out, for Northumberland is a county utterly devoid of *býr*s (Watts 1995, 206).

There is, however, a considerable difference between the specifics in the *býr*s in the Central Lowlands as a body and those in Dumfriesshire, for in the former area 80% of the specifics are not personal names and there is not a single one containing a Norman or Flemish personal name. Of the twenty-five names in *-býr*, twenty-two have specifics which are certainly or potentially Scandinavian and all the names could have been coined by Scandinavian settlers in the Viking period, some of them perhaps, as suggested to me by Geoffrey Barrow, by men who had been settled there to watch the coasts and rewarded for their services by land or revenues. The problem is, however, to know whether these coast-watchers were placed there by Vikings in the period of lively communication between York and Dublin or by the King of Scots at a later date. The *býr*-names in the Central Lowlands as a group have a

closer similarity to those in the Danelaw than do those in Dumfriesshire. Begbie (NT 491708), the two Busbies (NS 239457; NS 392409), two Busbys (NS 582564; NO 032269), Corbie (NO 330230), Corsbie (NT 607442), two Crosbies (NS 217500; NS 344302), Gedbys (NT 260922), five Humbies (NT 460625; NT 116677; NT 114755; NS 548546; NT 196862), Leaston (*Laysynbi* 1294) (NT 485635), Newby (NT 265371), Ravensby (NO 536349), two Sorbies (NS 245446; NY 453846), Weathersbie (lost in Fife) and Weddersbie (NO 260130) all apparently have parallels there, and only Blegbie (NT 480617), containing the Nordic adjective *bleikr* 'pale', either describing the local vegetation or referring to the activity of bleaching, or perhaps the related by-name *Bleikr*, and Pogbie (NT 466607), containing Nordic *púki* 'evil spirit' would seem to be new creations.

Following a suggestion made by Barbara Crawford (1987, 100), I have noted that there are resemblances between the distribution of hogback tombstones, a distinctive form of Anglo-Scandinavian sculpture, and that of the place-names in *-bý* (Fellows-Jensen 1989-90). The hogbacks have been studied in great detail by J. T. Lang, who has shown that the style would seem to have originated in northern Yorkshire, probably in the neighbourhood of Brompton, where there is a particularly fine collection now, around the second quarter of the tenth century, that it spread along the Tees valley via the Stainmoor pass to the Eden valley and from there to the Carlisle plain, and that the fashion for such tombstones would seem to have died out in England by the end of that century (Lang 1972-74, 1984, 1994). There are very few hogbacks further south in the Danelaw or in English Northumbria. The hogbacks in Scotland can be shown to be later than, and derivative from, the English ones. The earliest ones in Scotland can probably be dated to the late tenth century, the rest to the eleventh. A stylistic and iconographic analysis of the corpus of hogbacks has revealed very clear affinities between those in Cumberland, for example the so-called "warrior's tomb" at Gosforth, and the ones in Scotland, for example those in Govan. It is probably not without relevance that many of the English *bý*-names which have parallels in Scotland are found in areas of northern Yorkshire where hogbacks abound. In the Vale of York and Craven we find settlements bearing the names Bagby, Busby, Danby, Eppleby, Lazenby and Sowerby.

Geoffrey Barrow, who has long been interested in the names in the Central Lowlands and has given me most generous help with early forms and identifications, has argued recently that the clusters in the area are disparate and hardly to be associated with each other (Barrow

1998, 70-72). There is a cluster of names of wholly Scandinavian character in East Lothian: Begbie, Blegbie, Pogbie, Humbie and *Laysynbi*, as well as Smeaton (NT 350694) (*Smithebi* 1154x59) in Midlothian, and Barrow looks upon these names as reflecting a genuinely Scandinavian settlement beneath the Lammermuir edge that lasted long enough for the names to endure into a period when a Scandinavian language had ceased to be in common use in the locality. Barrow also notes a smaller group of names in west Cunningham and north-west Kyle, Ayrshire: Sorbie, Busbie and two Crosbies, which might also possibly reflect Scandinavian settlement, while he seems convinced that this cannot be the case with names such as Corsbie in Berwickshire, Newby in Peeblesshire, Corbie, Gedbys, Humbie, Weathersbie and Weddersbie in Fife and Ravensby in Angus, and apparently takes these names as examples of the borrowing of Nordic place-name terms and forms into Scots-speaking and Gaelic-speaking societies of eastern and southern Scotland (Barrow 1998, 72).

Simon Taylor has also taken a look at the names in *-bý*, first in Fife (Taylor 1995) and then on the wider basis of the central and eastern lowlands of Scotland (Taylor 2001). In the earlier paper he makes the important point that if the names in *-bý* in Fife had been coined as early as the tenth century, they would have been expected to have undergone gælicisation in this subsequently almost exclusively Gaelic-speaking environment. An original **saurbý*, for example, containing Nordic *saurr* m. 'mud, sour ground' should have developed to Soroby in Fife, as in Tiree, rather than Sorbie (Taylor 1995, 148). The correct explanation for the name Sorbie in Fife was first revealed by Taylor in the 1999 paper. The Harrays family of Sorbie in Wigtownshire acquired the lands of Kingsmuir in Fife in the late eighteenth century and must have brought the name Sorbie with them to their new home. The earliest record of Sorbie in Fife is from c.1860 and this is clearly an instance of very late analogical naming. Only one of the names in *-bý* in Fife is recorded in an early source, Corbie (*Corbi* c.1231), but the others are found in sixteenth- and seventeenth-century documents. Although it is impossible to prove that any of them were coined in the Viking period, Taylor argues that their status and situations are such that their sites may well have been cleared and settled by those who named them and that these settlers may have arrived either in the late tenth century, together with the hogback tombstones, or in the twelfth century, when there is known to have been an influx of settlers into Scotland north of the Forth from Lothian and northern England.

In the more recent paper Taylor emphasises the significance of the fact that most of the *býr*-names in central and southern Scotland have parallels elsewhere in the British Isles and attempts to identify a political background against which the names may have been bestowed upon the settlements. He notes that when the place-names enter the written record, usually in the Late Middle Ages or the Early Modern period, they tend to be borne by settlements on royal land or in baronies held directly of the crown. He would therefore argue that the Scottish kings in the tenth century may have encouraged limited Scandinavian settlement within their kingdom, perhaps on land which had formerly been occupied and worked but had become waste as a result of unsettled conditions. He considers it less likely that the names were coined in the twelfth century, although the fact that the developments reflected in the names in Fife and Kinross are in keeping with those shown by similar names in Anglian-speaking Lothian and northern England makes me more inclined to think that the names were coined at this later date on analogy with names from further south and that their survival in "Anglian" form in Gaelic-speaking regions reflects the political control wielded there by David I and his successors. We should not, incidentally, forget that Malcolm III had many connections with Northumbria and that he is said to have planted "Irishmen" in the Central Lowlands in the eleventh century and that these "Irishmen" seem to have had Scandinavian connections and may have coined some place-names (cf. Crawford 2000).

In recapitulation I would argue that the majority of the Scandinavian place-names in South-West Scotland and the Central Lowlands reflect the influence of the English Danelaw. Some of the names in Dumfriesshire and Galloway may have been coined in the Viking period in connection with the general anti-clockwise movement out from the Danelaw at that time. To the Central Lowlands some of the names may have been brought in the late tenth century by the men who also brought the fashion for hogback tombstones from the Danelaw, others perhaps by men who were planted in Scotland by the Scottish kings in the twelfth century. The example of the name Sorbie in Fife shows that names could be given to settlements on analogy with the names of settlements further south as late as in the eighteenth century. In reality, the only method we have of dating the formation of the names, as opposed to the founding of the settlements bearing the names, is by noting their first occurrence in a written source. Such datings in Scotland tend to be very imprecise because small settlements could easily have been in ex-

istence for centuries without their names' being recorded in a source that has survived. Even though the coining of the names cannot be dated closely, however, it seems to me most likely that their source of inspiration lay in the Danelaw and Cumbria.

While the Danish influence on the place-names of Scotland would thus seem to be indirect, the Scottish influence on Danish personal names was in part direct and, being of a later date, better documented but it was more ephemeral. The presence of Scots in Denmark has been studied by Thorkild Lyby Christensen in an article entitled 'Scots in Denmark in the sixteenth century' (1970), by Allan Tønnesen in a monograph on the foreign citizens of, and inhabitants in, Elsinore between 1550 and 1600 (1985), and by Thomas Riis in his two-volume study of *Scottish-Danish relations c. 1450-1707*, which treats both military personnel and the more permanent immigrants, including wealthy merchants, refugees, pedlars and humble artisans (1988). These three works record many examples of names borne by Scots living in Denmark but the work that is of particular interest for the study of personal names is one by my Århus colleague Torben Kisbye, whose early death unfortunately meant that his ambitious socio-onomastic project on personal names in Denmark did not come to fruition.

The title of his article, which appeared in Danish in 1988, too early for him to have been able to exploit the material presented by Thomas Riis, can be translated as 'John Jamieson becomes Hans Jacobsen. The names of the Elsinore Scots – an example of transposed nomenclature'. By a transposed name Kisbye means here the replacement of a Scots name by its etymological equivalent or supposed equivalent in Danish. *John*, for example, is replaced by *Hans*, which is, like John, a development from the biblical name *Johannes* but one that had been borrowed into Danish from German in the middle of the fourteenth century. Since most of the Scots names were transposed by the Danish scribes and clergy who were responsible for keeping administrative, legal and ecclesiastical records, it can sometimes be very difficult to determine whether the bearer of a name is a Scot or a Dane. Kisbye developed some useful techniques for identifying bearers of apparently Danish names as being of Scottish origin and he is able to demonstrate that almost every forename of foreign origin was subjected to transposition in the sixteenth and seventeenth centuries, the only exceptions being names which did not have easily recognisable Danish parallel forms, for example the name of the British saint *Ninian*, which was borne as forename by *Ninianus Blackj* in Elsinore in 1548, and some hereditary

surnames, e.g. *Craigingelt* and *Lyle*. A few of these surnames, usually those borne by families of a certain social standing, survived in use for generations, but in most cases the surnames disappeared and were replaced by Danish patronyms. The son of *Lauritz Fergusson*, for example, was baptised *Daniel Lauritzen* in 1600 and the son of *Frantz Birckie* was called *Hans Frandsen* in 1577. An example of the combination of a Danish patronym with a Scottish surname is the name of the famous Danish baroque poet *Thomas Hansen Kingo* (1634-1703). He was the son of a weaver, *Hans Thomassen Kingo*, who had come to Denmark with his father as a child.

The only occurrence of a *Mac*-surname in Kisbye's material is a *Iohanne Makgregor*, named in a copy of a Scottish charter in the Elsinore court records. It is possible that some *Mac*-patronyms are concealed behind Danish patronyms but it seems likely that most of the Scots in Denmark came not from Gaelic-speaking areas but from the harbour-towns along the east coast of Scotland, which had long been Scots-speaking, and the authorities at home in Scotland had also, of course, employed their own form of transposition. Refusing to accept Gaelic personal names, which they found barbaric, they had fixed substitutes for these names which were employed in official records. *Archibald*, for example, replaced Gaelic *Gilleasbuig*, and in later times Archibald and its short form *Archie* became very popular in Scotland. This practice of transposition probably lies behind the girls' name *Rachel*, given shortly before 1600 to a daughter of a butcher in Elsinore called *Anders Skotte* or *Anders Willumsen*. This feminine biblical name is not recorded in early sources in Denmark and it was not used in England until after the Reformation. It was, however, often employed in Scotland as a substitute for the Gaelic name *Raoghnaild* a name that was in turn a loan from Nordic *Ragnhildr* (Dunkling 1978, 115), so the Scottish butcher's daughter in Elsinore had in fact been given a heavily disguised Nordic name.

It seems to me that Torben Kisbye has on the whole done a very good job in identifying Scots in Denmark on the basis of their names but some errors can be pointed out. For example, the surname *Kirckilt* of *Mogens Nielsen Kirckilt*, mentioned in the Elsinore court records for 1563, which Kisbye, with reference to Tønnesen 1985, has identified (1988, 109) as a reflex of the Scottish place-name *Kirkcaldy*, must derive from the Danish place-name *Kirkelte* in Karlebo parish not far south of Elsinore (*Kirckiiholt* 1285), which is recorded as *Kirckilt* in 1582 (Jørgensen 1994, 156). This fact makes it much less likely that

Kirckilt's forename *Mogens* is a transposed form of Scots *Mungo*, as suggested by Kisbye, although a tailor named *Mungo Blackye* was admittedly registered as *Moenns Blackye* when he was given permission to set himself up in business with a stall in Elsinore (Kisbye 1988, 210). The girls' name *Gesse*, which Kisbye tentatively identifies as being a Low German hypocoristic form of a Continental Germanic name such as *Giseltrut* (Kisbye 1988, 112 and n. 51), is almost certainly a reflex of Scots *Jessie*, a diminutive of *Janet* (Dunkling 1978, 79), a name which is itself recorded with initial *G-* as *Genete*, e.g. *Genete Craigingelt* (Riis 1988, 58).

The major criticism that can be made of Kisbye's paper on transposition, however, is that he neglected to compare the body of Scottish forenames which he found in Danish sources with the body of names that was in use in contemporary Scotland. Roughly comparative material was readily available in Leslie Dunkling's *Scottish Christian Names* (1978), where the introduction (pp. 7-8) lists the names which occur most frequently in *The register of marriages for the parish of Edinburgh* for the period 1584-1700. Kisbye notes that the majority of the male Scots in Elsinore were called, or rather entered in the records as, *Anders*, *David*, *Hans, Jakob, Jørgen, Thomas*, *Sander* and *Villum*. These name-forms he rightly considers to reflect Scots *Andrew*, *David*, *John*, *James*, *George*, *Thomas*, *Alexander* and *William*. These eight names are among the nine most frequently occurring personal names in the Edinburgh register. The only Edinburgh name that is missing, number four in the list, is *Robert*, a name which Kisbye omitted from his survey because of the possibility of its being of German origin. Comparison with the Edinburgh material shows that Robert should be looked upon as a Scots name in Elsinore. The Edinburgh list also provides useful information about girls' names. The three names which occur most commonly among the Elsinore Scots are *Anne*, *Elisabeth* in various hypocoristic forms, and *Marine*. Kisbye argues that *Marine* is probably a substitute for *Mary* (1988, 112, n.49) but in the light of the fact that *Marion* was the fourth commonest name in Edinburgh and *Mary* only number thirteen on the hit-list, it seems more likely that *Marine* was a Danish substitute for *Marion*.

Five years before the appearance of his study of the names of the Elsinore Scots, Torben Kisbye had published a paper on personal names derived from the Ossianic poems (Kisbye 1983). A revised version of this paper appeared in English translation under the title 'The Ossianic names – A contribution to the history of Celtic personal names in Scan-

dinavia' in 1985 and my subsequent references will be to this later version, in which several errors have been corrected. The so-called Ossianic personal names, e.g. *Oskar*, *Orla*, *Selma*, *Malvina* and *Minona*, all derive ultimately from the works of the controversial Highland author and antiquary James Macpherson (1736-1796). When I was still a student of English literature in London, I looked upon the Ossianic poems as little more than a footnote to the fascination of the English poet Thomas Gray (1716-1771) with Old Norse literature. I was certainly surprised to find that Ossian played a quite prominent role in Danish cultural life, where Niels W. Gade's very popular overture entitled 'Nachklänge von Ossian' (1840) was performed at the very first orchestral concert that I attended in Copenhagen, and where the Danish artist Nicolai Abildgaard's painting 'Ossian sings to his own harp accompaniment' hangs in Statens Museum for Kunst and is frequently reproduced, and where the Danish author Steen Steensen Blicher's (1782-1848) translations of the Ossianic poems (1807-08) are probably better known than are Macpherson's originals in Britain.

Kisbye demonstrated in his paper how important it is to determine the immediate source of a loan-name and not just its ultimate origin. *Oskar*, for example, came to Denmark from Sweden in connection with an immigration of Swedish workers in the second half of the nineteenth century. Ultimately it owed its popularity in Sweden to Napoleon, who, as godfather, had bestowed the name Oscar upon the first-born son of one of his marshalls, Jean Baptiste Bernadotte, in 1799 (Kisbye 1985, 94). Bernadotte was subsequently made King of Sweden and his son succeeded him on the throne as Oscar I in 1844. In Denmark, Oskar, which originally had a modest number of bearers mainly of Swedish birth, temporarily became a so-called "idol-name", when Oscar I decided to side with Denmark in the war against Schleswig-Holstein, and it remained reasonably popular in the nineteenth century. There was a marked decline in the popularity of the name Oskar both in Denmark and to a lesser extent in Sweden, once the Swedish royal house stopped using it. There are, however, approximately 8,000 bearers of the name in Denmark today and the name has enjoyed a tremendous surge in popularity here since Kisbye's paper was published and is even expected to become an "over-fashionable" name (Meldgaard 1998, 117).

Orla, the name of a minor hero in the poems, was introduced to Denmark by a German-speaking family who called their son *Peter Martin Orla Lehmann* in 1810. This Orla Lehmann became a popular and influential National Liberal politician and advocate of constitutional gov-

ernment and the name Orla achieved a moderate popularity in Denmark. There are approximately 8,200 bearers of the name today, most of them probably rather elderly. Its comparative lack of success seems likely to reflect the fact that it is one of the very few names ending in *-a* in Danish which is not a girls' name.

Selma is a place-name in the poems but because it appears in such phrases as "the sons of Selma", translated into Danish as "Selmas sønner", it was mistakenly taken to be a feminine personal name. Kisbye explains its early popularity as a personal name in Sweden as a result of the popularity of the Selma poems by the Finno-Swedish poet Frans Michael Franzén (1772-1847). After its introduction to Denmark by Swedish immigrants, its popularity was further encouraged by the spread of the works of the Swedish author Selma Lagerlöf (1858-1940). The name Selma, with approximately 1,600 bearers, now seems to be enjoying a minor boom in Denmark (Meldgaard 1998, 240).

Another feminine name, *Minona*, was probably introduced to Denmark from Germany. The poems of Ossian influenced both Klopstock and Goethe and the latter included translations from the 1765 edition of Macpherson's work in his first novel *Die Leiden des jungen Werthers* from 1774. The German-speaking Danish poet and critic Heinrich Wilhelm Gerstenberg, who was born in Tønder in 1737 and was responsible for arousing interest in Germany in Shakespeare and Danish ballads, composed a not very successful Ossianic tragedy entitled *Minona oder die Angelsachsen* in 1785. The literary influence led to a minor fashion in Ossianic personal names in German cultural circles. Minona von Stackelberg, born in 1813, was officially the daughter of the Hungarian Countess Josephine von Brunswick and the Russian Ambassador in Vienna, Count Gustav Magnus von Stackelberg. Her mother, however, is claimed to have said that the girl's father was in reality the composer Beethoven, from whom the countess is believed to have received a proposal of marriage before she married the Ambassador (Seibicke 1977, 243). In Denmark the name Minona did not come into use until the mid-nineteenth century. There are about 50 bearers of the name at the present time.

The only Ossianic name which was introduced to Denmark directly as a loan from the Ossianic poems would seem to be the feminine name *Malvina*. This makes its appearance as early as 1811 and occurs quite frequently there among upper- and middle-class families in the nineteenth century, probably as a result of literary influence (Kisbye 1985, 97). Strangely enough, Kisbye neglects to mention that Blicher, whose

free translations of the Ossianic poems into Danish were largely responsible for their great popularity in Denmark, gave the name *Malvina* to one of his daughters, who became his favourite one. At the present time there are approximately 220 bearers of the name Malvina in Denmark.

Several important points are raised by Kisbye's Ossian paper. Firstly, there is the problem of whether the personal names in question can really be considered to be of Celtic origin. Fiona Stafford's sober assessment of the poems themselves is that Macpherson "drew on traditional sources to produce imaginative texts not modelled on any single identifiable original" (Gaskill 1996, vii). This would also seem to be true of the personal names in the poems. As far as the routes taken to Denmark by the names are concerned, Kisbye has shown that these varied. Oskar came from France via Sweden, Orla from Germany, Selma from Sweden, and only Malvina was probably derived directly from Macpherson. There is also the question of "idol-names", which Kisbye had treated earlier (1984). The original popularity of Oskar among Danes in Denmark reflects the temporary popularity of Oscar I of Sweden, while that of Orla certainly reflects the popularity of Orla Lehmann. Once a name has achieved the status of an idol-name in a country, however, its survival depends not on the continued popularity of the idol concerned but upon the name's being adopted in general use. Most babies are not named directly after "idols" but rather after some relation, friend or acquaintance of the parents. The original model may be forgotten in the process.

There is a sting in the tail of this story. Oscar Wilde, whose father was eye-surgeon to King Oscar II of Sweden, was given the names *Oscar Fingal* (another Ossianic name) *O'Flahertie Wills Wilde* in 1854, perhaps as a gesture of respect to the Swedish monarch, but that it was also because of the literary and national background of the name is shown by his mother's comment in a letter to a friend: "He is to be called Oscar Fingal Wilde. Is not that grand, misty and Ossianic?" (quoted in Gaskill 1996, v). Probably as a result of Oscar Wilde's trial and public disgrace in 1895, which turned him into a kind of "anti-idol", the popularity of the name declined in the British Isles but it has survived, and not only as a name for dogs, as Charlotte Mary Yonge claimed was the case as early as in 1863 (2. 92), and *Oscar* may well come to experience the same kind of renaissance there as in Denmark.

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Thinking about the environmental history of Scotland and Denmark since 1600

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Introduction

I need to begin these remarks with a confession as to my own very incomplete knowledge of the state of environmental history in Denmark. I have read, with great attention, the work of three Danish scholars whose focus has been on the period since 1600: Thorkild Kjærgaard, whose book, *The Danish Revolution 1500-1800: An Ecohistorical Interpretation* (1994), I found stimulating and provoking – particularly the first half – though I believe that many Danish historians now regard it sceptically; Bo Fritzbøger, *Kulturskoven: Dansk skovbrug fra oldtid til nutid* (1994), which I read rather slowly as my Danish needs improvement, but with great care as I myself am engaged on a history of Scottish woods: it is surely a model of what good woodland history can be; Kenneth Olwig's work on the Jutland heaths, *Nature's Ideological Landscape* (1984), which (taking an approach that owes much to modern American geographers), dealt with the changing meaning of a landscape particularly evocative to Danes.

To this I must add works on the history of biodiversity. Bernt Løppenthin, *Danske ynglefugle i fortid og nutid* (1967), was a pioneering study of Danish bird distribution since the last ice age; recent works have been in the "atlas" tradition pioneered in Britain, such as Michael Borch Grell, *Fuglenes Danmark* (1998), Michael Stoltze, *Danske dagsommerfugle* (1996), and Ole Fogh Nielsen *De danske guldsmede* (1998). As studies of birds, butterflies and dragonflies they concentrate on the more recent past.

I am aware that there must be many Danish scholars in these and other aspects of the multi-faceted subject of modern environmental history

of whose labours I am unaware: but at least my ignorance gives me an excuse to start by proposing four areas where we could look at Danish and Scottish experience in parallel – the history of soil fertility in organic agriculture, exemplified by Kjærgaard; the social and cultural history of woodland use, exemplified by Fritzbøger; the history of attitudes to nature and landscape, exemplified by Olwig; and species history. In each area it seems to me that there is scope for fruitfully comparing and contrasting Scottish and Danish historical experience, possibly even for formal joint research programmes between scholars in each country.

1. The history of soil fertility

To put it very simply, the Kjærgaard thesis is that Danish agricultural soils were suffering from acute and accelerating stress on the eve of the great agrarian reforms of the eighteenth century, caused essentially by deforestation since the sixteenth century, rising water tables and nutrient depletion: the introduction of red clover saved the day by restoring accessible nitrogen, assisted by other aspects of the agricultural revolution such as better drainage, cheap iron ploughs and a rationalised policy of woodland conservation. I confess to having doubts as to whether the cause adduced by Kjærgaard is sufficient and I see his contribution also within a context of British debate on medieval English history and the so-called Postan thesis, which raised the question as to how far the manorial fields were suffering from exhaustion as early as the fourteenth century. This problem has recently been addressed by a group of scholars working on Cuxham in Oxfordshire, analysing chemical inputs and outputs from the wonderfully detailed English agricultural records, and concluding that if there was a problem with manorial sustainability it was probably related rather to phosphorus than nitrogen.

Kjærgaard's work struck a chord for me, contemplating the shortcomings of Scottish agriculture at the start of the eighteenth century. His argument implied that seventeenth-century Denmark was poor and getting poorer, because it was an agrarian country depending largely on subsistence farming and there was a deteriorating soil base to support it. But Scotland was poor and evidently getting poorer, too – it probably had a greater rate of emigration than any other seventeenth-century European state; its wage rates were stagnant or falling

for a century after 1650; the people's diet between 1600-1750 contained less meat and more oats than before, which most people would regard as a fall in the standard of living even if it may imply healthier eating habits. What if Kjærgaard's argument could be applied equally to Scotland? In this case, recent deforestation was implausible, but a long-term failure in sustainability in peasant agriculture (particularly on marginal lands) was not. Often, observations on the poor performance of Scottish farming by later eighteenth-century agricultural improvers have been put down to their wish to emphasise their own achievements by denigrating the practices of their forerunners, or alternatively explained as the description of a husbandry not needing to improve output above subsistence since the market was not available to dispose of a surplus. But it may be that such accounts simply describe the shifts of a peasantry unable to do better on a stressed and deteriorating soil. Clearly the Scots (like the Danes) very successfully cured the problem in the later eighteenth century, and red clover was again an important part of the explanation, though liming and other calculated forms of soil improvement probably deserve at least equal weight. Since the soil of most of Denmark is basically calcareous and that of Scotland largely acid, the emphasis on lime in Scotland is understandable.

The problem lies in proving any thesis relating to nutrient depletion in soil. How do we know whether Danish or Scottish soils at the start of the eighteenth century contained less nitrogen, potassium or phosphorus than earlier, or if later soils contained more? The kind of input-output analysis carried out at Cuxham – and even that was suggestive rather than conclusive – certainly cannot be done from Scottish farm manorial or state documents, and I doubt if it could from Danish equivalents. Can archaeologists and soil scientists come to our rescue by the scientific analysis of buried soils, for example beneath datable buildings and enclosure walls? Can we find representative and datable soil profiles of the seventeenth and eighteenth centuries, and compare both their structure and chemical analysis? I put this question to my friend and colleague Professor Donald Davidson of Stirling University, who replied that it had never been done before but that it was not necessarily unfeasible. Most work on buried soils has been related to prehistory, but Professor Davidson's own detailed work on the medieval and early modern soils of Shetland and Orkney is paralleled to a degree by work on similar medieval plaggan soils in the Netherlands and in Denmark (by Professor Stoklund among others) and shows the potential for ap-

plying this science to historical problems. Investigations at a single site like Papa Stour, where undisturbed soils around an ancient farm settlement can be located, and shown to have been deepened and enriched for centuries, are necessarily different from investigations of a range of sites occurring almost by chance in the landscape under walls and buildings. Problems of typicality and sampling would arise: but nothing ventured, nothing won.

2. The social and cultural history of woodland use

Here one is struck equally by contrasts and similarities of national experience to which Professor Jeff Maxwell has already alluded, and a rich field for comparative environmental history suggests itself.

In both countries, in the first place, there was a gradually increasing sense from the late Middle Ages that there was a need for more wood cover, and for that which existed to be better treated. In Scotland, this manifested itself in desultory legislation enjoining owners and tenants to plant trees and threatening punishment for damaging plantations, between the fifteenth and the seventeenth centuries, which failed to prevent a steady decline in woodland cover until it reached, probably, a low point of about 4% of the land surface in the middle of the eighteenth century. By then, however, though the state had ceased to concern itself in the matter, individual improving land-owners had begun to consider the reafforestation of Scotland as a kind of patriotic virtue. The history of Scottish forestry in the modern sense begins with the writings and plantings of such nobles as the Earl of Haddington in the 1730's and the strenuous efforts of the Duke of Atholl later in the century – he who not only introduced the larch to silviculture, but allegedly fired cannon loaded with tree seed bombs, to burst on the inaccessible precipices of his estate. Meanwhile, throughout the country, landowners responded to rising prices for charcoal and tanbark by unilaterally excluding peasant animals from their broadleaf woods, and introducing relatively sustainable regimes of fencing and cutting coppice on rotation. In the nineteenth century, the landowners were patrons of the great seed collectors and explorers like David Douglas, who alone was responsible for introducing from North America the Sitka spruce, lodgepole pine and Douglas fir, the three most valuable exotic species in modern forestry in northern Europe. Individual lairds themselves often

went to great personal efforts to reclothe their lands in trees, but, thanks to the decay of the old coppice system as prices sank for charcoal and bark, at the end of the Victorian period it is doubtful if there was any more land covered in wood than there had been around 1750. It was left to the twentieth century, and to the example set by the Forestry Commission established by government in 1919, to increase the proportion from 4% of the land covered by wood to the 19% at which it currently stands.

The situation in Denmark is interesting because of the more serious and sustained intervention by the state from a much earlier date. Although even at its nadir the extent of woodland cover was probably a rather larger proportion of the land surface in Denmark than in Scotland, the sense of a crisis in wood supplies was much greater in Denmark. As early as 1681 it was forbidden by law to convert Danish woods to any other use – this, of course, does not mean that such conversion did not happen thereafter, but a statute of this sort was quite without parallel in Scotland, then or later. In the eighteenth century the leadership in modern forestry was associated with the so-called Gram-Langen reforms on crown land, encouraged by the great noble bureaucrats like Reventlow but essentially state-led rather than estate-led. The critical statute of 1805 altered the basis of woodland law, abolished rights of wood pasture, and in many respects put the landowner in the driving seat in forest management. Yet it also constrained what he could do in important ways: it was declared, for example, that all areas with mature trees (*overskov*) in 1805 should remain wood for ever, (a more effective repetition of the 1681 act). Danish law also protected the rights of public access to private woods: in Scotland, the purported and traditional "right to roam" is claimed over open land, but not over wood.

So one interesting question for comparative forest history relates to the relative role of the state in Scotland and Denmark. It is tempting to argue that the political ideology of the land of Adam Smith was different from that of the land of Count Reventlow, but that would be too superficial if only because Smith's free trade ideology hardly took root in Britain before the middle of the nineteenth century.

I would like to suggest two better reasons. The first is that the need for wood always had much greater urgency in Denmark than in Scotland. Scotland did not really have so urgent a need of wood for fuel – it was a land abounding in peat and coal, and only quite locally (for example on east Loch Lomondside) did peasants feel themselves to be

dependent on wood fuel. The biggest cities – Edinburgh, Glasgow – were black with coal-smoke from early modern times. Even the demand for charcoal for the eighteenth-century iron industry was trivial compared to further south – the Forest of Dean and the Weald in England supported several times as many blast furnaces and forges at any one time as the whole of Scotland. For Denmark, on the other hand, wood was often the only practicable fuel available, apart from, in places, inferior turf. Certainly wood was the only fuel possible to warm most people in Copenhagen, and the law of 1805 was triggered by a panic over a fuel shortage in the capital the previous winter.

Then there was the question of ship-building wood. Given Scotland's scrubby west-coast oak and knotty pine, England had more or less written her off as a supplier of naval stores, after experiments in the seventeenth century. The building of the frigate *Glenmore* from Speyside pine in the 1780s was not repeated again by the Royal Navy after its one serious eighteenth-century venture into the same matter. So Scotland was under no pressure to produce military timber, though patriotic lairds in the Borders encouraged by their neighbour Admiral Collingwood planted, after Trafalgar, avenues of what are still referred to in that region as "Collingwood oaks". In Denmark, the Admiralty traditionally reserved oaks in royal forests for building warships (it was still reserving 3,000 in 1965), but in practice most naval timber came to Denmark from its dependency in Norway. However, when the Norwegian part of the realm was handed to Sweden in 1814, the Danish state began again to take very seriously the need to grow its own naval timber, not of course foreseeing how quickly technology would change. So the intervention of the state in Danish woodland history is partly explained by the greater importance of wood as fuel and as military supplies compared to Scotland.

It is also explained, I suggest, by the different ownership position of woods in Denmark and Scotland. In Scotland the legal situation was simplicity itself: the landowner owned all the woods, and ordinary tenants, while they might by tradition be allowed to pasture their animals in the woods, to cut firewood or fell branches and trees for building or for tool making, had absolutely no rights in law to carry out any of these activities. When, after about 1760, Scottish lairds decided, in the face of rising prices for charcoal and bark, to enclose their woods, evict the goats, cattle and sheep from them, and to sell to the tenants (if necessary) the timber they had simply helped themselves to before, they

needed no law to help them to do it: the lairds' *dictat* legally removed the traditions of centuries. In Denmark, by contrast, legal rights to wood were a mass of complexity. Some landowners owned them as absolutely as in Scotland, but a commoner situation was for the peasants to have legal rights both to pasture in the woods and to cut the understorey trees (*underskov*) but the lords had the ownership of the high timber (*overskov*). It is not surprising that, when pressure for resources was on, as it was in the eighteenth century, *underskov* was not allowed by the peasants to grow back to *overskov* once a tree had been felled by the lord, so control over the woods began to pass to peasants: in the lords' view, the forests were of course being mismanaged and kept as scrub. The only way out of this *impasse* was to change the law: the statute of 1805 extinguished grazing rights in the wood and effectively transferred control over wood management exclusively to the lords, though with quite generous compensation to the peasants, which allowed them under some circumstances to transform existing areas of *underskov* to pasture or to arable fields. The details as explained by Fritzbøger are complex, but the point is clear: the existing law was so complicated that the state had no option but to step in with statute to change it. There was no such need for a change in the law in Scotland, so the state did not become involved.

A further intriguing point of contrast is the right of access to woods in the two countries. In Scotland, once the landowner decreed the woods shut, no-one could enter them without his permission unless an existing right-of-way such as an old cattle drover's road crossed them, and even then the landowner sometimes attempted to deny access, especially when in the nineteenth century sporting rights became of significant value. Poaching and trespass became big issues. In Denmark, as I understand it, a long-standing right of access to the woods for recreation or to gather berries was enshrined in law, and landowners could only shut their woods for very specific purposes, such as on days when a shoot was actually taking place or when there was a high risk of fire in dry weather. In Scotland, therefore, the tradition of using woods for recreation is recent and poorly developed, except now on the Forest Commission's property. But in Denmark the tradition is old and very highly developed; Danes spend on average 30 hours a year in the woods, and twice as many Danes go to the woods (public and private) as to their public libraries, and four times as many as to their theatres. The relative cultures of woodland recreational use is something else to probe, measure and compare.

3. The history of attitudes to nature and landscape

Consideration of how the public perceive and use woodland leads very naturally to our third topic, focussed on Olwig's study of the changing attitudes towards nature and landscape encapsulated in the history of the Jutland heaths. Olwig's work should be read not only by historians and geographers but by everyone concerned in countryside and conservation planning in north-western Europe. The story it has to tell is at once fascinating, subtle and sobering. Very much to simplify, the broad expanses of the Jutland heaths were discussed in the eighteenth century in terms of a dispute as to whether their inhabitants were full of Gothic virtue because far from the corrupting city, or souls degraded by their savage environment and by their distance from a benevolent improving centre. The parallel between the contemporary Scottish debate about the Highlanders is obvious, and there are links and cross-overs. For one thing Montesquieu's ideas about the influence of environment on people were enthusiastically received in Denmark because he located the seat of primitive virtue in the northern environment of Scandinavia: but they also resonated in Scotland, where Macpherson's *Ossian* appeared to corroborate the notion of virtue nurtured in the Highland wilderness. Ossianic notions in turn resonated back in Germany and Scandinavia (as Dr. Fellows-Jensen has demonstrated at this meeting in relation to personal names like Oscar and Selma). At the same moment as some Danish intellectuals were planning the reclamation of the heaths, others were admiring them as cultural reservoirs of an ancient primitive and virtuous people, in the same way as the heaths' archaeological remains preserved traces of an ancient past. Again, the parallel with the Highlands, simultaneously praised as romantic and wild by intellectuals and subjected to clearance and improvement by practical men, is very close. The ambiguity of Walter Scott towards an area at once "the fairy ground for romance and poetry" and the "subject of experimentation for professors of speculation, political and economical", is paralleled in the ambiguity of Jutland's greatest writer, Steen Steensen Blicher, torn between admiration of the wild landscape and sympathy for the people who had to live in it.

In Scotland, the Victorian interpretation of Scott and the romantic poets enabled the visitor to emphasise the wildness of Highland Scotland and to forget all about the people: as the crofters disappeared, this became progressively easier to do, until the Highlands began to be seen

as wilderness almost in the American sense, full of lonely places where the urban soul could be refreshed by the solitude, or by the physical challenge of the mountains.

In Denmark there was no clearance from the heaths, though they were no less sheep country: rather, population increased unhampered. Blicher ultimately resolved the ambiguity in his own mind by opting for the people – but for the people in their landscape setting. In doing so, he created a new type of interest for the landscape, as embodying the history of its inhabitants – a cultural landscape rather than simply a wild landscape. This was to have an enduring effect both on the perception and on the later use of the heaths.

The nineteenth century saw enormous change in Jutland – under Dalgas and *Hedeselskabet*, the improvers won, and the heaths largely disappeared beneath conifer plantation and arable cultivation, part of a great nationalist effort to compensate by reclamation for the loss of Schleswig-Holstein to Prussia: "What is lost without must be won within". But when in the twentieth century the wheel turned again, thinkers like Jeppe Aakjær condemned Dalgas and the improvers for class-biased, technocratic vandalism and demanded the preservation of what was left of the heaths as a cultural landscape, a memorial to a vanished people.

The Danish conservation movement in the twentieth century, like that in Scotland and elsewhere in the western world, has been inspired also by a perceived need to provide open space for recreation, and by nature conservation considerations. Olwig indeed has serious and relevant criticisms of Danish conservation that we will also recognise in Britain, especially that it has been overly based on the idea of reservations (so that biodiversity outside reserves has been allowed largely to degrade) and that conservation has mistaken nature for a given thing rather than an active process. Most of the heaths are now vanishing under regenerated trees since nature could not be stopped in its tracks because conservationists wished to keep the cultural landscapes of Blicher and Aakær.

Where I think the Danish tradition may differ, at least in emphasis, from the Scottish, is, however, in the importance accorded to the idea of a cultural landscape. In Scotland, we eventually managed to elide the countryside recreation and nature conservation interest in the care of one body, Scottish Natural Heritage, but we have left Historic Scotland alone to wrestle with the human past. Until recently, the emphasis in Scotland has been on archaeological sites rather than on cultural land-

scapes. Orkney is an exception, where the setting of the sites – perhaps because they are so numerous – has been accorded sensitive treatment. Contrast that with the setting of the stone circle of Callanish in Lewis or of Sueno's stone in Forres and Balfarg in Glenrothes, or (until very recently) the treatment of most Scottish archaeological sites by forestry planters, such as the larch planted over the astonishing Neolithic *cursus* known as the Cleaven Dyke. Countryside planning in Denmark has, in my judgement, succeeded far better than its equivalent in Scotland because it internalised, early in its development, this idea of a cultural landscape as an integral part of the total man-made and natural heritage that needed to be preserved; and the Danes legislated accordingly.

4. Species history

Finally, it is worth taking a glance at the history of biodiversity. What impact have human economic activities and presumptions about nature had over the last four centuries over some of the other species that occupy or occupied Denmark and Scotland? Løppenthin's work on birds is one of the few in either country to attempt a long perspective on this for any group, though in both countries there are now well-based studies on changes in bird distribution over the last half century. Stoltze and Nielsen's studies of insects take a shorter timespan, dividing distribution maps into records before and since 1990, and there are comparable studies in the UK. Reading all this literature carefully, one is again struck by both similarities and contrasts. Some are no surprise at all. We would have expected, and we find, in both countries a decline in the birds of arable fields, such as skylark, corncrake, corn bunting and grey partridge, and a decline in the birds of farm wetlands, such as snipe and redshank, in the countrysides of agrichemicals and deep drainage that have arisen since 1945. We would have expected, and we find, in both countries, a decline in the birds of freshwater marshes, such as the bittern and the crane, but also that it would be greater in Scotland than in Denmark because even more of this habitat has been lost: both the bittern and the crane have been extinct in Scotland for two centuries or more, but both still breed in Denmark.

We would probably have expected birds of prey to decline sharply in both countries after about 1830 with the perfection of the modern shotgun and its cartridge and the fashion for game preservation, and probably that there would be a limited recovery in the late twentieth century

as attitudes towards raptors changed. In Scotland the intervention of people was needed to reintroduce the goshawk, the red kite and the sea-eagle, but in Denmark they spread or reintroduced themselves. What seems peculiar to Scotland, though, is the continued, widespread and now illegal persecution of raptors by gamekeepers: this is a function of a long history of untrammelled power by landowners in Scotland, many of whom still consider themselves above the law in the management of their estates, while in Denmark they were long ago brought to heel.

One would expect birds of open country like the golden plover to do badly in Denmark once the heaths were enclosed. The severe decline since the eighteenth century of certain upland species in Scotland, like the ring ousel, needs more explanation: the open habitat is still there but now much degraded by overgrazing. It is intriguing, but mysterious, why both in Denmark and Scotland the woodcock was hardly known as a breeding bird before the nineteenth century, though it is quite common in both countries now. Other species that seem to have been long and firmly established in Denmark, such as the gooseander and tree sparrow, probably also only arrived in Scotland in the nineteenth century: perhaps both they and the woodcock represent colonisation pushing from the east, like the collared dove in our own century. The spread of the goldcrest over much of Scotland dates from the late eighteenth century, half a century before its arrival in Denmark: this may be connected mainly to the differential spread of conifer plantations in the two countries. The starling appears always to have been common in Denmark, but in the late eighteenth century was absent from most of Scotland after having perhaps been more numerous earlier, before making a remarkable comeback in the first half of the nineteenth century and now being rapidly on the decline again. Species history of this sort is full of conundrums, but across Europe we would probably understand more about biodiversity change if we could properly correlate such individual stories.

When we come to insects, I confess myself largely baffled. The standard Scottish book on butterflies suggests decline this century for perhaps half a dozen species – small blue, northern brown argus, marsh fritillary, pearl-bordered fritillary and wall: some – orangetip and ringlet – are making up ground lost in the nineteenth century, perhaps as air pollution decreases. In Denmark, however, where the butterfly fauna is in any case considerably more varied, the majority of species are sharply contracting their range and several have become extinct. The evidence for dragonflies, though less clear, seems much the same. In

Denmark, with a comparatively rich fauna in both groups, many species which were formerly widespread have in recent times rapidly declined, and appear to have vanished from former sites. Some have become extinct. In Scotland, a more restricted fauna has apparently suffered less.

For both groups of insects, there is a greater similarity between the situation in Denmark and England than between Denmark and Scotland, and perhaps the explanation may be the same: habitat there is more fragmented than in Scotland, which still has large stretches of continuous semi-natural habitat in the uplands. The isolation of sites results in all the problems of island ecology where small populations are subject to inbreeding and are difficult or impossible to refresh genetically from outside. What we see happening to butterflies and dragonflies must be reflected in very many other invertebrate groups, if we knew enough about them.

Then there is the whole question of how species history can illuminate wider problems of modern concern, such as global warming. The collection of data to construct a time-series is recognised as of critical value as a monitoring device. While it is not reasonable to expect historians to be able to uncover much in the way of detailed time-series from earlier documentary sources, they can sometimes give an outline that goes back much further than our current anxiety over climate change. The immigration of southern species is obviously a case in point; it has been a feature of at least the past century and a half that some southern or south-eastern species of birds have been pushing north. The pochard, for example, arrived both in Scotland and in Denmark around 1850: the black-necked grebe bred first in Denmark in 1872, in Scotland in 1930; the golden oriole arrived in Denmark around 1850, the black redstart around 1870, the serin and the short-toed treecreeper around 1950 – none of these have yet colonised Scotland, though two have established themselves in England.

Among insects, the dragonfly *Aeshna mixta* is a good example of a species that has pushed north in Denmark since the beginning of the century, as indeed it has in England, but, again, not yet made it to Scotland. The best explanation of all these range expansions is recovery from the Little Ice Age, that period of cooling in European history that reached its nadir in the seventeenth century. Some of the invasions are evidently recolonisations – the golden oriole in Chaucer's day had a vernacular English name, the 'woodweal'. This is not to deny the reality of modern global warming, of course, merely to point out that envi-

ronmental history can show how it is superimposed upon another trend of rebound from a period of global cooling.

On the other hand, in the last half century Scotland has been colonised by small numbers of a group of characteristically northern Scandinavian birds, including redwing, wood sandpiper, purple sandpiper, Temminck's stint and goldeneye. One explanation here, especially since few of the colonists have shown much ability to spread and become numerous, apart from the goldeneye in Speyside, is that weather patterns on spring migration since the 1960's have led to more easterly winds in May (the so-called blocking anti-cyclone) which has deflected small numbers of Scandinavian birds in breeding condition into Scotland, where they have nested, in marginal habitat and only with limited success. The swings and roundabouts of species history certainly cannot be interpreted solely by a model of recent anthropogenic climate change.

Conclusion

I hope I have done enough in this brief presentation to encourage you to agree that there are interesting questions in environmental history where a Danish/Scottish comparison is relevant. I am very aware of how much I have omitted by constraining myself to the last 400 years. Had I for example, gone back into the realm of prehistoric archaeology, of palynology and dendrochronology, we should have been here all morning. Both in that earlier time, and in the later period, with which I have been dealing, it is abundantly clear that there are areas where scholars in the two countries can work in parallel, perhaps even in partnership, to illuminate larger problems than we could solve if we worked in isolation.

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Nordic-Celtic links in folk literature

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1.

One of the best known monuments of Old Norse-Icelandic literature is the *Codex Regius* of the Poetic Edda, so called because it was formerly preserved in the royal collection of manuscripts in Copenhagen. This vellum codex dates from the thirteenth century and transmits nearly the whole extant corpus of Norse mythological and heroic poetry. It is a potent cultural symbol for Icelanders of today, and was accordingly one of the first treasures to be repatriated when it was decided to give back most of the manuscript books that had been brought to Denmark centuries ago while Iceland was still a Dano-Norwegian dependency (cf. the new and detailed account by Sigrún Davíðsdóttir 1999).

The commonly held view is that the poems of the Codex Regius enshrine the ancient myths of Norse paganism together with those no less ancient epic tales of heroes and heroines that the Vikings to a large extent shared with their Germanic cousins on the continent of Europe. The Danish medievalist and folklorist Svend Grundtvig, for example, writing in the second half of the nineteenth century, was firmly convinced that these myths and legends were part of the cultural baggage that accompanied the Viking colonists when they crossed the North Atlantic to establish settlements in the Northern and Western Isles of Scotland, the Faroe Islands, Iceland, and, ultimately, Greenland (see e.g. Grundtvig in Chesnutt and Larsen 1996, 12-13). A generation later the Icelander Finnur Jónsson, who was a professor at the University of Copenhagen, emphasized the Norwegian background of much of the oldest Icelandic literature (Finnur Jónsson 1907), and later still a Norwegian historical linguist, Didrik Arup Seip, argued that the Eddic poems of the Codex Regius had been copied in whole or in part from lost Norwegian originals (Seip 1951).

This culturally monolithic viewpoint has not, however, stood alone

over the years. It was challenged as early as 1878 by the Icelander Guðbrandur Vigfússon, who proposed to find the home of the majority of the Eddic poems in the British Isles. Guðbrandur Vigfússon was an emigré scholar working in Oxford, where he edited Norse texts for the Clarendon Press and the Rolls Series and compiled his famous Icelandic-English dictionary; it is perhaps not unlikely that he was influenced in his thinking by Matthew Arnold's lectures 'On the study of Celtic literature' from 1866, for he states himself that he had conceived his theory of the Eddic poems at the end of the 1860s. After their belated publication Guðbrandur Vigfússon's ideas were developed by the imaginative Norwegian philologist Sophus Bugge, who argued that the Norsemen in the British Isles had come into contact with elements of Christian and Classical literature that they imperfectly understood, and that they supplied raw material to a Norse-Icelandic oral tradition in which such elements were distorted and remodelled. Remarking that Irish literature offers the only European examples of vernacular prose epic antedating the Icelandic saga corpus from the High Middle Ages, Bugge also wrote a speculative study in which he proposed that the Norsemen had already practised the saga art in their period of political and military dominance in Ireland, a period that terminated with the famous battle of Clontarf in the early eleventh century (Bugge 1901-08; cf. Chesnutt 1989, 35-36 and notes).

Guðbrandur Vigfússon's and Bugge's challenges to the Germanic-Norse paternity of great monuments of Old Icelandic culture were not allowed to go unanswered. Their theories, and those of the following generation of scholars whom they inspired, were successively denied by patriotic Icelanders such as Benedikt Gröndal and Finnur Jónsson. Indeed, long after Bugge's death Finnur Jónsson devoted an entire volume of the communications of The Royal Danish Academy of Sciences and Letters to a wholesale refutation of the so-called 'Irish hypothesis' (Finnur Jónsson 1921; see also Gröndal 1880/1950). A principal target of Finnur Jónsson's criticism in this volume was the Swedish folklorist Carl Wilhelm von Sydow, who had made comparative studies of some supposedly mythological material in the *Prose Edda* of Snorri Sturluson and produced the provocative result that it was not really indigenous Northern myth but Celtic folklore that had reached Iceland from the West. It was emphasized by von Sydow that Gaelic analogues to the Norse myths are particularly concentrated in the Ossianic tales of Finn mac Cumaill and his Fiana, this being interpreted as a sign that Norse

mythology had assimilated elements from Irish folk tradition rather than from the more aristocratic literary repertoire represented by the Old Irish Ulster cycle (see *inter alia* von Sydow 1920).

A decade ago I discussed the polemic between Finnur Jónsson and von Sydow in some detail (Chesnutt 1989), and there is no need to repeat that discussion. What should, however, be highlighted at this point is that the possibility of a Gaelic impact on Norse-Icelandic tradition, having been sympathetically considered by Germanists and Celticists alike around the turn of the century, was increasingly discounted in Germanist circles after Finnur Jónsson's book of 1921. I can see several factors at work here. One is the emphasis of Icelandic scholars after the foundation of the University of Iceland on the learned European prerequisites of medieval Icelandic written culture, an emphasis that was clearly intended as the contribution of the national philology to preparing Iceland for independent statehood, and to which foreign students of the Eddas and sagas for a long time uncritically deferred (cf. Robinson 1992, 132). Another factor is the estrangement of folkloristics and philology provoked by the insistence of some folklorists, not least von Sydow himself, that oral tradition lives according to laws quite independent of written literature. To the extent that such folklorists convinced themselves and their philological colleagues of the legitimacy of this position, they diminished the scope of active collaboration on problems of source analysis.

It is therefore not altogether surprising that the 'Irish hypothesis' has survived as a concern of folklorists and Celticists rather than philologists and Germanists. In Iceland its only proponent of note in the mid-twentieth century was the literary historian Einar Ól. Sveinsson, who significantly had studied the Icelandic folktale early in his career (cf. Einar Ól. Sveinsson 1929, 1940). In Scandinavia the topic was sporadically treated by folklorists who had been influenced by von Sydow, particularly by Inger M. Boberg of Denmark and Anna Birgitta Rooth of Sweden (cf. Boberg 1934; Rooth 1961). It was only in Norway, however, that any systematic work was done in the period after World War I, and this was due to a special combination of circumstances. One was the emergence in Oslo of a small but highly respected group of Celtic linguists led by Carl J. S. Marstrander: this constituted an academic resource that made it possible for the folklorist Reidar Th. Christiansen to learn Scottish Gaelic and Irish well enough to carry out large-scale studies of Ossianic balladry and the Irish folktale (Christiansen 1931, 1959; *Lochlann* 1958-65). Another circumstance was the intellectual

symbiosis into which these Celticists entered with the Nordic philologists Magnus Olsen and Anne Holtsmark, resulting in outstanding contributions to the interpretation of Old Norse poetry in its Western context. It does not detract from the importance of its achievements that a patriotic driving force can be discerned behind the efforts of this Oslo school, which in that regard was not unlike the Icelandic philologists of the same period. The Norwegian researchers certainly wanted to elucidate both written and oral sources in the context of a former Norwegian cultural presence in the British Isles and North Atlantic, and their programmatic aim is implicit in the name of the Institute for Comparative Research in Human Culture (*Instituttet for sammenlignende kulturforskning*), an umbrella organization created in Norway in the 1920s. Here linguistics, folklore, and philology were all to be harnessed to the task of historical explanation, an admirable purpose that regrettably seems to have been abandoned as Norwegian humanities (and folkloristics in particular; cf. Chesnutt 1993, 245-46) succumbed to postwar paradigmatic temptations emanating from North America.

In the British Isles itself there has been a relative dearth of independent contributions to the Norse-Celtic discussion in the present century, but the positions adopted by Celticists have their own patriotic overtones. Irish scholars are inclined to sympathize with the line laid down by Guðbrandur Vigfússon and Bugge, making little secret of their assumption that the superiority of Celtic over Nordic civilization in the Viking Age would make it more likely for the latter to borrow from the former than vice versa. Scotsmen, on the other hand, are disposed to see significant cultural influences accompanying the Norse settlement of the Highlands and islands, grasping whether consciously or otherwise at the opportunity to differentiate the Scottish Gaelic from the dominant Anglo-Saxon inheritance. The validity of this emphasis on the Viking substratum in Gaelic culture ultimately derives from the authority and opinions of the nineteenth-century German Celticist Heinrich Zimmer; it is a viewpoint that surfaces as early as the work of the Rev. Neil Mackay in the 1890s to continue through George Henderson's book on *The Norse Influence on Celtic Scotland* from 1910, and indeed, wherever Hebridean lore and literature are discussed, the Norse settlement and the independent status of the Kingdom of the Isles until the end of the Middle Ages is liable to be adduced as a contextual factor (see e.g. Zimmer 1888; Mackay 1897; Henderson 1910; Matheson 1938, xlii). The Oslo Celticists have provided additional ammunition over the years

with their studies of the Norse impact on Hebridean toponymy and phonology (e.g. Oftedal 1964, a modest article with particularly far-reaching historical implications).

2.

The majority of writers who have dealt with the similarities between early Gaelic and Norse tradition treat the Viking Age as the period of productive interaction *par excellence*. On this view, all intercultural exchanges of significance would have taken place by the beginning of the eleventh century at the latest. In Iceland, where genetic studies have estimated the Celtic element in the early population at anything between about 15 and 40 per cent (cf. Gísli Sigurðsson 1988, 40), the preferred interpretation is that a significant proportion of settlers in the new country made their way there via the Celtic West, intermarrying en route and taking their (bilingual) offspring and slaves with them when they eventually remigrated. Inspired by Einar Ól. Sveinsson and the Cambridge Celticist Nora K. Chadwick (see e.g. Einar Ól. Sveinsson 1959, 1975a; Chadwick 1953-57), the Icelander Gísli Sigurðsson and the Englishman Peter Robinson have both used the Gaelic substratum in the settler population to explain the survival of great numbers of typically Celtic motifs in the mythical-heroic sagas. This is a genre that they envisage as emerging in writing from a long period of oral gestation among Icelanders of partly Gaelic descent (Gísli Sigurðsson 1988, 48-51; Robinson 1992, 130-31). The construction circumvents at least one of the obvious objections to the 'Irish hypothesis' in its older form, for it has always seemed doubtful how much peaceful intercourse could be assumed between Celt and Viking in the British Isles during the turbulent ninth and tenth centuries. Nor does the paucity of Norse loanwords in Old Irish and of Old Irish loanwords in Norse-Icelandic do anything to encourage a picture of intense contact – a fact that was stressed by the Scottish philologist William A. Craigie at an early stage in the debate (Craigie 1894, 1897), and again seized upon by Finnur Jónsson in the polemic volume of 1921 already referred to.

Faced with these last-mentioned difficulties, some commentators have reverted to a variant of the theory that the Brothers Grimm formulated long ago in order to account for parallels of motif and plot in the internationally distributed genre of the folktale. Where the Grimms explained such parallels as the common Indo-European inheritance of the

various peoples among whom the tales were found, correspondences between Celtic and Norse tradition have sometimes been understood as survivals from a time prior to the expansion of the Celtic and Germanic peoples beyond the limits of the European continent. This model – adumbrated already in a paper by von Sydow from the 1930s, when the Swedish folklorist had abandoned diffusionism in favour of his personal theory of folktale ecotypes – was canvassed after World War II by the Dutchman Jan de Vries, who specifically identified the La Tène culture as a point of common origin (de Vries 1953; cf. von Sydow 1934, 382-84). It remains not unpopular today and has been invoked very recently by the Canadian William Sayers in a comparative study of the Norse god Heimdallr (Sayers 1993).

In my opinion all these studies approach the problem from the wrong historical perspective. As I pointed out many years ago, the assimilation of the Norse colonists to the Gaelic population in Ireland and the Western Isles is a process that accelerated after, not before, the battle of Clontarf. That battle signalled the collapse of Norse imperialism in the West and the beginning of a period of more peaceful coexistence. The first known occurrence of a Norse name in an Irish family is in an entry in the Irish annals for 1031. The Killaloe Cross in the west of Ireland, with its eloquent testimony to bilingualism in the form of a double inscription in ogham and runes, is an eleventh-century monument. And the onomastic evidence as interpreted by Magne Oftedal (in the article from 1964 referred to above) would seem to show that the major influx of Norse loanwords into the Scottish Gaelic dialects of the Hebrides began in the eleventh century. This brings us, not by coincidence as I see it, into the period to which many of the Eddic poems must be assigned, to the oldest extant records of early Irish literature and the growth of the Ossianic cycle, and to the late flowering of skaldic art in what archaeologists now call the Late Norse period in Northern Scotland, a period symbolized by the promulgation of the cult of St Magnus in Orkney and the building of Kirkwall Cathedral (for my earlier exposition and detailed documentation see Chesnutt 1968).

The earldom of Orkney – embracing not only Orkney itself but also Shetland and the adjacent, predominantly Gaelic-speaking, areas of the Scottish mainland – in fact occupies a pivotal position when we try to elucidate the exchanges of narrative lore between Norseman and Gael in historical times. A short presentation of the most important textual evidence may be appropriate at this point:

1. The account of the battle of Clontarf in *Brennu-Njáls saga* mentions a rain of blood and other extraordinary portents that are acknowledged to be typically Celtic motifs. It also reports the supernatural phenomena experienced on the day of the battle by men all over the Viking world, from Iceland and the Hebrides to Orkney, Caithness, and the Faroe Islands. In the two last-mentioned places women had been sighted weaving on a ghastly loom of fate and chanting a poem, the so-called *Darraðarljóð*, that the saga purports to be directly quoting. As Anne Holtsmark has shown, the grotesque overall conception of this poem is essentially Celtic though it is clad in Norse linguistic dress, and she unequivocally locates it in the hybrid cultural environment of the Orkney earldom (Holtsmark 1939; cf. Goedheer 1938, 74-87). That may not in fact be the poem's original home, for internal evidence indicates that it treats of a quite different battle, but it remains overwhelmingly probable that the text reached Iceland from Orkney. It may be added as a curiosity that there is a report in Sir Walter Scott's *The Pirate* from which it might be inferred that a form of the *Darraðarljóð* was being recited in Orkney as late as the end of the eighteenth century (cf. Poole 1993; Helgi Guðmundsson 1997, 250-51).
2. According to Magnus Olsen, the *Darraðarljóð* exerted influence on *Krákumál*, a heroic skaldic poem cast in the form of a death-lay for the legendary hero Ragnarr loðbrók (whose wife Áslaug was also known as Kráka, i.e. 'scald-crow', whence the title). Since the poem is in reality a list of battles, Olsen interpreted its title as a translation loan from Irish *badb-scél*, 'a scald-crow story'; its creator would have been a bilingual Norseman from the West (Olsen 1935). The general thrust of this interpretation has been accepted by all subsequent authorities of note, including Jan de Vries and Roberta Frank (cf. Heinrichs 1993).
3. It is impossible to date *Darraðarljóð* by reference to the battle with which it is ostensibly connected, but Olsen assigned its derivative, *Krákumál*, to the second half of the twelfth century. A little older, because reliably attributed to Earl Rögnvaldr Kali of Orkney and the Icelandic collaborator with whom he composed it at some time in the early 1140s, is the metrical tour de force *Háttalykill* ('key of metres'), containing in one of its strophes an allusion to the legendary battle of the Hjaðningar, the so-called *Everlasting Fight* that Snorri Sturluson subsequently localized at Hoy in Orkney. As I demonstrated in 1968, the version of this story in Snorri's *Skáldskaparmál* reproduces a whole cluster of motifs already present in *Cath Maige*

Turedh ('The Second Battle of Moytura'), a medieval Irish text that is our earliest witness to the motif of the *Everlasting Fight* – or, as Bo Almqvist prefers to call it, the *Resuscitating Hag* – in Gaelic tradition, where the motif in question has remained hugely productive until modern times (Chesnutt 1968, 129-32; Almqvist 1978-81/1991, 13-17). In Iceland the motif recurs outside *Háttalykill* and *Skáldskaparmál* and it also turns up, doubtless under Icelandic literary influence, in the Faroese *Høgna táttur* (cf. Djurhuus and Matras 1951-63, nos. 1A III st. 135, 1Ba III st. 59, etc.); but it is not, I think, known in the Scandinavian homelands except from Saxo Grammaticus, who in this case as so often elsewhere must have been quoting an Icelandic informant. It had been forgotten in the Northern Isles by the time that the ballad of *Hildina*, a contaminated remnant of the Hjaðningar tradition, was recorded in Shetland in the eighteenth century (cf. Hægstad 1900).

4. Finally, from the early thirteenth century we have the ironic proverb-poem *Málsháttakvæði*, often attributed to the Orcadian bishop Bjarni Kolbeinsson. This text alludes to the unhappy fate of a certain love-sick Sörli who pitted himself futilely against the sea and burst. The traditional background of the reference was elucidated in 1924 by Reidar Th. Christiansen, pursuing an astute observation made as early as 1889 by Joseph Anderson and connecting the Norse text with the Scottish Gaelic ballad of *Seurlus an Dobhair*, a young prince of Lochlann (or 'modest Bergen', as the ballad specifies) who was enchanted while trespassing on Fenian territory. Pursuing the supernatural young woman who was the object of his desire, the Gaelic Seurlus, like his Norse namesake, rushed into the water from which he was thrown back on shore and burst. The outline if not the details of the story must therefore have been fixed by about the year 1200, in spite of the fact that the Gaelic ballad only survives in manuscripts from the second half of the eighteenth century (Anderson 1889-90; Christiansen 1924, 52-55; Christiansen 1931, 413-16; a different interpretation of the evidence is offered by Sjœstedt 1931, 376).

3.

The role of Orkney as mediator of such cultural hybrids has been elaborated upon by the Swedish folklorist Almqvist, who however makes the reservation that traditions such as that of the *Everlasting Fight/Re-*

suscitating Hag might well be considerably older than the Middle Irish saga redaction on which I based the reasoning in my article of 1968 (cf. Almqvist 1978-81/1991, 17). While not denying this possibility in theory, I find it more satisfactory in practice to attempt a chronological stratification proceeding from the literary witnesses of more or less fixed date. The four key examples presented above all belong to the Late Norse period, and so do several of the Eddic poems whose Western provenance can scarcely be doubted, even if an explicitly Orcadian connection cannot be proved. These poems include *Rígsþula*, *Hymiskviða*, *Lokasenna*, and the very late *Svipdagsmál* (see Young 1933, Chesnutt 1989, Hemmingsen 1999, and Einar Ól. Sveinsson 1975b respectively). In Snorri's *Prose Edda* we find, in addition to the Orcadian legend of the *Everlasting Fight*, the tale of the god Þórr and his expedition to the dwelling of the giant Útgarða-Loki. Studies initiated by von Sydow (1910) and continued by Rosemary Power (1985) and myself (Chesnutt 1989, where additional references are provided) have led me to the conclusion that Snorri had access to a body of Western tradition from the late Viking Age where Celtic elements were infused into the mythology of this favourite god. The fact that an Ossianic story-pattern attested in the late medieval Irish *Feis tíghe Chonáin* occupied a central place in this syncretistic process speaks strongly in favour of locating it in the Late Norse period, for this (as already mentioned) is the time at which the Ossianic repertory began to occupy a significant place in Irish storytelling (cf. Murphy 1961).

Space does not permit an exhaustive survey of the traces of Celtic influence on Snorri Sturluson's mythography, but attention may be drawn to some new work done by the Danish scholar Morten Warmind, briefly reported in print in a resumé of his Copenhagen dissertation entitled 'From Severed Heads to Valkyries' (Warmind 1999). Turning to other Old Icelandic texts traditionally attributed to Snorri, we find several popular anecdotes for which analogues in Gaelic folklore have been produced by Bo Almqvist in a series of articles, beginning in the 1960s with a treatment of the story of *The Uglier Foot* and continuing in the 1990s with the tales about *The Hero's Youthful Wish* and *The Unfair Race* (Almqvist 1966/1991, 1994a, and 1997, 241-46 respectively). Almqvist has also discussed Gaelic analogues to sagas not associated with Snorri and to various Norse-Icelandic migratory legends and belief stories (see Almqvist 1991, 1994b, 1996a, 1996b, 1998). Other recently published contributions in this area are the presentations by John Shaw and myself at a symposium held in Dublin in 1996 (Shaw 1999, 312-15;

Chesnutt 1999, supplemented by Chesnutt 2000). My contribution dealt with the ancient and widely diffused tale of *The Three Laughs*, and I shall briefly recapitulate the argument here as it highlights some important methodological issues.

The tale of *The Three Laughs* is of ultimately Oriental origin and appears in Western Europe in the twelfth century, when it is attached by Geoffrey of Monmouth to the figure of the prophet Merlin. The tale resurfaces in Iceland in the late medieval *Hálfs saga ok Hálfsrekka*, in a seventeenth-century florilegium, and in several later variants of which two were printed in Jón Árnason's nineteenth-century collection of folklore. Here Merlin's role is assumed by a merman caught in a mortal's fishing nets. In modern Irish folklore the story is typically fused with that of the mermaid bride; that its presence in Iceland is due to the mediation of Gaelic tradition is suggested by the common transformation of the prophet into a creature of the sea, and confirmed by a medieval Irish saga and by Scottish Gaelic oral variants from the islands of Barra and Tiree in which the motif configuration of the twelfth-century Welsh text is remarkably preserved. The configuration in question is unknown on the Scandinavian mainland.

We are confronted here with a situation similar to that obtaining in the case of Snorri's story of Útgarða-Loki, where the Gaelic comparative material ranges in date from the Late Middle Ages to the nineteenth or even the twentieth century. The source chronology is in other words comparable to that described earlier for the story of the lovesick Sörli, with an interval of half a millennium separating our folklore texts from their medieval literary analogues. Understandable scepticism has been expressed about the ability of folk narratives to survive for such a protracted period in oral tradition, and the reconstructions practised by folklorists such as Christiansen, Almqvist, and myself have been criticized for accepting too many blank patches, as it were, on the spatial and temporal distribution map (see e.g. Kellogg 1990-93, 524). These doubts have to a large extent been provoked by folklorists themselves, in so far as the theoretical work of the twentieth century has emphasized the instability rather than the stability of oral tradition. For example, my late colleague Bengt Holbek of the University of Copenhagen expressed strong reservations about the objective validity of the international folktale typology of Antti Aarne and Stith Thompson, stating that the Danish records of oral prose tradition rather gave the impression of kaleidoscopic variation of motifs and episodes (Holbek 1965). He also went on record as saying that a folktale pro-

bably could not be remembered over long periods of time (Holbek 1987, 256). In the field of folksong research a rather similar trend has been visible, especially since the publication of the Scotsman David Buchan's influential book on *The Ballad and the Folk*; inspired by Parry and Lord's studies of the Homeric formula, Buchan and like-minded folklorists have played down the stability of the song text in tradition in favour of spontaneous re-creation in performance (see especially Buchan 1972).

I shall not attempt to camouflage the fact that I too thought very much in these terms until confronted with the statements of East European folklorists like Walter Anderson and Isidor Levin, who insist that the oral transmission process is understood by tradition bearers themselves as essentially reproductive (see for example Levin's description of conditions in Tadzhikistan as reported in Beyer and Chesnutt 1997, 2-3). Nor should we by any means underestimate the capacity of illiterate tradition bearers for verbatim memorization. Elsewhere I have illustrated this capacity with the example of the famous monoglot Irish storyteller Seán Ó Conaill, whose repertoire was collected and published by Séamus Ó Duilearga, founder of the Irish Folklore Commission. Ó Duilearga testified that Séan Ó Conaill was able to repeat the text of the Irish romance of *Diarmuid agus Gráinne* almost word for word after having had it read to him from a published edition nearly sixty years previously (cf. Chesnutt 1997). The phenomenon was typical in Ireland: in the introduction to the very same edition as was read aloud to Seán Ó Conaill, Standish Hayes O'Grady reported that he had heard a man, who for his own part knew neither manuscript nor printed versions, 'relate at the fireside the death of the sons of Uisneach without omitting one adventure, and in great part retaining the very words of the written versions'. The explanation is to be found in the prevalence of reading aloud by hedge schoolmasters to groups assembled for collective tasks or, especially, for wakes (Murphy 1961, 60; cf. Bruford 1969, 55-61). A comparable practice is well attested for Iceland in the same period; the evidence was collected many years ago by the Icelander Hermann Pálsson of the University of Edinburgh (Hermann Pálsson 1962).

The notion of a hermetically sealed oral culture is a relic of Romanticism that has persisted embarrassingly in folkloristics. We can now see that, as far as Western Europe is concerned, the fate of oral literature has been interwoven with that of written literature at least since the introduction of printing, or in the Gaelic and Icelandic contexts at least

since paper manufacturing made it possible to multiply manuscript books at relatively low cost. As a reassurance to those who doubt the viability of complex narrative folklore surviving over many centuries 'on the lips of the people' we can point to the parallel manuscript tradition that both reflected and supported the art of oral recitation. As far as the Ossianic lore of Ireland and Gaelic Scotland is concerned, we know that the popular ballads were being anthologized by the beginning of the sixteenth century when Sir James MacGregor, Dean of Lismore in Argyllshire, and his brother Duncan put together the famous manuscript bearing the Dean's name. The related prose tales were also being written down by this time and manuscripts of them proliferate up to the nineteenth century. The late Alan Bruford of the School of Scottish Studies greatly advanced the state of our knowledge about the prose tales with his book *Gaelic Folk-Tales and Mediæval Romances* (Bruford 1969), in which he demonstrated that the oral versions collected in the nineteenth and twentieth centuries to a large extent could be treated as derivatives of the manuscript tradition. The majority of Celtic and folklore scholars of the time were not ready to reap the full benefit of Bruford's insights; we should note, however, that his study was unhesitatingly included in the journal *Béaloideas* by the editor, Séamus Ó Duilearga, who practised a very special kind of national-romantic rhetoric when describing his informants, but was fully aware of the relevance, whether direct or indirect, of written literature to the folk narrative tradition, as the annotations to his many publications of Irish folklore amply show (see the bibliography in Wall 1975).

4.

It is accordingly not so speculative as some philologists think, nor as disrespectful of the creativity of the people as some folklorists think, to analyse medieval written and modern oral versions of related stories in stemmatic terms. To be sure, the oral variants in our archives exhibit many instances of arbitrary addition and subtraction, motif substitution, and contamination of redactions or even types; but where stable secondary representations of an older pattern appear in the material, as in the case of the substitution of a maritime creature for the prophet in the story of *The Three Laughs*, and where the observed geographical distribution stands in a coherent relationship to known historical facts, it is perfectly legitimate to conclude that we are in the presence of a region-

ally distinctive redaction – in this case a Gaelic-Norse subtype of the story dating from the Middle Ages. On the other hand, the absolute inalterability of the written tradition should not be taken for granted either. Anyone who has worked with Gaelic or Icelandic manuscripts of romantic tales will testify that the scribes are wont to depart from their copy text at any time, introducing changes due to their recollection of other versions they have heard or seen. There is not such a great difference between literary and oral stemmatics as is believed by those who have practised only one of them (or neither).

Folkloristics, uncertain of its position in the middle ground between anthropology and literature (see e.g. Zumwalt 1988), has been subject throughout its history to abrupt shifts of paradigm. In the last couple of decades there have been tendencies on the one hand simply to abandon the study of oral literature in its historical perspective, and on the other hand to adopt the reductionist view that all oral tradition is derived from written models. The second trend is well represented in an entertaining, erudite, but capricious book from 1993 by the German scholar Rudolf Schenda, reviving a point of view that had been urged as early as the beginning of the 1930s by the Austrian-born journalist and literary historian Albert Wesselski (cf. Schenda 1993; Wesselski 1931). It is a predictable and necessary reaction to the romantic picture of the bookless folk to which I have alluded, but it presses the subjugation of oral to written tradition too hard. We can be quite certain that the tales of the Brothers Grimm in Germany or of Asbjørnsen and Moe in Norway have exerted normative influence on the oral storytelling of the nineteenth century, and that the manuscripts of Ossianic lore in Ireland and Scotland contributed to the retention in oral contexts of the ancient stories that are the focus of this article; it is not, however, reasonable wholly to deny the existence of an autonomous oral tradition, and the apparent incompatibility of Schenda's position with that of folklorists such as Holbek is perhaps due to their generalizing from bodies of material that are not really fully comparable. The wonder tales or *Märchen* studied by Holbek in fact constitute a discrete category within oral prose narrative; there is a certain tendency for them to mutate into regional subtypes (ecotypes), but we may allow that their transmission is generally not so stable as that of the romantic tales and anecdotes that dominate the horizon in discussions of Norse-Celtic folklore contacts. This explains, I think, the rather inconclusive results of a synthesis published at the end of his career by Reidar Th. Christiansen, who had indeed identified a few North Atlantic *Märchen* ecotypes in the course of his com-

parative studies, but not sufficient to postulate a distinctive Norse-Celtic input to this segment of the folktale repertoire. It may be mentioned for the record that the *Märchen* in question include not only well-known tales of magic such as AT 313 *The Girl as Helper in the Hero's Flight* (cf. Jason and Medea) and AT 327 *The Children and the Ogre* (cf. Hansel and Gretel), but also tales of more limited distribution such as AT 471 *The Bridge to the Other World* (The Seven Foals) and AT 726 *The Oldest on the Farm* (see Christiansen 1924, 50 and 1927-28; Christiansen 1959; Almqvist 1961).

What I have argued here is the case for a not insubstantial reception in medieval Iceland of narrative materials deriving from the hybrid cultural environment of the Celtic West in the Late Norse period. The principal vehicle of this reception would appear to have been Eddic and skaldic poetry in recited or written form, and to the extent that twelfth-century Orkney acted as a bridgehead the role of written documents should not be underestimated (cf. Helgi Guðmundsson 1997, ch. VIII). Cultural interaction with the West declined progressively in the later Middle Ages as the Norwegian and Dano-Norwegian monarchies ceded more and more of their territory and political authority to Scotland. It is therefore only to be expected that these originally Norse-Celtic materials have lived on in Iceland, Scotland, and Ireland in forms determined by the respective national traditions.

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Soils as cultural resources

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The papers presented at the Symposium aimed to review the environmental and cultural resources of small countries. This paper seeks to demonstrate that particular environmental resources are intimately related to past cultural processes; in essence, environmental and cultural resources should not be seen as separate themes. This paper briefly reviews the nature of cultural landscapes and then discusses one particular component, soils.

It is widely recognised that a holistic approach to landscapes is essential in order to integrate environmental and cultural resources. The concept of a *landscape* is cultural and thus subject to a variety of perspectives in space and time. As one example, the Scottish Highlands have been perceived in a variety of ways over the last 200 years. Smout (1981) traces the images of the Scottish Highlands from being alien, inhospitable, infertile in the early 18th century to the current situation where the region is visited annually by the order of a million people for many purposes. Although the varied topography and the distinctive land/water distributions make the Highlands so attractive to visitors, it is the superimposition of the cultural heritage which gives these and other Scottish landscapes their distinctive character. This is particularly the case in the more marginal areas of Scotland where there has been greater landscape continuity as well as better preservation of features from the past. In Scotland, as in Denmark, such marginal land has had to support considerably higher populations in the past than is the case today. The resultant landscape features are most clearly expressed in the occurrence of old field systems in upland Scotland, indicative of landscape antiquity and intense landscape management. This continuity of the past is most evident in more marginal and peripheral areas.

The nature of cultural landscapes

Knut Faegri, in a preface to the book *The Cultural Landscape: Past, Present and Future* (Birks *et al.* 1988), notes that the term cultural landscape has only become widely used since 1945. This book includes papers ranging from such topics as current traditional land management practices to anthropogenic impacts on vegetation during prehistoric times. Emanuelsson (1988) presents 'a cultural landscape model' with three parts: (1) a description of different levels of human use of the landscape with particular reference to soil nutrition, (2) the concept of ecological control to explain periods of regression in human populations, and (3) the role of climate as the differentiating factor for explaining spatial changes in land use. The overall thrust of the book is on changing anthropogenic impact, especially on vegetation. This reflects the considerable research tradition in palynology for unravelling links between human activity and vegetation change; the result is that the study of cultural landscapes is often perceived as being primarily concerned with the evolution of vegetation or land-use patterns. Instead, landscapes need to be approached in a much more integrative manner through appreciation of three key principles, (1) landscapes include a wide variety of components, all of which can be displayed as maps, (2) landscapes at one point in time will inevitably contain elements and traditions from earlier times, and (3) the nature of landscapes will inevitably vary depending upon the perception of individuals or human groups. The second principle can be very well illustrated by soils which can provide an intricate record of past human activity.

Soils as cultural artefacts

The traditional approach in pedology is to consider soils as subject to a range of factors, one being anthropogenic activity. Soils were often mapped as naturally occurring features, an approach, for example, adopted by the former Soil Survey for Scotland. The consequence is that the nature and properties of soils as they exist are often rather different from what might be expected if naturally occurring processes were the sole causes; instead, soils as landscape cultural components have many attributes which can only be explained with reference to

past land management practices. In essence, the nature and properties of soils can be considerably influenced by particular cultural processes; examples are as follows:

Stone clearance

A key constraint to the use of new agricultural implements in the 18th and 19th centuries was the high stone content in many Scottish soils; stones limit soil depth, increase implement wear and breakage as well as adding to labour costs. The stone content is high in most drift derived soils in Scotland, but this is particularly the case in granitic areas such as north-east Scotland where the cumulative effect of stone clearance is expressed in the presence of substantial stone walls known as consumption dykes. On the outskirts of Aberdeen, such dykes are up to 7m in width and 2m in height, indicative of the considerable effort made by generations of farmers. Although stone clearance accelerated with the introduction of new farming ways in the 18th and 19th centuries, clearance cairns are present in many upland areas and can date back to the third millennium BC as at Lairg in Sutherland (Carter, 1998).

Drainage

As with stone content, farmers have had a considerable cumulative effect on improving soil drainage for arable purposes. The most outstanding examples of land drainage in Scotland are the reclaimed Carselands of the Forth, Clyde and Tay. These low-lying estuarine deposits were colonised by peat following gradual uplift in post-glacial times and became the focus for peat removal and installation of drainage ditches from the 17th century. The legacy is some of the best agricultural land in Scotland. Cropping is also constrained by other poorly drained soils such as those derived from heavier textured drifts. These are particularly extensive in west and central Scotland where higher rainfalls also occur. Prior to the installation of stone and subsequently tile drains from the 17th century, drainage problems were tackled primarily by the creation of rigs. This involved either digging or ploughing to create ridges of soils with resultant improved drainage. In Scotland, such rigs are best preserved on improved pasture, golf courses or rough moorland,

where they can still be very striking landscape features. Such rigs can vary in width from narrow cord rig (c.1- 2m) to broad rig (up to c. 7m) and from being straight to highly sinuous. Dating evidence is sparse, but as with stone clearance features, rigs can date back to prehistoric times as in the Bowmont valley in south-east Scotland (Mercer and Tipping, 1994); Whyte and Whyte (1991) note that rigs continued to be formed in the first half of the 19th century in response to grain needs during the Napoleonic Wars.

Soil depth

The 'natural' soil in many marginal areas of Scotland is a shallow peaty or peaty gleyed podzol with a subsoil characterised by the presence of a fragipan (Bx horizon which is compact). Soil depth is thus a major constraint to plant growth and again, farmers have left a legacy in many areas of substantial improvement through deep ploughing and soil additions on rigland. Improvements in soil depth have been particularly outstanding in North-East Scotland. As any gardener knows, working and fertilising soils gradually leads to an increase in soil depth.

Manuring

For arable cropping in Scotland, both present and past, the critical importance of manuring needs no emphasis. Crop yields are highly dependent upon the availability of the key nutrients (N, P and K). Prior to the growing availability of commercial fertilisers in the 19th century, farming in Scotland depended primarily on the interaction of livestock and crops – livestock sustained crop growth and vice-versa (Shaw, 1994). Shaw (*op.cit.*) states that sheep dung was the most highly prized followed by that of fowl, horses and cattle; prior to 1850 very few pigs were kept in Scotland. Farms near to towns also benefited from the availability of night soil or other forms of organic waste; seaweed was extensively used where available though its benefits were limited to one or two seasons. The midden heap was where all waste from byres and houses was dumped prior to ultimate spreading on surrounding fields; overall cattle dung was the main component. The rapid decay of organic matter in soils inevitably poses major problems to any attempt to reconstruct manuring practices in the past – any evidence appears to have

disappeared, though recent work on lipid biomarkers offers the potential for identifying the type and intensities of past manuring (Simpson *et al.*, 1999).

Another important manuring process was paring whereby upper organic layers of soil were stripped, dried, used for bedding cattle and then stored in the midden prior to application to fields. On the lowlands where the provision of bedding for cattle was not such a problem, the dried turves were frequently burnt as part of the land preparation process prior to cultivation; as Woodward (1994) notes, this was very extensive in lowland England during the late 18th century. The stripping also removed some mineral material from the upper part of the soil; it was this mineral component that gradually led to the deepening of soils by the plaggen process at the rate of c.1mm per year. The effect of paring on heathlands was the creation of breckland, still evident in parts of Orkney and Shetland. The process of transporting turf, peat or soil has been widely practised round the North Sea; Stoklund (1999) calls this 'concentration agriculture' and he estimates that the required area of stripping is between three and ten times that of arable land. Turf manuring has been used in the western and northern areas of Jutland where soils are least fertile; it was widely practised until the middle of the 19th century when there was extensive reclamation of the heathland. Stoklund (1999) reports that for the island of Læsø, cut heathland turves or meadowland sods (*hakkenmøg*) were piled into heaps, left to decompose and were periodically chopped before being added along with manure to form dunghills which were subsequently added to fields. This process continued on Læsø until the first decades of the 20th century with one farmer persisting until 1949.

Plaggen soils – a case study of cultural soils

A plaggen soil is a specific type of anthropogenic soil characterized by a deepened topsoil (up to 130cm), produced by the gradual addition of turves which were impregnated by animal dung; other additions could be sand or litter. The topsoil is distinguished by a black to dark grey/brown colour, a high phosphate content and the inclusion of pottery or brick fragments. The deep topsoil is known as the *Eschhorizont* in Germany whilst Dutch plaggen soils are called *Enk* soils. Plaggen soils occur extensively throughout the sand and gravel landscapes of north-western Europe, stretching from Denmark and Schleswig-Hol-

stein to northern Belgium (Pape, 1970); similar soils occur in Ireland (Conry, 1974), Orkney (Davidson and Simpson, 1984) and Shetland (Davidson and Carter, 1998). Spek (1992) collates the evidence of dating and concludes that the majority of the German and Dutch plaggen soils were initiated in the 7th to 13th centuries; in more peripheral localities such as Orkney, their formation began later, c. the 12th century. Blume (1998) notes that plaggen management has been practised in particular localities for about 3,000 years with the oldest known plaggen soil under a Late Bronze Age mound on the Island of Sylt.

In Denmark, the Ulfborg project in Western Jutland has brought together a group of historians and environmental scientists from the University of Aarhus in order to understand the effects of agricultural practices on vegetation change and soil development. As explained by Dalsgaard (pers.comm.), the critical need in this area was the import of turf material and manure in order to sustain agriculture, a process which was in progress by the 15th century. At his Staby sampling site, a plaggen soil was investigated with a topsoil of 48 cm and high in total phosphate. It is likely that plaggen soils are extensive in central, northern and western Jutland.

In Scotland, examples of plaggen soil are also found in remote localities, for example the western mainland of Orkney and the small island of Papa Stour, located off the west coast of Shetland. Papa Stour provides an excellent illustration of the cultural legacy through manuring to present day soils. This island was the focus for the pioneering ethnographic studies of Fenton (1978) in the 1960s; he recorded the final years of the traditional mixed farming system based on cattle and sheep with crops of cereals, kale and potatoes. Thirty years later, an historically low human population in the island and sheep-dominated agriculture involving a grass-based forage system have ensured that most of the former arable land has gone out of cultivation, thereby preserving substantial areas of old arable soils unaffected by current agricultural practices. Therefore the island offers the opportunity to study cultivated soils that were the product of a distinctive set of traditional agricultural practices, unaffected by recent changes in farming (Davidson and Carter, 1998); it is also the focus of a current project involving micromorphology and biomarkers.

In the preliminary study, nine soil profiles were chosen to provide a wide variety of cultivated soils within the enclosed land of the island. Three were within rigs that formed part of the pre-1860 outfield of the enclosed land whilst another three were separate outsets. The remaining

three were from contrasting locations within one recently abandoned farm – a planticrue (a small stone enclosure for the raising of seedling kale plants), an enclosed kaleyard, and from adjacent uncultivated pasture land.

The documentary, ethnographic and soil evidence for turf manuring in Papa Stour indicates that the deep cultivated topsoils are true plaggen soils achieving topsoil depths of up to 80 cm. Turf was stripped from common lands and, after drying, was used for fuel or bedding for cattle before being applied to arable soils. There were three sources of organic manures in the traditional agricultural system of Papa Stour: peat and peaty turf, seaweed and animal dung. Fragments of carbonised and uncarbonised peat, noted in soil thin section, must relate only to the first of these three. The presence of carbonised residues reflects the use of peat and peaty turf as fuel with the ashes subsequently used as manure. Uncarbonised residues could derive from the direct use of peaty turves as manure or some more complex route via the byre or midden.

All fragments of peat (carbonised and uncarbonised), larger than 1 mm, were measured on soil thin sections and classified according to their internal structure, percentage mineral content, maximum mineral grain size and mineralogy/lithology. Results are summarised in Table 1 and are given as averages per group of thin sections in order to permit easy comparison. All of the fragments consist of organic matter or dominantly organic organo-mineral mixtures. In all profiles the dominant structural type (carbonised and uncarbonised) is amorphous organic matter with randomly arranged mineral grains. A substantial minority

Sample	Carbonised		Uncarbonised		Total area per slide (mm^2)
	Number of fragments per slide	Area per slide (mm^2)	Number of fragments per slide	Area per slide (mm^2)	
Deepened topsoils (n=16)	23.1	121.9	14.1	47.5	169.4
Kaleyard sample	10.0	29.0	190.0	1099.3	1128.3
Planticrue topsoil	3.5	11.3	13.0	42.0	53.3
Heathland Ah Horizon	3.0	10.6	0.0	0.0	10.6

Table 1. Summary statistics on peat fragments >1 mm recorded from soil thin sections (4,500 mm^2)

of fragments in all profiles are structured, in most cases this comprised parallel, convoluted layers of highly degraded plant tissue. In all samples, with one exception, tissue fragments are very rare. The proportion of mineral to organic matter in the fragments differ between carbonised and uncarbonised material. The majority of uncarbonised fragments contain less than 2% mineral components but for carbonised material there are roughly equal numbers of fragments with less than 2% and 2-20%. Very few fragments contain over 20% mineral components. The mineral grains are angular and most fragments contain grains up to fine sand size. Very few coarse sand grains are present.

Virtually all of this material may be interpreted as fragments of amorphous to semi-fibrous peat that is derived from the O horizon of a soil rather than an Ah horizon. The higher mineral content of the carbonised fragments is thought to be the product of shrinkage of the organic matter during combustion. Therefore the carbonised and uncarbonised material is essentially the same. The rare carbonised tissue fragments derive from woody plants and probably result from the burning of heathy turves. Average figures are given in Table 1 for deepened topsoils which demonstrate the overall dominance in soil thin sections of carbonised rather than uncarbonised fragments. Similar amorphous to semi-fibrous peat was applied to all of the cultivated soils. The slides from the topsoil in the planticrue are exceptional through having low concentrations of organic fragments and with the dominance of uncarbonised peat. This matches the documented practice of only manuring planticrues with fresh turf and only to a limited extent.

Conclusions

The distinctive feature about many Scottish landscapes is the imprint of past cultural processes; this continuity of the past is particularly evident in the more marginal and peripheral areas. Landscapes thus need to be perceived in terms of cultural rather than natural heritage. Fragments of ancient field systems as systematically surveyed by the Royal Commission on the Ancient and Historical Monuments of Scotland are the most obvious features of cultural inheritance on poorer land. However, the example quoted of plaggen soils as occurring in Scotland, Denmark and other areas of northwest Europe illustrates the importance of cultural processes in explaining present day environmental resources as well as for guiding landscape management strategies.

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The development of recording and protection of antiquities both within and as part of the landscape in Scotland

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Abstract

Archaeology within the landscape, and its understanding, are seen as the product of three phases of legal and intellectual development. Phase 1 saw the protection, often primitively, of the moveable artefact – a development that has continued with increasing sophistication until the present day. Phase 2, in the 19th century, saw the development of concern for the preservation of immovable artefacts in the landscape – as sites or monuments defined spatially and protected individually. Phase 3 which may be seen as beginning in the 1970's sees the awareness that the immovable and moveable artefact are indissolubly part of, and contributory to, the greater landscape and, that, in NW Europe at least, no part of the landscape is without its expression of human impact. The paper ends with a summary of current legal interdigitation in Scotland and a plea for greater understanding of the holistic concept of landscape, physical, aesthetic and intellectual in the future.

The control of the condition and custodianship of the relics of the national past in Britain has been a feature of Government concern since the middle ages. Broadly speaking it has passed through three stages of an increasing scale of its consideration.

The moveable artefact

By the 12th century the kings of England had established the concept of Treasure Trove (Hill 1936) whereby objects of gold or silver could be claimed for the crown in the absence of any better legal title lying else-

where. In effect the principle of *animus revertendi* was established – that the former owner had concealed the objects with the intention of recovery but had never carried that intention out. In Scotland broader protection is offered for objects of all types and compositions by the civil law principle of *Bona Vacantia* ('unclaimed goods') – which revert to the Crown. Successive attempts have been made to introduce more modern (or perhaps one should say less medieval) legislation without success – the only significant alteration to the law affecting moveable antiquities being under the Ancient Monuments and Archaeological Areas Act (AMAA Act 1979) where the use of metal detectors (to search for such objects) on Monuments protected by the Act was rendered illegal (for further details see Longworth 1993).

This early care for the moveable antiquity (quite coincidental in the British case) is, of course, paralleled to far greater effect in Scandinavia and Europe where frequently the State automatically has possession (or at least first option) upon all moveable antiquities unearthed by whatever means.

Indeed the Royal Danish Academy published a paper on archaeological excavations in the first issue of its *Proceedings* (1744). Erik Pontoppidan (1698-1764) reported his work on a megalithic monument in the park at the royal castle at Jægerspris (Klindt-Jensen, 1975, 35-36) and this among other developments led to the development, out of the Royal *Kunstkammer*, of the Royal Museum of Northern Antiquities at Copenhagen under the tutelage of C. J. Thomsen in the years following 1819. His help-mate and successor J. J. A. Worsaae published, in the English edition of his *Primeval Antiquities of Denmark* (1849, vi), the invocation "I hope the day is not far distant when the British people will have formed a national museum of antiquities commensurate with the importance of their remains. It is only in that way that they can be enabled to read the history of their country through its national monuments".

Daniel Wilson writing scarcely two years later (1851), in the preface to the book in which the term 'prehistory' is coined, perhaps understandably, awards the first laurels for the 'zeal for Archaeological Investigation' to the Master of Abbotsford, Sir Walter Scott. Having made that obeisance, the rest of his prefacial remarks are, in effect, a polemic in favour of the establishment of a National Museum in Edinburgh, which pay both explicit and implicit homage to Worsaae. The Society of Antiquaries of Scotland (formed in 1780) produced its first volume of *Proceedings* in 1854 and its collections were opened to the public as

the National Museum of Antiquities of Scotland in the winter of 1859 (Piggott, 1983).

Thus the first stage in the control of condition and custodianship of the moveable artefact is established – with progressive improvements in the exercise of the law of *Bona Vacantia* and with massive subsequent developments in provision for conservation and display.

The immoveable artefact

Britain, as a whole, was late in approaching the problem of the control and custodianship of the immoveable artefact. In Denmark (Klindt Jensen 1975, 48) the legal protection of ancient monuments is ensconced in the same Chancellery Order of 1807 that set out the requirement for a National Museum. The order required "that prehistoric monuments which are situated on farmland and are too large and bulky to be shifted must be divided into two groups, those which merit preservation ... and others of lesser importance". In Britain, where the excesses of the Industrial Revolution, the Second Agricultural Revolution as well as the processes of hyper-Urbanisation were all in train from the beginning of the nineteenth century, no such early protection was afforded. The fact of these processes, as well as the different social and economic structure of land tenure dictated otherwise. Change, at last, came in response to an increasingly broadly based awareness of the massive losses that were being sustained, even in the face of the eloquence of, among others, John Ruskin. In his Manchester lectures of 1857 (Lecture 2. pt.3) (Ruskin, 1860) he inveighed against the wholesale destruction of ancient and historic sites: –

> You will perhaps think that all this was necessary for the development of the human race ... but do you think it is *still* necessary for that development? Do you think that in this nineteenth century it is still necessary for the European nations to turn all the places where their principal art-treasures are into battle fields? For that is what they are doing even while I speak; the great firm of the world is managing its business at this moment, just as it has done in past times.

Sir John Lubbock (Liberal Member of Parliament and Chairman of London County Council), for seven consecutive years, up until 1879, placed his "National Monuments Preservation Bill" before the House of

Commons during Disraeli's administration of 1874-1880. With the incoming of Gladstone's Second Ministry in 1880 Lubbock achieved the passage of *The Ancient Monuments Protection Act* onto the Statute Book in 1882 – a severely emasculated measure that provided for only a specified list (or 'schedule') of seventy or so monuments in Britain and Ireland (including the Bass of Inverurie, the Stones of Callanish and Maes Howe, Orkney in Scotland).

Commissioners were appointed who could purchase sites from the schedule into State ownership or accept other sites as a gift through a Deed of Guardianship (designed to overcome the constraint of 'entail' whereby many contemporary estate owners could not alienate land). An Inspector of Ancient Monuments was appointed – Augustus Pitt Rivers – whose daughter, Alice, Lubbock married in 1884 thus uniting the two families who most prominently served British archaeology in the nineteenth century. Pitt Rivers was yet to reach the summit of his career as the 'father of British archaeology' – through his remarkable series of excavations, undertaken on his newly acquired estates in Dorset, and privately published in the seminal royal blue cloth-covered volumes that symbolise the emergence of British archaeology as a science. The fundamental weaknesses of the 1882 Act are perhaps best illustrated by the great henge of Avebury with its multiple ownership by its contained villagers which proved intractable to the law and Lubbock was compelled to purchase it himself. He took the name of the site when elevated to the peerage in 1900.

For further developments in Ancient Monuments legislation the reader is referred to Cleere's brief account (1984, 54-56). Suffice it to say that only in 1913 (The Ancient Monuments Consolidation Act) were the owners of sites other than those in Guardianship required to give one month's notice of intention to 'disturb, alter or destroy' the site and there was provision for the issue of compulsory preservation orders to be converted to a compulsory purchase order if required – a provision reinforced in a further Act of 1931 which increased the statutory notice period to three months from one, and allowed, in an initially little-used clause the prosecution of 'rescue excavation' whether a site was scheduled or not.

It was only in 1932 that the first Town and Country Planning Act reached the Statute Book which gave any protection to occupied buildings (as opposed to the unoccupied structures, ruins, earthworks, cavities, and burial sites protected by the Ancient Monuments Acts). Local authorities were enabled to specify buildings as 'of special architectural

or historic interest' and, given the approval of the Minister responsible, these could be subjected to a Preservation Order as was the case with the ancient monuments referred to above. There was, however, no list of buildings against which such proscription could be gauged and this did not become possible until, in the concluding phases of the Second World War in 1944, a revised Town and Country Planning Act laid upon the Minister the responsibility to compose a statutory List of buildings of special historic and architectural interest, a preliminary *sine qua non* that was given greater effect in the encompassing Town and Country Planning Act of 1947 which sought the preservation of entire (or parts of) Listed Buildings whether with the agreement of the owner or not. Grants for the restoration and maintenance of Listed Buildings were made available by the 1953 Ancient Monuments Act which established the Historic Buildings Council for the effective administration of such grants. By 1999 there are some 800,000 Listed Buildings of all categories in England & Wales, 44,600 in Scotland.

One other development in this second phase is important. In Scotland from the early 1890's pressure was mounting for a survey of the country to establish the number and range of antiquities that might merit protection and preservation. This focus upon antiquities in the landscape has a very long pedigree indeed in Scotland beginning, possibly, with the maps of Pont/Blaeu but certainly established with the extraordinary work of Major-General William Roy – the officer responsible for the military survey of Scotland following the severe shock administered to Government by the Highland Rebellion led by Charles Edward Stuart (Bonnie Prince Charlie) in 1745-46. Roy was a soldier who was clearly fascinated by the visible remains of the military campaigns of the Romans who had fought an equally indomitable enemy in North Britain. He carried out a series of immensely detailed and accurate surveys of Roman military works throughout Scotland, alongside his more pragmatic duties, which were published posthumously in 1793 (Roy 1793). No more distinguished antecedent for archaeological survey exists in the World. Thenceforward a tradition of high quality archaeological survey persisted in Scotland (through the surveys conducted of Orcadian tombs in the 1850's and 60's (Davidson & Henshall, 1989, 46) to the work of Christison (1898) and Fred Coles (for references between 1894-1911 see Burl, 1976, 380-1). In 1896 a seminal paper was published by David Murray, a Glasgow lawyer (1896). He took as his start point the foundation of archaeology as a science which he saw lay with C. J. Thomsen's establishment of the National Museum at Copen-

hagen. He states (1896,19) "The first thing to be done in the interest of our ancient monuments ... is to have an Archaeological Survey of the United Kingdom made by, and at the expense of, Government, similar to the Topographical and Geological Surveys which have already been executed". This idea was taken up by Gerard Baldwin Brown (1905), Professor of Fine Art in the University of Edinburgh. He drew attention to the requirement for State "inventory" and "in this matter Great Britain is in an almost isolated position" (1905, 151). He suggested (1905, 60-61) that "material prepared in this manner by various independent agencies "[*supra*]" would probably be found to be most complete in the case of Scotland, for which country a fairly satisfactory inventory of monuments of architecture and art might, with comparatively little difficulty, be compiled ... if ever a national work of inventorisation were set on foot, it is in Scotland that it might be started with the best promise of satisfactory result".

Within two years of this publication Baldwin Brown had joined forces with his friend Sir John Sinclair, Secretary of State for Scotland to create a standing Royal Commission, modelled explicitly on the lines of the Royal Commission on Historical Manuscripts (set up in 1866) (see Baldwin Brown 1905,11).

The RCAHMS was established in February 1908 with its English and Welsh sisters coming into being six months later. Its task was to inventorise all 'monuments and constructions', county by county on the basis of visit and survey. The basis of the survey was the Ordnance Survey basic scale mapping of Scotland which, in terms of its lineage, reaches back ultimately to the survey of William Roy (*supra*). It was, and remained until the mid 1980's quintessentially a *site by site* survey only exceptionally seeking to forge linkages between sites by the comprehension and recording of the landscape that contained them. The results were published county by county in book form with the inclusion, in 1983, of mapping services to the Ordnance Survey.

The landscape context

Within this brief, together with the rapid development of database information technology, the scene was set for a fundamental change in strategy brought about during the late eighties and rapidly accelerated through the last decade. This saw the attempt to create a landscape context for every site and to create a database, updated daily, that reflects

that landscape through the deployment of multiple layers of landscape information through a Geographical Information System. Publication has continued, but as an additional service to "Inventory" to explain and synthesise results for both the professional and the lay reader.

Thus has the Royal Commission entered Stage 3 of the development outlined in this paper – the move from State concern first for the moveable artefact, then (Stage 2) for the immoveable artefact (the site or monument), finally to the holistic concern for an archaeological review, record, and conservation and preservation policy for the whole land surface. Only thus can the challenges of modern developmental and conservational movements be met.

If 'inventorisation' in Scotland has endeavoured to offer its own lead in this new and wider context how has the 'sharp end' of conservation, preservation and management gone forward? The best recent published summary of these developments is Macinnes (1993). In this paper Lesley Macinnes commences by making the vital point that 'benign neglect' is not an option for archaeologists in the modern landscape if their aim is the contextualisation of 'sites' within the contemporary and where possible, reconstructable landscape that surrounds them.

The complex, multiple needs of landscape archaeology as we enter the third millennium have met with a series of diverse responses in Britain which reach across the whole gamut of landscape management agencies at governmental level. This is perhaps exactly as it should be, as it is important to remember that the interests of the archaeologist, the naturalist, the forester, the farmer and the 'scenic beauty' manager, among many others are seldom identical and often in direct conflict.

Some initiatives have not been developed with archaeology in mind at all – the 'Landscape Set-Aside' initiative developed within the context of the European Community Agricultural Policy is a measure concerned with the reduction of surplus agricultural production and aimed, therefore, at production sustained at relatively high cost on marginal land. The relinquishment of such land often, however, removes agricultural pressure from archaeological material, undamaged until relatively recent expansion. Sadly such relief can be short-lived as such arrangements are generally of only five years standing.

Of greater value are the European 'environmental impact assessment' initiatives that have their origin in EC Directive 85/337 that have been implemented in Britain for a restricted range of infra-structural developments – including forestry. It is these provisions that led directly to the provision of Planning Policy Guidance to Local Authorities

(for Archaeology PPG16 (NPPG5 in Scotland) PPG15 (NPPG9) for Architecture) by Central Government which has sought to revolutionise the status of archaeology and, indeed, architecture within the local planning process – the prime assumptions being (a) survival and (b) that the developer pays for both assessment and, if necessary, investigation. Whatever its effects upon the profession of archaeologist it has rendered the interests of archaeology within the landscape far more prominent if, often, only crudely catered for.

Other avenues to link archaeology to other landscape interests have also opened in the last decade. Under the *Electricity Act* 1989 and the *Water Resources Act* of 1991 authorities responsible for these public utilities are required "to have regard to the desirability of protecting" sites of archaeological and architectural interests. The Forestry Commission has also imposed upon itself a policy that it should not grant aid tree-planting that would damage archaeological interests while the *Environmental Protection Act* of 1990 required the Nature Conservancy Council to enter into a 'statement of intent' with English Heritage and such agreements have been extended to Historic Scotland (*The Natural Heritage (Scotland) Act* 1991) and run also in Wales.

Perhaps most importantly however there are the provisions couched within the *Agriculture Act* 1986 that generally "provides for the conservation and enhancement ... of amenity of the countryside ... and any features of archaeological interest there", and more specifically for the establishment of Environmentally Sensitive Areas (Scotland now has five that cover 30% of her land area) which stand alongside a series of other initiatives ('Areas of Outstanding Natural Beauty' and 'National Scenic Areas') to provide a mosaic of measures within which management plans for the protection and proper control of archaeological features can be developed.

Doubtless further improvements to the consideration of archaeological interest in the landscape can be suggested and hopefully, in time, will be implemented. It is this writer's view, however, that three developments need to take place before full use can be made of existing provision.

1. A complete Historic Land use Assessment of the whole land surface of Scotland ought to be completed – providing a basic index against which the archaeological significance of any area can be immediately judged as a start point in any exercise of protection.
2. An upgraded, holistic National Sites and Monuments Record linked

directly, electronically to all local sites and monuments records should be created with full exchange of appropriate data between records – and with the network of local sites and monuments records made complete (some local authorities in Scotland still do not subscribe to this vital component of Planning expertise) with the parallel provision of archaeologists within planning departments to interpret and curate the local record, and

3. (possibly most important) The construction and dissemination of an holistic, time-depthed, aesthetically sophisticated and intellectually disciplined understanding of the term landscape to achieve a proper understanding in all quarters of the complexity of its interactions, its layering and its evolution from the past and into the future (Mercer, forthcoming).

To this end all our disciplines will have to subscribe – and with an urgency, the need for which, in Scotland, we see all around us.

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Food webs and fish production in the North Sea

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Abstract

Pelagic primary production (growth of microscopic phytoplankton cells) forms the basis of marine food webs and, hence, ultimately limits the magnitude of fish production in the ocean. It is, however, only a minute fraction of the primary production that ends up as harvestable fish biomass. The magnitude of this fraction depends on the structure and functioning of the marine food web, which is ultimately governed by physical factors, particularly hydrodynamics. This paper briefly reviews recent major developments in our understanding of marine pelagic food web structure. On the basis of this modern view, it is discussed why the North Sea, in terms of fisheries, is among the most productive regions of the world oceans.

Introduction

Marine food webs are almost entirely based on the growth production of microscopic phytoplankton cells and contributions from the production of benthic algae and other sources are insignificant. Therefore, the magnitude of fish production in the ocean is ultimately limited by the magnitude of pelagic primary production. It is, however, only a small fraction of the pelagic primary production that is eventually channelled up the food web to end as harvestable fish biomass. The magnitude of marine fish yield corresponds to only about 1% or less of the pelagic primary production (e.g. Steele 1974). This fraction is variable, however, and the magnitude of fish production is therefore governed both by variation in the proportion of the primary production that ends as fish as well as variation in the magnitude of primary production. Thus, fish production depends on marine food web structure and functioning.

In this paper I shall examine the factors that govern pelagic primary production and food web structure and, hence, the magnitude of fish production in the ocean. In the spirit of this symposium, I shall focus on the North Sea, and I shall attempt to make explanations accessible to a non-expert audience. This presentation is to a large extent based on several previous reviews (Kiørboe 1991, 1993, 1996, 1998).

Marine food web structure

J. H. Steele (from Aberdeen) excellently summarized the classical description of the pelagic food chain in his seminal book on the structure of the North Sea ecosystem (Steele 1974). According to this description, almost all phytoplankton production is consumed by zooplankton, particularly copepods, a group of mm-sized crustaceans. About one third of the phytoplankton consumed by copepods is expelled as large (~ 0.1 mm) faecal pellets that sediment rapidly to the sea floor. The organic material contained in the faecal pellets fuels the biological processes on the sea floor, including the production of demersal (bottom-living) fish. Another third of the consumed phytoplankton is transformed to copepod biomass and provides food for plankton-eating fish, such as herring and mackerel. And the last third is metabolized by the copepods. The classical description leaves room for additional trophic levels, such as arrow-worms and jellyfish feeding on copepods, and must be characterized as a food web rather than a food chain.

Steele (1974) attempted to construct a budget for the fate of the organic material produced by the phytoplankton in the North Sea. He found that about 1% of the pelagic primary production ended up as fish biomass that could be harvested. Based on knowledge of transfer efficiencies and on the assumed structure of the food web described above, he could make the budget fit exactly (but barely). That is, there was just sufficient pelagic primary production to account for the fish catches. However, the classical description has turned out to be far too simple and our understanding of pelagic food web structure and functioning has undergone major changes during the last 2-3 decades – in ways that make Steele's budget invalid. In this section I first discuss some of the concepts developed and discoveries made since Steele's book and then describe the present understanding of pelagic food web structure.

New vs. regenerated production: Because phytoplankton cells utilize light to combine inorganic carbon and mineral nutrients into organic compounds, primary production takes place only in the upper, illuminated part of the ocean (the 20-100 m deep *euphotic* zone). Vertical temperature stratification of the water column during the productive season limits vertical mixing and, hence, renewal of mineral nutrients from below the euphotic zone. Therefore, nutrients become exhausted in the euphotic zone, often to concentrations below the analytical detection level. Mineral nutrients are, however, to a large extent recycled within the euphotic zone; that is, phytoplankton cells are consumed by herbivores (e.g. zooplankton) that degrade the organic compounds to inorganic carbon and nutrients. These recycled nutrients may be used again for further primary production in the euphotic zone. Primary production based on recycled nutrients is termed *recycled production* (Dugdale & Goering 1967). It does not lead to net build-up of biomass in the euphotic zone and, thus, does not lead to formation of harvestable biomass. In contrast, mixing events caused by wind, currents or cooling of surface waters may inject new nutrients from below the euphotic zone, where nutrient concentrations are typically high. Primary production based on new nutrients is termed *new production*. New production may lead to net build-up of plankton biomass in the euphotic zone and to harvestable biomass. The source of mineral nutrients thus has implications for the fraction of primary production that is eventually channelled to fish. Therefore, the magnitude of fisheries depends on hydrodynamic processes.

The significance of small primary producers. Classical descriptions of phytoplankton communities were based on samples collected by plankton nets with a mesh size of 20 µm or so. This, of course, led to emphasis on phytoplankton cells larger than that. However, improved sampling and microscopic techniques led to the discovery in the 70's and 80's that very small phytoplankton cells make up a large fraction of the phytoplankton biomass, and indeed dominate the phytoplankton community in vast areas of the ocean (Stockner 1988). Size fractionated primary production measurements revealed that cells less than a few microns in size normally make by far the most significant contribution to pelagic primary production. Cells of this small size are unavailable to copepods, which can only capture particles larger than about 5 µm (e.g. Berggreen *et al.* 1988). Therefore, it is only a relatively small fraction of the primary production that is consumed by the copepods.

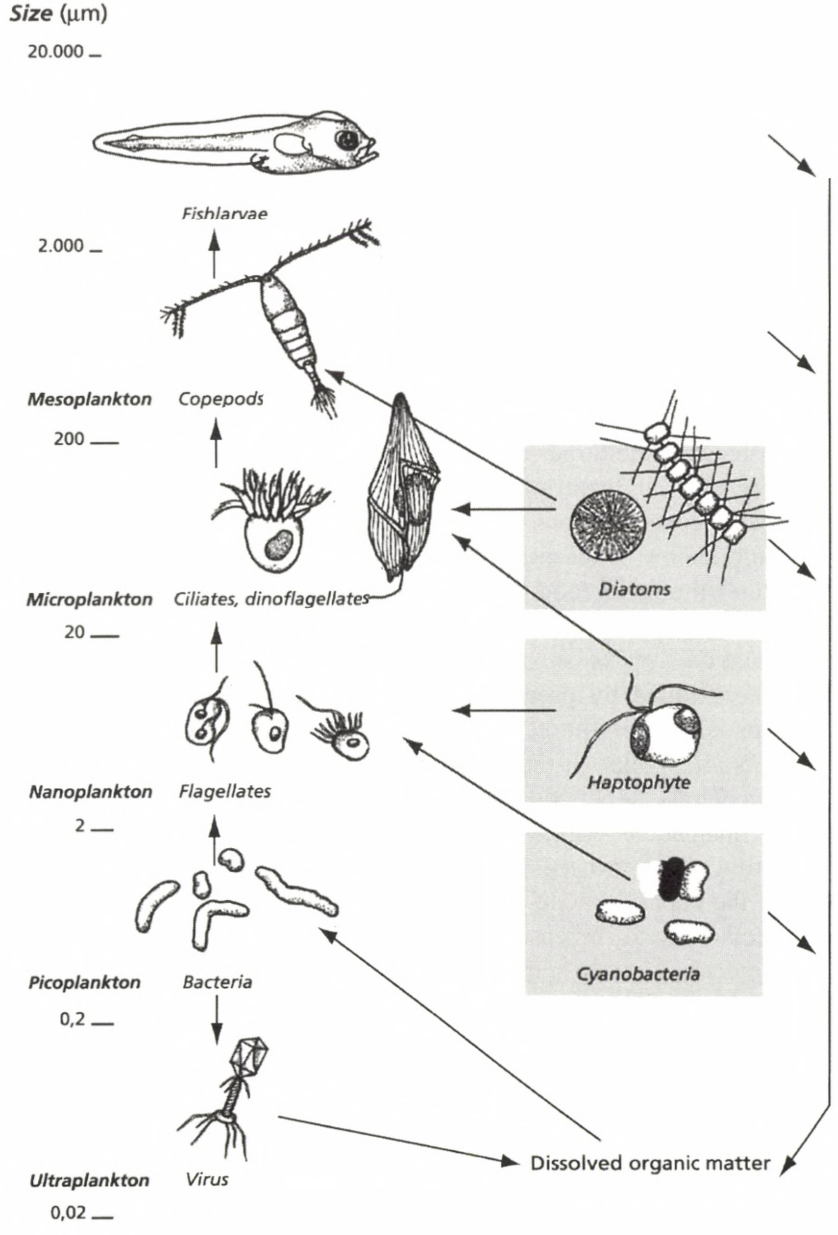
Pelagic bacteria and dissolved organic matter. The existence of free-living pelagic bacteria has long been recognized (Pomeroy 1970), but their concentration and activity were until recently assumed to be relatively low. The application of fluorescence microscopy, staining and radioactive labelling techniques (Fuhrman & Azam 1980, Hobbie *et al.* 1977) demonstrated, however, that bacteria are very abundant and grow rapidly in marine waters. Bacterial production may correspond to up to 50% of the primary production. Bacteria are heterotrophs; i.e. they feed on organic matter that must eventually stem from primary production, primarily dissolved organic matter. Thus, it seems that a large fraction of the pelagic primary production ends up in dissolved rather than particulate form, and is consumed by bacteria. Pelagic bacteria are small, typically less than 1 µm, and are thus unavailable to copepods.

Even though bulk phytoplankton biomass varies dramatically seasonally and spatially in the ocean, microscopic counts of bacteria and small phytoplankton cells revealed that these appear to occur at remarkably constant concentrations (Malone 1980). Bacteria, for example, occur in concentrations varying only between 10^4 to about 10^7 ml^{-1} (Azam *et al.* 1983).

The microbial loop. From the above it appears that a significant fraction of the pelagic primary production is unavailable to copepods and, thus, is not channelled in the 'classical' food chain. What, then, is the fate of this significant production of small bacteria and phytoplankton? And what factors control the abundance of small cells and account for their remarkably constant concentrations in the pelagic environment? Fenchel (1984 and other papers) in a series of elegant papers demonstrated that small (2-10 µm) heterotrophic flagellates occur abundantly in the ocean and feed on and control the populations of bacteria and small phytoplankton cells. These flagellates are in turn preyed upon by

Fig. 1. The pelagic food web. The organisms are organized after size (largest at → the top) and with autotrophs (phytoplankton) to the right and heterotrophs to the left. The fate of the primary production depends on the size of the primary producers. Production due to large phytoplankters (e.g. diatoms) are channelled in a relatively short, 'classical' grazing food chain to higher trophic levels (incl. fish), while production resulting from small cells (e.g. cyanobacteria) is channelled in a long microbial food web. Dissolved organic matter, leaking from all living organisms, is 'looped' back into the food web by bacteria. Most of the organic matter, which is processed by microorganisms, is 'burned' up before it reaches higher trophic levels. Modified from Fenchel (1988) and Nielsen & Hansen (1999).

10-50 µm large ciliates that may eventually be consumed by copepods and thus 'return' organic matter to the classical food web (Fig. 1). This 'shunt' in the pelagic food web became known as the *microbial loop*



(Azam *et al.* 1983). Because of the inefficiency of energy transfer between trophic levels, and because of the large number of trophic steps in the microbial loop, most of the organic material processed in this loop is remineralized or 'burned up' by the involved organisms. Generally, about 90% or more of the organic material produced by small phytoplankton is degraded by pelagic microorganisms and, thus, unavailable for fish production. In contrast, primary production due to large cells is channelled in a short 'classical' grazing food chain (Fig. 1) and a much larger fraction of this production is potentially available for fish production.

Why are there big phytoplankton cells in the ocean? Small phytoplankton cells are in almost all respects superior to larger cells: they grow faster, they settle more slowly out of the euphotic zone, they harvest light more efficiently, and they take up nutrients faster and more efficiently, particularly at low ambient nutrient concentrations, than do large cells (Kiørboe 1993). Why, then, do not small phytoplankton cells always outcompete larger cells? Despite the dominance of small cells, there are, after all, larger phytoplankters in the ocean, although at highly variable concentrations. The existence of larger cells has not only academic interest since primary production resulting from large cells constitutes the main food for the copepods and, hence, nourishes the 'classical' food chain and supports fish production.

Population sizes of small phytoplankton cells and bacteria are efficiently controlled by predators while larger phytoplankton cells are not. This is because the generation times of bacteria and small phytoplankters are similar to the generation times of their flagellate predators. In contrast, copepods have generation times that are 1-several orders of magnitude longer than their large-sized phytoplankton prey populations. Thus, whenever or wherever new nutrients become available in the euphotic zone (see below), populations of both large and small cells start to increase. The small cells are rapidly caught up by their predators – and their populations controlled –, while the larger cells can continue their growth almost unexploited by their predators until all nutrients have been exploited. This is because the predator (copepod) population response is much delayed. Therefore, large-sized cells *bloom* whenever new nutrients become temporarily available. Injections of nutrients in the euphotic zone are due primarily to hydrographic events, such as mixing events caused by wind, tides or currents. Therefore, hydrodynamic processes govern the structure of the

pelagic food web, and the magnitude of fish production is related to the spatio-temporal frequency of such events. We shall return to this later.

Feeding the sea floor. According to the classical description of the pelagic food web, faecal pellets produced by copepods sink to the sea floor and provide the main input of organic matter here. However, observed fluxes of copepod faecal pellets to the sea floor are generally much less than would be expected from the abundance of copepods in the water column and their anticipated faecal production rate (e.g. Smetacek 1980). Apparently, faecal pellets are to a large extent remineralized (degraded) in the water column and before reaching the sea floor. This is both because of the rapid leakage of solute substances out of faecal pellets (Jumars *et al.* 1989), and because faecal pellets are captured and consumed by specialized copepods in the water column (Gonzáles & Smetacek 1994). In effect, very few pellets reach the sea floor, even in relatively shallow regions.

How, then, does organic material reach the sea floor? Recall that there is no primary production of organic matter taking place at the sea floor (at least at depths exceeding 20-100 m), and benthic life depends entirely on organic matter supplied from above. Settling velocities of particles increase with the density difference between the particle and the ambient water, and with the square of the particle radius (Stokes' law). Phytoplankton cells do sink, but owing to their small size and almost neutral density, they do so only very slowly, about 1 m per day, or less. This is often far too little to account for the observed arrival rate of organic material at the bottom, which may require settling velocities orders of magnitude higher. Stokes' law implies that vertical material fluxes in the ocean must be due to relatively large particles.

Such particles were discovered in the ocean in the 50's by Japanese scientists (Suzuki & Kato 1953) and were named *marine snow*. Only within the last decade or so, however, have the occurrence, formation mechanisms and implications of these spectacular particles (Fig. 2) been studied in more detail (Alldredge & Silver 1988; Alldredge & Jackson 1995). Marine snow is mm-cm sized porous aggregates consisting of a wide variety of small primary particles. The aggregates are delicate and disintegrate easily into primary particles, for example when captured by plankton nets and other conventional sampling devices. This explains why marine snow was overlooked for so long. The primary particles of marine snow can be phytoplankton cells (live or

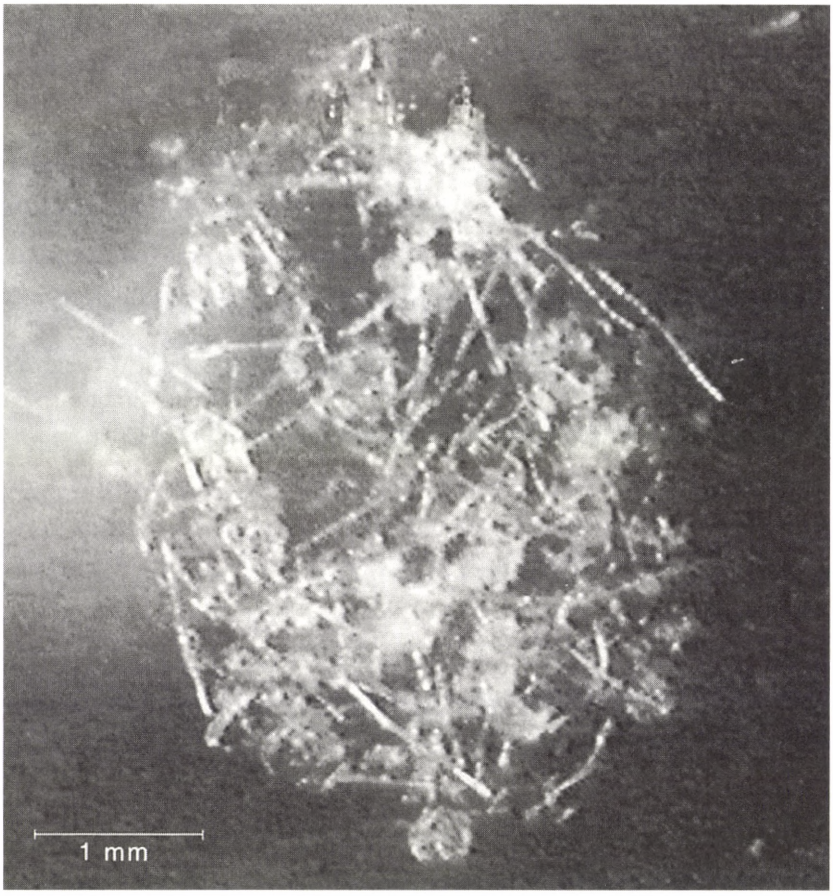


Fig. 2. *In situ* video micrograph of marine snow aggregate. This particular aggregate consists solely of diatoms cell chains (*Chaetoceros* sp), but aggregates can be composed of almost any type of particle that occurs in the water column.

dead) and other microorganisms, faecal pellets, dead animals or animal fragments, etc. Aggregates may be formed by a variety of mechanisms, of which an important one is *coagulation* (Jackson 1990, Kiørboe *et al.* 1990). This is a mechanism similar to the mechanism by which raindrops are formed from water particles in a turbulent cloud: differences in settling velocity between particles as well as turbulent water motion cause primary particles to collide. If the particles are 'sticky', they tend to adhere upon collision and to form subsequently larger and larger aggregates. With increasing size, the aggregates fall with increasing ve-

locity, and sinking rates sufficient to account for observed vertical particle fluxes will eventually result. Note that the aggregation process is strongly dependent on the size of primary particles. Collision frequency increases with the cube of particle radius! Therefore, aggregation and subsequent vertical flux is most important for relatively large particles, including large phytoplankton cells.

Marine snow aggregates appear to be ubiquitously present in the ocean, and often at high to extremely high concentrations. From observations of aggregate abundances, typically made by *in situ* photography or video, one would expect a constant rain of material to the sea floor. However, aggregation does not necessarily imply that the involved particles sink out of the euphotic zones. Aggregates are sites of elevated biological activity in that they house a rich flora and fauna. Some zooplankton organisms are specifically adapted to colonize and feed on aggregates, and aggregation may thus at times imply elevated mineralisation rates in the euphotic zone rather than sedimentation (Kiørboe *et al.* 1998). Nevertheless, marine snow aggregates are the main vehicles for vertical particle transport in the ocean (Fowler & Knauer 1986) and provide the direct or indirect supply of food for bottom dwelling organisms, including demersal fish.

Hydrodynamic control of pelagic food web structure. The pattern that emerges from the above is that pelagic food web structure depends on the size distribution of the phytoplankton. Primary production resulting from small cells is processed in a microbial food web, while large cells either sediment to the sea floor or are consumed by copepods. Thus, production owing to large cells – but not small ones – may eventually be channelled to fish production. The relative significance of large vs. small cells depends on hydrodynamic processes. Small cells occur in relatively constant concentrations owing to the density dependent predator control of their population sizes. Large cells, in contrast, vary substantially in population sizes. They bloom when and where nutrients become temporarily available, because in such dis-equilibrium situations their populations escape grazing control. Nutrients are injected into an otherwise nutrient-poor surface layer by vertical mixing processes. Too deep vertical mixing, however, implies that the phytoplankton become light limited. Therefore, blooms of large cells generally occur where or when mixed and stratified water masses meet. Only at such interfaces (in time or space) are the requirements for both light and nutrients satisfied. In the next section we shall examine examples of

how such spatio-temporal nutrient injections cause phytoplankton blooms, elevated production of copepods, gatherings of larval fish, and transport of organic matter to the sea floor. Eventually, it is the spatio-temporal frequency of such events that determine the magnitude of fish production in the ocean.

Examples from the North Sea

Seasonal changes

During the winter the North Sea is vertically mixed and the concentration of inorganic nutrients is high throughout the water column because of insufficient light for primary production and, hence, nutrient uptake. With increasing solar radiation during the spring, the surface layer becomes heated, and the consequently lower density of the surface layer prevents it from being mixed with the cooler and denser deeper waters. Thus, residing phytoplankton populations are retained within the upper layer, experience a high and consistent light intensity, and owing to the plentiful supply of inorganic nutrients, their populations increase. This results in the spring phytoplankton bloom (Fig. 3 a). Although both large and small cells occur, the spring bloom is typically dominated in terms of biomass by large-sized diatoms. The spring bloom lasts only 1-2 weeks and ends when all inorganic nutrients have been exhausted. A major fraction of the phytoplankton may then combine into marine snow aggregates that settle to the sea floor (Smetacek 1985, Kiørboe *et al.* 1994). The copepods respond immediately to the elevated availability of phytoplankton food by producing eggs at high rates (Fig. 3 c,d), whereas the increase in copepod abundance is much delayed and reaches its highest annual value only several months later (Fig. 3 e). An additional peak in phytoplankton and copepod egg production occurs in the fall. This corresponds to the period where the vertical temperature stratification of the water column starts being eroded owing to reduced solar radiation and increased vertical mixing because of autumn storms (Fig. 3). This again leads to injection of new nutrients, and to a response in the pelagic food web. Thus, the sequence of events illustrated in Fig. 3 fits exactly into the generalized pattern described above. A significant fraction of the annual production of copepods is associated with these two seasonal events.

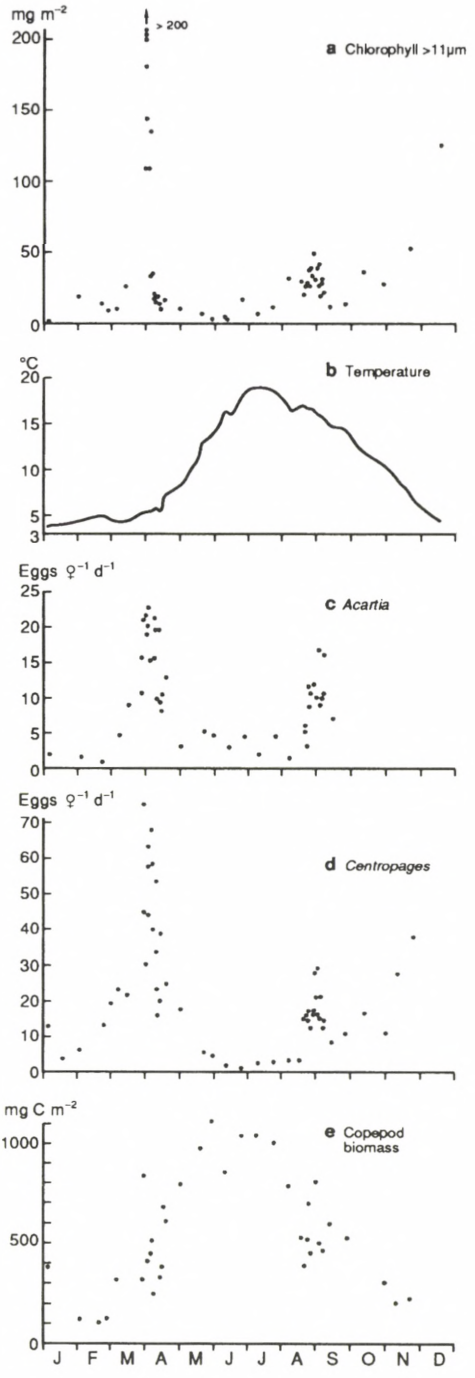
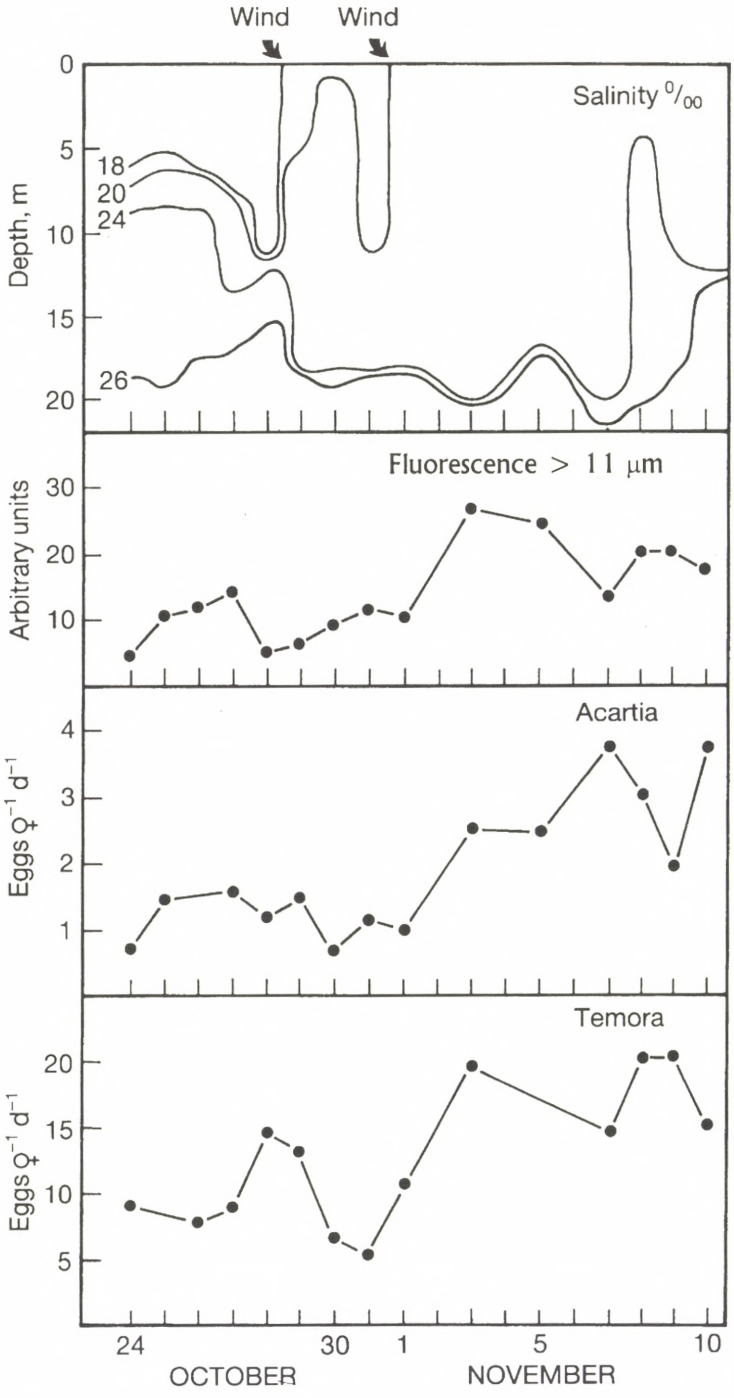


Fig. 3. Seasonal production events as recorded during an annual cycle in the North Sea area (Southern Kattegat). The biomass of large-sized phytoplankton, quantified as the concentration of chlorophyll retained on an 11-m filter (panel a) shows blooms in spring and autumn when vertical water column structure changes. These blooms are closely tracked by the productivity of copepods, quantified as rates of egg production (panels c,d), whereas the biomass of copepods (panel e) varies almost independently of phytoplankton concentration and rather follows variation in temperature (panel b). Data from Kiørboe & Nielsen (1994).


Wind
Wind
Salinity ‰
Depth, m
0
5
10
15
20
18
20
24
26
Fluorescence > 11 μm
Arbitrary units
30
20
10
Acartia
Eggs ♀⁻¹ d⁻¹
4
3
2
1
Temora
Eggs ♀⁻¹ d⁻¹
20
15
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OCTOBER
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← Fig. 4. Effect of a wind event on vertical water column structure, biomass of large phytoplankters (quantified as fluorescence due to particles > 11 m), and egg production in two species of copepods (*Acartia tonsa* and *Temora longicornis*) in the southern Kattegat. Strong winds erode the water column stratification and result in an almost homogenous vertical salinity distribution (upper panel). This causes increased availability of nutrients in the upper layer and a subsequent bloom of large-sized phytoplankters and elevated productivity of copepods. Data from Kiørboe & Nielsen (1990).

Wind events

Variation in vertical water column structure may occur at much shorter than seasonal time scales as a result of wind events. Strong winds may cause erosion of the temperature stratification, and subsequent surface heating may reestablish the water column structure. The wind-mixing event may bring inorganic nutrients from the bottom to the surface layer, and cause the larger-sized phytoplankters to bloom and subsequently cause elevated copepod production. Observations in the North Sea and elsewhere demonstrate this sequence of events (Fig. 4).

Tidal fronts

In some shallow regions of the North Sea where tidal currents are strong, tidal mixing may locally overcome the vertical temperature stratification of the water column. Thus, while the deeper parts are stratified, the more shallow parts become tidally mixed. The transition zone between mixed and stratified water is called a tidal front. The position of the tidal front varies temporarily with variation in solar radiation, and with the intensity of tidal mixing, which varies with the neap-spring fortnightly tidal cycle. Thus, in the frontal region, the water column constantly changes between mixing and stratification. Mixing brings nutrients to the surface, and subsequent stratification retains phytoplankton in the illuminated surface layer. As expected from the above conceptual scheme, blooms of large sized phytoplankters often occur at tidal fronts, and the effect moves up the 'classical' food chain to both copepods and larval fish (Fig. 5). The effect is also manifest in a vertical flux of organic material to the sea floor, which results in elevated biomass of benthic invertebrates (Josefson & Conley, 1997). Tidal fronts occur abundantly in the North Sea (Pingree & Griffiths 1978) and may account for the very high fish yield in this area.

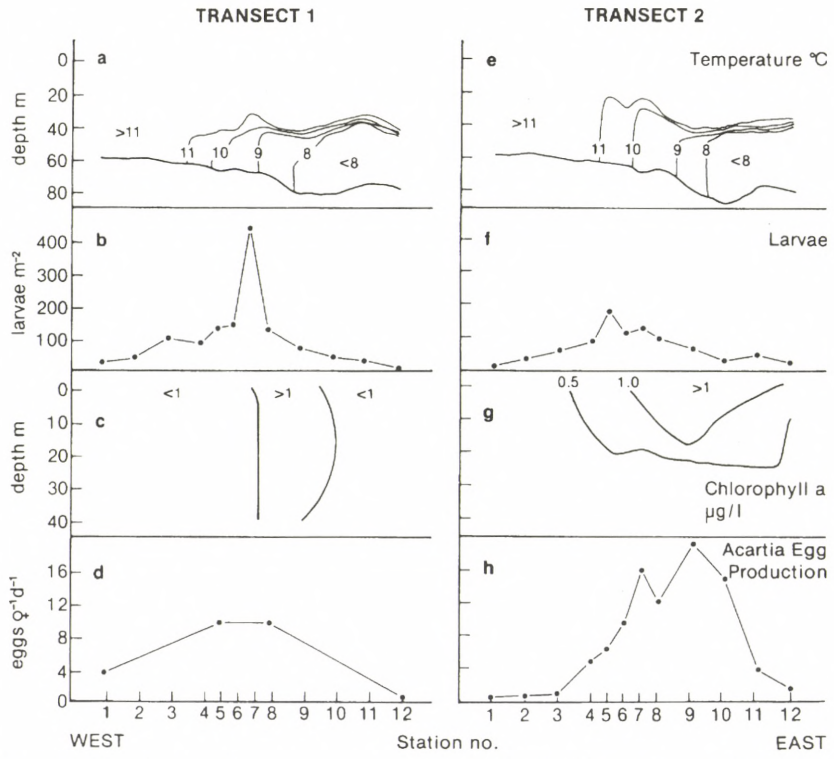

Fig. 5. Distribution of temperature (panels a,e) herring larvae (panels b,f), phytoplankton (panels c,g) and egg production of the copepod *Acartia tonsa* (panels d,h) across a tidal front in the North-western part of the North Sea. The frontal zone is the region between the entirely mixed water column (western part of the transect, where temperature is constant down to the bottom) and the stratified part (eastern part of the transect, where the temperature is higher at the surface than in bottom water). Data collected during two transects of the front. Data from Kiørboe *et al.* (1988).

Vertical discontinuities

The vertical mixing that occurs on the shallow side of tidal fronts may impact phytoplankton production and pelagic food web structure in relatively large regions and beyond the immediate frontal area. Bo Pedersen (1994) described a mechanism whereby nutrients mixed into the surface layer may be transported along the layer separating the surface and the deep water (the pycnocline) over extended areas, and account for the frequent occurrence of sub-surface phytoplankton maxima asso-

ciated with the pycnocline (Fig. 6). Throughout the summer period, where the North Sea is vertically stratified owing to temperature differences, one often finds high concentrations of phytoplankton at the pycnocline, i.e., 15-25 m below the surface (called subsurface phytoplankton maxima). Such subsurface maxima may occur as a result of the accumulation of sinking phytoplankton at the density interface, or of a locally enhanced growth of phytoplankton. Direct measurements of growth rates suggest that the latter may often be the case in the North Sea (Richardson & Christoffersen 1991). This is most likely because of the local combination of sufficient light (from above) and sustained availability of nutrients. Vertical tidal mixing in the shallow region of a front generates water of intermediate density with a high nutrient concentration. This water flows horizontally into the vertically stratified region, exactly at the depth where the density matches that of the mixed water (Fig. 6). This way, nutrients are 'pumped' into the pycnocline. Pumping intensity varies on a fortnightly cycle, and thus causes a fortnightly cycle in the transport of nutrients for phytoplankton production. Because of the time variation in nutrient availability, grazing on large cells never comes into equilibrium with their production, hence the locally elevated concentration of big cells. The distribution of these sub-

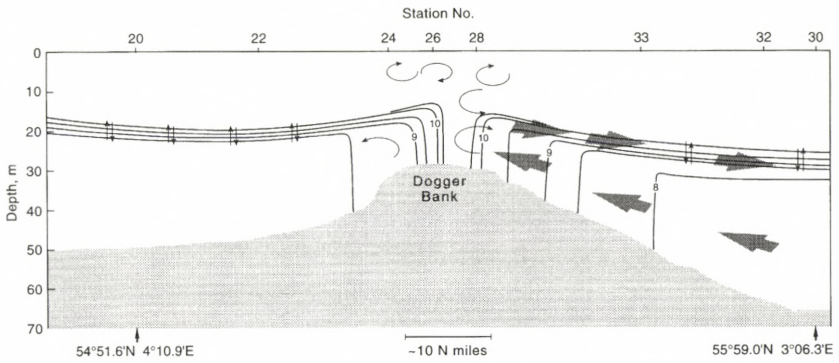

Fig. 6. Schematic of the tidal nutrient pump on Dogger Bank in the southern North Sea as described by Bo Pedersen (1994). Winds and tides cause mixing of the water column to the bottom of the centre of the bank. Water of intermediate density and nutrient content thus generated intrudes along the pycnocline away from the bank. This generates favorable growth conditions for phytoplankton at the pycnocline. Because tidal mixing intensity varies in a fortnightly cycle, this mechanism causes a pulsed supply of nutrients in the pycnocline. After Nielsen *et al.* (1993).

surface phytoplankton maxima in the North Sea fits nicely with those predicted from bottom topography, tidal energy, and hydrodynamic analyses (Bo Pedersen 1994). Our conceptual scheme above would suggest that these subsurface phytoplankton maxima would fuel a 'classical' grazing food chain and, thus, production at higher trophic levels. Recent studies in the North Sea confirm this (Richardson *et al.* 1998).

Other spatio-temporal oceanographic discontinuities

There are several other processes that may cause injection of nutrients into the photic zone of the ocean. One well-known example is coastal upwelling. On a larger scale, this occurs on the east coasts of the continents, for example the Benguela current off South Africa, and off the Chilean east coast. These regions are extremely productive, both in terms of phytoplankton production, and in terms of fisheries. Coastal upwelling also occurs on a much smaller scale in, for example, the North Sea, although of much less significance here than elsewhere.

Fish production in the North Sea

Fish production – or rather fisheries yield – on the continental shelves of the world's oceans varies between regions, mainly between 1-5 t per km^2 (FAO 1997). Upwelling regions may, however, experience significantly higher catches, e.g. about 25 t/km^2 in the Southeast Pacific off the South American coast. In our part of the world, the North Atlantic, peak fish landings correspond to 3-4 t/km^2 (FAO 1997). This average figure, however, covers relatively large local differences. Peak North Sea catches are about 3×10^6 t (ICES 1992) over an area of 0.5×10^6 km^2 (Steele 1974), corresponding to 6 t/km^2, i.e. almost twice the average. At the other end of the range is the nearby Irish Sea, with annual catches of about 1 t/km^2 (Brander 1977). These differences are not the result of differences in fishing effort, because both numbers refer to the peak catches in the 70's. Subsequently, capture rates have declined in both areas, suggesting maximum efforts in both areas. What is the reason for the very productive fisheries in the North Sea?

The North Sea is rich on hydrographic 'discontinuities', i.e. regions or periods, where the water column structure varies spatially or temporally, and where inorganic nutrients become locally or temporarily available for new production. It is the availability of new nutrients and the spatio-temporal frequency of hydrographic discontinuities that eventually determine the magnitude of fish production in a particular area. These hydrographic 'structures' include the several tidal fronts in the western and

southern parts of the North Sea and coastal fronts in the eastern part. From a production point of view, the tidally driven nutrient pump described above also seems to be of importance in the North Sea. Richardson & Bo Pedersen (1998) estimated for the North Sea proper, that the spring bloom accounts for about 40% of the annual new primary production, frontal and coastal regions for another 40%, and the production in the subsurface phytoplankton populations for the remaining 20%. However, in the southern more shallow part of the North Sea, where a disproportionate fraction of the value of the fisheries is retrieved, the subsurface production may be relatively much more important. For the Dogger Bank area, for example, it has been demonstrated that the magnitude of the new production owing to this mechanism is more important than the spring phytoplankton production, and accounts for maybe 2/3 of the total annual new production (Richardson *et al*, 2000).

The total *new* production in the North Sea was estimated by Richardson and Bo Pedersen (1998) to be about 40 g organic carbon/m^2/year. The *regenerated* production is presumably 2-5 times larger than this, making total primary production in the North Sea in the order of 150 g C/m^2/year or more, which is largely consistent with measurements. However, it is only the 40 g of new production which leads to the building up of harvestable biomass. With the estimated fisheries yield converted to organic carbon, 6 t live weight/km^2/year = ca. 3 g C/m^2/year, it follows that corresponding to about 1% of the new production ends as harvestable fish biomass. This estimated efficiency is not very different from the efficiency estimated by Steele (1974) more than 25 years ago. However, it is arrived at in a very different manner, and it builds on a very different understanding of pelagic food web structure and functioning.

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Strolling players: theatre as an agency of cultural exchange

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Theatre has been used as a metaphor for human life in folk and popular culture and in Western literature and philosophy since Plato. By the sixteenth century the notion of *Theatrum Mundi* was commonplace: there are abundant references to the world as a stage, to humankind as 'poor players', each one with a 'part' to enact and to the Deity or Providence as dramatist, director and spectator. In contemporary secular society, sociologists, psychologists and even management consultants use notions of 'role', 'performance' and 'acting out' in the pursuit of their disciplines.

> Whenever there is culture there are forms of theatre. (Fischer-Lichte 1988, 1)

The nature of the performance event renders it, albeit in divergent forms, common to many cultural systems. While each culture will evolve a theatrical code specific to itself and use signs of particular relevance to its constituents, the essentials of the act of performing, namely, the actor and the spectator, are universal. The performing arts, therefore, may be seen as ideal vehicles for cultural exchange. Western theatre since classical times can legitimately be regarded as an exemplar of transculturation. Carl Weber (Marranca and Dasgupta 1991, 31) cites the evolution of Molière's comedic technique from the Greek comedy of Aristophanes, through the Latin New Comedy of Plautus and the Italian Commedia dell' Arte. That line could be continued to include Holberg, a Dane, Ionesco, a Roumanian, and return to present day Italy in the work of Dario Fo. Shakespeare, Schiller and Brecht, together with many contemporary dramatists, have deconstructed and re-encoded sources emanating from other cultural contexts in creating new works. In contemporary theatre practice, a Russian, (Stanislavsky), a German, (Brecht), a Pole, (Grotowski), a Frenchman, (Artaud), and a Brazilian, (Boal) dominate the theories and techniques of acting and directing.

Despite the evidence of theatre culture's being a veritable *jeu sans frontières*, however, the institution of theatre is generally organised on a national basis financially and politically in terms of the creation and implementation of a cultural strategy. This is certainly true in Europe since the growth of the concept of individual nationhood in the nineteenth century. And nations first of all seek to represent themselves to themselves. Such representation may affirm the aesthetic taste of the dominant class or group, for example, in 'National' companies whose remit includes the conservation of the national canon and the preservation of a dramatic heritage, or it may critique such taste within alternative and *avant-garde* productions that both in choice of material presented and in methods of presentation challenge the hegemonic discourse of the classical. Indeed it is such alternative movements that import most freely from 'alien' cultures, if the dominant national culture is too lacking in energy to promote self-generated innovation.

Within any nation there are many sub-cultures. How and to what extent these are represented on stage is always a matter of debate, often of fierce argument. As many Scots would resent the national image that is projected abroad through the drug-dealing delinquents of Edinburgh in *Trainspotting* as would detest the blue-faced tartanry of *Braveheart*. Loren Kruger in *The National Stage* expresses the ambivalence thus:

> The idea of representing the nation in the theatre, of summoning a representative audience which will in turn recognise itself as a nation on stage, offers a compelling if ambiguous image of national unity, less as an indisputable fact than as an object of speculation. (Kruger 1992, 3)

Thus theatre literally 'stages' a nation by providing a public locus in which that nation can perform itself and by so doing may either reify or problematize its perceived identities. Self-presentation is linked to self-reflection, and as much may be revealed through the imaginative or fictitious texts through which a culture (re)presents itself as through the study of 'truthful' or 'factual' texts such as histories, political treatises or statistical reports.

Although in many respects theatre can be seen as an artform that will 'travel well', there are many features specific to it that render transportation problematic. The transportation of a performance created initially for an audience, presumed broadly to share common cultural competences, to a new target audience that is likely, albeit in varying

degrees, to differ from the first in the cultural capital which it brings to the theatrical event creates a range of challenges for both the 'exporter' and the 'importer'. These challenges, I suggest, are unique to theatrical art, for while the interlingual translation of a script is common to all literary works, the non-verbal languages of theatre, for example, the paralinguistic and kinesic signs of the actor and the iconic signs of the setting and costume design, are deeply rooted in the source culture and could be conceived of as being even less amenable to translation than the literary text. Actors, for example, in their gestural language, in the pace and rhythm of their performances, as well as in the intonation, stress and colouring of their speech, have been trained to perform in a manner which is both inscribed by, and reflective of, their cultural roots. The director, Peter Brook, in his experiments using a range of actors from a variety of histrionic traditions has attempted to develop an intercultural playing style and to erode national peculiarities but, in the main, it is not difficult to detect significant differences in modes of acting even between close neighbours such as Scotland and England. Indeed the whole *mise en scène* (that is literally, the process and result of putting a dramatic text on a stage) is crucially bound by the selection and organisation of cultural sign systems that are shared by the production team and by the audience. The theatrical signs can only be understood by those with a knowledge of the cultural system from which these signs are drawn.

Further, the specificity of a theatrical event in terms of the time, location and context of its presentation implies that a change in any of the original conditions will mean that what is 'exported' is not the original production, not even a re-production of it, but a new product. Since the performance event is by its very nature transitory and ephemeral, a fact that is at once a frustration and a fascination to the theatre historian, it cannot have an independent afterlife. What frequently occurs in the exportation is that the 'alien' form, the new wine, is insensitively served up in the old bottles of the receiving culture's theatrical conventions. Thus, a piece of Japanese Noh theatre may be crabbed and confined within a Western proscenium arch stage or a twenty-four hour Indian epic may be compressed to suit the expectations and the short attention span of a Western audience.

In the light of these preliminary observations I propose now to examine the main components of a theatrical performance and consider the extent to which each may be rendered exportable. These components are the script (or scenario) which is generally referred to as the 'pre-

text': the *mise en scène* or the performance text, and, finally, the context, the socio-economic, historical, geographic and theatrical conditions in which the performance text takes place. I have chosen to use as my principal source of examples, Henrik Ibsen's *A Doll's House*, not only because this pre-text can be justifiably regarded as seminal in the European modernist movement and as the springboard for major changes in Western dramaturgy, but also because Ibsen's career brings together the theatrical cultures of our two countries and is therefore an appropriate exemplar for this occasion.

In a letter to William Archer, the Scottish critic, who was the prime mover in the campaign to present Ibsen's work on the British stage in that he translated and directed several of the major plays, Ibsen wrote:

> I have been revolving many things in my mind lately, and one of the conclusions to which I have come is that there are very strong traces in me of my Scotch descent. But this is only a feeling – perhaps a wish that it were so. (Morison 1905, 443)

Ibsen's 'Scotch descent' dated back to the eighteenth century and there was more German and Danish blood in his ancestry than Scottish, but his flattering comment to Archer perhaps excuses the light-hearted appropriation by Scots of the Scandinavian playwright of whom it has been said that he was really a Scot called 'Henry Gibson'. A programme note for a production of *Hedda Gabler* at the tiny Curtain Theatre in Glasgow in 1938 refers to Ibsen as 'the only Scottish dramatist of outstanding quality.'

Ibsen learned his dramaturgical craft at the Royal Theatre in Copenhagen where he worked under Fru Heiberg: his champion and philosophical partner was the Danish critic, Georg Brandes: William Bloch, Denmark's most perceptive director of the naturalistic drama exercised his skills on Ibsen's plays: Ibsen wrote in Dano-Norwegian, and although the period of his social prose dramas coincides with the movement to 'Norwegianize' the language, his voluntary exile overseas meant that he was very little influenced by the 'Maalstrife'.

Any cultural exporter must deal with the translation of the source pre-text into the language of the target culture. There are many problems surrounding linguistic translation and a distinguished and formidable canon of theoretical literature exists on the subject. As Patrice Pavis has noted:

> The phenomenon of translation for the stage ... goes beyond the rather limited phenomenon of the interlingual translation of the dramatic text. (Pavis 1992, 36)

The theatre translation must be rendered 'playable' in the target culture, which means that the notion of literalness or 'faithfulness' to the original will have to be modified in order that it is, in the first instance, 'speakable' by the actors, and secondly that it makes possible, or allows for, a *mise en scène* that will be appropriate to the target audience. Translation for the stage, then, is as much of a dramaturgical exercise as it is a linguistic one.

A second challenge for the translator of a dramatic text is that s/he must resist the temptation to render the script into the dominant language of the target culture if the original does not use the dominant language of the source culture. Such a mistake will reduce the original to blandness and lose the linguistic texture. Translation into Standard English or into Parisian French, for example, 'can have a homogenizing effect as a translating medium'. Bill Findlay, a Scottish writer, who has become celebrated for his translations into Scots of the work of the Quebeçois playwright, Michel Tremblay who writes in the Montreal dialect or *joual*, rightly claims that:

> the class-associated tones [of Standard English] have misrepresented both the non-standard and the bi-lingual nature of much of Western drama and its rootedness in a particular regional or national culture. (Findlay 1996, 193).

He cities as examples not only the work of Tremblay, but of Francis Xaver Kroetz, 'rooted' in the Bavarian underclass, of Dario Fo, writing in the regional accent of Northern Italy and of Edmond Rostand using his native Gascon in such works as *Cyrano de Bergerac*.

Two contemporary scholars, Egil Tornqvist and Kirsten Shepherd-Barr have written at length on the translating difficulties surrounding Ibsen's *A Doll's House*. I propose to discuss only one, the translation of the title of the play. Ibsen's title *Et Dukkehjem* means literally 'a small neat cosy home'. It does not have the connotations of a children's toy inherent in the English translation *A Doll's House*, the American, *A Doll House* or the French, *La Maison de Poupée*. Dano-Norwegian had two other words for the toy, 'dukkehus' and 'dukkestue'. The French and English translations clearly pick up on Nora's references to herself as

having been no more than 'a pretty doll' in both her father's house and in her husband's. Thus the focus of the piece is specifically on the woman, Nora. Indeed German translators habitually took the heroine's name as the title. Ibsen's *Et Dukkehjem*, however, has a wider social implication namely that the turbulent but secretive action of the play was probably being re-played behind the comfortable and respectable facades of many of the 'small neat cosy homes' of Northern Europe. The societal repression that promotes an ideology of 'separate spheres' for men and women is seen as damaging to all the inhabitants, husband, wife, children and guests, not simply to one woman character. Ibsen's original title is ironic, not symbolic, as it becomes in the English and French renderings. Thus, the meaning of the original has been subtly altered, even before the translators have begun to work on the dialogue itself. Nonetheless, the ambiguities regarding the title are trivial compared to the crimes perpetrated by some translators/adaptors in Germany, England and Belgium who substituted a 'happy' ending in which Nora remains with her children for Ibsen's original when she leaves alone, slamming the door – a sound said to have reverberated all over European theatre.

I shall now consider the problems of transposition that relate specifically to stage presentation. *A Doll's House* belongs to the Naturalistic movement prevalent in Europe in the later nineteenth century which, with its roots firmly in the works of Auguste Compte, Charles Bernard and, above all, Charles Darwin's *Origin of Species*, focused on the important role of heredity and environment in the evolution of an individual. The Naturalists sought to represent on stage as accurately as was possible the environment that shaped the *dramatis personae*. Settings were designed to give information on the period and place of the action and on the characters' social, financial and psychological state. The problem that arises in the transportation of such a *mise en scène* is that what is regarded as eminently naturalistic in one country may seem positively exotic in another. A director must choose either to reproduce as closely as possible the stage directions in the source thus underlining its 'foreign-ness' or to seek equivalences in the target culture, which may not be immediately obvious.

The first full production of *A Doll's House* in England in 1889 attempted to represent, indeed to emphasise, the Norwegian setting, with a tiled stove, prints by Thorvaldsen on the walls and a contemporary Norwegian newspaper lying on the couch. This type of setting was very different from the usual lavish designs realised on the West End stage,

which mirrored the town and country houses of the affluent audiences. It was partly for this reason that Ibsen's dramas were often dismissed as 'provincial' that is, non-metropolitan.

The French theatre, on the other hand, made no concessions to the play's country of origin in the first production in Paris in 1894. William Archer described the set as:

> A gaunt and arras-hung baronial hall, decked with trophies of war and of the chase – as though the Helmers had taken a flat in the Castle of Otranto (Tornqvist 1955, 67).

In this instance, the equivalence was misplaced and the social status of a Norwegian bank manager and his wife totally misrepresented.

Finally I shall turn to 'context': I have already referred to the importance of the place in which the theatrical performance is situated, i.e. the geographical, social and architectural features of the venue. These will condition the nature of the audience and its reception of the performance and will also dictate the experience and the reputation of the participants. A comparative study of the first Danish, English and French productions of *A Doll's House* clearly demonstrates this.

A Doll's House received its first professional production at the Royal Danish Theatre in Copenhagen in 1879. This theatre had recently passed from being truly 'Royal' by becoming a governmental democratic national institution. The players belonged to the national company. This was, therefore, a highly prestigious venue, supported by the State, and therefore, not wholly reliant on commercial success or on popular taste. The Royal Theatre had a long and distinguished history and had an undisputed role in Danish national culture. About two weeks before the production, the pretext had been published, and it is therefore likely that many of the literary and sophisticated audience would have read or at least would have heard of the play they were about to witness. The production was a considerable success, playing for twenty-one performances in the first season.

In England the theatrical context was very different. Two competent but comparatively unknown actors, Janet Achurch and Charles Charrington, approached William Archer for the rights to his translation of the play. Archer who had formed the opinion that Ibsen's plays would never be performed on a London stage, was delighted and became involved as adviser and as director of the production which was performed at the Novelty Theatre in Holborn, well outside the fashionable

West End ambience, in 1889. Money for the production was raised by Achurch and Charrington themselves, through an advance they received on entering into a two-year contract to tour Australia and New Zealand. Elizabeth Robins, the American actress who was later to play the great Ibsen heroines in London, commented as follows on the venue and the audience for this epoch-making production:

> I cannot think such an experience was ever ushered in with so little warning. There was not a hint in the pokey, dingy theatre, in the sparse, rather dingy audience, that we were on the threshold of an event that was to change lives and literatures. (Robins 1928, 9)

In contrast to the National Theatre of Denmark, the Novelty in London was a 'fringe' venue, occasionally hired out to *ad hoc* companies for *avant-garde* productions that had no prospect of being mounted in the commercial theatre but which catered largely for an audience seeking an alternative form of entertainment to that which the dominant culture promoted.

In Paris, *A Doll's House* was first professionally performed in 1894 at the Vaudeville, a boulevard theatre, managed by Paul Porel, whose wife, Réjane, starred as Nora. Réjane was already a celebrated performer in the commercial theatre, her reputation having been gained in light comedy of manners. This was a commercial venture, not a state event, or a 'fringe' experiment.

Interestingly both in London and in Paris, the first professional productions were preceded by contrasting private performances. In France, the play was read before a distinguished audience of two hundred literary radicals at the Salon of Mme Auberon de Nerville. It took ten months to prepare and was directed fairly simply by Le Comte de Tillet, possibly with some help from Dumas *fils*. This had little impact on the general public and was really an aristocratic literary party but none the less it was reviewed in the *avant-garde* press. The amateur performance in England was organised by Eleanor Marx-Aveling, Karl Marx's daughter. The cast included critic, iconoclast, future dramatist and passionate Ibsenite, G. B. Shaw.

Productions of *A Doll's House* did not go unnoticed in any of the cultures to which the play was presented. In Copenhagen, the target culture or the closest one comes to Ibsen's 'intended' audience, the critical reception did not focus, as it did elsewhere, on the pre-text as a feminist tract, but rather took the side of the abandoned husband, Helmer, and

questioned the morality of a mother's abandonment of her children. The reason for the critics' (and the Danish audience's) identification with Helmer might well have been the portrayal of the character by the celebrated and much loved actor, Emil Poulsen, who far from rendering the character as a pompous, narrow-minded bank manager, created the impression of a man with:

> the right touch of vacillation, half-educated, half likeable, a little arrogant and cleverly ordinary. (*Dagbladet*, 22 December 1879)

The *Dags-Telegrafen* (22 December 1879) described him as 'a congenial, refined, professionally energetic and honest, domestically happy and likeable personality'.

In addition Betty Hennings' Nora established her reputation as a first-rate actress within Denmark. Her previous career as a dancer enabled her to give a rendering of the Tarantella that was regarded as the finest in the early productions. The excellence of the acting overall encouraged the view that the play was 'a dramatization of a moral and ethical dilemma', one which the audiences found so engaging and ultimately so detrimental to normal conversation that placards were hung on the walls of Danish drawing-rooms advising guests that there were to be 'No Doll's House discussions here'. There was, however, no suggestion that the play was designed to be, or was received as, a blow for the emergent women's rights movement.

In London, the initial reception of Ibsen's dramas was largely clouded by the identification of the dramatist with a socialist political philosophy. The anti-Ibsen critic, Clement Scott, coined the term 'Ibsenite' and 'Ibsenism' came to mean far more than a group of people who enjoyed Ibsen's plays. To Scott and to upholders of the sacred cows of Victorianism, Ibsenites were:

> nasty minded people who find discussion of nasty subjects to their taste in exact proportions to their nastiness. (Archer 1893)

To Herbert Waring, the actor who first played Helmer in London, the characteristics of an 'Ibsenite' were, first, a reverence for the 'New Woman', secondly, an intense belief in an intellectual oligarchy as an ideal form of government, thirdly, the appreciation of the consequences of heredity, and finally, a yearning after truth and individual freedom. (Waring 1894) One reason for this close identification of Ibsen with

radical socialism was the fact that the plays were first presented by alternative *ad hoc* companies of actors whose desire to reform the theatre often went hand-in-hand with a desire to reform society as a whole. But a major influence was George Bernard Shaw whose *Quintessence of Ibsenism* (1891), one of a series of lectures on *Socialism in Contemporary Literature*, delivered to the Fabian Society in the previous year, crystallized the view that Ibsen was a champion of political radicalism and particularly of women's rights.

The first serious translation of *Et Dukkehjem* into English by Henrietta Frances Lord was prefaced by an essay on the unhappy position of women in contemporary society. Appropriately, the piece was entitled, *Nora.* Many, however, believed that Ibsen had been butchered to make a Fabian holiday and William Archer, on the occasion of the Achurch/Charrington *Doll's House* in 1889, made it clear that to see the plays purely as social documents was to take an absurdly limited view and to ignore Ibsen's dramatic and theatrical poetry.

> To treat Nora's arguments in the last scene of *A Doll's House* as though they were ordered propositions of an essay by John Stuart Mill is to give a striking example of the strange literalness of the English mind; its inability to distinguish between drama and dogma. (Archer 1889)

Despite the sense in Archer's comments, however, the production of *A Doll's House* and the critical response that accompanied it influenced the future reception of Ibsen's plays throughout the following decade. To quote Kirsten Shepherd-Barr:

> *A Doll's House* [in Britain] set up expectations of [Ibsen's] work as 'closed' texts/performances *ie* those that aim in generating a precise response from a more or less precise group of empirical readers. (Shepherd-Barr 1997, 59)

The plays were deemed to be interesting only to an audience of left-wing intellectual radicals and were, with the exception of *An Enemy of the People*, emphatically refused production in the fashionable commercial theatres of the actor-managers.

Kirsten Shepherd-Barr also makes the pertinent point that most of the principal promoters of Ibsen's plays on the English stage were not Eng-

lish. There was William Archer, a Scot: George Moore, G. B. Shaw and Oscar Wilde, all Irish: Henry James, Elizabeth Robins and Marion Lea, all Americans, and J. T. Grein, a Dutchman. The Ibsen advocates, therefore, came from what could be seen at the time as cultures marginal to the dominant London one, against which they were mounting an aesthetic and even a political campaign.

In Paris, Réjane's light-hearted, childish, flirtatious Nora caused no such ripples on the political scene. The character was portrayed as charming, slightly naughty, an excellent vehicle for a well-known star, celebrated for winning audiences by her attractive and vivacious personality. French critics saw Nora, not as a portrayal of a real woman but as an idea, *un symbole révolutionnaire*, and, therefore, hardly a threat. Others took the view that as a Scandinavian woman culturally distanced from a French one, and emphatically not a Parisienne, Nora was no challenge to the stability of indigenous morality, however fascinating she might be as a *revoltée*, a type of foreign deviant.

Thus, in three cultures, there is evidence that there were three quite different *Doll's Houses*, one which inspired a moral controversy, one which fanned the flames of feminism and one which was no more than the presentation of an archetype of the eternal female mystique, charming, but unpredictably wayward because she had not the good fortune to be born a Frenchwoman.

In my choice of a historical example to demonstrate the challenges inherent in international trade in theatrical products, I have reluctantly avoided discussion of some major issues relevant to the contemporary commodification of culture, for example, the dilution of the source text to enhance its marketability, the cannibalisation of only partially understood peripheral cultures to revive a moribund core culture and/or, the contrary phenomenon, when a destabilised or impoverished peripheral culture is fed, forcibly or otherwise, by an imperialist culture's produce. All of these topics are matters for future debate which our learned societies may come to confront.

Nonetheless my personal conclusion coincides with that of the Canadian theatre director, Robert Lepage, whose innovative productions of drama and opera have travelled widely and well over the last decade:

> A culture that does not export is doomed to disappear.

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National identity in Denmark

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I

Danish national identity may be as old as the oldest preserved mention of the name of the kingdom and its inhabitants. Danes are referred to by a Gothic historian in 551 A.D. Dania appears as the Latin name of the country from around 700. A Danish king called Godfred held his own in a meeting with Charlemagne in 810. Sixteen years later a Frankish court poet (Ermoldus Nigellus) describes the Danes in a Latin poem as swift characters, keen users of arms, handsome, tall, noble-looking, and practically living on the ocean in their boats. At that time, after the assault on the monastery at Lindisfarne in 793, the Danes had made themselves known abroad, and had even before that conducted successful raids on Catholic Europe. In the 960's, the large Jelling stone, a monument with a runic inscription – as a rare exception carved in horizontal lines – gives the name Denmark in the vernacular as *tanmaurk*. But the message of the inscription – that King Harold conquered all of Denmark and Norway and christianized the Danes – does not unfortunately reveal exactly what the term Denmark comprises, nor does any other contemporary source.

II

National identity is most often discussed or proclaimed when it is under threat. In the 1130's and through to the 50's, pretenders to the Danish throne fought in civil wars. A one-king monarchy was re-established in 1157. The victorious royal dynasty was interested in forgetting this immediate past. Therefore Saxo, a national historian living in the decades before and after 1200, was commissioned by two consecutive Danish archbishops and one king to record the deeds of the Danes (*Gesta Danorum*, though this title is hardly Saxo's own). He came up with a

comprehensive chronicle in ambitious Silver-Age Latin, a work which was copied throughout the Middle Ages, usually in abbreviated versions, until it was printed in Paris in 1514 and earned surprised and admiring attention from Erasmus of Rotterdam.

Now Saxo did not deign to explain the origin of the Danes, as had been the tradition in other medieval histories that he knew of: he started with a topographical chapter about Denmark, Norway, Sweden and Lapland, as if his country had always existed. Organizing his account as a lengthy gallop through the long series of Danish kings, Saxo emphasized the superiority of the Danes in their dealings with neighbouring nations such as the Saxons (Germans) and in particular the Swedes. In his Norwegian royal Chronicle (*Heimskringla*) from the 1220's, Snorri Sturluson, who wrote in the Norse language, adopted a similar partial angle in his vivid account of the naval battle of Svold (1000). On board his famous ship *The Long Serpent*, Snorri's hero, the Norwegian king Olav Tryggvason, confronts the joint fleet of his Scandinavian enemies, saying that the Danes lack courage and the Swedes would be better off staying at home in their pagan temples, but that his countrymen opposing him would very likely put up a stubborn resistance, "for they are Norwegians like ourselves".

At all events, in his chapters on Stærkodder the giant and on various Danish princesses, all of them pagan, Saxo introduces the ideal Danish hero and heroine. The *man* is every inch a warrior, touchy regarding his honour, faithful and reliable, but vindictive towards his enemies, generally tough and sturdy. He hates German culture, luxurious living – including delicately prepared food, elegant clothes, jewellery and music by foreign pipers – to him raw meat is the natural diet of Nordic warriors. Contrarily, a *woman* has to be so chaste that she will not even glance at a man, let alone speak to him. Thus, Saxo comments, in the good old days, girls did not provoke evil thoughts, the decency of their mind being depicted in their modest faces. It remains uncertain whether this characterization reflects the popular conception of Danish identity or is a more universal idea, according to which one partly defines oneself as truly civilized as opposed to one's barbarian surroundings, partly idolizes an oldfashioned, so to speak Spartan or Puritan, lifestyle. Saxo's models in ancient Roman historiography might easily be credited for the formula. His images have hardly any consequences for the subsequent Danish medieval history and literature. The so-called medieval ballads (in Danish "folkeviser") do occasionally present some of these traits in their protagonists. However, they cannot be dated with

much accuracy, and practically none of them is recorded before 1550, by which time Saxo had been published in two editions and widely quoted in print.

III

The Lutheran reformation, brought to completion in Denmark in 1536 after a brief but violent civil war, was preceded by the introduction of the art of printing (1482) and by an influx of European humanism. Politically, this coincided with the final dissolution of the United Scandinavian Kingdom, as Sweden in 1523 chose to become an independent monarchy, reigned over by a native king, Gustav Vasa. This was the start of almost 400 years of continuous diminution of the Danish state.

From now on and up until 1720, the Danes along with the Norwegians (who stayed in the Union until 1814) at intervals made war on the Swedes, their objectives varying from a restoration of the triple kingdom, over preservation of Danish superiority in the Baltic, to the reconquest of the provinces east of the Øresund that had been ceded to Sweden 1658-60. In both Denmark and Sweden the rulers took a keen interest in finding and defining national identity, an issue that encouraged both open and indirect competition between the two Nordic states. Humanistic scholars specializing in various fields were enrolled in the defence of the honour of their country.

As mentioned above, Saxo's chronicle had been published in 1514 in a truly magnificent edition. The editor was the then-Catholic scholar and later secretary of the Danish King Christiern II (1513-23), Christiern Pedersen (c. 1478-1554). It was only with difficulty that Pedersen had unearthed a fairly complete manuscript for the printing and afterwards it disappeared, leaving his 1514 Paris publication as the only authority for Saxo's full text. In the mist of native oral legends, Saxo had attempted to discover a venerable Danish national past, comparable to that of the Roman empire. The greatest ancient Danish king, one so-called Peace-Frothi, thus was reigning according to Saxo over most of Northern Europe at the time when Augustus was Roman emperor and Christ was born. The book left an imposing impression of the history of the Danish kingdom on its international audience. The edition was reprinted twice, in 1534 (Basel) and 1576 (Frankfurt a.M.). The Swedes had no source of comparable age or literary quality.

To what extent all these efforts were noticed by the common subjects of the Danish kings we do not know but there were in fact a few popular moves too. Incidentally, the first book printed in Denmark in Danish was a commercial enterprise, namely the late-medieval *Rhyming Chronicle* (1495), a long series of royal self-presentations expressed in the first person in fluent doggerel, relying heavily for its material on Saxo. It was reprinted at least eight times up until the end of the Kalmar War (1613), which was the last successful Danish military engagement with the Swedes.

In 1534, the above-mentioned Christiern Pedersen gave his countrymen a popular national hero unknown to Saxo, Holger Danske, in translations of two medieval chapbooks on Charlemagne and Ogier le Danois. Holger had originally been mentioned in the French epic *Chanson de Roland* (1060) and he later appeared in other medieval poems. Holger the Dane survives to this very day as a national symbol, a Danish Frederick Barbarossa, emerging in times of national need from his sleep in a hidden dwelling.

The revivified Holger Danske entered Denmark just when the origin of the Danish flag (*Dannebrog*) had been rediscovered by a Grey Friar, Peder Olsen (Petrus Olai). Basing his work upon older, today lost sources, Olsen had in 1527 recorded the legend of how the red flag with the white cross had fallen from the skies, or rather from Heaven, to ensure Danish – and Christian – victory in the battle of Lyndanisse in Estonia on June 15th 1219. Alluding to papers left behind by Olsen at his death around 1570, Anders Sørensen Vedel, the most prominent historian of the period, took the opportunity to insert a brief account of this incident in the preface to his translation of Saxo in 1575. This Danish version of Saxo had been commissioned by two consecutive chancellors and it is written in a rather free and lively, lightly archaic diction.

In the middle of the 16th century, a regular feud between Danish and Swedish historians broke out as to which of the two Scandinavian kingdoms was the older. On each side arguments were diligently produced in accordance with contemporary historical methodology, i.e. with the aid of free, at times really imaginative, combinations of sources and not seldom through very speculative reasoning, bordering on pure fiction. The goal was to take the origin of each nation as far back as possible to the creation of the world as recounted in the Bible. The race for superiority in this field was rather futile but finally it was won by the Swedish scholar and scientist Olof Rudbeck, who in a four-volume work 1679-

1702 identified Sweden as the lost continent of Atlantis in Plato, the cradle of mankind, nominating the Swedish language as the mother of all tongues and considering Greek and Roman mythology to be distorted versions of lost Swedish proto-myths.

At the same time in Denmark, Saxo experienced a revival, as an excellently revised text appeared in 1644-45, with learned notes in Latin. For the first time in Europe, a medieval author had been edited as accurately and meticulously as the acknowledged classical authors. The editor, Professor Stephanus Stephanius (1599-1650), had a mastery of both classical and medieval Latin authors and for his commentary had also secured assistance from Icelanders in order to be able to give parallels from their native tradition. Not by chance, three quarters of his annotations concern Saxo's treatment of the pagan period. A Dano-Swedish fight for the ownership of the pagan past had by now been going on for some decades. One battle-field was runology.

The leading scholar on the Danish side was Ole Worm, professor of medicine and a general practitioner in Copenhagen, with a burning humanistic interest and wealth to back it up. In a theoretical introduction in Latin, *Runer seu Danica litteratura antiquissima* (Runes or the Oldest Danish Letters), 1636, he called the runes an exclusively Danish phenomenon and argued, true to his patriotic purpose, that they originated in the Hebrew alphabet and were at least six centuries older than Charlemagne. In 1643 Worm published his chief work, *Danicorum Monumentorum Libri Sex*, an attempt to survey and interpret all the then-known 144 Danish runic monuments (a supplement was added in 1651).

Though much more unfolded itself later, the renaissance of pagan Scandinavia, inspired by a patriotic desire to glorify the forefathers, begins here. Editions of Eddic poems in two or three languages – Icelandic, Latin, Danish – appeared in Copenhagen from 1665. At the same time, philologists introduced modern, regularly alternating metres in Danish poetry, constantly praising the age, power and potential of the vernacular. But there were no popular symbols of national identity yet. The king – whatever his looks, capacity and actual deeds – inevitably became the focusing point of patriotism.

The lack of good poetry in the mother-tongue and the lack of educational institutions where it might be taught prohibited a popular spread of culture. One fruitful revival, however, concerned lyrics in Danish. Anders Sørensen Vedel was commissioned in 1586 by the Danish

queen to collect old Danish ballads in a manuscript for her, but instead, in 1591, he presented her with a truly pioneering printed collection, *It Hundrede vduaalde Danske Viser* (A Selection of One Hundred Danish Songs). Since about 1550 in Denmark, courtiers, noblemen and noblewomen had gathered together and copied these presumably medieval songs, but Vedel's book established them as an acknowledged literary genre of the day and was very likely the inspiration for more collecting as well as probably for the creation of new ballads or updated variants. Vedel's own interest in the ballads was primarily historical, although in a fine introduction he also showed his understanding of their functional, aesthetical and linguistic value. The book was reprinted at least nine times and from 1695 came out anew in a version augmented with another hundred songs, edited by Peder Syv. Though they in origin may hail from medieval France, the mood of their style was recaptured through imitation of metre and vocabulary time and again in the 19th century by poets who considered them to be part of the genuine national heritage, something truly Danish. Even if they as poetry have a homely ring, however, they do not stress Danishness and hardly offer any national symbols.

It seems typical that when the greatest poet of the 17th century, Thomas Kingo, in the 1670's wanted to praise Danish courage in the Scanian campaigns, he assured his readers that the poorly equipped Danish peasant soldiers did not fall short of their ancestors, the venerable Cimbrians, who once shook the Roman empire, and the Goths, who conquered land in Spain and France. The richness of the legacy from the Viking-Age had not yet been realized, although the promising young scholar Thomas Bartholin in a 700-page book from 1689 written in Latin managed to quote many unprinted and untranslated pieces of Old Icelandic poetry. He had been aided in this respect by his Icelandic friend Árni Magnússon but unfortunately Bartholin's death in 1690 postponed further progress. Oddly enough, the legacy was later taken care of by foreigners in the French language, for example the Frenchman Montesquieu in 1748 and the Swiss P.-H. Mallet in 1755-56 pointed out the influence of the Nordic climate and of Nordic pagan religion respectively on the achievements of the Vikings and thus helped Danish pre-romanticists and romanticists to retrieve this lost Golden Age of Great Power glory. From now on, poets and historians started to study the not yet edited or translated sources in the original Norse language.

IV

In early Danish romanticism 1802-06, after the battle of the Roads of Copenhagen against Lord Nelson, modern writers and critics resolutely replaced neoclassical Roman culture and history by native Viking-Age mythology and legends. But soon the Danish kingdom, as the only remaining ally of Napoleon's France, fell victim to a series of national catastrophes. The British bombarded Copenhagen and carried off the Dano-Norwegian fleet in 1807. In 1813 the Danish monetary system had to be reorganized, which in plain terms meant state bankruptcy, and in the peace treaty of Kiel 1814 Denmark lost Norway to Sweden. A war 1848-50 against Schleswig-Holstein nationalists supported by the German Federation was won by the Danes, but a second war in 1864 against Prussia on the issue of the incorporation of the Duchy of Schleswig into the Danish monarchy was lost badly, so that all of Schleswig – inclusive of close on 200,000 Danish inhabitants – became a German province. After a plebiscite, the Danish-speaking northern part of Schleswig joined the Danish kingdom in 1920. The border created on that occasion seems to be such a fortunate instance of its kind in Europe that not even Hitler wanted to change its course, when the Third Reich was strong enough to do as it liked. Since the 1955 Bonn and Copenhagen declarations on the rights of Danish and German minorities in the now-divided duchy, peaceful cooperation between the former arch enemies has replaced persecution and suppression.

It is an interesting question whether the new Øresund bridge from Copenhagen to its old twin city, Malmö, today Sweden's third largest city, will mean a return of the lost East Danish provinces to Denmark. Not formally of course, but in actuality. Many inhabitants of Scania have for years been looking to Copenhagen as their capital rather than the very distant Stockholm, and the language they speak still sounds much like the old East Danish dialect somewhat swedicized. There are signs of a growing feeling of regional patriotism – not a desire to become Danish again, but a desire to be allowed to study and cultivate the history of Scania. Ever since 1660, the Swedes have tried to suppress the fact that Scania for about eight centuries had formed part of the Danish kingdom.

However, early in the 19th century, the Danes had to redefine their national identity radically. They swiftly rose to the occasion. In 1779, Johannes Ewald had written the historical song "King Christian stood by the lofty mast" which was to become – and still is – the Danish roy-

al anthem. Here the poet called the ocean the true path of the Danes to glory and victory, exemplifying his point through poetical re-creation of scenes from fortunate naval encounters with the Swedes – one of the heroes he treated was Norwegian-born Tordenskiold. Without Norway and the fleet, without a political part to play on the European scene except that of a sympathetic and pitiable victim, the Danes after 1814 resigned themselves to praising native achievements in culture. Up until the death of the conservative absolute king, Frederik VI, in 1839, it was rather risky to participate in any political debate, so poetry and fiction were quite decisive in the formation of public opinion.

First taken up, as early as 1815, was a cult of the vernacular. In fact, hardly any other nation in Europe possesses so much lyrical poetry about the beauty of the mother-tongue as natural, sweet, nice, honest – poems that are still cherished and sung by Danes. In prose, prominent and famous writers such as Søren Kierkegaard and N. F. S. Grundtvig wrote philosophically about the qualities of the Danish language.

Another aspect stressed in poetry was the harmonious and idyllic East Danish landscape of Zealand and adjacent islands, with undulating fields and meadows and attractive old forests, whose beech-trees were mirrored in the calm surface of a small secluded lake or of the Baltic. Painters were soon depicting these landscapes and their pictures are still selling at high prices.

This conception of a peaceful nature generated or paralleled the feeling that Denmark was best portrayed as a woman – a thought which would have been incomprehensible before 1800, when the Danish fleet ruled the Baltic waves. Denmark was now seen as a protective mother figure or a pretty young girl, maybe the love goddess of Norse mythology, maybe even a "shield maiden" (a Scandinavian Amazon), but if so, one striking you more with her beauty than with her sword, the red-white flag being her most obvious attribute.

From 1805 to his death in 1872, Grundtvig was a prolific student of the Danish mind, especially in his historical chronicles and in several booklets on the establishment of a National Folk High-School for the uneducated part of the population. He contributed much to the idea of Danish identity, also linking the femininity of Denmark to the meek and patient believers of the Bible, for example the widow of Nain. Bereft of military, i.e. masculine, power, Denmark had to be content with being the modern country of *Kiærlighed* (a Danish word meaning at the same time charity and love). From November 1844, Grundtvig's interpretation was taught at local folk high-schools that today form a network of

about one hundred. It is rather unique that the works of a Christian and romantic poet should survive so solidly in such a vigorous institution. In addition, *The Folk High-School Songbook*, which was originally published in 1894, is used as a national songbook by the Danes far outside the Grundtvigian schools and circles, so far in 17 printings. Further, in both numbers and quality Grundtvig dominates the authorized hymnbook of the Danish Lutheran People's Church. Grundtvig's prime educational tool was mutual interaction between teachers and students through the living, i.e. the spoken, word. He served ten years as a member of the young Danish parliament (1848-58), and in general may safely be credited with an essential part in the prevailing mood of Danish political culture today, where an exchange of opinions usually ends in a compromise, leaving nobody to lose face entirely. Grundtvig coined the phrase: grant your neighbour (and possible opponent) the same degree of freedom that you would ask for yourself. Of course, in the real life of the 1990's, things do not always work out this smoothly, but in spite of unemployment and cultural clashes there still seems to be an underlying atmosphere of consensus.

A cult of the national flag also arose in the mid-19th century. In 1834, the king had determined that private persons were not to be allowed to hoist the flag, but during the war of 1848-50 the flag was used by everybody, and the authorities could do nothing to repress this national enthusiasm, so in 1854 the common use was legalized. Foreigners from non-Scandinavian countries today observe with some incredulity how often the Danes fondly include the Dannebrog flag in their everyday life, even decorating the Christmas tree with garlands of small red and white flags.

At the same time, national symbols were humanized. The first European monument for an unknown soldier was unveiled in Fredericia in 1858. It is not a grave but a statue of a typical young peasant conscript, very much alive and rejoicing in victory and with a beech-tree branch raised high in his right hand. The two most popular poems about the Three Years' War were respectively a rousing march, "The Brave Soldier", the text of which only dealt with the possible bloodshed of the Danes, whereas the German foe was merely ridiculed, and a modest epic about a schoolboy serving as a hornblower in the army – a statue of him was unveiled in 1899 right on the City Hall Square of Copenhagen. Military persons of higher rank are not popular in Denmark. Modern Danes are not literal conquerors – they want to be left alone, preferring happiness to greatness, only hitting back in case of really serious provo-

cations. When twelve Danish writers in 1991 were asked to write a chapter about their favourite national hero, they all significantly preferred heroes of culture, arts and technology.

The 19th-century symbols are still with us. One innovation in the 20th century may be an added touch of affectionate irony and humour when approaching national issues – something that seems difficult for non-Danes to scent and understand. The beloved "Mother's tongue" may, for example, be changed – without doubt phonetically more correctly – to "muddy tongue" (in Danish *Modersmål* and *muddersmål*), but no harm is intended, the expression is definitely used tongue-in-cheek, mainly with the intention of characterizing the growing gap between written and spoken Danish in the younger generations.

From 1864 to c. 1964, Denmark was unique among European states in having no national minorities – apart from the usually stay-at-home inhabitants of the old North Atlantic possessions, Iceland, Greenland and the Faroe Islands, whose languages did not affect the Danish linguistic climate. In Denmark proper, all citizens were Danish by birth and education and spoke the same vernacular. Maybe it was a fortunate situation – but it was in fact uncharacteristic in comparison with all previous periods of Danish history and should be regarded as the exception rather than the norm. Since the 1960's, immigrants, guestworkers and refugees have clouded the picture. Some feel that Danish culture and language are threatened, others may point out that never before in our history have so many people at the same time been using the Danish language. Anyway, cultural dilution – if it is a fact – is a product of various inevitable factors and not just immigration alone, e.g. the development of internationally oriented communities and the explosion in electronic communications.

In 1992, Denmark won the European soccer championship, a triumphal feat that has been followed by others. Suddenly, the Danes were not the perennial losers anymore. It seemed like a dream come true, a bit hard to accept. Gradually during the 1990's, Danes were becoming accustomed to not necessarily being insignificant in the European political context. The Danish economy seems basically sound and the Danish currency is the strongest in Scandinavia – odd to think of, since for decades it was a natural law that the Swedish krone always was one third more valuable than the Danish one.

Also, Danish armed forces are participating in UN-enterprises (the Gulf and Balkan wars) and doing rather well. A sign of this is a painting from 1998, representing Danish UN-troops in Bosnia. It had been exe-

cuted by the American artist Thomas Kluge as a farewell greeting from the previous US ambassador to Denmark. Four young soldiers with very determined, cool and at the same time fearful expressions during "a short break" (the title of the work) are surveying an exotic mountain landscape. After many visits to the Museum of Danish National History at Frederiksborg Castle, the ambassador had come to the conclusion that the Danes ought to dispel their century-old defeatism and be proud of their army. Actually, a remarkable change of temperature in Danish public opinion about Denmark's role in international conflicts can be felt. Even political parties with traditionally very set ideas about the issue are loosening up. A new national identity may be on its way. It remains to be seen.

Scottish identity

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There are two extreme perspectives that can be taken of Scottish identity as seen through its architectural and planning legacy. One which simply identifies with the monumental and symbolic set-pieces, the churches, town halls and memorials, the other with the commonplace, the houses, factories and shops. Ultimately, both have shaped the environment in turn conditioning and informing our lives. Understandably there has been in the last few years a preoccupation with the search for representative symbolic forms to reflect Scotland's new-found political status. However, that distraction has perhaps deflected general attention away from the incipient erosion of the quality of the everyday places and buildings we inhabit.

Nowhere is that more apparent than on the edges of our cities, towns and villages, where a seemingly insatiable desire for new housing is being met by a repetitive formula of standardised detached single-family domestic units, mirroring more closely the production line ethos of the mass car market than the intimate hand-made romantic ideal images of the isolated countryside cottage. The most obvious characteristic of this housing production type is that it is not specific to any place and that it shares many of the production values of the automobile, ironically the very means by which the suburban house is maintained. They are:

a dependence on strictly regulated performance standards, accepted industry wide, regulating the street network and the ubiquitous cul de sac format,

an acceptance that the individual unit type is capable of being located anywhere (if necessary with local accessories)

a massive marketing campaign to convince the general public of its ideal qualities.

What is surprising is the scale of the uptake of this housing pattern as witnessed on the borders of the built-up areas and even the creep into the denser centres. To the detached observer, it might appear to be part of a grand national planning strategy to edge our settlements and part infill the rotten cores. Remarkably, however, there is no such universally accepted strategy, but rather a planning vacuum occupied by a lowest common denominator house-delivery mechanism, facilitated by a host of civic regulations to make sure that the refuse bins can be emptied, and that the police are satisfied with the security arrangements.

The closer we look at the scale of this 'naturally' proliferating urban 'virus', the more helpless we become and unable to offer a viable alternative. Mass house replication, supported by technical regulation and huge marketing budgets, cloned across our landscapes is a formidable movement. What makes it all the more threatening is that it claims a status of moral rightness because of its public sanction and acceptance; they, the public, of course, buying into it in ever increasing numbers.

One could hardly argue warmly in favour of this quickly emerging new Scottish 'identity', any more than welcoming the proliferation of universal fast food outlets or the seeming standardisation of retail choice. Yet for the most part this *is* the real identity of the new Scotland. The old Scottish identity of dense town and village centres, grouped around the local shops and post office, is becoming an ever distant memory, and even with the most rigorous legislative historic building protection systems, old buildings in old streets with intimate uses become vulnerable.

So how do we reconcile the reality of this rampant new identity with the yearning for a representation of traditional identities? Perhaps, firstly, by recognising that the old identities, as represented by our idea of intimate cities, towns and villages, have at all times in our history been threatened with change, and above all by the enduring desire of urban folk to escape into the country, into nature. This desire, over the past two and a half centuries, has been shaped by mercantile forces of renewal every bit as powerful as the suburbanising pressures of today.

We only have to look back to the mid 18th century, where it is possible to imagine the Old Town of Edinburgh bursting at the seams, a cacophony of civic life in lime-washed, half-timbered dwellings densely and unhealthily packed together, extending from the Castle down to the palace. It is not surprising that its counterpoint found form in the construction in the adjacent countryside of the Edinburgh New Town, with

its broad streets conducting fresh air between elegant grey stone facades. We owe this civic expansion, which doubled the scale of the old town, not to some accident but to the conscious exploitation of the green fields that surrounded the town, and to its promotion as an escapist ideal, not least in health terms.

This luxury, of permanent proximity to the countryside, had been, until then, the privilege of the truly rich or ennobled. But now this access became a possibility to a new group of people, and achieved not by direct land purchase and building but through the work of an intermediary class, who developed the infrastructure for subsequent purchase. The suburbs began here, and like them Edinburgh's expansion was copied across the country with a proliferation of Union Streets and George Streets set into grid layouts, and supported by a grander industrial infrastructure of canals such as the Union Canal and eventually railways.

By the early 19th century, nibbling into the green surrounding Scottish towns, the suburban extensions now took the form of rhythmically shapely settlements of sweeping crescents and gardens, in an exponentially growing exodus of the privileged, ever deeper into that countryside. Curiously, however, each subsequent extension into that countryside left an embedded fragment of a previous generation's incursion into the countryside, and gradually, as the cities and towns developed, took the form of a layering of forlorn escapist departures. In our own century, that drive was ratcheted up, as seemingly the whole nation sought to escape into the hinterland, both in peripheral estates and, subsequently in the leap-frogging post-war New Town movement.

This annular growth model of the expansion of urban centres into the seemingly infinite natural desired space beyond has other qualities which are worth noting. Perhaps some enlightened citizen recognised the inevitability that each new vision would in subsequent generations be swallowed up by the next ring. In defence, some ground might become allocated to long-term amenity, so that now, in the annular pattern, we can spot the aberrations of parks and green space sandwiched in the development layers. Of course, deep within the city rings, many older areas went rotten, to be replaced within our century by buildings set in space, a forlorn space which seemed to yearn for the now far-distant natural landscape. When the inner urban core itself went rotten, an urban landscape of paved streets and planted courts seemed to allude to a distant association with a dim green embraced past.

What emerges within this short analysis is the dependence of urban

folk, through modern time, on a relationship to the landscape from within which the urban form has grown. We have 'captured' countless fragments of landscapes and yet we still remain unsatisfied. Perhaps now, finally, our exploitation of the green periphery has run out of control, with developer house-boxes massing in all directions around our settlements. Somehow the contest is no longer fair. We seem to be destroying, not simply enjoying, that no longer infinite green space. We now face a starker choice, a realisation that the space between individual settlements, (or in our annular analogy, between the trees) is precious, that it needs to be re-conceptualised as a centre, a green centre, an activity centre, a living green space that in turn can, in a series of reverse rings, ripple back in towards the urban centres.

Modern people have repeatedly demonstrated through modern time, that they hold the countryside in precious esteem, but owing to our dependence on agriculture the outer edge of the cities has seldom been seen as an amenity but rather a soft development resource. We face the opportunity now to rethink that city border protection mentality, to create a texture of living park landscapes, laced between our settlements, in a pattern every bit as varied as the imagination can conceive. Development is not ruled out, but the land simply demands more of it than simple mass building. The stakes have become higher, but it is no answer to simply bottle up demand and once more allow only elite building in that green space. We need to rethink our development world far more comprehensively, and three general ideas may serve as starting points.

One such world was recently conceptualised within the Year of Architecture project in Glasgow, where a multilayered, varied ensemble of flats and houses was assembled in a tight inner city site. The ensemble owed little either to the dominant inner city flatted form, or to the suburban two-storey house model, but more to a loose imaginative juxtapositional character, that revelled in a harmonious dialogue between various contributors. That dialogue welcomed differences and sought new forms of social and formal relationships, within a series of landscaped volumes and settings. In microcosm, its garden framework proactively challenged the inevitability of continued city edge incursions into nature, and put forward the possibility, in the imagination of a model far richer than a simple continuation of the exploitative edge.

A second option is to channel that peripheral development energy and pent up demand into nationally agreed large development sites, where there is more opportunity to consolidate infrastructural invest-

ment in transport, education and leisure. This would inevitably affect the ability of individual settlements to grow other than in a limited manner, but if these large focal point projects were distributed evenly around the countryside it could be argued, from a regional perspective, that each settlement would benefit in wider terms. For example the redevelopment of Ravenscraig in Lanarkshire could be seen to serve the periphery conurbation that stretches around from East Kilbride and Hamilton north to Airdrie and Cumbernauld, with its population of over half a million people.

The third and most extreme of the three options – that of completely new and distinct settlements within the 'living park landscapes' – might offer, in unique circumstances, the opportunity to absorb significant development pressure, but only at the point at which these landscapes have been reconceived as open, accessible and usable spaces serving the new and old conurbations.

In conclusion, there is no getting away from the fact that if we wish to face and address the realities of this new Scottish identity, hard choices will require to be made about whether we need to curb the freedom of the exploitative mechanisms of development and the superficial attractiveness of the product that results. If we dare to address the wider disbenefits of the endless consumption and eating up of green spaces, we will have to challenge and begin reversing the whole development process of the modern age in Scotland. A new value system and control mechanisms will have to be evolved. This system would place limits on today's market-driven 'freedoms', but in compensation would allow an extended democratic access to a new, fused vision of nature and urban settlement – a new urban – rural living landscape.

This essay is based on and extends the argument developed with Miles Glendinning in the Polygon publication – Clone City.

Scots law and Scottish national identity

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In 1949 the Saltire Society, whose aim is to promote awareness by Scots of their heritage, published a small book, *The Scottish Legal Tradition*, by Lord Cooper – Lord President of the Court of Session and Scotland's senior judge. In it he advanced the view that Scots law was a badge of Scottish identity and that Scotland had survived as a nation since the Act of Union of 1707, in part at least, through its distinctive legal system. He wrote: "Scots Law is in a special sense the mirror of Scotland's history and traditions and a typical product of the national character, and it is just as truly a part of our national inheritance as our language or literature or religion." (Cooper 1991, 65)

Cooper was a prolific writer on Scottish legal history and his work, though largely superseded, had a profound influence on some academic lawyers who were beginning to rise to prominence in the 1950's. One of these was the late Sir Thomas Broun Smith, a former occupant of the Chair of Scots Law in Aberdeen University and destined to re-establish the serious study of law in the Scottish universities. Smith, reflecting Cooper, saw Scots law as "an authentic emanation of the Scottish spirit – a Scottish Volksgeist". (Willock 1976, 3) In the preface to his major work, Smith insisted that "since her Union with England in 1707 Scotland has in a sense survived as a nation by and through her Laws and Legal System." (Smith 1962, vii)

Perhaps this perception of Scots law was conditioned by the resurgence of interest in Scottish culture in the first half of this century. Whatever the catalyst, this juxtaposition of law and nationality (one should not say 'nationhood' since Cooper was a staunch Unionist) which sees Scots law as emblematic of Scottish identity is still held in some quarters today. In a postscript to the 1991 edition of Cooper, another judge, Lord Dervaird, predicted that the future of Scots law depended, ultimately, "on the respect and affection it engenders in the people of Scotland. It is a symbol, and I venture to think the pre-eminent symbol, of the existence of Scotland as a separate nation." (Cooper 1991, 93).

The Cooper-Smith school are legal nationalists and represent the

civilian tradition of Scots law. Scholars of this mindset adhere to at least two beliefs. The first, is that English law exerts a malign influence over indigenous principles: and the agencies which facilitate this are the Westminster Parliament and the judiciary, primarily, though not exclusively, the House of Lords. The second, is that our lawyers fail to nurture Scots law. Writing of commercial law, my own discipline, Gow, another civilian, upbraided us for our "indifference to the present and future needs of the community whose interests we profess to serve." (Gow 1964, vii) Both Cooper and Smith saw Scots law as a mixed legal system: *i.e.*, one which has been influenced, though not necessarily in equal measure, by English law and, more importantly, by the civilian legal systems of Europe through which principles of Roman law have percolated down to the present day. They also made a virtue of this perception of Scots law. Much could be learned by looking at the laws of other mixed systems, such as South Africa, when considering the formulation and development of Scottish legal principles. However, being a mixed legal system was not a passive condition, not merely "a seat on the fence", (Cooper 1957, 201) Scots law could forge a bridge between these two major legal traditions, the Common Law and the Civil Law. (Cooper 1991, 87; Levy-Ullmann 1925, 390) But being a mixed legal system poses dangers, and both Cooper and Smith were pessimistic about the future of Scots law. The former professed himself hostile to the spirit of legal integration already abroad in 1949. He equated (and one has some sympathy here, for English law does not always readily accommodate other viewpoints) assimilation with the annihilation of Scots law. (Cooper 1957, 199) Smith's prognosis that by the year 2000 Scots law would no longer be in a position to "claim acceptance as a Civilian system" (Smith 1962, 72) has indeed been shown to be substantially accurate. (Thomson 1996).

Modern Scots civilians, unsurprisingly, now query the concept of the mixed legal system: regarding it as one in which the junior partner (Scots law) does not borrow from the senior jurisdiction (English law) but has the latter's rules foisted upon it. Indeed some (Evans-Jones 1998) object to referring to the 'genius' of Scots law lying in its old-established practice of "willing borrowing and adaptation". (Sellar 1988, 87; Forte 1994, 383) They see nothing wrong, however, in urging us to look to the Civil Law jurisdictions for inspiration; and they have eagerly embraced the idea of a pan-European *ius commune* in which lawyers will be free to borrow from a (civilian) gene pool of ideas and principles. Some idea of how the *ius commune* is seen from a Scottish per-

spective may be gained from the following passage: "It is at one and the same time a convenient shorthand for a reference to a general code of ideas as being relevant to any system of private law and a reminder of a common inheritance in a tradition of thought". (Blackie and Whitty 1996, 66)

That Roman law and the civilian principles created during the process of its reception in Europe have influenced some areas of Scots law is undeniable. This is observable in the medieval period (Stein 1988, 269; Gordon 1995, 15-23) and in the transitional world of the sixteenth century, where it was used to plug gaps in the indigenous law. (Lesley 1596, 119-120) During the seventeenth century Scots often pursued legal studies abroad (Dutch universities were a popular destination) where Roman law formed the cornerstone of legal education. It is unremarkable then to find Roman law being regarded as a source of ideas (Gordon 1995, 28-33) and being referred to in legal argument. Civilian influences are also readily observable in the works of the institutional writers (so-called because most modelled their works on Justinian's *Institutes*) of the seventeenth and eighteenth centuries. But these influences are not so prevalent as Scottish civilians would like us to believe: Scots criminal law and the law of succession, for example, have remained largely immune. (Thomson 1997, 20) Just how Scots law might have developed had political conditions remained unchanged is a matter for conjecture because changes did occur and with profound repercussions for contemporary Scots law.

Article 18 of the Treaty of Union of 1707 stated that union would not result in change to Scots private law except where this was for the "evident utility" of the Scots. Article 19 preserved the College of Justice as the supreme court *in* Scotland and restricted judicial appointments to members of the Scottish Bar. The language of both articles is, however, opaque and Article 19, in particular, was not couched in terms which clearly precluded appeals to the House of Lords. It did not take long for Scots to exploit this opacity and, although the House declined to entertain appeals in Scottish criminal causes, it did accept jurisdiction in civil actions. This has been the subject of complaint both past and present. Until the mid-nineteenth century no Scottish judges sat in the House of Lords and Scottish appeals were heard by English judges sitting with lay peers. There was scope for misunderstanding arguments, an element of ignorance in some judgments and a measure of studied arrogance in others. Take, for example, the case of the mid-nineteenth century Scottish miner killed in a work accident caused by

a fellow employee's negligence. His widow sued for compensation: arguing that the company was liable for its employee's negligence. At this time Scots law recognised the principle of vicarious liability and the Court of Session judges found for the widow. The mine-owners then appealed to the House of Lords who reversed this decision. At the time, English law subscribed to the view that employers were not vicariously liable to employees harmed by co-employees. After reviewing the English cases Lord Chancellor Cranworth opined: "If such be the law of England, on what ground can it be argued not to be the law of Scotland? The law as established in England is founded on principles of universal application ... I think it would be most inexpedient to sanction a different rule to the north of the Tweed from that which prevails to the south". (*Bartonshill Coal Co.* v. *Reid* (1858) 3 MacQueen 266, at 285) Such pronouncements were, of course, intolerable and would never be made today. But what is objectionable here is not the notion that it might be desirable to treat English and Scots workers equally, but rather the arrogant assumption that the English model was inherently superior.

By convention there are now two Scottish law lords. And, although there is no rule that these must sit in Scottish appeals, the English judges frequently defer to the Scots' opinions. Despite these changes, dissatisfaction is sometimes expressed with decisions of the House in Scottish appeals and the Scottish judges sometimes accused of anglicising Scots law. It is important to realise, however, that despite arguments that the civilian purity of Scots law has been (and is being) corrupted by the House of Lords, the influence of the Common Law has only infrequently been exerted by crude oppression. Just as Roman law, Canon law, French and Dutch law have all played some part in the formulation of some principles of Scots law, so too Common Law ideas have been borrowed and adapted. Nor has this process been confined to the period after the Union of 1707. The Cooper-Smith axis, naturally, sees things differently. (Cooper 1944; 1952; Paton 1958, 18; Smith 1984) Admitting that Norman penetration of Scotland in the twelfth and thirteenth century brought with it English legal ideas which Scottish monarchs willingly adopted, Cooper maintained that the Wars of Independence (roughly 1296-1346) had ended the influence of the Common Law. (Cooper 1991, 68) However, recent research has demonstrated the debt owed by later medieval Scots law to that of England. (Sellar 1988; Forte 1990; MacQueen 1993) Take for example the Scottish legal treatise known as *Regiam Majestatem*, which was composed sometime af-

ter 1318 and most probably before the death of Robert I in 1329. (Duncan 1961) Although this work reflects Romano-canonical influence, it is substantially derived from a late twelfth-century English text, the *Tractatus de Legibus et Consuetudinibus Angliae*, attributed to Ranulf de Glanvill, justiciar of England from 1180-1189. So at the height of the struggle between England and Scotland when, according to Cooper, "the legal cleavage between the two countries must be dated" (Cooper 1944, lxii), we find the Scots employing an English work in the composition of a statement of law which continued to be used during the fifteenth century. (MacQueen 1993, 85-98) Paradoxically, however, *Regiam* may afford the best example of a coincidence between Scots law and Scottish identity. For if we see *Regiam* as intended to represent the law of a sovereign state, then, although it is first and foremost an example of regal instrumentality, it may also have fulfilled a more populist role as a badge of contemporary Scottish identity. (MacQueen 1995, 3-19).

Since 1707, however, the single most important reference point for Scots law has been the law of England. Our modern law of reparation, the law of contract, and the criminal law all display its influence. In my own field of commercial law we ignore English developments at our peril. The volume of arbitration and litigation is greater in England than in Scotland and, consequently, English law frequently encounters new issues, and pioneers new solutions, well before these arise for consideration in the Scottish courts. This does not mean that we should suspend our critical faculties, but it does mean that we should not be doctrinally blinkered. And my views on the development of modern commercial law, far from being heterodox today, would have been quite acceptable to my eighteenth century counterparts.

Smith regarded the eighteenth century as "the classical age" of Scots law and identified several continental writers whose works he regarded as influential. (Smith 1962, 74) But in contemporary commercial causes there was a judicial perception that these writers were irrelevant. As Scots began to encroach on what had been English markets prior to the Union, it became apparent that our commercial law was unsophisticated. Insurance, for example, did not develop in Scotland as the normal means of protection against risk of loss until the mid-eighteenth century: some two centuries after it had become relatively commonplace in England. (Forte 1987) Consequently, although the process papers for insurance cases in Scotland throughout the eighteenth century reveal that continental writers and legislation were sometimes cited by coun-

sel, these progressively demonstrate that English cases had become the major source of influence. Nor were the judges content to rely on counsel drawing these cases to their attention. Their approach was more proactive.

In a substantial number of cases, when faced with an issue which had never arisen for consideration before, the court would stop proceedings and order both parties to obtain the opinions of English barristers and/or of Lloyd's underwriters. (Forte 1995) This practice was not confined to insurance but occurred across a wide spectrum of commercial issues and continued into the nineteenth century. The reason why this strategy was adopted is articulated by a contemporary judge, Lord Hailes, and this supplies a necessary corrective to Smith's blanket description of the influences at work in Scotland during the eighteenth century (Hailes 1826, 622-623): "We in Scotland are in the helpless infancy of commerce. On a mercantile question, especially concerning insurance, I would rather have the opinions of English merchants, than of all the theorists and all the ordinances of Europe ... Our Scottish insurances are copied from the English: for the interpretation of words in such a copy, am I to go to the original, or the ordinances of Amsterdam or Stockholm? I can have no doubt of the law it is the law of Mr Dunning, Sir Joseph Yates, Lord Camden, and Lord Mansfield." (These were eminent English counsel and judges.) I am sure that this perspective was conditioned by a suspicion, perhaps even an awareness, that Scottish commercial interests might be best served by forging a less distinctive system of commercial law than would have been the case had civilian ideas dominated judicial reasoning. It is unlikely that a Scottish underwriter, or an English one covering a Scottish interest, would have appreciated losing a case because some sixteenth century Spanish ordinance, or the view of some seventeenth century Dutch legal theorist, was against him: particularly if his argument was supported by current Lloyd's practice or there was an English case in point. By the end of the eighteenth century Scots commercial law had adopted an attitude of pragmatic realism and was moving rapidly away from exclusive dependence on civilian jurisprudence.

The rejection of civilian principles as irrelevant to commercial law was vehemently expressed in the early nineteenth century by Lord Brougham in *Thomson* v. *Campbell's Trustees* (1831) 5 W. & S.16: "I not only deny the authority of the Civil Law as a direct authority; I deny the weight of it – the general deference to it – in a question of mercantile law, in mercantile times, and in a mercantile country." Only a few

year earlier, George Joseph Bell, whose work enjoys institutional status, declared English commercial law to be the most relevant source of ideas for Scots lawyers; and was dismissive of the utility of the works of earlier Scottish institutional writers, such as Stair and Erskine, in this context. (Bell, 1810) Bell does not advocate uncritical acceptance of English law and the Scottish judiciary have not taken English decisions on simple trust. (*McGowan* v. *Wright* (1852) 15 D. 229, per Lord Justice-Clerk Hope at 232) Nevertheless, the suggestion that commercial issues ought to be viewed from a Scottish perspective only was emphatically rejected. in the nineteenth century (*Strachan* v. *McDougle* (1835) 13 S. 954), and has a modern echo in *Sharp* v. *Thomson* 1995 S.L.T. 837, per Lord Coulsfield at 869: "Although weight should be given to the arguments that the purity of Scots law, as a system based on the civil law, should be maintained ... these arguments should not be overemphasised or treated as in themselves decisive." The nineteenth century perception of commercial law and directions for its development was not just a judicial one. Scottish business interests ardently supported assimilation with English law to create a system of 'British' commercial law. It is also rather ironic that some lawyers who advocated assimilation and codification were influenced in this view by periods of study spent in Germany. (Rodger 1992) Between 1882 and 1906 statutes codifying the law of negotiable instrument, partnership, sale and insurance were passed which applied to both England and Scotland and virtually created a uniform law which still endures. It is not without significance that under the Scotland Act 1998 large tracts of commercial law do not fall within the legislative competence of the Scottish Parliament, but are "reserved" to Westminster. The exigencies of a unitary economy require this.

The future of Scots law is currently being debated. This debate centres on the influence of English law upon Scots law (Forte 1994; Whitty 1996), and, though it should not be conducted in terms of the nostrum – "Scots law is worst. English law is best." (or *vice versa*) – this sometimes happens. But the real debate is that between two opposing philosophies – pragmatic realism and civilian purism. A recent example of the nature of the debate and of the way in which problems may be satisfactorily resolved is afforded by the case of *Smith* v. *Bank of Scotland* 1997 S.C. (H.L.) 111. Here, a wife was persuaded by her husband to grant a security over their home in return for a bank loan to his business. He misrepresented the purpose for which the security was needed and she subsequently attempted to set it aside. She was unsuccessful in

the Scottish courts which, following precedents, held that the bank was not under any duty to warn her of the risk she was running and to advise her to obtain independent legal advice. It was accepted that the industry code of practice to which the bank subscribed enjoined banks to issue such warnings; but the Court of Session observed that the code of practice was not a source of law. At this time, however, the House of Lords had already decided, in an English case on virtually the same facts, that banks did owe these duties to third party guarantors, and Mrs Smith's appeal to the Lords was upheld. But although the leading opinions were delivered by two Scottish judges, these provoked a hostile reaction from some Scottish commentators. We should, however, be very clear about what the objectors are condoning. Their views mean that the position of a wife would: (a) be different from her counterpart in England; (b) be inferior to her English counterpart; and (c) not reflect standards which the relevant industry itself regards as fair. Purity might have been maintained, but only at the sacrifice of socio-economic rationality. Lord Clyde (at 120) summed up the choices rather well: "In the present case we are dealing with an area of law whose development has for a long time been influenced by decisions on the other side of the border. I am not persuaded that there are any social or economic considerations which would justify a difference in the law between the two jurisdictions in the particular point here under consideration. Indeed when similar transactions with similar institutions or indeed branches of the same institutions may be taking place in both countries there is a clear practical advantage in the preservation of corresponding legal provisions." One may observe in passing that, in strictly legal terms, the case was determined on the application of the principle of good faith: a principle with which civil lawyers are familiar (though they cannot all agree that it exists) and English lawyers are not.

The pragmatic approach to Scots law is, unlike its civilian counterpart, neither doctrinaire nor ideological. It is one which, I think, has found favour with most judges (including the current Lord President (Rodger 1996, 24) and the greater part of the legal profession for over two centuries. At an intellectual level it does not deny the possible usefulness of reference to civilian material, as indeed happened in *Morgan Guaranty Trust Company of New York* v. *Lothian Regional Council* 1995 S.C. 151 (dealing with interest rate and currency exchange agreements – *i.e.*, swaps). It merely argues that the utilitarian demands placed upon a legal system which remains part of a larger political and economic unit are justifiably paramount; and that factors other than

purely legal ones must often be considered. No harm is done to the practical application of the law in Scotland, and no obvious hurt to the people who have recourse to that law, if it has borrowed or adapted an idea here and there from England, any more than if some principle of civilian jurisprudence has been utilised in its stead. Moreover, we no longer fully control our own destiny. Membership of the European Union has affected Scots law in ways which it might not have developed organically: *e.g.*, in relation to corporate and market regulation and consumer and environmental protection. It is now possible to speak of an 'EC consumer law' or 'EC environmental law' which is driven by social, political, economic and scientific considerations rather than by legal ideologies. The corollary of harmonisation in these areas is, of course, the subordination of the national law of each member state (Weatherill and Beaumont 1999, 1037) and it is not only Scots law which, in a European context, must periodically surrender systemic integrity.

None of this denies the existence of a Scottish legal system. It is simply a different system from that which the purists want us to have. It remains different from English law in that it still advocates the development of principles: and principles are something that English law deeply distrusts. It is not, unlike English law, inherently hostile to compromise: witness the willingness with which the Scottish Law Commission has recommended that the Scots law on contract formation might be modelled on provisions of the UN Convention on Contracts for the International Sale of Goods. (Scot. Law Com. 1993) Many English lawyers dislike the Convention which is the product of both Common Law and civilian thinking: one describes it as "a further erosion of our own excellent municipal law". (Wheatley 1990: *cf.* Forte 1997, 57-64) The Commission's proposal that we reform our municipal law in line with the Convention is based on factors such as the need for modernity, the advantages of having a uniform set of rules of general application, and Scottish responsiveness to global developments. This is a market-oriented approach to the problems of being a small jurisdiction. We must make Scots law attractive to foreign business and our courts and arbitration panels attractive *fora* for the resolution of business disputes. (Forte 1997, 55-57) Such imperatives are the operative, legal cultural stimuli found in Scotland today. As an agent for law reform, the Scottish Law Commission is now far less concerned with ideology than it was thirty years ago. The objective has become the creation of an efficient market in legal products and

services which meets the needs of both domestic and foreign users: hence the influence on the most recent proposals for reforming contract law of international and supranational models such as the UNIDROIT *Principles of International Commercial Contracts* and the *Principles of European Contract Law* prepared by the Commission on European Contract Law (chaired by Professor Ole Lando of the Copenhagen Business School).

It also remains possible to maintain the existence of a Scottish legal culture: we have our own courts, procedures, law schools, legal profession and judges. (Thomson 1996, 25) Indeed we even have our own legislature again. And, if it helps, we can say that Scots law has an identity: it is a mixed legal system. But to claim that, today, the substantive law is one of the things which defines one in any truly meaningful way as Scottish goes too far. And if the person in the street thinks that Scots law is something quintessentially Scottish, he or she is wrong in that belief. The content of Scots law is determined by those who make, interpret, and apply it; and they do this with an eye on modernity and socio-economic efficiency free from sentimentality. It may well be that in a devolved Scotland there will be opportunities to conduct surveys of popular opinion in areas such as crime and family affairs: but this will require funding and may reveal that there is little to distinguish perceptions north and south of the Border. In some areas, such as contract and reparation, extensive cross-border business may well act as a brake on any far-reaching changes. A further brake on legislative autonomy is represented by the European Union's long-term desire to create a European private law code, and its short-term objective of creating a European contract code, as adjuncts to the efficient functioning of the Single Market. Two things are worthy of comment. First, the driving force here is the facilitation of cross-border business. Second, the emphasis will be on solutions and not legal traditions. As we move into the twenty-first century pragmatic realism and utilitarian functionalism will increasingly come to dominate legal developments both within Europe and beyond. This already reflects the prevailing mood in Scotland's legal community and represents an approach which is entirely consistent with Scottish success both past and present. By maintaining this outlook it will serve us in the future also.

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Denmark and Scotland: the environmental and cultural resources of small nations

A symposium arranged jointly by
The Royal Danish Academy of Sciences and Letters and
the Royal Society of Edinburgh

Wednesday 15th September 1999

20.00-21.30 registration at the Royal Danish Academy and informal reception

Thursday 16th September 1999

9.15.-9.30 Words of welcome by the President of the Academy, **Birger Munk Olsen**

Chair: Birger Munk Olsen

9.30-10.15 **J. Godfrey Fitton and Lotte Melchior Larsen**: The geological history of the North Atlantic Ocean

Olaf Michelsen and John A. Korstgård: The geological history of the North Sea Basin

10.15-10.45 Coffee /tea

Chair: John Laver

10.45-11.30 **Doreen J. Waugh**: 'Fae da nort tae da suddart': Norse settlement in Shetland with special reference to Unst, Fetlar and Old Scatness.
Christopher D. Morris : Norse settlement in Orkney

11.30-12.15 **Nanna Noe-Nygaard**: Effects of postglacial climate, sea level and environmental changes on the mode of life of the prehistoric population and on the diversity of contemporary larger mammals in Sjælland, Denmark

12.15-13.30 Lunch

Chair: Henning Sørensen

13.30-14.15 **T. Jeff. Maxwell**: Land management and rural development

14.15-15.00 **Bjarne Stoklund**: Vernacular architecture between environment and culture: the case of the "stock-stove"-houses in Shetland

15.00-15.30 Coffee/tea

Chair: Margaret McKay

15.30-16.15 **William Ritchie**: The environmental impact of changing uses on the North Sea littoral of Scotland

16.15-17.00 **Gillian Fellows-Jensen**: Danish place-names in Scotland and Scottish personal names in Denmark: a survey of recent research

Evening free

Friday 17th September 1999

Chair: John Beck

9.30-10.15 **T. C. Smout**: Considering environmental history in Scotland and Denmark since 1600

10.15-10.45: Coffee/tea

Chair: Peter Harder

10.45-11.30 **Michael Chesnutt**: Nordic-Celtic links in folk-literature

11.30-12.15 **Donald A. Davidson** : Sites and landscapes: nature, identity and management

R. J. Mercer: Perception and management of the built and natural heritage

12.15-13.30 Lunch

Chair: R. J. Donovan

13.30-14.15 **Thomas Kiørboe**: Food webs and fish production in the North Sea

14.15-15.00 **Jan McDonald**: Strolling players: Theatre as cultural export

15.00-15.30 Coffee/tea

Chair: Malcolm Jeeves

15.30-16.15 **Flemming Lundgreen-Nielsen**: National identity in Denmark

16.15-17.00 **David Page:** National identity in Scotland
Angelo Forte: National identity in Scotland

17.00-17.15 Concluding remarks by **Malcolm Jeeves**, President of the Royal Society of Edinburgh

18.00 Bus leaves from the Royal Danish Academy for the Carlsberg Academy

18.30 Supper in Pompeji at the Carlsberg Academy
Mette Bligaard: Danish-Scottish cultural links and exchanges

Saturday 18th September

11.45-18.00 Excursion to Roskilde to visit the Cathedral and the Viking Ship Museum. We started at the Cathedral, where the Dean, Jens Arendt, took us on a conducted tour. After lunch at the museum there was a talk by **Ole Crumlin-Pedersen** on The Skuldelev 1, 2 and 6-ships as examples of relations between Denmark, Norway and the British Isles in the 11th century, a showing of the English version of the film about the excavation and conservation of the Viking ships and a guided tour of the exhibits.

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