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Notes

Doggerland: the cultural dynamics of a shifting coastline

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Abstract: The landmass now covered by the North Sea, here referred to as Doggerland, has had an important but neglected influence on the course of prehistory in northwestern Europe. The physical character of Doggerland in the Late Glacial and earlier Holocene is assessed, together with its re-colonization by humans after the Last Glacial Maximum. The development of a maritime-based society along the northern coast of Doggerland is postulated, and it is argued that the coastal inhabitants, with their specialized adaptation to this zone, will have moved with the coast as relative sea-levels changed. The interactions of coastal and inland populations are considered, including the probable influence of the coastal groups in delaying the spread of farming into the region.

In northwestern Europe, from Ireland to southern Scandinavia, there is an absence of archaeological evidence dated to the Last Glacial (Devensian/Weichselian) Maximum. Conditions approximating those of an arctic desert pertained in front of the British and Scandinavian ice sheets, and it is generally accepted that the lack of evidence for human occupation is due, quite simply, to the absence of humans. For 10 000 years, from about 23 000 BP to about 13 500 BP (radiocarbon years), the region was uninhabited (Housley *et al.* 1997). As conditions ameliorated, people began to explore the land beyond their glacial refugia; the changing character of the archaeological evidence indicates that, within a few centuries of pioneering visits, permanent human occupation was established. For southern Britain and southern Jutland, the presence of settled groups of people can be dated to about 12 400 BP, i.e. to the earlier part of the Windermere or Bølling interstadial. At this time, land was continuous between the two regions, and it too will have been inhabited.

The land between, subsequently submerged by the North Sea, is here referred to as Doggerland, named after the Dogger Bank which has long been recognized as a former area of dryland and fresh waters (Reid 1913). Although there has as yet been no specifically archaeological survey of the region, something of its character can be gleaned from the results of geological exploration and by extrapolating from the data available for adjacent regions. The evidence for the physical condition of Doggerland in successive periods is discussed in Coles 1998, including that for coastline position and for the major river courses. Sea-level change in northwestern Europe has

recently been modelled in a series of papers by Lambeck and colleagues (e.g. Lambeck 1993, Lambeck *et al.* 1998) which should in due course enable greater precision and confidence in coastline reconstruction. The more that is known of the former landmass, the more its relevance to Late Glacial and Postglacial prehistory becomes clear (Coles 1998, 1999). In the present context, the focus will be predominantly on Doggerland's coastal zone, following a brief consideration first of inland conditions at the time of the Windermere/Bølling-Allerød interstadial and then of the initial character of human occupation of the land.

Topography of Doggerland

The combined effects of erosion and siltation, together with the physical difficulties of underwater survey, make it difficult to determine the detailed topography of Doggerland. Occasionally, coring pin-points a former freshwater lake, or commercial survey incidentally provides evidence for former surface features (Firth 2000). Major features, resulting from Quaternary glaciation and its aftermath, can be identified for some locations, and others can be postulated. For example, the exposed land was cut by deep incisions, which had been eroded out as subglacial drainage channels under the outer margin of ice-sheets. When the ice wasted, the channels were exposed as tunnel valleys, long, narrow and steep-sided, sometimes sinuous and often partially filled by a freshwater lake. Tunnel valleys 1–3 km wide, 100 m deep and 25–60 km long were present in the area between what is now northeastern Scotland and what is now the

Dogger Bank. A further group of valleys, not quite so deep, extended eastwards from the present Humber estuary to the south of Dogger Bank, which itself is likely to have formed a substantial upland mass. At the Weichselian maximum, land beyond the ice-sheet margins is likely to have been uplifted as a glacial forebulge, an effect which only slowly dissipated with de-glaciation. The present Dogger Bank may therefore represent former Dogger Hills which extended further and higher than present bathymetry suggests.

Doggerland had three major river networks, two draining to the north and one southwards to the Channel River (Fig. 1) (Coles 1998, p. 54–57). The northeastern network was dominated by the Elbe which flowed to the west of Jutland through the Urstromtal, a vast valley still identifiable on the sea-floor, and on across eastern Doggerland to an estuary opening into the Norwegian Trench. The northwestern network had a smaller catchment, draining the region west of the Dogger Hills together with much of what is now eastern England, and flowing to an estuary

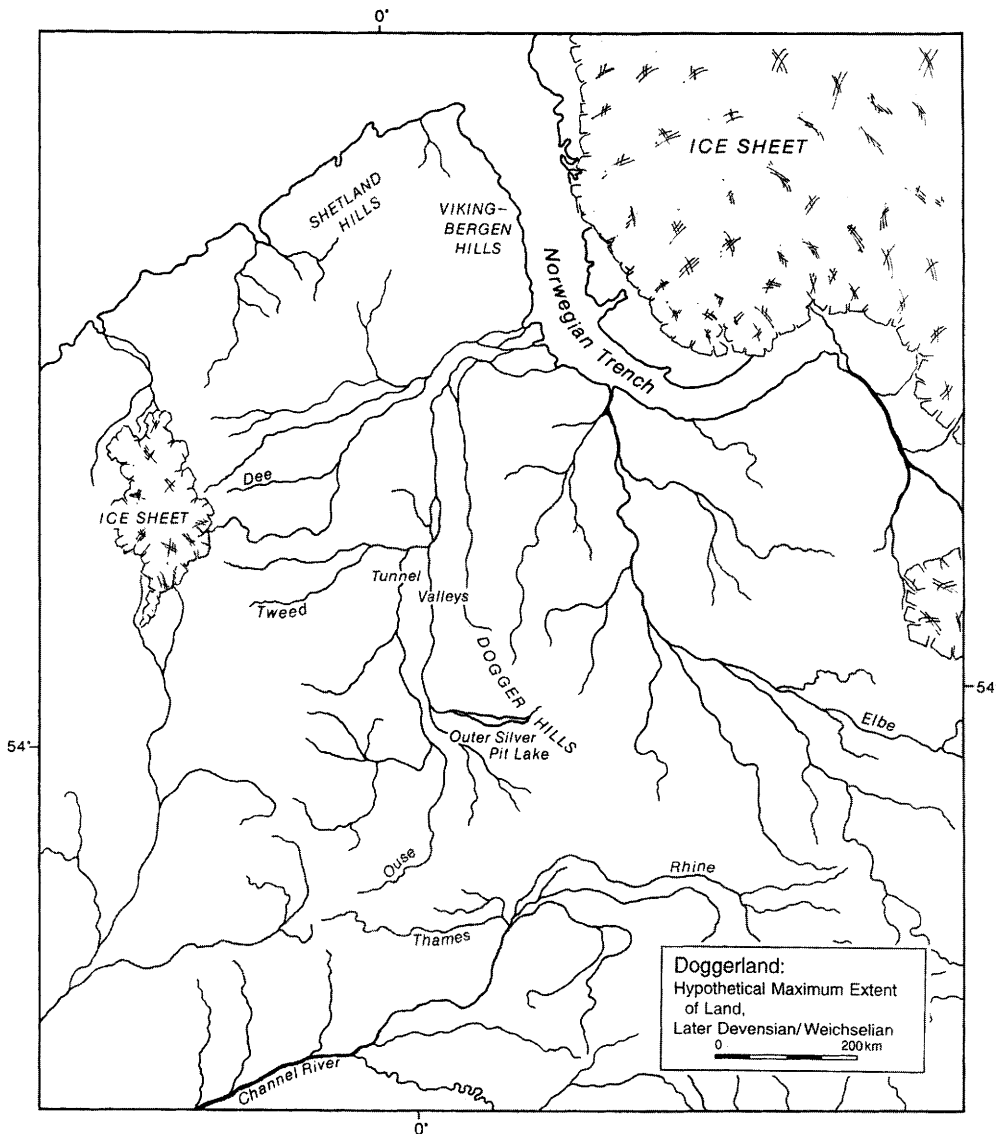


Fig. 1. Doggerland in the Later Devensian/Weichselian, with an indication of the major river systems. The evidence on which Figs 1–4 are based is discussed in Coles 1998.

between the Dogger Hills and the Yorkshire Wolds. South of Doggerland's main watershed, the Rhine and the Thames met to flow south-westwards into the Channel River and out to the Atlantic, with an estuary well to the west.

Flora and fauna

The opening of the Windermere/Bölling-Allerød interstadial (Fig. 2) was marked by a rapid rise in temperature, followed relatively slowly by the

development of open grassy parkland vegetation interspersed with patches of light birch woodland and a few other trees (e.g. Kolstrup 1991; Tipping 1991). There will have been many areas of wetland vegetation fringing shallow lakes and streams and rivers. Herds of grazing and browsing mammals colonised the land, accompanied by their predators including humans. Direct evidence for Doggerland's fauna is provided by bones trawled from the North Sea floor, many of them from the vicinity of Brown Bank (van

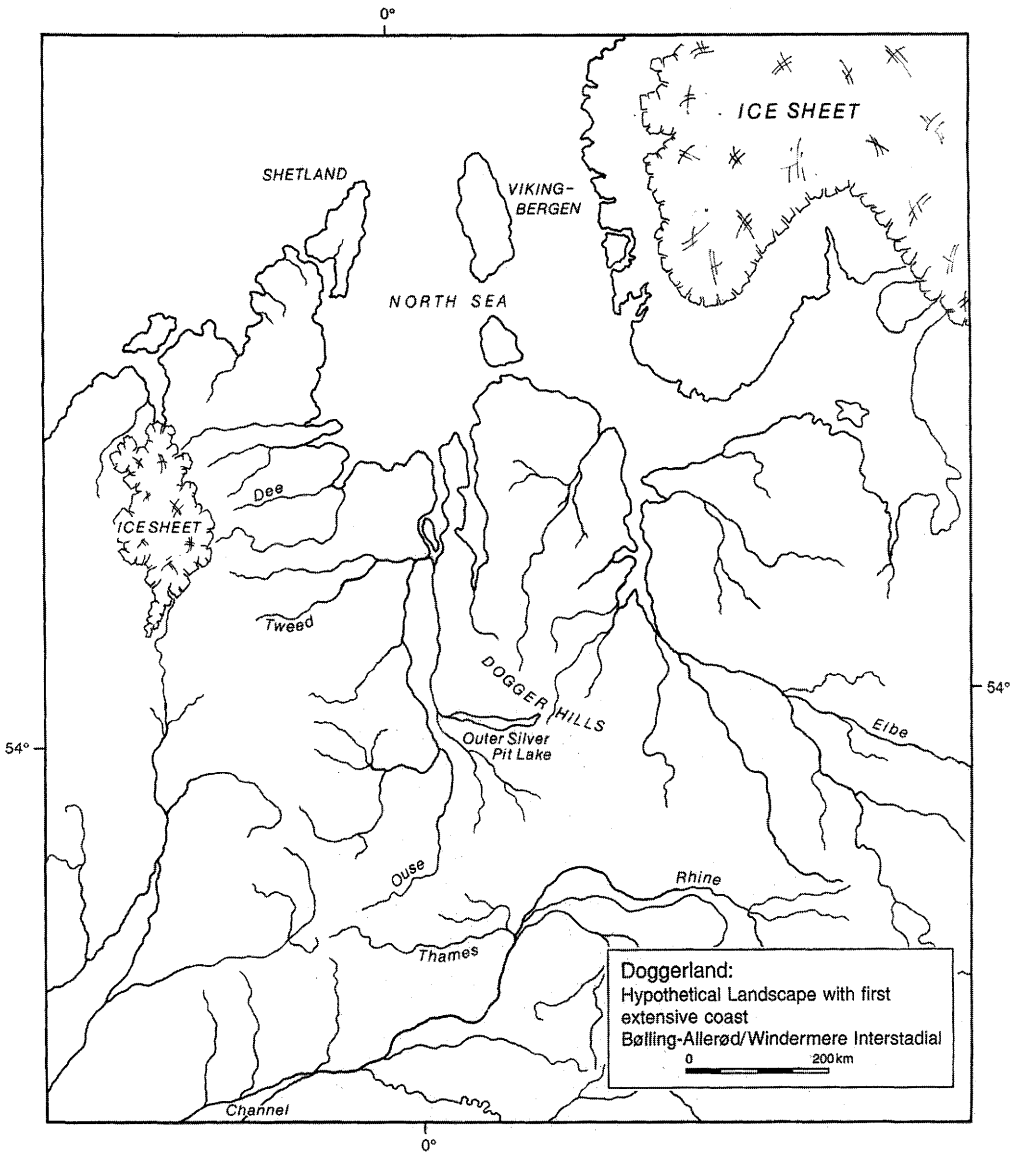


Fig. 2. Doggerland during the Bølling-Allerød/Windermere interstadial, showing development of northern coast and estuaries and presence of Viking-Bergen island.

Kolfschoten & Laban 1995); those bones which, themselves undated, can be attributed to the interstadial by reference to the faunas of adjacent lands, include horse, mammoth and red deer. The open vegetation and frequent expanses of fresh water coupled with warm temperatures, may have attracted many thousands of migrating birds; these too will have attracted human predators.

The people of Doggerland

The Late Glacial hunter-gatherers who explored and then settled Doggerland came from inland Europe (Housley *et al.* 1997), and as such they will have been familiar with the general conditions that prevailed through the land. Eventually, however, the first exploratory groups reached, what was for them, an entirely new environment: the coast. The location for this encounter will have been along the north coast of Doggerland, both southern Britain and Jutland then being inland regions.

The people who looked out over the cold North Sea faced a double culture shock, not only salt water and an unfamiliar suite of plants and animals which might or might not be exploited using existing skills and equipment, but also an environment which put a halt to the millennia-long process of colonization. An engrained cultural tradition of exploring new lands became in large measure redundant when this particular northwestern frontier was reached.

The coastline of the interstadial and following cold phase may have been relatively stable, for although the British and Scandinavian ice-sheets were reduced, a rapid rise in relative sea-level was only to come with the later wasting of the extensive North American ice-sheets. In places throughout Doggerland, there is evidence for a sea-level standstill, for example along the Norwegian Trench at some stage between 12 500 BP and 10 800 BP (Johnson *et al.* 1993). Shetland and the Orkneys remained part of mainland Scotland, and a large island existed between their position and Norway, referred to as Viking-Bergen or Frigg island. One small flint flake, probably worked by humans, has been found in a core taken from Viking-Bergen (Long *et al.* 1986). This raises the possibility that humans reached the island before it was submerged, having therefore developed the boats and the skills required to navigate the North Sea. It is unlikely that people penetrated this far north while Viking-Bergen was still attached to the Dogger mainland, in the light of Housley *et al.*'s (1997) calculations of the rate at which humans moved into the newly available land as the ice-sheets wasted.

Colonization of western Norway was probably also by boat, given the lack of an ice-free corridor of land around the southwestern margin of the Scandinavian ice sheet at the postulated time of colonization (Anundsen 1996). The first human presence on the Norwegian coast is currently dated to the Allerød, on the basis of indirect evidence in the form of charcoal which is thought to derive from fires that had burned in a context where a natural origin would be unlikely (Bang-Andersen 1996).

From these slight indications, it can be argued that people had developed a way of life adapted to coastal and marine conditions before the opening of the Holocene. The abundance of marine mammals, sea-birds and fish known from Scandinavian coastal sites indicates the attractions of the sea; in cultural terms, the challenge of developing new skills and equipment in order to exploit these marine resources may have taken the place formerly held by land exploration,

Ethnographic studies of coastal hunter-fisher-gatherers indicate potential for the development of complex maritime-orientated societies which, when compared with contemporary inland groups have relatively sedentary settlement patterns and relatively high population densities (e.g. Rousselot *et al.* 1988). It is unlikely that the first coastal peoples of northwestern Europe will have closely resembled more recent maritime groups, but a relative complexity, density and settled character may have pertained from an early stage vis-a-vis inlanders, in so far as these aspects will have been related to the year-round availability of natural resources along the coast and particularly around estuaries, and to the technological investments related to the exploitation of fish and sea mammals.

Archaeological evidence for Late Glacial maritime hunter-fisher-gatherers is largely absent from northwestern Europe, for the available coastline was that of northern Doggerland, now submerged by the North Sea. From the opening of the Holocene (Fig. 3), evidence is available, from northeastern England and from southern Scandinavia, in those places where the shifting relationship between land and sea levels has left the coastal zone of the earlier Holocene accessible. It appears that from the early Mesolithic onwards, a coastal and an inland way of life can be differentiated, with the coastal peoples exploiting their hinterland as well as the sea, and thereby establishing a broad band of occupied territory along the coast. Inlanders may have exchanged goods with coastal people, and visited the coastal zone, but their own settlement

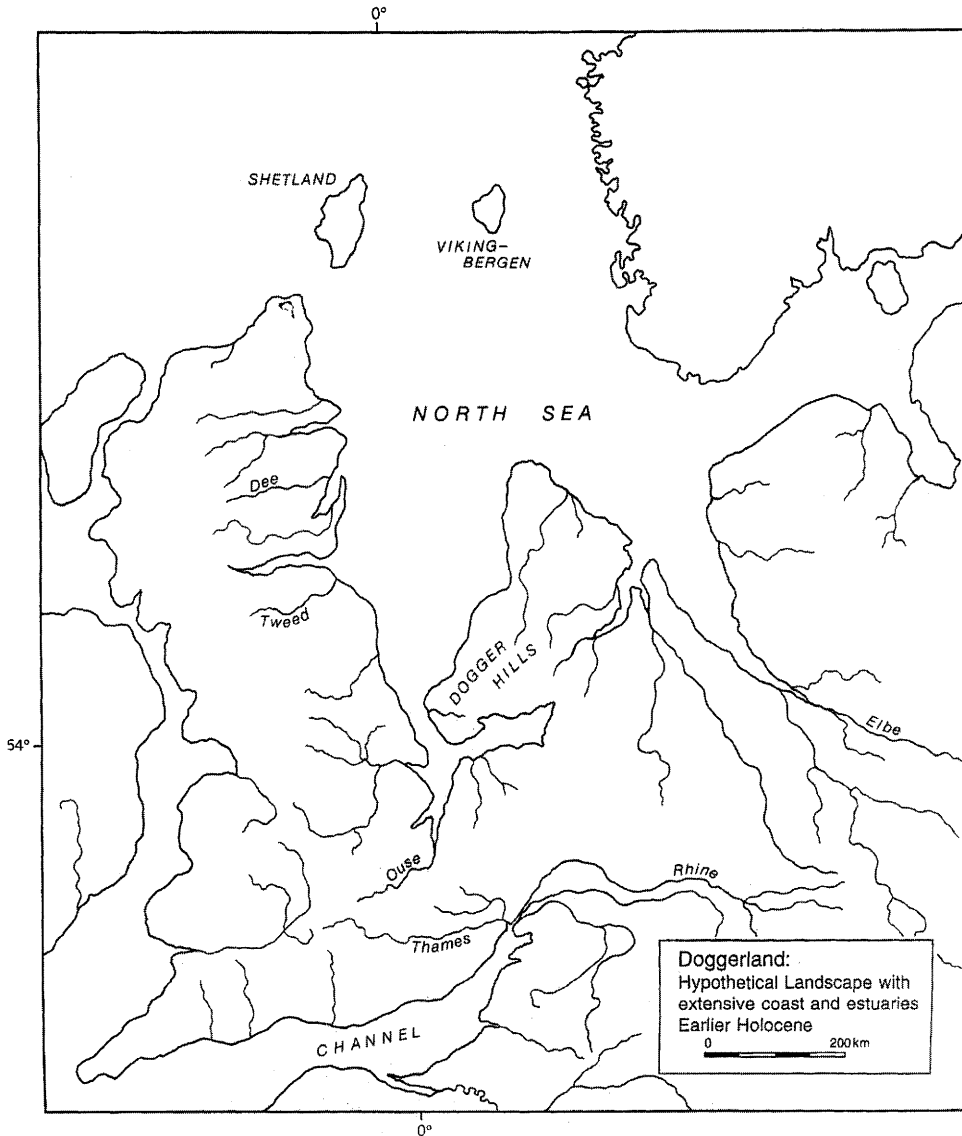


Fig. 3. Doggerland during the earlier Holocene, showing lengthening coast and major estuaries.

pattern did not infringe on the coastal belt. Two strands of evidence support this hypothesis: analysis of stable carbon-isotope ratios in bones from humans and their domestic dogs indicates either a predominantly marine diet or a predominantly inland diet (e.g. Nordqvist 1995), and analysis of material culture shows the development of localized styles within a framework of contacts over long distances. By the Late Mesolithic in southern Scandinavia, three zones can be distinguished, coastal, hinterland and inland, with the hinterland evidence probably left by coastal people during seasonal

visits to the interior of their overall territory (Andersen 1998). For Jutland the inland zone, inhabited by people without access to the coast, extended at least as far west as the present western coast, a reminder of Doggerland's former presence beyond.

Coastal changes

In the time period from the Late Glacial to the Late Mesolithic, approximately 12 000 BP to 6000 cal BP (4000 cal BC) the coastline of Doggerland shifted in response to rising sea-levels

and much of the former landmass became submerged by the North Sea. It has been argued elsewhere (Coles 1998) that land loss may have been slower than generally assumed, in part because Doggerland was not a flat and featureless plain. Figures 1–4 present one possible scenario for land loss, and Shennan *et al.* (2000) present another. A significant element in the process of land loss, evident from Figs 1–4, was the increase in the length of coastline and of estuarine areas, two zones of ecological richness inhabited by a relatively dense and settled human population adapted to a maritime economy. This, of

course, is an assumption, based on the reasons set out above. If it is accepted as plausible, it is then relevant to consider what happened to these coastal people as sea-level rose.

It is inherently likely that, as the environment which they knew shifted, the coastal people moved with it. They will have had the advantage numerically over inlanders, and they had generations of experience of coastal and estuarine exploitation. Moreover, their maritime habitat was expanding, and it will not have stressed them to absorb formerly inland groups into their midst. Throughout the millenia of sea-level rise,

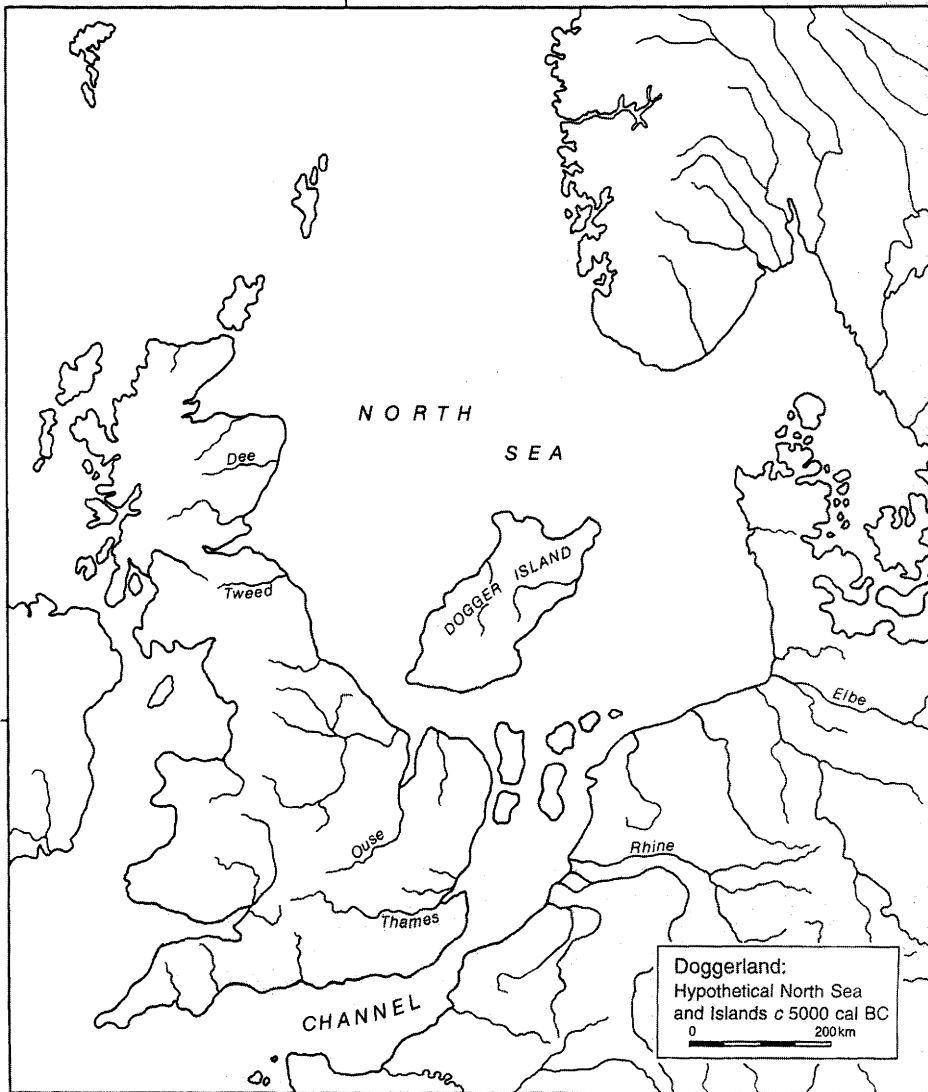


Fig. 4. Doggerland in the later stages of sea-level rise.

the people displaced were not those who saw their familiar beaches and living places lost to the encroaching waves, but the inlanders who yielded to the full package of advancing coastline, complete with flora, fauna and a well-adapted human population.

Almost as soon as the Late Glacial people on Doggerland's coast first developed a maritime-orientated society, the long-term process of moving with the moving coast will have begun. It must have become an entrenched cultural tradition, as was the concomitant absorption of inlanders. To call people 'settled' is therefore in one sense misleading, but 'settled' is an apt description of their tenure of the coastal zone and, as suggested by Andersen (1998) for the Late Mesolithic, they probably had tenure of a hinterland belt as well.

At about 6000–5800 cal BC, the watershed between the North Sea drainage systems and the Channel drainage system may have been breached, the event being dated by reference to conditions in the Southern Bight which changed from brackish to marine at about this time (Eisma *et al.* 1981). The Storegga submarine landslide off Norway and the consequent tsunami are possible candidates for natural catastrophic events that hastened the breach. However, sea-level rise continued for a further two millennia, until about 4000 cal BC (Shennan *et al.* 2000; Long *et al.* 2000), and studies of tidal systems off the coast of the Netherlands indicate some impediment to open contact between Channel and North Sea until about 3800 cal BC (B. van der Walk, pers. comm.). Perhaps, therefore, the watershed zone remained as some form of barrier, a series of islands if not continuous land, beyond 6000–5800 cal BC. (For a more detailed discussion of these points, see Coles 1998, p. 66–69).

Effects on people and human economy

The cultural process postulated above, of coastal populations moving with the coastal zone, may therefore have endured until the NW European transition to farming, which took place for what are now the lands bordering the North Sea at about 4200–4000 cal BC. Hypotheses abound as to how farming became established in Europe. The detail of conflicting interpretations need not concern us here, although it is relevant to note the main possibilities:

(a) expansion of farmers together with livestock and crops from southeastern Europe via Danubian and Mediterranean routes;

(b) expansion of the idea of farming and acquisition by indigenous peoples of domestic animals and crops;

(c) local experimentation and development of plant and animal husbandry, with eventual acquisition of non-native species.

Varying combinations of these pathways in different regions and at different times are likely. With farming comes evidence for more substantial and more permanent settlement, for pottery and new lithic technologies, and for changing cultural relations with the land. This last aspect is now seen as the crux of the Neolithic by a number of prehistorians (see Edmonds & Richards 1998 for examples of current concerns).

Neolithic settlement had spread rapidly across Europe from its roots in the Near East, for example along the Danube and its tributaries and down the Rhine, with the earliest farming settlements of the Aegean and Balkans dating to about 6500 cal BC and the earliest of the northwest to about 5400 cal BC (Whittle 1996). The northwestward advance of the Neolithic seems to have met with an invisible barrier some 100–150 km inland of today's coastline: from Ireland, Britain, the Netherlands, North Germany and southern Scandinavia the archaeological evidence at present available indicates the passing of 1200–1400 years before these regions too acquired a neolithic way of life at or shortly before 4000 cal BC.

Prehistorians have suggested various reasons for this lengthy halt to the spread of farming, noting for example the farmers' preference for loess and their slow adaptation to the cultivation of other soils, and the strength of foraging traditions in the lands beyond the loess. In some parts of the farm-free North Sea belt, there is scant archaeological evidence for a late foraging (Mesolithic) population in the 5th millennium cal BC, but in southern Scandinavia in particular a flourishing, culturally rich and innovative foraging population can be documented (e.g. Andersen 1998, Fischer 1995). The evidence comes mainly from what was the coastal zone of the period, from those parts of it which are now accessible to archaeological survey thanks to the interplay of land and sea level change in this particular region. In the Netherlands, the relevant zone is largely blanketed by Holocene sedimentation, but current railroad construction has led to targeted deep archaeological investigations which indicate a similar later Mesolithic potential (e.g. Hardingveld site, L. P. Louwe Kooijmans, pers. comm.). These flourishing groups were, to take the perspective of this

paper, Doggerland's coastal peoples, those who had the advantage over inlanders.

Northwestern Europe in the earlier Holocene can be considered as a land slowly overwhelmed by two advancing waves, farming from the south and the shifting Doggerland coast from the north. Each process, farming as well as the coastal shift, displaced or absorbed inland foragers, in the coastal zone for reasons outlined above, and along the frontier of farming for essentially similar reasons of disparity in population densities and the expansive cultural traditions of the people carried by the wave.

Each people, coastal foragers and inland farmers, will have had a forward zone of contact with inland foragers, and it must have been towards the late 6th millennium cal BC that the unfortunate inland foragers began to find themselves pinched from both sides, between the two waves of advance. In this light, although other factors no doubt contributed, the major force that halted the previously rapid spread of farming can be seen to be Doggerland's coastal population, supported and conditioned by long-term sea-level rise. It has been argued above that the coastal people were more settled than inlanders, their numbers were greater, their economy more diversified, all of which would have put them more on a par with the farmers than their inland neighbours were. And, probably the most significant factor, their cultural outlook was as expansive and tuned to absorbing others, rather than themselves being overwhelmed, as that of the farmers. Moreover, the coastal people had no choice but to move, so long as the coastal zone continued to shift. It was this perhaps which gave the edge to the coastal foragers, and halted the advance of farming 150 km or so inland of the coast, presumably on the outer edge of the coastal zone of exploitation.

In the centuries following their arrival at the invisible barrier at about 5400 cal BC, farming groups can be seen to consolidate and infill their zones of settlement. During this phase, the Linear Bandkeramik or LBK, little cultural change is indicated in the archaeological record. The Rössen period, a time of greater cultural and economic adaptation, followed from about 4800 cal BC. During the Rössen phase in particular, contact is evident with the foragers to the north, traced archaeologically in items such as pottery and stone axe or adze blades of Rössen origin, found on sites beyond the farming frontier (Whittle 1996; Louwe Kooijmans 1998; van Gijn 1998).

For so long as sea-level continued to rise, the buffer zone between the coast and the cultivated

lands must have been shrinking. Cultural adjustments will have occurred for both farmers and foragers, perhaps even contributing to the LBK-Rössen changes on the farming side and to the development of cemeteries and other indicators of a strengthening hold on the land amongst the coastal foragers. The first archaeological signs of farming settlement in the buffer zone and beyond, in Jutland, south Sweden, Britain and Ireland, date to about 4200–4000 cal BC, at or more probably a little before the standstill in sea-level rise dated by Shennan *et al.* (2000) and Long (2000) to around 4000 cal BC. Further work on the chronology of both processes might elucidate whether or not there is a link, whether for example marine regression drew with it the coastal people, leaving a belt of relatively unoccupied land soon exploited by farmers. The process of marine regression itself may have sufficiently upset coastal patterns of subsistence and cultural traditions for the system to collapse. Alternatively, 1200 years of contact may have familiarized farmers with the sea, sufficient for their final advance into Britain and Ireland and into southern Scandinavia.

Too often, the long process of sea-level rise has been ignored by prehistorians, and the existence of Doggerland and its people has been neglected. Both were of major importance, exerting an influence on regions beyond the area of the present North Sea, just as the shifting Atlantic coastline and its inhabitants no doubt influenced in some way events further to the west. This paper has been written to draw attention to some of the cultural repercussions of the shifting North Sea coastline, partly in the hope that developments in survey techniques will soon enable a search for evidence to support or refute its arguments.

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