Alasdair WHITTLE

# PROLEGOMENA TO THE STUDY OF THE MESOLITHIC-NEOLITHIC TRANSITION IN BRITAIN AND IRELAND

## Summary

The study of the Mesolithic-Neolithic transition in Britain and Ireland is itself in a state of transition. Theoretical and comparative studies have opened up many possibilities to consider, from agricultural colonisation to indigenous adaptation. The available evidence is such that there is little agreement at present on the processes involved, or even on their chronology. An early transition may involve colonisation, a late one some form of acculturation.

## Introduction

The Mesolithic-Neolithic transition has proved to be a subject of as much enduring interest in Britain and Ireland as elsewhere. Not only successive generations of researchers but also widely differing schools of approach - from the technological, demographic and ecological to the social - have found the question of perennial importance, and present thereby a useful measure of the state of explanation in general at any one time. The question brings together two long-term processes of change. One is the expansion by both colonisation and diffusion of the agricultural package of cereals and domesticated animals through the European continent from beginnings in the Near East (and perhaps south-east Europe itself) between 8000 and 6000 b.c..The other is the colonisation and subsequent use of north-west Europe which begins as far back as the warmer phases of the last glacial period, and continues into the post-glacial period. From the coming together of these two processes there emerged in Britain and Ireland by the later fourth millennium b.c. at the latest communities with agriculture as their main form of subsistence, more or less stable settlement, and a range of burial and ritual sites which seem to mark a sense of territoriality and permanence. The changes leading to this development must have been varied. They involve patterns of subsistence and settlement, but also aspects of cultural identity and values, contact, communication and movement; long-term historical process but also perhaps shorter-term events. From this perspective the nature of the change in question itself becomes problematical. What before might have been defined as a shift from hunter-gatherer or forager to farmer has now to be much more clearly investigated in the light of possibilities that both foragers and farmers were extremely diverse in character. This awareness has to be added to lasting questions of the source of change, whether from outside or inside Britain and Ireland, and of its date.

No obvious solution beckons in the British and Irish case, but it may be claimed that the nature of a solution for the future has become clearer. If the constituents of archaeological enquiry can be somewhat simplistically divided into theory and data, the reason for this can be explained. There has been considerable progress in the theory relevant to such a transition, leading to a wider range of models of both foragers and farmers, and to a better understanding too of the factors which influence the collection of archaeological data relevant to the transition. Varied analogies are also available from the European continent. However, the specific evidence available in Britain and Ireland does not lead to any easy choice between the now competing possibilities, not least because of chronological uncertainties. I will therefore review in turn some models of foragers and farmers, the archaeological correlates of such models, and some continental cases where the models may apply; and the British and Irish evidence in the light of the present spectrum of competing interpretations. There will be a final word on suggestions for future research.

## 1. Models and expectations

### 1.1. Mesolithic models

While the noble savage of the eighteenth century Enlightement had at least some order to his existence, the savage of evolutionary schemes of the nineteenth century was less fortunate. It took a long time to restore and indeed perceive the independent nature of hunter-gatherer society. The process culminated in the suggestion of an original 'affluent society' based on the ethnographic observation of surviving hunter-gatherers

(Lee and DeVore 1968). This viewpoint had a galvanising effect on hunter-gatherer studies in archaeology, and has led to many models being formulated. Perhaps as a throwback to the tradition of savagery, the majority of these archaeological models have posited subsistence as the dominant factor or central concern in hunter-gatherer society. Hunter-gatherers are seen to face risk from uncertain and fluctuating resources, and their response is now considered to have been ordered and calculated. Three main varieties of supposed response will be examined. All share to a large degree the belief that subsistence was not a haphazard, 'catch-as-catch-can' matter, but a strategy involving decision and choice, usually designed to play safe, to operate in such a way as to be sure to get through bad seasons or bad years. In this orientation studies of 'scheduling' have been important (e.g.Jochim 1976), which have recently been refined further into 'optimal foraging' theory (e.g.Smith 1983), in which foragers are seen to make careful decisions about diet breadth, patch choice, time allocation, group size, settlement pattern and so on.

In the first kind of model (e.g.Jochim 1976; Mellars 1978 *passim;* Gramsch 1981 *passim*), hunter-gatherers are seen as having little or no direct control over the resources on which they relied. In temperate Europe both plant and animal resources varied from season to season in availability or abundance. The risk which this posed was countered in various ways. A wide range of resources was exploited, including animals, plants, fish and shellfish. No one resource was exploited to the point of overall depletion. Subsistence was carefully scheduled to exploit the seasonally most abundant resources. This entails in most situations a degree of settlement mobility, to move from place to place of seasonal abundance. Human groups were generally small, though larger aggregations might be possible in situations of high resource abundance or for short periods of time or both. Both base camps and specialised extraction camps could be part of the settlement pattern. A large overall territory for each group is likely, and population density is low. Human numbers are not thought to threaten easy procurement of key resources.

The second kind of model shares many basic features with the first, but posits careful site location in positions of recurrent resource abundance greatly to reduce or even to remove the need for mobility. Locally larger groups might be possible, but such favoured locations would not be widespread, and would tend to be on or near coasts (e.g.Mikkelsen 1978; cf.Renouf 1984). Limited control of resources could have been possible and aided the concentration of favourable conditions in chosen locations. For example, clearance by fire or other means would serve to increase the abundance of nut-bearing species like hazel, because of its colonising abilities, and to attract game to regenerating browse (Mellars 1976a), and the provision of leaf fodder would be another way of affecting animal movement (Dimbleby and Simmons 1974).

The third kind of model envisages more extensive development. Resource control could have been extended, to affect the reproduction of both plants (Clarke 1976) and animals, archaeological criteria for whose domestication are weak (Higgs and Jarman 1969); selective control could have been imposed on deer, cattle or pigs by a variety of means: by selective culling, by control of herd movement, or even by penning and other restriction. An element of delayed return on investment enters considerations. Storage would also have served to reduce the effect of immediate conditions and spread the benefit of particular resources over longer periods. Carefully chosen locations with an abundance of recurrent resources, especially near or on coasts, could have allowed the occupation of permanent or semi-permanent bases; along with such incipient sedentism specialised hunting and extraction camps would be found. Population density would increase locally, and perhaps threaten some resource depletion.

All three kinds of model give prime importance to technological, demographic and ecological factors, according to which social arrangements are seen as determined by or following from those conditions. This is not to say that social arrangements are ignored. Following the ethnography (e.g.Leacock and Lee 1982: 7-9), generalisations are often offered that small band societies were egalitarian, bonded by an ethic of sharing, lacked individual property or wealth and status positions other than those due to age or sex, and lacked permanent leadership. This kind of social arrangement can be envisaged for the first two models above, and even for the third kind. Yet both the theoretical orientation and the scope of the ethnographic sources can be challenged. Once values are brought into the discussion (Bender 1978; Ingold 1980), the possibility of technology in the broad sense being guided by social ethic cannot be ignored. The situation amongst surviving hunter-gatherers today need not adequately match that of the past, and it is clear that at least some foragers, as on the north-west coast of America, did have such features as leadership and property (Renouf 1984). Another kind of approach therefore needs to be used, in which greater attention is given to social arrangement from the outset, and in which the possibility is actively considered of growth, competition between individuals and groups, and the exploitation of opportunities for consolidating difference or inequality; difference between groups might be at least as important as that within groups. This kind of model might best be applied to or combined with the third kind of situation described above, but need not be excluded *a priori* from the other two. The risks facing post-glacial hunter-gatherers need not have been necessarily greater than those facing later societies of early farmers, and the diverse resources of the early post-glacial environment may have offered as many opportunities as problems.

The archaeological correlates of the first two models should in brief include a structured settlement pattern, with mainly small, seasonally occupied sites and occasional larger ones, and a diverse range of resources used; territoriality and indications of status should be weak. In general the correlates of the third should be distinguishable from these, with again a structured settlement pattern, but with more large sites probably in coastal locations, a range of resources but some signs of control or specialisation, and storage; territoriality would be more developed, expressed through artefact style or cemeteries for example, and difference between groups could be seen in site size and duration, and between individuals in terms of artefacts used as grave goods.

There has clearly been much success in applying models of this kind to the European Mesolithic record, even though most of these have been dominated by the concerns for technology, demography or ecology. A structured settlement pattern with mainly small sites and seasonality of occupation is a recurrent perception in the archaeological record, even though seasonality is hard to pin down, and the absence of storage and resource control is equally hard positively to prove. However, some version of the first or second models is widely applicable (e.g. Sakellaridis 1979; Arora 1973; Jochim 1976; Newell 1973; Price 1978; Brinch Petersen 1973; Gramsch 1981; Bonsall 1989.). Some version of the third model may also be applicable. Coastal regions such as southern Scandinavia in the later Mesolithic or Ertebølle phase have coastal sites, including large shell middens, which have been seen as permanent or semi-permanent bases with surrounding extraction camps both on the coast and inland (Rowley-Conwy 1983, 1984). A wide range of resources was exploited, though there is no specific evidence for direct resource control. Artefact styles have regionalised distributions (Petersen 1984), which could reflect increased territoriality, and cemeteries such as at Vedbaek on Zealand and Skateholm in Scania (Albrethsen and Petersen 1976; Larsson 1988) may also express local concern for land and ancestry, as well as showing some differences within communities.

In the light of the late date of the Ertebølle phase, it is tempting to see a chronological development through the post-glacial period, at least in some areas, from the first two models to the third. From the ecological-demographic perspective there would be strong reasons for this. In the first two millennia of the post-glacial period one may envisage diverse resources available, in a still open or not fully wooded environment, in variable climatic conditions; in this setting mobility and seasonality would be appropriate, and the increasingly favourable conditions might encourage population growth. After the arrival of climax vegetation, coastal locations may have become more favoured, and continued growth of population can there be envisaged, aided by the packing of groups previously settled in areas now inundated by sea level rise; inland, resources may have become harder to extract, but could have encouraged experimentation with resource control. It remains to be seen whether this chronological scheme is viable. The southern Scandinavian evidence is preferentially preserved from later phases of the Mesolithic by the circumstances of coastal change, and knowledge of the use of the coast in earlier phases is limited. Demographic growth may have been a factor from much earlier, and is not necessarily to be seen as a variable dependent on ecology. Much depends too on the baseline from which development is seen to start; any notion of differentiated late-glacial hunters would radically alter expectations of the early post-glacial period. The third model may therefore be applicable, and southern Scandinavia may indeed be one of the best examples for the late Mesolithic, but the radical possibility remains that this kind of situation existed earlier too, and not purely for ecological-demographic reasons.

These models are simplifications of a great range of possibilities. It is possible to alter their constituents, for example by including storage techniques in the first two. Not all their archaeological correlates are clear, and in particular the question of social difference, both between and within groups, is problematical. However, enough should have been shown of the ethnographic contribution to constructing frameworks for the examination of the evidence, and of at least some success in applying the resultant models. They have provided an important yardstick for studies in Britain and Ireland.

### 1.2. Acculturation models

More models have been offered in recent years of hunter-gatherers in the process of transition to becoming farmers. There has remained an ethnographic contribution (e.g. Megaw 1977) but there has been greater use of inductive generalisation from the archaeological record itself. There has been an older tradition of considering the potential contribution of Mesolithic communities to an agricultural lifestyle, including the use of fire for clearance, and boats; another specific suggestion has been of burial traditions, including the use of megaliths (Case 1969a; Clark 1980). More recent contributions have focussed on the motives for transition, once agriculture is available in adjacent areas as an option. Four sorts of model may be discussed. The first and most common envisages hunter-gatherers under various forms of pressure. Hunter-gatherers may be in situations similar to either the first two models above or to the third. They are then seen to come under pressure from some form of imbalance, for example between their numbers and the resources currently supporting them with the available technology (e.g.Bradley 1984). Their problems are then seen as analogous to that facing many farming communities, and agriculture is adopted as the only resort, despite the higher requirements on labour, with other elements of the Neolithic way of life following as a matter of course. This model does not

envisage any very clear benefits or advantages for an agricultural way of life. The process of pressure is usually seen as a long-term one.

No very clear archaeological correlates are specified by this kind of model. Imbalance is inferred. It would be possible to specify a gradual growth in site numbers or a decline in certain resources, but this has yet to be rigorously applied in a European situation. However, candidates for a useful application of this kind of model can be suggested in northern Germany and the coastal part of the Netherlands in the fourth millennium b.c.. A recent discussion (Rowley-Conwy 1985) has sought to deny or at least to minimise the evidence for change in the Ellerbek area at sites like Rosenhof and Forstermoor (Schwabedissen 1981). The evidence takes the form of claimed cereal pollen and bones of domesticated cattle in Ellerbek contexts, from the mid fourth millennium b.c.. It is true that the evidence is not properly published, but the slightly later site of Siggeneben-Süd from the same area (Meurers-Balke 1983) seems to show a continuation of the same process of local acculturation. Therefore the adoption of at least some agricultural practice or resources from nearby farmers is a strong possibility, and might reflect ecological or demographic pressure. The Swifterbant sites in the Dutch Ijsselmeer could show the same sort of process. The sites in question also belong to the mid fourth millennium b.c., and show the use of both grain and domesticated animals as well as wild game, fish and plants.

A variant of the pressure model constitutes the second acculturation model. In this the emphasis is on short-term pressure, ending a period of rejection of or resistance to an agricultural way of life. Despite the availability of agriculture, hunter-gatherers, especially those with some degree of resource control and sedentism, may not immediately choose to abandon their own way of life, as it offers at least equal security and lower labour input. However, if some crucial resource then fails, agriculture then becomes the best option to maintain sedentism and current population levels. This model has been applied to the late Mesolithic Ertebølle culture in central and northern Denmark (Rowley-Conwy 1984,1985). The envisaged sequence is as follows. Sea level rise in the early fourth millennium b.c. brings a new abundance of marine resources. Opportunistically, these are exploited, allowing large sedentary coastal sites, and agriculture available only a few hundred kilometres to the south is not seriously considered. In the late fourth millennium b.c. sea levels alter again, affecting salinity, which in turn affects the abundance of marine species, and especially the availability of oysters which could have been a crucial late winter staple. Finally, agriculture is rapidly adopted as an alternative. Both the model and its application need to be examined. The model, as with others noted above, gives prime importance to subsistence. In the central-northern Danish case, the long period between the arrival of agriculture with the LBK culture to the south and the local adoption of agriculture is indeed increasingly striking. Resistance, however, could have other explanations, for example for reasons of cultural identity or value. Equally, there is a strong possibility of earlier coastal sites, and camps like Vengaet-Nord in the Vedbaek estuary (Jensen and Petersen 1985) dating from the mid fifth millennium b.c. do not support any easy correlation between coastal use, sea level and salinity. As far as I am aware there is no specific evidence to support the role of oyster as late winter stopgap, which would not be critical anyway if storage was practised. Some late Ertebølle sites may have had cereals (Jennbert 1985). Nonetheless, the model is useful for positing rapid change under specific circumstances.

Another variant of the pressure model constitutes the third acculturation model. According to this farmers themselves become a form of pressure. Disruption is one of a number of effects that farmers could have had on adjacent hunter-gatherers (Whittle 1977). Hunter-gatherer land-use would be all the more affected if it involved extensive territory. Competition with farmers for grazing and land could result - unless some form of symbiosis were achieved - and seasonal scheduling could become disrupted. Whether or not hunter-gatherers were highly developed or under some other form of pressure, such disruption could induce the adoption of agriculture and subsequent cultural assimilation. A relevant European case is that of the LBK culture. Assuming this to be of external origin, it apparently spreads rapidly in the mid fifth millennium b.c. across the loess lands of central-western Europe, which were perhaps sparsely occupied by hunter-gatherer populations. While some interaction has been claimed around its north-western fringe with the indigenous population (Newell 1970; Waterbolk 1968), the LBK seems otherwise to have disrupted local communities within the area of its distribution, and may have affected those closest to it, for example the Ellerbek group discussed above.

In all these three models there is very little discussion of the actual mechanics of change. However, these should be seen as more of a problem, since a number of different possibilities are evident. Sedentary foragers could perhaps more easily adopt the agricultural package than mobile ones. The difficulties are as much organisational as technical. The commitment of investment and delayed return would entail radical reorganisation of a previously mobile life, though presumably familiarity with both plants and animals would ease the technical changes to cultivation and husbandry. It might be supposed that piecemeal adoption would be equally easy for both mobile and more sedentary hunter-gatherers, but it may have been harder for mobile groups to integrate small herds or small plots into their annual round. These rather speculative considerations do have important implications for the likely structuring of the archaeological record. On the one hand change may be expected to appear rather rapidly, and on the other the greatest visible continuity may be expected among

more sedentary foragers.

The final acculturation model to be discussed here changes the focus to aspects of cultural identity (Ashbee 1982). Indigenous communities could have picked up new food staples for a variety of reasons. As a form of respect or imitation, they could also have adopted material items and such practices as monument building. The model was formulated for the case of the British Isles, and can be discussed separately later, but it does usefully raise again the issue of cultural practice and identity. Too often, as noted above, these are seen as secondary adjuncts to the practice of agriculture; culture is seen as adaptive behaviour. Traditionally too archaeological culture has been equated directly with self-defining human group. More recent approaches to the study of material culture have reaffirmed the complexity of its use and suggested especially its active role in social interaction (e.g.Hodder 1982). It is possible to envisage two sorts of contrasting situations, each with important implications for the archaeological recognition of change in the artefactual record. On the one hand hunter-gatherer groups could adopt agricultural staples without adopting, or only slowly adopting, the cultural paraphernalia of the Neolithic including pottery. The early Neolithic in the west Mediterranean is perhaps the best example of this (summarised in Whittle 1985). On the other hand much of the cultural paraphernalia could be adopted without full adoption of the agricultural package, at least to begin with. This situation has been less recognised, and needs to be discussed in the light of consideration of models of agricultural communities (see Thomas 1988).

### 1.3. Neolithic models

There is of course a vast literature about early agriculture, but it is more diffuse than that about hunter-gatherers and lacks the recent burst of consideration of archaeological implications. For too many researchers, the Neolithic ushers in visions of uniform, permanent settlements whose inhabitants cultivate and rear in similar ways, and show an equal tendency to increase in number. It is worth therefore considering aspects of both resource use and settlement, and then two contrasting models of early agricultural communities. It will be noted that the ethnographic contribution is here much reduced.

It seems clear that the major staples of the early agricultural economy were the cereals wheat and barley, and the domesticates cattle, pig, sheep and goats. Cultivated legumes are also found, and there are domesticated dogs. This much has been known since the last century. Of greater importance is the balance between these resources. The problems are considerable. On the one hand it is difficult adequately to take into account all the formation processes and post-depositional factors which may affect the relative numbers within floral and faunal assemblages, and on the other it is harder still to estimate the balance between cereals and animals, even in ideal circumstances of recovery. In temperate north-west Europe the evidence as a whole may suggest the prime importance of wheat and barley, and cattle. On theoretical grounds it may be expected that cereals would make a more effective contribution in forested environments than animals, whose numbers would be constrained by the less than ideal grazing conditions (Fleming 1972). However, the reliance on ecological generality is dangerous, and anyway risks ignoring the diversity of resources which the agricultural package offers and its adaptability to different situations. There is a similar problem with wild resources. It is clear that neither wild plants nor wild animals were ignored by early farmers, but both the details of their use and their relative importance are problematical. It is often assumed that deer and other game were randomly hunted by early farmers, often in connection with crop protection, but it is possible to envisage the continuation of strategies of control of movement, and of careful culling. The likelihood that red deer were introduced into the Orkneys by early farmers (Whittle 1977; Renfrew 1985) supports this notion. It is unclear what contribution this kind of food made to the diet. Raw numbers of bones can sometimes suggest a quite substantial contribution, but it is not impossible that some high numbers reflect opportunistically gained gluts, rather than the regular balance.

Also relevant are questions of goals, values, labour input and intensification. Goals and values are little considered. One suggestion for the LBK culture was that its strategy was designed to minimise loss and risk rather than to maximise gains under favourable conditions (Hamond 1981: 225; see also Bogucki 1988), and in this perception of risk there is much in common with the technological-ecological approach to hunter-gatherers. The approach may be limited. If it is accepted that all forms of subsistence face risk from unpredictable conditions and that this was unlikely to be ignored by the people in question, there is still the wider question of what production was for, and the possibility remains that favourable conditions were exploited to the full. It seems unwise to restrict early farmers to the pursuit only of cautious survival. Production may best be seen as for livelihood, for the maintenance of social position (Gamble 1981). The difference between hunting and herding has been seen as not so much one of technique as one of ethic, and in terms of a contrast between sharing and acquisition (Ingold 1980). Both foraging and farming are subject to risk and periodic disaster, but offer the possibility of more than mere survival. This weakens the technological-ecological imperatives which so often dominate subsistence studies. Agriculture could be adopted for the positive reasons of sedentary existence, differential production and the opportunity for acquisition, rather than as the inevitable consequence of population growth or as a foil to ecological change or forager miscalculation. It has often been observed in recent years from the ethnographic record that farming may well involve higher labour input

than foraging (e.g.Lee and DeVore 1968; Bakels 1978). This is often seen to act as a deterrent to the adoption of agriculture, but this is to confuse means with ends. Slightly harder means may have been accepted to achieve desired ends.

It follows from this that there should be no preconceived notions about the intensity of production in early agriculture. There has been a tendency to envisage a baseline of low production and extensive land-use. This was encouraged by Boserup's model of agricultural development (1965). It is likely, however, that in the LBK there was intensive, localised production based on valley-sited cereal plots and cattle husbandry. The use of the ard or plough cannot be definitely excluded from this early stage, nor land boundaries, though both are archaeologically invisible because of the conditions of preservation on the loess. A final consideration in this vein is the organisation of production. Many aspects of farming benefit from cooperation, just as in foraging, but few require large units of labour. The possibilities for individual action are considerable, particularly in the context of a dispersed settlement pattern, discussed below, and of an acquisitive ethic.

More thought also deserves to be given to agricultural settlement. Both its distribution and its permanence are relevant. Too often agricultural settlement has been seen as a by-product of the agricultural economy, but the way people distribute themselves across the landscape is of interest in its own right, and may reveal much about social values. In central-western Europe in the earlier Neolithic the dominant mode of distribution is dispersal, with rather small units of settlement, mainly of hamlet and homestead size, and occasional villages and enclosures. Not all sites are of equal size, nor of equal duration. Indeed dendrochronology in the Alpine foreland suggests that many individual sites were short-lived (e.g.Becker *et al.* 1985). This kind of picture is certainly compatible with the evidence elsewhere, where the chronological resolution is not so sharp. This contrasts with the long-term permanence of the settled landscape in which individual sites waxed and waned. Now there is no inherent advantage in either nucleation or dispersal, and it seems more sensible to see in the choice of dispersal not some ecological constraint but a reflection of values of independence and the necessity for some space between neighbouring social groups. The relative durations of sites may be some measure of their success and failure in a competitive social milieu. It is also important to remember the existence of specialised sites in Neolithic settlement patterns. These include hunting and herding camps, and other extraction camps of a transient nature.

Two simple models can be offered to simplify some of the possible contrasts discussed so far, and to provide comparison with hunter-gatherers. In the first model, farmers are seen as fully sedentary, with permanent settlements in well-defined landscapes. The economy is based on cereals and domesticates, especially cattle, and production is intensive. The contrast with even sedentary hunter-gatherers is considerable. In the second model, farmers are also sedentary, but the settled landscape is more permanent than individual sites within it, and the margins of the settled landscape may vary too. The economy is based on cereals and domesticates, but there is some use, often opportunistic, of wild resources. The intensity of production varies from settlement to settlement, just as their size and duration vary too. There is contrast here too with hunter-gatherers, but also a degree of partial overlap. The second model may better fit the earlier Neolithic of central-western Europe than the first. The LBK culture may show some of the features of the first model, but its internal variation is more in line with the second. Another example of the second kind of model could be the Early Neolithic phase in Denmark, in which considerable continuity with the late Mesolithic has been argued, with limited clearance, varied, short-lived settlements, some cultivation, and husbandry concentrated on preexisting species such as pig (Madsen 1982).

Farming communities expanded through time, and the most common explanation for this has been in terms of population increase. There is no reason to doubt this in general terms, and the Neolithic record is full of cases which seem to fit this explanation, including the initial burst of the LBK, and secondary infilling in the fourth and third millennia b.c. (Whittle 1985). The Boserup model of agricultural development (1965) gave impetus to this view, with its argument, counter to that of Malthus, that population increase and pressure encouraged technological development. When looked at in more detail, population turns out to be problematic. Population cannot be seen as an independent variable. Increase is the result of alterations in mortality or fertility (in the demographic senses) or both. Mortality could be affected by changes in the food supply, from which a propensity to increase in the Neolithic may partly stem. Fertility is also relevant, and this may be affected as much by social arrangements as by immutable conditions of reproduction. Given that people can control their reproduction by a whole range of direct and indirect means, increases in fertility may indicate a conscious desire for more family, kin or group members. For farmers living in dispersed settlements with fairly small, independent units of labour, there would be considerable advantages in extra hands and extra dependants. Secondly, it follows from this social dimension that any suggestion of a possible growth rate can only be a crude average, and that rates may have varied considerably, from nil upwards. One hypothesis has been of a steady rate of growth through the Pleistocene, between 0,0007 and 0,0003 per cent per annum (Cohen 1977), but the choice and permanence of rate are difficult and critical. In a given area it has been shown that even a seemingly modest rate of increase, 3 ± 1 per cent per annum, which is suggested for

colonising groups from ethnography, if continued would lead to vast numbers of sites within 400 years (Hamond 1981). It is at least as realistic to envisage reductions in the rate of increase once infilling began. However, the possibility of short-term spurts remains important. Thirdly, there is a problem in the perception of increase. There is ethnographic evidence to show that people in the short term can wrongly perceive increases and decreases, especially again in situations of dispersal (Ardener 1974). The notion of population 'pressure' requires assumptions to be made about social value. Population could increase but not exert significant pressure, if people were prepared to accept more crowding or less easy access to resources. We would perhaps more readily imagine that some change would result, either in changes in population dispersal, through external migration or internal infilling, or in terms of labour input, or in terms of technological improvements of productivity; but these all depend on questions of value and attitude. It is interesting to consider the implications for different strategies of subsistence. One geared to reducing risk would perhaps seek to reduce population increase in the first place, but then to minimise the risk of unknown new environments by short-distance migration only. A strategy less primarily concerned with risk might both welcome population increase, and cope with a variety of responses, including considerable relocation. There seems no good reason to exclude this possibility from consideration of the European Neolithic.

The subject is therefore complex, but the possibility of rapid, short-term growth is important for the theme of Mesolithic-Neolithic transition. At least one response to population growth is movement. It has become fashionable to be suspicious of population movement in British prehistory. Where the evidence is ambiguous, it is right to consider as many other explanations as possible, but it is misguided to exclude movement from these in advance. Different kinds of movement can briefly be considered. There may be wholesale migration - the lock, stock and barrel model. Equally plausible is splitting off, by smaller sections of parent communities - the fission model. Relocation may be considered over both shorter and longer ranges. Dispersal on arrival is also relevant. Relocated groups may cluster in a given area or areas, or may become widely dispersed. The effect of existing population is also important. Immigrants may seek to avoid the native population, or to disrupt it; a third possibility is to take up space left by the native population, by 'infiltration' of empty niches (Neustupny 1982). Lastly, the process of movement can be considered over different timescales, both shorter and longer. These brief considerations alone are sufficient to make the potential complexity and diversity of movement clear. It is not difficult to suggest possible cases of colonisation, beginning with the apparently rapid movement of the LBK across central and western Europe. It is clear too that movement of some kind, even if restricted to what have been characterised as 'far-reaching and rapid seasonal movements of a few individuals' (Case 1969b), must be an integral part of this phase of European prehistory. Rössen shaft-hole axe-hammers are moved north into the Ertebølle area (Fischer 1982). Neither sheep nor goats nor cereals were native to Britain and Ireland, and cattle may have been absent from or have been only a small part of the early post-glacial fauna in Ireland (van Wijngaarden-Bakker 1985). That people moved around, including across the Channel and North Sea, is therefore indisputable. Their identity and motives remain of course to be established. It is necessary only at this point to insist that colonising farmers cannot be excluded *a priori*.

Recent material culture studies (e.g.Hodder 1982; Miller 1985) are also relevant to the transition from the point of view of farming communities. Rather than seeing pottery, ground and polished stone axes, and other items as merely some kind of inevitable, functional component of a sedentary way of life, it is preferable to consider the possible range of uses, both symbolic and practical, of material culture. Material culture may be actively used in social interaction, to express and enhance group position and identity. It is not, however, inevitably so used, and different circumstances may result in different emphases. The implications for the study of material continuity in transitions such as this are considerable. In a previous study of the British Mesolithic-Neolithic transition, it was suggested merely that one could envisage a 'black box', the input into which and the output from which were known, but whose internal workings were not recoverable (Whittle 1977). Now it is possible to consider wider possibilities. The question of identity is closely tied to the conditions of colonisation, including the size and composition of group involved, the distances and timescales involved, dispersal in new locations, and the attitude and distribution of native population. Identity may be stressed, indeed new identity may be forged in the experience of colonisation, particularly if more or less whole communities are involved in movement over long distances in a short space of time in new terrain or at least in conditions of some risk. Cohesion would then be important, and material culture would be one of a number of ways in which it could be reinforced. The case of the LBK again may fit this kind of model. However, in line with the theory outlined briefly above, different conditions may produce different uses of material culture. Smaller groups, shorter distances, a longer timescale, less risk, individualising tendencies rather than community solidarity, might all help to encourage material discontinuity between parent and descendant communities. If style is ideology (Shanks and Tilley 1987), then the ideology of colonists may vary.

## **2**. Mesolithic and Neolithic expectations

This part of the paper has been lengthy, but necessary to set out a range of possibilities. Models of

hunter-gatherers and farmers suggest that they could share much in common in certain situations and forms of development. They could also be vastly different. There are good grounds for a model of acculturation by hunter-gatherers, adding desirable new staples to a developed resource base in a pattern of semi-sedentary or sedentary settlement. Another version of the acculturation model could incorporate more mobile hunter-gatherers, making a more rapid transition under the pressure of specific circumstances. There is no doubt that models of this kind have become increasingly popular over the last generation of research (from Waterbolk 1968 onwards). Two biasses towards this kind of model may be noted. One is the fine quality of evidence in northern Germany and southern Scandinavia, where the model may best apply. The second is the mood of our own times. It is increasingly suggested that this affects preference for explanations (e.g.Hodder 1986). This is unlikely to be straightforward. After all, earlier this century after Irish independence there was still a strong preference for the colonisation model in Irish studies. Today there may be a bias to the acculturation model through identification with such values as political independence and economic self-sufficiency. This is not to say that the acculturation model is thereby flawed in itself. It is important, however, to stress the possible diversity of early farming communities, and the real possibilities of expansion and colonisation by them. With these competing alternatives in mind, the British and Irish evidence can now be reviewed.

## 3. The British and Irish evidence

### 3.1. Mesolithic and Neolithic profiles

The basic cultural content of both the Later Mesolithic and the Earlier Neolithic are well known, and do not require extensive repetition here. A brief survey will help to define some of the problems under discussion and to focus on the probable period of transition.

If a simple division between Earlier and Later Mesolithic between 7000 b.c. and 6000 b.c. is accepted (Mellars 1974; Jacobi 1979), then the general character of later lithic industries is clear. Over much of the country, assemblages characterised by smaller rather than larger microliths dominate. These microliths were also of more elaborate form than earlier types, including more geometric shapes and in some cases features such as invasive retouch. Heavy tools such as axes and picks occur. Some regional variation is evident. In northern and eastern Ireland (Woodman 1978,1985) an earlier microlithic tradition gives way to a flake and point tradition. In western Scotland on shell middens there are simple flake and microlith assemblages (Mellars 1987). Further south, regional variants may be suggested on the basis of microlith preferences, and areas such as the Weald, the Pennines, the Midlands and East Anglia, and the south-west, may be thereby picked out (Jacobi 1979). In the Weald, so-called Horsham points with concave bases and invasive retouch are a notable regionalised feature (Mellars 1974). In the south-east, some heavier assemblages such as that from Lower Halstow in Kent could belong to the Atlantic period (Jacobi 1982). In the Later Mesolithic, it is likely that there are the same sort of more regionalised patterns that can also be seen on the continent. One discussion has set these out for southern Britain and boldly compared them to patterns of material culture in the Earlier Neolithic (Care 1979). Whether these patterns were stable remains to be seen. The picture is built up on the basis of surface collections and stray finds, with fewer excavated assemblages, and even fewer dated sites (Jacobi 1979). In more detail, regional sequence is everywhere difficult to establish. For example, in central-southern/south-east England 'Wealden' microlithic types such as obliques, isosceles and rhombic forms and basally retouched microliths may begin in the seventh millennium b.c., but could overlap in the sixth and fifth millennia with narrow blade industries with straight-backed, scalene and geometric forms (Jacobi 1982). If, once again, style is to do with identity and ideology, difference is the key, rather than linear progression, and no simple sequence need necessarily be expected. Some candidates for a late date do emerge, such as the straight-backed and lunate forms from early fourth millennium sites on the Pennines or the possibly Atlantic period assemblage from Lower Halstow (Jacobi 1982), but others will be harder to recognise without a sustained programme of excavation and dating. An imprecise dating of most assemblages to the sixth or fifth millennia does not help the question of the transition, and the situation in the fourth millennium, as we shall see below, is less clear still.

There is limited evidence for the movement of raw materials in the Later Mesolithic, such as of Portland chert in the south-west. Little is known of bone and antler industries. There are antler harpoons in the west Scottish 'Obanian' group. There are no known cases of Mesolithic pottery. Compared therefore with southern Scandinavia (e.g.Petersen 1984), the material record is sparse and selectively preserved.

Numerous sites are known, apart from the larger quantities of stray finds. Most are small and lack deep stratigraphy, or indeed much stratigraphic build-up at all. They range over the landscape, though western Scottish sites are largely from the coast, and eastern Irish sites are from the coast or rivers. Coastal sites are also found elsewhere. Some differentiation can be seen in terms of site size, location and artefact composition (Mellars 1976b), and a pattern of bases and camps of varying duration can be suggested. Resources known to have been exploited include deer, pig, aurochs, fish both river and marine, and shellfish; the use of plant food is probable. Clearances were made in forest and woodland. Evidence for burial is virtually non-existent, though there is possibly a substantial Earlier Mesolithic burial deposit from the

Mendips (Jacobi pers. comm.).

## 2.2. The Earlier Neolithic

The general characteristics of the Earlier Neolithic of the British Isles are well known. Flint assemblages include narrow flake production, many scrapers, and leaf-shaped pressure-flaked arrowheads. Axe blades were made of flint and other hard stone, and were produced in quantity at mines and other sources, and circulated over large distances; chipped flint axe blades do not show *tranchet* edges. Other materials including Beer flint and Portland chert were circulated in the south of the country. Round-based pottery styles were everywhere in use, with regional variations in form and decoration. Forms included cups, bowls, carinated bowls, and jars. Outturned and otherwise emphasised rims were not uncommon. Decoration was generally horizontally zoned and restrained, consisting of impressions and incisions on the rims and upper parts of vessels, and is absent from much of south-west and northern England.

Numerous sites are known, apart from the larger quantity of stray finds. Domestic sites are not large and generally without substantial stratigraphic build-up. Many are defined merely by spreads of artefacts, some by the presence of pits and post-holes, and a few by the presence of discernible structures, usually rectangular post-framed buildings of modest size, between 6 and 12 m in length. These latter appear to be found singly. A pattern of dispersed homesteads and hamlets may be suggested. Finds have been recovered over wide areas of the landscape, and the environmental evidence culled by pollen and molluscan analysis suggests the use also of much of the landscape. An interesting example is the late fourth millennium wooden trackway, the Sweet Track, set across the fen of the Somerset Levels (Coles and Coles 1986). It may be, however, that greater densities of settlement are to be found in lowland parts, with only occasional or seasonal use of uplands. This remains to be established in detail. Some river valleys have less identifiable settlement than might be predicted, such as the Upper Thames valley (Bradley and Holgate 1984), and specialised extraction sites, both in the lowlands and in the uplands, have yet to be recognised on any scale. Individual settlements may have been short lived within zones of more permanent settlement. From the Midlands southwards there is a series of ditched enclosure sites (with so far only one or two more northerly outliers); in the south-west there is a complementary series of stone walled enclosures. The ditched enclosures have from one to four interrupted ditch circuits, some with more continuous internal banks and occasionally palisades. Some may have presented formidable barriers. Their sizes and locations are extremely varied, from the massive chalk downland site of Hambledon Hill in Dorset (Mercer 1980) to the more modest single circuit of Etton, Cambridgeshire on the edge of the East Anglian fens (Pryor *et al.* 1985). Activities at these sites were also very varied. They may have included domestic occupation and subsistence organisation, but also feasting, depositions, exchange, ritual and burial. Some were short-lived, others remained in use for long periods; some may have been specialised sites, others places of varying role, the greater the number of these indicating perhaps the greater the social importance of the occupants or users.

Subsistence seems to have been based on mixed farming. Pollen and molluscan analysis indicate widespread forest clearance, though the extent and permanence of this may have varied considerably both locally and regionally. A degree of mobility could have been a feature of the early stages of the Neolithic. Both impermanent and permanent land boundaries defining plots and land holdings may be a feature of the Earlier Neolithic. There are stake lines under barrows, and western Irish stone wall systems may go back this early (Caulfield 1983). Major staples were wheat and barley, cattle, pigs, sheep and goats, of which the cereals and the ovicaprids had to be imported by someone at some stage. The use of fish can be documented at coastal sites, such as Knap of Howar in the Orkneys (Ritchie 1984). Less obvious resources such as honey can also be documented by chemical analysis of food residues in pottery (Needham and Evans 1987). Much research remains to be done on the detail of resource use, and the balance and especially the scale of agricultural production are unclear. It may be suggested that many sites were not wholly self-sufficient but part of wider networks, and that the scale of production was regularly far beyond that of mere subsistence. One example is the possible emphasis on dairying in the cattle husbandry at Hambledon Hill. The picture may have been rather different in the earliest stages of the Neolithic.

Many burial sites or at least sites with burials are known. Some enclosures have more and less deliberate depositions of human remains in their ditches. Small pit graves are known, as at Pangbourne or Fengate (Pryor 1976). There is the well known series of barrows and cairns, which incorporate various wooden and stone structures housing inhumed and cremated remains. There is considerable regional variation in the form of monuments, and in the sequence of their construction. Some megalithic monuments may be gradually expanded and take in earlier smaller versions, but many appear to have been built in one go and to have thereafter remained accessible. In the earthen long barrow tradition mortuary structures and enclosures could precede the final mound construction. The number of burials varies, from few to many. Burials may be simultaneous or successive, direct or secondary reburials, whole bodies or incomplete skeletons, articulated or disarticulated; there may be secondary sorting and even circulation of bones, and attention was often paid to age, sex and body part in arrangements of bones in chambers and structures. No simple or single role or meaning may be attached to these burials and structures, but it may be suggested generally that the importance of the dead for

the living was considerable; ancestry may have been a major way in which cosmological and practical order was achieved and maintained. It is tempting to see a causal relation between this feature and the development of a more settled agricultural landscape.

### 3.3. Latest Mesolithic and earliest Neolithic ?

These brief sketches serve to outline the nature of gross change, but over a considerable timescale. The Earlier Neolithic picture in particular may relate to a period considerably after the introduction of agriculture. In seeking to explain the transition from the Mesolithic to the Neolithic in the British Isles it rapidly becomes problematic to know just where in time the transition falls. It has not so far proved possible to identify with any clarity the latest Mesolithic and earliest Neolithic cultural repertoire. One may suggest that success may come through the continued study of microlith styles, but so far pottery and other Neolithic traits seem little amenable to fine seriation within regional zones and sequences. This must be a goal in future research.

A fallback position is to consider the radiocarbon evidence. This has now to be done in the full realisation that conventional or routine dating is imprecise, that many older samples were not carefully collected or examined for possible sources of error, that dates should be expressed at two rather than one standard deviation, and that the calibration curve for the fourth millennium b.c. has many wiggles in it (Pearson *et al.* 1986). The method is therefore a somewhat blunt instrument for fine dating of such a transition as that under discussion. There are tens of relevant dates, from domestic sites, burial and ritual sites and from environmental sequences, such as peat profiles. The former two categories indicate that the transition lies somewhere in the fourth millennium b.c.; the latter category is compatible with this. The great problem is to know where the transition lies, and whether this varies regionally. There are some Mesolithic dates from the fourth millennium, but these are scattered in time and do not prima facie indicate strong continuity; they are also scattered in space and indicate more activity in the north and west of the country (see the list in Zvelebil and Rowly-Conwy 1986; also Williams 1989). Individual samples must also carefully be scrutinised. Thus the late fourth millennium date from the Kennet valley site of Wawcott I (Froom 1976) may be from charcoal unconnected with the Mesolithic artefacts in question, and samples from rock shelters in the south-east may have suffered contamination by movement through sand. There are equal problems on the Neolithic side. Two options are available. At first sight the bulk of dates appear to begin from about 3500 b.c., and it is possible to try to push back beginnings a little earlier (Whittle 1977), relying on occasional sites with earlier dates such as Ballynagilly in Co. Tyrone, northern Ireland (ApSimon 1976) and on the pollen evidence for slight vegetational disturbance in the earlier fourth millennium also (Smith 1981; Pilcher and Smith 1979). From this point of view the appearance of the Neolithic is widespread and rapid. On the other hand individual dates must be scrutinised. Thus the early archaeological dates from Ballynagilly for example might be from old charcoal and not directly related to subsequent depositions of Neolithic artefacts; the date from the Lambourn long barrow might be affected by hard water contamination (Waton 1982). In this way it would be possible to depress the archaeological dates for the reliable beginnings of the British Neolithic to about 3300/3200 b.c. (Kinnes 1985). It is not plausible to depress all the dates from peat profiles showing earlier fourth millennium b.c. vegetational disturbance but the later starting date would coincide with the major phase of clearance seen in dated pollen diagrams in the later fourth millennium b.c..

It is simply not possible to decide between these competing possibilities in the present state of information. It will be necessary to discuss models with alternative chronologies in mind. What does become likely from the current state of the radiocarbon evidence, even taking the calibration curve into account, is that there may have been in most areas a rather short period of transition, whatever the processes and mechanisms involved. This is compatible with the considerable changes in artefacts and other cultural traits, and the lack of mixed assemblages. It is also compatible with the lack of evidence for stratigraphic superimposition or continuity between Mesolithic and Neolithic. Rather few sites have both Mesolithic and Neolithic artefacts on them. A characteristic situation is the Neolithic open site or enclosure with a few identifiably Mesolithic artefacts, usually microliths, in a large flint assemblage. The presence of Neolithic flint on Mesolithic sites is far rarer. In eastern Ireland there is also little evidence for transition (Woodman 1976,1978). On the coast at the sites of Dalkey Island and Rough Island flint assemblages identified as late Mesolithic (with Bann flakes) have been found in beach deposits later than material identified as early Neolithic. Inland in the Bann valley close to the head of Lough Neagh Mesolithic flints of similar type were found with Neolithic pottery; the context may or may not be disturbed. Elsewhere the only other regular candidate for some kind of close relationship has been in the soils buried by Neolithic barrows and cairns. Three recently excavated Cotswold-Severn tombs of the type with lateral entrances, Ascott-under-Wychwood, Oxfordshire, Hazleton, Gloucestershire, and Gwernvale, Powys (Benson and Clegg 1978; Saville 1984; Britnell and Savory 1984) have all yielded Mesolithic as well as Neolithic flints from the pre-cairn soil. The fact that the tombs are all of the same type might encourage the view that these are of the same, perhaps early date, and even the possibility of a direct causal link between Mesolithic activity and the choice of site for Neolithic monumental constructions. However, the chronology of such pre-barrow situations remains to be unravelled in detail, and more indirect causes of juxtaposition can

be envisaged, such as the existence of old clearings. The only other likely example of chronological overlap comes from western Scotland, and is suggested, somewhat indirectly, by the radiocarbon evidence. In this area there is a series of coastal shell middens. The group recently researched on the island of Oronsay date from the late fifth to the late fourth millennium b.c. (Mellars 1987). The latest dates are therefore at face value later than the possible beginnings of the Neolithic in Scotland and neighbouring Ireland. Mesolithic continuity might here be explained in terms of the remoteness of the area or of the suitability of traditional practice to the terrain and available resources. It is worth pointing out, however, that there are few artefacts deposited at such shell middens, and it would not be impossible for traditional practice to continue on outlying islands, perhaps on a seasonal basis, after the introduction of agriculture on the mainland and other islands. These exceptions are important, but the apparent general rapidity of change is surely significant for the discussion of process.

One major **caveat** must be entered. Discussion at present is limited to those areas and sites which have remained archaeologically visible and accessible. It is well known, however, that there has been isostatic land recovery in the west of the country and a combination of sea level rise and land sinkage in the east (Tooley 1981). At face value therefore it is perhaps not surprising that such late Mesolithic sites as have been dated do come, as described above, from the north and west of the country (Bradley 1984). It is easily appreciated that relevant fourth millennium coastal deposits in, for example, the south-east of England should now be several metres below sea level, variously scoured by tides and covered by other deposits (Devoy 1980). It is unlikely that the conditions exist in which to emulate the recent achievements of Danish underwater archaeology and to recover sites like Tybrind Vig and Argus. Sea level change will also have affected the regime of alluviation in lower river valleys, affecting in turn the visibility there of late Mesolithic and early Neolithic sites. One significant example is Runnymede, near Staines in Middlesex, where the Earlier Neolithic occupation was separated from Bronze Age occupation by sterile alluvium (Needham 1985). The general pattern of early Neolithic activity in the lower Thames valley appears to be valley-centred (Needham and Trott 1987), and there can be no doubt that other important sites remain to be unmasked. It is therefore in the present state of information very difficult to estimate whether one should predict the existence of numerous Kongemose- or Ertebølle-style coastal settlements in the south-east, and such an uncertainty is a serious loss to the discussion of process. Despite this, it has to be recognised that coastal change does not affect the survival of hinterland sites, equivalent for example to Ringkloster in the Ertebølle culture. Such could potentially be located and identified as specialised sites even in the absence of coastal survival. Little work has been done on this problem. Lower Halstow in Kent may be one candidate for such status, though earlier explorations there leave much to be desired (Jacobi 1982). Coastal survey in the Blackwater estuary of Essex may also prove to be relevant (Wilkinson and Murphy 1986).

### 3.4. Mesolithic process: an environmental approach

The poverty of the British evidence should by now be all too clear, but it is worth comparing the possibilities outlined in the first part of this paper with the situation in different environmental zones, since it would be a mistake to assume that similar processes were at work everywhere. This will be done first from the point of view that Mesolithic communities were responsible for the introduction of agriculture into the British Isles. It is also important to keep chronological possibilities and problems firmly in mind. Four main environmental zones may be discussed: major estuaries; other coasts; inland lowlands, including river valleys; and uplands.

For the reasons discussed above, it is not possible to offer much discussion of the late Mesolithic situation in major estuaries such as that of the Thames. On grounds of environmental similarity, it might be possible to envisage similar development to that in eastern Jutland and Zealand, where coastal sites can be seen from at least the fifth millennium b.c., and where a degree of stability of settlement may have been attained in the fourth millennium. The other obvious analogy, even closer to hand, is the Ijssel estuary in the Netherlands. Such coastal communities could have either resisted the introduction of agriculture until alterations in their own resource base made it necessary, as has been argued in Denmark (Rowley-Conwy 1984), or because of their sea-going capabilities, been well placed to acquire valuable new staples if they were under any kind of pressure from population or resource supply or wished for other reasons to reinforce an increasingly sedentary way of life. The situation is purely hypothetical, but one might predict nonetheless that there would be some sort of concentration of early Neolithic activity around previous centres of this kind, and this at least does not seem to be the case.

Around other parts of the coast there are more certain signs of Mesolithic presence. Sites such as Culver Well, Portland, Dorset (Palmer 1976); Westward Ho!, Devon (Churchill 1965); Freshwater West, Dyfed (Jacobi 1980); Eskmeals, Cumbria (Bonsall *et al.* 1989); or Dalkey Island, Co. Dublin (Liverage 1969; Woodman 1978) can all be dated to the Atlantic period and mainly to the fifth millennium b.c.. As far as can be seen a wide range of resources were exploited on the coasts, including fish and shellfish, but also terrestrial mammals. Sites were on the whole small, though some have some degree of stratigraphic build-up. There is insufficient evidence on which to judge, but it is likely that sites such as these were only seasonally occupied. It has been suggested that they were part of a wider network of mobile settlement which included sites in adjacent

inland areas, both lowland and upland (Jacobi 1980). These latter will be discussed in a moment. Coastal sites of this kind do not offer any easy clues as to social process. The most that can be said perhaps is that in situations of change, whether due to problems of resource procurement or supply or to increased desire for sedentary conditions, sea-going communities would have been well placed to learn of and to acquire new staples such as cereals and ovicaprids. Their acquisition might subsequently engender further rapid change, since cultivation and settlement mobility are not easily combined. Most of the sites with early fourth millennium vegetational disturbance and claimed early cereal pollen are in coastal or near coastal locations (Edwards and Hirons 1984). One example is Cashelkeelty, Co. Kerry, in the south-west of Ireland (Lynch 1981). The juxtaposition of Neolithic burial monuments on the western seaboard is also consistent with this sort of beginning, though it by no means proves it.

The Oronsay sites belong mainly to the fourth millennium b.c.. Their continuity serves to remind us that not all coastal communities need be seen as involved in the process of change, even if the arguments for a Mesolithic role are accepted elsewhere. It is possible that these sites too were part of wider networks of mobile settlement, but the surprising result of seasonal analysis of fish bones has been the number of different times of the year during which people were out on Oronsay. Only late winter and early spring are unrepresented, though it remains to be seen whether there was continuity through the year at all times, or whether in any one year there were in fact only sporadic visits to the island.

Lowland and upland sites inland can perhaps best be discussed together. There are numerous Later Mesolithic sites in these zones, though few are well investigated or closely dated. Sites on the whole seem to have been small and not occupied for long periods of time (Mellars 1976b). Seasonality is not well established, since the quality of faunal assemblages is abysmal. Upland sites may be presumed to have been occupied in summer, but lowland summer sites are quite possible as well. Reexamination of Star Carr in the Earlier Mesolithic has clearly demonstrated this (Pitts 1979; Legge and Rowley-Conwy 1988). As another gross generalisation it may be suggested that the pattern of settlement was again mobile in many areas. This may have been combined with a degree of resource control, of the kinds outlined in the first part of the paper. There is sporadic evidence for forest disturbance of some kind in the Later Mesolithic, and many examples come from upland situations (Simmons *et al.* 1981). A connection with hunting or herding strategies is plausible (Mellars 1976a). Clearance serves to increase the amount of browse, and therefore helps to control the movement of animals. Unexpectedly high counts of ivy pollen at Oakhanger, Hampshire, are also suggestive of the provision of lures or even fodder for the same motive (Dimbleby and Simmons 1974). This evidence helps to suggest an ordered structure to mobile settlement rather than more settled existence.

Pollen evidence from the early fourth millennium b.c. is also relevant. At this date there seem to be more widespread signs of vegetational disturbance, involving some reduction in tree pollen and an increase in grasses and herbs, and these have been noted from south-west and northern Ireland, north-west England, and East Anglia, mainly from inland situations, both lowland and upland (Simmons *et al.* 1981; Smith 1981). Thus pollen sites in Cumbria are in the coastal plain, while those in northern Ireland are from both lowland and upland in the interior of the region. There are the familiar problems of pollen catchment to consider. The size of these disturbances is also hard to estimate, though it has often been noted that very small clearances are not likely to register at all in regional pollen rain due to the blocking effect of the forest canopy itself. These clearances could be seen as part of some sort of intensification or change of traditional Mesolithic practice, for the sorts of motive already discussed.

If the Neolithic is seen as beginning in the earlier fourth millennium b.c. from a Mesolithic background, it is naturally of the greatest interest that with some of these clearances has been claimed the presence of cereal pollen (Edwards and Hirons 1984). If valid this would show an early use of a staple presumably acquired from elsewhere and the early presence of agriculture. However, the presence of cereal pollen does not establish the identity of its cultivators. There is also the problem of its identification, which is relevant to both sides of the argument. It will be necessary for further analysis to discriminate between cereal pollen and large grass pollen, because the two overlap in size. It may also be noted that cereal pollen has poor dispersal. Two of the sites from which early fourth millennium b.c. cereal pollen has been claimed are in upland situations, Ballynagilly, Co. Tyrone, in northern Ireland, and Soyland Moor, West Yorkshire, in the central Pennines (Edwards and Hirons 1984). On the grounds of cereal pollen dispersal, such claimed cultivation would have to have taken place close to the sampling points, but an upland situation like Ballynagilly is not an obvious candidate for early experiments with cultivation. It also has to be recognised that disproving these particular claims would not remove the possibility of cereal cultivation elsewhere. Ideally pollen analysis should be carried out very close to a securely identified and dated early Neolithic occupation site.

If this evidence is discounted, it does not remove the possibility of other forms of change and experimentation in the earlier fourth millennium b.c., nor the possibility of a major phase of indigenous change centred in the later fourth millennium b.c., finding expression then in the pollen diagrams in the major clearances documented at that point.

There are at the present time no compelling empirical grounds for accepting any of these Mesolithic hypotheses. The argument from the rapidity of change

may work against the Mesolithic case, though in the discussion of acculturation models above circumstances in which rapid change could take place were considered. Indigenous change might well be expected to be involve at least some cultural continuity, and to have proceeded at different paces in the different environments outlined. However, if the transition does prove to be later in the fourth millennium rather than earlier, the case for Mesolithic acculturation becomes stronger. A final chronological variation should be noted (Thomas 1988). It is possible to suggest the beginnings of experimentation by Mesolithic communities with sedentism and cereal cultivation in the early fourth millennium b.c., using the sort of evidence already outlined, but a delay until the later part of the millennium of a shift in the material expression of cultural identity. Yet this assumes a rather simple separation between economy and culture, and leaves unexplained the mechanism whereby after a long period of cultural separation from the continent communities in the British Isles should realign themselves with the continent. There is perhaps a case to be made for the convergence of culture in regional systems of interaction (Bradley 1984), or for simple imitation (Ashbee 1982), but it is for the time being a difficult argument.

### 3.5. Neolithic process: the case for expansion and cultural change

If the Neolithic is seen as beginning in the earlier fourth millennium b.c., there is a good case for attributing this to colonists to a greater or lesser extent. Symptoms of change would be as before, but the identity of the protagonists would change. Thus of relevance are early signs of forest disturbance, with or without discernible cereal pollen; such early dated archaeological sites as Ballynagilly; the bulk of archaeological dates suggesting an established Neolithic presence from approximately 3500 b.c. onwards; the mass of dated pollen evidence, subsuming the infamous elm decline, for sustained clearance by the later fourth millennium b.c.; and the cultural changes in pottery, lithics, houses, monuments and the rest. Some comments are in order on each of these factors before discussing the wider process of Neolithic expansion in Europe.

Pre-elm decline clearances could be appropriate to pioneering agricultural activity. Not all clearance need be connected with cultivation. There could be an overlap with Mesolithic practice, and pioneer farmers might well be preferentially attracted to areas of active Mesolithic clearance or of lighter secondary forest in regenerated or regenerating clearances. The argument over identifiable cereal pollen can be left open. The early presence of cereals may well support the case for colonists, since despite the logistical difficulties of movement (Case 1969b), they would be better placed to initiate such cultivation than indigenous inhabitants. As noted before, the absence of definite cereal pollen from diagrams does not remove the possibility of its cultivation, in view of its poor dispersal.

The dates from Ballynagilly remain controversial, and its upland setting is surprising for a pioneer settlement. Yet three points need to be made about the site. The dates from it do form a coherent series, the composition of samples was carefully assessed (ApSimon 1976: 23), and the site and the pollen dates (Pilcher and Smith 1979) also conform to give a coherent picture of early beginnings and subsequent development. Thus the earliest dated features are two pits and a hearth (ApSimon 1976: 20), while from the later fourth millennium b.c. comes a modest-sized timber building; these conform with the early and main clearance phases respectively. Secondly, the limited extent of early features could be compatible with pioneering levels of population. Thirdly, the upland setting may demonstrate the extent of Neolithic penetration from the outset. Even if the site is to be seen as a specialised, seasonal camp, it gives some measure of the extent to which traditional indigenous practice could have been disrupted by pioneering farmers with competing needs for space and resources. Alternatively, competition itself with native populations could have served as a mechanism of wide dispersal, and it was noted earlier how late Mesolithic communities in northern Ireland seem to concentrate on the rivers and coasts of the region.

While individual dates can and should be scrutinised, it is hard to talk away the whole dating evidence for an established later fourth millennium b.c. Neolithic presence, including open sites with pits and occasionally houses, trackways involving substantial forest clearance and timber use, enclosures and burial monuments. The weight of the pollen evidence for clearance is impressive too, especially if we go back to the point that small clearances would hardly be detectable in diagrams anyway. That is not to say that many problems do not remain. The elm decline itself is seen increasingly as non-anthropogenic (Groenman-van Waateringe 1983), and the size and duration of clearances are hard to establish.

The cultural makeup of the Earlier Neolithic is of interest too. While arguments for borrowing or imitation by native communities have been presented, it remains the fact that there appears to be very little continuity of Mesolithic tradition into Earlier Neolithic assemblages, as outlined above, and there is by contrast a ready-made continental repertoire of pottery styles, lithic styles, domestic architecture, burial monuments and ditched enclosures which could have been drawn on by immigrant farmers. The obvious problem has been that it is not possible to point to any single source area. This requires discussion below of the process of cultural change during colonisation, but should not obscure the continuity of sorts offered by the case for Neolithic colonisation.

The possible cross-Channel colonisation of the British Isles needs to be seen in a broader context of

the spread of agriculture across Europe. There seems little doubt that population movement and expansion were major factors in this process, although from region to region there are detailed problems of explanation. Thus debate over the extent of indigenous contribution recurs right across Europe (Whittle 1985). There are four important observations to be made. Neolithic expansion was not made at a steady rate. There may have been pauses, such as in the northern part of the Balkans in the earlier fifth millennium b.c., and there certainly seem to have been periods of increased acceleration, such as in the initial spread of the LBK in central-west Europe in the mid fifth millennium. Secondly, the explanation of this may be twofold: a combination of population behaviour, and local circumstance including the attitude of native communities. In periods of rapid spread, restraint on population increase may have been reduced, and native reaction or resistance decreased or minimal. In tha case of the LBK, it is unclear anyway whether there was a significant Mesolithic population already in the loess areas, and the relative emptiness of the niche to be filled may have encouraged rapid population increase as well as geographical spread. The circumstances of the 'takeoff' remain obscure. Thirdly, while native communities may in some cases have been avoided, they were normally part of the situation, and may regularly have suffered either disruption or rapid assimilation (Whittle 1977). Finally, expansion was not geographically even. Many areas were only settled as part of a process of secondary infilling. Colonisation can therefore be a selective process, and it would indeed be surprising if pioneers did not seek to replicate preferred conditions.

Turning to north-west Europe, it can be seen that there has been much emphasis recently on the slowness with which agriculture was established in Denmark and the rest of southern Scandinavia, in the late fourth millennium b.c., compared with the start of the LBK in the fifth millennium on the loess only a few hundred kilometres to the south (Rowley-Conwy 1984; Zvelebil and Rowley-Conwy 1986). Explanation of this has been in terms of Ertebølle resistance to agriculture. Whatever the merits of the arguments in the Danish case, it might be possible to extrapolate from it to the situation in the British Isles, but in view of the points just made above this would be unwise. There is in fact wider continental evidence to take into account. In Schleswig-Holstein itself just to the south of Denmark, there is evidence for more complicated and earlier change, in the mid fourth millennium (Schwabedissen 1981; Meurers-Balke 1983), involving perhaps both colonisation and acculturation. Sustained native resistance can therefore be seen as only part of the situation. On a wider scale too, it is clear that there was considerable secondary expansion after the initial LBK colonisation of the loess in the fifth millennium. The LBK of the Paris Basin, which begins perhaps in the late fifth millennium, can be seen as part of the same process (Ilett 1983), and other ready examples come from Switzerland at the south end of the Rhine, and from the north European plain beyond the loess, both colonised in the fourth millennium. The range of soils available in the Paris Basin and in the British Isles may have been more favourable and desirable than that on the westernmost loess and to its north (Langohr and Sanders 1985; Langohr this volume). Some of the western loess may have been relatively poor, and sandy and clayey soils to the north would be inferior to gravel and chalk soils. Outwards expansion can also be seen in conjunction with evidence for internal change and the beginnings of secondary infilling (Whittle 1977). Thus in the Rhineland, LBK dispersed homesteads are replaced by Grossgartach and Rössen nucleated hamlets (Schwellnus 1983; Dohrn-Ihmig 1983), and there are the beginnings of moves out of the river zones preferred in the LBK phase. However, it must also be recognised that there may be phases of hiatus in such local sequences, and further east at any rate (in the Halle area) there are signs that settlement sites declined in number in the Rössen phase (Starling 1983). Analysis of the later part of the post-LBK sequence is hampered by archaeological visibility. On the Aldenhoven Platte it is clear from pollen analysis that there was considerable Michelsberg activity in the later fourth millennium, but there are few archaeological traces (Schwellnus pers comm). Changes in house construction must be at least partly responsible. In the Paris Basin, change can be seen by the Chasseen phase of the later fourth millennium in the appearance of sites on the edge of the interfluves (Ilett 1983).

The best argument for colonisation of the British Isles is therefore to be set in the earlier fourth millennium, in a phase of change in the British Isles as documented in pollen and other evidence set out above, and in a phase of demonstrable settlement change on the continent, from which fissioning would be plausible. The chronology of Danish development is irrelevant if colonisation was selective. The advantages of the British Isles were manifold (Whittle 1977), and their early uptake easily understandable in the light of possible motives and conditions discussed above. Theoretical discussion has shown that even a fairly modest rate of population increase will result in significant growth in a short space of time (Hamond 1981), and as with the LBK on the loess the colonisation of the British Isles, combined with perhaps some measure of competition from native communities, could have led to wide and rapid spread of population.

Older comparisons of cultural content sought continental sources in the TRB-Michelsberg-Chasseen horizon of the later fourth millennium (Piggott 1955). There are certainly comparisons to be made here of pottery, lithics, burial monuments and enclosures. It is, however, possible to raise all these comparisons chronologically into the post-LBK horizon of the earlier fourth millennium (Whittle 1977). These general arguments are well known, and there is little point in rehearsing the details. Of greater interest are the claims for the colonisation of the British Isles in a period of

general cultural re-formation in western Europe, and the selective nature of the British re-formation in particular. As we have noted earlier, the specific degree of material continuity in colonisation must have much to do with the conditions under which colonisation was carried out. The eclectic nature of the emergent British cultural repertoire is puzzling in terms of exact sources, but may be highly informative about the nature of colonisation. It may suggest that this was carried out by fragmented social groups in a process of fissioning, that there was no sustained cohesion during colonisation, and that from an early date new regional identities were formed within the British Isles which may at least in part have drawn on existing Mesolithic regional patterns, indicating the extent of assimilation of native by incomer, and *vice versa.* The scale of individual movement may have been considerable, and it is by no means impossible that developments in the architecture of burial monuments on the north European plain and in southern Scandinavia were influenced by the existing repertoire of the British Isles.

Note has finally to be taken of the argument for a late start to the British Neolithic, by the process of colonisation. Such low dating would come from review of the radiocarbon evidence, as noted above. The same sorts of argument from settlement change and cultural change could be applied, but in my opinion less convincingly. Outwards expansion seems to precede sustained internal infilling, and there is no compelling reason to seek artefactual resemblances in Chasseen, Michelsberg or TRB traditions. If the British Neolithic does turn out to have begun as late as the late fourth millennium b.c., we are back perhaps with the arguments for native acculturation, and in turn with the problems of native continuity during the rest of the fourth millennium.

## Conclusion

No easy conclusion is to be drawn from the British evidence at present. It has been important to outline some of the competing theoretical possibilities against which future results may be judged, but actually setting the various models against the data has been disappointing. Neither the date of transition nor the nature of communities during transition are well known. Both the earlier and the later fourth millennium are presently under discussion. Many hunter-gatherer communities may have been seasonally mobile, but the situation is not known in major estuaries. Early farmers were widely dispersed, and perhaps best fit the second model outlined above, of some mobility and diversity within stable zones of settlement. A case can be made for rapid native acculturation in the earlier fourth millennium, though there is little sign of native cultural continuity thereafter. Reasons for such a transition cannot be documented, but could range from the avoidance of resource imbalance to the deliberate intensification of production. A case can also be made for colonisation in the earlier fourth millennium, which takes into account the continental situation, the apparent rapidity of change, and the cultural repertoire of the Neolithic. Varied motives may be considered, from the relieving of population pressure on the continent to the active seeking out of favourable conditions for expansion. It is not possible in the present state of the evidence finally to choose between these various competing possibilities. It can also be argued that the Neolithic began in the late fourth millennium. This appears to me to be a weak case, because of the lack of evidence so far for Mesolithic continuity in most areas through the fourth millennium, but if it proves to be valid, then the argument for acculturation is stronger than that for colonisation at that date. There could be a case for economic and cultural developments having taken place at different dates, but there is as yet no specific evidence for this.

Much further research is needed, and the outlook is unfortunately gloomy. Key sites of the right date will be hard to locate in river valleys and estuaries, and the funding of problem-orientated research is not easy. We may have to wait patiently for chance discoveries of the appropriate kind.

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*Alasdair WHITTLE,*
*School of History and Archaeology,*
*University of Wales College of Cardiff.*
*Great Britain.*

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