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The History of European Agriculture -- The Uplands

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The history of European agriculture – the uplands

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The history of agriculture is better understood by placing agriculture in a broad theoretical framework and in the context of other economies. Economies are classified according to the economic niche they occupy. The territorial concept is adopted in order to estimate their potential. Patterns of exploitation can be seen in the prehistoric record. It is believed that in this way we are more able to understand the history and the consequences of land and resource utilization.

In the past studies of prehistoric agriculture have largely been secondary to the interests of art history and artefactual styles. To these have been added conclusions derived from disciplines centred upon vegetational, climatic and animal and plant history. We have questioned elsewhere (M. Jarman, this volume) interpretations of past human behaviour which have been derived from disciplines centred upon other interests. An approach centred upon man and those aspects of his behaviour which can be more easily investigated by scientific means is more helpful. It is also necessary to place agriculture in the context of other subsistence economies (Higgs 1974).

Our concern is with the long term trends of five hundred to a thousand years or more. Archaeology has many such periods and its special quality is its perspective in time. Briefer episodes will need to be related to long term trends but need additional but subsidiary hypotheses.

The primary forces selected for study are the relations between populations, resources and technology through time. Unlike many other factors they can be investigated satisfactorily by using data from archaeological sites.

Populations

Bearing in mind the potential of the geometric rate of increase inherent in animal populations, human populations are taken to tend to increase in the long term. There were periods and places in which some populations grew beyond the level which could be maintained with the technology of the time and were then sharply reduced or dispersed. These exceptions are of special interest.

Held up by the technology of the time, populations do not tend to increase in a steady upward curve but in a series of steps.

From this it was concluded that inhabitable but supposed empty areas would usually prove to have been inhabited and that in the long term where there was a viable economic niche available, it is expected that it would have been filled. Sometimes mountain areas appear to have been uninhabited because in archaeology sites are usually valued according to the quantity or quality of their artefacts and in mountain regions they appear to be few and insignificant. But mobile economies make very few artefacts. Many of their sites are therefore trace sites but they are an important part of the evidence. We found numerous trace sites in such areas almost

wherever we looked. Some of them were known but had been overlooked in the records and some were previously unknown.

Sites have therefore been divided into preferred sites with repeated or prolonged occupations and transitory or trace sites. There are of course other sites which are not directly related to economic purposes.

Resources

Our concern is primarily with staple foods.

Resources are distributed so that effort is required to bring them together into economic units. A principal deterrent to this integration is the distance factor. This can be estimated by considering the distance resources are from the site (the consuming centre), or better still, by estimating the time taken to transport the resources over that distance for in this way impediments to movement are taken into account.

Resources are called complementary if by bringing them together higher populations can be maintained than would otherwise be possible.

Resources may be regarded as having an economic reach. They attract consumers to them. Summer mountain resources, for example, draw in populations from the lowlands. If the uplands are rich and the nearby resources are comparatively poor, the reach will stretch over them and gather from further away. If the distance apart is great transhumance may result. If they are balanced and the distance apart is small, transhumance will not arise and livestock transference where most of the animals move but most of the humans do not, is likely to take place.

Technology

As the amount of the resources, particularly that of the necessity least available, is the ultimate factor limiting human population, if populations are to increase, they must overcome this limitation. This can be done by lifting the resource ceiling either by

(*a*) increasing the extractive capacity at a particular place by developing the technology, or by

(*b*) increasing the site's economic reach by overcoming, by technology, the distance factor, that is, the time taken to bring together resources to consuming centres in, for example, the form of controlled animal adaptations, roads and aqueducts.

Economies – the means by which resources are exploited

They can be conveniently divided into those which are:

(*a*) Economic niche I, sedentary. The site is fully occupied all the year round.

(*b*) Economic niche II, mobile cum sedentary. For example the economic unit has tillage on the lowlands and transfers livestock to the adjacent hills or rough pastures.

(*c*) Economic niche III, mobile. Groups move from place to place over the year integrating resources distant from each other. Examples, pastoralists, hunters and gatherers.

These elements form the components of an overall system of exploitation (Higgs 1974).

Exploitation patterns

We are aware from ethology and anthropology of the tendency for resources to be exploited both by animals and by man in an orderly fashion. Was there such a pattern in the long term in antiquity and can it still be observed? Such patterns if they existed would have been based

on resources distribution largely undisturbed by monetary systems. The nature of the resources and their distribution are a directive upon social systems and economies.

Figure 1 illustrates an exploitation pattern at its simplest where all economies are mobile, as in Europe they would nearly all have been before crop agriculture. In group 1 they move from shore to hinterland. Group 2 integrates resources within the plain. Group 3 relates lowlands to adjacent foothills and group 4 integrates the most distant resources with those complementary in the lowland. There will be lateral movements based on the same principles of resource integration. Together they form the total gross exploitation pattern. Rarely in Europe, seasonally wet and dry areas with complementary resources, will be similarly integrated. Groups 3 and 4 are the interest of this paper.

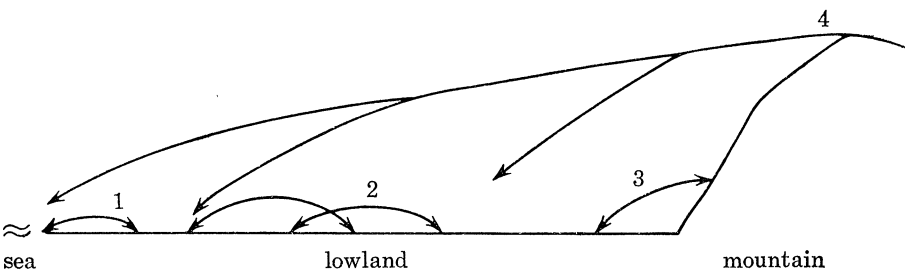

FIGURE 1. Exploitation pattern with mobile economies.

TERRITORIAL ANALYSIS

First we have to assess the economies practised at individual sites in order to see their place in the pattern. Ethological and anthropological studies can help, for all animals have it in common that they exploit resources. They can provide a range of behavioural forms from which to choose. How far factors held in common by animal and human populations can be profitably studied, is worth further consideration. We know, for example, that with animal dependent economies the animals and the men must have in common a way of life which is at least tolerable and at best advantageous to both species and each is a guide to the other. Again, some birds migrate regularly, some occasionally and some not at all. The same may be said of men. The former is said to be by reason of instinct, the latter by cultural choice but the result is similar. The consideration of one may help the consideration of the other especially as the best known long term record of the behaviour of any species is that of man.

I have no hesitation in using as a guide the zoological concept of territory as used by Darling (1937) and Jewell & Loizos (1966). It does confine investigations to a manageable and highly relevant area from which the subsistence was probably obtained. There are known exceptions to this, but they are uncommon and on our time scale usually do not long survive.

The alternative broader allocation of sites to climatic or vegetational zones is of coarser value. The zonal criteria are not based on human needs. In consequence a site is commonly in a situation which, with subsistence in mind, is atypical of the zone to which it has been allocated. In a forest a human group, for example, may seek to exploit the open spaces, or in a desert, places which have water. The best economic and not the zonal average situation was sought. Sites are commonly placed at the junction of environments, in economic ecotones, rather than in a uniform environment. What I am suggesting is a more refined and precise evaluation for our man centred study (Higgs 1972).

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Territory is for archaeological purposes defined as the area habitually exploited. Defence is not implied. Occasional forays outside it are ignored. Carr Saunders in his exhaustive studies in world populations could find no true wanderers. Their position, as witness the common fate of the territorial animal without a territory, is too vulnerable to be maintained in the long term.

The area and the resources exploited may be expected to change as the technology changes. Human technological change moves more quickly than slow physiological animal change.

Mobile economies

Hunter gatherer groups in a uniform accessible habitat commonly exploit habitually an area within say 10 km of their base. It is too uneconomic and therefore in the long term too vulnerable to do otherwise. This area is best measured by the time/distance factor, the time taken to traverse the distance involved. Two hours' walking time gives a reasonable estimate.

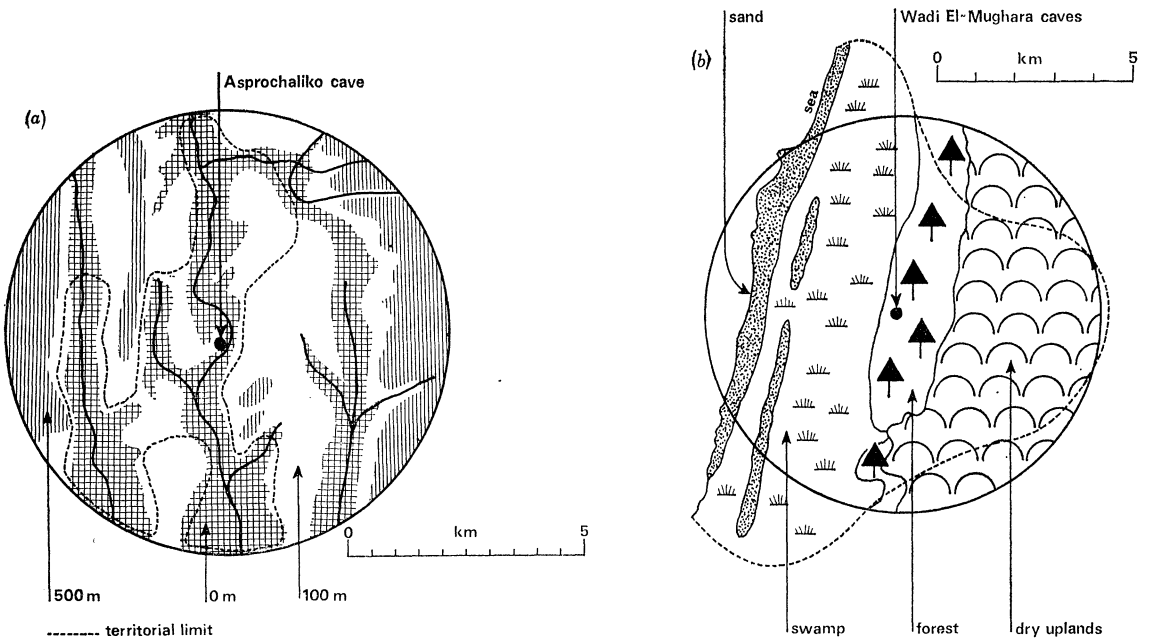

FIGURE 2. (*a*) The territory of a Palaeolithic cave. Its limits are indicated by the broken line. (*b*) A cave site in an economic ecotone. The inhabitants exploited a variety of environments.

Figure 2*a* illustrates the territory of Asprochaliko, a palaeolithic cave. Commonly the impediments will be such that the site territory so measured will be far from a circle with a 10 km diameter. The dotted line shows the exploitable territory confined within steep mountains. It does not of course resemble the geographer's hexagon.

Figure 2*b* illustrates the site territory of the famous hunter gatherer sites of Mount Carmel. There is an area of marsh or wet grazing, a tree belt, and behind it the dry hills. The territorial analysis explains a faunal assemblage which contains hippopotamus, an indicator of wet conditions (the swamp), gazelle, an indicator of dry conditions (the dry hills), and deer, indicators forest conditions. Without territorial analysis such sites are commonly taken to be in a single uniform environment recognized by the species most frequently represented, or an intermediate

single environment is deduced. This site is in an economic ecotone, advantageous because of the diversity of the resources (Vita-Finzi & Higgs 1970).

Annual territories

Most known hunter gatherers and some pastoralists move seasonally to integrate resources, because except in exceptional circumstances their extractive capacity at a particular place is low. They usually have a number of occupation sites which are included in their annual territory. Any one site represents only one facet of a human group's activities. Transhumant annual territories, as in Romania, include in them sites as much as 1200 km apart. More commonly hundreds of kilometres are known to have been travelled by hunter gatherers and pastoralists in a year. In historic times Romania was crossed by transhumant routes leading to Russia, Poland and Bulgaria. As mountain ranges commonly give rise to population movements, they encourage rather than deter cultural diffusion. The implications for the explanations of pottery style diffusion is obvious.

Sedentary agriculture

Sedentary agriculture groups commonly exploit a territory which is within 5 km or 1 h walking time of the settlement. Their extractive capacity decreases as the distance from the settlement increases, at the rate of about 20 % per kilometre. Modern geographers hold this view of present day subsistence economies and there is plenty of supporting evidence from history.

Figure 3*a* gives an example of the territory of a sedentary pastoralist. The animal element of the mobile cum sedentary economies have a slightly larger territory amounting to $1\frac{1}{2}$ h walking time. The livestock routes which the herdsmen followed are shown. Beyond this it is

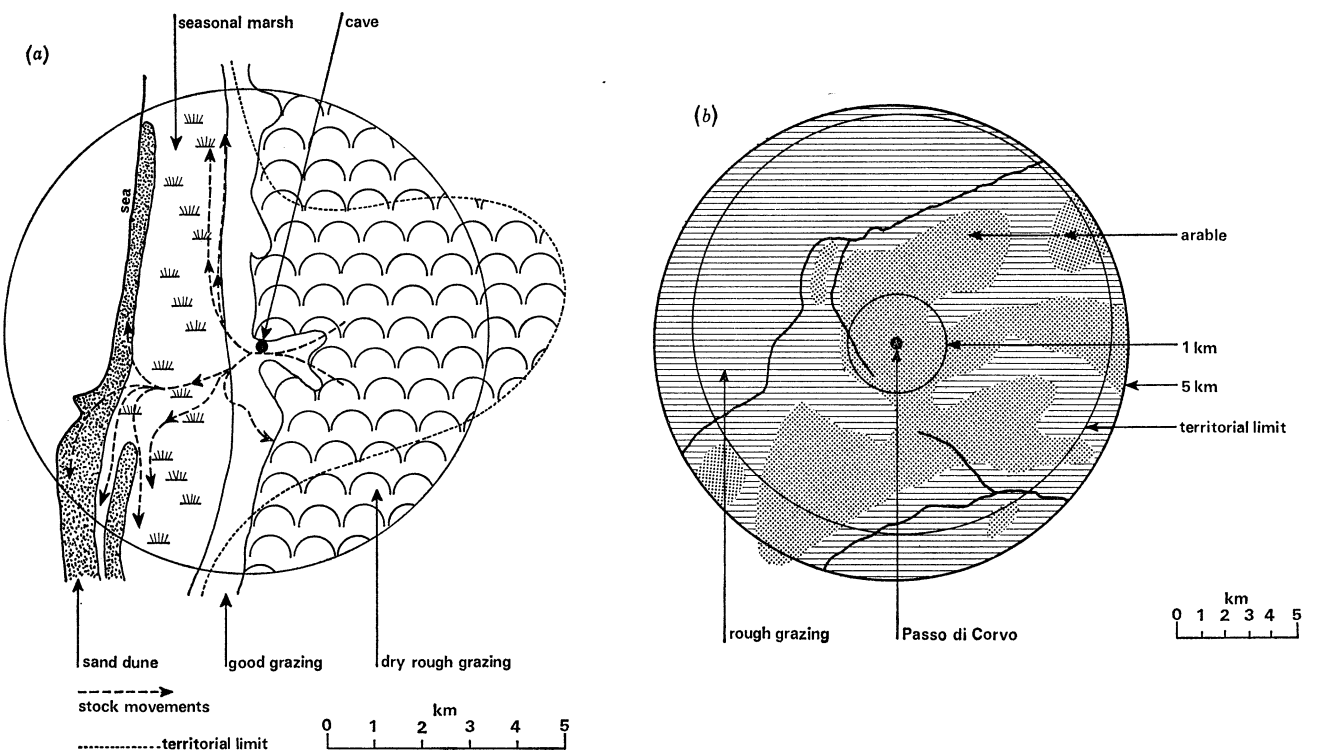

FIGURE 3. (*a*) The territory of a sedentary pastoralist. Livestock routes. (*b*) The territory of a site which was placed so that full advantage could be taken of an easily tillable soil.

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uneconomic to go. The animals must walk, feed and produce. The daily energy output must be less than the intake (Higgs 1972). The pastoral element of mobile cum sedentary village economies in most of Europe has a similar form.

These time distances have been taken in order to establish the full potential. But the critical area especially for crop dependent sites is that which is within 1 km, i.e. 10 min walking time from the site. According to our data it is probably less.

Occasionally extended territories exist where by reason of fences, natural corrals, or by relying upon animals' territorial behaviour, as with sheep, resources at a greater distance can be exploited (Sturdy 1972).

Figure 3*b* illustrates a situation where a site is placed precisely where the light tillable soils could be best exploited. The economy may be expected to be dominated by crop agriculture.

Similarly there are sites which are placed precisely where full advantage could be taken of a grazing area which was unlikely to have been under crop agriculture. Potentially the economy would have been animal based.

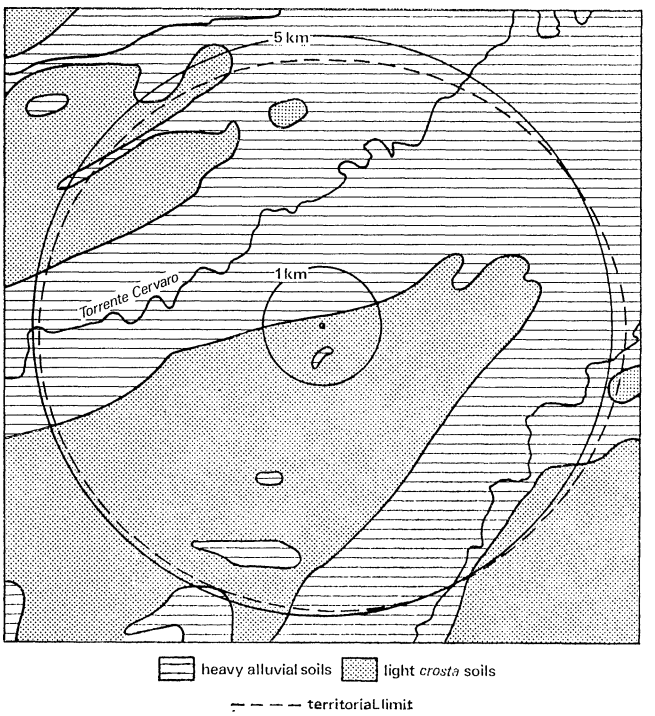

FIGURE 4. A site located where advantage could be taken of both heavy and light soils.

Figure 4 shows a site which was located at the junction of two different soils so that both could be exploited in the economic strategy. There was probably a mixed agriculture with significant elements of both crop and animal husbandry.

It seems from the data acquired that most sites were not located in a uniform environment but in highly preferred situations and that some sites are closely related to a particular resource potential. By the methods employed crop agriculture, for example, can be seen to have been especially easy, difficult or impossible. We can begin to consider the relative importance of particular foods to the inhabitants of particular sites, a matter which has previously been difficult or impossible to assess.

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We have also developed other techniques of analysing soils in order to estimate how suitable they were for different technologies.

Assessment of site potential

The site of Gezer (figure 5) is placed near to the tractable rendzina soils within the 1 km of the site ring. The Bronze Age site and the present Bedouin sites with a primitive technology are on a hill overlooking them. The modern kibbutz with a more advanced technology is not tied to these deposits. It exploits more of the less well drained and previously less desirable soils.

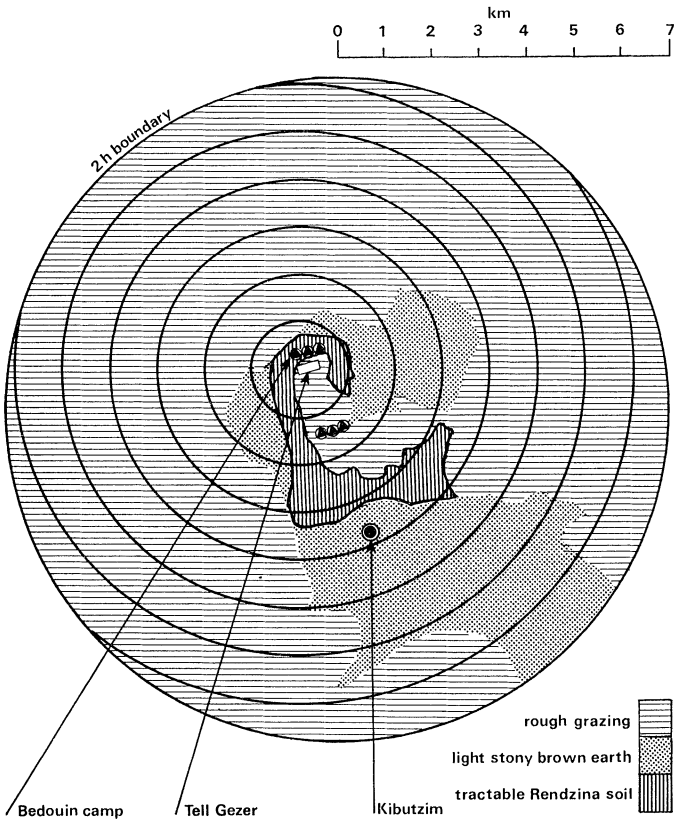

FIGURE 5. Gezer: an area exploited by Bronze Age, Bedouin and an advanced mechanical technology. The last leads to a change in habitation site location.

The soils of Israel have been studied exhaustively. Their productivity from their pristine state to the present domesticated soil has been established. Their potential in prehistory is all the more easily assesssed. Weighting is necessary for distance, yield and other factors (Webley 1972). Based on potential productivity and energy units the population is likely to have been about 1400. Biblical sources and the standing boundary stones indicate that the site had a territory nearer to 2 km² than the 3 km² of a 1 km circle in extent, but this recorded figure does not include livestock transference to the outer territorial areas. The similarity of the basic figures is encouraging.

In estimating the past potential of sites we must ask, however, what significant changes may have taken place in their territory since it was occupied. This is a less difficult task than it might seem to be. The area involved is now small, and can be studied intensively.

The present-day situation is a base to work from. Some encouragement can be taken from the fact that many of the grossest and most significant elements of the topography, such as plains and mountains and their influence upon agriculture would have remained unchanged over the period in question. Even at this modest level the method is informative. Further encouragement comes from the multitude of excavated sites from which the data retrieved shows that the agriculture practised in the past was very similar to that practised now and whatever changes did take place they were not sufficient to change the basic elements in the economy. The repeated occupations of tell sites and even modern villages tell the same story.

Where gross topographical changes have taken place, they are often easy to observe, and they can be dated by artefacts or radiocarbon, as, for example, the extensive deposition which took place around the Mediterranean in post Classical times (Vita-Finzi 1969). Some soil changes are also not difficult to detect. There is also evidence from Russia and Germany which indicates that there were no significant differences in soils over the period involved in four fifths of the instances studied.

It is recognized, however, that some sites are too difficult to evaluate. This should not dissuade us from trying however, for sufficiently reliable data can be found to evaluate most site potentials with some confidence at a worthwhile level of interpretation. Furthermore, conclusions drawn from excavated on-site data can test those drawn from off-site data and vice versa. Each by itself is in fact an incomplete set of data. The one shows what could have been done, the other something of what was done. But we can obtain a better estimate of land utilization by using off-site data than we can by the use of excavated data.

As a result of this work we now have a coherent and intelligible body of results drawn from sites distributed over many different areas in Europe.

Europe and upland exploitation

Europe is a mountainous continent. The north European plain aside, lowlands are confined to restricted pockets. We cannot reasonably ignore mountain economies and pastoral peoples.

We know that transhumants, who arise when complementary resources are so far apart that the family groups exploiting them would otherwise be split up over long periods of the year, are a world wide phenomenon from the Americas to Tibet. There was no other way to exploit resources distributed in this fashion to good advantage. Mobile economies are said still to exploit 25×10^6 km^2 of the Earth's surface, and the extent of their populations is vast but unknown. They all have some things in common because their institutions of necessity must fit their way of life.

Often wealthy, their wealth was not in artefacts but on the hoof. These elusive peoples often escape the archaeologists as they escaped the manorial record, and sometimes the tax collector and often the historian. The economic niche resting upon deeper roots, continued to be filled in spite of wars, changes in social and political systems, existing cultural levels and the coming and going of civilizations. Their influence and their value to archaeology are considerable. The orderly pattern of their exploitations can be seen in the historic livestock routes, the cañadas of Spain, the tratturi of Italy and the drumurile de oi of Romania.

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Spain

Spain consists largely of uplands and some small scattered plains. The central plateau, with a rainfall which does not exceed 25 cm per annum, had in 1950 a scarcely viable marginal dry arable agriculture. Despite a developed technology, around Zaragossa in the rain shadow of the Pyrenees, from 1946 to 1950 the grain harvest was a total failure and many villages were abandoned. In the uplands there is a long cold season which is equally restrictive. Elsewhere, dry arable agriculture produced each year only about 750 kg of grain per hectare. It is not likely that such marginal crop dependent arable agriculture with its risk of quick starvation, especially present before the development of land transport, ever played a large part in pre-history. Before sophisticated technology livestock economies were most probably dominant. The general distribution of archaeological sites would seem to bear that out.

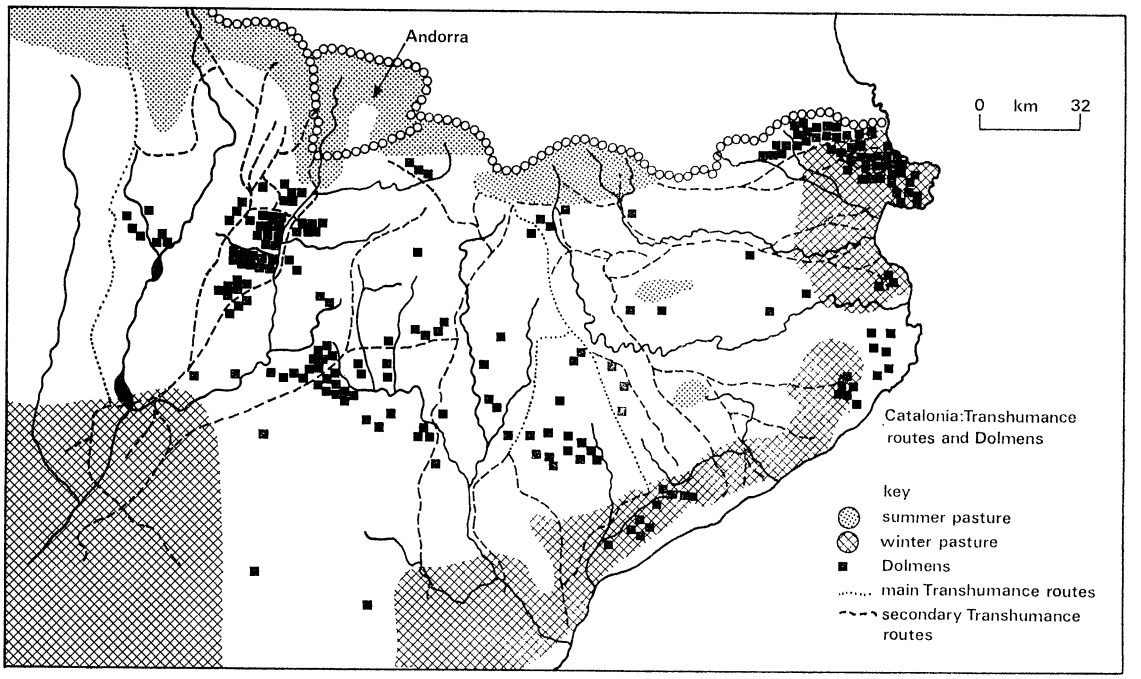

FIGURE 6. The distribution of dolmens in Catalonia. They tend to follow the ancient livestock routes rather than the river valleys.

On the other hand Spain is crossed and recrossed by cañadas, the livestock routes upon whose associated flocks church and state depended. Some of them are 650 km or so in length. Encouraged by the mediaeval wool trade, although there were many cattle routes too, they go back to the earliest written records and were present in Roman and Visigoth times. As far back as history goes there is evidence for a orderly pattern of exploitation by this means. We must therefore look at the earliest prehistoric site locations to see if they too fit such a pattern. They may do so because the complementary nature of resources for animal based economies in such regions remained the same, whether the animals were domesticated or not.

It must be remembered that the cañada routes are not always precisely known and all archaeological sites may not be expected to be related to them. On the other hand many villages and towns were built on these routes for they made very marginal crop based village settlements economically viable. In the past, as between 1967 and 1975, thousands of villages

were abandoned to the archaeological record when routes were slightly changed by the railways or motor transport or for other reasons. It is possible that the easily observable monumental archaeological sites may show a similar economic directional drift.

Figure 6 illustrates the distribution of individual dolmens in Catalonia. Note their distribution at the ends of the cañadas and how dolmens and livestock routes tend to follow each other and not go by the natural river valley routes, but across country.

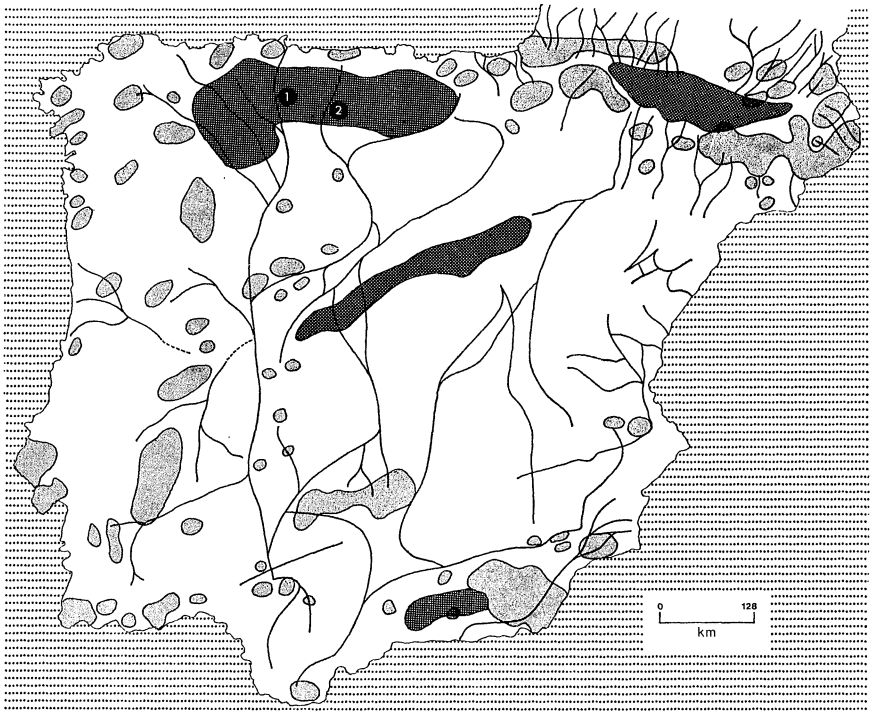

FIGURE 7. The distribution of megaliths appears to be related to mountain ranges and to ancient livestock routes which united complementary upland and lowland resources. Light shading, megaliths; dark shading, mountains.

In figure 7 megalith zones are shown and not individual sites. A consideration of the distribution of complementary resources divides the area into four sections. The Pyrenees with their seasonal summer resources and their numerous medium and short distance livestock routes and megaliths. The Sierra Nevada areas in the south with its livestock routes and megalith and seasonal summer resources. The coastal areas, north, west and south, winter refuge pasture areas for livestock and their megaliths. The fourth economic directional drift is from the cooler, wetter north to the warmer, drier south, as the two westernmost Royal cañadas show. These latter long distance routes and the branches from them, tend to have a linear distribution of megaliths running in the same direction. There is a similar distribution in the south of Spain which is associated with the Sierra Nevada. The distribution maps are taken from two different unconnected disciplines and the maps have been crudely placed without adjustment one upon the other. Bearing in mind that all the routes and the winter resource areas are from imprecise historical records which we are in the process of adjusting, I am encouraged to think that the distribution of cañadas is in some way related at least in part to the distribution of megaliths – that they show similar directional drifts and that an exploitation pattern may be seen.

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Figure 8 shows the curious distribution of the known Azilian sites. They broadly follow a similar distribution pattern to that of the megaliths in the same area. They run from west to east and cross from the Spanish coast to the wetter eastern and more fertile French side of the Pyrenees. At this time the occupiers of the sites were the makers of the much earlier palaeolithic pre-crop agriculture Azilian cultures which had red deer as their staple food. The sites are often within a kilometre or so of a megalith. The direction of the economic drift, directed by the seasonal distribution of resources, is the same only the animals are different. Palaeolithic sites follow much the same pattern.

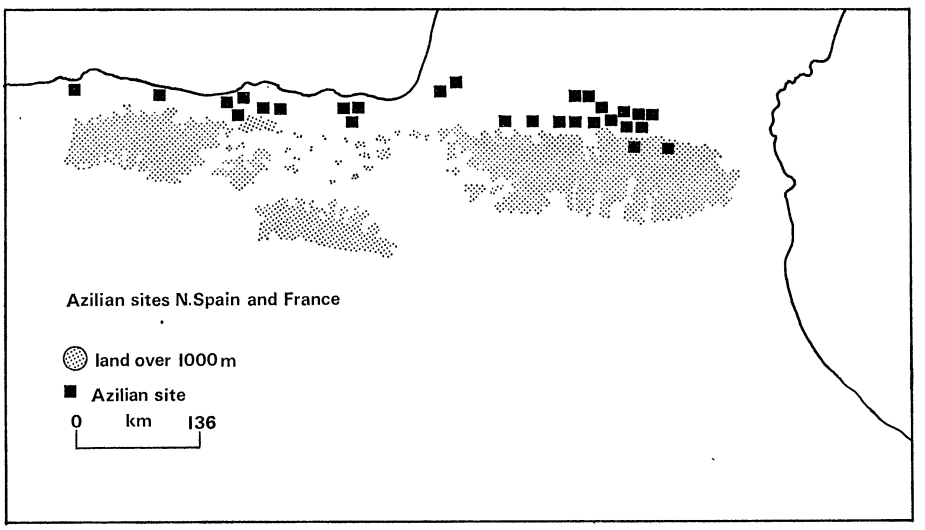

FIGURE 8. The distribution of Azilian sites. It is similar to the distribution of megaliths in the same area.

Italy

Peninsular Italy has a large area of uplands, the central range of the Appenines. Transhumant routes are again recorded in the earliest written records. The routes were perhaps better organized by the Romans and subsequently developed by the mediaeval wool trade.

If you relate them to the known Neolithic and Bronze Age sites (Barker 1974) their distribution suggests that there is earlier evidence for similar exploitation patterns.

Some relationship is to be expected, for in similar situations such livestock arose everywhere else in the world regardless of cultural levels. It is not to be expected that all the sites were directly related to them, but remembering the abandoned villages of Spain, many probably were. It is known that the resources complementary to the Appenines were the lowland areas of the west coast and the Tavoliere in the south. From these two areas most of the summer pastures of the uplands were exploited, even the more distant eastward Appenines from the west coast. The less hospitable much colder east coast sites which suffer from the 'gregale', the cold winds from Greece and from cold sea currents, are in areas which provide less good winter grazing. Incidentally the pottery styles there are distinct and relatively static, features no doubt due to their isolation from the main stream and population movements. A reconsideration of pottery styles and their distribution on an economic basis may be rewarding for specialists in pottery typology.

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The reach of these Appenine resources southwards made the Tavoliere a more viable economic proposition.

In Neolithic times in the Tavoliere agriculture was at a high level. In the Bronze Age it was at a lower level (Jarman & Webley 1974). The evidence indicates that this was probably due to a minor climatic change which made the area too dry for arable agriculture. But in the longer term similar fluctuations recur (figure 10). By historic times there was a return to crops followed by a fall in mediaeval times and a return at the present time. These later

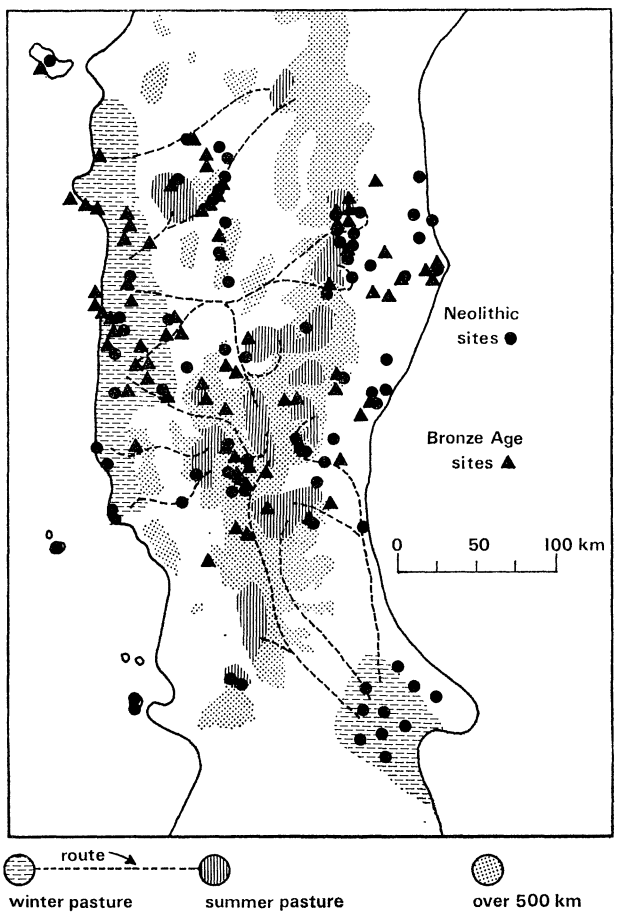

FIGURE 9. The distribution of Neolithic and Bronze Age sites and transhumant routes in Italy.

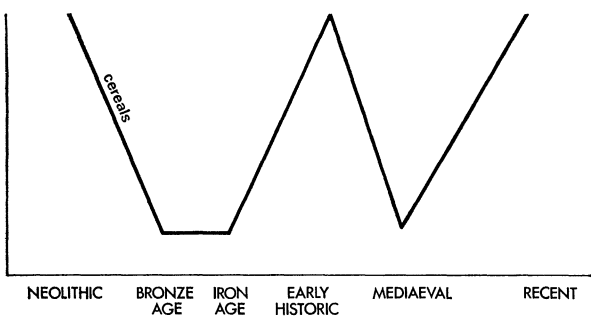

FIGURE 10. Long term fluctuations in crop agriculture in the Tavoliere.

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fluctuations are attributed to political or social changes. A simpler explanation is that this is a marginal area for subsistence crop agriculture precariously balanced between two alternative economic systems. A variety of minor influences may tip the balance in either direction. Its precarious nature may be seen in present day agriculture. The grain yield is not high, commonly about half the seasons give 1250–1850 kg/hectare, which is not minimal. It is, however, highly variable. From time to time there is a total crop failure. The starvation threat to crop based subsistence economies was always present for a stored crop surplus as a reserve was a rapidly wasting asset and unlike livestock its value could not have been maintained or increased. The development of towns and monetary systems eventually meant that a surplus in the good years of the wasting assets could be exchanged for more durable forms of wealth and crop agriculture in the Tavoliere became a more viable proposition.

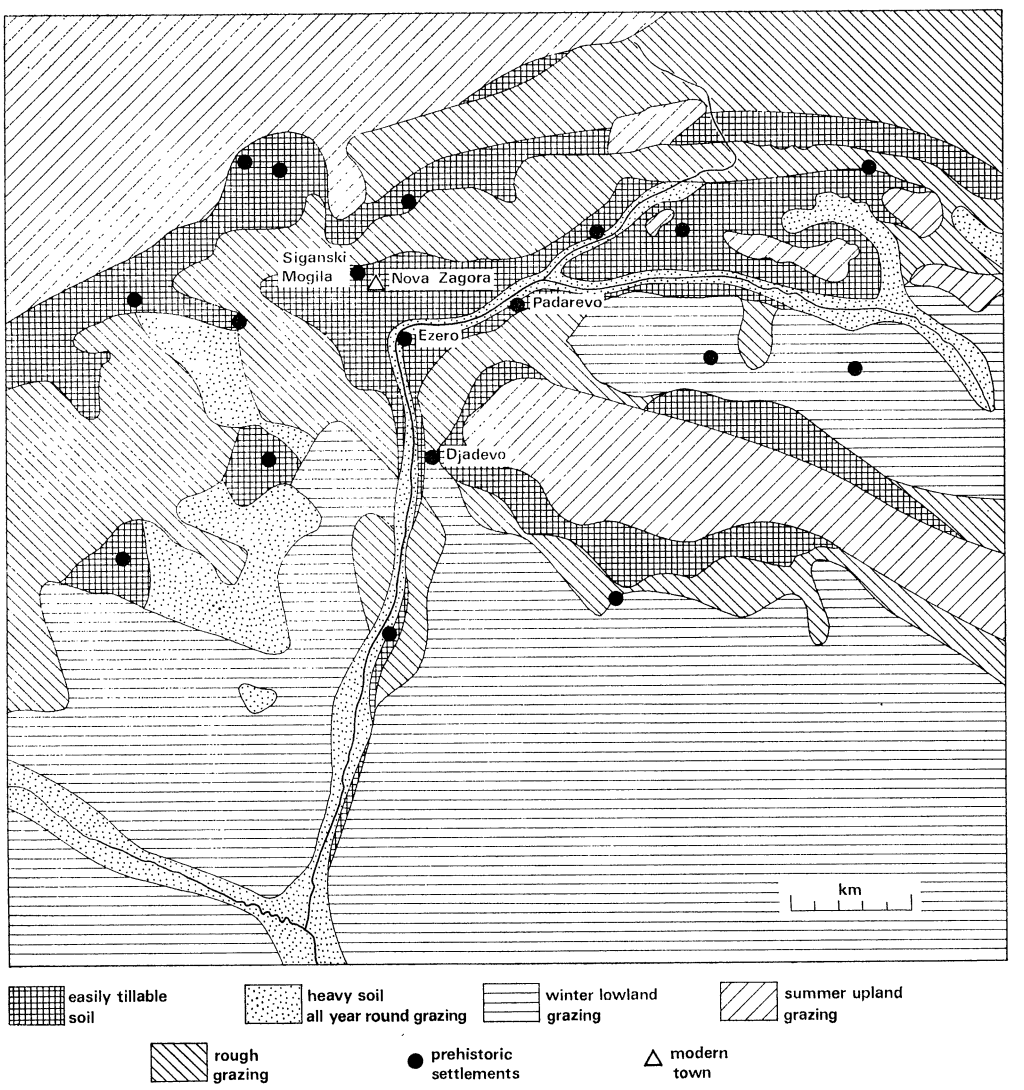

FIGURE 11. The distribution of Neolithic sites in Bulgaria and their association with easily tillable soils.

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Bulgaria

In Neolithic and Bronze Age times around Nova Zagora sites were close enough together to form a single and powerful economic unit (see figure 11) (Dennell & Webley 1974). The distance factor had little effect.

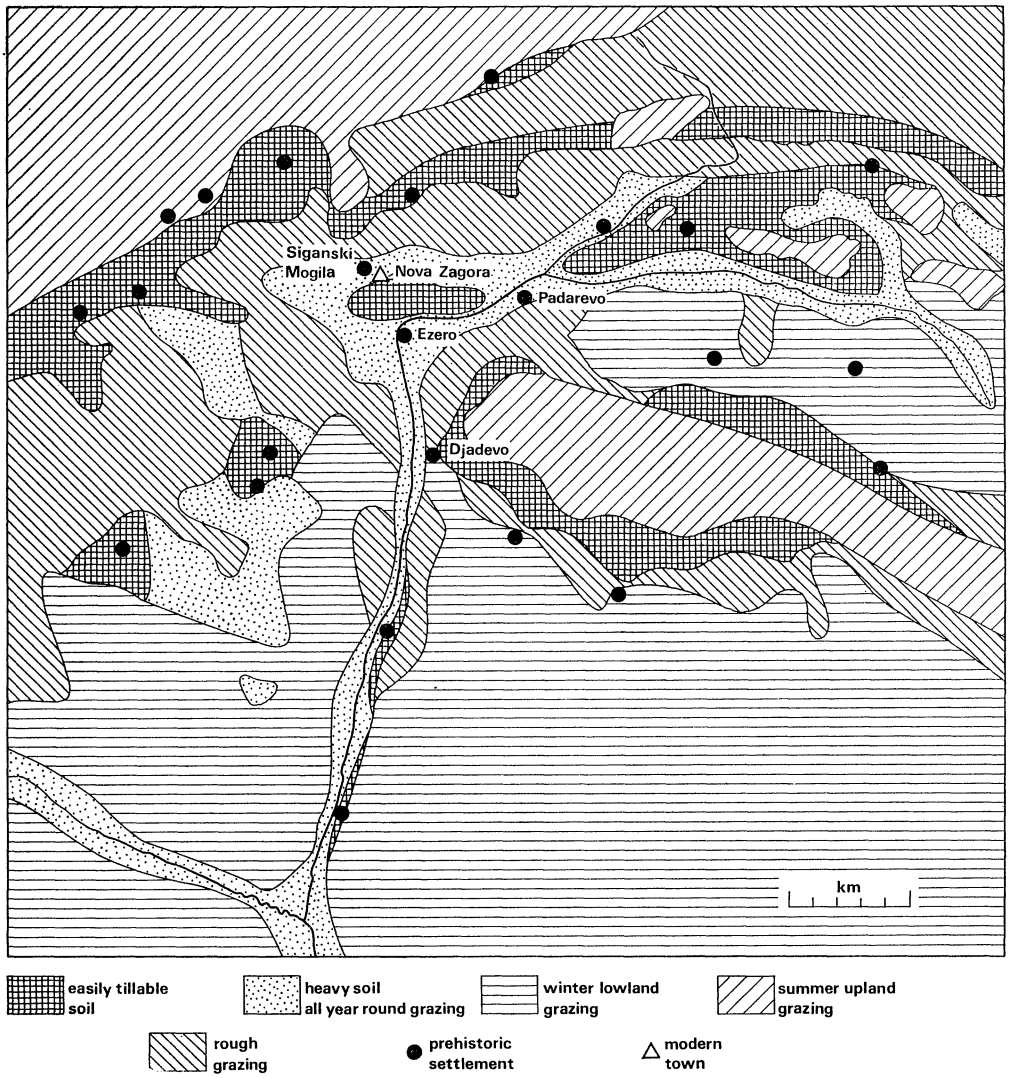

FIGURE 12. The distribution of Bronze Age sites in Bulgaria and the reduction in the area of tillable soils consequent upon sheet erosion.

Territorial analysis shows that the territories of the principal sites include areas of easily tillable soil and from these sites the hills and the heavy clays, at that time beyond the range of the primitive tool technology, could be grazed to advantage in a rotational wet and dry grazing system. If the men had not found such a grazing system, the animals would have done so for themselves. The sites were placed where a diversity of different resources could be best exploited by a mobile cum sedentary farming system (Economic niche III).

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The whole area was capable of being fully exploited with the technology of the time. Note the extent of the tillable soils. Here is an instance where dramatic changes in the sites' environs took place during their occupation.

Erosion began in the Bronze Age and the tells were eventually abandoned. It is unlikely that the people willingly chose to leave their long accumulated and durable wealth and it is reasonable to consider a relationship between the two. The erosion may have been due in part to the long continued overall exploitation of a brittle environment or a change in rainfall or to a combination of both. It is significant perhaps that the situation was not very different from what it is today. Recent agricultural experiments on slopes have been abandoned because of sheet erosion.

The deposition consequent upon this erosion covered the easily tillable soil with a heavy clay (figure 12). The areas of easily tillable soil were greatly diminished. At Siganski Mogila, Ezero, Padarevo and Djadevo the ability to produce crops was sharply reduced. The crop centre of this cluster was destroyed. The Nova Zagora area which in Bronze Age times looked as if it had all the qualities of a developing civilization turned to pastoralism, and the advantage now lay with the wet and dry grazing system.

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