The NorthRibatejo

My research is concerned with transition and change. These occured at different levels and interacted with different realities. I sustain that the main guide for social change is to be found in social relations and their politics. Having said this, it is obvious that the "liberty of choice" for human societies was conditioned (but not determined) by those other realities, often pointed by several authors: geomorphology; climate; biome.
These realities are processes in themselves, and also have patterns of transition and change, in interaction the ones with the others, and with human societies as well.
The Paleoecology and, to some extent, the Paleoeconomic approaches, have stressed the importance of the environment for social evolution, at least in the display of natural preconditions (named "resources").In this sense, systems theory has been applied to establish that more complex and diverse eco-systems tend to be more stable, and from this statement derived the notion of ecotonal zones as being of higher potential.
The problem is to assert to what extent geomorphological, climatic or biomatical variability and change is actually articulated with social evolution (Brum et al. 1986; Chaline 1972; Daveau 1979;Daveau and Gonçalves 1985).
I have previously stated that for my object I am using different scales of approach, understanding that the explanation of global mechanisms of change implies the determination of the spatial and chronological boundaries of human societies at each moment. I have taken the Mediterranean and part of Europe as the "Centre of the Meso-Neolithic world". I have also suggested that a Central European World evolved beside the former, and that throughout the Neolithic,, evolution both tended to meet, in an Atlantic axis. In this process, I have argued that socio-political structures were the framework of human responses, these being unequal, but overall combined.
Three routes have been used in all the process: peer polity interaction, fluvial navigation and open sea navigation. Iberia played a major role in the process, and its interest derives from: its strong internal variability; the fact that it has fast and fairly easy access to Europe and the north of Africa; the fact that it is the link between the Atlantic and the Mediterranean (Martins 1946). Iberia as a whole is therefore my second scale of analysis.
According to my model, variability, transition and change must be analyzed at a regional scale, even if they can only be understood at an overall scale. Therefore I focus on, at a third scale of analysis, one region: the North Ribatejo, in Central Portugal. My aim is to account for the regional patterns of continuity and change in this region, and latter to assess its interaction with other close and distant regions.
Regions themselves are a difficult unity to define. All one can do, at first, is to establish environmental units. Some major difficulties arise from such an approach, though. On one hand, human societies do not confine themselves to any "natural" boundaries, and the purpose of this research is to study human societies. A chain of mountains may be a natural frontier, but it may as well be a complementary environment within a transhumance economic model, and by that a privileged area for human communities interaction. The same goes for a main river. On the other hand, continuous units, like plains of good arable soils, could be "no Man's land" for non-agricultural human groups, and therefore an effective socio-spatial limit.
Ecological boundaries are also difficult to establish. This is true for the present, but as has been sufficiently stressed by the Paleoeconomists, it is even more significant for Past societies. From the three main variables that compose the environment (apart from humans), one has a limited knowledge of geomorphology (including pedogenesis), some evidences for animal and vegetational cover (from their archaeological remains) and barely anything of detailed climate. This knowledge is acceptable at larger scales, but it does not apply to detailed regions.

For the definition of a region of research, I have therefore used the criteria of potential stability of the variables throughout the Holocene, focusing therefore on the geomorphological units, but excluding soils, biome and climatic variables.
I have mentioned Iberia's three main geomorphological units, and that they are also present in the western territory that is now known as Portugal (Costa 1940; Medeiros 1984; Ribeiro et al. 1979; Ribeiro 1986; Ribeiro, Lautensach and Daveau 1988). From the point of view of the available archaeological data, the Centre-West (Ribatejo-Estremadura) (Martins 1944; Ribeiro 1949, 1968), from the Tagus Valley to the Atlantic, has been the focus of numerous field researches. It has been argued it constitutes a region by itself (Correia 1940; Fleury 1936). The role of the Tagus river has also been proved for very early periods. The diversity could not be better defined than in the North of Ribatejo, where the three mentioned geomorphological units meet .
My research focussed, at first, in the Nabdo Valley (Oosterbeek 1987b). The Nabão flows from the limestone massif to the Cambrian Valley of the Zêzere, also cutting the northern limit of the Quaternary alluvial deposits that cover Miocene formations. Its association both to the Tagus and to the Atlantic coast (through the calcareous Massif) was a second reason of choice. Finally, no significant archaeological work had been done previously, and so it was easier to avoid preconceptual bias on the regional account of the Neolithic process.
The region itself has no precise boundaries, only gravitational axis (Roncayolo 1986a; Ruiz Zapatero and Burillo 1988). These are considered to be the the mid-low Tagus valley and its tributary rivers (Zêzere, with the Nabão; Almonda). Also, it is a non homogeneous region; on the contrary, it is basically the crossroad of the Mesocenozoic occidental fringe (Centro 1981; Simposios 1987), with the Miocenic Tagus basin (Carvalho 1968) and the Central-Iberian zone of the Ancient Massif (the "Meseta") (Ribeiro 1949).
A first approach to sites distribution, indicated some correlation with the mentioned units. The purpose of the project was to assert what the economic potential resources might have been, and had actually been used at different stages. No direct paleo-ecological studies existed for the region, and since the beginning of my research not much has been added that might help to trace a regional picture. I have tried to overcome this limitation by using modern evidence associated to studies made in other regions in what they implied of possible supra-regional characteristics. It will never be too much to underline the dangers of such an approach, for geomorphological and ecological evolution has possibly been much more impressive than was thought just a few years ago (Smith 1979). I will take into account the results of some regional surveys, namely the one on south-east Spain, by Gilman and Thomes (1985), as well as recent Palynological studies undertaken by J. Mateus (1993).
Considering the existence of three main geomorphological units, I have sampled each one of them, as is discussed in chapter 9. My aim here is to draw a picture of the paleo-landscape based on modern cartography.
The North of the Ribatejo Province is presently considered as predominantly industrial, in contrast with the south (Leziria). This is due to an almost lack of plains in the north, as well as of high arable potential soils, such as flood areas. The north has been the stage for interior but limited agriculture, and its importance in the Middle Ages and in the industrial revolution derived mainly from: its strategic location (due to the different accesses mentioned above), its forest and its good fluvial branches (used for early industries energy supply, and goods trade).
The geomorphological units associate Mesozoic limestone in the north-west (Triasic, Jurassic, Cretassic and Liassic), Precambrian and Paleozoic rocks in the north-east, and Ceno-Anthropozoic deposits in the south (Miocene, Plio-Quaternary, Holocene) though the Anthropozoic ones also occur in the top of the other major units. The Pleistocene sequence includes a series of terraces below 100m, some with middle and upper Paleolithic remains.

The Mesozoic complex is particularly disturbed by many inverse faults, mainly of north/south direction.
The lithology of these units includes also three main sedimentary complexes (Mouterde et al. 1971; Zbyszewski 1971 a, 1971 b; Rousset and Mouterde 1971; Ruget-Perrot 1961): limestone
with flint) in the NorthWest; sand and sandstone in the south, and schists and granites in the north-east. Quartz and Quartzite PlioPleistocene pebbles occur on top of all these units. Deep alluvium deposits dominate the south, but they also occur in the more shallow valleys of the other two units. The ph of soils runs from alkaline in the north-west, to medium acidity in the north-east and south.
The region is crossed by two main rivers (Tagus and Zêzere), another important fluvial valley(the Nabão), and many smaller rivers and streams, especially in the west (draining the karstic relief of the limestone Massif). Natural springs of fresh water are numerous, and archaeological sites often are close to either or both of these two sources of water.
It must be also mentioned that the western part of the region has a very high average productivity of underground water resources
400-500 m3 / day / 2 km), associated to the surface torrent of the Zêzere and Tagus. All this water has a limited superficial drainage.
200-300 mm of annual average) and a regular but not too high evapotranspiration (500-600mm of annual average) that is in balance with the heavy rains.
The agricultural potential of the soils is very good, if one takes the region as a whole, for its diversity. Basically, the north has good aptitude for forestry (classified as class F), and the south has very high potential arable soils (class A). There are some details, though, that might be very important to understand the actual soil potential in Prehistoric times. First, the Northern region does have alluvium deposits, that inspite of being very shallow, do provide excellent conditions for horticulture. Also, the alkaline soils have good conditions for nitrification and calcium assimilation, and their main problem is the slow mineralization of organic remains, which can be overcome by organic manure. Third, alkaline soils, even without fertilization, do support cereal cultivation, and they have the advantage of being light, and therefore easy to work with stone or wood implements. Fourth, the southern soils present two disadvantages : the processes of humidification and nitrification are more difficult (and to overcome this, chemical fertilization is required, in the long run); they are heavy clayish soils, virtually impossible to use without metal instruments and / or animal traction.
Modern agricultural systems do provide some indications. The alluvium soils are considered as being the good ones for agriculture, but they are devoted to extensive mechanical ploughing. The northeast soils are used mainly for forestry and pasture, and the north-west ones for forestry alone. Nevertheless, small scale intensive agriculture was current in the area until 30 years ago. Older people (over 60 years) that still live in the region, keep on developing farming in these light soils, that tend to be abandoned by young people, who migrate to towns for financial and cultural reasons. But the light northern soils do provide crops on a subsistence basis economy, and they are comparatively easy to be worked.
Small farmers in the south, experience a much harder way of living, when they can not afford using machines: hand ploughing of 100m2 takes about 30 hours of work.
Finally, one must consider erosion may have been very strong, and soils on top of the hills might have been thicker then they are now (Birot 1949). Cultivation in the mountainous north presented therefore only one main problem: the need either to be confined to thin alluvium in the valley, or to develop a terracing system in the slopes (that, of course, implied a certain degree of social coordination). But the use of the wide southern soils could also only be made through the development of irrigation systems, the maintenance of which would certainly imply more continuous communal work.

If one considers the surface lithic remains that can be found in survey, they are concentrated, for the Neolithic, in the north, rather than the north-east or the south. One can therefore assume, that it is likely that only in a latter period southern soils began to be, at least intensively, used, as I shall discuss latter.

Climate and Biome are even more difficult to assess for prehistoric times. I will indicate, nevertheless, some major trends that might be operational in the Atlantic and Sub-Boreal periods.

The region of North Ribatejo is presently defined as a zone of sub-mediterranean policulture, with sub-atlantic elements.T he climate is characterized by a very clear difference of seasons, with high thermic amplitude (from about 5 or less °C maximum temperature in January, to over 40 °C in July-August, and an annual average of 16°C) associated to a reasonably high rainfall (over 700 mm of annual average).

About 100 days per year have an average rainfall of over 1000 mm per square metre per day, and floods still affect the towns. Before dam systems were built, late this century, their effects were catastrophic. The relative humidity is high (75% of annual average at 9.00 A.M.TMG - classified as moderately humid). The data from cave excavations, for the Atlantic period, from the sedimentary record (and lithochemical process), indicate a temperate humid and warm climate (sandy deposits and high processes of calcium carbonate solution), that might support a dense forest (and associated fauna). The lithochemical processes cease by 3000 B.C., indicating a possible climatic variation associated to the European Sub-Boreal.

Present climate registers between 30 to 40 days per year of overnight frost, with dramatic consequences for agriculture in the first two months of the year. Evidence of secondary gelifraction in the Neolithic and Chalcolithic deposits in the entrance of caves and openair settlements, may account for a similar condition.

Finally, the present wind record indicates three main directions (mainly from north; north-west and less from south-west). These contribute to both Mediterranean and Atlantic climate moderation. From the archaeological record, one has very little evidence. Some elements, though, suggest a similar pattern: the south and south-east slopes of hills, show a higher rate of erosion ; Holocenic deposits in caves, tend to be thicker in caves with an north or north-west entrance (like Cadaval), than in the ones having a south or east entrance; all recorded caves with a north or north-west entrance have not been used for habitation (though evidence for this is very few); huts in the Beaker settlement of Fonte Quente are located in the Southern slope indicating a possible protection to the wind blowing from north).

The vegetation cover, today, is roughly Atlanto-Mediterranean, with stronger Mediterranean influence in the south, which is natural. The dominant species are Pinus pinastra atlantic , Pinus pinea, Quercus rotundifolia , Olea europea europea, and unfortunately increasing Eucalyptus spp. Other highly represented species are Quercus faginea , Ficus carica , Vitis vinifera vinifera and fruit trees. Pinus is in "recession", made more serious by recent fires. But it is perhaps more significant, to my purpose, to indicate that many Quercus rotundifolia are not cultivated, and that abandoned former agricultured soils tend to be occupied by bushes of Quercus spp., thus indicating the potential prevailing original Holocenic forestry (that might include a more significant percentage of Quercus faginea). Cabbages, potatoes and tomatoes are cultivated, at a small scale almost everywhere. Two main cereals are cultivated: Zea mays, L. in the south, and Hordeum sativa, Jess, in the north (occasionally associated to Triticum Aestivum, L.).

As I have mentioned, there are no regional paleoecological studies. It is possible to draw some guidelines from regional models developed for south-west Europe (Lumley et al. 1976; Miskovsky 1976; Morzadec-Kerfoum 1976; Planchais 1976; Renault-Miskovsky 1976; Vernet 1991), and isolated pollen diagrams obtained for Portugal (Leeuwarden and Jansen 1985; Mateus 1985; Real 1985; Queiroz 1985). Studies in the French Midi, revealed a

progressive substitution of Pinus spp. by Quercus spp. throughout the Boreal and Atlantic periods, Quercus suber being the dominant species by 5000 B.C. in the Languedoc. In the Provence region, there was a balance between unforested periods and others dominated by an association of Quercus spp. and Pinus halepensis (the latter one being still present in the region I am concerned with), and a latter dominance of Quercus rotundifolia due to the anthropization of the vegetation cover. Inspite of the dangers of such long distance parallels, it is likely that Quercus spp., and possibly rotundifolia, was the dominant species from the 3rd. millennium on, if one considers also the "spontaneous" vegetation that is currently reoccupying the abandoned farmer agricultural areas.. The closest pollen diagrams available, that have some interest for this region, are from Alpiarça, some 50 km to the south, in the Tagus Valey. The diagrams have been obtained from stratigraphical profiles, in the flood plain, from a settlement site called Gazeço da Bruxa. What these diagrams confirm is both the prevailing presence of Quercus spp. and, very significantly, an important deforestation in the late 3rd. millennium. This evidence is surely very important, since it matches the assumptions I have been making for the use of the Southern soils of North Ribatejo (that are the extreme north of the flood plain - Lezíria - deposits, where Alpiarça stands). It also clearly indicates a latter deposition than in the Central Massif "Serra da Estrela" (the highest mountain of Portugal, where evidence of intensive use of soils has been dated back to the 5th. millennium, in an area over 1500 m. above sea level, and with very poor agricultural potential, to our present standard).

The present faunal assemblages in the region are not significant for my purpose, since almost no wild species survived (occasional foxes and rabbits, more and more rare), and most of the domesticated animals (cattle, pig) are kept indoors, with a limited mobility for sheep and goats (and occasionally, in the north-east, cattle also). The archaeological record is not very rich, but on the other hand it clearly indicates a strong diversity in the Mesolithic and throughout the Neolithic (which is hardly surprising, if one considers the excellent combination of water supplies, mixed forest and soil differentiation).

Here I come to the conclusion on this chapter. Its aim was the definition of the region, and what I have tried was a combination of present description with past assumptions. But here lies the unity of the region, its transitional character. My first assumption was that variability, transition and change must be analyzed at a regional scale. The same words can be used to define this region, and I come out of this chapter with another assumption: if there is an interaction between social and "natural" process, transition regions are the best to observe social transition.

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