Summary. Research into the Chalcolithic period in the region of Lower Estremadura, south of Torres Vedras, western Portugal, has generated much new data from fortified sites and cemeteries. The lack, so far, of a thorough overview of this diverse body of information has hindered the definition of the Chalcolithic culture of the region. The economic, social and cultural transformation observed at sites with a long sequence beginning with the Late Neolithic, has never been analysed.

The results obtained by the author in one of the most notable sites of the region, the fortified site of Leceia, near the town of Oeiras, are of particular interest. Seventeen excavation campaigns carried out since 1983 have provided a remarkable body of information. The characterization of other previously identified Chalcolithic groups in Portugal allow us to see how the Chalcolithic of Estremadura relates, at a regional level, with the cultural development to the north, the south, the hinterland and the coast.

Of major importance to this discussion are the chronometric results obtained in Leceia. For the first time, the 36 radiocarbon dates and their subsequent statistical treatment have allowed us to establish absolute boundaries for the existing successive cultural phases of the Late Neolithic and the Early, Middle and Late Chalcolithic.

INTRODUCTION

Lower Estremadura is a privileged area for research on the Chalcolithic. The richness of the archaeological remains found here may be explained by the favourable natural conditions, but the present-day high population density is, to a great extent, responsible for the many casual discoveries which have led to the large number of earlier studies. These have inspired hundreds of published accounts detailing both settlements and cemeteries, many of them, unfortunately, of very limited scientific interest.

In this context the results obtained by the author in the fortified site of Leceia, near Oeiras may be considered. The seventeen excavation campaigns, carried out annually since 1983, have led to a comprehensive body of stratigraphic data together with numerous field observations, providing an essential background for future work at other archaeological sites in the region. The information obtained at Leceia relates to the thousand-year evolution of a dynamic and complex society which intensively exploited the available natural resources. It
was the agricultural potential, maximized by the progressive improvement in technologies, that created a prosperous economy able to support trade in goods and raw materials with other regions. Such trading is well documented by the artefacts discovered. We are dealing, then, with a society that was clearly open to trade while being settled in, and limited to, a well defined territory. The external economic relations established by the inhabitants of Leceia, introduced new technologies (copper-working, for example) and, at a more abstract level, a religious ideology. This may be recognized from the nature and typology of idols recovered which show the fusion of indigenous traits with cultural ideas from the Mediterranean. According to Jorge (1994, 472) this is why Estremadura shows a greater architectural diversity as well as the greatest number of Mediterranean-style fortified sites. Jorge has also shown there to be a direct relationship between architectural complexity and the existence of intramural semi-specialized areas for storage or production. The latter are well documented in Leceia by

### TABLE 1

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* These results have already been corrected for the effect of the oceanic reservoir. The apparent age of marine shells on the Portuguese coast during most of the Chalcolithic is 380 ± 30 years ¹⁴C (Soares 1989).
three circular stone structures, regarded as the foundations of threshing floors for drying or threshing cereals or other vegetable products (Cardoso 1989, figs. 73, 74; Cardoso 1994a, fig. 62). These structures and the walls that surround them are a reality irrespective of whether or not such evidence represents ‘the will to protect spaces and socially important activities with the use of an architecture of supra-regional prestige’ (Jorge 1994, 472–3).

Leceia constitutes the nucleus of a stable and sedentary population, distributed in smaller settlements throughout a definite region surrounding the fortified site, and probably unified by blood ties. This was, then, basically a society with initial tribal roots. Similar nuclei probably existed throughout the territory of Lower Estremadura, as is indicated by other evidence of population concentrations.

What model, then, explains the birth and evolution of this society between the middle of the fourth and the end of the third millennium BC? At an earlier stage there had been a social process influenced by external impulses conditioned by economic circumstances and the
natural resources available. From this interaction (Parreira 1990, 29) resulted a society with distinctive qualities, which evolved early on and interacted with other human groups at an inter-regional level.

THE CULTURAL PHASES REPRESENTED AT LECIEIA AND THEIR ABSOLUTE CHRONOLOGY

Three main cultural phases can be distinguished in the Chalcolithic of Estremadura, each of which is found at Leceia. They are stratified in archaeological layers displaying specific characteristics and containing distinctive artefacts. Among the latter, pottery stands out: certain types may be regarded as markers, or ‘type fossils’, of obvious validity. This does not mean that it is impossible to find pottery of a given cultural phase in a layer of another phase. In addition to the probable residual survival of certain types one must also accept the vertical and/or horizontal displacement of sherds either at the time of their deposition or later. Such observations only have a statistical value if based on a large number of occurrences. In addition, during large-area excavations, like that of Leceia, it is not easy to separate accurately the material from different archaeological layers where they are intercutting. This is especially evident for interface zones. In summary then, to be credible the material recorded must be statistically valid. Let us now see what the main characteristics are of the three cultural phases stratigraphically identified in Leceia.

The first cultural phase: the Late Neolithic

Throughout the course of the second half of the fourth millennium BC, one sees in Estremadura progressive occupation of topographically elevated places favoured with good natural defences (Silva 1983). At Leceia, the site consists of a low cliff platform in the shape of a buttress overlooking the fertile valley of the Barcarena, about four kilometres from the river Tagus, defended on two sides by a ten metre high limestone scarp. Here an open settlement was

Figure 2
Cross-section 3/1994 illustrating the general stratigraphic succession observed (marked (*) in Fig. 3). 1 – Layer 2 (Middle Chalcolithic); 2 – Layer 3 (early Chalcolithic); 3 – Layer 4 (Late Neolithic); 4 – ‘terra rossa’, corresponding to the top of the geological substratum.
Figure 3
Leceia 1983/1996 – Schematic plan of the area excavated.
Figure 4

Characteristic ceramics of all cultural phases represented. Below: carinated cups and indented lip vessels (Late Neolithic); in the centre: ‘copos’ and cups with fluted decoration (Early Chalcolithic); above: imprinted ‘acacia leaf’ and ‘composite leaves’ decorated motifs and Bell Beaker (Middle Chalcolithic and Late Chalcolithic).
established on an outcrop of compact Lower Cretaceous limestone, with rock shelters in the face of the outcrop. The location of the site was determined by both geomorphology and by the surrounding resources. In addition to the good natural defences provided by this platform, the existence of a valley offered a natural means of entry and circulation for both the local population and for goods coming from the Tagus estuary into the hinterland of the Lisbon peninsula. In addition, the valley was not only a potential area for the production of food in small cultivation plots but in the vicinity of the confluence of the Barcarena stream with the river Tagus was an ideal place for tapping water resources. In the course of the Late Neolithic and the Chalcolithic the average sea-level would have been higher than at present (Dias 1985, fig. 4). This would have led to the formation of a estuary rich in readily available aquatic resources and providing easy upstream navigation from the Tagus estuary to the prehistoric fortified site of Leceia.

The nine radiocarbon dates obtained for this period of occupation lie within the time-interval corresponding to the Late Neolithic (Soares and Cardoso 1995). Using the CALIB program, probability accumulation graphs were plotted of the data collected and several intervals were established. Thus, at a probability of 50%, the chronology obtained for the Late Neolithic occupation corresponds to the interval 3350–3040 cal. BC which, at a probability of 95% becomes 3510–2900 cal. BC.

Although no defensive structures have been identified at the Estremadura sites, the choice of naturally defended and topographically elevated places suggests the existence of potential conflict. Since one only defends (besides one’s own person) what is worth defending, what sort of goods compelled these communities to seek refuge at the top of the hills? In all probability it was those resulting from the accumulation of excess agricultural production generated by the introduction of improved technologies such as the plough, the cart, and the use of animal traction.

We are, indeed, dealing with some of the most striking symbols of the so-called Revolution of Secondary Products (RSP). The existence of food products in surplus for the first time offers a glimpse of the instability and inter-group social tension, so well documented at Leceia, that will characterize the entire third millennium in Estremadura.

The energy supplied by harnessing bovine resources, applied both to agriculture (exemplified in the presence of the plough) as well as to transportation (the presence of the cart), was evaluated by Gimpel (1975). If the average speed of an ox is of the order of 0.73 m/s and the force applied approximately 54 kgf, the power is nearly 40 kgf m/s, which is higher than that calculated for a mule (30 kgf m/s), but lower than that for a horse (60 kgf m/s).

'The walls do not just mean economy, but economy and society. They are built to protect someone and something from others. Thus, the definition of “these others” is fundamental, as it is to know what types of societies confront each other and the economic context that allows it.’ (Gonçalves 1989–1991, 405). These are pertinent observations to which we will try to make a further contribution throughout this paper.

The second cultural phase: the Early Chalcolithic

At Leceia, after a period of abandonment that could have lasted between 30 and 150 years (Soares and Cardoso 1995), one can identify, at the very beginning of the Early Chalcolithic, (dated around 2800 BC) the building of an imposing fortification, standing either on the bedrock or on the layer corresponding to the occupation of the Late Neolithic (Cardoso
The defensive structure was undoubtedly carefully planned and methodically carried out. The differences recorded between this phase of occupation and the Neolithic phase are not enough, however, to suggest a cultural break (there would certainly have been a discontinuity of a socio-economic systems) and even less are they enough to suggest the arrival of new populations unfamiliar to the region. On the contrary, in this fortification one glimpses the logical consequence of instability in the Late Neolithic, and the continued preference for a naturally defensible site.

As with the Late Neolithic, the Early Chalcolithic is also dated at Leceia with a high degree of accuracy. The nine radiocarbon dates allowed the plotting of a probability accumulation graph (based on the CALIB program). At a probability of 50%, the duration of the Early Chalcolithic would have been between 2770 and 2550 cal. BC and, at a probability of 95%, between 2870 and 2400 cal. BC (Soares and Cardoso 1995).

We should remember, however, that the 50% probability period represents the *floruit* of the group, or rather, the period it flourished (see the discussion of this concept in Soares and Cabral 1993, 220). Given the above dates, it is certain that the Early Chalcolithic was of shorter duration than the Late Neolithic (2800–2600 BC). If so, the first fortification at Leceia, raised soon after the beginning of the early Chalcolithic, would go back to about 2800 BC. On the other hand, the *terminus* of this cultural phase would be close to 2500 BC, a conclusion reinforced by the dates ascribed to the following phase, the Middle Chalcolithic, to be dealt with below.

Leceia, then, should be considered to belong with two other, better known Estremadura sites — Vila Nova de S. Pedro (Azumbuja), where hundreds of flint arrowheads were found in hoards, perhaps constituting military arsenals, in the stratum Vila Nova I (Paço 1964, 145), and Zambujal (Torres Vedras). The vigour of Chalcolithic human expansion in Lower Estremadura was expressed in large fortified centres (in some cases showing proto-urban characteristics). Their location was determined by natural defences (they were all on platforms delimited by scarps, as at Leceia or Zambujal, or on the top of hills) close to agricultural valleys of high fertility, commanding the natural routes in the region. The favourable geomorphological conditions and the agricultural capacity of the soils were thus the two determining factors for the choice of such fortified places.

Farming activities in large fields or in small enclosed plots suitable for the growing of wheat and barley, as have been identified at Vila Nova de S. Pedro (Paço 1954), would have been the determining factors in the economy and subsistence of these Chalcolithic populations of Estremadura, in particular those living on the promontory of Leceia overlooking the fertile Barcarena valley. On the other hand, animal traction used in ploughing made crop growing possible on heavy, rich soils, such as the basaltic soils to the east, north and west of the prehistoric settlement. These soils were suitable for intensive agriculture of the kind which has been maintained up to the present day.

The importance of farming in these neighbouring territories is indirectly indicated by the pollen stratified in an episode of abandonment in the Early Chalcolithic sequence, detected at the site. Professor João Pais of the New University of Lisbon has recognized, in the relevant pollen spectra, a great predominance of gramineae and compositae, traditionally associated with the production of cereals. These species become dominant only in areas that are totally or partially abandoned for a period of time.

The artefacts recovered document the importance of agricultural life. These include axes destined for deforestation, frequently with edges blunted through use, hoes, numerous
hand querns and blades of sickles made out of flint. Vegetable crops were grown in small plots along the valleys, perhaps already using primitive irrigation systems (Parreira 1990), as is well illustrated at Vila Nova de S. Pedro by the existence of such plants as board bean (Paço 1954) and flax (Paço and Arthur 1953; Paço 1954).

At Leceia, even though seeds of these species have so far not been found, the evidence of agriculture and possibly horticulture is reinforced, not only by the tools already mentioned but by the existence of three flagstone structures of a circular plan best regarded as the bases of threshing floors (Cardoso 1989, figs. 73 and 74; Cardoso 1994a, fig. 15). Such structures were probably covered with compacted clay or hardened potter’s earth, as is used in similar traditional constructions today. The remains found in one of them show that such structures were used not only for processing cereals, but also for drying vegetables like broad beans comparable to those preserved by carbonization at Vila Nova de S. Pedro. We are dealing, at Leceia with the only known case, in the Chalcolithic of Portugal, which demonstrates the vigour of the fully established agricultural economy.

This system of production was complemented with the tending of sheep, goats and oxen, as well as with the raising of domestic swine which together provided the population with most of their protein. This shows just how settled these communities were and how proficiently they could handle the domesticated species that then, as now, constitute the primary source of protein in the human diet.

The hunting of deer and wild boar indicates the existence of clearances in the forests and large open spaces occupied by natural pastures suitable for the circulation of the herds of aurochs and wild horses present in the faunal inventories. Fishing and gathering molluscs on the nearby seashore were easier than now, for the rivers and streams were not as silted up. The change in conditions is due to the recent Flandrian rise in sea level. Fishing activities are quite well documented at most of these sites showing that fishing was important in supplementing the diet. The presence of several copper fish-hooks together with the remains of ciprinids (dory and porgy) demonstrates the practice of coastal angling. In addition, mention should be made to the fishing weights, either carved limestone blocks or just pebbles used in fishing lines or nets (Cardoso 1996).

Finally, the wear on several polished stone axes tells us of important forestry activities such as tree clearing, for opening up fields for agriculture or for pasturing purposes, as well as for obtaining firewood and other woodland products like acorns. The latter have been identified at Vila Nova de S. Pedro where they were ground into flour (Paço 1954).

From what has been shown at Leceia, one may visualize a community methodically and thoroughly exploiting the natural resources available in the surrounding habitats, from the estuary, through the coastal zone to the woods and pastures of the hinterland. The proximity of the shore to all the sixteen fortified sites in Estremadura listed by Jorge (1994, 465) shows, to a greater or lesser degree, the importance of maritime resources in the economy and subsistence of these populations. In the case of Lower Estremadura this is further emphasized by the distribution, around the Sado estuary, of Chalcolithic sites which took advantage of the elevated ground along the northern bank of the river (Silva and Soares 1986). The role of the aquatic resources in the diet of these populations is well illustrated in remarkable research work on the remnants of the malacological fauna collected at the fortified site of Rotura (Silva 1963). In the particular case of Leceia, the exploitation of the estuary is well documented from the Late Neolithic. In spite of the diversity of the exploited biotopes one need travel no more than 5 km to obtain all the molluscs identified there (Cardoso et al. 1996a). The Barcarena rivermouth
formed a small estuarine bay whose depths at low tide would yield oysters (*Crassostrea angulata*) as well as cockles (*Cerastoderma edule*). Upstream, clams (*Venerupis decussata*) were also found in intertidal mud and sand.

On the ocean coast of the Oeiras municipality, limpets (*Patella* sp.), mussels (*Mytilus* sp.) and other types of clams (*Monodonta lineata*), were collected from the rocks. Offshore, in slightly deeper sandy substrata, triton (*Nassarius reticulatus*), warty venus (*Venus verrucosa*) and scallops (*Pecten maximus*) could also be found. Numerous remains of all of these and other less common species have been found at the site. Even though abundant, the malacological fauna’s contribution to the food supply has yet to be defined. What we may accept is that with such plentiful remains at certain sites in the region, like Parede, the maritime resources must have provided an essential part of the diet (Correia 1980).

The early phase of the Estremadura Chalcolithic is particularly well characterized by the well-known fluted decoration applied to two types of pottery vessels: cups and ‘copos’, which have a restricted stratigraphic distribution.

The first place where fluted pottery — especially the ‘copos’ — was recognized as a valuable cultural indicator was at Vila Nova de S. Pedro. Yet, fourteen years, elapsed from the beginning of the excavations in 1937 before A. do Paço ‘began to suspect’ the existence of a stratigraphy, in spite of the recognition, in the campaign of 1942, of a layer pre-dating the building of the central fortification (Paço and Jalhay 1943). It was not until 1951, during the fifteenth digging campaign, that two very distinct layers were recorded under the inside face of the wall of the central fortification (Paço and Arthur 1952, 293). In the lower layer, ‘a high-quality sherd of red pottery was uncovered, made with fine, well-seived clay which had been well fired’. It was completely unlike the other ceramics. This was, as the authors explained, a vessel in the shape of a chalice, a deep kind of vessel, slightly curved and opening up delicately towards the mouth, with the decoration limited to parallel, chequered or herring-bone grooves. It carried a light burnish, made with a blunt implement drawn over the clay to give it a sort of polish. The authors were clearly describing a ‘fluted copos’, a form so characteristic of the Vila Nova I cultural phase (defined there by the so-called ‘lower layer’) that one can consider it as the stratotype (adopting the terminology of stratigraphical geology) of the initial Chalcolithic of Estremadura. In a short study dedicated to this type of pottery, A. do Paço states, ‘The stratum that lies directly above the bedrock of the fortification varies in thickness between 25 and 30 centimetres’ (Paço 1959, 254). The lack of definition of the relationship between this layer and the internal fortification led, in 1959, to the opening of a section to intersect the structure (Savory 1970). This demonstrated that that layer preceded the phase of the fortification — a fact accepted in the meantime by A. do Paço (Paço 1964). This pottery — the ‘Importkeramik’ of Sangmeister — (Paço and Sangmeister 1956a) would assume great importance in the colonialist doctrine that both authors proposed, as did the British archaeologist B. Blance (Blance 1961), who, in spite of earlier recognizing its local manufacture (Blance 1959) saw great similarity between such pottery and that of the Aegean (Early Cycladic). Since it does not occur in any other region of the Iberian Peninsula, this pottery could result from a direct relationship between the eastern Mediterranean and Portuguese Estremadura, a region considered by another German archaeologist as a door for oriental influences arriving by sea in a pre-Bell Beaker epoch (Leisner 1961, 425–6). B. Blance explicitly stated that ‘the frequency of herring bone decoration that connects the pre-beaker pottery mainly to that of the Aegean Sea allows the admission of “direct contact” with the civilizations of those regions’ (*op. cit.*, 426, 427). However, the apparent lack of
intermediate stations along the Mediterranean coast, might seem to argue against such contacts.

The comparison of this decorative pattern with Mediterranean ceramics had previously been proposed by Paço and Sangmeister (1956b). Sangmeister’s enthusiasm, when confronted for the first time with the imposing fortification of Vila Nova de S. Pedro — declaring that he had never seen anything like it before — along with the dramatic results obtained in the 1955 campaign (the ‘campaign of the walls’) — might explain (and might in part have served to invigorate) the search for distant parallels. Let us not forget that diffusionist theories were, at the time, taken to the extreme to the point of recognizing supposed Egyptian affinities in the dolmen paintings of Beira Alta (Leisner 1961, 425, 426). A ‘nuance’ of this extreme perspective was introduced by Savory (1970, 1983–84, 28 in the Portuguese translation): The ‘copos’ may represent a comparatively narrow chronological horizon and possibly a new element in the population, but, even though the inspiration appears to be coming from external sources they are certainly not imported. They were locally made and, whatever their inspiration, they have no exact parallels outside the Tagus estuary region. Moreover we now know that this is a form that already existed in the Late Neolithic in Leceia (Cardoso et al. 1983/84; 1996a).

Among the decorated pottery, one can also observe the use of the fluted technique inside large vessels with thick lips — a form that in Estremadura replaced the carinated cups of the Late Neolithic. (Besides Leisner’s monographic study of 1961, see also Cardoso 1989, fig. 119, no. 6; Cardoso 1994a, figs. 118, no. 2 and 119, no. 3 and 4.) This type of decorated vessel sometimes occurs in the Chalcolithic in the south-west, as at the site of Porto Torrão (Arnaud 1993) demonstrating the existence of contact between the Estremaduran area and the south-west during the Chalcolithic.

Among the other Early Chalcolithic remains in Estremadura, the quality of bifacial working of certain flint artefacts, sometimes called ‘Egyptian finishing’, is another allusion to the eastern Mediterranean invoked by those who believed in Chalcolithic diffusionism (Jalhay 1943). However, such a flaking technique was already known in the Late Neolithic of this region, and is illustrated by the fine halberds from the Cova da Moura cave (Torres Vedras) or the caves of Senhora da Luz (Rio Maior) (Cardoso et al. 1996b). Such a technique has expression in finely worked artefacts, like the beautiful mitre-shaped arrow points, unknown in the late Neolithic but plentiful at Leceia and at Vila Nova de S. Pedro, especially during the Chalcolithic.

In the Early Chalcolithic of Estremadura, the absence of copper artefacts has to be stressed, at least at Leceia. They are also unknown at Zambujal. At Vila Nova de S. Pedro the archaeological records are deficient, preventing any conclusion, although Savory (1970) found no traces of copper artefacts in the section cut in 1959 in the layer with ‘copos’ sherds belonging to this cultural phase. This matter is of major importance; at Leceia, the criterion of absence — significant considering the representative nature of the area dug — demonstrates that the building of that important fortification was dictated by defensive considerations only and is unrelated to metallurgical activities. This contradicts the thesis postulated after the excavation of Zambujal in the 1960s and 1970s, according to which copper extraction was the reason for the presence, in this ‘finisterrae’ of Europe, of groups of prospectors, metallurgists and merchants, who came from the eastern Mediterranean regions.

The successive phases of structural strengthening, observed in Leceia throughout the Early Chalcolithic, as in Zambujal and in Vila Nova de S. Pedro (shown by the excavations of
V. Gonçalves in the 1980s), were the result of planned readjustments. This suggests the continuation, or perhaps worsening, of social instability in the course of the Early Chalcolithic — a period of around 200 years during the first half of the third millennium BC. The magnificence of such building-work clearly demonstrates a hierarchical society, on an intra- and inter-communal level. The tribal model, which presupposes equality on account of blood ties, does not totally correspond to the observed reality. It is more appropriate to visualize a settled society, clearly established in its own territory, whose openness to external stimuli favoured the arrival of outsiders. The presence of the latter, however, are not necessary to explain the forms of intra-communal social differentiation which were already emerging. The differences in housing structure, both in size and quality of building may be related to privilege proportional to the social status of their respective inhabitants. One such case is an imposing house, circular in plan, situated in the best defended area, while others, smaller in size and built to a lower standard, are situated in places more easily exposed to enemy raids.

On the other hand, the building of this imposing fortification with its three defensive lines and a built-up area almost as large as Vila Nova de S. Pedro (10,000 sq m) and larger than that of Zambujal (7000 sq m) presupposes the existence of surplus food supplies. Only thus could a section of the population be released from productive activities for long periods of time.

Finally, one can visualize at Leceia not only the social division of labour, as in any other tribal community, but also a hierarchy of functions, leaving the general coordination of everyone’s work in the hands of an ‘elite’. In effect, the occupation of the Leceia platform, like the building of the inner enclosure of Vila Nova de S. Pedro, seems to have been the result of a previously defined plan methodically, accurately and simultaneously put into practice: the three lines of walls, occupying a space of about 10,000 sq m, can be shown to have been built at the same time, thus showing a clear a priori idea of what was intended to be built. Such a conclusion is based on the stratigraphic observations: leaving aside later repairs, reinforcements or modifications, all three defensive lines invariably lie either on the geological bedrock or on the layer corresponding to the Late Neolithic. This demonstrates that their construction occurred simultaneously, soon after the beginning of the Early Chalcolithic.

The cultural phase described as the Early Estremadura Chalcolithic is found in isolated places, among others in the small, elevated, unfortified sites built at such locations as Alto do Dafundo (Gonçalves and Serrão 1978) and Pedrão (Soares and Silva 1975). Its stratigraphic position, well defined at Leceia, is particularly interesting but there are few stratigraphies available in Estremadura, most of them being of limited value and significance. At the site of Parede (Serrão 1983) a layer was identified (the fourth of the defined general sequence) containing fluted pottery. However the conditions under which the excavations took place and the limited extent of the area exposed in the largely-destroyed site prevented definite conclusions being drawn. The other Estremaduran site is that of Rotura. In the sections studied (Ferreira and Silva 1970), the basal layer produced a vessel with fluted decoration but none of the characteristic ‘copos’ were found. These observations were later confirmed by one of the authors (Silva 1971). However what do occur in abundance, are fragments of large vessels decorated by blunt or fine impressions (with chequered and other designs), characteristic of the Middle Chalcolithic. The presence of numerous fragments of earthenware crucibles for melting metals, indicating the presence of metallurgy, lead one to ascribe the relevant layer not to the Early Chalcolithic but instead to the Middle Chalcolithic — and more precisely perhaps to the early phase of this period. This is comparable with the phase recently identified at Columbreira (Gonçalves, J.L.M. 1994). Here the use of imprinted ‘acacia leaf’ or ‘crucifera’ motifs was still
unknown, although the fluted decoration still survived, at least on some vessels. Such an interpretation answers doubts about the cultural position of this layer, which probably belongs to a late stage in the Early Chalcolithic of Estremadura (Silva and Soares 1986, 83).

In Estremadura, the Early Chalcolithic undoubtedly corresponds to a period of a flourishing economy, shown in the improvements achieved in productive capacity. Some of these were known from the end of the Neolithic, others only in the Middle Chalcolithic, and all were accompanied by the increasing complexity of the social fabric.

The third cultural phase: the Middle Chalcolithic

The Middle Chalcolithic in Estremadura begins at the end of the first half of the third millennium BC. It is generally well documented for the sites occupied or founded in the preceding cultural phase. Apparently this cultural phase is rarely found isolated at small sites, unlike some of the sites of the Early Chalcolithic and Late Chalcolithic (the epoch of the Bell Beaker ‘phenomenon’). One exception may have been the fortified site of Pedra de Ouro (Paço 1966; Leisner and Schubart 1966). Decorated pottery continued to be the most distinctive archaeographic element, as it had been in the preceding cultural phase. It takes the form of the well-known oval imprinted motif, organized in pairs (‘acacia leaf’) or in groups of four leaves (‘crucifera’). These are totally unknown in Layer 3 at Leceia, corresponding to the initial Chalcolithic (Fig. 4).

Together with the radiocarbon dates relating to other cultural phases, the eighteen radiocarbon dates available for Leceia’s Middle Chalcolithic make this site the best understood, in terms of its chronological-cultural evolution, of all those known in Portugal. For the first time, the statistical treatment of the whole set of data gives a date for the transition between the Early and the Middle Chalcolithic of around 2700–2600 cal. BC (Cardoso and Soares 1996). Greater accuracy is not possible at the moment, due to the fact that the available calibration curve (Stuiver and Pearson 1993; Stuiver and Reimer 1993) shows a very weak inclination with numerous oscillations in the time-interval in question. The *terminus* of this cultural phase may, however, be placed close to 2200 cal. BC, perhaps coinciding with the time when Bell Beaker pottery in Leceia and in other large settlements in Estremadura was well in evidence — one says ‘Middle’ because the first pottery of this type in Estremadura, and in particular at Leceia, is older (Cardoso and Soares 1990/92). The Bell Beaker presence at this site was discussed in the paper just referred to. It has been shown that the community living within the walls co-existed with the people with Bell Beaker pottery who had initially occupied the open space outside the fortification.

The special attention given to the defensive structures at Zambujal up to the Bell Beaker epoch (Sangmeister and Schubart 1981), is not paralleled at Leceia, where the defences belong almost exclusively to the Early Chalcolithic. The pre-existing defensive structures began rapidly to decay, with many of them found razed to their foundations before the Beaker presence within the walls.

At Vila Nova de S. Pedro, according to the observations from the last excavations (Gonçalves, V.S. 1994), the walls may have built progressively from the exterior to the interior, in such a way that the central fortification is the most recent. This agrees with the stratigraphic observations mentioned earlier.

The section cut through the site in 1959 (Savory 1970) provided the opportunity to identify a new cultural phase, with a stratigraphic identity never before revealed in
Estremadura. The acceptance of the presence of colonists from the eastern regions of the Iberian Peninsula (Savory 1968), corresponding to this cultural phase, was a compromise to accommodate the extreme diffusionist theories supported by earlier authors. Colonization from afar, never explicitly accepted by Savory, became intra-peninsular colonization, closer to more moderate diffusionist concepts and more acceptable. The implication was of the movement of small groups on a limited scale.

The cultural correlation of the layer above that of the ‘copos’ at Vila Nova de S. Pedro (Savory’s Period II) with the Middle Chalcolithic of Estremadura raises certain reservations. Indeed, the author gives prominence to ‘symbol ceramic’ with solar decoration, with evident Millarean parallels, but does not refer, even once, to the characteristic patterns of ‘acacia’ or ‘crucifera’ leaves. These are only mentioned (under the designation of ‘Chibanes pottery’, in the Portuguese translation of Savory 1970, 1983/84, 27), in Period III, thus co-existing with Bell Beaker pottery. A. do Paço found fragments of those ceramics, but did not ascribe any chronological-cultural meaning to them. On the contrary, he misinterpreted them, as is seen from his words regarding the samples from the fortified site of Pedra de Ouro, Alenquer (Paço 1966, 127): ‘The problem of the chronology of these last ceramics is one which worries us the most because they have not appeared to us in a well defined layer. One presumes them to be later than the Bell Beaker Culture’. As was shown later, this does not correspond to reality. It is probable that the absence of this type of ceramic in the layer overlying that of the ‘copos’ at Vila Nova de S. Pedro, in the section investigated by Savory, has more to do with the limited extent of the excavation than to real scarcity of pottery. In fact, several of these fragments are pictured in a recent work reporting on 50 years of excavations at that fortification (Arnaud and Gonçalves 1995, fig. 26). The significance of this pottery should not be underestimated. The constancy of decorated motifs and forms associated with them (exclusively in the region of Lower Estremadura) is remarkable. Such a phenomenon will certainly have a social explanation. Effectively, the homogeneity of these ceramics in a vast region like this indicates the existence of intensive social contacts and argues against there being closed and self-sufficient communities. This is exactly the opposite of what was demonstrated by Alarcão (1992, 55) in some of the Iron Age fortified sites of northern Portugal.

If one accepts pottery-making as a specific, essentially feminine task, in each settlement (Paço 1957; Coelho and Cardoso 1992), the constancy alluded to may be explained by virilocality: that is to say, women moving into their husbands’ homes, thus securing the diffusion of such ceramics through multiple marriages within the cultural area of the Lower Estremadura.

The large spherical storage vessels (‘provisions vessels’) show exuberant ‘acacia leaf’ and ‘composite leaf’ decoration at the lip. These vessels are more abundant in the full Chalcolithic of Estremadura than in the preceding period. As for the stone implements, one should stress the existence of the numerous oval, flint blades, mostly used in sickles. Their abundance in the Middle Chalcolithic in Leceia, when compared to the Early Chalcolithic, is six times as high. Such facts reflect the intensification of production then reached, made possible by the improvement in agricultural techniques as well as by the introduction of new activities which improved the exploitation of natural resources. The evidence of such activities is seen in artefacts, almost unknown in the Early Chalcolithic, such as weaving weights (Arnaud and Gonçalves 1995, 34) and cheese-presses with perforated walls, used in milk products: these are known only in the full Chalcolithic of Estremadura, at least in Leceia. The so-called Revolution of Secondary Products (RSP) was still in progress in the full Chalcolithic
of Lower Estremadura just as it had been in the north-east and south-west. For the eastern Upper Algarve, a clear demonstration of the same situation is given by Gonçalves (1989–1991, 409).

However, besides the introduction of these ‘novelties’, no alterations or discontinuities in the cultural sequence can be seen in the archaeological sequence at Leceia, in the bone and stone industry. This confirms the already-known conservative nature of such artefacts which Uerpmann (1995) asserts strongly for the stone industry of Zambujal.

In the Middle Chalcolithic, the ‘copos’ are replaced by vessels of analogous shape but coarser and larger, and now decorated with motifs such as ‘acacia’ and ‘cruciform’ leaves. At Leceia there is no confirmation of the hypothesis advanced by Parreira (1990) that the ‘copos’ were served different functions from other items of Chalcolithic tableware thus justifying their maintenance throughout the entire pre-beaker phase. On the contrary, one can see at Leceia the disappearance of the classical shape even though the tradition of its manufacture was not completely lost. Whether fine or coarse in style and whatever the decoration, the ‘copos’ are just drinking vessels, as their name implies. No wonder that we find them in a Bell Beaker context, although with decorations typical of the period (Bubner 1979, fig. 2; Gonçalves 1992, fig. 17, no. 3).

Whatever the conclusions, the stratigraphies obtained in the three major Chalcolithic Estremaduran sites, are difficult to correlate. At Vila Nova de S. Pedro, there is no reliable record save the stratigraphic cross-section of 1959, and this can be considered representative to only a very limited degree, a fact recognized by the author himself. The few published photographs of the earlier excavations are unfortunately of poor quality. At Zambujal, the record has favoured the definition of successive building phases to the detriment of careful stratigraphic investigation. Sections exist but are poor and difficult to correlate, thus preventing the establishment of a general stratigraphic sequence for the site and the corresponding cultural assemblage content (Sangmeister and Schubart 1981). The excavators postulated a similar sequence to that of Paço and Sangmeister (1956a) at Vila Nova de S. Pedro. In this scheme only two main cultural phases were identified: the pre-Bell Beaker and the Bell Beaker phases. This scheme would explain the occurrence throughout the entire building sequence — although in variable percentages — of the ‘acacia leaf’ and/or the ‘cruciform’ types of pottery decoration (Kunst 1987, abb. 70). Later, Kunst (1996, 280) improved the accuracy of the scheme by defining, for Zambujal, the following sequence based on pottery decoration:

1. The exclusive presence of cylinder-shaped ‘copos’;
2. Frequent cylindrical ‘copos’ + scarce ‘acacia leaf’ decoration and ‘composite leaves’ (‘carved leaves’ of the author);
3. Frequent cylindrical ‘copos’ + frequent carved leaf decoration + scarce Bell Beaker pottery;
4. Frequent decoration with carved leaves + frequent Bell beakers + scarce cylindrical ‘copos’ (rummaged specimens only);
5. Frequent Bell Beakers + scarce carved leaf decorations + absence of cylindrical ‘copos’.

These observations reveal an enrichment, throughout the stratigraphic sequence, of the ‘acacia leaf’ and ‘cruciform leaf’ decorations, absent only in the initial stage of the occupation of the site and in decline in the final stage, at the same time as the ‘copos’ also begin to decline and disappear while the Bell Beaker pottery takes their place.
At Leceia, these observations are well supported, with the difference that at this site the simultaneous existence of cylindrical ‘copos’ and Bell Beaker pottery is not confirmed. Also, the association of the ‘copos’ with ‘carved leaves’ pottery may be due to disturbance, given their vestigial character.

If our archaeological knowledge of the three Estremaduran sites most thoroughly studied is of very uneven value, what may one say of those sites where research was carried out by obsolete methods and without stratigraphic definition? Although less monumental, these sites are of no less scientific interest.

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