REGIONAL DEVELOPMENT AND INTERACTION IN SOUTH-EAST SPAIN (6000-1000 b.c.)

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REGIONAL DEVELOPMENT AND INTERACTION IN SOUTH-EAST SPAIN (6000 - 1000 b.c.)

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This study is concerned with the emergence and subsequent development of agricultural communities in south-east Spain. Using different scales of analysis and a wide range of data it focuses on regional variations in social, political and economic organization between the Early Neolithic and Argaric Bronze Age. Particular attention has been given to evaluating patterns of regional variation and the processes which underlie these patterns. A systematic survey (Chapter 4) provides much needed information about Neolithic-Bronze Age settlement in a regional context. Another important, and complimentary, part of this research is concerned with cultural development and variability at a larger scale. This second level of analysis (Chapter 5) is an examination of mortuary practices on an inter-regional scale and involves more than 2000 Copper Age and Bronze Age tombs. The conclusion (Chapter 6) is an attempt to place cultural developments in south-east Spain in a wider context. These discussions emphasize the dynamic relationship between ecological and cultural processes, and draw important distinctions between the growth of agricultural communities in the humid, as opposed to the semi-arid, zones of south-east Spain. The contrast between these two zones is clearly reflected by differences in social ranking, prestige displays, economic intensification, and settlement evolution. More importantly, perhaps, the nature of ecological-cultural interaction from 6000-1000 b.c. in south-east Spain provides valuable information about the growth and variability of complex societies.

CHAPTER I

HISTORY OF RESEARCH

Although a small number of prehistoric cemeteries in south-east Spain were apparently investigated in the Roman period (Molina González and Roldán Herváz 1983: 62) and during the Inquisition (Sánchez Cantón 1929)[1.], the roots of prehistoric archaeology in this area were more firmly established by work undertaken around the middle of the nineteenth century. Early research by Gongora (1868), MacPherson (1870), Inchaurrandieta (1870, 1875) and Navarro (1884), for example, provided a wealth of information about later prehistoric settlements, cemeteries and fortifications, as well as details about the range of materials associated with them. The work of these early pioneers was followed shortly afterwards by the more systematic, extensive and prolonged campaign of research conducted by Henri and Louis Siret between c.1880 and the beginning of the century - investigations which covered a wide range of sites from Palaeolithic caves to Bronze Age settlements (Siret and Siret 1887; Siret 1893; 1906, 1907, 1913).

Like the contemporary excavations of Schliemann (1878, 1880) in the East Mediterranean these inquiries began to raise important questions about the nature and chronology of various cultural developments (e.g metallurgy, tomb construction, colonization and trade) and were instrumental in creating an interest in the origin and evolution of prehistoric communities in Iberia generally. The Siret brothers were especially important in this regard. Attracted by the rich archaeological landscapes of eastern Andalucia and Murcia - covered with caves, megalithic cemeteries and hilltop settlements - the Sirets began an ambitious programme of excavation and fieldwork which culminated in the publication of their massive synthesis, Les Premiers âges du métal dans le Sud-Est de l'Espagne (Siret and Siret 1887). After more than a century, this work still remains an indispensible source of data for evaluating prehistoric development in south-east Spain.

In contrast to the scale of work pursued by the Sirets, most of the archaeological research in south-east Spain prior to the Civil War was fairly localized and produced results which varied widely in quality

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1. The Argaric cemetery of Baeza, in the central part of the province of Jaén, was excavated in the middle of the 17th century in order to obtain the relics of religious martyrs.

(Julio Fúrgus 1905, 1906, 1909; Cabré Aguiló 1922; Cuadrado Ruiz 1930; Such 1920; Motos 1918; Mergelina 1922; Belda Domínguez 1929; Pericot and Ponsell 1928). During this period excavators and excavations were handicapped by a lack of detailed and reliable cultural sequences. As a consequence, excavations were oriented towards site-specific problems which generally excluded any investigation of artefacts or assemblages in their wider cultural or geographic context. To make matters worse, the unsystematic methods used to collect this data, and incomplete publication of many projects, did little to promote any detailed understanding of materials, sites or the cultural sequence generally.

Until the Second World War the results of much of Louis Siret's work - particularly on funerary monuments in south-east Spain - remained in museum storage or in unpublished notebooks. Using these unpublished sources of information (including some limited fieldwork of their own), George and Vera Leisner completed an enormous survey of megalithic cemeteries in southern Iberia (Leisner and Leisner 1943). This extensive catalogue of several hundred megalithic tombs and their contents represents one of the largest and most detailed sources of Neolithic - Copper Age mortuary data in Western Europe. More importantly, however, the Leisners' comprehensive programme of research focused, for the first time in Spanish prehistoric studies, on a general 'common denominator' (i.e. tombs) which could be used for broad, regional comparisons. Systematic recording of these megalithic tombs provided an important vehicle for evaluating regional variability not only within south-east Spain, but also in other areas of the Peninsula, the Mediterranean and temperate Europe. With tombs established as a basic unit of comparison it was possible to detect several major differences in mortuary practices within south-east Spain, for example, on the basis of: (1) the presence or absence of megalithic tombs; (2) the relative concentration of tombs and cemeteries; (3) the form, size, and complexity of tomb construction.

The great potential of this study for further comparative and regional analysis, however, went largely unrealized. The systematic inventory of funerary monuments undertaken by the Leisners was unfortunately not followed up by an equally systematic exploration of their contemporary settlements, nor by attempts to relate these monuments to settlements. As a result, our present knowledge of Late Neolithic and Copper Age cemeteries is considerably more complete than our understanding of settlement patterns.

While the Leisners were undertaking work on megalithic tombs in south-east Spain a number of excavations began at major settlement sites in Murcia, Almería and Granada (Martínez Santa Olalla et. al. 1947; Martínez Santa Olalla, unpublished; Mergelina 1942; Val Caturla 1945, 1948; Ruiz Argilés 1948; Cuadrado Díaz 1943, 1944, 1945-1946; Crespo García 1948; Tarradell 1947-1948, 1948; Millan 1940). With the exception of excavations at La Bastida in Murcia, these projects were relatively small in scale and unrelated to a general research strategy. Even at La Bastida, where some attempts were made to investigate the area surrounding the settlement rather than simply the site itself, the methods used to collect information created a number of serious interpretive obstacles. Three dimensional recording, collection of floral and faunal remains, and systematic sampling were not employed at this site or in other contemporary excavations, and little or no attention was paid to the spatial variations of material within settlements. Apart from these methodological problems most excavations at this time failed to produce the type of deeply stratified sequence necessary for tracing long-term cultural developments and typological relationships.[2] With such serious chronological problems still unresolved, there was little incentive to relate different sites to one another, or to propose general sequences of development within specific areas.

In the last three decades, the pace and scope of archaeological investigation in south-east Spain has increased enormously. Moreover, from a methodological perspective, research in this area has gradually become more systematic as excavation strategies and analytical techniques have been improved. Throughout this period, excavations from Málaga to Alicante have focused on large settlements with long sequences, and with the aid of radiocarbon based chronologies, have done much to clarify the culture historical sequences in this area.

The main stimulus for this archaeological renaissance was provided by a series of investigations in the late 1950s and early 1960s, notably at the Cueva de Nerja (Pellicer Catalán 1963); Cueva de la Carigüela - Piñar (Pellicer Catalán 1964b); and perhaps most importantly, Los Millares (Almagro Basch and Arribas 1963). These projects were followed by an extensive and influential programme of research in north-eastern Granada at the sites of Cerro de la Virgen (Schüle and Pellicer 1966)

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2. The Final Neolithic (?)/Copper Age settlement of Terrera Ventura, excavated by Martínez Santa Olalla during this period, did produce a deep cultural deposit but these excavations have yet to be published; see Topp and Arribas (1965) for an inventory of some of the materials from this investigation.

and Cerro del Real (Pellicer and Schüle 1962, 1966). Shortly afterwards, these investigations, in turn, led to a systematic and long-term series of excavations in Granada directed by Professor Arribas and his colleagues at the University of Granada. This research programme included the following major sites: Los Castillejos (Arribas and Molina 1978, 1979); Cerro de la Encina (Arribas et. al. 1974); Cuesta del Negro (Molina González and Pareja López 1975; Saéz Peréz et. al. 1975); Torre Cardela (Molina Fajardo et. al. 1975); El Malagón (Arribas et. al. 1977, 1978); Los Castellones (Mendoza et. al. 1975; Aguayo de Hoyo 1977); and Cerro del Cortijo (Molina Fajardo 1980). More recently, this form of integrated, regional research has been paralleled by more intensive work in other parts of the south-east including coastal Málaga, Jaén, Murcia and Almería (Moreno Aragüez and Ramos Muñoz 1984a and b; Gran Aymeris 1982; Sánchez Ruiz and Casas Garrido 1984; Molina et. al. 1978; Muñoz 1982; Molina et. al. 1980; Martínez and Botella 1980; Arteaga and Schubart 1980; Schubart and Arteaga 1980, 1983; Schubart 1980; Ayala Juan 1979; García del Toro and Ayala Juan 1983).

While the primary objectives of recent research have been to refine local chronologies and culture historical sequences, less attention has been given to general syntheses. Indeed, a comprehensive and up-to-date overview of later prehistory in south-east Spain is altogether lacking at present. Systematic sampling, regional survey and other types of analysis (trade element, thin sectioning, faunal, botanical, sediment, etc.) which are common in other parts of the Mediterranean and temperate Europe have yet to become standard practice in south-east Spain. In general, contemporary research has continued to concentrate on large settlements and cemeteries without accounting for the range of natural resources or prehistoric activity in the vicinity of the sites under investigation. However, recent site catchment work by Gilman and Thornes (1984), integrating archaeological, historical and geomorphological evidence, has pointed out the potential of new approaches to the prehistory of this area.

Having briefly reviewed the history of excavation and fieldwork in south-east Spain, the following section is devoted to a short review of the interpretive models which have been applied to this area.

I. b. Summary of Models and Paradigms

Although many different factors have affected the direction and growth of prehistoric research in Iberia, and in south-east Spain particularly, archaeological paradigms in the Peninsula have, until recently, been dominated by two main concepts: 'diffusion' and 'colonization'. In general both of these terms have been poorly or loosely defined (cf. Renfrew 1978), and more often than not, have been applied uncritically to a wide variety of complex phenomena. In many cases it seems, simplistic ideas of this type have been used to explain away problems which deserve more careful and comprehensive analysis. In Iberia, for example, colonization and diffusion have been claimed for virtually every period of Peninsular prehistory, from Palaeolithic migrations (Almagro 1948) and intrusive Neolithic farmers (Malaquer de Motes 1972), to Copper and Bronze Age metal prospectors (Blance 1960, 1964; Almagro and Arribas 1963; Savory 1968).

The origins of colonial and diffusionist argument, in Iberia at least, appear to lie in the early attempts to explain widespread artefactual and architectural similarities with a minimal knowledge of their cultural and chronological contexts. While the deficiencies of archaeological data may have provided the initial stimulus for diffusionist-colonial perspectives in the Peninsula, historical processes were widely used to support and sustain them. Clearly, the use of these arguments by archaeologists in the Eastern Mediterranean (see critiques by Childe 1958, Renfrew 1967), and the documentation of such processes by classical scholars and historians, provided further justification for the development of such models in Iberia. The records of invasions, colonization, migration, warfare and trade in the historical period offered convenient analogies to explain the movement of ideas and materials across the Mediterranean. In particular, the long history of colonialism and far flung commercial activity throughout the Mediterranean provided a certain amount of empirical support for the diffusionist position. Spanish and Portuguese colonialism in Africa and the Americas, for example, would have provided a rich and immediate source of analogies for such interpretations. Transferring the reality of contemporary or historically documented processes of culture contact, population movement and so on, into prehistoric contexts was a common practice at the beginning of the century and remained fashionable in Iberia for a considerable period. While prehistorians were quick to make use of documentary evidence as a source of interpretive models, few of them appreciated the consequences of projecting unmodified historical phenomena back into a less familiar past.

Siret (1907), for example, was one of the first to use the 'colonial-diffusionist' model to interpret evidence from south-east Spain.

According to him, the large fortified settlements and megalithic cemeteries in Almería were the result of Phoenician colonies established in this area primarily for the purpose of locating and extracting metal ores. Bonsor (1899) adopted a similar 'orientalist' position in his treatment of megalithic architecture in Andalucia.

This early development of diffusionist models in south-east Spain was followed by a more general search for European and Mediterranean parallels which involved a number of different features: monumental architecture, tombs and a range of different artefacts (Dechelette 1908; Forde 1929, 1930; Childe 1925; Åberg 1921; Castillo Yurrita 1922; Thurlow Leeds 1920, 1922). Moreover, evidence of mining and metal production was used by Siret (1908, 1909, 1934, 1948) and others (Bosch Gimpera and Luxán 1935; Cuadrado Ruiz 1946) to verify the existence of foreign metal prospectors.

The Leisners' (1943) review of megalithic tombs was also strongly affected by diffusionist arguments. Passage graves, or so-called 'tholoi', in the Los Millares cemetery, for example, were regarded as Aegean in origin, while those in other parts of Andalucia were seen as the product of local nomadic pastoralists. This division between the indigenous population and foreign colonists proved to be an influential theme which continued to be used for some time - not only in south-east Spain (Schüle 1969; Schüle and Pellicer 1966; Kalb 1969, 1975) but also in Central Portugal (Savory 1968; Schubart 1969). Furthermore, the Leisners proposed that the rich grave goods from Los Millares were evidence of material imported from outside the Peninsula. Again, similar arguments for imported goods were made in the context of the Vila Nova de S. Pedro horizon in Central Portugal (Paço and Sangmeister 1956; Blance 1971). In both cases, 'exotic' objects such as idols, stone vessels, combs, decorated pottery, and bone pins were linked with East Mediterranean prototypes - predominantly the assemblages of the Cycladic and Early Minoan periods in the Aegean.

At the same time, attempts were made to strengthen the East Mediterranean connections with Iberia by establishing a link between fortified settlements in the two areas. Various investigators pointed to the similarities between defensive enclosures at sites like Campos, Los Millares, and Vila Nova de S. Pedro in Iberia with others such as Lerna and Chalandriani in the Aegean (Almagro and Arribas 1963; Blance 1960, 1964; Savory 1968; Paço and Sangmeister 1956). Topp (1959), on the other hand, argued for Balkan and Danubian influences in Mediterranean Spain during this period, on the basis of material from the Copper Age settlement of Terrera Ventura in Almería.

During the 1960s various modifications were made to the colonial and diffusionist positions, particularly with the advent of radiocarbon dates from Los Millares, but in general Iberian prehistorians still maintained the idea of close connections between the Peninsula and the East Mediterranean (Almagro and Arribas 1963; Arribas 1959; Blance 1964; Berdichewsky Scher 1964; Schüle and Pellicer 1966). Rather than alter the foundations of the diffusionist paradigm in any fundamental way, evidence from new excavations was merely used to support and reinforce them.

Renfrew's (1967) attack on this paradigm, however, dealt a crippling blow to the concept of colonies and to East Mediterranean contacts generally. His critique concentrated on several key arguments about the linkage between Iberia and the East Mediterranean, including:

(a) the chronological priority of innovations in the East, as opposed to the West, Mediterranean - especially passage graves and metallurgy

(b) the comparability of artefacts and assemblages in the two areas

(d) the existence of colonial settlements based on the control of metal sources

Renfrew's analysis pointed to a number of major flaws in the diffusionist position. First, radiocarbon dates for Iberian passage graves were considerably earlier than the Aegean proto-types from which they were supposed to have evolved. Next, there was a total absence of any recognizable objects of East Mediterranean origin in all of the proposed areas of colonial influence. Similarities between fortifications, figurines, ceramic vessels, metal daggers and other objects were found to be more apparent than real. Moreover, colonial centres like south-east Spain and Central Portugal were areas largely devoid of tin ores - a fact which did considerable damage to the idea of foreign metal prospectors. Collectively, these arguments constituted a major change in emphasis - from models of cultural change based on external stimuli (e.g. population movements, colonialism, and long-distance trade), to those based on more localized, internal mechanisms and processes of change.

Following Renfrew, more recent work in south-east Spain and the Peninsula has focused on the importance of local and internal developments such as metallurgy (Arribas and Molina 1978, 1979; Chapman 1984; Harrison and Craddock 1981), settlement (Arribas 1976; Arribas and Molina 1982; Arribas et. al. 1974, 1977, 1978, 1979, 1983; Lull 1983; Mathers 1984a and b), economy (Lauk 1976; Harrison 1985; Boessneck and Driesch 1980; Muñoz 1984) and social-political organization (Chapman 1975, 1981; Gilman 1976, 1981; Gilman and Thornes 1984; Mathers 1984a). This change in theoretical orientation, initiated by Renfrew's work in Iberia and the Aegean (Renfrew 1967, 1973), gradually had a profound effect not only on models of the Millaran Copper Age, but also the preceeding and succeeding periods.

Early Neolithic agriculture was always a particularly attractive focus for diffusionist ideas. The appearance of Asiatic domesticates such as ovicaprines, wheat and barley, together with cardial impressed pottery, polished stone axes, grinding slabs and rubbers created a formidable stumbling block for any notion of locally evolved farming strategies - particularly given the absence of these features in the preceeding Epipalaeolithic. For many years, there appeared to be little argument about the East to West migration of sea borne, immigrant farmers (Pellicer Catalán 1967; Savory 1968; Martínez Santa Olalla 1948; San Valero Aparisi 1946, 1956; Malaquer de Motes 1972). Recent evidence from Early Neolithic sites in Mediterranean Spain, southern France and neighbouring islands, however, presents a serious challenge to the idea of colonization of this area by Cardial farmers from the East Mediterranean. In general, the problems with this colonization model can be listed as follows:

(a) Cardial Impressed Wares are a development characteristic of the West Mediterranean, but are rare or absent in the East Mediterranean

(b) Radiocarbon dates for incised ware assemblages in Andalucia place them at least a millennium before the earliest dated Cardial Impressed Ware site in Mediterranean Spain (i.e. Coveta de l'Or - c. 4800 b.c.) and contemporary with the earliest cardial sites in southern France (i.e. Cap Ragnon and Camprafaud - both c. 6000 b.c.). This fact, together with the regional variations within Cardial assemblages themselves, indicates considerable diversity in development rather than uniform colonization.

(c) Early Neolithic communities throughout the West Mediterranean show little signs of developing an intensive mixed farming strategy until the 5th 4th and in some cases even the 3rd millennia b.c. The commitment to cereal cultivation is a very gradual process, and varies widely from region to region.

(d) The development of plant and animal domesticates, maritime activity, ceramic production and other

> features traditionally associated with Early Neolithic and early agricultural communities do not correlate well with one another either in space or time (cf. Lewthwaite 1981, 1985)

These points,however, do not alter the fact that some elements (such as ovicaprines and domesticated cereals) do appear to be introduced into the West Mediterranean during the Post-Glacial (Geddes 1983, 1985; Lewthwaite 1981). Consequently, arguments about the origins of early stock and cereal economies still, rightly, focus on the possible mechanisms for their introduction - though in recent years less attention has been paid to 'colonization' by immigrant farmers (e.g. Geddes 1984; Guilaine et. al. 1979). Moreover, recent investigations of Neolithic communities in Mediterranean Spain have begun to focus on regional variations in settlement and economic strategies and the sources of those variations (Pellicer and Acosta 1982; Muñoz 1984; Martí Oliver 1978; Mathers 1984a).

Because of their extensive distribution and the different features associated with them, the development of Bell Beakers in the Peninsula presented a problem which was entirely distinct from that posed by the appearance of mixed farming strategies. The models designed to resolve this problem, however, were familiar diffusionist ones. Superficial similarities in the form of Iberian and European Beakers, and the general lack of closed finds, led to a great deal of argument about the origins and chronology of Bell Beaker pottery and other paraphernalia associated with it (e.g. wristguards, V-perforated buttons, etc.). Several impressionistic scenarios were constructed to explain the widespread similarities in these assemblages, and the reasons for the seemingly simultaneous spread of Beaker artefacts and copper metallurgy. These descriptive models included: a mobile warrior class (Savory 1968), nomadic pastoralists (Malaquer de Motes 1972), armed merchants (Childe 1958) and itinerant smiths (Sangmeister 1972). A general attempt to explain the distribution of various Beaker traits and objects was made by Junghans et. al (1960) and Sangmeister (1972) who proposed a 'reflux' movement involving an initial diffusion of Beaker materials from Iberia to Central Europe, and a secondary diffusion of traits in the opposite direction. All of these models failed to point to any mechanisms which could have been responsible for the population movements, conquests or regional contacts which they proposed. Moreover, they generally associated Beaker pottery with a particular ethnic group (Beaker people), and attributed broad stylistic similarities to their movement across Europe.

On the other hand, more recent investigations have provided a wealth of information about regional variations in Beaker development which destroy the concept of uniformity within the Iberian Bell Beaker complex (Harrison 1977, 1980; Harrison and Gilman 1977; Delibes de Castro 1977). Throughout southern Iberia, Beakers are found in a variety of locations within settlements, as well as in passage graves, dolmen, rock-cut tombs, 'gallery' graves, caves and rockshelters. Harrison's detailed work on Beakers in different parts of the Peninsula has underlined significant regional variations in: (1) the frequency of different types of Beakers; (2) the range of different forms, motifs and decorative techniques; (3) the quantity of Beaker decorated vessels; (4) the longevity of Beaker motifs. Perhaps most importantly, recent research has shifted the focus of Beaker studies from the search for origins to the explanation of local variations and to the processes involved in long-term social change (Chapman 1975, 1981; Gilman 1981; Harrison and Gilman 1977; Harrison 1980; Gilman and Thornes 1984; Mathers 1984b).

Moreover, evidence of pre-Beaker metallurgy in south-east Spain (Arribas and Molina 1978, 1979; Almagro Gorbea 1979) and central Portugal (Harrison 1974, 1977; Monteagudo 1977) suggests that the connection between Beaker assemblages and the introduction of metal technology is spurious. It also indicates that the general relationship between Beakers and metallurgy is more complex than many earlier models suggested. Finally, the long period in which copper metallurgy develops, and the relatively low level of production in both the Pre-Beaker and Beaker phases in Iberia (Almagro Gorbea 1979; Monteagudo 1977; Chapman 1984) suggests that:

(a) metal production developed gradually and in fairly localized areas in both the Pre-Beaker and Beaker periods

(b) the manufacture of metal objects and metallurgy during these periods has often been overestimated and misunderstood

(c) the manufacture of copper objects was a local innovation rather than an external introduction

Research on the Argaric Bronze Age in south-east Spain has consistently stressed the importance of external stimuli as a major factor in cultural development during this period. Traditional models of the Argaric have fixed its origins either in Central Europe (Siret 1907; Dechelette 1908) or the Central-Eastern Mediterranean (Evans 1955-1956; Brea 1953-1954). Many of the traditional characteristics of Argaric communities such as bronze weapons; silver, gold and other ornaments, as well as cist and pithoi burials were seen as evidence of links between these areas (Jungans _et_. _al_. 1960; Savory 1968; Blance 1960, 1971; Schubart and

Arteaga 1983). In most cases, the arguments connecting temperate European or Eastern Mediterranean Bronze Age communities with the Argaric were based on similarities between selected types of artefacts, rather than systematic comparisons of assemblages and their variations. Moreover, the geographic origin of particular Argaric traits was seldom specified. Blance (1964: 139), for example, suggested that the Early Bronze Age - or Argar A - in the southeast 'was interrupted by the arrival of pithos (burying) people from somewhere further East'.

The establishment of Argaric communities throughout south-east Spain and their emphasis on the production of metal objects has traditionally been regarded as evidence of foreign metal prospectors (Childe 1925; Bosch Gimpera 1954; Almagro Basch 1958; Malaquer de Motes 1972) - models which were, in many ways, similar to those used to explain the presence of fortified settlements in the preceeding period. Again, however, recent research has exposed the failure of diffusionist models to account for the patterning in available data. In particular, the model of settlements occupied by foreign metal prospectors does little to explain why El Argar, the type site of the south-eastern Bronze Age, has such a large quantity of metal objects, despite the fact that ore sources are not available in its immediate vicinity. Moreover, as Gilman and Thornes (1984) have noted, a comparison of the distances between: (1) known ore sources and known CopperAge/Bronze Age sites, and (2) known ore sources and randomly selected points, did not produce any significant differences. This suggests that, if ore sources did affect the location of Argaric settlements in any way, they were a relatively minor or secondary consideration.

Another aspect of Argaric development which has been reinterpreted in the last few years is the dramatic change in funerary rituals between the Late Copper Age and Early Bronze Age. In the past, this transition has been viewed as an abrupt one brought about by the arrival of new populations or new traits (Blance 1971; Savory 1968; Bosch Gimpera 1954; Carriazo 1963; Schubart 1974). Lull (1983) and Ayala Juan (1979-1980), on the other hand, have pointed to a number of similar features in the ceramic assemblages of both periods. Furthermore, recent excavations at Fuente Alamo (Schubart and Arteaga 1983) have emphasized that there are at least some elements of continuity between Late Copper Age and Early Bronze Age funerary assemblages, such as 'covacho' or rockshelter burials, and stone idols. V-perforated buttons from the El Argar cemetery (Siret and Siret 1887) provide more evidence of continuity between these two periods. Finally, Chapman (1981) and Mathers (1984a) have suggested that the origins of individual burial can be seen in the increasing complexity and differentation in Late Copper Age megalithic tombs. Rather than involve mysterious influences from untraceable homelands, recent research on the development of the Argaric has recognized the need to examine Bronze Age communities from many different perspectives - technological, economic, ritual and socio-political (Gilman 1976, 1981; Lull 1983; Chapman 1975, 1978, 1981, 1984; Mathers 1984b).

Present Research Strategies: Directions and Problems

The social evolutionary perspectives promoted by Renfrew (1967), and later expanded by Chapman (1975, 1978, 1981) and Gilman (1976, 1981) have stressed the importance of internal dynamics and development, and the necessity for understanding cultural change in its local context. Until recently, however, many models of south-eastern prehistory were based on a reworking and re-evaluation of older evidence. As a result, discussion of local 'autonomy' and innovation have tended to treat development in south-east Spain in a rather general way, comparing it in 'block' fashion with other parts of Iberia, the Mediterranean, or temperate Europe (e.g. Harrison 1977, 1980; Gilman 1976). While general comparisons of this kind are necessary, and valuable, rather less attention has been paid to regional variability <u>within</u> south-east Spain (see, however, Gilman and Thornes 1984). A detailed understanding of this variability will not only shed light on the patterns of cultural development in this region, but will also improve the results of more general, comparative analyses.

New excavations, especially the major programme of excavations undertaken in Granada and Almería by Arribas and his collaborators, have made an enormous contribution to our knowledge of the cultural-chronological sequence in the south-east, and have made it possible to establish a variety of new models on more concrete and satisfactory foundations. Nevertheless, it is clear that a comprehensive understanding of Neolithic-Bronze Age development in south-east Spain will not come about simply as a result of amassing large amounts of new data. Some of the evidence from recent excavations, for example, continues to be interpreted in terms of metal prospectors or East Mediterranean contacts (Aguayo de Hoyo 1977; Hernández Hernández and Dug Godoy 1975; Arribas *et. al.* 1977; Schubart and Arteaga 1983). Moreover, the lack of integrated studies at the site, and regional, levels has diluted the value of much of the research pursued in the last decade. Without fundamental changes in the way data is collected, and evaluated, however, it is difficult to see how either old paradigms or new models can be adequately tested.

What is badly needed in south-east Spain at the present time is a variety of investigations concentrating on different geographic and temporal scales. If we are to understand local development and 'autonomy' we need to look for different ways of defining and assessing these variables in time and space. It is clear, for example, that on one level the cultural sequence in the south-east as a whole is markedly different from other areas of southern Iberia, and indeed, the West Mediterranean generally - a characteristic which underlines a certain 'autonomy' with respect to the development of this region. On the other hand, imported material such as ivory, ostrich eggshell and Bell Beakers point to another aspect of cultural evolution which is not independent, but connected to larger scale developments. It is also apparent that there are marked differences within south-east Spain, from both a synchronic and diachronic perspective. In short, the complex process of assessing cultural evolution in this area must begin by addressing aspects of regional variability which are not limited to site-specific problems or to small, localized areas.

Site catchment work by Gilman and Thornes (1984) in various parts of Málaga, Almería, Granada and Murcia has already begun to develop a more systematic approach to regional analysis in south-east Spain. Although rare at present, comparative investigations of this type can, and should, be complimented by other types of research at the regional level.

Background to this Investigation

Given the potential of intra-regional and inter-regional comparisons, and the general lack of these approaches in south-east Spain, the major objective in my research was to develop a series of different data sets appropriate for the analysis of cultural development at several geographic and temporal scales. In order to accomplish this goal, the research presented in Chapters IV and V focused on:

(a) the controlled collection of new data at a regional scale

(b) the development of new approaches to existing data and the analysis of inter-regional patterning

(c) the integration of old and new sources of evidence

In order to provide specific and reliable evidence on local evolution and development, the investigation described in Chapter IV focused on a systematic survey of prehistoric activity in the Guadalentín Basin in southern Murcia. The purpose of this case study was to provide a detailed example of long-term, regional development. Archaeological surveys are of limited value, however, unless the results can be applied in a comparative way to their wider geographic and cultural surroundings. Inevitably, the problem is one of relating detailed case studies to other, less well investigated areas. In south-east Spain, this problem is made more acute by the absence of other, controlled regional surveys. In some respects, the larger quantity of settlement data from this area compensates for its generally poor quality, so that it is possible to make some statements about general settlement despite the lack of systematic fieldwork.

Another approach to the problem of how to evaluate inter-regional variability is presented in Chapter V. This section emphasizes the importance and potential of evidence from mortuary contexts in south-east Spain. The vast amount of evidence from these tombs has been used as a 'common denominator' to compare development and variability in different regions. Together with other types of data from settlement excavations, these approaches provide a 'hierarchy' of evidence which can be used to evaluate development at a variety of different scales. When integrated, this evidence helped to establish a detailed, general model for the evolution of Neolithic, Copper Age and Bronze Age communities in south-east Spain.

Although the focus of this study is south-east Spain as a whole[3], the case study presented in Chapter IV concentrates on the Guadalentín drainage basin in southern Murcia. This particular region was chosen for a variety of reasons. First, this zone incorporates a wide range of ecological and topographic zones including a broad stretch of lowlands, fringed by foothills, and followed by a series of pre-littoral ranges (reaching a maximum of 1500 m). Another reason for selecting this area was the general lack of information here. In the last two decades, during a period of intensive archaeological work in Almería, Granada, Málaga and Jaén, the province of Murcia has received relatively little archaeological attention - a situation which has left an important gap in our understanding of cultural development in the south-east. Prior

3. That is to say, the provinces of Málaga, Jaén, Albacete, Murcia, Alicante, Almería and Granada.

to this period work in the Guadalentín Basin had generally been sporadic and poorly documented (see Chapter IV) , and like other parts of south-east Spain, no attention had been given to the analysis of regional site distributions.

Given the lack of detailed information here and in other lowland areas of Murcia and Almería, several major questions were posed by existing data:

(a) Was the lack of Neolithic sites in these semi-arid zones genuine or the result of other factors (e.g. geomorphic processes, differences in fieldwork intensities, etc.)?

(b) What factors were responsible for the clear variations in funerary traditions between regions (e.g. megalithic tombs throughout lowland Almería, but generally cave and rock-shelter burials in Murcia)?

(c) Were there any pronounced differences in settlement or funerary traditions in the humid, as opposed to semi-arid,regions?

(d) What processes stimulated the shift in cultural focus from southern Almería in the Copper Age, to northern Almería and southern Murcia in the succeeding Bronze Age?

(e) Why is there general continuity in settlement patterns and material culture in the humid uplands but dislocation and discontinuity in the drier lowlands?

The major problems raised by cultural development in southern Murcia, and the semi-arid lowlands generally, suggested that the Guadalentín Basin would be an important area for research,and that the results from this region would have wider implications for understanding the long-term sequence in both the upland and lowland zones.

CHAPTER II

SOUTH-EAST SPAIN: ENVIRONMENTAL SETTING

II. a. Present Environments

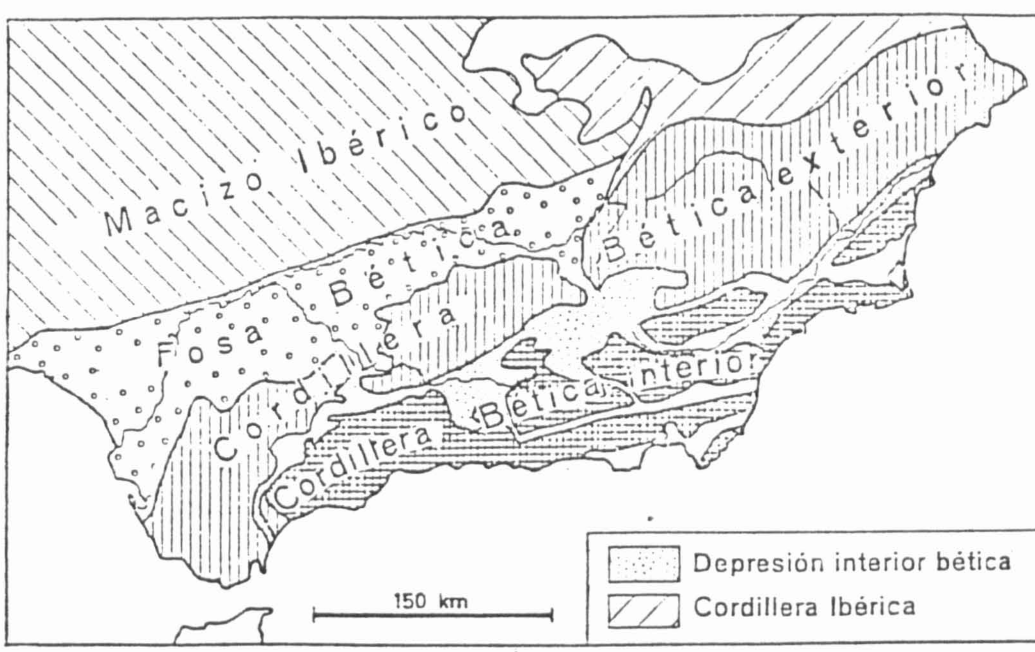
In both the horizontal and vertical dimension, south-east Spain is a zone of dramatic contrasts. The snow covered peaks of the Sierra Nevada lie only 40 to 50 km north of the narrow strip of sub-tropical lowlands which make up the Costa del Sol. While rainfall reaches an annual average of 128 mm on the semi-arid plains of the Cabo de Gata, it increases to nearly 20 times this figure in the alpine areas of the Sierra de Grazalema in Central Málaga (Neumann 1960). The eastern coastal plain and the interior lowlands - plagued by high temperatures and extreme, annual variations in rainfall - contrast with the generally wetter and cooler regimes in the west and northwest (Appendix 2:1).

Although the primary focus of attention in subsequent chapters will be on tracing the development of later prehistoric communities in Murcia, Almería and Granada, for the purpose of this discussion, south-east Spain will be defined in broader geographic terms so as to include the provinces of Alicante, Málaga, Jaén and Albacete. Morphologically, this area is dominated by the Betic or Andalucian Cordillera, an alpine mountain system which extends northeast in a wide band from Cádiz to the eastern coast - just south of the Júcar drainage basin. This range is the highest in the Peninsula and can be sub-divided into 3 major units, all running parallel to each other in a south-west to north-east direction (Figure 2:1).

The southernmost of these units, known as the Interior or Peni-Bétic Cordillera, is composed largely of metamorphic and sedimentary rocks which rise steeply from the south coast towards the northeast in a series of transverse fractures. Crystalline rocks in the centre of this range culminate in the oval-shaped domes of the Sierra Nevada (3481 m), Sierra de Baza (2242 m) and the Sierra de Filabres (2168 m). These steeply inclined domes are separated from one another by a number of synclinal depressions which have been further accented by fluviatile erosion - primarily by the Andarax and Guadalfeo Rivers. Secondly, there is the Sub-Bétic or Exterior Cordillera, stretching north-east from Cádiz in a discontinuous line towards the Valencian coast, and constituting the

Figure 2:1

Structural Division of the Cordillera Bética (or Andalucian Mountain System)



(from Lautensach 1967: Figure 43b)

largest component of the Bétic mountain system. The numerous sierras that make up this range consist mainly of limestones and average less than 2000 m in height. Finally, the Intra-Bétic Depression, situated between the Peni-Bétic range in the south and the Sub-Bétic system in the north, extends some 450 kilometres northeast from the Guadiaro Valley near the Straits of Gibraltar, to the Mediterranean coast - south of the city of Alicante. This depression is primarily composed of a series of discrete intermontane basins such as those at Loja, Moreda, Granada, Guadix, Baza and Lorca. Houston (1967:194) describes this depression as a complex feature:

> "... sometimes forming a fractured basin as in the Miocene Vega of Granada, aided by synclinal features, or flexured troughs floored by Tertiary detritus, or simply the alignment of softer rocks removed by differential erosion. In the valleys of the Guadiana Menor, Almanzora and Guadalentín, it comprises an extensive series of badlands. Elsewhere the Tertiary plains appear more docile and cultivated".

To the east and south of this large mountainous barrier lie the interior lowlands - and further east, the margins of the Mediterranean coast. The southern and eastern coasts of this region are narrow, rugged and fringed by cliffs, particularly along the Costa del Sol where mountains extend up to the sea front. A number of larger, but sporadic pockets of coastal plains are found around the cities of Málaga and Almería, as well as to the south of the Almanzora drainage in eastern Almería. The most extensive coastal plains however, are found between Cartagena in southern Murcia and the city of Alicante. All of these coastal lowlands are bordered by the Bétic Cordillera, to either the north or west.

The dissected and variable nature of landscapes in south-east Spain clearly presents difficulties for any overall evaluation, or comparison, of contemporary environments in this region. In order to overcome these problems, therefore, it is necessary to define several generalized environmental zones. These zones, which have been broadly defined below (also see Appendix 2:2), generally correspond to the tripartite geographic-geological division outlined above.

(a) <u>Mountainous Upland Zones</u>
Highly dissected and steep sloping terrain (i.e. with slopes greater than c. 8-10^{o}) between c. 600-3500 m. These areas consist almost entirely of the sierras in the Bétic Cordillera system (both Interior and Sub-Bétic ranges).

(b) <u>Intermontane Basins</u>
Enclosed upland valleys, including some

'badlands', generally above 600 m and gently sloping (i.e. with slopes of less than 8^{o}). These areas lie within the Intra-Bétic Depression.

(c) Coastal and Interior Lowlands
Gently sloping terrain below 600 m (including some extensive 'badlands') which forms the lowland area of the littoral fringe. This zone is composed of various stretches of coastal plain which surround the pre-littoral ranges of the Interior Bétic Cordillera.

These structural units correspond to a graded series of general climatic and altitudinal zones, with semi-humid regimes at high altitudes, dry regimes at intermediate height, and extremely dry zones at the lowest altitudes. While these divisions are highly schematic and largely based on morphological features, they nevertheless correspond well with the various climatic and vegetational divisions of south-east Spain proposed by Solé Sabarís (1954), Sermet (1967), Lautensach (1967), Neumann (1960) and others.

The climatic regime of south-east Spain parallels in many ways the more generalized patterns that affect the entire Peninsula: rainfall increases from east to west, and with altitude; the range of annual temperatures increases from the coast towards the interior; and aridity increases from north to south, and from west to east. Furthermore, just as in the Peninsula as a whole, south-east Spain can be divided into zones with Atlantic, Mediterranean and Continental climatic regimes. Areas with a moist Atlantic climate are found in the west (i.e. the western fringe of the Sub-Bétic Cordillera), zones of drier Mediterranean type regime occur in the east (coastal and interior lowlands), while Continental regimes are found throughout much of the upland interior (large parts of the Peni-Bétic and Sub-Bétic Cordillera, and particularly the intermontane basins). Each of these three zones, however, is characterized by specific meteorological patterns that not only distinguish them from one another, but also separate them from other climatic provinces in the Iberian Peninsula.

The largest of these three zones, the mountainous uplands of the Bétic Cordillera, receives the highest and most regular precipitation in south-east Spain - with annual averages ranging from c. 600 to over 2000 mm per year (Neumann 1960). Sierras located on the western exterior of the Sub-Bétic Cordillera are directly exposed to Atlantic breezes and consequently have very high annual rainfall totals - particularly in the south-west: Sierra de Grazalema (2109 mm), El Robledal (1220 mm) and

Montifarte (1133 mm). Rainfall in this upland zone decreases rapidly towards the east-northeast, however, because of the diminished effects of moist Atlantic winds (blocked by the Sub-Bétic Cordillera), as well as the development of foehn[1] and rainshadow conditions towards the Mediterranean coast.

To the south, the coastal ranges of the Bétic Cordillera are characterized by high humidity and rainfall because of their exposure to both Mediterranean, and less frequently, Atlantic fronts. In much of this coastal mountain zone (running east from Tarifa to Adra), precipitation reaches 1000 mm or more (Neumann 1960). While the Sub-Bétic range, and the south-western portion of the Peni-Bétic system are characterized by annual rainfall totals of 800-2000 mm, mountainous areas of Peni-Bétic range north-east of the Andarax drainage in Almería are considerably drier, with annual averages generally between 500 and 800 mm. The number of rain days is high throughout much of this region; for example, stations above 1000 m in the Sierras of Pozo and Cazorla in Jaén average more than 100 rain days per year (Neumann 1960: 185). In addition, the frequency of snow days generally increases with altitude, and with distance from the coast. As a result of low winter temperatures, snow cover in a number of the higher ranges - for example, the Sierra Nevada (3481 m) or Sierra de Cazorla (1474) - may last from one to four months (Lautensach 1967: 45), and makes considerable impact on local water budgets during periods of spring melting.

The Intra-Bética or Interior Depression is a linear arrangement of intermontane basins and receives considerably less rainfall than the mountainous upland zone which defines the border of these elevated plains. Since these basins are enclosed on nearly all sides, the effects of Atlantic cyclones and maritime influences from the nearby Mediterranean are minimized or cancelled altogether. Just as in the mountain zones, rainfall in this depression is greatest in the south-western corridor and diminishes markedly towards the north-east (Neumann 1960). For example, the more open basins of Loja and Granada in the centre of the depression average 400-600 mm. per year, while the basins of Guadix, Baza and Huéscar to the north-east, surrounded by high sierras, have an annual average of only 300-350 mm. (Neumann 1960: 201-202). Throughout the depression there is a consistent fall-off in precipitation from the upland margins to the central interior of each basin.

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1. A foehn, or föhn, is a warm, dry wind which blows down the leeward side of a mountain range.

Finally, the interior and coastal lowlands are distinguished from the other two zones by their extremely low precipitation values and widely variable rainfall. The semi-arid lowlands of Almería, located in the centre of this zone, constitute the driest area of Europe - with large parts of this region receiving less than 250 mm. annually. Within this sector, the lowest and most unpredictable rainfall occurs along the coast, immediately adjacent to the sea. At the coastal station of Cabo de Gata for example, Neumann (1960: 175) notes that the yearly rainfall total for 1913 was a mere 17.0 mm., while five years later it reached 344.0 mm - more than 20 times the earlier figure. Moving north of the coastal and interior lowlands in southern Almería(which average less than 300 mm. throughout), rainfall increases considerably around the Almanzora drainage, but falls again to below 300 mm. further north in Murcia, in the vicinity of the Segura Basin. The average number of rain days in parts of this littoral zone is only 17-20 days - five times lower than in some of the western uplands of the Sub-Bétic Cordillera (Neumann 1960: 185). Torrential storms are common throughout this zone - both on the coast and in the interior lowlands (Elías 1963; López Bermúdez 1971, 1973; Thornes 1976: 44-45), and in the modern period have been particularly dramatic in the areas such as the Alpujarras below the Sierra Nevada, and the Almanzora Basin in eastern Almería (Thornes 1976: 45, fig. 4:1).

Like much of the Mediterranean, south-east Spain is affected by prolonged summer drought (Vilá Valentí 1961 a and b). The number of dry months (i.e. with less than 30 mm. of rainfall) increases from 2 in the western sierras, to over 3 in the centre of the Intra-Bétic Depression, and finally reaches 5-6 months on the southern coast (Lautensach 1967: 690). While winter dry months are lacking in the uplands of the Bétic Cordillera, they often occur along the coast and within the interior, largely because of the persistence of the high temperatures, dry North African winds, cloudless skies and low relative humidity.

Annual temperatures are high across the whole of the south-east, with maximum values of 18-19^{o}C on the southern coastal strip between Málaga and the Cabo de Gata. Following the coastline north-east and south-west of this sub-tropical zone, annual temperatures decrease to 17.4^{o}C at Alicante and 15.8^{o}C at Tarifa, respectively (Neumann 1960:189). In contrast, annual temperatures in the interior are significantly lower, falling to 8.8^{o}C in the Sierra de Pozo to the north-west. Annual fluctuations in temperature increase with distance from the coast, as the maritime influences of the Mediterranean are reduced. For example, temperature variations in the Sierra de Cazorla in the northern half of the Peni-Bétic range average more than 20^{o}C annually - nearly twice that of the more temperate coastal fringes.

Despite the effects of human interference and geomorphological changes, the present cover of vegetation in south-east Spain nevertheless, does correspond, in some ways to the generalized pattern of contemporary climate outlined above. Throughout much of the littoral zone and the Intra-Bétic Depression the vegetation has adapted to a set of conditions characterized by high temperatures, prolonged drought and high rates of evaporation.

Mountainous uplands, on the other hand, are characterized by cooler and moister conditions, and hence, a different type of vegetation. In the Sierra Nevada and some of the other high sierras, for example, Alpine pastures and woodlands of silver pine or Spanish fir surround the upper slopes. Less elevated upland areas exhibit a more broken cover of vegetation, largely those communities associated with Quercus illicus, Quercus pubescens, Quercus cocciferae or red pine. Because of the compact, vertical zonation of ecosystems in the Bétic Cordillera, and its varied geology and pedology, this area presents a large number of distinct vegetational communities. On the Atlantic facade of the Bétic Cordillera, north-west of Tarifa, lies a band of coastline dominated by pinon pine, while the adjacent coast of southern Málaga and Granada is dominated by sub-tropical species linked with the dwarf palm. The south-eastern littoral from Adra to Alicante on the other hand, is covered by a large expanse of semi-arid steppe dominated by Stipa tenacissima (esparto grass), Lygeum spartum('matweed'),and various aromatic shrubs with extensive areas of halofitic vegetation along the coast and around the margins of inland lagoons. This dry steppe vegetation is typical of badland areas in southern Almería and Murcia, as well as the Guadix and Baza basins in the interior (Lautensach 1967; López Bermúdez 1973; Sermet 1967). In contrast to the diversity of scrub vegetation that has developed in the upland zone - particularly tree species (carob, various types of oak and pine, wild olive, and palm) the variety and density of vegetation in the more arid lowlands is much reduced. The range of vegetation in these lowlands is constrained by the general homogenity of relief, and more importantly, by the pattern of low and irregular rainfall.

II. b. Geomorphic Processes in the Contemporary Environment

Before moving on to discuss the character of past environments in south-east Spain, it is important to examine how geomorphological factors have affected the appearance and composition of the modern environment. It is clear that geomorphological processes at work in landscapes throughout south-east Spain have had considerable influence on the nature and distribution of various environmental features - soils, vegetation, water availability and topography. Although the magnitude of these effects has been enhanced considerably by the activities of man, the purpose here is to outline a number of important geomorphological processes (and their associated consequences) which exist irrespective of any human interference.

One of the most important agents of geomorphological change has been the action of water, which has helped to break down, remove and transport considerable amounts of organic and inorganic material. While soil erosion is a widespread problem in the Iberian Peninsula (Bennet 1960), and in the Mediterranean generally (Braudel 1972; Houston 1967; Vita-Finzi 1969), it can be particularly aggressive and dramatic in south-east Spain. Commenting on erosional processes in the south-east, Thornes (1976: 4) for example, suggests that "the climatic, topographic and geological factors were almost designed by nature to produce maximum problems". Throughout much of the lowlands and the Interior Depression, easily erodable marine sediments, sparse vegetation cover, torrential rainfall and steeply dissected local terrain, have helped to maintain a long-term pattern of degradation in a number of areas. Repeated episodes of soil erosion effectively reduce the opportunities for soil and plant development, thereby making the land surface even more susceptible to destabilization. Recent studies of erosion in the south-east, however, have demonstrated that the scale and effects of this process have been exaggerated and that rapid, large-scale degradation is restricted to particular types of lithology (Gilman and Thornes 1984; Wise et. al. 1982). Moreover, it is often low frequency, discontinuous geomorphic events which have the greatest effect on the landscape, rather than processes which are more continuous and gradual (Butzer 1976; Thornes 1976; Shaw 1981).

The most spectacular form of erosion in south-east Spain is produced by periodic flash-flooding in various parts of the lowland interior (López Bermúdez 1973; Thornes 1974, 1976; Solé Sabarís 1954: 92). The tremendous power of these floods is best illustrated by the Guadalentín River in southern Murcia, which although it has only a seasonal flow, nevertheless filled the 20 million m^3 capacity reservoir at Valdeinfierno with sediment in less than a century (Thornes 1976: 45; Lautensach 1967: 91).

Equally, the torrential courses of the Alpujarra region, composed of easily erodable clay with steep gradients, are subject to particularly intense erosion, and transport enormous amounts of material (Thornes 1976: 9-11; 45-46; Solé Sabarís1954: 92). The Alpujarra drainages, like many fluvial networks in the lowlands of south-east Spain, have had a long history of vigorous erosion in their upper reaches and deposition in their lower courses. Maritime activities during the Phoenician, Roman and Medieval period were profoundly affected by these processes, with ports and villages being abandoned, and ultimately inundated, due to the rapid infilling of inland drainage basins and the active formation of large deltaic fans (Sermet 1943). Few rivers in Iberia are altogether free from irregular and hazardous flows, but as Thornes (1976: 44) has noted, 'Floods are almost part of the way of life in south-east Spain'.

The main reasons for the frequency and dramatic effects of these floods in the lowland zone appear to be: (1) the intensity of rainfall, and (2) the high rates of evaporation. Although rainfall in the uplands is generally greater, it falls more regularly, and hence, is less torrential. Moreover, evaporation is less severe, allowing the development of a soil and plant cover which inhibits runoff and increases infiltration. While floods are not entirely absent from the uplands, on the whole, they are less severe and less frequent than in drier, low lying areas.

By contrast, most of the fluvial networks in the lowlands are dry for much of the year and have low annual flow rates (e.g. Solé Sabarís 1954: 81; Masachs Alavedra 1942); the Segura, Almanzora and Andarax rivers are the only exceptions to this general pattern. As Lautensach (1967: 80) notes, the average flow of all rivers in the humid and semi-humid zones of south-east Spain increases from their source, while in the semi-arid regions average flows decrease from their sources, due to a lack of input from tributary drainages. Rivers in these drier regions have their origin in the semi-humid uplands, and often have no flow at all until floods occur within their source areas (Lautensach 1967: 91). Average annual flows for these rivers are misleading and tend to mask the short-lived episodes (usually in winter), when large volumes of water pour through these catchments. The arid and irregular climatic regime of this area compounds the effects of erosion and flooding by inhibiting the development of a protective cover of soil and vegetation. This reduces infiltration to a minimum and encourages high rates of runoff. Furthermore, intense evaporation ensures that the upper portion of the soil profile is perpetually dehydrated. Desiccated material on the surface is then very susceptible to transport by wind and water.

Further erosional problems are created by the nature of soils within the lowland zone. As mentioned previously, soft marine sediments (marls, clays, silts) are found throughout much of the Interior Depression and lowland zone as a result of transgressions by the Mediterranean Sea during the Miocene and Pliocene (Montenant and True 1971; Völk 1967; Birot and Solé Sabarís 1959). Many of these deposits are horizontally bedded and have been severely dissected, except where they have been overlain by more resistant materials - such as Quaternary gravels. In addition, the calcareous and permeable nature of these soils creates a further problem known as caliche. Caliches are basically crusts, composed largely of calcium carbonate, which may be concentrated in the upper part of a soil horizon by, for example, capillary action due to intense evaporation. These crusts form in a variety of ways (Rutte 1958), both at and below the surface, and often comprise extensive 'paved' surfaces which reduce soil and plant development as well as infiltration. These features are frequently found in the calcium rich Tertiary deposits of southern Murcia and Almería. Prolonged conditions of drought in many areas of south-east Spain create another type of seal or crust on the surface of many soils, which acts in much the same way as superficial caliche deposits. Thornes (1976: 10) for example, describes the development of these features in the Alpujarra region:

> "...throughout the summer months the soil has become intensely dry and with high tensions surface evaporation leads to the development of a clearly defined crust. This provides for very rapid run-off with the first heavy rains of autumn".

The effects of this crust, however, are more ephemeral than with caliche deposits since soil crusts are thinner and less resistant, and consequently are destroyed by periods of sustained rainfall.

Another geomorphological process which is accelerated in the semi-arid areas of south-east Spain is the chemical and mechanical breakdown of geological deposits. Because the climatic regime in many parts of the south-east is not conducive to the establishment of well developed soils or dense vegetation, there are large areas of exposed soil and rock surfaces. These surfaces present numerous opportunities for attack by wind, heat and water.

The effect of winds on the southern coast and south-eastern lowlands is especially important. North African winds such as the 'Leveche' (moving from western Almería to Murcia and Alicante) and the 'Solano' or 'Shergui' (blowing out of Morocco to the Costa del Sol and Gibraltar) travel only a short distance over the sea and are still hot, dry and laden with dust by the time they reach the south-eastern coastal plain (Branigan and Jarret 1975: 41). These winds, in combination with high summer temperatures, are partly responsible for inhibiting the growth of humus since they dry out, oxidize, and transport organic material before it can be incorporated into the soil. The winds also increase evapotranspiration and the loss of soil moisture in the upper portion of the soil, increasing its suceptibility to removal by aeolian or fluvial transport. This loss of moisture results in a further decline in soil fertility since the activity of soil organisms is dramatically reduced. In turn, this reduces the movement, or cycling, of nutrients through the soil - a process which leads to serious leaching.

Having described some of the general features of contemporary environments, the aim of the next section is to examine how far analogies based on contemporary environments and geomorphic-ecological processes can be used to evaluate the character and development of landscapes in the later prehistoric period.

II. c. Past Environments

> Although nature herself shows us the link between man and the landscape, it would be arbitrary and false to speak of 'natural' and 'cultural' landscapes as though they were separate portions of the environment.
>
> It is particularly difficult in the Mediterranean to separate or even distinguish between the natural and cultural features of the landscape because it has been so long and continuously operated by man.
>
> (Houston 1967: 707-708)

From the extensively terraced hillsides of southern Murcia and irrigated deltas of coastal Málaga, to the sporadic woodlands of upland Granada, contemporary landscapes throughout south-east Spain owe their appearance to a long and complex series of interactions between man and the ecosystem. Since few of the prehistoric landscapes in this region have survived into the modern period without alterations of some description, an understanding of the nature and magnitude of environmental change is crucial for evaluating the ecological context of later prehistoric communities. This section is, therefore, devoted to outlining the nature of various environmental changes in south-east Spain during the Holocene - focusing first on documentary evidence, and then proxy sources of data.

Despite a number of attempts to synthesize European or worldwide climatic sequences for the Holocene (Denton and Karlen 1973; Lamb 1971, 1977; Mörner 1971), the nature, chronology and severity of climatic fluctuations during this period continues to be a major stumbling block for palaeoclimatic and palaeoenvironmental models. Even within northern Europe where there is abundant environmental data, the traditional scheme of Post-Glacial climatic development (i.e. Pre-Boreal/Boreal/Atlantic/Sub-Boreal/Sub-Atlantic) can only be used as a gross indication of climatic trends, since the pattern and timing of these changes varies considerably from area to area (Goudie 1977: 116-117).

In general, localized climatic and environmental histories in the Mediterranean are neither as numerous nor detailed as those in temperate Europe. Although the Holocene climatic record in the Mediterranean has improved tremendously over the last 20 years as a result of more numerous and thorough environmental investigations (Bintliff 1975, 1977; Wagstaff 1981; Delano-Smith 1979; Renfrew and Wagstaff (eds.) 1982; Vita-Finzi 1969, Reille et. al. 1980; Renault-Miskovsky 1972), the task of isolating generalized climatic trends in this area continues to be more difficult than in adjacent northern regions.

Nevertheless, Raikes (1972, 1978) has suggested that Holocene climate in the Mediterranean has been fairly stable and from c. 7000 B.C., or earlier, has been essentially similar to present day climate; however, see Lamb (1977) and Goudie (1977) for an alternative view. In south-east Spain, a number of investigators have suggested that there have been no 'major' climatic changes since c. 5000 B.C. (Chapman 1975, 1978; Gilman 1976; Gilman and Thornes 1984).[2] Arguments presented by Lull (1983) for a climatic change at the beginning of the Bronze Age in south-east Spain fail to distinguish between environmental and climatic changes, and largely ignore the impact of human interference in the landscape. While the limited evidence available does not suggest any

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2. This leaves open the question of how to define, or measure, 'major' climatic changes - whether in terms of impact on ecosystems, effects on human communities, alterations in meteorological patterns, or a combination of all of these.

dramatic, long-term changes in temperature or rainfall in south-east Spain since the beginning of the Neolithic, this does not rule out important short-term climatic events, and anthropogenic factors. These facts are particularly significant because it is clear that there have been substantial environmental changes during this period.

As recent historical research in climatology has pointed out, the relationship between climatic changes and cultural responses has all too often been obscured by over-generalized models, poor data and untested assumptions (Wigley et. al. (eds.) 1981). Our present knowledge of this relationship in south-east Spain is extremely poor, since climatic trends of a millennium or more cannot be detailed with great confidence. In any case, the fact that climatic and cultural changes occur at roughly the same time does not, necessarily, establish any connection between them (ibid).

However, in order to arrive at a generalized model of palaeoclimatic developments in south-east Spain it is necessary to draw on information from a variety of sources and geographic areas. Models which attempt to characterize the nature and effects of Holocene climatic trends in south-east Spain - as in many other areas - are dependent on 3 main types of information:

(a) records from meteorological instruments
(b) historical/documentary accounts
(c) indirect or proxy sources (e.g. pollen, fauna, sediments, etc.)

In south-east Spain, as in many other parts of the mediterranean, meteorological data is unevenly distributed both geographically and through time. Although climatic records from instruments do not extend much beyond the mid 19th century in the south-east, contemporary evidence does provide valuable information about the frequency, and consequences, of short-term climatic events such as the torrential storms of 1973 (Thornes 1976: 45-52) or the catastrophic flood of 1879 (Torres Fontes 1962). Documentary sources of climatic data cover a considerably longer period than the instrumental record, but are more discontinuous and difficult to interpret (e.g. McKay 1981 and López Bermúdez 1973; cf. Raikes 1978: 7-8). Finally, proxy sources of evidence are common in the south-east but still have not been exploited in any systematic way. In any case, the use of such evidence often involves a number of interpretive obstacles - particularly the evaluation of human versus geormophic processes. Nevertheless, these sources of information do offer some useful insights into the possible development and impact of Post-Glacial climate.

Instrument Date

While long, continuous records are generally lacking in south-east Spain for such meteorological variables as temperature, winds and relative humidity, measurements of rainfall variations are far more complete. Several important patterns are visible in these rainfall records:

(a) A generally inverse relationship between the amount of rainfall and its variability (i.e. no. of rain days per year).

This pattern can be observed, region-wide on an annual and inter-annual basis - Neumann 1960: 185; cf. White 1966: 18-19.

(b) The tendency for unusual events such as floods or droughts to cluster within relatively short periods of time

For example, López Bermúdez (1971 in reviewing the rainfall records of Murcia for the period between 1860 and 1970 found exceptionally high seasonal rainfall in 1951, 1957 and 1969, as well as intense drought in 1964 and 1968. The antiquity of this phenomenon is underlined by the 7 year drought in Spain around 640 A.D. (Schulten 1963: 166), and the long history of flooding in the Segura Basin in Murcia. Flood records for the Segura River, between 1258 and 1970, for example, indicate that 8 major floods occurred during the 15 year period of 1726-1741 (López Bermúdez 1973: 131-132; also see Appendix 4.41).

In a more general context, Flohn (1981) has suggested that although the statistical significance of such clustering is uncertain, the repetition or consecutive occurrence of extreme climatic events within short periods is well documented in many parts of the world, and has had a considerable effect on the stability of human communities and their local environment (cf. Raikes 1978: 12).

(c) Seasonal, annual and inter-annual fluctuations which are often extreme, but are seemingly random (i.e. display no particular cycles or recurrence intervals).

These patterns have had an important impact on economic productivity and ecological stability throughout south-east Spain - not only by bringing about the progressive degradation of soils and vegetation, but more importantly, by periodically initiating short-lived episodes of rapid and dramatic environmental change. As McGovern (1981), Parry (1975), Raikes (1978) and others have stressed, short-term climatic changes may be of considerably more importance to environmental stability than long-term trends - particularly in so-called marginal areas. In a prehistoric context, it is therefore worthwhile to consider these single events and short-term variations as having considerable potential, not only for creating environmental change, but also stimulating the need for a behavioural response.

Historical/Documentary Data

Turning to documentary records for south-east Spain, climatic data usually has to be 'distilled' from general accounts of the landscape and various environmental phenomena - accounts which vary greatly in their reliability and detail. Although there are a number of potentially informative Medieval and Roman literary sources, spanning a period of considerably greater length than that covered by instrumental records, there have been few attempts to exploit these sources for the purposes of modelling past climatic or environmental conditions (but see McKay 1981).

One aspect of the Peninsular environment which attracted the attention of the classical authors was the behaviour of both major and minor river systems. Classical writers made repeated reference to the navigation routes available along a large number of Iberian rivers - testimony which not only reflects their importance for trade and communication, but also provides general information on sedimentation rates, delta formation and so on. These records make it clear that many inland drainages which are no longer navigable did serve as important links between various coastal and hinterland areas during antiquity. For example, in antiquity the Guadalquivir was navigable as far as Córdoba. Now, however, it is only possible to travel upstream as far as Sevilla - a difference of some 125 km. Pliny (in Schulten 1963: 13) reports that the Genil and Guadalimar rivers (in Granada and Jaén respectively) were supporting riverine traffic in the Roman period, while no such movements are possible there today. There is also evidence for several deep riverine ports, well inland from the southern coast, during the Roman period, including those at Vélez-Málaga, Almuñécar, Adra, Purchena and the island of Luna at Torre del Mar (Sermet: 1943: 23-24). These ports were subsequently abandoned due to sedimentation, while coastal sites such as the Phoenician port at Adra were destroyed by delta formation and long shore movement of alluvium. The progress and consequences of erosion/aggradation in this area are also confirmed by 18th century maps, which differ markedly from modern ones (Sermet 1943: 17). These patterns have been repeated in many large river systems and their tributaries in the Atlantic, Levantine and particularly, the south-eastern coastal zone (Schulten 1963: 13-14; Sermet 1943). Another preoccupation of the classical writers was the description of the local landscape and its vegetation. During the Greco-Roman period, for example, various chroniclers including Mela (in Schulten 1963: 170), Pliny and Strabo (in Lautensach 1967: 711) took note of the large expanse of hemp and esparto vegetation which extended over the large plain between the port of Cartagena and the Segura River in southern Murcia. This plain was referred to by the latter authors as the Campus Spartarius or 'region of esparto'. Lautensach (1967: 711) suggests that this treeless, semi-arid environment was largely natural, though he admits that it may have been extended in various areas by human interference. Pliny (in Schulten 1963:) also provides some indication of the mild climate around Cartagena by noting the flowering of roses there during the winter.

Documentary sources throughout the West Mediterranean also indicate that woodland areas were far more extensive in the Greco-Roman period than in the present day (e.g. Delano-Smith 1979). In south-east Spain, the presence of large dense stands of woodland is noted by Strabo (in Darby 1956: 185), who also makes reference to the intensive exploitation and destruction of these areas for fuel, shipbuilding and other materials. Phoenician and Roman settlements are also known to have exploited the forested slopes of the Sierra Nevada. During the Medieval period intensive exploitation of these areas is documented in episodes such as the timber crisis in Spain during the 17th century (Braudel 1972: 142) and the dramatic deforestation of the Alpujarras ranges in the same period (Sermet 1943).

Historical accounts of land use in classical antiquity and the early modern period suggest that climatic conditions were broadly similar to those of the present day. Irrigation and water control is well documented throughout much of the Levante and south-east Spain during the Iberian, Roman and Medieval periods (Glick 1970; Scott-Moncrieff 1868; Schüle 1967; Butzer 1985) demonstrating the consistent need for artificial facilities to ensure reliable commercial and domestic water supplies - especially in the coastal lowlands. During the Roman period, for example, the classical author Varron (in Schulten 1963:170) reports that irrigation was widespread in the south-east.

Proxy Data

One of the most important sources of proxy climatic data for the Holocene in the Iberian Peninsula has been pollen analysis. The number of pollen diagrams available for this period in Andalucia and the Levante, however, is very limited (c.6), and hence has made it difficult to interpret vegetational development and variability except in a few isolated areas. Since detailed pollen investigations have been carried out at only one site in south-east Spain - the Padul bog near the Sierra Nevada in southern Granada - it is useful to examine the results of this study in some detail.

The site of Padul is a former upland lake located 740 m above sea level. The sedimentary sequence here is composed of a series of peat, clay, mud and calcareous deposits which total more than 100 m in depth. Of the 70m section which has been analyzed thus far, the upper 20 m belong to the Holocene and Weischal (Last Glacial) with 49 radiocarbon dates falling between 220 $\pm$ 150 b.c. and more than 52,000 b.c.. The remaining 50 m are believed to represent the Eemain, Saalian and the Holstein Interglacial. Although the date range from this site covers the whole of the Holocene (from Pre-Boreal to Sub-Atlantic) only 14 dates are directly associated with pollen investigations (Menéndez Amor and Florschütz 1962, 1964; Florschütz et. al. 1971);[3.] the latest of these 14 dates is (GrN-2185) 3030 $\pm$ 60 b.c.. Consequently, pollen data from this site corresponds to the period between the Early Post-Glacial and the Late Atlantic/Early Sub-Boreal.

The vegetation of the Post-Glacial period (Phase Z) at Padul is dominated throughout by oak (Quercus ilex) and pine, with only minimal representation of other tree species. Oak surpasses pine in the Pre-Boreal and maintains its dominance until the end of the sequence (c. 3000 b.c.). Artemisia, Chenopoidiaceae and Ephedra - which Florschütz et. al. (1971) consider to be important indicators of steppe conditions - decrease markedly in the Post-Glacial and are represented by low values throughout the remaining part of the sequence. During the Atlantic period herbaceous plants reach about 50%, which together with evidence from tree species, suggests a landscape of open woodland (López García 1978).

In summary, the climatic-environmental sequence at Padul appears to be one of generally arid conditions in the Late Glacial characterized largely by open steppe and some pine forest, giving way to oak woodland and warmer more humid conditions in the Early Post-Glacial. The Pre-Boreal, Boreal and Early Atlantic phases are dominated by oak forest with

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3. 35 dates from various cores have recently been published, but have yet to be related to earlier pollen analyses (González et. al. 1982).

smaller proportions of pine, and low values of open, steppe species. The final part of the Padul sequence is characterized by essentially the same range of species, but with a decrease in pine, which López García (1978) regards as evidence for lower humidity. In contrast, two fluctuations occur during the middle of the Atlantic period, which signal important, but apparently short-lived environmental changes within the Post-Glacial. The first of these oscillations occurs in the early 5th millennium (4800 ± 85 b.c.) with a peak of Artemisia, Chenopoidiaceae, and Ephedra (increasing by 10%) and a dramatic rise in sedges. After this temporary increase in open vegetation, there is a return to an almost exclusive cover of oak forest, with arboreal pollen reaching 95%. In the final part of the Padul sequence, covering the later 5th millennium there is another minor increase in steppe vegetation beginning shortly before a date of 4410 ± 90 b.c.. This is represented by a small rise in steppe species (of 7-8%) and a considerable increase in grass cover. Both of these episodes exhibit a marked increase in open vegetation such as Artemisia, Chenopoidiaceae and grasses, as well as a sharp rise in herbaceous plants. These oscillations are also characterized by a decline in oak and a corresponding increase in pine. Taken as a whole, the characteristics of these episodes suggest that they were relatively short periods of environmental disturbances, possibly associated with human interference.

Commenting on the decline in tree pollen after the middle of the 5th millennium at Padul, Gilman and Thornes (1984: 12) have suggested that 'Eu-Mediterranean sclerophylous woodlands became established in 'Atlantic' times, subsequent deforestation being attributable to human intervention.' Furthermore, they suggest that a range of pollen diagrams from Cataluña and the Levante point to a similar general pattern: Ereta del Pedregal in Valencia (Menéndez Amor and Florschütz 1961b); Olot in Gerona (Menéndez Amor 1964); Torreblanca in Castellón (Menéndez Amor and Florschütz 1961b); and Verdelpino in Cuenca (López García 1977). In addition, they argue that similar interference horizons at this date can be seen in pollen diagrams from other parts of the West and East Mediterranean (Gilman and Thornes 1984: 12). López García (1978) has also argued that many of the fluctuations in later Holocene pollen diagrams from Iberia should be regarded as evidence of anthropogenic processes, rather than changes in climate. While many of these horizons may well be the result of clearances and other human activity the problem of distinguishing between environmental changes induced by short-term climatic changes, and those caused by human communities, still persists; the possibility that both occurred simultaneously also cannot be ruled out.

Leaving this problem aside, the significance of the Padul pollen record for understanding environmental-climatic changes in south-east Spain during later prehistory is complicated by a number of other factors. First, the location of the site at a relatively high altitude (740 m) and in close proximity to the glaciated areas of the Sierra Nevada (Obermaier and Carandell 1916; García Saínz 1943) makes it difficult to use this evidence to trace the development of Late Glacial and Post-Glacial environments in other areas of south-east Spain. This is particularly true in regions such as the intermontane basins of the Bétic Depression and the eastern coastal plain which were undoubtedly influenced by different climatic, geological and topographic conditions. Moreover, the data from Padul terminates at the beginning of the 3rd millennium and therefore does not provide any evidence with which to evaluate environmental development during the Copper and Bronze Ages in the south-east.

Aside from the pollen investigations at Padul, the only other pollen sequence which can be used to interpret the development of Post-Glacial vegetation in south-east Spain comes from a peat deposit at Ereta del Pedregal (Navarrés, Valencia) - a later prehistoric settlement with Copper and Bronze Age occupation (Fletcher Valls 1961; Menéndez Amor and Florschütz 1961a). Although this site is, strictly speaking, outside of south-east Spain, it does provide some insight into the possible nature of environmental development in the south-east, particularly since the Ereta sequence spans the entire 3rd millennium (i.e. up to c.2000 b.c.). At Ereta the upper surface of the peat is dated to 1980 $\pm$ 250 b.c., while another date of 4180 $\pm$ 300 b.c. falls approximately one third of the way down the profile. At the base of the peat - which probably dates to the Early Post-Glacial - pine forest is dominant, with a small component of oak. Thereafter, the dominance of pine vis-a-vis oak fluctuates until the end of the 5th millennium when oak is established as the primary tree species. Shortly after 4000 b.c., there is a dramatic increase in heath, sedge and grassland species. This increase in open vegetation is followed by a progressive reduction in oak and a corresponding increase in pine throughout the third millennium - a trend which is paralleled by the evidence from Padul where this pattern is visible at the very end of the sequence (i.e. the beginning of the third millennium b.c.). López García (1978) has interpreted decreasing oak and increasing pine values at both Ereta and Padul as evidence of decreasing humidity.

The presence of 'cereal' pollen in the Ereta diagram in association with

Artemisia, Chenopoidiaceae, Plantago and Rumex appears to be indicative of a clearance phase for cultivation (Menéndez Amor and Florschütz 1961a: 98-99) - possibly in the latter half of this sequence. Unfortunately, the presence of cereal pollen was noted, but its stratigraphic position was not recorded. The fact that the Ereta pollen sequence is apparently associated with agricultural activities, and indeed, is associated with a prehistoric settlement, does require that we be cautious in using this data for any generalized interpretation of south-eastern environments. Despite clear evidence for environmental changes in the Padul and Ereta pollen data, and the claims for climatic changes in these sequences (cf. López García 1978), major changes in the composition of vegetation can be explained by factors other than climate. Whether or not minor climatic shifts made any impact in these, or other areas, remains to be seen.

Another source of environmental data for the later prehistoric period in south-east Spain is faunal evidence. Data of this kind consists of: (1) pictorial representations and (2) animal remains. Neither of these two sources of data are particularly ideal from an interpretive point of view since many species are highly mobile or can tolerate a wide range of ecological conditions. Nevertheless they do provide some useful, albeit generalized, environmental data.

Paintings of animals are common in caves and rockshelters in south-east Spain and neighbouring areas, and make it possible to draw a few general conclusions about long-term environmental development. Epipalaeolithic and Neolithic rock art is widespread in eastern Spain (Walker 1969, 1971; Cabré Aguiló 1915; Béltran 1968, 1982) and is also known in the southern coastal zone and the uplands of Granada, Murcia and Almería (Walker 1979; Lillo Carpio, P. and Lillo Carpio M. 1979; Breuil and Motos 1915; Cabré Aguiló 1915). The variety of fauna represented in the rock art of south-east Spain is variable, but is consistently dominated by caprids and cervids, with smaller proportions of bovids and equids (Walker 1969, 1979). More importantly perhaps, evidence from rock art sites in many parts of the south-east suggest that there have been significant changes in the distribution of various animal populations since the Early Holocene. For example, Walker (1979: 514-515 in reviewing the Epipalaeolithic and Neolithic rock art of northern and western Murcia concluded that:

> ".. many of the painted wild quadrupeds are not found today in the Segura Basin, being confined to the highest ranges on its periphery (Cervus elaphus, Capra ibex; Sus scrofa) and some live no

nearer than the distant Pyrenean or Cantabrian ranges (Rupicapra rupicapra; Ursus arctus)..."

Remains of bear are known from several Neolithic and Copper Age sites in south-east Spain (e.g. Arribas 1968), while bear and chamois are depicted in Levantine rock art (Béltran 1982). Both species are now restricted to the cooler, alpine regions in the northern part of Spain. Other evidence, such as the deer illustrated on one ceramic vessel from the Copper Age cemetery of Los Millares (Leisner and Leisner 1943: Plate 12, no. 61) may also suggest significant environmental change, since the conditions suitable for cervids are completely absent in this area at present.

While rock art provides some general indications of the types of animals present in the environment, the testimony of skeletal remains is less ambiguous. Where faunal information is available, there is clear evidence that the ranges of different animals have been substantially altered in south-east Spain since the Neolithic - a pattern which is consistent with the pictorial evidence discussed above. Faunal evidence from Copper Age and Bronze Age settlements in both upland and lowland zones of south-east Spain suggests that areas of woodland were considerably more extensive at that time. For example, Chapman (1978: 264-265) states:

> "Evidence that the lowland river valleys in Almería were more wooded during the local Copper and Bronze Age can be derived from examination of the fauna collected by the Siret brothers in their original excavations. Apart from those animals such as cattle, sheep, goat and horse which, in view of their known environmental requirements, one would expect to prefer open steppe or garrigue conditions, there are also others which seem to prefer woodland or swamp locations. The three species of deer, red (Cervus elaphus), roe (Cervus capreolus) and fallow (dama) are primarily associated with woodland environments especially where there are open clearings providing good grazing, and so it is surprising to find them represented at such sites at Tabernas, Campos, Zapata and Parazuelos....
> There is, today, no woodland even in scattered remnants anywhere within the probable exploitation territories of these sites and deer of any species are no longer to be found in any part of lowland Almería".

Furthermore, the remains of deer are also known from other Copper and Bronze Age contexts in lowland Almería and the south-east, such as Los Millares (Arribas 1959: 97), Lugarico Viejo, Cerro de las Canteras and Fuente Alamo (Arribas 1968: 39) in Almería; Ifre (Arribas 1968:39) and

El Prado (Walker 1985) in Murcia; and Cerro del Real (Boessneck 1969), Cerro de la Virgen (Driesch 1972) and Montefrío (Arribas 1968: 39) in Granada. In addition, pigs - which generally prefer woodland or shady moist habitats - are also common on these sites and suggest that there may have been more dense vegetation in many parts of the south-east during the 2nd and 3rd millennia. Chapman (1978: 265) also suggests that the presence of pigs may indicate the existence of swamps (e.g. at Campos?) and perennial springs (e.g. Fuente Alamo and Los Millares).

Finally, on the strength of the detailed faunal investigations at the sites of Cerro del Real and Cerro de la Virgen in the upland zone of north-eastern Granada, and Terrera Ventura on the lowland fringes of western Almeria (Appendices 2: 3 - 2: 5) several individuals have proposed that landscapes in south-east Spain during later prehistory would have been characterized by more wooded vegetation along the major drainage basins, and a drier and more sparse cover of steppe or garrigue in the interflueve areas (Boessneck 1969, Driesch and Morales 1977; Chapman 1975, 1978). In the more humid and mountainous upland zones, the cover of vegetation would no doubt have been consistently greater, due to more favourable soil and climatic conditions, as well as lower population densities and less intensive human interference (cf. Chapman 1978: 264; García Sánchez 1963). This fact may help to explain the apparently longer survival of fauna such as deer in many upland areas - for example, at Cerro del Real until the Islamic period (Driesch 1972) and at Villena in Alicante until the early Medieval period (Walker 1979).

Although environmental interpretations based on faunal remains present a number of problems, several points are clear. First, wherever the more humid, woodland habitats necessary to support deer and pig were located - whether in river valleys in the immediate vicinity of settlements, or in the adjacent uplands some distance away - it is apparent that these areas were close enough to be exploited, either regularly (as in the case of pig) or less frequently (as is perhaps indicated by deer). Secondly, since the conditions necessary to support deer and pig, as well as the actual animals themselves, have disappeared (e.g. in lowland Almería) or have been dramatically reduced, throughout south-east Spain, it is clear that there are good grounds for supposing that these areas have undergone considerable ecological change since the later prehistoric period. Furthermore, with respect to the timing of these changes, there is some evidence to suggest that significant alterations of the environment were already underway during the Copper Age and Bronze Age. In particular, faunal evidence, again from

Terrera Ventura, Cerro del Real and Cerro de la Virgen, indicates a progressive reduction in the importance of both deer and pig between the 3rd millennium and the later 2nd millennium b.c. - a trend which continues into the Islamic period at the latter two sites. Finally, Driesch and Morales (1977) suggest that the emphasis of Bronze Age communities on domesticated animals such as sheep, and particularly goat, reflect a gradual desiccation of the lowland environment, and eventually, the creation of a widespread semi-arid steppe.

Sedimentary sequences provide another valuable source of environmental data for the Post-Glacial period, and over the last two decades have received an increasing amount of attention throughout the Mediterranean (Bintliff 1975, 1977; Butzer 1975; Davidson 1980; Delano Smith 1979; Vita-Finzi 1969, 1976; Wagstaff 1981). Within south-east Spain, the sedimentary record of various drainage basins has recently been the subject of a number of palaeoecological and geomorphological investigations (Thornes 1976; Wise et. al. 1981; Gilman and Thornes 1984; Cuenca Payá and Walker 1977; Cuenca Payá 1971; Walker and Cuenca Payá 1977). Besides their importance for assessing the visibility of prehistoric sites, studies of sedimentary processes provide an important source of information on the evolution of climatic regimes and environments during the Holocene in south-east Spain.

Within the south-east some of the most systematic and detailed information about later prehistoric environments has been provided by the geomorphological research undertaken by Gilman, Thornes and Wise (Gilman and Thornes 1984; Wise et. al. 1981). This research was based in part on a region-wide study of erosional processes in south-east Spain and, contrary to conventional wisdom, has emphasized that there have been relatively small scale changes in the landscape due to climatic variables. These investigations have reinforced the idea of climatic stability in south-east Spain during the last 6000 years. Furthermore, this conclusion is consistent with earlier pedological studies at the Copper Age site of Los Millares. Analysis of the xerorendsina horizons and artificial soils found in several tombs at this site has stressed the similarity between climatic conditions in the 3rd millennium b.c. and those of the present day (Kubiena, in Almagro Basch and Arribas 1963: 261).

By contrast, work by Cuenca Payá and Walker (1977) has suggested that the period between c. 7000-2000 b.c. was characterized by an extended period of aridity. This scheme is based on aeolian sand deposits from the Pantano de Elda and Rambla de Caprala, near Villena in Alicante, and similar deposits from the Epipalaeolithic-Neolithic site of Abrigo

Grande, near Cieza in Murcia. All of these sites have produced one radiocarbon date - each associated with deposits containing an aeolian sand horizon. Recently, however, this model has been criticized by Gilman and Thornes (1984: 13) who note that:

> "The textural similarity of materials in different depositional contexts 60 kms. distant from one another constitutes slender evidence for a difference in climate."

Although the geographic scale of Cuenca Payá and Walker's work is relatively large, the number of sites which they have examined is small. Moreover, when compared to the whole of south-east Spain, the size and detail of these studies do not warrant the long distance extrapolation of results over this entire area. There has also been a failure here to undertake an integrated study of a single drainage system in order to determine the nature and sources of variability within it - such as different rates of sedimentation, different processes acting on various parts of the drainage, and so on (cf. Delano Smith 1979; Wagstaff 1979). Without this kind of investigation, long distance comparisons of depositional processes in fluvial and non-fluvial contexts are unlikely to produce an accurate assessment either of individual areas, or of the south-eastern region as a whole.

Vita-Finzi (1969, 1976) has proposed a more general, pan-Mediterranean model of fluvial erosion and deposition which is partly based on data from south-east Spain. This model calls for various widespread climatic changes which result in broadly synchronous and similar cycles of erosion and aggradation across the Mediterranean. According to Vita-Finzi these climatic episodes ultimately resulted in the deposition of a large, readily identifiable deposit known as the 'Younger Fill'. In practice, however, this horizon has proven to be considerably more diverse (both within and between deposits) and more complex, than Vita-Finzi's model suggests (Delano Smith 1979; Davidson 1980). Wagstaff (1981), for example, has found several distinct horizons within the so-called 'Younger Fill' which can be related to periods of intensive land use, and suggests that Vita-Finzi's proposed periods of climatic change can, in fact, be shown to have been periods of economic intensification. It is also clear that there are no particular grounds for believing that climatic conditions were similar in the Mediterranean Basin as a whole - as the 'Younger Fill' model implies - especially given the wide variations which are apparent in the contemporary climatic regimes of this region (ibid.). Nor is there any reason why the results of climatic change need have been similar from one end of the Mediterranean to the other. Finally, the processes involved in the sedimentary sequence in any given drainage basin are likely to have been far more complex and diverse than Vita-Finzi suggests, and hence, more likely to be the result of factors other than widespread climatic change (Gilman and Thornes 1984: 13).

In summary, proxy environmental-climatic evidence from south-east Spain does not suggest that there have been any marked, long-term changes in major climatic variables such as rainfall or temperature since the Early Neolithic. Although this view has received widespread support (Schüle 1967; Driesch and Morales 1977; Driesch 1972; Chapman 1975, 1978; Gilman and Thornes 1984; Almagro Basch and Arribas 1963), some investigators have opted for an alternative position. While the model put forward by Cuencá Paya and Walker (see above) suggests an arid climatic phase covering the period between c. 7000-2000 b.c., Lull (1983) has argued for an entirely opposite trend (i.e. greater humidity) for the Copper and Bronze Ages - c. 2600-1000 b.c..

Using various types of proxy evidence, particularly faunal remains, Lull (1983) has argued that climatic conditions during much of the 2nd and 3rd millennia b.c. in south-east Spain were significantly different from those of today. With respect to fauna, he suggests that the predominance of 'woodland' species at many sites of this period reflects more humid conditions than those which prevail in south-east Spain at present. This interpretation, however, suffers from several major flaws. First, environmental changes of the kind described by Lull can be caused by factors other than climate. Agricultural intensification, for example, can significantly reduce the complexity, stability and diversity of local ecosystems (cf. Rindos 1983). The process of economic intensification is well documented in south-east Spain during the Copper and Bronze Ages (see Chapter III), and would have had considerable effects on the number of plant and animal species in a given area. Moreover, ecological simplification of this type would have had particularly striking consequences in the context of a semi-arid climatic regime like that of the present day. Secondly, Lull assumes that many of the species which are supposed to be indicative of moister conditions were exploited as a food resource, rather than for other purposes. Boar's teeth, eagle bones, fish vertebrae and other faunal remains, however, were often fashioned into ornaments, or deposited - in an unmodified form - in tombs. A more careful analysis of bear, fox, lynx and other species could reveal that these animals were sought after not necessarily (or primarily) as a subsistence resource, but for other utilitarian or ritual purposes (e.g.

skins or ornaments). The presence of these species at any given site may, therefore, represent not part of the local fauna but, instead, represent animals (and by implication - habitats) which were found a considerable distance from the site.[4] In any case, even if various wild species were exploited exclusively for their meat, they may still have been transported to the site from habitats a considerable distance from a given settlement. In addition, the major changes in land use since the Bronze Age, particularly the deforestation of many areas and the widespread use of irrigation, have significantly altered the soils, vegetation, water tables, animal populations, and indeed, micro-climates of many areas. Given these and other changes in south-eastern landscapes, it is hardly surprising that there has been a major reduction in 'woodland' or humid ecosystems, and the plants and animals which they support.

Lull's model also does not take account of several important factors relating to the collection and interpretation of data used in his analysis. With regard to faunal evidence, for example, he uses the number of fragments rather than the minimum number of individuals to assess the relative importance of 'humid' versus 'steppe' species. He also assumes that the faunal assemblages used in his model are representative of the sites from which they were derived, despite the lack of any systematic sampling, taphonomic analysis, and the absence of basic information about their context. Moreover, there is an important assumption here that faunal assemblages:

(a) represent animals from local environments

(b) constitute a reliable sample of the range of species available locally

(c) accurately reflect the proportion of 'humid' versus 'steppe' species in local environments

It is somewhat ironic that Lull (1983: 34) finds it necessary to exclude domestic animals from his assessment of Copper and Bronze Age environments, but is content to use wild fauna - despite his recognition that cultural selection processes are involved in the exploitation of both domestic

4. This possibility could be tested by examining whether whole skeletons, as opposed to selected parts of these animals, were found on settlement sites. If, for example, animals were being transported to the site from a considerable distance one might expect to find a different set of bones represented than if animals were available locally (cf. Binford 1981). Moreover, one might also look for evidence that only specific skeletal parts were being transported into the site (e.g. the teeth of wild boar or bear) for special purposes such as funerary rituals. In this case, skeletal material might be involved in exchange rather than subsistence.

and wild species (ibid: 49).

Finally, Lull (1983:47) uses pollen analysis from the Pyrenees and Corsica to argue that more humid conditions did exist in south-east Spain during the 2nd and 3rd millennia b.c.. It is not clear, however, whether environmental development in either of these areas can be related to climatic changes in south-east Spain. Furthermore, it remains to be seen whether the development of vegetation in these two areas was free from substantial human interference, particularly given the increasingly intensive exploitation of both the Pyrenean and Corsican landscapes from the 3rd millennium onwards (Bahn 1983; Lewthwaite 1983).

Having outlined the evidence for various ecological-climatic changes in inland areas of south-east Spain, the final part of this section is devoted to an examination of environmental changes along the coastal margins. Although information about Late Glacial and Holocene sea level changes in the West Mediterranean still remains fairly general, it is clear that this region followed the world-wide pattern of rising sea level in the Flandrian, beginning about 13,000 b.c. (Mörner 1971; Butzer 1975; Shackelton et. al. 1984). The rate of sea level rise varies from place to place, and through time, but is generally rapid until about 4000 B.C. (Goudie 1977: 174). With regard to coastal areas of the West Mediterranean generally, Lewthwaite (1982a: 302) has pointed out that:

> The modern pattern of non-tectonic lagoons, deltas and flooded estuaries is largely consequent on the achievement of relative stability after the 4th millennium b.c..

This stability would no doubt have had important consequences, not only for settlement and exploitation - both before and after the 4th millennium b.c. - but also for the visibility of prehistoric sites belonging to these two periods. Using archaeological data from underwater investigations, Fleming (1969, 1972) has suggested that sea levels in the West Mediterranean have changed no more than 1 m over the last 2000 years. Although sea levels appear to have been relatively stable over the last 2 millennia, the nature of coastal margins in many parts of south-east Spain have been dramatically transformed by land use strategies in neighbouring zones inland, particularly in the classical and early modern periods. The dramatic effects of removing or interfering with established vegetational communities, for example, is well illustrated by 16th century land use in the Alpujarra mountains north of Málaga. As Sermet (1943: 26-27) has noted, after the Moorish Rebellion, the Alpujarra area was repopulated by rural Castillians who abandoned Moorish irrigation systems and began to extend dry farming over the lower slopes of the Alpujarra sierras. By the end of the 17th century nearly all the mountain slopes had been severely eroded. Exposed soils were rapidly degraded and transported to the coast via seasonal torrents which characterize the area (Thornes 1976). These processes helped to make substantial contributions to deltaic fans and coastal sedimentation in and around Málaga. In addition to sea level changes which have drowned much of the coastline exploited in the Late Glacial and Early Holocene, the progress of coastal sedimentation in a number of areas has effectively obscured the coastline of the later prehistoric period, in many areas.

II. Conclusion

The previous discussion has illustrated the variety of environmental evidence which is presently available in south-east Spain, as well as many of the difficulties of interpreting this data. In attempting to draw conclusions about environmental-climatic development in south-east Spain, and its impact on prehistoric communities, it is useful to make a few general points about the interaction of climate, ecosystems and culture.

With regard to identifying the stimulus for environmental change, it is apparent that the relative contributions of climate and human activities have altered dramatically through time - both in south-east Spain and elsewhere. Equally, the relative importance of climatic vis-a-vis social factors in creating cultural change is widely variable in space and time. The increasing importance of community organization and regional interaction in later prehistory helped to create a less direct relationship between climatic change and behavioural responses (cf. Wigley _et_. _al_. (eds.) 1981). In addition, the integration of individuals and communities into larger and more complex social units has made it more difficult to evaluate the relationship between climatic, ecological and cultural changes. These difficulties are further compounded by the fact that major ecological alterations, as well as localized, micro-climatic changes, were consistently brought about by intensive agricultural production in the later prehistoric period.

Another important consideration is the relative stability of different environmental zones within south-east Spain. Aside from the effects of intensive land use strategies, the 'marginal' character of landscapes in many parts of the south-east is also due to their latitude, morphology, climatic regime and orientation with respect to the rest of the Peninsula - the latter resulting in pronounced rainshadow effects. All of these factors have helped to create 'brittle' environments throughout much of this region which are prone to ecological simplification and degradation. While the instability of south-eastern ecosystems has increased since the Early Holocene, the geological, pedological, topographic and climatic characteristics of the lowland zone particularly, would have ensured that a large part of south-east Spain would have been consistently less diverse and less stable (in ecological terms) than neighbouring Levantine and Atlantic provinces of the Peninsula.

One of the most useful measures of ecological stability in any ecosystem is its 'resilience' (MacArthur 1955; Holling 1973; Odum 1971). In general, this variable is determined by an ecosystem's ability to maintain a high species diversity and is reflected in the amount of time necessary to restore high levels of ecological complexity (or climax conditions) once the ecosystem has been subjected to interference by human or non-human agencies. Throughout the greater part of the Holocene at least, it is clear that upland zones in south-east Spain - because of their higher rainfall and humidity, greater altitudinal variability, better developed soils and more effective cover of vegetation - were able to maintain a high species diversity, and were therefore considerably more stable and productive than adjacent lowland zones. It is also clear that the ecological diversity of these upland zones, along with their ability to maintain or regenerate their productivity, made them consistently more attractive than the lowland region (see Chapter III); evaluation of the littoral areas is naturally difficult because of sedimentation and marine transgression. More significantly, when permanent occupation and exploitation of the lowlands did take place, the effects of human activities were quantitatively and qualitatively different from the consequences of exploitation in the uplands of the Bétic Cordillera, and to a lesser extent, in the Inter-Bétic Depression.

A brief summary of the differences between upland and lowland areas of south-east Spain will help to identify why the ecological stability of these areas differed so widely throughout the Holocene. First, it is clear that whatever the prevailing climatic regime may have been, the altitudinal variability of the upland zone would have created a wide range of ecological habitats, containing a number of soil types, plant communities, micro-climates, and so on. In contrast, the lowland zone exhibited considerably less environmental variation due to the nature of its topography, general geographic position, and particularly its climate. It is not particularly surprising therefore, to find that hunter-gatherer and early agricultural communities in south-east Spain display a clear and consistent pattern of occupation in upland regions (Mathers 1984a) where the diversity, productivity, density and stability of exploitable resources was substantially greater.

Secondly, the development of mixed farming economies in the south-east had a significant but variable impact on the landscapes of this region. Generally speaking, cereal cultivation and stock raising helped to stimulate the process of ecological simplification on a large scale - in both the upland and lowland zones. This process was, however, a gradual one. Early agricultural strategies in south-east Spain appear to have placed more emphasis on animal-based subsistence strategies (both stock and wild species) rather than intensive cereal based ones (see Chapter III). By the 3rd millennium b.c., however, more intensive land use strategies were adopted throughout south-east Spain - a development which accelerated the process of ecological simplification, especially in the lowland zone.

While the lowland landscapes of Almería and Murcia were not nearly as degraded in the Later Neolithic and Copper Age, the possibilities of maintaining ecological stability, or initiating regeneration, were considerably reduced once permanent occupation of this area had begun. As Whyte (1966: 328) has noted, human interference with arid and semi-arid ecosystems often makes the process of environmental degradation irreversible:

> "One of the most serious but seldom mentioned consequences of human activity is the deterioration of microclimates to a more arid level following the disappearance of the woody plants and the reduction in the average height of herbaceous cover. The action of wind on plants and soils becomes much more marked, temperature variations on and below the soil surface become greater, infiltration of water into the soil is affected, evaporation is more intense, and the more xerophilous species replace the more mesophilous. This deterioration in microclimates undoubtedly explains why many species, particularly trees and shrubs, are no longer reproduced and why it takes so long for vegetation to regenerate after centuries of misuse. Perhaps even more important is the reduction in effectiveness of the desert fringe types of vegetation in acting as a protective barrier between the desert on the one hand and the more mesophilous types of sub-humid and humid vegetation on the other".

The difficulties of sustaining agricultural economies in areas such as the Murcian and Almerian lowlands provide a marked contrast with the less intensive and less precarious mixed farming economies which appear in the coastal zone around Málaga, and particularly in the basins of the Inter-Bétic Depression. The latter areas received higher, and more predictable rainfall than the adjacent lowlands, and can therefore support a wider range of resources - and with respect to prehistoric agriculture, would have presented a far more extensive area for exploitation. As a result, the intensity of exploitation in these upland areas was considerably less than in lowland Murcia and Almería (cf. Gilman and Thornes 1984; Lull 1983). Equally, the better developed soils and plant communities, as well as the higher precipitation, enabled upland ecosystems to maintain their productivity, or rapidly regenerate. These circumstances helped to minimize the risk of long-term degradation and economic failure throughout much of the upland zone.

Another factor which has affected the stability of upland and lowland environments in the south-east is the impact of short-term climatic variations. It was noted earlier in this chapter that modern meteorological records demonstrate that short-term climatic variations are more frequent, and more severe, in the lowland zone than at higher altitudes - a pattern which may also be applicable to the later prehistoric period. In any case, it is apparent that brief climatic fluctuations, on the order of days, years and decades, are far more significant in the drier, lower lying areas. The general lack of effective plant cover to buffer against episodes such as torrential storms, and the often slow process of regeneration in the aftermath of such events, make the lowland ecosystems of south-east Spain particularly susceptible to ecological simplification - especially after the sustained exposure of soil surfaces due to cultivation or grazing. Raikes (1978: 12), for example, has outlined how short-term climatic phenomena may affect, and interact, with human activities in this type of environmental context:

> In semi-arid areas deforestation and overgrazing have between them done so much to make the soil easily erodable and susceptible to direct evaporation losses that the plant communities we now see are hardly ever the climax vegetation. The resulting desertic condition is not due to climatic change but to interference by man and animals....... with the soil condition. The process is called desertification in contrast to desertisation which is due to the interaction of only climatic and vegetational factors. Of these last there is one climatic factor in semi-arid areas which acting by itself causes desertisation and, in conjunction with non-climatic factors, causes desertification. That is the extremely high variability of annual or seasonal amounts of rainfall of between 250 mm and about 500 mm, and the observed tendency for years of deficit to be clustered. The effect of as little as five consecutive years of drought, sufficient to even eliminate some members of the plant community, can often be as dramatic as if the deficit had lasted several centuries. For

> unless a nearby source exists for repopulation by the eliminated species, the effect is a progressive degradation of the plant community towards that which would originally have been appropriate to much lower rainfall or soil moisture".

It is clear from evidence presented in later chapters that Neolithic, Copper Age and Bronze Age communities in south-east Spain played an important role in modifying the landscape, and in producing significant environmental change - particularly in the semi-arid lowlands. The need for continuous, and often large scale, modification of the landscape in these areas, either to facilitate greater production, or merely maintain it at a particular level, would have seriously inhibited any regeneration. Equally, continuous modification of this kind would have increased the susceptibility of the landscape to both low and high frequency climatic events. In this context, Raikes (1978: 11) suggests that during the Holocene in the Mediterranean:

> The purely climatic changes were surely marginal and the ecological effects, if they have been correctly interpreted as such, were often due to, or reinforced by, non-climatic causes.

The appearance of agricultural communities in the 'marginal' zones of southern Almería by the 3rd millennium b.c., for example, indicates that the obstacles to economic development and permanent settlement in these zones had been overcome. Equally, the continuity of settlements in this semi-arid zone over a millennium or more indicates that communities had adapted their economic and social organization to deal with short-term, unpredictable fluctuations without serious failures or collapse. By the later prehistoric period it is likely, therefore, that climatic variations were effectively absorbed by communities without the need for dramatic reactions or restructuring. Technological and social 'buffers', such as irrigation or exchange, were increasingly used to override, or minimize, the effects of climatic fluctuations.

While it is important to evaluate cultural responses to climatic and environmental fluctuations, it is clear that prehistoric communities could not only exacerbate the effects of climatic and environmental changes, but could also initiate such processes (though in the case of the former only on a small scale - i.e. micro-climatic changes). In assessing the reaction of various cultural systems to environmental and climatic perturbations, therefore, it is essential to understand the cultural dimension of this relationship - in particular, how later prehistoric communities could have brought about major changes in local ecosystems and micro-climatic conditions. Consequently, it is appropriate to move on, in the next chapter, to evaluate the internal and external organization of Neolithic, Copper Age and Bronze Age communities in the south-east, in order to determine the ways in which these systems may have responded to, or been affected by, climatic and environmental change.

CHAPTER III

CHRONOLOGY AND MATERIAL CULTURE

III. a. Introduction

While the emphasis of archaeological investigation has shifted dramatically over the last few decades, spatial and temporal variations in material culture continue to be of primary importance for evaluating the processes, and the mechanisms, of cultural change. Nevertheless, in Iberia approaches to material culture are still dominated by culture historical perspectives which focus on typology and classification, rather than on behavioural processes. It would be unrealistic, however, to see culture history as somehow being divorced from, or replaced by, an emphasis on culture process, since in many ways the two are connected with one another. Much of the value of material culture lies not so much in outlining spatial and temporal differences in assemblages, but rather in identifying how and why these differences are significant in behavioural terms. In this sense, culture history is an important, but preliminary, stage in archaeological explanation since it attempts to isolate various types of material patterning without explicitly examining the factors which stimulated those patterns. Therefore, if our aim is to investigate both the pattern and processes of cultural development, it is necessary to employ approaches which combine culture history and culture process - using one to outline generalized material patterns, and the other to identify the mechanisms and processes which underlie those patterns. In order to accomplish the latter, it is important to determine the significance of various material elements within the cultural system, and furthermore, demonstrate how these elements can be used to examine the 'workings' of that system. Towards this end, the culture historical sequence outlined below is intended to provide the necessary background for developing,and evaluating, the models put forward in later sections.

The purpose of this chapter is, therefore, threefold: (1) to provide an up-to-date synthesis of culture historical sequences in south-east Spain between the Early Neolithic and Middle Bronze Age; (2) to highlight the basic strengths and weaknesses of available information; and (3) to outline a general developmental sequence to compare against hypotheses formulated in later chapters.

Before detailing the chronology and assemblages for each individual period, however, it is essential to provide some background information with which to assess the cultural sequence in south-east Spain - particularly during the early agricultural period. This general perspective is important for several reasons. First, because this research is focused primarily on the evolution of farming communities it is necessary to address the problem of how and why agricultural strategies developed. Examining the general context of this development, and the processes involved in it is equally important and clearly cannot be accomplished by treating one area in isolation. These questions are even more significant when one considers the general absence of early agricultural communities in many areas of south-east Spain. Consequently, in order to understand the distinctive character of development in south-east Spain it is necessary to look first at the process of agricultural evolution and expansion in the West Mediterranean generally.

III. b. Early Neolithic Communities (6000-4500 b.c.)

Early Agricultural Communities in their West Mediterranean Context

Despite the considerable interest and attention focused on the process of 'neolithization' in the Mediterranean during the 5th and 6th millennia b.c., the development of early agricultural communities in south-east Spain and the West Mediterranean generally remains a complex and poorly understood phenomenon. In evaluating the emergence of agricultural communities in south-east Spain it is particularly important not to divorce this area from the more widespread development of the Cardial Impressed Ware 'network' in other parts of the Central and West Mediterranean. The importance of this wider perspective is clear, especially when considering the extensive and integrated character of early Impressed Ware communities in the West Mediterranean Basin. Moreover, it is apparent that Neolithic settlement in many parts of south-east Spain is considerably later and more sporadically distributed than in many adjacent areas such as Languedoc (Guilaine and Roudil 1976; Mills 1983); Provence (Courtin and Froget 1970; Courtin _et_. _al_. 1972; Courtin 1974); Corsica (Bailloud 1969; Lanfranchi 1972; Lewthwaite 1983); Sardinia (Carta 1966-1967; Trump 1980; Lewthwaite 1983); Cataluña (Muñoz 1963, 1975; Martí Oliver 1978);Valencia (Aparicio Pérez and San Valero 1977; Martí Oliver _et_. _al_. 1980; Marti Olíver 1977; Navarette Enciso 1976), and Western Andalucia (Pellicer and Acosta 1982; Muñoz 1984). Given the distinctive character of Neolithic development in south-east Spain, and the difficulties of understanding this area in isolation, the following section is devoted to a general discussion of Early Neolithic communities in the West Mediterranean.

From this broader perspective, several general patterns emerge which are useful for interpreting the appearance and growth of agricultural communities in south-east Spain. First, as Lewthwaite (1982 a & b) has pointed out, traditional models of Cardial Impressed Ware communities in the West Mediterranean have made a simplistic association between maritime activity, domesticated stock and cereals, and pottery, while overlooking the considerable chronological differences between the development of these various elements. For example, while evidence of seafaring dates to the 10th millennium b.c. in the Aegean (Cherry 1981: 45) and the 7th millennium b.c. in the West Mediterranean islands (Lewthwaite 1982a: 294), domesticates such as ovicaprines appear in the early 6th millennium (Geddes 1983, 1985) and cereals generally in the 5th millennium b.c. (Guilaine 1976; Phillips 1982). Moreover, the cross-cultural evidence presented by Lewthwaite (1982a) emphasizes that pottery need not be associated with any of these developments, and furthermore, because of its variable contexts, cannot be used to define a specific type of economic strategy.

Rather than arrive 'in block' therefore, these 3 elements,-maritime transport, pottery and domesticates - seem to have developed at different rates, with markedly different trajectories. Cardial and other Early Neolithic pottery, for example, is finely decorated, well fired and exhibits considerable diversity in form and decoration from its outset (Asquerino Fernández 1977; Navarrete Enciso 1976), without any clear signs of a preceding plain ware phase. Likewise, ancestoral populations of ovicaprines are absent in Late Pleistocene and Early Holocene contexts in the West Mediterranean, strongly suggesting an introduction into this area. Evidence from the Aude Valley in southern France and Andorra, however, indicates that economic strategies based on ovicaprines were present in this area in the early 6th millennium b.c. (Geddes 1983, 1985). Cereal cultivation, on the other hand, appears to be much later in date (Guilaine 1976; Lewthwaite 1982a) and have a relatively minor impact on settlement, technology and organization, until the 4th millennium b.c. (Phillips 1982; Geddes 1984; Mathers 1984a). Finally, the Cardial Impressed Ware communities found on Corsica and Sardinia (Lewthwaite 1983; Camps 1976) indicate that maritime transport was already well developed in the Early Neolithic and that colonization of at least some new areas did take place in the West Mediterranean during the 7th millennium b.c.. The view which emerges from the present evidence, therefore, is as Lewthwaite (1982a) has suggested, one of 'cardial disorder', with little evidence to support either the indigenous development of agricultural economies, ceramics, etc., or their widespread implantation by seafaring Neolithic colonists.

Contrary to the traditional view of social and economic development in early agricultural communities there is widespread evidence that most of the characteristic features associated with the Early Neolithic developed gradually in the West Mediterranean and over a prolonged period of time. In Iberia, for example, Martí Oliver (1978: 63) notes:

> "Certainly it is not until the full Eneolithic when the whole complex of characteristics subsumed under the term Neolithic, reach the Peninsula, although it is often clear that, much before this, in the so-called Early Neolithic or Neolithic with cardial impressed pottery, the importance of agriculture and stock raising was decisive."

Although domesticated stock were important in Early Neolithic economies throughout eastern and southern Spain, the significance of cereal cultivation does not appear to be as great as Martí Oliver (ibid) and others have suggested. Indeed, it appears that the economic emphasis of many Early Neolithic communities in Mediterranean Spain was focused primarily on the management of domesticated stock and the hunting of wild species, while the exploitation of cereals constituted a relatively minor, or subsidiary, component in subsistence terms (Muñoz 1984; Guilaine *et.al*. 1982).

In this context it is significant that many of the early Incised and Impressed Ware groups in Iberia and the West Mediterranean display a considerable degree of continuity with Epipalaeolithic settlement locations, technologies and exploitation patterns (Fortea Pérez 1970, 1973; Walker 1973, 1977; Such 1920; Phillips 1975; Barker 1975, 1981; Jarman 1976; Mills 1980). Even some of the so-called 'fully' Neolithic sites such as Or or Sarsa continue to be located in caves, and do not display any of the characteristics which are traditionally associated with the Neolithic *sensu strictu*, such as enclosures or fortifications, open air settlements, formalized cemeteries, large population aggregations, intensive cereal cultivation, and large residential dwellings. Indeed, these features typify the Middle and Late phases of the Neolithic in the West Mediterranean rather than its initial stage (Phillips 1982; Martí Oliver 1978; Guilaine 1976; Mathers 1984a).

Although Late Epipalaeolithic economies in the West Mediterranean are based exclusively, or almost exclusively, on wild plant and animal resources, they also have a number of important general features in common with Early Neolithic subsistence strategies, notably: a high degree of residential mobility, an emphasis on exploiting mobile animal resources, and the apparently secondary, or supplementary, importance of 'immobile' resources such as plants or shellfish. Since the management of domesticated stock seems to precede an effective commitment to cereal cultivation by some two or three millennia in various parts of the West Mediterranean, it is appropriate to ask what conditions would have favoured the early development of stock economies and delayed the emergence of intensive cereal cultivation.

First, the risks associated with subsistence economies in the West Mediterranean during the Late Epipalaeolithic and Early Neolithic were minimized by: (1) an emphasis on mobile resources and mobile patterns of residence, and (2) the exploitation of a broad spectrum of resources. Cereal based economies on the other hand, often involve intensification in space as well as intensification on a particular set of resources - factors which help to narrow the range of plant and animal species exploited on both a seasonal and annual basis. While this limitation of the resource base is one source of risk, the irregularities inherent in crop production (due to fluctuations in climate, crop diseases, pests, etc.) are another. Overall, therefore, mobile, broad-based economies, like those pursued in the Early Neolithic, are likely to have been less prone to the major fluctuations and 'failures' which often characterize strategies dependent on the cultivation of cereals.

Another factor which is relevant to the issue of economic continuity between Late Epipalaeolithic and Early Neolithic communities in the West Mediterranean is the nature of environmental conditions during the Atlantic climatic phase. In a recent discussion of environmental data for this period Lewthwaite (1982a and b) suggests that: (1) the present pattern of fluvial networks was not stabilized until the 4th millennium b.c.; and (2) the Early Holocene environments in many parts of the West Mediterranean were characterized by a decidious forest cover rather than the evergreen oak climax which has been traditionally assumed. Lewthwaite (1982a: 302) concludes that:

> ".. far from being a saddlepoint of 'stress' in the early 6th millennium b.c., the inception of the Atlantic climatic episode even in the Mediterranean

may have created an unprecedented and irrevocably lost environments for which there are neither ecological nor ethnographic analogies".

Given the diversity and productivity of West Mediterranean environments during this period Lewthwaite is critical of the 'economic stress model' put forward by Clarke (1976) to explain the widespread adoption of domesticated plants and animals. From this perspective, the continuity between Epipalaeolithic and Neolithic economic strategies is largely due to a lack of stress.

Domesticates such as ovicaprines would have been relatively easy to integrate into a broad based and spatially extensive pattern of exploitation, involving seasonal, or more frequent movements. First, they would have provided a fairly secure form of meat-on-the-hoof, in small 'units' which were convenient for consumption. Secondly, they are particularly efficient at converting energy and are able to browse a wide variety of vegetation. Finally, they may also have supplied valuable by-products such as milk, wool, etc.. In many respects, therefore, domesticates could have been employed in a relatively mobile economic strategy which had more in common with the pattern of broad spectrum exploitation in the Late Epipalaeolithic than it had with Later Neolithic economies based predominantly on cereals.

While Lewthwaite (1982a and b) has been critical of models which emphasize economic stress as a stimulus for the widespread adoption of domesticates, a case can be made for various types of 'stress' developing in the West Mediterranean area during the Atlantic. In particular, there are several aspects of environmental change that could have produced considerable discontinuity and disruption in local economies throughout the West Mediterranean Basin. First, there was a substantial contraction of the Mediterranean coastal plain on the Costa Brava, in the Gulf of Valencia and in the Gulf of Lions, as a result of the Flandrian transgression (Shackelton et. al. 1984). While these changes may have been relatively gradual from one generation to the next, three relevant variables are worth bearing in mind here:

(a) Coastal topography would have played a crucial role in the impact of any given rise in sea level. Hence,a rise of several metres may have had negligible effects in areas with steep sloping coastal margins, but drown extensive areas of land in regions with a more gentle gradient (cf. Delano-Smith 1979: 391; Goudie 1977: 174-175)

(b) Storm or tidal surges may have periodically breached coastal barriers and inundated large areas, so that although sea level may have remained relatively 'constant' from one generation to another, periodic incursions of saline water may have considerably reduced the stability and productivity of littoral ecosystems.

(c) The rate at which sea level rose was also important, and evidence from various sources points to a global pattern of sea level changes during the Flandrian characterized by a relatively rapid and continuous rise, beginning c.14,000 B.P. and stabilizing around 6000-5500 B.P. (Mörner 1969; Jelgersma 1961, 1966; Fairbridge 1961; Schofield 1964). This rapid rise in sea level would have had significant destabilizing effects on both terrestrial and marine ecosystems until about 4000 b.c. when a more stable pattern of fluvial networks and sea levels was achieved (Delano Smith 1979; Lewthwaite 1982a).

It is also worth noting that there is little evidence, either in the form of occupation debris or rock art, for Epipalaeolithic activity in the interior of the Iberian Peninsula (e.g. the Meseta). This suggests, therefore, that much of the economic activity and emphasis at this period was focused on what can be broadly termed the littoral zone - that is, the macro-ecotone incorporating both the coastal plain and the adjacent plateau fringe. The compression of this zone by Post-Glacial rises in sea level would have had serious repercussions for existing settlement and economic strategies.

It is interesting to note that many areas which appear to have suffered substantial losses of coastline during the Flandrian are also zones which have some of the earliest, and more sizeable, clusters of Early Neolithic sites. Indeed, in Mediterranean Spain there appears to be a good correlation between these areas, and areas with a high density of both Epipalaeolithic sites and Levantine rock art (Walker 1969, 1971; Béltran 1982; Fortea Pérez 1973). For example, the clusters of Epipal-aeolithic occupations and Levantine art in Castellón de la Plana and Tereul, and another concentration in Valencia and Alicante, coincide with zones of fairly high density Early Neolithic settlement (cf. Béltran 1982: 10-11 and Martí Oliver 1978: 84). In Mediterranean Spain at least, these patterns suggest that:

(a) There is a considerable degree of overlap between Epipalaeolithic and Early Neolithic settlement patterns

(b) The high density of activity in many lowland and plateau areas near the coast, together with sizeable losses of land in adjacent territories due to the Flandrian transgression, would have considerably magnified the other economic stresses faced by communities during this period (see below)

(c) The model put forward by Clarke (1976) suggesting that domesticates were taken up more rapidly in areas which experienced the greatest stress cannot be completely dismissed

(d) The expansion of settlement into hinterland areas of Mediterranean Spain during the Epipalaeolithic and Early Neolithic may have been prompted by the combination of: (1) local changes in climate and vegetation and (2) higher regional population densities. (These higher density populations would have been particularly pronounced in the traditionally favoured areas of exploitation and settlement - i.e. the littoral margins and the interface zone between the plateau and coastal lowlands.

(e) Settlement expansion into the interior of Mediterranean Spain appears to be contemporary with the colonization of several West Mediterranean islands such as Corsica and Sardinia (Cherry 1981; Lewthwaite 1982, 1983), and may represent a further adaptation to the 'stresses' which characterize the Early Atlantic

Other climatic and vegetational changes during this period would also have had some impact on the degree of 'stress' or economic risk experienced by various communities in the West Mediterranean. The onset of warmer temperatures during the Climatic Optimum and the higher (and perhaps more regularly distributed) rainfall helped to promote the growth of deciduous forest in many areas of the West Mediterranean (Reille et. al. 1980; Guilaine et. al. 1982). In turn, these changes had widespread influence on the distribution, availability and productivity of terrestrial and marine resources. While there is little evidence to suggest that Post-Glacial environments were less productive than Late Pleistocene ones, with respect to overall biomass, the change from a fairly open type of steppe vegetation to a more closed deciduous woodland did cause considerable dislocation - not only with regard to existing plant and animal communities but also to traditional economic strategies. In general, this disruption of ecological and economic systems was stimulated by changes in:

(a) Resource Composition
(Not only the types of plant and animal species, but also their relative proportions)

(b) Resource Distribution
(Spatial and temporal patterns of clustering and dispersal)

(d) Resource Availability
(Dependent on (a) and (b), as well as the

predictability and stability of resources on a seasonal, annual and inter-annual basis)

Therefore, the problems created by a reduction in exploitable area (via sea level changes) and by important climatic-environmental shifts ultimately helped to stimulate major organizational and technological responses. These responses included changes in scheduling, technologies, mobility, and exploitation emphasis, in order to maintain economic stability.

While the discussion above has argued that various climatic and ecological developments seriously disrupted traditional economic strategies in the Early Atlantic, it is now appropriate to examine how local hunter-gather communities reacted to various types of economic 'stresses'. First of all, there is little sign of a movement towards greater plant food exploitation and processing in the West Mediterranean prior to the appearance of Early Neolithic communities - e.g. querns, rubbers, 'sickle gloss', storage facilities and so on. This evidence is not consistent with the 'gradualist' model of locally developed food production suggested by Clarke (1976). Evidence for greater exploitation of plant resources can, however, be linked with Early Neolithic communities, for example, at La Sarsa (Asquerino Fernández 1978), Or (Martí Oliver et. al. 1980; Martí Oliver 1977) and Cocina (Fortea Pérez 1970, 1973) in Spain, and elsewhere in the West Mediterranean: at Basi (Bailloud 1969) and Curacciaghiu (Lanfranchi 1972) in Corsica; Ile Riou (Courtin and Froget 1971) and Châteauneuf-les-Martigues (Escalon de Fonton 1956) in southern France; and Maddalena di Muccia (Lollini 1965) in Italy. Nevertheless, it appears that in Early Neolithic economies domesticated plants either constituted a minor component, or were used in such a manner as not to severely disrupt the traditional patterns or schedules of resource exploitation. Initially anyway, the strategy appears to be one of integrating these domesticated resources into existing economic strategies, rather than using domesticates to establish entirely new strategies.

Although the exploitation of domesticated plants offered a number of short-term advantages, the problems of ensuring a regular and predictable yield from these resources in the long-term created several major obstacles to the rapid, and widespread, development of cereal cultivation. These problems include:

(a) the more continuous management and greater labour investment which was required

(b) the fact that exploitation or many other resources was made difficult or impossible by conflicting schedules, disruption or destruction of their habitats, etc.

(c) the major adjustments in technology, settlement and societal organization which were necessary

(d) limited areas where cereal cultivation would have been successful without major energy investments or major fluctuations in production

(e) the ironic fact that although greater investments of energy were designed to increase or stabilize productivity, they inevitably led to renewed, and often greater, instability

From an 'optimal foraging' perspective the use of mobile animal resources such as domesticated stock in the Early Neolithic made it possible to pursue low investment, mobile and broad spectrum exploitation strategies which did not develop in the direction of sedentary and labour intensive strategies (based on cereal cultivation) for several millennia. The greater risks, investments and adjustments involved in cereal cultivation - in comparison with locally available alternatives such as stock raising and broad spectrum foraging - appear to be the major reasons for the delayed commitment to intensive cultivation.

The question of why cereal cultivation was increasingly favoured as an economic option cannot be entirely resolved in this discussion. Nevertheless the combined effects of factors such as those listed below, may provide a useful guide to the reasons behind the progressively greater commitment to, and dependence on, cereal crops. These factors include:

(a) increasing population density (due to environmental changes such as land losses linked to rising sea level) and increases in absolute population size - both resulting in the greater use of available land and resources, and in some circumstances encouraging spatially more intensive exploitation (whether broad-spectrum or resource-species specific strategies)

(b) the long-term effects of ovicaprine pastoralism (particularly repeated or spatially restricted browsing) on the stability and variety of other exploitable plant and animal species (cf. Geddes 1983)

(c) familiarization with the techniques and problems of cereal production

(d) the ability of cereals to produce a high energy resource in a relatively compact space

(e) possibilities for selecting and encouraging particular characteristics of cereals, and thereby increasing their productivity (per unit area) and the ease with which they could be processed

When compared with other parts of the West Mediterranean, south-east Spain is clearly an anomalous region with respect to development in both the Early, and Later, Neolithic. While models of Early Neolithic development in the north-west arc of the Mediterranean give chronological priority to coastal as opposed to interior sites, the pattern of settlement in south-east Spain during this period is entirely different. Although Early Neolithic settlements are common in many coastal regions of southern France and Mediterranean Spain - particularly in the Gulf of Lions (Phillips 1975, Guilaine 1976) and Gulf of Valencia (Martí Oliver 1978: 84) - assemblages of this date are, with the possible exception of one vessel[1.], entirely absent in the coastal lowlands of south-east Spain (Savory 1968: 64, fig. 18; Navarrete Enciso 1976; Guilaine 1979; Mathers 1984a). Moreover, the widespread absence of Middle, Late and Final Neolithic materials in the lowland zone between Adra and Alicante (Savory 1968; Mathers 1984a), suggests that large-scale agricultural settlement of this area did not begin before the 3rd millennium b.c. Radiocarbon dates for settlements in the lowland zone of the south-east also support these conclusions (Balbín-Behrmann 1978; López 1978; Walker 1985).

By contrast, incised wares, cardial pottery and other Impressed Ware assemblages, as well as Later Neolithic materials, are well represented in the upland interior of the south-east (Navarrete Enciso 1976; Martí Oliver 1978; Arribas and Molina 1978; Molina González 1970; Arribas 1972). Radiocarbon dates for sites in this area also confirm the chronological precedence of interior areas over those on the coast (see Appendix 3.1), sometimes representing a gap of some 3 millennia or more. The marked concentration of Early-Late Neolithic settlements in the humid, upland zone of south-east Spain, therefore, represents a considerable contrast with the general absence of such occupation in the drier, lowland zone.[2.]

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1. A large Cardial Impressed Ware vessel was found at the Cueva de los Tollos in Murcia (Siret and Siret 1887: 17-20, Plate 2).
2. Neolithic sites on the Málaga-Granada coast are the exception to this pattern (Menjibar et. al. 1981, 1983; Pellicer Catalán 1967; Giménez Reyna 1946; Pérez de Barradas 1961; Arribas 1972). These sites are found in areas where rainfall and relative humidity are considerably greater than in neighbouring coastal areas of Punta del Sabinal, Puntal del Río and Cabo de Gata in coastal Almería (Neumann 1960); Neolithic sites in the coastal zone of Málaga and Granada are located in areas which have considerably more topographic and ecological diversity than the littoral areas of Almería and Murcia, the former providing a compact series of ecosystems with a wide variety of resources - circumstances which ensured greater economic stability.

Given the limited distribution of Early Neolithic sites in south-east Spain, and the general lack of detailed information for sites of this period in Mediterranean Spain, the following discussion of material culture and chronology includes sites which, strictly speaking, lie outside the boundaries of this research. Nevertheless, these sites - from a variety of locations in southern and eastern Spain - are crucial for understanding the development of Neolithic communities in south-east Spain proper.

Lithic Industries

In general, Early Neolithic flint assemblages in eastern and southern Spain can be divided into two main categories:

(a) Industries of Epipalaeolithic Tradition (Geometric Facies)[3]. Including geometrics, microblade-microlithic technology, microburins, scrapers, backed blades and bladelets - with the addition of lunates, segments and 'double bevel' retouch in the 5th millennium b.c. (e.g. at Botiquiera del Moros - Barandiaran 1976)

(b) 'Pure Cardial' Neolithic Industries[4]. Dominated by blades and bladelets, but includes perforators, trapezes, lunates and retouched flakes.

The contemporaneity of these two industries has been established by radiocarbon, and by the presence of distinctive typological elements (e.g. cardial impressed ware) in both contexts (Fortea Pérez 1973; Barandiaran 1976; Rodriguez 1982; Barandiaran and Cava 1981; Martí Oliver *et. al*. 1980). In the Valencia region, Martí Oliver (1982), Fortea Pérez (1973), and others have used the differences between these two types of assemblages as an index of 'neolithization', suggesting that industries of Epipalaeolithic tradition represent acculturated indigenious communities and that 'Pure Cardial' industries are indicative of fully Neolithic groups. On the other hand, Aparicio Pérez (1982) uses evidence from the same region to argue that there is clear continuity between Late Epipalaeolithic and Early Neolithic assemblages.

While the reasons behind this industrial variability are both complex

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3. Best represented by Phase III at the Cueva de la Cocina - Fortéa Pérez (1973).
4. Typified by Coveta de l'Or and Cueva de la Sarsa - Martí Oliver *et. al*. (1980); Martí Oliver (1977); San Valero Aparisi (1950); Asquerino Fernández (1978); also see Appendix 3:2.

and problematic, several facts are clear. First, there are major shifts in lithic technology in Mediterranean Spain between the Late Epipalaeolithic and Early Neolithic, including: (1) the disappearance of the microburin technique, strangulated blades, geometrics with 'apices triedricos', burins, and almost all forms of scrapers, as well as (2) the appearance of blades with 'sickle gloss', sickle teeth and perforators. These shifts do not, however, represent a total break with earlier traditions, even at sites like Or or Sarsa - where various forms of geometrics were found in Early Neolithic contexts. Secondly, Early Neolithic assemblages throughout the interior of eastern and southern Spain display a considerable degree of continuity with earlier Epipalaeolithic stone tool industries (Rodriguez 1982; Sarrion Montañana 1980; Fortea Pérez 1973; Barandiaran 1976; Aparicio Pérez 1979).

In addition to the typological differences between these two industries there are marked contrasts in the types of raw materials used. According to Fortea Pérez (1973) and Martí Oliver _et_. _al_. (1980) the flint employed at both Or and Sarsa is of high quality and can be readily distinguished from materials used in other contemporary assemblages of Epipalaeolithic tradition. Fortea has likened this material to obsidian and suggests it was thermally treated. He also suggests that this flint was imported from some distance away since it is not available locally.[5] Material found on other contemporary sites is generally of poor quality, in contrast to the lithic assemblage from Or where inferior materials such as crystalline rock are rare (Martí Oliver _et_. _al_. 1980).

Other lithic elements also help to differentiate Or-Sarsa and Cocina type assemblages, either in a quantitative or qualitative way. At Or and Sarsa, for example, the presence of stone bracelets and necklace beads, schist pendants and limestone discs clearly distinguish these assemblages from other Early Neolithic sites in the south-east where these forms are generally absent (cf. Fortea Pérez 1973). While axes, adzes, mortars and plaques are found at Or and Sarsa in relatively small numbers (Asquerino 1978; Martí Oliver _et_. _al_. 1980; Martí Oliver 1983; Appendix 3:3), they are consistently more abundant than in other assemblages of the same date. The single quern from cardial levels at Cocina (Fortea Pérez 1973: 89) is exceptional, while axes, adzes and other large stone

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5. Despite the lack of sourcing or trade element analysis, the considerable distance between major limestone areas (i.e. possible source areas for flint) and the location of Or and Sarsa again suggests that flint found on these sites may have been imported.

tools are extremely rare in Early Neolithic assemblages of Epipalaeolithic tradition.

Several Early Neolithic sites from central and western Andalucia[6], however, have also produced evidence of stone ornaments (such as bracelets and pendants), polished stone objects, querns and rubbers (Pellicer and Acosta 1982). The latter two types of artefacts are consistently stained with red pigment and appear to have been used to crush and prepare ochre, rather than for processing cereals. In general, the flint industries associated with these sites are dominated by blades and bladelets.

Bone and Shell Industries

Another aspect of technology which has often been regarded as a characteristic of the Early Cardial Neolithic at Or and Sarsa is the emergence of well developed bone and shell working traditions. Recent excavations at Or (Martí Oliver et. al. 1980; Martí Oliver 1983) have confirmed the existence of a rich bone and shell industry in the Early Cardial which includes points, spoons, discs, rings, necklace beads and small pendants, together with a wide variety of perforated and unperforated marine shells. The lowest levels of the site - all associated with Cardial Impressed Ware - contain only a small number of bone and shell items (Appendix 3:4). By a later horizon, however, radiocarbon dated to 4770 ± 380 b.c., there is a considerable flourescence of both bone and shell production, indicated by the greater diversity, and larger number of objects (Appendix 3:4). This sequence suggests the fairly rapid development of bone and shell technology following the initial occupation of the site. Though unstratified, the abundance of bone and shell material from Sarsa (San Valero Aparisi 1950; Asquerino 1978) suggests that these industries may also have been important here during the Early Neolithic.

Elsewhere, bone and shell objects are less common. Bone ornaments have been reported from the Cueva de la Dehesilla, and bone points from Cueva Chica de Santiago, but given the preliminary nature of investigations at both sites it is difficult to evaluate the scale of production in either case, (Pellicer and Acosta 1982). In Early Neolithic assemblages of Epipalaeolithic tradition (i.e. Cocina type) bone and shell objects

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6. These sites, which include the Cueva de Nerja (Málaga); Cueva Chica de Santiago (Sevilla); and the Cueva del Parralejo and Cueva de la Dehesilla (Cádiz), all date between 6000-5000 b.c. and all apparently have little or no Cardial Impressed Ware pottery.

are rare. When these items do occur they are generally isolated, and crudely manufactured, objects such as unperforated marine shells, sharpened bone splinters, and occasionally, finished tools - e.g. at Mallaetes (Fortea Pérez 1973) and Nacimiento (Rodriguez 1979, 1982).

Ceramic Assemblages

Until recently, the correlation between Cardial Impressed wares *sensu strictu* (i.e. decorated with *Cardium edule L.*) and the initiation of the Neolithic in the West Mediterranean has generally been taken for granted (Arribas 1972; Martí Oliver 1978; Martí Oliver *et. al.* 1980; Pellicer Catalán 1963, 1964c, 1967; Brea 1950; Guilaine 1976, 1979). For a considerable time, however, there has been an undercurrent of minority opinion favouring several alternatives to the normative view of Early Neolithic ceramic development - challenging in particular the idea that the earliest, and indeed, the only ceramic assemblages in the Early Neolithic were Cardial Impressed wares. These alternative propositions, which have been especially prominent in Iberia, can be summarized as follows:

(a) *a Pre-Ceramic Neolithic phase* (Pellicer Catalán 1967: 38-39; Malaquer de Motes 1963: 24-25)

(b) *a Plain Ware Ceramic phase pre-dating Cardial Impressed wares* (Asquerino Fernández 1977; Fernández-Miranda and Moure Romanillo 1975)

(c) *an Impressed-Incised Ware horizon that pre-dates Cardial assemblages* (Olaría de Gusí and Gusí 1978; Olaría de Gusí *et. al.* 1982)

(d) *an Impressed-Incised Ware horizon which has little or no Cardial Impressed Ware, but is contemporary with it* (Camps 1971; Rodriguez 1979, 1982; Muñoz Amilibia 1975, 1984)

While there is no evidence of Early Neolithic plain ware horizon in the Levante or Andalucia, recent excavations in both areas have produced radiocarbon dates, ceramic assemblages and other data which could be used to support either one of the other three propositions (see recent review by Muñoz Amilibia 1984). The only one of these alternative models which has received clear empirical support, however, is the proposition that there are Early Neolithic incised-impressed ware assemblages (with little or no Cardium impressed pottery), which are contemporary with 'classic' Cardial assemblages. The former appear to be concentrated mainly in central and western Andalucia, and the latter along the Levantine coastal margins (Martí Oliver 1978; Pellicer and Acosta 1982; Muñoz Amilibia 1984).

Impressed and incised ware from Málaga, Cádiz and Sevilla have been dated to the 6th millennium b.c. and are characterized by a wide variety of vessel forms, motifs and decorative techniques (Pellicer and Acosta 1982). Vessels range from semi-spherical, carinated and globular forms to containers with pronounced necks and conical bases. Lugs and handles are also common, including the characteristic 'spout handles' so often found in Middle Neolithic contexts. Incised and channelled almagra wares, which are typical of these Early Neolithic assemblages, reach their maximum development in the Middle Neolithic (cf. Vicent Zaragoza and Muñoz Amilibia 1973). Besides almagra, decorated pottery is composed of motifs such as meanders, chevrons, short lines, 'puntillado' (point decoration), channels, and incisions, as well as decorated lugs, handles, cordons and rims. Only a few examples of Cardial Impressed Ware or cardial-like decoration are known in these assemblages.

Cardial Impressed Ware assemblages, on the other hand, are mainly found in eastern Andalucia and the Levante. The Cardial ceramic assemblages from sites such as Cueva de la Sarsa and Coveta de l'Or are some of the richest and best known in the West Mediterranean. The data from Or is particularly important because of the well documented stratigraphy and series of radiocarbon dates from the site. Indeed, the Early Cardial ceramic assemblage from Or is an essential component in what Martí Oliver (1978) and others, have defined as the 'Or-type Neolithic' in the Valencian region. The earliest ceramics from Or are dated to before 4770 $\pm$ 380 b.c. and are dominated by finely produced and richly decorated cardial pottery. The vast majority of Cardial wares have light reddish and blackish fabrics which are very fine and well fired. Decorative motifs are extremely varied and carefully executed, and often occur on both interior and exterior surfaces. In many cases, the decoration covers a large part of the external surface, which is further embellished by a fine burnish.

The forms of vessels are very diverse and include globular, high-sided and hemi-spherical bowls, vessels with lugs, strap handles, cordons, 'bottle-like' forms and so on. This diversity in form is matched by an extremely varied range of Cardial Impressed Ware motifs, among them: horizontal, diagonal and vertical bands; herringbone and trellis designs, and various 'Baroque-style' decorations. The range of forms and decorations is more varied at this early stage than at any subsequent phase in the Or sequence. Ceramic material from La Sarsa (San Valero Aparisi 1950; Asquerino Fernández 1976, 1978) seems to agree well with the general characteristics of Early Neolithic pottery assemblages at Or.

In contrast to Cardial Impressed Wares, other decorative motifs appear to be poorly represented at Or - and other contemporary Cardial sites. Conversely, plain wares seem to dominate the ceramic assemblage overall, surpassing both Cardial and non-Cardial decorated wares (Appendix 3:5).[7.]

One interesting aspect of the Early Cardial ceramics at Or is the high proportion of vessels which were repaired. Martí Oliver et. al. (1980: 163) note that the perforations on many vessels from Early Neolithic horizons at Or were made after the containers were fired, and appear in close proximity to ancient fractures. They suggest that these are repair holes and point to their unequal distribution in the stratigraphic sequence. Nearly all the fragments from Trenches J-4/J-5 which have such repair holes are found at Or before c. 4700 b.c., and moreover, are only found on vessels with Cardial Impressed Ware decoration. Martí Oliver (in Martí Oliver et. al. 1980) suggests that the interest in maintaining such vessels after breakage was due to either: (1) a desire to preserve high quality wares, or perhaps (2) the 'limitations or inconvenience' of replacing them. Finally he notes that the fabrics of these vessels were extremely pure, highly susceptible to breakage, and hence, were frequently in need of repair. There is a marked decline in the number of repaired vessels through time at Or - a trend which is linked with both technological and stylistic changes in later ceramic assemblages (see discussion in Middle Neolithic section below).

Subsistence Economies

During the last decade, the volume of economic evidence from Early Neolithic sites in eastern and southern Spain has increased enormously. This growing body of data has made it possible, for the first time, to assess early agricultural strategies in a detailed and comparative way. However, while faunal analyses have been undertaken on a large scale, evaluations of botanical remains have been rare.

Turning first to the evidence of cereal cultivation, the most complete

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7. As Martí Oliver et. al. (1980: 144-164) have pointed out, however, some care should be exercised in using these figures since there are major problems in trying to relate fragment counts to the number of vessels, because of: (1) size variations between different kinds of vessels (and hence their relative contribution to the overall mass of sherds); (2) the range of decorative techniques on a single vessel (e.g. several cases from Or had incised and impressed decoration on the same fragment); (3) the proportion of the surface area which is decorated; and (4) differential fragmentation (e.g. due to vessel size, thickness or quality).

and informative sequence to date is the Early-Middle Neolithic levels at Or. Initial studies of the cereal remains from this site identified the following species: Triticum monococcum L (1%); Triticum dicoccum Schübl (42%); Triticum aestivum-compactum Schiem, s.l. (18%); Hordeum vulgare L. and Hordeum polystichum var. nudum (39% - combined); Hopf 1964). More recent investigations have produced additional botanical remains, but unlike earlier analyses, have also provided stratigraphic and chronological details about the context of these remains.

New investigations at Or have revealed that cereals are present from the beginning of the sequence - i.e. before 4770 ± 360 b.c. (López García, in Martí Oliver et. al. 1980). By contrast with earlier botanical samples, cereals recovered from recent excavations have all proven to be one species - Triticum aestivum-compactum Schiem, s.l.. Despite the considerable variations between cereal samples from Or, particular emphasis appears to have been given to bread wheat, emmer and naked barley. It is also significant that such a wide range of species are present in this early context.

On other Early Neolithic sites, however, the evidence for cereals is quantitatively and qualitatively inferior. At Sarsa, for example, barley (Savory 1968: 70) and wheat (San Valero Aparisi 1950: 29) have been reported, but there are no details available about the chronological or cultural context of these remains. Similarly, Savory (1968: 76) noted that 'grain' was found at Cueva de la Carigüela (Piñar, Granada), but did not provide any further details.

Better evidence is available from the site of Cueva de los Murciélagos (Zuheros, Córdoba) which dates to the terminal part of the Early Neolithic (c. 4300-4000 b.c.). Excavations by Vicent Zaragoza and Muñoz Amilibia (1973) in the area of this site known as 'Cueva Chica' produced Triticum dicoccum, Triticum compactum and Hordeum vulgare, as well as acorns. Some quantitative details about the cereal remains from Cueva Chica, recently published by Muñoz Amilibia (1984: 351-352), indicate that between c. 4300-4000 b.c. naked barley and emmer are the dominant cereals, while breadwheat is only a minor component. While naked barley and emmer are important at both Or and Zuheros, breadwheat is emphasized to a much greater extent at the former. According to Muñoz Amilibia (ibid), the different mixes of cereals at Or and Zuheros must be understood in terms of temporal changes in subsistence strategies, and ecological variations between sites. However, the fact that no adequate recovery techniques were used at either of these two sites, and that no systematic sampling was employed during these two excavations, suggests that there is no reliable basis for such evaluations at present.[8]

While cereals are present in many Early Neolithic contexts in the Levante and Andalucia, the limited number of tools associated with cereal processing (e.g. Appendix 3:3), and the apparent use of many querns and rubbers for grinding ochre, suggests that intensive cereal cultivation was not a major component in early agricultural economies.[9] Tools of this type and cereal remains are apparently absent in Epipalaeolithic contexts (though no systematic attempts have been made to collect the latter). Present evidence, therefore, suggests that domesticated cereals were introduced into eastern and southern Spain.

Recent analyses of faunal assemblages from Epipalaeolithic and Early Neolithic sites in eastern and southern Spain have been undertaken on a large scale, and have produced some unexpected and provocative results. The most controversial evidence has come from two sites in Castellón - Cova Matutano and Cova Fosca, where the presence of sheep has been claimed in contexts dated by radiocarbon to 12,010-8050 b.c. and 7510-5050 b.c., respectively (Muñoz Amilibia 1984: 355). Moreover, level III at Fosca, dated to c. 7500-6900 b.c., has also produced evidence of domesticated goat (ibid). The preliminary nature of excavations at both sites, and the apparent lack of any ancestoral population of ovids in this region, suggests that more details are necessary in order to evaluate this data. As Muñoz Amilibia (1984: 355) points out, the results from Castellón, unlike those from southern France (Geddes 1984, 1985) are associated with the Early, and not the Late, Epipalaeolithic.

Domesticated species have also been found in Pre-Neolithic contexts at the Cueva de Nerja in Málaga (Boessneck and Driesch 1980). Fauna from Epipalaeolithic levels (dated to c. 8600-6300 b.c.) and a transitional Epipalaeolithic-Early Neolithic horizon, have produced a range of domesticated species including ovicaprines, pig, dog and cattle - the last

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8. The pronounced intra-site variations in botanical samples at Or (i.e. between samples collected by Hopf (1964) and López García (in Martí Oliver et. al. 1980: 175-192) underline the need for rigorous sampling.

9. This conclusion is reinforced by the enormous volume of unstratified materials from La Sarsa, published by Asquerino (1978), which include only 9 stone tools which could have been used for cereal processing (i.e. other than flint objects). These 9 tools include: 3 'smoothing tools (alisadores); 3 pestles; 2 axes; 2 hammers or percussors; and 1 rubber; commenting on material notincluded in this inventory Asquerino (1978: 139) notes that many pestles from this site bore traces of ochre.

of these belonging exclusively to the later level. The percentage of domesticated fauna increases from 24.3% in the Epipalaeolithic, to 30.6% in the transitional phase, and finally reaches 90.6% in the Early Neolithic. The marked increase in domesticated fauna at Nerja during the Early Neolithic (dated to c. 6000-5100 b.c.) is consistent with the pattern from some Early Neolithic sites such as Or, Sarsa and Zuheros (Martí Oliver et. al. 1980; Muñoz Amilibia 1984: 354; Appendix 3:6), but not others - e.g. Carigüela (Uerpmann 1979: Appendix 3) Dehesilla and Parralejo (Boessneck and Driesch 1980). At the latter three sites - all associated with domesticated pig, cattle and ovicaprines - wild fauna from Early Neolithic levels reaches c. 25%, 80.6% and 77.6% respectively. In general, the main hunted species at Early Neolithic sites in the Levante and Andalucia appear to be rabbit, red deer and wild goat (Capra pyrenaica). On the other hand, the main domesticated species are - in order of importance - ovicaprines, pig and cattle. Of these, ovicaprines make up the bulk of most Early Neolithic faunal assemblages.

While the emphasis of Early Neolithic economies in western Andalucia was largely on wild species, contemporary subsistence strategies in eastern Andalucia and the Levante domesticated animals played a far more significant role in subsistence strategies (cf. Muñoz Amilibia 1984; Boessneck and Driesch 1980). On the basis of evidence from the latter two areas Uerpmann (1979) has argued that pastoralism was especially widespread in the latter part of the Early Neolithic and the Middle Neolithic. More recent evidence, however, suggests that mixed stock economies may have already been well developed by the early 5th millennium b.c., supplemented by the exploitation of wild animals and domesticated cereals. The significance of the latter two strategies, however, appears to have been secondary - providing supplementary resources on a seasonal, or opportunistic,basis.

Settlement

Over the last 20 years, Early Neolithic settlement in Iberia has been one of the most controversial and ambiguous aspects of agricultural development in the West Mediterranean. Despite the abundance of sites in the eastern and southern Peninsula, the quality of data available from most regions is extremely poor, particularly with respect to settlement chronology. To make matters worse, there has, until very recently, been a pronounced dichotomy between the large number of known sites and very small numbers of detailed distribution maps or site lists.

One outstanding problem with regard to Early Neolithic settlement in

Mediterranean Spain is the general lack of 'true' coastal sites - i.e. sites lying on the coastal plain within several kilometres from the sea, (e.g. see Appendix 3:7). In cases such as the Cueva de la Isla (Campello, Alicante), Cueva de Nerja (Maro, Málaga) and Cueva de Sant Llorens (Sitges, Barcelona) where such coastal sites do exist, they are, almost without exception, cave sites (cf. Martí Oliver 1978). Although a very small number of open-air Cardial sites are known in Mediterranean Spain (Appendix 3:8), only one of these - Roc d'En Sardinya (Sant Genis de Vilasar, Barcelona) - actually lies on the coastal plain. Moreover, Early Neolithic 'village' sites of the type found in Calabria, the Tavoliere and perhaps, too in the interior areas of southern France (cf. Phillips 1975), are relatively late phenomena in Mediterranean Spain - generally appearing in the late, or final, phases of the Neolithic. When such large, open settlements do appear in eastern and southern Iberia, they are concentrated in the interior of the Peninsula, in the humid uplands. Many coastal areas of Mediterranean Spain do not appear to be settled nearly as intensively as the littoral zones of southern France or southern Italy, nor do they seem to have the same range of settlement types.

Large 'blank areas' devoid of Cardial Neolithic settlement are found in Almería, Murcia, and the Levante and correspond closely with extensive areas of coastal plain - not only on the littoral of Castellón and Valencia, but also the broad plain around Cartagena-Mazarrón, and (towards the interior) the lowlands of the Guadalentín Basin. Although isolated Cardial sites are found on the northern edge of the wide plain in Castellón (notably in areas with higher rainfall and in close proximity to the upland zone) Early Neolithic sites are almost completely lacking in the coastal and interior lowlands further south - from Adra to Alicante (Mathers 1984a).

While the general absence of Early Neolithic sites in these areas is likely to be the result of many complex local and regional factors, climatic and ecological conditions in several coastal areas of Mediterranean Spain may have helped to discourage long-term, or widespread residential activity (see Chapter 4). Alternatively, geomorphic processes, biases in fieldwork, and modern land use may also have played an important role in reducing the visibility of Early Neolithic sites in many areas. On the basis of present evidence, however, there appear to be several general patterns which suggest that Early Neolithic settlement in coastal areas of Mediterranean Spain was not as great as in other neighbouring areas of the West Mediterranean. These patterns include:

(a) the general lack of Middle, Late and Final Neolithic occupations in many littoral areas of Murcia, eastern Andalucia and the Levante

(b) the small number of Early Neolithic sites found in the coastal zone of Mediterranean Spain, despite the large area of coastline which this represents

(c) the number of Early Neolithic sites from inland versus coastal areas

In addition, the distribution of Levantine rock art (Walker 1969, 1971; Béltran 1982) and Late Epipalaeolithic occupations, suggest that the long-term focus of activity - between the 7th and 3rd millennia b.c. - was not so much on the coast, but towards the humid upland valleys, lagoonal areas and mountainous zones of the interior.

In general, Early Neolithic settlement patterns in the Levante and Andalucia suggest that the spatial and resource specific intensification which becomes a hallmark of later Neolithic economies, is poorly developed during the early Cardial period. On the other hand, there are signs from some sites that the mobility of Early Neolithic communities was lower than during the Epipalaeolithic. Evidence from Or and Sarsa, for example, indicates that cave sites were beginning to be used not only as temporary base camps, but also as longer term residential sites. The appearance and use of domesticated plants and animals, the wide variety of tools and other industrial debris present (indicating a functionally diverse, rather than specialized, occupation) and the appearance of some large macro-tools (such as hammers, querns and axes) - all suggest major differences between Early Neolithic and Epipalaeolithic occupations.

Exchange Systems

Because of the lack of detailed inventories and trace element analyses, the nature and 'direction' of Early Neolithic exchange systems in Mediterranean Spain are still poorly understood. Although the Cardial sequence at Or indicates that a wide variety of decorative items and raw materials were in use during the Early Neolithic, the quantity of these objects is relatively small given the chronological span involved (i.e. some 1000 radiocarbon years); (Appendices 3:4 and 3:5). The marble, limestone and schist/slate bracelets found in Early Neolithic contexts throughout eastern and southern Spain are associated with both Cardial, and Impressed-Incised ware assemblages (Vicent Zaragoza and Muñoz Amilibia 1973; Pellicer and Acosta 1982; Pellicer Catalán 1963, 1964b, 1967; Arribas 1972; Aparicio Pérez and San Valero Aparisi 1977). These items are particularly abundant in the last centuries of the 5th millennium b.c., and along with almagra pottery, clearly indicate the development of a regional interaction sphere within the larger Cardial 'network' - the former linking eastern and western Andalucia, as well as parts of the Levante. Investigation of these patterns, and the processes which helped to create them, however, have yet to be undertaken in any detail.

Traditional models of coastal Cardial groups exchanging various objects and materials with communities in the interior or hinterland (e.g. Fortea Pérez 1973; Asquerino Fernández 1977), appear to be far more applicable to southern France and Italy where there is evidence for the movement of items from the coast to areas inland. The almost complete absence of obsidian in Iberia throughout the Neolithic, together with the relatively low incidence of coastal settlements here, contrasts markedly with other areas of the West Mediterranean (Sardinia, Corsica, Sicily, Peninsular Italy, Southern France and North Africa) which were part of a well documented exchange network involving obsidian and other materials (Hallam _et_. _al_. 1976; Camps 1984: 199, Fig. 6; Phillips 1975; Phillips _et_. _al_. 1977; Ammermann 1979). The fact that this network did not develop on the Mediterranean coast of Spain may be due in part to the geographic distribution, and particularly the low density, of settlement in many parts of this littoral zone. Other significant geographic factors, however, include:

(a) _the large expanse of open sea between the Iberian coast and the nearest obsidian sources_ (By contrast, areas actively involved in the West Mediterranean obsidian exchange either lie in close proximity to source areas themselves (e.g. Corsica, Sicily, and central Italy) or are adjacent to a series of 'island stepping stones' which would have minimized the need for long crossings by sea (e.g. southern France and northern Italy)

(b) _the logistical problems of overland exchanges to Iberia given major physical barriers like the eastern Pryenees_

Mortuary Practices

Evidence of human remains in Early Neolithic contexts in Mediterranean Spain is generally sparse and poorly documented. Martí Oliver (1978), Asquerino Fernández (1978) and Casanova Vaño (1978) note that many Cardial Impressed Ware sites in the Levante served as both residential areas and cemeteries, but the chronological status of many of these 'interments' is not clear since cardial impressed wares are also found in Middle Neolithic assemblages. Scattered human remains are associated with Early Neolithic horizons in Andalucia (e.g. at Zuheros - Vicent

Zaragoza and Muñoz Amilibia 1973), but as in the Levante, they do not appear to be arranged or deposited in any particular pattern. In both areas, however, details about the context of skeletal material are extremely vague.

One notable exception to this pattern is the double burial from La Sarsa, recently published by Casanova Vaño (1978). The burial is located in a small wedge-like fissure to one side of the Sala Gran or 'Large Chamber'. Within this fissure were the remains of an adult, and another individual - possibly a child, together with a variety of grave goods including: a vessel with cardial decoration, a bone spoon, a bone object with a spindle-like form, 3 polished bone points, 2 bone finger rings, 3 perforated Pectunculus shells, 1 perforated Cardium edule, 3 perforated Columbella shells, 5 flint blade-bladelets, and a flint flake. The matrix surrounding the skeletal material and their associated grave goods was a breccia-like deposit formed by calcium carbonate, red soil, ash and carbon, which in turn was covered by two levels which appear to be devoid of material. The maximum depth of the deposit was 0.93 m, and the whole of the fissure was sealed off the main chamber via a small stone revetment wall (0.90 x 0.21 m).

Whether the Sarsa burial is early or late in the Cardial Neolithic sequence is difficult to judge at the present time. Outside the Valencian region, however, in the province of Granada, there are a number of demonstrably Middle Neolithic cave occupations - associated with Cardial ware - which have evidence of skeletal remains or burials proper (e.g. Cueva de la Carigüela and Cueva del Agua). At Carigüela, where there is a long and detailed Neolithic sequence, skeletal remains are absent in the Early Neolithic levels, but appear in the Middle, and particularly the Final Neolithic levels (Pellicer Catalán 1964b).

Elsewhere in the West Mediterranean, Early Neolithic burials are known, but are still relatively rare. Such burials are found, for example, at Araguina-Sennola on Corsica, dating to c. 4700-4500 b.c., and another possible Early Neolithic burial from Quartier de la Balance in the Vaucluse region of southern France (Phillips 1975: 56-58). Both of these burials were apparently accompanied by grave goods. The small number of well documented Early Neolithic interments in Mediterranean Spain, and the West Mediterranean generally, makes it difficult to evaluate their significance.

Social Organization

On the basis of present evidence, the social organization of Early Neolithic groups in Mediterranean Spain is still extremely difficult to evaluate in any detailed manner. Having said this, there are several sources of information which provide at least some guidelines or points of reference for such an evaluation.

First, the size of the groups involved does not appear to have been very large, even when one considers sites like Or which most closely resemble a long-term (though not necessarily year round) residence site. The differentiation of status - by the possession of exclusive materials - cannot be detected on an intra-site basis, and inter-site comparisons are frustrated by the small number of sites. If we are to assess the status of Cardial Impressed Ware pottery, for example, such comparisons will be crucial. At present, there is little conclusive evidence to suggest that Cardial ware did indeed function as a prestige valuable. The selective repair of Cardial vessels from Or (see above) and the Sarsa burial containing Cardial impressed ware, however, emphasize the need to look more carefully at the context of Cardial and other decorated wares - in different contexts within sites, and between different types of sites.

While the internal organization of Early Neolithic communities in Mediterranean Spain remains ambiguous in many respects it is clear that personal ornamentation and display were increasingly important towards the latter part of this period. Sporadic burial evidence indicates that some attention was given to material expressions of status, though the frequency and consistency of mortuary rituals does not suggest that such rituals were either common or standardized. The fact that burials become more frequent, and more highly structured, in the Middle Neolithic may also indicate - as Saxe (1970), Bradley (1984) and others have suggested - that increasing investment in a particular circumscribed territory led to the development of symbolic ties between the geographic domain of ancestors and that of the living community. By the later phases of the Neolithic, this relationship, and the use of restricted territories, is reflected in the development of formalized 'disposal areas', many of which are spatially distinct from the settlement proper (cf. Chapman 1981b).

It should be emphasized, nevertheless, that the Early Neolithic in Mediterranean Spain marks only the beginning of these processes. The reasons behind the accelerated development of social differentiation and ranking, intensified inter-regional exchange and other social phenomena will be explored in the following sections.

Middle Neolithic Communities (4300 - 3500 b.c.)

Introduction

While the preceding discussion of the Early Neolithic focused largely on areas outside of south-east Spain 'proper', the following sections will concentrate, increasingly, on evidence from eastern Andalucia and Murcia. These differences in scale and approach with respect to the previous section are conditioned by several major considerations. First, the integrated character of Impressed Ware communities, the evidence of widespread inter-regional contacts, and the apparent introduction of plant and animal domesticates from areas outside of Iberia made it necessary to discuss the Early Neolithic in more general geographic terms. Likewise, the better quality and larger quantity of data from areas other than south-east Spain gave considerable advantages to a broad, comparative approach. In contrast to the early stages of the West Mediterranean Neolithic - characterized by the widespread appearance and general uniformity of Cardial Impressed wares - the Middle Neolithic is marked by considerable variability in assemblages and regional 'traditions' (Phillips 1975). By the last centuries of the 5th millennium b.c. for example, Cardial wares gradually disappear and are replaced by a varied range of vessel forms, decorative techniques, and motifs. Regional differences in ceramic and other assemblages are particularly pronounced. In order to understand the patterns and processes behind this Middle Neolithic 'regionalization' therefore, it is essential to focus on developments within south-east Spain itself.

Lithic Industries

Despite the small number of lithic assemblages which have been published in detail, there are few notable differences between Early and Middle Neolithic stone tool industries. At Or, for example, Martí Oliver *et. al*. (1980: 294) note that the flint industry from Middle Neolithic levels is characterized by the survival of all previous tool types (Appendix 3:2), and offers no discontinuities with respect to Early Neolithic assemblages which it overlies. Middle Neolithic horizons at Or continue to be dominated by high percentages of blades, bladelets and waste material, while maintaining a 3:1 ratio of waste to tools, which again parallels the pattern in earlier levels. Trapezes and segments, however, occur for the first time in the Middle Neolithic at Or, and the frequency of sickle tools and retouched flakes increases significantly over Early Neolithic totals (Appendix 3:2).

At Carigüela the fine blades which form the bulk of the flint assemblage in the Early Neolithic levels, continue into the Middle Neolithic - both complexes being associated with Cardial impressed ware (Pellicer Catalán 1964b).[10.] Cores are scarce throughout the Neolithic at this site, with only one example from Early Neolithic levels and none from Middle Neolithic ones. Further west, in Córdoba, the Middle Neolithic levels at Zuheros are dominated by small, elongated bladelets of trapezoidal form (Appendix 3:9). These are generally unretouched, though often there are traces of use wear.

In summarizing the differences between Neolithic I (Early Neolithic) and II (Middle-Late Neolithic) phases in the Valencian region, Aparicio Pérez and San Valero Aparisi (1977) noted that the only major discrepancy between the two phases lay in their respective pottery assemblages. They do note, nevertheless, that in the Valencia area arrowheads with bifacial retouch occur for the first time in the Neolithic II period, along with the more generalized use of the double bevel technique. More recently, Martí Oliver <u>et</u>. <u>al</u>. (1980: 296-297), recognizing the chronological and typological significance of arrowheads and the various methods of producing them, have tried to define the temporal parameters of these elements more precisely, suggesting - along with Fortea Pérez (1973) - an evolution from invasive marginal retouch in the Middle Neolithic, to covering, bifacial retouch in the Late-Final Neolithic. Arrowheads, however, are rare at Or, absent at Sarsa and Zuheros, and overall very few have been found in secure Middle Neolithic contexts.

While in the past there has been a tendency to link ground and polished stone tools with both the early and later stages of the Neolithic in southern and eastern Spain (Savory 1968; San Valero Aparisi 1950; Asquerino Fernández 1977), Middle Neolithic sites have produced little evidence of objects such as axes, adzes, querns, hammers, and rubbers. Extensive excavations in trenches J-4/J-5 at Or, for example, produced no traces of axes or adzes (Martí Oliver <u>et</u>. <u>al</u>. 1980), while more

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10. The original cultural-chronological sequence for Carigüela outlined by Pellicer Catalán (1964b) has recently been revised by Molina González and Roldán Herváz (1983: 36). As a result, all references to the Carigüela stratigraphy in this discussion follow the modified scheme put forward by the latter.

recent campaigns have only yielded one axe/adze from an undated Cardial level (Martí Oliver 1983: 34). At Carigüela axes and adzes are absent in the Early Neolithic but present in the earliest Middle Neolithic levels (Appendix 3:10); the number of these objects, however, was not reported. Axes are present throughout the Middle Neolithic at Zuheros, but are rare; only one example was found in each of the three major levels (Appendix 3:9). Almost all the axes and adzes from these sites are polished, rather than ground, stone.

Ground stone tools on the other hand are represented largely by querns, 'plaques' and percussors or hammers, and like polished stone tools, are relatively scarce. Querns, hammers and stone plaques are rare in both Early and Middle Neolithic contexts at Or (Appendix 3:3). At Carigüela, querns are absent in Early Neolithic levels but occur in unspecified numbers in the Middle Neolithic (Appendix 3:10). Percussors, on the other hand, are absent. At Zuheros querns appear to be present in very small quantities during the latter part of the Middle Neolithic, but are absent in the initial stages (Appendix 3:9).

Ornamental objects in stone, with the exception of bracelets, are also not very prolific on Middle Neolithic sites in eastern and southern Spain. Stone necklace beads and pendants are lacking at Or in its earliest levels, and are relatively rare in Middle, and indeed, Later Neolithic contexts (Appendix 3:3). These objects are apparently absent altogether from the Middle Neolithic horizons at Carigüela and Zuheros.

By contrast, a variety of stone bracelets - marble, schist, slate, shale, calcite and limestone - are found in quantity over an extensive area of southern and eastern Spain in the Middle Neolithic. Indeed, these stone bracelets are characteristic of the Middle Neolithic in the Andaluz region, reaching a particularly high concentration in caves along the Málaga coast.

Away from the Málaga coast stone bracelets are also found in the upland interior at sites like Carigüela. Here stone bracelets are absent in the Early Neolithic, but do appear in Middle Neolithic levels. These bracelets are made of either limestone or shale, and take two general forms (which closely resemble the calcite bracelets from Nerja): (1) wide forms with large, engraved parallel lines and (2) smooth, narrow types without decoration. Stone bracelets at Carigüela first appear in the Middle Neolithic and continue to the end of the Copper Age. Pellicer Catalán (1964b: 66) notes that an uncompleted limestone bracelet from a late Middle Neolithic context at this site points to the in-situ manufacture of these objects. With regard to function, Pellicer points out that the burial of an individual from the Cueva del Agua - also in Granada - had a limestone 'bracelet' around its ankle; this interment, however, may be Late, rather than Middle, Neolithic (Pellicer Catalán 1964a: 326, 328, Figure 19, 1967: 39).

Further west in Córdoba stone bracelets are found throughout the Middle Neolithic sequence at Zuheros (Appendix 3:9). Northwards towards the Levante, these bracelets are also found in northern Almería (Olaría de Gusí 1974; Jiménez Navarro 1962: 41-42), Murcia (Mathers, unpublished), Alicante (Vicent Zaragoza and Muñoz Amilibia 1973: 86; Savory 1968: 76), Castellón (Aparicio Pérez and San Valero Aparisi 1977) and Valencia Asquerino Fernández 1978; Martí Oliver 1978, 1983).

Overall, stone bracelets - of both the incised and undecorated variety - are a widespread phenomenon in the Middle Neolithic. The densest concentration of these objects is the Costa del Sol where at Nerja, for example, there are more than 50 fragments of engraved bracelets alone. Stone bracelets are so abundant here that Pellicer Catalán (1963: 40) considers that the Málagan coastal fringe was the principal centre for the production of these objects - despite the examples from Carigüela which he suggests may have been a secondary production centre.

Bone and Shell Industries

Although there is an increase in the quantity and diversity of bone objects in the Middle Neolithic, the numbers of these items are still not particularly high (Appendix 3:4). Nevertheless, the wide range of tools and ornaments made from bone indicates that this raw material took on a new importance during this period. Items of personal adornment such as finger rings, tubes, pendants and discs became far more common and were almost exclusively made of bone. Some of these ornamental objects, such as the scored finger rings from Sarsa (San Valero Aparisi 1950), were finely tooled and polished. Fish vertebrae, which occur on some Middle Neolithic sites, may represent an additional form of bone ornament. On the other hand, domestic objects made of bone are generally more abundant than ornamental items, and more crudely manufactured. These utilitarian implements include points/awls, spatula and spoons - the first being especially numerous.

At Or there is a clear diversification of bone technology immediately before, and during, the early Middle Neolithic (Appendix 3:4). The Middle Neolithic horizon at Or not only represents an increase in the number of points, rings, needles and pendants (with respect to Early Neolithic levels), but also signals the appearance, for the first time, of various other bone items (e.g. discs and fish vertebrae). With the possible exception of points/awls, however, the number of bone items is relatively small (Appendix 3:4).

The nearby site of Sarsa produced an extremely rich and varied assemblage of bone objects, which unfortunately, can only be termed 'Neolithic' as it lacks any detailed stratigraphic or chronological context. Nonetheless, it is clear that during some part of the 5th millennium b.c. the manufacture of bone tools and ornaments underwent a considerable fluorescence at Sarsa - not only in terms of the abundance and diversity of bone objects, but also the finely executed production and finishing of some items. San Valero Aparisi (1950: 90-91) listed the following bone implements and ornaments from Sarsa: 150 points/awls, 25 spoons, 4 blades (hojas), 23 rings, 1 vertebra, 1 piece of horn, and a spatula of the same material, as well as 3 perforated canines. Spatula, spoons and points/awls from Sarsa are often carefully polished, and other fragmented bone pieces, including handles, are incised with geometric motifs. One piece of horn from Sarsa is also elaborately decorated. In addition, 7 fragments of scored long bone, each with one or two circular incisions, provide evidence for the in-situ manufacture of bone rings. Another fragment of a flat bone corresponds to a ring in the process of manufacture, with its interior already cut away. The richness and variety of the bone industry at Sarsa, and to a lesser extent at Or, is exceptional - at least in comparison with other known sites. For example, at Zuheros (Appendix 3:13) and Carigüela, bone tools and ornaments are rare.

Like bone objects, shell material from Middle Neolithic sites in southeast Spain is sparse - with the possible exception of undated materials from Sarsa. At Or, for example, only 2 necklace beads/pendants have been found in Middle Neolithic levels. Although shell bracelets and other shell ornaments (perforated bivalves and necklace beads) are known from Cova Fosca in a Neolithic context, the stratigraphic and chronological details of these objects have yet to be determined in any detail (Aparicio Pérez and San Valero Aparisi 1977). At Nerja, the proposed Middle Neolithic levels lack shell ornaments, despite the abundance of shell in these levels (Pellicer Catalán 1963: 21-22). At Carigüela and Zuheros, shell tools and ornaments are completely absent. In contrast to all of these sites, the quantity of shell ornaments at Sarsa is enormous. Appendix 3:11 demonstrates not only the large numbers of shells used as adornment, but also the wide variety of species which were employed as decoration. Shell bracelets, however, appear to be absent from this site, and from Middle Neolithic sites generally.

Ceramic Assemblages

Middle Neolithic ceramics in the Levante and eastern Andalucia have two main characteristics which distinguish them from Early Neolithic assemblages. Firstly, they are marked by the dominance of non-Cardial impressed wares, and secondly, by the progressive reduction and eventual elimination of Cardial decoration. Cardial Impressed ware continues into the early part of the Middle Neolithic, and afterwards is present in increasingly smaller quantities towards the end of the 5th millennium b.c.. Whilst there are signs that the 'unity' of Iberian Cardial groups was being undermined before the Middle Neolithic proper (i.e. before 4300 b.c.), this process is accelerated during the last centuries of the 5th millennium. This breakdown in the relatively homogeneous character of Cardial assemblages is highlighted by the widespread use of incised, non-Cardial impressed, and other decorative techniques, the regionalization of ceramic traditions, and ultimately, the exclusion of Cardial decoration. Similar trends are also visible during the late 5th and early 4th millennium in Peninsular Italy, southern France and the West Mediterranean islands (Lewthwaite 1982a, 1983; Barfield 1971; Mills 1983; Waldren 1982; Phillips 1982; Whitehouse 1969), though the chronology and rapidity of these developments is variable (e.g.differences between Provence and Languedoc - Phillips 1975: 64-65). By the first few centuries of the 4th millennium b.c. Cardial pottery had disappeared throughout the West Mediterranean.[11.]

Ceramic development at Or is particularly useful for evaluating the evolution of Cardial Impressed Wares since the sequence here spans the Early and Middle Neolithic. The major types of decoration from the Middle Neolithic levels at Or include: incisions, channelling, Cardium impressions, and 'Cardial scraping or grooving' - the latter being confined to the earlier stages. Plastic decoration is also well represented and is often elaborated with undulations or finger impressions

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11. Although some investigators have proposed that Cardial Impressed wares persist into the late 4th, and even the early 3rd, millennia b.c. in Mediterranean Spain (e.g. Asquerino Fernández 1977, 1978) these views are based on undated and poorly documented material. Moreover, this view is not supported by any of the sites where detailed stratigraphic and chronological sequences are available (Martí Oliver 1978: Martí Oliver et. al. 1980; and Vicent Zaragoza and Muñoz Amilibia 1973; Pellicer Catalán 1964b).

(e.g. cordons). In addition, many non-Cardial impressions were made with toothed instruments such as combs or points. The gradual decrease in cardial pottery and the parallel increase in non-Cardial impressed wares, can be seen in the Or stratigraphy, summarized in Appendix 3:2. The last major stage of occupation at this site - spanning the whole of the 4th, and the first part of the 3rd, millennia b.c. - is totally devoid of cardial pottery, (Martí Oliver et. al. 1980: 149). These quantitative changes in ceramic types are accompanied by qualitative changes in ceramic production. The changes affect three main features of pottery manufacture: the purity of fabrics, the execution of decoration, and surface treatment. At Or, Martí Oliver et. al. (1980: 160) note that there is a marked decline in the quality of pottery, with respect to these three variables, from Early to Middle Neolithic. By the Middle Neolithic vessel fabrics have become more coarse, surfaces are treated less carefully, and the variety and precision of decoration is reduced. Detailed analyses by Gallart (in Martí Oliver et. al. 1980) suggests that this pattern applies equally to decorated and undecorated fragments. Whilst there are some examples of fine wares at this horizon, the overall character of Middle Neolithic assemblages at Or indicates a general reduction in quality. In addition, the low incidence of mended vessels during the Middle Neolithic at Or contrasts markedly with Early Neolithic levels.

Within south-east Spain proper, the stratigraphic sequence at Carigüela is of considerable importance for detailing the development of Middle Neolithic pottery assemblages in the upland interior. Pellicer Catalán (1964b: 54) defined the Middle Neolithic horizon here on the basis of the relatively sparse representation of all types of impressed wares, and the first appearance of incised and almagra pottery. In general, vessels with fine fabrics are found throughout the Carigüela sequence from Neolithic to Bronze Age, but the frequency of coarse wares increases in the upper levels - beginning in the Late Neolithic. In the Early and Middle Neolithic, however, nearly all of the vessels have fine fabrics, and spatulated or burnished surfaces. The undated Middle Neolithic levels all contain Cardial Impressed ware. These levels are also characterized by impressions and incisions (often filled with red paste), almagra, 'puntillado', spout handles, incised and impressed cordons, single or multiple handles (some with perforations or appendices), and various types of lugs. The main vessel forms are globular pots with straight necks and various tronco-conical vessels. Incrustations or paste filling become increasingly common on impressed and incised pottery towards the end of the Middle Neolithic at Carigüela, as do almagra wares.

Another type of ceramic assemblage, which is contemporary with the cardial pottery of the Levante and eastern Andalucia, is represented by Early-Middle Neolithic wares in central and western Andalucia. Although there is a large amount of data about Middle Neolithic ceramics from the Costa del Sol and other hinterland areas of Andalucia, the evolution of impressed-incised wares still cannot be traced in any detailed way because of the general lack of long stratigraphic sequences - a problem which should be overcome by investigations now in progress (cf. Pellicer and Acosta 1982). At present, the best evidence about the development of these ceramic assemblages comes from Zuheros and Nerja.

At Zuheros, Middle Neolithic assemblages are dominated by incised, plain and almagra wares, but Cardial decoration is absent. Incised decoration is often crude and very deep, and is frequently filled with a reddish paste; the incised pottery is, however, generally of high quality with pure fabrics, good firing, and carefully burnished surfaces. Almagra decoration is found on globular vessels with a cylindrical neck (often with decorated cordons and incisions), dishes, bottle-like forms, saucepans, and vessels with spouts or spout handles. According to Vicent Zaragoza and Muñoz Amilibia (1973: 94), 'true almagra' consists of a fine layer of diluted clay or slip mixed with a colouring agent (almagra or iron oxide) and applied to the surface of the vessel before it is fired. After firing, the almagra layer is fused to the surface of the vessel, and is sometimes smoothed or burnished, resulting in a very high quality finish. This layer is found on both the exterior and interior surface. Vicent and Muñoz have distinguished two major types of almagra wares:

Type I: Brilliant red covering of high quality, which gives the appearance of a true glaze. This is subsequently well fired and burnished.

Type II: Less brilliant red (including matte), though more of the almagra layer adheres to the fabric because of good firing.

Type II variant. More of a layer of paint or covering. It is matte and is easily cracked, but appears to have been applied before firing. Vicent and Muñoz (ibid) suggest that only this type can be compared with the painted pottery of Los Millares type.

Type I appears to be somewhat earlier in the Zuheros sequence than Type II, and Vicent Zaragoza and Muñoz Amilibia (1973: 94) have suggested that there is a progressive reduction in the quality of almagra wares from the Middle Neolithic to the Copper Age in Andalucia generally.

Nerja, like other cave sites on the Costa del Sol is characterized by the following features: spout handles, handles with 'appendices', almagra wares, 'puntillado' and incised decoration, fillings of red paste, and a variety of cordons, lugs and handles (Pellicer 1963; Giménez Reyna 1946; San Valero Aparisi 1975; Olaría de Gusí 1977; Posac Mon 1973; Mora Figueroa 1976; Pérez de Barradas 1961). According to Pellicer and Acosta (1982) almagra wares reach their peak at Nerja in the Middle Neolithic. Cardial and cardial-like decoration, however, is rare, here and on the southern coast generally. In the latter part of the Middle Neolithic in southern and eastern Spain Cardial wares disappear and are replaced by a range of impressed and incised decoration which is typical of Early-Middle Neolithic assemblages along the south coast and the interior of central and western Andalucia.

Subsistence

Despite the large number of Middle Neolithic sites in the Levante and Andalucia our knowledge of subsistence strategies during this period is still very poor. This problem is particularly pronounced in south-east Spain where the amount of faunal and botanical data is extremely limited. At the present time, only the remains from Or in Valencia, Cueva Chica in Córdoba, and Carigüela in Granada, provide any reliable basis for evaluating exploitation patterns and economic trends.

Details about plant exploitation in southern and eastern Spain during the Middle Neolithic are relatively sparse. Most published samples have been derived from large, concentrated pockets of carbonized grain or other plant remains, and are not the product of systematic collection strategies. Detailed botanical analyses have been carried out, however, on material from Or and Zuheros.

At Or, Hopf's (1964) analysis of cereal remains from Level VII (dated K-1754/1008) 4315 ± 75 b.c.) revealed the following species:

Triticum monococcum	14 grains (0.89%)
Triticum dococcum.........................	145 grains (13.47%)
Triticum aestivum-compactum...............	198 grains (20.20%)
Hordeum vulgare L. (and var. nudum)........	697 grains (65.44%)

More recent studies of botanical remains from Middle Neolithic levels at Or, however, have only revealed grains of Triticum aestivum-compactum.

At Zuheros, samples from early Middle Neolithic levels (c. 4200-4000 b.c.)

have produced evidence of Triticum dicoccum Schübl, Triticum compactum and Hordeum vulgare L. var. nudum (Hopf 1974). Data recently presented by Muñoz Amilibia (1984: 353-354), points to the following trends during this period:

(a) a reduction in emmer wheat from (c. 90 - 15%)
(b) a corresponding increase in barley (c. 5-6 to 80%)
(c) consistently small values for breadwheat (c. 5 to 10%)

Apart from cereals, there is evidence of acorns in Level III dated to the beginning of the 4th millennium b.c.. A pit-like depression partly filled with carbonized grain was also found in this level. This feature, which Vicent Zaragoza and Muñoz Amilibia (1973: 46) regard as a silo, consists of a pit measuring 0.80 x 0.60 m located near the back wall of the cave. The base of the pit was made up of loose stones and was covered by a pocket of carbonized cereals.

Turning to animal exploitation, the stratigraphy at Or reveals that the species best represented in Early Neolithic levels continue to be the major staples in the Middle Neolithic (Appendix 3:6). In order of importance - based on the numbers of fragments - these species include: ovicaprines, rabbit and deer. Cattle appears in the Or sequence immediately prior to the Middle Neolithic, and reaches its highest totals in Levels 11 (7%) and 9 (6%), dating to c. 4500-4300 b.c.. In general, however, cattle occurs sporadically and in relatively small quantities in the Middle Neolithic at Or. Overall, there appears to be a continuation of Early Neolithic exploitation patterns, largely based on domesticated ovicaprines and pig, and supplemented by rabbit and deer. The ratio of domesticated to wild species is a relatively constant figure of 2:1 throughout the Middle Neolithic, as opposed to a more variable figure in the Early Neolithic (Appendix 3:6).

At Zuheros, animal-based exploitation in the Middle Neolithic is somewhat different from that at Or (Appendix 3:12). The most notable difference between the two sites is the greater emphasis on cattle at Zuheros (20-22%), compared with Or (0-7%). Apart from cattle, however, the general economic pattern at these sites is similar, with ovicaprines assuming primary importance in both cases, and domesticated pig, as well as rabbit, serving as important supplementary resources. Data from the two published levels at Zuheros which have produced faunal remains (V and IV) points to several significant shifts between c. 4300 and 4000 b.c.. These shifts include:

(a) an 11% decrease in sheep and 7% reduction in rabbit towards the later 5th millennium

(b) a corresponding increase of 10% in domesticated pig, and 11% in goat over the same period;

Preliminary analyses of Middle Neolithic levels at Carigüela (Uerpmann 1979: 177, Appendix 3:14), suggest that faunal assemblages were dominated by ovicaprines, and followed by cattle, pig, and rabbit respectively. Dog appears for the first time in the Middle Neolithic.[12.]

At all of these sites the emphasis on wild fauna is minimal (Appendices 3:6, 3:12 and 3:14). As various authors have suggested, Middle Neolithic exploitation patterns in the Levante and eastern Andalucia were based on a relatively mobile strategy of stock raising, mixed with some cereal cultivation and hunting (Muñoz Amilibia 1984; Boessneck and Driesch 1980; Uerpmann 1979; Molina González and Roldán Herváz 1983). Further west in Andalucia, the exploitation of wild fauna appears to have played a far more significant role in Middle Neolithic subsistence.

Settlement

In general, the characteristics of Middle Neolithic settlements in the south-eastern Peninsula are much the same as those of the Early Neolithic. Some of the most outstanding similarities between these two periods are: (1) the predominance of cave and rockshelter occupations; (2) the sparse evidence of long-term residential activity; (3) the dual function of sites as a focus for both domestic and funerary activities; and (4) the limited evidence for food processing or cultivation on any significant scale. The number of Middle Neolithic sites in southern Iberia, however, appears to be greater than in the Early Neolithic - particularly in eastern Andalucia where Cardial material is limited and sporadically distributed (Navarrete Enciso 1976; Molina González and Roldán Herváz 1983; Appendix 3:7).

The increased density and number of Middle Neolithic sites in Andalucia has been regarded by many as the product of its relatively late 'Neolithization' (Pellicer 1964b; Navarrete Enciso 1976; Olaría de Gusí 1977a). Navarrete Enciso (1976), for example, has suggested that over much of the south-eastern Peninsula there was a slow and retarded development

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12. These patterns must be regarded as very general, however, because of the small quantity of material examined in this analysis.

of the Neolithic in comparison with other areas of Iberia (such as nearby coastal regions of Alicante and Valencia). This argument has now been turned on its head by radiocarbon dates from Andalucia which place the beginnings of the Neolithic more than a millennium earlier than in the Levante (Pellicer and Acosta 1982).

Middle Neolithic sites are generally very small and do not exhibit any clear signs of the 'remodelling' that one might expect from long-term residential sites (e.g. remains of enclosures, dwellings and storage facilities). While evidence of cultivation is forthcoming from some sites, the low frequency of tools and facilities associated with plant exploitation reveal that little emphasis was given to plant resources. This suggests that Middle Neolithic communities in the south-east maintained a considerable degree of mobility with regard to their settlement and exploitation strategies, a point which has recently been emphasized by Molina González and Roldán Hervás (1983: 43-44) in a discussion of the Middle Neolithic in western Granada:

> 'The system of production by Middle Neolithic communities based on pastoralism and a marginal type of agriculture, necessitated a type of semi-nomadism, with dispersed settlements situated on the piedmont of the limestone mountain ranges. The habitations, consisting of small occupation areas in rockshelters and caves, suggest small scale, seasonal, occupation. There is no doubt that these can be regarded as troglodite settlements, though open-air habitations could be more common than has often been supposed. The insubstantial character of the materials used in the construction of these possible encampments, which were occupied over short periods of time, did not permit the accumulation of deep deposits, and hence, it is clear why there is so little (structural) evidence.'

Middle Neolithic sites in the south-east appear to be heavily concentrated in the coastal mountain ranges around Málaga (Olaría de Gusí 1977a), the intermontane basins and piedmont areas of western Granada (Botella et. al. 1981; Menjíbar Silva et. al. 1981; Navarrete Enciso 1976), and the moist, upland interior of Jaén, Almería, Murcia, Alicante and Valencia (Martí Oliver 1978; Jiménez Navarro 1962; Olaría de Gusí 1974; Navarrete Enciso and Carrasco 1978; Rodriguez 1982; Appendix 3:7). The relatively humid environmental and climatic conditions which characterize these areas would have: (1) minimized the risks of exploiting, and experimenting with, cereal crops, and (2) provided extensive areas of pasture and grazing. Typically, sites lie in the mountainous or hillzone region overlooking a small alluviated valley.

The problem of other types of sites in the Middle Neolithic is still largely unresolved because of the general lack of systematic fieldwork. Nevertheless, the sites of La Molaina (Saéz and Martínez 1981) and Alfacar (Molina González 1970), located in and around the Vega de Granada, both represent rare examples of open-air Neolithic occupations. At present, however, these sites have not been dated precisely and may correspond to the Late, rather than the Middle Neolithic.

Exchange

Despite their differences, Middle Neolithic assemblages in the Levante and Andalucia share a number of important characteristics with one another. Distinctive ceramic features such as spout handles and almagra decoration, for example, are widespread in these two areas during the Middle Neolithic. Stone bracelets are also found in abundance throughout the coastal region from Málaga to Gibraltar, and across the interior from Valencia and Alicante to Córdoba. Whether or not these items were involved in long-distance exchange is not yet clear, but their widespread distribution suggests that exchange and/or communication links between local areas had become more regularized and frequent. Several important developments may have helped to stimulate such linkages:

(a) the increased number and density of Early Neolithic sites

(b) adjustments to, and possible reductions in, primary and secondary exploitation territories

(c) given (a) and (b), the increased use of exchange to gain (or maintain) access to resources not available locally

The collective consequences of these developments may have helped to create the pattern of greater regional integration and communication which typifies the Middle Neolithic in eastern and southern Spain. At present, however, this speculative assessment cannot be tested against a reliable set of data - largely because of a lack of trace element and thin section analyses.

Mortuary Practices

In the Andaluz and Levantine regions, scattered human remains are commonly associated with domestic settlement debris (Asquerino Fernández 1976, 1977; Martí Oliver 1977, 1978; Pellicer Catalán 1964b; Vicent Zaragoza and Muñoz Amilibia 1973; Menjíbar Silva *et. al*. 1981; Botella *et. al*. 1981), but the disposition of these remains is almost always such that the term 'burial' must be used in its broadest sense. Formalized burial, in the sense of the purposeful interment of all or most of the skeleton, is unusual. Normally, where human remains do occur they are represented by only a small number of bone fragments - e.g. only 7 fragments from the Middle Neolithic levels at Zuheros (Vicent Zaragoza and Muñoz Amilibia 1973).

There are rare examples of the interment of fully articulated individuals, though there is some debate as to whether these date to the Middle Neolithic (e.g. at Cueva del Agua - Alhama, Granada (Pellicer Catalán 1964c)). Elsewhere in Granada, the site of Carigüela has produced evidence of individual interments in its early Middle Neolithic levels, and collective burials in the later Middle Neolithic (Pellicer Catalán 1964b). There are, however, no further details about the form of these burials or any associated grave goods. In addition, pit/trench graves from the open-air site of La Molaina at Pinos Puente in Granada (Saéz and Martínez 1981) may also date to the Middle Neolithic.

Further south at Nerja, the Middle Neolithic levels produced only scattered human remains. Pellicer Catalán (1963: 21-22) notes that there were small quantities of skeletal material in each of these levels, but provides no further information.

Whether there was a widespread trend from early, single burials to later, collective ones - as hinted by the Carigüela sequence - burial evidence from these sites does not provide any clear evidence of formalized ranking or prestige displays.

Social Organization

Despite the greater quantity of personal ornaments and greater frequency of 'formalized' burials in Middle Neolithic contexts in Andalucia and the Levante, there is no evidence of any major shifts in the way communities were organized. Settlement evidence suggests that groups were still relatively small, and still exercised a significant degree of mobility. Material expressions of rank and status are difficult to detect on the basis of present evidence, even in contexts where burials are known. These characteristics are generally consistent with the pattern of community organization which typifies the previous period.

In eastern Andalucia, Molina González and Roldán Hervás (1983: 45) have proposed that Middle Neolithic communities correspond well with Sahlin's (1972) concept of the 'Domestic Mode of Production'. Hence, they suggest that Middle Neolithic social organization was characterized by:

(a) close kinship ties

(b) 'egalitarian' social relations without clear differentiation

(c) a sexually based division of labour

(d) household production oriented towards collective use and limited by a primitive type of technology

By the terminal stage of the Neolithic, however, communities throughout south-east Spain underwent a number of major changes which substantially altered these patterns.

LATE-FINAL NEOLITHIC (3500 - 2600 b.c.)

Introduction

As the last two sections have emphasized, much of the Neolithic sequence in south-east Spain is marked by small, incremental changes in organization and material culture. In what may be termed the 'Earlier' Neolithic (ca. 5500 - 3500 b.c.), there is the impression of a gradual transformation and a relatively high degree of cultural continuity through time. The vast majority of changes - in ceramic styles, technology, ritual, communal organization, and so on - appear to have been quantitative, rather than qualitative.

The importance of the Late-Final Neolithic period in the south-east is, however, that it differs so markedly from the preceding pattern of Neolithic development in this area.[13] Although there are some indications of continuity in the early part of the Neolithic, by the end of the 4th millennium there are clear signs that the relatively continuous development which characterized earlier periods had now been disrupted. This discontinuity is marked by a series of major changes which include:

(1) the widespread appearance of permanent, and large-scale, open-air settlements

(2) the major commitment to spatially intensive, <u>and</u> energy intensive, agricultural strategies

(3) increasing investments in ritual (particularly funerary practices)

(4) the accelerated process of regional diversification, and the emergence of separate, easily distinguishable, regional 'cells'

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13. At least in the upland zone: evidence from the lowlands is more problematic, largely because of the difficulties of evaluating so-called 'Almerian' and other possible Late-Final sites.

Lithic Industries

Lithic assemblages from the initial part of the Late Neolithic appear to have much in common with the industries of the earlier Impressed Ware horizon, or 'Cave Culture'. Some continuity between earlier and later Neolithic assemblages is reflected in flint industries, since trapezes, triangles and other microlithic style tools were common in southern and eastern areas of Spain during the Later Neolithic (Muñoz Amilibia 1963; Ripoll Perello and Llongueras Campaña 1963; Arribas 1972; Martí Oliver *et. al*. 1980).

Another element of continuity between the 'Cave Culture' and the early stages of the Late Neolithic is the persistence of assemblages dominated by small bladelets. In the Late Neolithic levels at Los Castillejos, for example, Arribas and Molina (1978: 124) note the development of an 'in situ' microlithic type industry very similar to those which appear in Neolithic Cave Culture assemblages and in the 'archaic' tombs of the so-called 'Almería Culture' (Leisners' Phase I) - Appendix 3:15. Similarly, Gossé's (1941) inventory of materials from El Gárcel lists a variety of microlithic and microblade forms, including backed bladelets, microburins, and a very high proportion of trapeze-triangle forms - Appendix 3:16.

Although Gossé (1941: 70, Fig. 11) reports that 'points' (puntas) were found at El Gárcel, these objects appear to have been made on flint flakes and worked only on one side. At Los Castillejos, bifacially worked arrowheads with concave bases first appear in the Early-Middle Copper Age levels. Martí Oliver (1978: 90) notes that in the Valencian region arrowheads with bifacial retouch are rare in the Early-Middle Neolithic, but more abundant in the Late-Final Neolithic. He also notes that in the same area 'double bevel retouch' and blades with an obliquely retouched truncation are characteristic of the transition to the Copper Age. The latter are found in considerable numbers at El Gárcel (Appendix 3:16).

Late Neolithic levels at Nerja produced a relatively nondescript lithic assemblage composed of small flakes and blades (Pellicer Catalán 1963), whilst at Carigüela Late-Final Neolithic levels contain a mixture of fine small blades and larger, coarser ones (Pellicer Catalán 1964b). Lithic and other materials from the earliest levels at Terrera Ventura (Gusí Jener 1975) still await publication.

During the Final Neolithic at Los Castillejos, however, there are considerable changes in the flint industry including a marked reduction in bladelets, and a corresponding increase in medium and large sized blades (Arribas and Molina 1978). There is also a significant increase in the number of retouched flakes in the Final Neolithic levels. Whether this shift from microblade/microlithic technology to larger blade industries is a widespread phenomenon or not, has yet to be demonstrated. However, Millaran Copper Age industries, from what we know of domestic assemblages at present, show a clear preference for larger blade forms; even the trapezes found on some of these sites are not particularly small, and may have been produced by simply snapping, and then retouching, blades rather than employing the microburin technique.

Non-Flint Lithic Material

Polished stone axes, adzes, chisels and gouges are common on Late-Final Neolithic sites in the South-East.[14.] A lack of quantitative analyses on an inter - or intra-site basis however, precludes any conclusions about their importance during this period.

Much the same can be said of grinding slabs, querns and rubbers. Again, these items are common and their numbers probably reflect a considerable emphasis on food processing at this time. Without more detailed analyses, however, little more can be said.

Material from El Gárcel points to the continued use of stone bracelets - in this case marble (Appendix 3:17). Final Neolithic levels at Nerja also produced stone bracelets - some made of calcite and others of black slate or shale; both types of bracelet were narrow and undecorated. In contrast, the Late and Final Neolithic levels at Los Castillejos excavated thus far have produced no stone bracelets, or other types of stone ornament. A single limestone cruciform idol was found in the last Neolithic level at Carigüela, and Pellicer Catalán (1964b) sees this as an indication of links with the 'Almería Culture'.

Bone and Shell Industries

Compared with the bone working traditions of the Cave Culture or

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14. Arribas and Molina (1978) note, for example, that the majority of polished stone axes were found in Final Neolithic and Early Copper Age levels at Los Castillejos; the number of axes however was unspecified.

Impressed Ware phase, these industries in the Late and Final Neolithic are fairly impoverished. Much of the variety of earlier periods appears to have been lost during the Later Neolithic, since bone objects are largely restricted to punches/awls and spatulae. These two types of bone objects are the only ones recorded at Los Castillejos and Carigüela during the Late-Final Neolithic, while only awls/punches are present in contemporary horizons at Nerja. On the basis of bone objects from Nerja, Pellicer Catalán (1963:41) suggests that the textile industry began its rudimentary development in the Final Neolithic and Early Copper Age.

Shell objects are equally sparse in Late and Final Neolithic contexts. Pectunculus shell bracelets, like those found at El Gárcel, were encountered in Final Neolithic levels at Nerja (Pellicer Catalán 1963: 40). Marine shell is found in the Late and Final Neolithic - though there is no indication of whether these items were artificially modified or not. There is also no information regarding the number of these objects. At Los Castillejos, contemporary levels have produced no traces of shell.

Although this evidence suggests that bone and shell technology experienced a genuine decline during the Later Neolithic - both in terms of the volume, and the range, of different items produced - there is the possibility that the material from domestic or settlement contexts may simply be the tip of the iceberg. Until we know more about contemporary burial assemblages it would be unwise to suggest that materials derived from settlements were representative of the full range of industrial activities and production. This suggestion is dubious for 2 reasons: (1) because items such as shell rings and bracelets, decorated bone objects, and so on are found in 'rundgraber' tombs of the so-called Almería Culture, and (2) because later Millaran funerary assemblages contain items which are rare or absent in domestic contexts. A fuller understanding of the mortuary evidence from this period, therefore, could lead to a more comprehensive view of shell and bone industries. At present, however, it does appear that, at least in the 'domestic sphere', bone and shell production was not particularly well developed.

Ceramic Industries

Initially at least, Late Neolithic ceramic assemblages were very similar in form and decoration to earlier impressed wares. Several Late Neolithic assemblages, particularly those from Carigüela and Los Castillejos, have a relatively high proportion of impressed and incised wares, and display a fairly wide range of motifs and decorative features (Appendix 3:18).

The most common forms of decoration are continuous and discontinuous incisions, cordons, almagra, ridging, finger impressions, various lugs and handles, and some 'puntillado' - all of which are commonplace on sites of the Andaluz Cave Culture. Simple globular 'saucepans', spherical and tronco-conical bowls and 'necked vessels' are the most frquently occuring forms.

During the Late Neolithic, however, there are perceptible signs of change in the composition of ceramic assemblages - changes which are further exaggerated in the Final Neolithic. One such change was the progressive reduction in almagra wares. The date of (GrN-5526) 3115 ± 40 b.c. from Nerja was derived from a Late-Final Neolithic horizon containing almagra (Hopf and Pellicer Catalán 1970) and helps to establish the fact that almagra wares were in use for almost three millennia in the southern Peninsula. Pellicer Catalán (1963) notes, however, that by the end of the 4th millennium there is very little almagra present at Nerja. Similarly, Arribas and Molina (1978: 55, fig.14) have noted that almagra wares disappear shortly after the initiation of the Copper Age.

Another important change in Late Neolithic ceramic assemblages is the progressive shift towards plain wares, and again this trend becomes more pronounced in the Final Neolithic. As Molina González and Roldán Herváz (1983: 46) have recently pointed out:

> "In the stratigraphic sequences from some Granadan and Malagan caves (Carigüela, Nerja, etc.) it can be seen that between the Middle and Late Neolithic there is continuous cultural development, characterized by a gradual increase in the importance of plain ware ceramics to the detriment of richly decorated vessels so abundant in the first of these two periods, when the communities of the Cave Culture reached their apex. At Carigüela there is, from Level VIII, the imposition of plain styles in the pottery with little originality in form, which represents a strong contrast with the richness and baroquism of ceramics found in previous levels".

This reduction in decorated wares can also be seen at Los Castillejos in the Final Neolithic (only 2.3% of total), and by the Early Copper Age decorated wares have been all but eliminated from the domestic pottery assemblage (Arribas and Molina 1978: 55).

Other changes during the Final Neolithic involve the appearance of new types of ceramic vessels. Among these are semi-spherical and helmet-shaped bowls, and large carinated dishes, which first appear during the Final Neolithic at Los Castillejos. Despite these important changes there are still some elements of continuity with earlier assemblages. At Los Castillejos, for example, some 'Cave Culture' vessel forms and decorative elements continue to be found in the Final Neolithic.

The problems raised in the discussion of Late-Final Neolithic bone and shell production apply equally to ceramic manufacture. In all these cases it is not clear what objects were being placed in burial assemblages, nor is it clear whether there are quantitative or qualitative differences between domestic and funerary assemblages.

Subsistence

Evidence for plant exploitation during the Late-Final Neolithic in south-east Spain is generally sparse and lacking in detail, largely because of the failure to employ adequate recovery techniques. At El Gárcel, Gossé (1941: 81) reports beans, olive stones, rye and wheat, together with a considerable number of querns and rubbers. The silo dated to the late 4th millennium b.c. at Nerja produced remains of wheat, barley and acorns (Pellicer Catalán 1963). Although Pellicer Catalán (1964b) reported that a considerable number of querns were found in Late-Final Neolithic levels at Carigüela, he also notes that most of these were used to grind ochre, since many of them bore traces of this material on their surfaces. Consequently, Pellicer has suggested that this negative evidence, together with the lack of denticulated or serrated blades, indicates the late arrival of cultivation to this area. As a further demonstration of this fact he notes that wheat first appears in the Final Copper Age levels at Carigüela. However, following the revision of the Cariguela sequence offered by Molina González and Roldán Hervâz (1983: 36) the appearance of wheat appears to date, instead, to the Final Neolithic.

Faunal remains from Late Neolithic contexts in eastern Andalucia suggest that the general pattern of animal exploitation was similar to that of the Middle Neolithic. Evidence from Los Castillejos (Uerpmann, in Arribas and Molina 1978: 153-168) and Nerja (Boessneck and Driesch 1980) indicates that sheep and goat are dominant, followed by cattle, and then pig.[15.] Wild species, on the other hand, only represent about 10% of the total

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15. Fauna from Late-Final Neolithic contexts in central and western Andalucia indicate a significant increase in domesticated animals - in contrast to Early assemblages dominated by wild species (Boessneck and Driesch 1980). However, wild animals are still a major component in Late-Final Neolithic economic strategies in this area - e.g. representing c. 20% at Dehesilla and c. 50% at Parralejo.

at both sites.

By the Final Neolithic/Early Copper Age horizon at Los Castillejos, there appear to be a number of quantitative changes to this pattern, but few qualitative ones. These changes include:

(a) a significant reduction in ovicaprines (of c.25%)

(b) an increase in pig (c. 6-10%)

(c) a decline in rabbit (c. 6%)

(d) an increase in red deer (from nil in the Late Neolithic to 13% in the Final Neolithic/Early Copper Age

(e) the first appearance of horse (c. 20%)

Overall, however, the pattern of animal exploitation is similar in both the Late and Final Neolithic, with more or less the same species being exploited and in roughly the same proportion. The extent to which this sequence is applicable - to this site as a whole (due to unsystematic sampling) or to the south-east generally - is, however, unclear.

Settlement

One of the most important developments during the Late-Final Neolithic in South-East Spain was the widespread appearance of open-air settlements. In contrast to the preceding Impressed Ware phase, when settlements were restricted almost exclusively to caves and rockshelters, permanent open-air settlements appear in the South-East towards the end of the 4th millennium b.c., and become increasingly numerous in the first centuries of the 3rd millennium.

Thanks to recent investigations by the University of Granada, the evolution of open-air sites is fairly well documented in the Peñas de los Gitanos region, near Montefrío, in Western Granada. The site of Los Castillejos lies on a small flattened hilltop which was first occupied around 3200 b.c., since Late Neolithic debris lies immediately above bedrock. The Late-Final Neolithic occupation consisted of a number of weakly built structures made of organic material; these structures appear to have been partially shielded from the elements by the rocky perimeter which bordered the settlement area. Despite the small area excavated thus far, materials from this horizon do appear to indicate that the site was permanently occupied.

In the immediate vicinity of Los Castillejos, Arribas and Molina (1978:

121) report that there are Middle and Late Neolithic occupations in caves, rockshelters and fissures - some with materials similar to those from the Los Castillejos settlement. Molina González and Roldán Herváz (1983: 51) see the occupation of caves/rockshelters on the one hand, and open-air sites on the other, as evidence of separate economic strategies,[16.] stating that:

> "Together with communities who continued to inhabit caves, other groups belonging to this same Cave Culture horizon began to substitute their semi-nomadic economic strategy for an increasing sedentarization in environments which were more favourable to an agricultural way of life. Thus originated the first sedentary habitations in the open air, utilized by a population that, although it maintained the same material manifestations as the Cave Culture (pottery with the forms and decorations of the Cave Culture, shell and marble bracelets, flint industry with small blades and geometric elements, etc.), changed their settlement pattern and economic regime".

While the Peñas de los Gitanos area provides a specific and localized, example of the changes in settlement during the Late and Final Neolithic there are also significant large-scale changes during this period.

On a regional scale, one of the most important changes during the Late and Final Neolithic was an increase in the density and number of sites. Settlement in the south-east prior to 3500 b.c. was generally fairly sparse (cf. Olaría de Gusí 1977a). By the end of the 4th and beginning of the 3rd millennia there appears to be a widespread increase in the number of settlements, as well as an expansion of settlement into some previously unoccupied, or sparsely occupied, areas.

Several sites in the semi-arid zone have been put forward as evidence of occupation in the Neolithic - including El Gárcel, Tres Cabezos, Almizaraque, and Terrera Ventura (Walker 1973a; Savory 1968; Bosch Gimpera 1969; Gossé 1941; Gilman and Thornes 1984). The status of El Gárcel as a Neolithic site has been based on a number of features which are rare or absent in Millaran Copper Age contexts. One such feature is a flint industry dominated by small bladelets and trapezes, similar to those found in round graves. Other unusual features from El Gárcel are its plain ware pottery assemblage distinguishable by its large,

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16. This rather simplistic correlation between site types and economic strategies, however, obscures a much more complex pattern involving: (1) the use of different sites within the same economic strategy, and (2) the use of several different exploitation strategies by the inhabitants of a single site.

pointed-base forms and the large number of shell ornaments found here. On the other hand, however, radiocarbon dates for this site (Appendix 3:1) and evidence of copper slag at the site (Acosta 1976), suggest a later chronology.

Despite the ambiguity surrounding the El Gárcel settlement, it does appear , on balance, that this site does pre-date the classic Millaran Copper Age - beginning around 2600 b.c.. The microblade industry, trapezoidal microliths and microburins from this site do not fit comfortably into a Millaran context, nor do the ceramic forms, or the large number of shell bracelets and rings. If we accept the rather broad label of 'Late Neolithic and/or Early Copper Age' for El Gárcel, as proposed by Gilman and Thornes (1984: 73), the crucial question is how long a time interval there is between this early development and the beginning of the Millaran _sensu scritu_. The pre-Millaran status of early levels at Terrera Ventura, Tres Cabezos, and perhaps Almizaraque, present even greater interpretive problems. In short, none of these four sites present unambiguous evidence for Late or Final Neolithic settlement in the semi-arid lowlands of south-east Spain.

A comprehensive evaluation of settlement during this period is difficult, because of the many ambiguities in available data. It is possible however to define 3 general patterns which account for much of the regional variability in settlement during the Late-Final Neolithic:

(1) In areas which were previously occupied by Impressed Ware communities, local increases in the number and density of settlements (Western Granada, Málaga)

(2) localized expansion of settlement into areas which either had negligible occupation during the Impressed Ware horizon, or lacked it altogether (Eastern Granada, Northern Almería, and perhaps Northern Murcia)

(3) the continued absence, or low density, of sites in areas which were largely unsettled during the Impressed Ware Neolithic (much of lowland Almería and Murcia)

The third category corresponds to most of the semi-arid lowland zone of Murcia and Almería where evidence for Late-Final Neolithic settlement is minimal or non-existent. Even if one accepted that El Gárcel, Tres Cabezos and a handful of other sites belonged to the Final Neolithic, the occupation of these lowland areas during the Neolithic is very late indeed, and the density of sites is very low.

Settlement expansion in the Late-Final Neolithic, therefore, seems to have occurred in those areas which were relatively free from climatic and environmental extremes, and where resource fluctuations were minimized. In the south-east, these types of areas are found primarily within the Peni-Bétic or Andalucian mountain system. In comparison with the dry steppe areas of the eastern lowlands these uplands zones afforded higher and more evenly distributed rainfall, and hence more varied and productive ecosystems. It is suggested however, that the expansion of settlement in the Late-Final Neolithic occurred only in particular areas - essentially those regions which could accommodate existing technologies and economic strategies without presenting any major obstacles or risks. The fact that Late Neolithic settlement appears to be largely absent from the more extreme and risk-ridden environments in the South-East (Mathers 1984a) suggests that the problems posed by these areas were still an effective barrier to large scale permanent settlement. The Late-Final Neolithic therefore, appears to mark the beginning of a long-term process of settlement expansion which proceeds in a step-by-step fashion, gradually extending settlement into increasingly marginal environments. The pattern of Copper Age settlement, discussed in the following section, is the next stage in this progression.

Exchange

The lack of analyses and detailed site inventories make it impossible to reach any definitive conclusions about regional interaction during the Late-Final Neolithic. Objects such as 'Almerian' cruciform idols, as well as stone and shell bracelets, occur over a wide area of south-east Spain during this period (Leisner and Leisner 1943; Pellicer Catalán 1964b), but no attempt has been made as yet to identify distribution patterns, 'style zones' or source areas.

Burial

Although mortuary practices during the Late-Final Neolithic are crucial for evaluating the growth of social ranking and the intensification of ritual activities, our understanding of burial rites during this period is uneven and very superficial. Present evidence suggests, however, that there are a variety of burial modes in use at this time - trench/pit graves (Los Castillejos); caves, rockshelters, and natural fissures, (Carigüela, etc); and possibly passage graves (Río de Gor) and round graves (Almanzora Basin).[14] The relationship between these different types of interment either in geographic, chronological or behavioural terms, is unclear. Some of these interpretive difficulties are exemplified by the site of Los Castillejos which contains trench/pit graves within the settlement during the Final Neolithic (Level VB) (Arribas and Molina 1978: 95), but also has a group of megalithic tombs in its immediate vicinity (Mergelina 1941-1942, 1945-1946; Leisner and Leisner 1943). Since the trench/pit graves from this site are still unpublished, it is impossible to relate them to the development of the nearby megalithic cemetery.

Despite the problems of establishing the earliest use of megalithic tombs, Molina González and Roldán Hervás (1983) suggest that some of the tombs from the Río de Gor area in Granada were constructed in the Final Neolithic (c. 2900-2600 b.c.), based on the presence of impressed pottery which they parallel with that of the Cave Culture; see discussion of this evidence in Chapter 5. In most cases, however, our lack of a relative or absolute chronology for early megalithic tombs in south-east Spain makes it extremely difficult to establish whether or not they were in use during the Late-Final Neolithic period.

Burials in rock fissures, caves and rockshelters are also known during the Late-Final Neolithic (Molina González 1970; Menjíbar Silva _et_. _al_. 1981; Botella _et_. _al_. 1981; Olaría de Gusí 1977a; Botella 1973; Pellicer Catalán 1964b), but the details of these interments have yet to be fully published. Burials of this kind are particularly common in south-east Spain during the succeeding Copper Age, and often constitute a local alternative to passage graves and other megalithic tombs in many parts of Granada, Málaga, Murcia, Alicante and much of the Levante (Belda Domínguez 1929; Carrasco _et_. _al_. 1979; García Sánchez _et_. _al_. 1976; Molina Fajardo 1979; Arribas 1956; Fernández de Aviles 1946).

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14. The chronological status of 'Almerian' round graves, and the 'Almería Culture' generally, is a long standing, but still unresolved problem. Excavations at the round grave cemetery of Las Churuletas in Almería (Olaría de Gusí 1977b) have emphasized the similarities between the contents of these tombs and the materials from classic Millaran passage graves: vessels with rims bevelled inwards, painted pottery, decorated bone, arrowheads, copper and a variety of vessel forms. While this evidence suggests that there is some overlap between the use of Millaran passage graves and the Las Churuletas (and other) round tombs, it does not rule out the possibility that the latter pre-date the former. Radiocarbon dates from so-called 'Almerian' contexts will do much to resolve this dilemma.

One interesting feature of at least some of the Late-Final Neolithic cave-rockshelter burials is the presence of human bone (the majority of which are crania and long bones) which bear traces of 'fine incisions and marks made by cutting the muscles and ligaments at a time after death' (Botella 1973). Molina González and Roldán Herváz (1983: 50-51) suggest that this may be some kind of defleshing ritual prior to intering the corpse, and note that a large quantity of these marks are found on skeletal material from the Late-Final Neolithic site of Las Majolicas. This material was found in what Molina González and Roldán Herváz describe as a 'true ossuary' in association with a level of ash. Botella (1973) notes that there are similar incised bones from the Cueva de las Tontas and from Carigüela; the latter included an unstratified cranial chalice or vessel (craneo-copa) which Molina González and Roldán Herváz (1983:51) suggest may be related to the more recent phase of Neolithic occupation there.

Overall, and despite the ambiguities of available data, there do appear to be considerable differences in the types of burial being used during the Late-Final Neolithic.

Social Organization

Like many other aspects of Late and Final Neolithic communities, an evaluation of social organization is fraught with difficulties. The lack of reliable mortuary evidence for this period is perhaps the most outstanding drawback in this regard. Publication of the Las Majolicas ossuary and the 'fosa' graves from Los Castillejos may, however, offer some insight into the process of accelerated social differentiation - a process which is already well developed in the Copper Age.

Leaving aside mortuary evidence, many sites of this period are still in caves and appear to display a type of organization similar to Impressed Ware communities. Open-air sites, from what we know of them, appear to be relatively small in extent, and relatively uncomplicated with respect to building materials, construction and layout. The internal organization and size of the Los Castillejos settlement, for example, does not suggest any clear signs of hierarchization. Craft production also shows little sign of the specialization which is so often associated with the development of social ranking and institutionalized status.

Recently, Molina González and Roldán Herváz (1978: 70) have likened Late-Final Neolithic communities in Granada to Sahlin's (1972) 'Domestic Mode of Production', stating that there are 'still no pronounced differences in the richness or hierarchy in the population'. They note that although the construction of megalithic tombs denotes some 'incipient hierarchization' of society, the early and developed stages of the megalithic phenomenon in Granada consist of cemeteries which were essentially similar for each segment of the community (possibly clans) and tombs which lack prestige goods. It is their contention therefore, that during much of the 'megalithic period' in Granada communities were largely egalitarian.

It is perhaps too early to judge whether the early phase of megalithic construction in Granada, or in any other part of south-east Spain, conforms to the model proposed above. There is certainly reason to suggest that in the later phases of megalithic tomb development, there is considerably more evidence for status differentiation that Molina González and Roldán Herváz (ibid) would have us believe, even if we restrict ourselves solely to the Granadan tombs. At present, however there is nothing concrete to suggest that Late-Final Neolithic communities were moving towards greater inequality and more pronounced expressions of status. This widespread lack of evidence may well be exaggerating the contrasts between the organization of Final Neolithic communities on the one hand, and Copper Age ones on the other. Since tomb construction, status differentiation and prestige competition develop rapidly in the Copper Age, there is a possibility that some of these features had their 'more humble' beginnings in the final stages of the Neolithic.

COPPER AGE (2600-1800 b.c.)

Throughout south-east Spain, the Copper Age is a period of fundamental change in settlement, burial, technology, economic strategies and overall organization. The wealth of information from Copper Age settlements and cemeteries in this area has made it possible to identify a number of major trends during the later 3rd and early 2nd millennia. These include: increased local and regional population densities; greater emphasis on spatially concentrated and labour intensive economic strategies; more pronounced status differentiation; intensified inter and intra-regional exchange; and greater emphasis on defence. Perhaps the most significant development in south-east Spain during the Copper Age, however,is the clear differentiation of regions (e.g. lowland Almería and Murcia, western Granada and the Lower Guadalquivir, eastern Granada, and the uplands of Murcia and Almería) - with respect to variables such as architectural traditions, ceramics, prestige valuables, funerary rituals and social/political organization.

Lithic Industries

Copper Age flint industries represent a considerable departure from earlier Neolithic traditions with respect to three main features: the form of individual artefacts (e.g. blades and projectile points), the composition of assemblages as a whole, and manufacturing techniques.

Whilst Late and Final Neolithic assemblages are dominated by a microlithic/microblade technology (e.g. small cores, trapezes, and bladelets less than 5 cm long), Copper Age industries have a clear emphasis on larger tools, with a predominance of blades 5-15 cm long. This change is particularly apparent at Los Castillejos between Phases II (c. 2800-2600 b.c.) and III (c. 2600-2100 b.c.) (Arribas and Molina 1978; Appendix 3:17).

Early (or Pre-Beaker) Copper Age horizons in south-east Spain have consistently produced evidence of high quality flint production (e.g. Almagro Basch and Arribas 1963; Arribas *et. al*. 1978, 1979, 1983). This well executed flintwork is represented by the frequent use of bifacial retouch, and to a lesser extent, fine pressure flaking. The Early Copper Age is also characterized by a wide variety of tool forms, among them: scrapers, burins, awls, arrowheads, so-called 'sickle teeth', daggers, halberds, knives, etc. - often with considerable variations within each tool category. Overall, Copper Age industries appear to be much more diverse in form and composition than Final Neolithic assemblages, and reflect a wider spectrum of manufacturing techniques.

Within the Copper Age there are significant differences in flint industries which correspond roughly to the Pre-Beaker and Beaker phases - c. 2600-2100 b.c. and 2100-1700 b.c. respectively. Domestic assemblages during the earlier part of the Copper Age generally consist of a broader range of tools, better quality raw materials, and finer flint working than in the Later Copper Age. The inferior nature of later industries is exemplified by the Beaker horizons at sites such as Cerro de los Castellones (Mendoza *et. al*. 1975) and Los Castillejos (Arribas and Molina 1978, 1979) which are dominated by irregularly worked and poor quality flint. The trend towards more crudely produced assemblages is commonplace and continues into the Bronze Age with a further decline in the quality of materials and manufacturing techniques. It must be stressed however, that this decline only applies to *domestic* flint assemblages, and not to flint objects associated with *funerary* activities, which actually increase in quality and diversity over this period.

The fact that fine flintwork was confined almost exclusively to the production of funerary objects suggests that copper metallurgy made a progressively important impact - not only on flintworking techniques, but also on the kinds of objects produced for funerary use. Up to a point, there appears to be some mutual interaction or 'competition' between flint and metallurgical production, with the development of one (metal) compromising the traditional role of the other (flint) (Mathers 1984a). The effect of metallurgy on the production of flint tools for domestic activities is less clear, however, since the number of clearly 'utilitarian' metal tools is very small indeed. Some awls, saws, chisels, and other possible domestic metal objects are known from the south-eastern Copper Age, but few are associated with contexts other than burials (Monteagudo 1977). Given the small number of utilitarian metal objects from both the Copper and Bronze Age, metal appears to have been considerably more significant for funerary purposes than as a material for everyday use (see Arribas 1968; Chapman 1984).

Consequently, the decline in the quality and range of domestic flint assemblages is likely to have been only partially affected by copper and bronze metallurgy. A more significant factor may have been the increasingly intensive cropping of cereals, olives and vines (Gilman 1976, 1981, Gilman and Thornes 1984), and the apparent reduction in the importance of hunting. This shift in economic emphasis no longer placed a premium on skilled flintwork, but instead focused lithic technology on the production of larger and more durable tools suitable for activities such as food processing (querns, rubbers, cleavers, etc.).

Querns, whetstones, axes, hammers, rubbers and other 'macro' tools are found in abundance throughout the Copper Age. The quantity and diversity of these objects reflects the increasing importance of large, heavy duty tools in several areas of domestic and industrial activity including:

(a) woodworking (for construction, fuel, forest clearance)

(b) raw material extraction and processing

(c) food preparation

The majority of these tools were designed for prolonged use and consequently bear traces of intensive wear. Other stone objects such as spindle whorls and discs, provide evidence of weaving and textile production. More often however, objects of this type were made of less durable materials such as daub or ceramics.

Less utilitarian items such as stone 'idols' are also found in domestic contexts, albeit in small numbers. The raw materials used to produce idols are also variable - from more common materials such as calcareous concretions (Walker 1984), to more exotic ones like ivory (Arribas 1977). The greatest quantity and variety of these objects is, however, in funerary contexts. Likewise, stone ornaments such as pendants, plaques and necklace beads are largely restricted to burials.

Bone and Shell Industries

Copper Age levels at Los Castillejos suggest that the bone industry follows a similar trend to that of flint, with a fluorescence in the Early Copper Age and a subsequent decline towards the beginning of the Bronze Age (Arribas and Molina 1978, 1979). Bone tools from the earlier phase include well executed spatulas, awls/punches, needles, and a comb. By the later phases of the Copper Age however, the bone industry is reduced to a relatively narrow range of objects (mainly awls and some spatulas), many of which were crudely manufactured on bone splinters.

Unlike domestic bone assemblages, bone objects intended for funerary purposes are often elaborately manufactured and decorated, such as bone idols of various types (flat, cruciform, phalanges) and decorated bone objects (sandals, tubes, long bones). Phalange idols are amongst the most common objects, and are found in Millaran cemeteries throughout south-east Spain (Leisner and Leisner 1943; García Sánchez and Spahni 1959; Almagro Basch and Arribas 1963; Topp and Arribas 1965). Some of these phalanges are engraved with the so-called Millaran 'eye-idol' motif - a type of decoration also found on long bones, stone plaques and pottery (Almagro Gorbea, M.J. 1965, 1973; Almagro Basch and Arribas 1963; Botella 1980; Leisner and Leisner 1943; Motos 1918).

Shell is found in both domestic and funerary contexts but its numerical importance in one as opposed to the other is difficult to assess at present. The majority of shell objects are personal ornaments such as perforated pendants, necklace beads, bracelets or rings. There are also a significant number of unmodified shells whose purpose is unclear. Others show considerable wear, suggesting that at least some of them were not produced specifically for funerary purposes. At many sites the variety of species is considerable (Val Caturla 1948, Topp and Arribas 1965; Almagro Basch and Arribas 1963).

Metallurgy

Although some investigators have proposed that copper metallurgy developed in Iberia prior to 3000 b.c. (Almagro Gorbea M. 1979; Rothenberg and Blanco-Ferijerio 1982), evidence for these claims has been ambiguous and unconvincing (Chapman 1984). On the other hand, available radiocarbon dates suggest that Iberian metallurgy began in the early 3rd millennium (Harrison 1980; Arribas and Molina 1979; 1984; Chapman 1982; 1984).

During the 3rd and early 2nd millennia b.c. copper was the most widely exploited of all metal ores in south-east Spain. Tin, on the other hand, was not used systematically until the succeeding Bronze Age (Chapman 1984; Harrison 1974; Harrison and Craddock 1981). Equally, there is no clear evidence for gold or silver production in south-east Spain during the Copper Age.

Pre-Beaker metallurgy in the south-east is limited to a fairly narrow range of artefact types - many of them small, simple items which did not require a large amount of metal or sophisticated casting techniques (e.g. chisels and awls). Other objects such as saws, flat axes, projectile points, and knives/daggers, seem to have been produced using fairly crude moulds (Monteagudo 1977). As Allan (1970:19) noted:

> "Copper articles were scarce at Los Millares and these early settlers were only masters of the simplest techniques of forging and open mould casting."

More sophisticated methods of production followed in the Beaker period (c. 2100 - 1800 b.c.), with the regular appearance of arsenical copper alloys (Harrison and Craddock 1981) and the introduction of a wider range of objects (tanged points, mid-ribbed daggers, etc.)

In general, the distribution of copper objects in south-east Spain is scattered and lacks any specific or significant concentrations. At most sites, and indeed in many regions, the quantities of metal are small (Harrison 1974; Chapman 1984). In a few areas of south-east Spain, however, this low density distribution is punctuated by major concentrations of copper objects - represented by the sites of Los Millares (Almagro Basch and Arribas 1963; Leisner and Leisner 1943; Arribas et. al. 1978; 1979) and Almizaraque (Almagro Basch 1965; Almagro Gorbea M.J. 1965; Siret 1948). The quantity of metal objects at these two sites is considerably greater than at other contemporary Copper Age settlements. (Appendix 3:19).

There are, however, several notable differences between these two sites.

First, Almizaraque is a much smaller site; it does not have any visible signs of fortification; and perhaps more importantly in this context, lies only a short distance from the rich ore deposits at Herrerías (Almagro Gorbea M.J. 1965). Los Millares on the other hand, is a far more extensive site, is heavily fortified, and lies some considerable distance from major ore sources (Appendix 3:19). Moreover, as Table 3:1 shows, there is a significant discrepancy between Los Millares and Almizaraque when the context of metal objects at these two sites is compared.

Table 3:1. Total of Copper Objects from Los Millares and Almizaraque

LOS MILLARES		ALMIZARAQUE	
Settlement Area	Cemetery	Settlement Area	Cemetery
3	c.71	c. 70	20

Ceramics

Ceramic assemblages in the Pre-Beaker and Beaker phases of the Copper Age in south-east Spain differ significantly from those of the Late and Final Neolithic. The overwhelming dominance of plain wares throughout the Copper Age represents a considerable break with the more varied and sometimes elaborately decorated pottery of the Late and Final Neolithic. This transition is best represented at Los Castillejos between Phases II and III (Final Neolithic, and Early-Middle Copper Age, respectively).

As Appendix 3:20 shows, the frequency and variety of decorated pottery at Los Castillejos declines dramatically in the Early Copper Age; after c. 2500 b.c. the quantity of decorated ware is low, and the range of decoration is very limited. By the Early Copper Age, for example, 'true' almagra wares had declined significantly, and by c. 2500 b.c. began to be replaced by chestnut brown paint and coloured washes. Almagra finally disappeared around 2400 b.c., along with several other established types of decoration (Appendix 3:20). However, some forms of painting and applied decoration (e.g. infilling with paste, painted washes, lugs, etc.) continued to be used during the later Copper Age (Leisner and Leisner 1943; Almagro Basch and Arribas 1963; Almagro Gorbea M.J. 1977).

Throughout the Copper Age in south-east Spain the quantity of decorated pottery - from both settlements and cemeteries - remains very low. Seldom do decorated wares exceed more than about 5-10% of the ceramic assemblage from a site. Furthermore, it appears that the vast majority of decorated ceramic material was derived from ritual/funerary contexts rather than domestic ones. Undecorated, but fine quality, vessels also appear in limited numbers in Pre-Beaker contexts: for example, the black wares at Cerro de la Virgen (Schüle and Pellicer Catalán 1966), the burnished bowls from El Malagón (Arribas et. al. 1978) and the polished dish-like vessels from Cerro de las Canteras (Motos 1918).

Leaving aside decorated pottery, and undecorated fine wares, it is clear that there were major changes in the rest of the ceramic assemblage during the Early Copper Age. At Los Castillejos, for example, Neolithic forms are replaced by a variety of bowls - wide, semi-spherical, helmet-shaped - which typify Copper Age assemblages over the whole of the south-east, (Almagro Basch and Arribas 1963; Leisner and Leisner 1943; Topp and Arribas 1965; Almagro Gorbea M.J. 1973; Muñoz Amilibia 1983; Schüle and Pellicer Catalán 1966). Also common during the Early Copper Age were globular jars with restricted openings or 'necks' (Arribas and Molina 1978).

Another new form, characteristic of the Early Copper Age in Granada and the Lower Guadalquivir was the large flat dish with a thick, bevelled rim (Ruiz Mata 1975 a and b; Arribas and Molina 1978; Arribas et. al. 1978). Midway through the Copper Age these large dishes are superceded by plate-like forms with bevelled and projecting rims which continue until the end of the Beaker period, and are found in the initial levels at a number of Argaric sites in Granada (Arribas and Molina 1978). Also characteristic of this phase are: (1) globular vessels with a high carination; (2) flat vessels with a central carination; and particularly, (3) large ovoid jars or crocks - with or without carinations.

Coarse domestic pottery with impressions of vegetable fibres, cord or matting is frequently found in Middle and Late Copper Age sites, (Walker 1984; Arribas and Molina 1978; Motos 1918; Arribas et. al. 1978; Topp and Arribas 1965). Some of these impressions were no doubt accidental, but the vast majority of examples were clearly the result of either:

(a) drying moist, unfired vessels on mats of vegetable fibre prior to firing

or

(b) constructing vessels inside a mould or container made of vegetable fibres

Another important point about ceramic production during the Late Copper Age is the apparent decline in the quality of both plain and decorated wares - e.g. at Cerro de la Virgen (Schüle and Pellicer Catalán 1966: 7-9). Other ceramic items commonly associated with Copper Age occupations include clay plaques, beads, loom weights, spindle whorls and curved horn-shaped objects ('cuernecillos') (Siret and Siret 1887; Arribas and Molina 1978; Mendoza _et_. _al_. 1975; Walker 1984; Schüle and Pellicer Catalán 1966).

During the period c. 2100 - 1800 b.c. ceramic assemblages in south-east Spain are notable not only for the small quantities of Beaker pottery they contain, but also for their high degree of continuity with the Pre-Beaker period. Like copper objects, the overall quantity of Beakers in south-east Spain is very low and the majority of examples are concentrated at only a handful of sites (Appendix 3:21). Interestingly, many of the sites that have a significant number of copper objects, also have a considerable quantity of Beaker pottery (compare Appendices 3:18 and 3:21). As Harrison (1975: 75) has noted, however, the importance of the Beaker phenomenon in south-east Spain should not be overrated:

> 'In southeastern Spain Beakers never developed a local style, and appeared instead as a series of horizon markers within the far larger (and longer) Almerian-Millaran-Argaric continuum. From Cerro de la Virgen's stratigraphy it seems that Beakers played a very small role in the cultural development of the region, and that compared to their great abundance in the Tagus Estuary, their numbers are infinitessimal. There is more Beaker pottery from one rich site such as Alapraia than in all the Almerian and Granadine tombs put together.'

The Beakers which are presently known in this area are generally found in cemeteries - with the notable exceptions of Terrera Ventura and Almizaraque (where the majority of finds have come from the settlement area). Unlike early Beaker developments in central Portugal, Maritime Beakers in south-east Spain do not appear to be abundant or locally inspired (Harrison 1977, 1980; Schüle and Pellicer Catalán 1966; Arribas 1976). In comparison, later Ciempozuelos Beakers in south-east Spain are more numerous and more widely distributed (Appendix 3:21), but are still scarce when viewed from a Peninsular perspective.

Although systematic sampling was not employed in their excavations, Schüle and Pellicer Catalán (1966) calculate that Beakers formed 5-10% of the total ceramic assemblage at the site of Cerro de la Virgen.

Figures for other Copper Age sites in the region are also low even after combining the totals for Maritime and Ciempozuelos Beakers. The poverty of Beaker development in the south-east is further reinforced by the widespread lack of characteristic items such as V-perforated buttons, Palmela points and wristguards.

Rather than marking an abrupt change in material culture or organization, the Beaker period in the South-East displays a significant degree of continuity with the preceding phase of the Copper Age - particularly with respect to ceramic production. At Cerro de la Virgen for example, Schüle and Pellicer Catalán (1966: 8-9) note that all the pottery forms present in Pre-Beaker levels continue into the Beaker and Bronze Age periods.

Subsistence

For many years, interpretations of Copper Age stock and cereal economies depended more on speculation than on empirical evidence. Over the past two decades, however, there has been a marked increase in the volume of economic evidence from south-east Spain - mainly in the form of faunal analyses (Schüle 1969; Boessneck 1969; Driesch 1972, 1973a and b; Driesch and Kokabi 1977; Driesch and Morales 1977; Uerpmann, in Arribas and Molina 1978). Botanical evidence on the other hand is lacking from the vast majority of sites, despite the clear emphasis of Copper Age communities on cereal crops; the only data available is the result of chance finds or large concentrations, rather than systematic collection (Netolitzky 1935; Neuweiler 1935; Martínez Santa Olalla 1946; Téllez and Ceferri 1954; Walker 1973b; Gossé 1941).

Turning to evidence of plant exploitation, the quality of available data makes it difficult to draw many general conclusions. Data included in Appendix 3:22 indicates that different varieties of wheat and barley were cultivated during the Copper Age, along with lentils, horse beans and flax. Evidence of rye at El Gárcel (Gossé 1941) has been doubted, since the introduction of this crop appears to be a much later phenomenon (Arribas 1968: 43). Olive stones are known from the sites of El Gárcel and Los Millares but appear to be wild rather than cultivated (Arribas 1968: 43; Halbaek 1962: 183); without more detailed evidence the importance of olives in Copper Age economies remains uncertain.

The large quantities of grinding slabs, rubbers, and pestles indicate that plant foods, and particularly cereals, played an important role in

Copper Age economies. Unfortunately, little information is available about the ways in which grain was stored - though there have been some suggestions that the numerous silos found at some sites may have been used for this purpose (Gusí Jener 1975; Almagro Basch and Arribas 1963).

Evidence for irrigation or water control systems in the south-eastern Copper Age comes from a variety of sources. First, as Chapman (1975, 1978) points out, botanical evidence from a number of sites points to the existence of crops which could not have been grown locally without artificial watering. Secondly, Copper Age sites in the more arid regions of the south-east are almost exclusively located in riverine positions, well suited for diverting, controlling and collecting water (Chapman 1975, 1978; Gilman 1976, 1981; Mathers 1984a and b). The widespread absence of inter-fluvial sites from these areas further reinforces this conclusion. Finally, the existence of features such as the cistern and 'aqueduct' at Los Millares (Siret and Siret 1887) and the canal from Cerro de la Virgen (Schüle 1967) provide further evidence for water control strategies.

> "... with relatively few exceptions, pre-Bronze Age agricultural sites in the south-east were oriented to exploit hydraulic resources in the arid, but not in the moist sector of south-east Spain."
>
> (Gilman and Thornes 1984: 178)

Perhaps because of the imbalance between faunal and botanical evidence, discussions of Copper Age subsistence in south-east Spain have focused primarily on animal resources. While Copper Age faunal assemblages are dominated by cattle and ovicaprines, other animals such as pig, red deer and rabbit constitute important supplementary resources (Appendices 3:23 - 3:27). The economic significance of horse, however, was negligible until the later stages of the Copper Age (Arribas and Molina 1978; Driesch 1972; Gilman and Thornes 1984). Wild species constitute only very small percentages throughout the Copper Age.

Overall, several important patterns can be seen in animal exploitation strategies, including:

(a) Fairly stable percentages of cattle and ovicaprines between the Early Copper Age and Early Bronze Age

(b) A progressive increase in horse and a corresponding decline in pig, over the same period

(c) The predominance of domestic species over wild ones (with ratios varying between 2:1 and 4:1)

(d) A general uniformity in economic emphasis (i.e. the range of major species exploited and the relative percentages of those species) between sites in different environmental and geographic zones

The latter point, which has recently been emphasized by Gilman and Thornes (1984) is perhaps surprising, given the marked environmental differences between the humid uplands of the south-east and the more arid lowlands As Gilman and Thornes (1984: 25) have noted,

> "The available evidence indicates that the Copper Age inhabitants of both arid and moist sectors of south-east Spain were cultivating the same plants and animals and that they were ranking them, so to speak, in a similar fashion. Given the variability of the environment, they would not, of course, have been able to achieve their common goals by identical means throughout the region".

It appears, therefore, that the economic variations between Copper Age communities have more to do with the methods of exploitation, than the choice of resources.

Despite the overwhelming evidence for sustained, sedentary occupation, Copper Age communities have often been portrayed as pastoral or nomadic, particularly during the Beaker period (Savory 1968; Sangmeister 1972; Walker 1973a).Chapman (1979) and Lewthwaite (1982c), however, have criticised the way in which historical episodes of transhumance have been applied to prehistoric contexts in the West Mediterranean, suggesting that the circumstance which promoted, and maintained, transhumance systems in the historical period were fundamentally different from those which may have prompted stock movements in later prehistory. The size and complexity of the often cited Medieval transhumance systems operated in the West Mediterranean (Klein 1920; Braudel 1972; Delano Smith 1979), make them unsatisfactory analogues for the Copper and Bronze Ages.

Another serious flaw in the pastoralist and transhumance models for this period are the assumptions that either local pasture was: (1) of insufficient quality and/or quantity to support the desired number of animals, or (2) was absent altogether. Recent site catchment studies of 35 prehistoric sites (Neolithic - Bronze Age) in south-east Spain, however, have demonstrated that:

> "....almost all the sites would have had summer grazing available within reasonable walking distances. The pasture near the sites might be exhausted by very large herds, but neither

> the absolute size of the prehistoric settlements nor the faunal series from them indicates that such large herds existed. The three lines of evidence available (site setting, site size, known fauna) suggest, rather, that the prehistoric inhabitants of the south-east could have arranged to graze their animals on daily excursions without necessitating substantial changes in the division of labour between households".
>
> (Gilman and Thornes 1984: 182)

Despite the general lack of palaeoenvironmental/palaeobotanical evidence, it is clear that the humid uplands of south-east Spain would have offered more extensive and varied opportunities for grazing, than the drier lowland zone. Consequently, although communities in the humid and semi-arid areas of the south-east exploited similar animals, and 'ranked' them in roughly the same way, the importance of stock raising (in proportional terms) may still have been significantly greater in the humid zones where environmental constraints on grazing were more relaxed. Likewise, given the more diverse and favourable habitats for game in the humid regions, there may have been a greater, or more sustained emphasis on wild species in those areas as compared with the semi-arid zones.

Overall, there appears to be little variation in the range of animal and plant species exploited by Copper Age communities. As Gilman and Thornes (1984) have noted, however, there are major differences in strategies used to exploit these resources. In general terms, these differences correspond to the two major ecological zones in the south-east - the humid uplands, and the more arid lowlands. The major difference in economic orientation between these two regions is the emphasis on capital intensive cropping strategies in the semi-arid lowlands, and more extensive strategies in the humid uplands (Gilman and Thornes 1984; Mathers 1984a and b).

Settlement

By 2700-2600 b.c. there appears to be a major expansion of settlement throughout south-east Spain involving an increase in local (and regional) population densities, and the occupation of previously unsettled territories. Although this process may have begun - to a limited extent - in the Final Neolithic, this expansion of settlement can also be paralleled in other parts of Europe at the same horizon (Sheratt 1981).

While many Late-Final neolithic occupations were still in caves and rock-shelters, Copper Age sites throughout the south-east are found in the open-air. The locations of these settlements range from river terraces and flood plains, to low hillocks and steep, rocky spurs. In more arid regions, rivers and major tributaries were favoured for settlement - reflecting the need for reliable water sources and the emphasis on water control strategies (Chapman 1975, 1978; Gilman 1976; Mathers 1984a and b). In the moister upland regions where intensive water control was less important, and where constraints on site location were less acute, Copper Age settlements are found in more varied ecological and topographic settings.

Although little systematic work has been done to define the spatial extent of most Copper Age settlements in south-east Spain, in general it appears these sites were relatively small. Despite the evidence at some sites for large-scale systems of defence, the actual size of habitation areas is fairly restricted. Los Millares for example, has a series of very large concentric fortifications which in turn are surrounded by a 'screen' of approximately 10 perimeter 'forts' (Arribas et. al. 1978, 1981). In spite of this complex defensive network, the maximum extent of occupation within the settlement appears to have covered only 2 hectares (Siret and Siret 1887; Almagro Basch and Arribas 1963). Copper Age sites in Murcia, Granada, Jaén and Almería are often much smaller - many measuring less than 100 square metres (e.g. Campos - Siret and Siret 1887; Cueva del Plomo - Muñoz 1983).

One outstanding feature of Copper Age communities in south-east Spain is the defensive character of many settlements- something which is apparent not only in the construction of fortifications, but also in the physical surroundings of the site. The presence or absence of 'defensive' constructions has not been the subject of systematic investigations on south-eastern Copper Age sites, but it is clear that not all sites were fortified, and that the nature of 'defences' varies significantly between sites. A number of lowland Copper Age sites, including La Gerundia (Siret and Siret 1887), Almizaraque (Almagro Gorbea M.J. 1973), and those near Librilla in Murcia (Chapter IV), do not appear to have man-made defences. With the exception of Almizaraque, however,these sites are located on river terraces or spurs isolated by fluvial erosion - positions which offer various natural defences.

Internally, settlements were not laid out according to any coherent, overall plan. Although dwellings and other structures sometimes form distinct clusters with large empty spaces in between, (e.g. El Malagón, Los Millares) the organization of structures, work spaces and storage areas does not conform to any consistent or standardized pattern. Dwellings are usually round or ovoid, and irregularly built, but the shape and type of construction varies within settlements and between regions (Arribas 1976, Almagro Basch and Arribas 1963; Schüle and Pellicer Catalán 1966; Arribas et. al. 1978). Normally, dwellings consist of small oval stone footings measuring some 3 - 7 m in diameter, with walls of stone or adobe. Impressions of cord, cane, and branches, together with the ash layers associated with collapsed dwellings, suggest that these structures were roofed with organic material bound together with twine and covered by daub.

For the most part, our knowledge of the spatial organization of activities within Copper Age settlements is very poor. We do know, however, that at several sites some stages of metal production were carried out within the confines of the settlement (Arribas et. al. 1978; Motos 1918; Siret and Siret 1887). Recent data from Los Millares (Arribas et. al. 1981) suggests metallurgical activity had also been pursued in and around the outlying 'forts'. Likewise, evidence from pits and silos within the settlement area indicates underground storage of grain and other provisions. Evidence of centralized storage facilities, however, is lacking. The location of other activities such as ceramic manufacture, bone and shell production, flint working, and so on, within the settlement is problematic at nearly all sites because of a lack of systematic, area excavations. Motos (1918), however, identified several discrete areas of flint and bone production at Cerro de los Canteras.

To date there are no obvious cases of status differentiation within the settlement area, for example, with regard to domestic architecture, materials associated with dwellings, or size discrepancies. It must be said, however, that there have been no specific attempts to address these questions. Given some of the clear differences in status within some Copper Age cemeteries (Chapman 1975), it is crucial that future research tackles the problem of whether any of the distinctions visible in funerary evidence are paralleled in the evidence from habitation areas.

Exchange

Although much has been written about 'commerce' and exchange systems during the Copper Age, little analytical work has been done to identify the source areas or distribution patterns of different raw materials. One exceptional case of such work, the SAM programme of metal analyses (Jungans et. al. 1960; 1968), involved a number of serious flaws and its conclusions have been subjected to severe criticisms (cf. Waterbolk and Butler 1965; Harrison 1975). The basis for most discussions of exchange in the Iberian Copper Age have therefore depended largely on the typological similarities between assemblages.

One well known example of long distance exchange in the Peninsular Copper Age are the linkages established by south-east Spain and central Portugal with the Maghreb region of North Africa (Gilman 1975; Harrison and Gilman 1977). While the role of central Portugal in this exchange seems to have been fairly active - judging by the volume of North African imports into the Tagus Estuary and the Portuguese Beakers in the Maghreb - the interaction between the south-east and North Africa is less straightforward. Indeed, the importance of this connection may have been exaggerated somewhat, considering the few sites in the south-east where items such as ivory and ostrich eggshell are found, and the small amounts of material known at these sites. The overall quantities of North African 'imports' on south-eastern Copper Age sites is especially small when one considers the time span involved (c. 700-800 years). The connections between the south-east and North Africa, therefore, do not appear to have been particularly well developed or intense, and indeed, may have been indirect.

Within the Peninsula there are some indications of long distance 'connections' between central Portugal and south-east Spain: Millaran elements such as 'Almerian' flat idols, eye-motifs, and phalange idols in the former, and VNSP elements such as thick rimmed dishes and decorated plaque idols in the latter (Savory 1968; Arribas and Molina 1978; Leisner and Leisner 1943). The small quantities of Millaran materials in VNSP contexts, and vice versa, however do not support the idea of an active, centrally organized system of long-distance exchange. Instead, it suggests the sporadic introduction of material which may have travelled long distances through a series of 'filters' or intermediaries.

In south-east Spain, the earliest form of Beakers are those of International or Maritime style, dating to c. 2100-1900 b.c.. Their numbers are small, their distribution is restricted, and according to Harrison (1977) they are clearly an intrusive element indicative of long-distance exchanges. These circumstances contrast markedly with the situation in central Portugal where Beakers are more abundant, more evenly distributed, and exhibit greater continuity with preceding Pre-Beaker assemblages. Later Ciempozuelos style Beakers in south-east Spain are more abundant, more widespread, and in general, less carefully produced (cf. Schüle and Pellicer Catalán 1966). Whether or not these later Beakers are locally manufactured is unknown. The general absence of many traditional Beaker items such as Palmela points and V-perforated buttons in the south-east, however, suggests a certain insularity - which together with the regionalization of Beaker pottery, would be consistent with the idea of more localized production of Beakers. A great deal of analytical and theoretical work remains to be done, however, on the Beaker phenomenon in the south-east, and in the Peninsula generally.

Mortuary Practices

Although the precise character of Late-Final Neolithic burials in south-east Spain is still an open question, there is no doubt that the Copper Age marks a crucial stage in the development and elaboration of mortuary rituals. In particular, the Copper Age is characterized by the wide-spread emergence of formalized burial areas, associated with communal burial practices (cf. Chapman 1981b).

The nature of Copper Age tombs and grave goods varies considerably in south-east Spain, not only through time, but also between regions (Mathers 1984a) and within individual cemeteries (Chapman 1975, 1981a). Although megalithic tombs are the characteristic form of burial in many parts of south-east Spain during this period, there are many other types of burial in use, including: caves, rockshelters, crevices and rock cut tombs (Leisner and Leisner 1943; Belda 1929; García Sánchez *et. al*. 1976; Pellicer Catalán 1957-1958). Moreover within all these different modes of burial there is considerable diversity in form, methods of construction, and raw materials.

The range of grave goods is equally large, not only with respect to the raw materials used (Appendix 3:28), but also the form of different artefact types and their degree of elaboration. It is also clear that grave assemblages differ significantly between regions, between cemeteries, and indeed between tombs in a cemetery. Metal, ivory, alabaster, ostrich eggshell, amber, jet, and decorated pottery are amongst the least common objects found in south-eastern tombs (Leisner and Leisner 1943; García Sánchez and Spahni 1959). The strong tendency for these 'exotic' items to be associated with one another, and - by and large - with the most elaborately constructed megalithic tombs, reinforces the idea that they were materials used to identify rank and status (Chapman 1981a; Mathers 1984a and b).

Overall, the most important differences in Copper Age mortuary rituals are those between cemeteries in the arid zone, and those in the more humid regions, of south-east Spain. The dichotomy between these two areas is marked by:

(a) Funerary Architecture

Complex, large and elaborately constructed passage graves in the semi-arid zone, versus the generally smaller and simpler chambered tombs, rock-cut tombs, and caves/rockshelters in more humid areas

(b) Grave Goods

Concentration of material such as metal, ivory, ostrich eggshell, alabaster, amber, etc. in the semi-arid zone, and the significantly smaller quantities of such items in the humid zone

(c) External Funerary Ritual (outside primary burial area)

Exterior features such as stone row, baetyls, enclosures, menhirs, forecourts, pavements, and ritual deposits of pottery, are almost exclusive to cemeteries in the semi-arid zone

These contrasts all underline the marked differences in energy expenditure and ritual elaboration in various parts of south-east Spain during the Copper Age.

Social Organization

Some of the clearest evidence of societal restructuring comes from mortuary data. Copper Age cemeteries provide a variety of evidence for the emergence of a formalized set of social and ideological conventions to govern the relationship between the living and the dead, the production and display of various materials, the disposal of the dead, the differentiation of groups and individuals, and so on. On the basis of funerary evidence at least, organization within communities appears to have been related to various corporate or kinship groups - with different levels of status and authority. The variability of funerary rituals, however, suggests that the level of control exercised by any one group was not sufficiently developed to standardize mortuary ritual throughout the community (see Chapter V). The degree of differentiation and social control appears to have varied considerably within, and between regions - judging by variations in tomb construction, grave goods, etc.

The greatest complexity in funerary ritual, and the most highly developed systems of social control were achieved in the more arid regions of south-east Spain (cf. Mathers 1984a and b; Gilman and Thornes 1984).

In the moister regions of the south-east, social organization appears to have been considerably more 'egalitarian', and its emphasis on ritual much less significant. This less differentiated pattern of organization is particularly clear from the megalithic and other cemeteries in these areas (García Sánchez and Spahni 1959; Mergelina 1942, 1946; Leisner and Leisner 1943). Despite the very large number of published tombs and tomb inventories from the humid zone, there is little trace of the complexity or variability which characterizes cemeteries in the semi-arid zone - in terms of specific features such as tomb construction or grave goods, and with respect to mortuary ritual generally.

Towards the end of the 3rd millennium b.c., and particularly during the Beaker period, there are signs of a fundamental reorganization of communities in south-east Spain which culminates in the development of the Argaric Bronze Age around 1900 - 1800 b.c.. Some of the signs of this transformation are modifications to communal burial practices (such as tomb segmentation), the increasing emphasis on metal objects, the greater importance of defence, and the emergence of more standardized prestige symbols (e.g. Beakers, eye-idol motifs, etc.). These changes mark the beginning of a disintegration process which eroded the communal or kinship-based organization of Copper Age communities, and ultimately brought about the dramatic replacement of Millaran organizational structures and material culture. The results of this transformation are discussed in the next section.

EARLY-MIDDLE BRONZE AGE (1800-1300 b.c.)

By the first few centuries of the 2nd millennium b.c., the internal and external organization of prehistoric communities in south-east Spain began to be altered in several fundamental respects - a process which led to the emergence of the Argaric Bronze Age. This transformation can be seen in settlement distributions (both local and regional), raw material exploitation, mortuary practices, artefact production, and regional 'interaction'. While the pace of change appears to be rapid and dramatic in some areas of Bronze Age society (e.g. funerary rituals), other changes are more gradual and continuous (e.g. economic strategies). Equally, the magnitude of change varies from one geographic region to the next so that, for example, Copper and Bronze Age communities are markedly different in lowland areas of south-east Spain, but less so in many upland regions. In this sense, the emergence of Bronze Age communities can be seen as the product of both continuous and discontinuous processes.

Lithic Industries

One of the most striking characteristics of both domestic and funerary assemblages in south-east Spain during the Bronze Age is the scarcity of flint (Martínez and Botella 1980; Hernández Hernández and Dug Godoy 1975; Arribas et. al. 1974; Molina González and Pareja López 1975; Appendix 3:29). As well as a reduction in the quantities of flint objects being produced there is also a pronounced deterioration in manufacturing techniques. Blades are generally large and irregular, and many lack any form of retouching. One of the few recognizable tools found in Bronze Age flint assemblages is the saw or sickle-like denticulate which consists of a thick blade with crude and irregular notching on one side. Some fine blades and bladelets are known, but overall their numerical significance is negligible. The most common elements in these assemblages are asymetrical flint flakes and blades which are large and thick, and are generally produced from fairly resistant raw materials. From a functional point of view, all these factors suggest that Bronze Age flint assemblages were mainly composed of: (1) durable tools intended for heavy-duty tasks, and (2) expedient tools designed for general purpose use.

In addition, Argaric communities consistently used poor quality raw materials other than flint for the production of tools - such as quartz, quartzite, rhyolite and limestone (Cuadrado Díaz 1945-1946; Val Caturla 1945). These materials were used in much the same way as flint, with an emphasis on simple methods of manufacture and minimal retouching.

Throughout south-east Spain lithic industries are dominated by large tools associated with food processing activities - especially querns and rubbers (Lull 1983; Carriazo 1963). These objects, together with pestles, hammers, and mortars, are found in a wide variety of shapes, sizes and raw materials. Although petrological analyses are lacking, the majority of these objects appear to have been produced using lithic materials which were available locally.

Ground and polished stone axes continue to be found on Bronze Age sites in domestic contexts, but in smaller quantities than in the Copper Age. The frequency of stone axes in Bronze Age tombs is lower still, and represents a sharp contrast with earlier periods when large numbers of these objects were found in funerary contexts. The decline in axe production may be related, in part, to improvements in metal technology.

Stone moulds for casting axes, awls and other objects have been found at several Bronze Age sites in the south-east (Siret and Siret 1887; Martínez Santa Olalla et. al. 1947: 76), but they are not very common. Some are simple open moulds, while others are more complex - like the three piece mould from Cuesta del Negro, designed to cast 2 axes simultaneously (Molina González and Pareja López 1975: Figures 48-51).

Stone 'idols' or 'throat-stones' are known in Argaric contexts but, like moulds, are fairly rare. These objects resemble the baetyl idols associated with Millaran passage graves, but their significance - either for ritual or any other purpose - remains obscure. Whetstones, on the other hand, are found on many Bronze Age sites in the south-east. Most are perforated at both ends in a manner similar to the wristguards of the Beaker period. Indeed, since wristguards are known in Argaric assemblages, it is only the large size of some whetstones which distinguishes them. Overall, whetstones are relatively common and are found almost exclusively in domestic contexts, while wristguards are relatively rare, and are largely restricted to burials (Siret and Siret 1887; Blance 1971). Stone objects such as beads, pendants and other personal ornaments continue to be important in the Bronze Age, and are generally confined to burials. However, aside from necklace beads, the total quantity of stone ornaments found in Bronze Age burials is very small (Chapter 5).

Bone and Shell Industries

Neither of these industries are particularly important or well developed during the Bronze Age, and in many respects this pattern coincides with the later stages of the Copper Age when bone and shell were employed largely for ornamental purposes. Apart from a few miscellaneous bone items like the arrowhead from El Picacho (Hernández Hernández and Dug Godoy 1975: 30-31, Fig.12) and the dagger pommel from El Oficio (Siret and Siret 1887: Plate 62) bone objects from Bronze Age settlements and cemeteries in south-east Spain generally fall into two categories: (1) small decorative objects (such as buttons, pendants, tubes and especially beads), and (2) awls and needles.

Bone beads are by far the most common and varied type of ornamental object, and most are associated with burials. One of the more notable forms of bone bead is the segmented variety which is usually linked with Bronze Age burials in the south-east. Although awls and needles are relatively common, they are almost always crude and often merely consist of sharpened bone splinters. In other cases they have an articulation on one end which served as a handle.

Shell production is generally less abundant and is almost exclusively devoted to adornment. These items include beads, tubes, pendants, and some unperforated marine shells; they are found in both tombs and habitation areas, but in quantities which are considerably lower than in the preceding period.

Metallurgy

As Savory (1968: 213) has noted, the onset of the Early Bronze Age was not associated with any immediate or sweeping changes in metal technology. Yet, as Ayala Juan (1979-1980) and Harrison (1974) have emphasized, successive technological developments helped to promote the rapid evolution of metallurgy during the Argaric. These developments eventually led to a very different form of metal production, which can be distinguished from Copper metallurgy on the basis of several major features.

While there are definite concentrations of metal objects during the Bronze Age - for example at El Argar (Siret and Siret 1887) - the distribution of these items is far more extensive than in the Copper Age. Argaric communities also place considerably greater emphasis on tin ores (both cassiterite and stannite) for the production of bronze, although arsenical copper still predominates. In addition, silver metallurgy appears for the first time in the Argaric. Finally, the range of artefacts in Early-Middle-Bronze Age contexts increases substantially, resulting in a wider variety of personal ornaments, domestic tools, and weapons. These objects include razors, saws, awls/pins, halberds, swords, axes, diadems, finger rings, beads, bracelets, earrings, pendants, knives, daggers, arrowheads, and spiral armbands.

It is clear that the volume and diversity of metal production increased sharply during the Bronze Age. The scale of these industries however, should not be overemphasized. As Chapman (1984) has noted, the quantities of metal from Bronze Age sites in south-east Spain are small and are consistent with the pattern of small scale production over much of the Mediterranean and temperate Europe during this time (cf. Coles and Harding 1979).

Whilst some objects such as saws, chisels and awls are commonly found in settlement contexts, the vast majority of metal objects from Argaric sites are derived from cemeteries. Indeed, the focus of Argaric metallurgy was towards the manufacture of weapons and personal ornaments rather than domestic, utilitarian items. As Arribas (1968: 49) has stated:

> "We know of no agricultural tools made of metal from the Bronze Age."

Argaric metallurgy is dominated by the use of arsenical copper, rather than tin bronze. The low frequency of tin bronzes is largely due to the scarcity of tin ores in south-east Spain and in the Peninsula generally (Allan 1972; Almagro Gorbea M. 1979; Blance 1971). Harrison (1974: 79) has suggested that tin is available in precisely the area where the Argaric develops, occuring in small isolated pockets. Furthermore, he suggests that the 'erratic' quantities of tin in Argaric metalwork were due to chance discoveries of tin ore deposits which provided this material at some times but not others (Cartagena, on the coast of Murcia, is the only major source of tin in the area - Schulten 1963). The exploitation of tin ores in the Bronze Age appears, however, to have beensporadic and relatively small scale, since an analysis of some 2000 metal objects from Argaric sites revealed that 2/3 were composed of copper and 1/3 were bronze (Siret and Siret 1887).

Argaric communities also produced a range of objects in silver and gold. Silver metallurgy was generally restricted to the manufacture of personal ornaments (e.g. earrings, pendants, finger rings, bracelets, diadems and the overwhelming majority of these objects are associated with cemeteries. Although they are less common, gold objects were also designed for ornamental use, and are similarly restricted to burial contexts (Chapter 5).

Aside from metal objects themselves, there is a range of evidence relating to mining and metallurgy in the Bronze Age, including:

(a) extraction and processing tools (chisels, maces, hammers, crucibles and moulds)

(b) by-products (wasters, slag)

(c) facilities (reduction kilns or smelting areas)

(d) raw materials (carbonates of copper, etc.)

Savory (1968) has suggested that the large number of 'waisted' hammers from El Argar were associated with copper mining, and similar claims have been made for these tools at other sites (e.g. Martínez Santa Olalla et. al. 1947). More direct evidence comes from the casting waste and slag found on a number of south-eastern sites (Siret and Siret 1887;

Martínez Santa Olalla et. al. 1947; Lull 1983); crucibles are also known, though not in large numbers (Ayala Juan 1979-1980; Siret and Siret 1887; Lull 1983). Although evidence of ore reduction processes is very incomplete, some smelting areas have been documented - e.g. at La Bastida (Totana, Murcia) - (Martínez Santa Olalla et. al. 1947: 53, 80). Raw material in the form of unrefined ore is also relatively rare.

Our knowledge of mining activities during the Argaric is very poor - largely because the ongoing exploitation of mineral deposits in south-east Spain has destroyed much of the evidence of earlier workings (Allan 1972). Ayala Juan (1979-1980) suggests that the methods of mining used during this period consisted of simply exploiting surface exposures and seams - a strategy which also appears to have been employed in the Huelva region (Rothenberg and Blanco Freijeiro 1982).

Given what we know at present about the distribution of ore bodies, the distances between Argaric sites and their nearest metal sources varied considerably (Gilman and Thornes 1984; García Sánchez 1963; Lull 1983). Furthermore, there is no direct relationship between the quantity of metal at a given site and its proximity to an ore source. A classic example of this situation is El Argar, which despite its lack of local sources, has one of the largest concentrations of Bronze Age metal artefacts in the Iberian Peninsula. Conversely, there are other sites such as Cabezo Negro in southern Murcia (Ayala Juan 1979-1980) which are immediately adjacent to metal sources, but do not display any particularly unusual emphasis on mining or metallurgy.

The innovations and developments which characterize Bronze Age metallurgy in south-east Spain appear to have been stimulated more by the rapid growth of social hierarchies, than by a desire to increase the efficiency of existing technologies or economic strategies. Several facts point to the importance of metal as a prestige symbol, rather than for utilitarian tasks:

(a) the small quantities of objects produced

(b) the concentration of metal artefacts in tombs

(c) the clearly ornamental function of many objects (diadems, rings, bracelets, etc.)

(d) the close association of metal objects (particularly larger ones such as swords, halberds and daggers) with other exotic items such as ivory, boar's teeth, and chalices.

CERAMICS

One outstanding feature of Argaric communities in south-east Spain is their distinctive ceramic assemblages (Siret and Siret 1887; Blance 1971; Schubart 1975; Cuadrado Díaz 1950; Lull 1982, 1983). Typically, these assemblages contain a large proportion of carinated vessels which vary in size, form and quality; marked carinations occur in the upper, lower and central parts of the profile. Globular, cylindrical and ovoid vessels are also common, along with a range of simple bowls. The former are often crudely manufactured and of considerable size - suggesting that they may have been used for bulk storage. Finally, there are chalices or 'copas' made of very fine clay and highly burnished.

Another general feature of Argaric pottery is the absence of decoration. There are however, some signs of surface treatment - generally on the exterior. While most vessels have been smoothed, some are highly burnished, creating a type of glossy 'film' on the surface of the vessel. Chalices have a particularly high quality burnish of this type on both interior and exterior surfaces. Ayala Juan (1979-1980) suggests that the primary function of burnishing was to make vessels more impermeable, but no doubt some prestige value could also have been attached to this process.

As in the preceding period, Argaric pottery was made entirely by hand, with no evidence of wheel-turned forms. Early and Middle Bronze Age pottery from the south-east is generally of good quality. In most cases, the vessels have a fine temper and have been well fired. Other vessels, which are less carefully prepared and normally have larger and coarser tempering material, tend to be of considerable size.

Although funerary pottery has been the subject of intense interest since the Siret investigations in the late 19th century (Siret and Siret 1887; Bosch Gimpera 1954; Carriazo 1963; Blance 1971; Lull 1982, 1983, 1984; Schubart 1975), our knowledge of domestic assemblages has lagged very much behind.

As a result, it is difficult to make any detailed comparisons between the ceramic inventories from settlements and cemeteries. It is clear, however, that many of the vessels used as funerary urns or offered as grave goods are also found in settlement contexts (e.g. a variety of carinated forms, chalices, bowls, etc.) In the case of urns, there have been suggestions that these large earthenware vessels were originally used for storage purposes, and later reused for interments (Cuadrado

Díaz 1950). In addition, Schubart and Arteaga (1983: 59) have noted that within the Argaric core area (i.e. north-east Almería and southern Murcia) there is little to differentiate the pottery from settlements and cemeteries, whereas in more perhipheral, neighbouring areas (e.g. Granada) there is a pronounced contrast between domestic and funerary wares.

In general terms at least, there are several fundamental differences between Argaric ceramic assemblages and those of the preceding period. The main differences, which relate to manufacturing methods and to the variability in vessel forms, are summarized below:

(a) Uniformity of Manufacturing

Argaric pottery displays a high degree of consistency with respect to colour, firing, tempering materials, fabric strength, and surface treatment. Even the very large storage vessels and funerary urns which appear in the Argaric achieve a level of quality and consistency which surpasses many smaller Copper Age forms. The technique of constructing large, coarse vessels in esparto and other types of 'moulds' (commonly practised by Copper Age communities), generally disappears in the Bronze Age.

(b) Uniformity of Style

The range of vessel forms produced during the Early and Middle Bronze Age is more standardized than in the Copper Age. Many Copper Age forms disappear entirely in the Bronze Age (e.g. the wide range of globular 'necked' vessels, dishes, bevel-rimmed bowls, etc.). Furthermore, decoration such as painting, incision, and impression disappears almost entirely. Features such as lugs and handles become less frequent, and conform to a more stylized pattern.

The overall impression therefore, is that, as a whole Bronze Age assemblages do represent a considerable departure from Copper Age traditions.[15] Aside from ceramic vessels, a number of other clay objects have been found on Argaric sites. One of the most common of these are 'loom weights' which are present throughout the south-east (Siret and Siret

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15. Nevertheless, there are marked regional variations in the development of Bronze Age ceramic assemblages. For example, while differences between Copper and Bronze Age pottery are minimal in many parts of Granada (Schüle and Pellicer Catalán 1966; Lull 1983; Arribas 1976), the contrasts appear to be significantly more pronounced in the core area of the Argaric (Schubart and Arteaga 1983).

1887; Arribas et. al. 1974; Santa Olalla et. al. 1947; Lull 1983) and are made of crudely prepared daub, fired at low temperatures. Cuadrado Díaz (1950: 112) noted that at El Argar some 500 of these were found around a carbonized tree trunk, while another 100 were arranged in 2 concentric circles around a vessel filled with vegetable carbon. Other examples were arranged in a similar manner near a hearth at La Almoloya in Murcia (Cuadrado Díaz 1945-1946). Ceramic spindle whorls, spoons and ladles are known from a number of Argaric sites but in substantially smaller quantities than 'loom weights' (Cuadrado Díaz 1950: 119). There are also a few examples of ceramic figurines such as the clay bulls from El Argar (Cuadrado Díaz 1950: 101) and the possible Argaric equid figurine from Los Caspares - both in Almería.

Subsistence

As a result of research undertaken in south-east Spain during the last two decades, our knowledge of Argaric subsistence economies is restricted to one area (Granada and western Almería) and to one type of enquiry (faunal analyses).

Most of our information about crop cultivation during the Early and Middle Bronze Age comes from work by the Sirets in the last century (Siret and Siret 1887). This small body of data has been added to subsequently by a number of other isolated finds and analyses (Appendix 3:30). In general, this evidence suggests that wheat and barley were the major cereal crops, supplemented by a range of legumes, and in a few isolated cases, by acorns, olives and carob. The presence of a carob pod and olive stones from El Argar has led to the suggestion that Argaric communities may have engaged in some form of polyculture or tree crop cultivation (Gilman 1976; Gilman and Thornes 1984: 25, 33). It remains to be seen, however, whether such evidence points to the cultivation of tree crops or simply the exploitation of wild resources; in any case, it is not clear how significant olive or carob were in the Argaric - irrespective of their morphological status.

Evidence of flax cultivation has been found on several Bronze Age sites in the south-east, particularly in the lowland zone (see Appendix 3:30). As various investigators have pointed out (Chapman 1978: 28; Gilman and Thornes 1984: 34) the presence of flax in areas with an annual rainfall total of less than 250 mm is especially important since this crop requires at least 450 mm/year before it can be grown without artificial watering. The implication is, therefore, that flax could only have been cultivated in the semi-arid zone with the aid of irrigation or water control techniques.

Aside from the crops themselves, there are several indirect sources of information about plant processing and storage. First, there are a range of thick, denticulated flint blades which were used for harvesting cereals, judging by the heavy wear and 'sickle gloss' found on many of them. The abundance and wide variety of rubbers, querns, mortars and pestles also underlines the importance of cereal cultivation during the Argaric. At Ifre, Siret and Siret (1887) noted the existence of a possible bread oven associated with a number of querns - some of which were set into banks of adobe along one wall.

Storage of plant remains is also apparent at a number of sites: wheat and acorns at Cerro de las Viñas (Ayala Juan 1980: 163-164); wheat at Zapata (Siret and Siret 1887) and Cerro de las Peñalosa (Lull 1984: 1202); wheat and barley at both Lugarico Viejo and Fuente Vermeja (Siret and Siret 1887). At Cabezo del Negro in southern Murcia, Aubet et. al. (1979: 200) found a circular, stone built storage facility containing a large amount of carbonized grain. Nearby was a ceramic vessel also used for storage.

One labour intensive cropping strategy which was widely employed during the Bronze Age was irrigation or water control. A number of Bronze Age sites in the south-east have produced evidence of facilities such as cisterns (Chapman 1978), while others have wells which may be associated with Argaric occupations (e.g. at Fuente Álamo - Schubart and Arteaga (1983) and La Bastida). Botanical evidence such as the flax from Zapata (see above), reinforces the idea that crops in some areas were cultivated with the help of artificial watering. In addition, site catchment work by Gilman and Thornes (1984: 184-185) at various Bronze Age sites in the south-east suggests that:

> "The Argaric Culture of the 2nd millennium BC presents clear social and economic contrasts to its predecessor, the Los Millares Culture. In both uplands and coastal sectors of the south-east, sites tend to be oriented towards irrigable land. In both sectors too, sites tend to be placed in defensive positions at some cost of easy access to arable land...... In any event it is clear that the importance of irrigation throughout south-east Spain formed a pattern of agricultural intensification which also includes the use of cattle and horses for their traction power and possibly arboriculture as well."
>
> (Gilman and Thornes 1984: 184-185)

Investigations at sites in Granada have provided the most detailed evidence to date about Bronze Age animal economies in the south-east (Appendices 3:34, 3:36; 3:38). Despite the lack of systematic sampling, these different analyses reveal several consistent, general patterns:

(a) The heavy emphasis on domesticated animals and the relatively minor importance of wild fauna

(b) The economic priority given to ovicaprines and cattle

(c) The supplementary role of pig, horse and rabbit (in order of importance)

Aside from the quantitative information they provide, faunal investigations in Granada supply valuable evidence about the ways in which various animals were used. Most of the sheep, goat and pig from these sites, for example, were slaughtered when young, and hence appear to have been reared exclusively for their meat. A smaller percentage of ovicaprines were kept beyond the age of two years for milk and wool production - some 25% at Cerro de la Virgen (Driesch 1972) and 35% at Cerro de la Encina (Driesch, in Arribas _et_. _al_. 1974). In contrast, information about horse and cattle indicates that a large proportion of these animals were maintained for far longer periods than would have been appropriate had they been raised solely for their meat. For example, age distribution data for horses from Cerro de la Encina (Appendix 3:31) indicates that the vast majority of individuals were adults (i.e. more than 2 years old). Cattle remains from Argaric levels at Cerro de la Virgen and Cuesta del Negro (Lauk 1976: 31), display a similar pattern. As Gilman and Thornes (1984: 28) have noted:

> "If animals were being kept for their meat it would be most rational to cull the herd of all except breeding stock before the animals became adults".

The importance of cattle and horse in Argaric economies, together with the age distribution data discussed above, has prompted the suggestion that these animals were used for a variety of purposes other than simply their meat. (Lull (1984: 1205), for example, has suggested that horses were used for transportation and as pack animals during the Argaric. As Harrison (1980:154) points out, however, pictorial and artefactual evidence does not support either of these propositions. Other arguments have emphasized the importance of horse and cattle, 'not only for their meat but also their traction power'- Gilman and Thornes (1984: 25); also Driesch (1972); Lull (1984). The argument that animals were used for traction ploughing is based on the increased quantities of cattle and horse in Argaric faunal assemblages, and the large proportion of adult individuals. At the moment, there is no anatomical evidence to suggest that either horse or cattle were used in this way (e.g. widening of hoofs, fusion of vertebrae, severe arthritis). Although some older cattle in Argaric assemblages may have been kept for dairy products, there do appear to be good reasons for supposing that both horse and cattle were used in the Bronze Age for traction ploughing. First there is widespread evidence in Europe linking the increased importance of horse and cattle with the introduction of plough agriculture (Sherratt 1981). Secondly, unlike cattle, it would have been uneconomical to maintain a large adult horse population if they had not been exploited as beasts-of-burden. Finally, the presence of both horse and cattle in the more arid parts of the south-east - where pasture is both scarce and seasonal - suggests that they were used in capital intensive agriculture.

In more general terms, Gilman and Thornes (1984: 25) have stated that:

> "... the main trends in animal husbandry from Neolithic to Bronze Age as indicated by the overall proportion of species reflect an increasing emphasis over time on larger animals".

Broadly speaking, the proportion of cattle and horse increase during the Argaric, while the importance of ovicaprines and pig decline.[16.]

Remains of fish and objects interpreted as fishing equipment have been found on several Argaric sites (Siret and Siret 1887). Many of these objects are either ornamental (e.g. vertebrae used as necklace beads) or have a possible connection with fishing activities (e.g. 'weights'). On the basis of present evidence, however, fishing does not appear to have made a systematic or substantial contribution to Argaric subsistence strategies - bearing in mind that rigorous methods of recovery have not been employed in the excavation of these sites.

Although hunting was not insignificant during this period, there is a marked decline in the importance of wild fauna with respect to the preceding Copper Age (Appendices 3:35, 3:37, 3:39). Rabbit is of para-

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16. The change in emphasis towards larger animals is, however, exaggerated by the bone weight figures which Gilman and Thornes (1984) use as the basis for their evaluation. Bone weights are not a particularly accurate measure of 'economic importance' since animals with larger and heavier bones will be systematically over-represented in any inter-species comparisons; e.g. contrast the high values for cattle and horse based on bone weights with the markedly lower values based on minimum number of individuals and number of fragments - Appendix 3:32.

mount importance among the wild species, followed by a smaller proportion of red deer, and finally by a variety of other species whose overall significance is negligible (lynx, boar, and ibex).

Exchange

The precise nature of exchange relationships in the Argaric is difficult to assess in detail because of the absence of appropriate analyses. It is clear, however, that the exchange of prestige items was taking place throughout the south-east - and in some cases over considerable distances. Lull (1984: 1209), for example, has stated that:

> "The circulation of copper objects is suggested by the appearance of Argaric metal objects in settlements far from ore sources."

One possible example of this process comes from the site of Cerro del Culantrillo near Gorafe in eastern Granada. Here, García Sánchez (1963: 87, 89) has pointed to the contrast between the various metal objects from the site and the lack of moulds, crucibles and slag. The nearest copper sources apparently lie some 20 - 30 kms away in the Sierra de Baza and Marquesado regions. García Sánchez goes on to suggest that while the normal ratio of copper to bronze objects on Argaric sites is 2:1, analyses of the material from Cerro del Culantrillo revealed that this ratio was reversed - with bronze being more abundant than copper. The presence of such a large proportion of tin-bronze objects suggests that they may have been imported from Almería or Murcia, where tin was more abundant or accessible.

Prestige exchange is also suggested by the presence of ivory objects at El Argar (Siret and Siret 1887), La Bastida (Santa Olalla et. al. 1947), and other Argaric sites. The famous 'faience' beads from Tomb 9 at Fuente Álamo (Siret and Siret 1887) may also constitute evidence for such exchanges.

Settlement

Ever since the Sirets' early work in south-east Spain it has been clear that there are marked differences between Copper and Bronze Age settlement systems. These differences exist at a various scales - both micro (e.g. the internal characteristics of settlements) and macro (intra- and inter-regional patterns). Some of the most important features of Bronze Age settlement are:

(a) the consistent use of rectangular or trapezoidal structures (as opposed to the circular or ovoid ones common in the Copper Age)

(b) generally smaller habitation areas than in the Copper Age (this may simply reflect more spatially concentrated settlement with densely occupied living areas)

(c) the defensive position of most settlements and the frequent addition of man-made defences

(d) the location of sites in a variety of geographic and environmental zones (some of which have little or no traces of earlier occupation)

(e) occupation near springs, ramblas, or rivers, and near land suitable for gravity-fed irrigation

(f) the greater density of sites per unit area than in the Copper Age

The materials and techniques used to construct Bronze Age habitations in south-east Spain can be divided into 2 general types, following Lull (1984: 1217). The first, characteristic of Almería and southern Murcia, consists of structures with stone foundations composed of irregular stones and blocks, and walls with wooden posts covered in adobe. The second type of construction, found in large areas of Granada, consists of walls of wattle and daub, but lacks any stone footing. Roofs appear to have been covered by branches or sticks tied with cord and sometimes interlaced with wooden beams.

In general, Argaric dwellings are tightly packed and are often arranged in rows so that most structures share a wall with an adjoining dwelling (e.g. Siret and Siret 1887: Plate XV). Many of these dwellings have been built on artificial terraces cut into the steeply sloping hillsides on which the settlement rests (Lull 1983; Martínez Santa Olalla _et_. _al_. 1947; García Sandoval 1964).

In all but a few cases - such as Cerro de la Virgen - Argaric settlements were established at locations where there was no previous Copper Age (or earlier) occupation. However, this fact should not obscure the close spatial relationship which exists between Copper and Bronze Age settlements in a number of areas. El Argar and La Gerundia, for example, dating to the Bronze Age and Copper Age respectively, lie less than 25 m from one another. Similarly, the Argaric settlement of La Bastida is located less than 0.5 km from the earlier Copper Age settlement of Juan Climaco. The spatial relationship between 2nd and 3rd millennium sites, however, varies considerably between regions, and between environmental zones.

The low density of Argaric sites in southern Almería, for example, contrasts markedly with the expansion of settlement in areas such as southern Murcia and north-east Almería. Indeed, the abandonment of important Copper Age centres such as Los Millares and El Barranquete (both in southern Almería) marks an important regional shift in settlement, and political dominance, during the Bronze Age. In the Argaric there are also important shifts in settlement to different environmental zones within the same region. For example, in southern Almería and the Guadalentín Basin in Murcia, many Copper Age riverine sites are not reoccupied in the Bronze Age. In both of these areas, however, Bronze Age sites are found in hillzone areas nearby, where Copper Age settlement was less extensive or absent.

Although the greatest density of Argaric sites is in foothill regions, where broken terrain offered good opportunities for defence, there are a number of low lying sites in the Campo de Lorca which apparently lack any natural or artificial defences (Ayala Juan 1977-1978; 1979, 1979-1980; García del Toro and Ayala Juan 1978). While the unusual character of these settlements has yet to be explained, Ayala Juan (1980) suggests that these lowland sites may have been linked to neighbouring upland settlements by a series of alliances or exchanges, or by a formal 'federation'.

Mortuary Practices

One of the most dramatic changes in south-east Spain during the Argaric was the shift from communal to individualized burial. This shift is marked in many areas by the abandonment of megalithic, and other forms of, collective burial, and the emergence of funerary rituals based on the display of individual wealth and status. Millaran burial practices and much of the ritual paraphernalia that accompanied them disappear throughout the south-eastern lowlands during the Bronze Age. Elsewhere, 3rd millennium traditions of communal burial are replaced in a more gradual way. Argaric burial traditions represent fundamental changes, not only in terms of new types of funerary architecture (pithoi, cists, etc.) and grave goods (silver ornaments, bronze halberds and swords, chalices), but also with respect to the treatment and arrangement of cadavers, the location of tombs, and so on (Appendix 3:40).

Although single burials are by far the most common form of Argaric interment there are also a significant number of tombs containing two individuals, and a smaller proportion containing three or four. Double burials with 2 adults have, in all cases where a sex determination has been possible,proved to be male and female, and never individuals of the same sex (e.g. El Almoloya Tomb 1 - Cuadrado Díaz 1945-1946). Other double burials contain one adult together with a child (e.g. Cerro de la Encina Tomb 1 - Torre Peña and Saéz Pérez 1975). On the other hand, triple burials - which are fairly rare - can contain all adults (e.g. La Bastida Tomb 80 - Santa Olalla et. al. 1947), all children (Ruiz Argiles 1948: 132-133) or a mixture of adults and children (e.g.Cuesta del Negro Tomb 2 - Molina González and Pareja López 1975).

Argaric tombs fall into 2 main categories: cists and urns (or pithoi). Ceramic urns/pithoi are more common than cists on most Argaric sites and exhibit a greater degree of variability in form and size. While the vast majority of Argaric burials are either in cists or urns,[17] there are a number of other forms of interment in use during this period, particularly in the more humid uplands (Chapter 5). In comparison with cists and urns, however, the frequency of these miscellaneous tomb types is very low.

One particularly important feature of Argaric mortuary ritual is the pronounced variations between different regions. Early and Middle Bronze Age cemeteries in the more arid regions exhibit a consistently greater concentration of prestige objects (e.g. ivory, silver, gold, amber, tin-bronze) than more humid regions nearby (Mathers 1984b; Gilman and Thornes 1984). Variations in grave goods within cemeteries are also considerably more pronounced in the semi-arid regions.

Another interesting aspect of these regional differences is the continuation of some Copper burial traditions into the Bronze Age - especially in the upland zone. In Granada, particularly, there are a number of examples of megalithic tombs which continue to be used in the Argaric (Leisner and Leisner 1943), and in some cases show signs of reuse in the Late Bronze Age (Ferrer Palma 1978) and Iron Age (Leisner and Leisner 1943). There is also a considerable degree of continuity between Copper and Bronze Age funerary assemblages in Granada. As Carrasco Rus (1979: 267) suggests, although there is a radical change in tomb forms and grave goods in Granada during the Bronze Age, this change occurs in the middle of the Argaric rather than at the beginning. In the semi-arid zone,

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17. More than 85% in the province of Murcia (Ayala Juan 1979-1980: Lam. III).

secondary burials in megalithic tombs also appear in areas such as the Andarax Basin (e.g. Los Millares - Almagro and Arribas 1963) and the Campo de Níjar (e.g. El Barranquete - Almagro Gorbea M.J. 1973). Finally, the survival of Copper Age burial practices is apparent, too, in northern areas such as Valencia, where collective tombs continue into the Bronze Age (Aparicio Pérez 1976).

Three major developments suggest that control over the production and exchange of prestige goods increased significantly during the Argaric:

(a) The regular, and almost monotonous, forms of grave goods (carinated pottery, daggers and axes, chalices, etc.) which are found in much of the south-east

(b) The almost total elimination of more common types of raw materials - such as stone, bone, shell and flint - from grave assemblages (except very small items like necklace beads)

(c) The extreme variations in tomb inventories

The rationalization of prestige competition in this way is one of the most dramatic signs of societal reorganization and change in the Early Bronze Age.

The development or evolution of individualized burials is difficult to evaluate in a detailed manner because of the general lack of chronological data for different burial types. Nevertheless, as some investigators have pointed out, the internal division or segmentation of passage graves appears to mark the gradual emergence of more individualized burial practices (Chapman 1981; Mathers 1984b).

Social Organization

The evidence presented above suggests that by the early 2nd millennium b.c., communities in many parts of south-east Spain had developed a hierarchical system of social and political organization which differed significantly from the preceding period. The concentration of high status ornaments in a relatively small percentage of Argaric tombs indicates that the access to, and the production of, various ornaments (e.g. in silver, gold, ivory, silver, and copper) was subjected to a number of social constraints. Similar constraints also appear to have been placed on the production and display of large copper and bronze weapons - such as daggers, swords, halberds and axes (which appear infrequently and have a restricted distribution within individual cemeteries and regions).

In comparison with the Copper Age, Argaric funerary practices display far less variability with respect to artefact forms, raw materials and decoration. The greater degree of standardization in Argaric mortuary ritual and prestige competition suggests that these activities were more carefully controlled and regulated than in the previous period. In addition, there are other major features which help to distinguish Argaric mortuary rituals from earlier collective ones:

(a) less investment in tomb architecture and more on tomb contents

(b) greater emphasis on personal ornamentation

(c) use of increasingly concentrated, and portable, prestige items

Recently, Lull (1983) has proposed a three stage evolutionary scheme for Argaric social development based on cemetery evidence. These stages are briefly summarized below:

(a) Early Argaric - no differences of any type between interments except for age and sex

(b) Middle Argaric - appearance of qualitative differences in grave goods of individuals of the same sex, while infant graves continue to lack grave goods

(c) Final Argaric - still greater differentiation between individuals, with a large proportion of the population without grave goods of any type, and the appearance of some burials of children with rich grave inventories

Particularly significant is the fact that rich infant burials only occur in the terminal stages of the Argaric. As Lull (1983: 457) has noted, this phenomenon suggests an increasingly greater degree of ranking and the development of more ascribed status.

The organizational restructuring which took place in the Early Bronze Age also involved changes on a regional scale. The emphasis of this social order on the individual accumulation and display of wealth helped to intensify the volume and frequency of regional 'interaction' or exchange . In addition, the appearance of portable, concentrated wealth (e.g. metal objects) did much to increase the traffic of exotic materials being exchanged between different communities. The portable nature of Argaric prestige items may also have contributed to the defensive character of some settlements - in as much as defences helped to protect the valuable resources and investments of a community.

At the present time, there are no clear signs of status differentiation within sites, except in burial contexts. Domestic dwellings appear to be generally of the same size and type of construction within individual settlements, suggesting that habitation structures do not provide a very sensitive measure of social ranking. Spatial variations in material have yet to be studied in detail.

CHAPTER IV

REGIONAL SURVEY IN THE GUADALENTÍN BASIN (MURCIA): A CASE STUDY

IV. a. Introduction

For almost a century the primary source of information about later prehistoric settlement in south-east Spain has been the data collected by Henri and Louis Siret in the mid-late nineteenth century (Siret and Siret 1887; Siret 1893). These investigations, which extended over several provinces and included nearly 100 major sites, constituted the first overview of prehistoric settlement in the south-east and one of the very few generalized programmes of research ever carried out in the region.

Much of the research which followed in the wake of the Sirets' fieldwork addressed either very specific problems (such as the cultural sequence at individual sites and the typological development of specific artefacts) or more general, theoretical issues (like cultural origins, population movements, trade, etc.). Cemeteries and mortuary practices soon became the main object of research, rather than settlements. Until recently, archaeological investigations in south-east Spain were often structured along these lines, and tended to examine existing evidence rather than amass large amounts of new data.

Over the past 25 years on the other hand, the quality and quantity of data has increased considerably. Yet these modern investigations have, like earlier work, focused on single, isolated sites rather than the more extensive settlement systems of which they form a part. The lack of any systematic regional investigations has made it difficult to draw any general conclusions from these localized excavations. Although there is a considerable amount of settlement evidence from sources other than excavations, nearly all of this information has been the result of unsystematic methods of data collection, ranging from chance finds and treasure hunting, to intuitive 'prospección'. This pool of evidence, though substantial, is unsuitable for any detailed comparative analyses. However, all too often, data of this type has been used to reinforce normative ideas about prehistoric settlement, rather than test them.

Overall, the collective strength of (1) detailed evidence from excavations and (2) miscellaneous, general information from other sources, still does not provide an adequate basis for developing detailed models of later prehistoric settlement in the south-east. Throughout the whole of this region there is still a lack of very basic information about:

(a) the full range of sites within a given area (of which settlements are only one type)

(b) the location of sites with respect to different kinds of resources

(c) the spatial variation of sites with regard to size, density and function

(d) the major geographic and functional changes in settlement through time

Therefore, perhaps the most outstanding problem in trying to evaluate later prehistoric settlement systems in this area is the absence of information at the intermediate stage between small, localized groups of sites (where information has been detailed, but has lacked a wider context) and very large regions (where evidence has been more abundant, but less complete and dependable). The case study presented here is a preliminary step towards filling that gap with systematic regional data.

This chapter begins by providing some background information about the survey area- starting with a description of the physical environment, and followed by a brief summary of previous archaeological work in the region. The second section is devoted to the methodology used in the survey and to the presentation of the results. The final section offers an overall interpretation of the findings from the survey, as well as a number of general conclusions.

IV. b. Physical Environment

Like many other provinces bordering on the Mediterranean coast of Spain, Murcia can be divided into 2 major environmental zones: the humid uplands of the interior, and the more arid coastal lowlands. This dichotomy reflects not only contrasts in temperature, rainfall, and topography, but also significant differences in vegetation and ecological diversity (see Chapter II). Various physical and ecological characteristics of the Murcia region have been outlined below in order to place this case study in its regional setting.

The different types of relief found in the province of Murcia can be divided into 3 main categories: the mountainous terrain of the Cordillera Bética, the interior lowlands of the Guadalentín and Segura Basins, and the Mediterranean coastal plain. The first of these areas, also known as the Andalucian mountain system, dominates much of the province in a broad band which runs south-west to north-east in a broken series of ranges. Within the Cordillera Bética there are a number of high altitude zones which have a set of climatic and ecological characteristics that distinguish them from the rest of Murcia. These areas include the Western Highlands - located on the border with Jaén and Granada (2001 m), and the Sierra de Espuña (1579 m) - which lies in the south-central part of the province astride the Pre-littoral Depression or Guadalentín Basin (Figure 4.1). On average, these two regions have the highest annual rainfall (c. 400-700 mm) and the lowest annual temperatures (14°C) in Murcia (Figures 4.2 and 4.3). The combination of relatively high rainfall and low temperatures in these regions makes it possible to support a fairly dense and varied cover of vegetation. The relatively high humidity and moist conditions which are maintained in these areas also encourages the growth of browse and pasture, and consequently makes them an attractive source of summer grazing. In addition, as Roselló et. al. (1968-1969: 16) have noted, both the Western Highlands and Sierra Espuña contain large reserves of water which reach areas at lower altitudes via the periodic flow of rivers and springs.

Lower lying parts of the Cordillera Bética in Murcia present a different set of ecological and climatic conditions. In the north, on the high plateau of Yecla and Jumilla (500-1000 m), annual temperatures are still relatively cool (Figure 4.3), but vegetation is generally less dense and less varied. Annual rainfall is also markedly lower, ranging between about 300 and 350 mm (Figure 4.2). A similar pattern can be found in the western half of the province between the Guadalentín and Segura Basins, and the Western Highlands. Temperatures and rainfall are slightly higher here than in the north, however, and the vegetation is generally more sporadic. This western, upland sector of the province is also notable for its extensive network of rivers, all of which flow in a north-easterly direction to empty into the Segura Basin. This complex of rivers - including the Benámor, Argos, Mundo, Quipar and Mula - forms the densest fluvial network in the province.

To the east of these upland drainage systems lies a large expanse of dry, elevated terrain sandwiched between the Segura Basin below and the northern plateau above. In this part of the Cordillera Bética, relief is relatively gentle with only a few ranges exceeding 1000 m. Here, annual rainfall and temperatures are similar to the arid climatic regime found near the coast (Figures 4.2 and 4.3). These hot, dry conditions have stimulated a relatively sparse cover of vegetation, dominated by thermophilic and xerophytic species such as esparto, thyme and rosemary.

The remaining areas of the Cordillera Bética in Murcia are formed by the Sierra de Carrascoy and the Pre-littoral ranges of the Campo de Lorca. Both areas lie on the southern side of the Guadalentín Basin and constitute the last series of ranges before reaching the coastal plain to the south-east. Whereas the Sierra de Carrascoy is separated from the Mediterranean by the wide plain of the Campo de Cartagena, the Pre-littoral ranges lie immediately adjacent to the coast, along a narrow strip of lowlands around Mazarrón and Aguilas. Annual temperatures are similar in the two regions, but rainfall is slightly higher in the Carrascoy range (Figures 4.3 and 4.2 respectively). Arid climatic conditions and steppe vegetation are widespread in both areas.

The second major environmental zone in the province is the central lowland region which includes two major drainage basins: the Guadalentín, and the Segura. The Guadalentín drainage, or Pre-littoral Depression, forms part of an extensive intermontane basin which runs roughly parallel through the central part of the Cordillera Bética from Gibraltar to Alicante. In Murcia this depression begins on the border with Almería and runs north-east until ultimately it joins up with the Segura Basin near the capital city of Murcia. On the contrary, the lowlands of the Segura drainage, which constitutes part of the exterior fringe of the Cordillera Bética, begin on the north-western border of the province and run south-east. Both drainage basins have been heavily infilled with Quaternary alluvium and colluvium, and where sufficient water supplies are available, many of these areas have been converted into large irrigated zones or 'huertas' which are densely cultivated (e.g. the Vega de Murcia and Campo de Lorca). Relatively high annual temperatures and low rainfall are characteristic of these regions, and the vegetation is often meagre, except around regular supplies of water. While the Guadalentín drainage system is relatively narrow (c. 14 km. wide), regular in shape, and compact, the Segura is broad, irregular and very extensive. Another important contrast between the two areas is that while there are a large number of major rivers and tributaries which empty into the Segura, the Guadalentín is not fed by any other rivers, and receives significant inputs of water from only a small number of secondary drainages or 'ramblas'.

The third, and final, zone to be considered here is the lowland region of the Mediterranean littoral. This area is made up of a wide coastal plain known as the Campo de Cartagena, and a more restricted lowland area between Mazarrón and the Almerian border. In general, temperatures and vegetation in this region are similar to the Guadalentín and Segura Basins. The prevalence of semi-arid climatic conditions throughout this zone has encouraged the growth of dry, esparto steppe over much of the region. Rainfall in the Campo de Cartagena is variable, with annual averages above 300 mm in some sectors, but below this figure in other areas (Figure 4:2). Meanwhile, the coastal strip between Aguilas and Mazarrón has the lowest annual rainfall in the province, with totals falling below 300 mm. With the exception of the Rambla de Albujón which bisects the Campo de Cartagena, this littoral zone is largely dominated by parched interflueves. In general, ramblas are few in number, have very sporadic flows, and are concentrated in specific areas. One particularly important concentration of ramblas, for example, is found in the coastal lowlands around the Gulf of Mazarrón. Despite the extremely arid conditions here, localized clusters of ramblas - created by the Pre-littoral ranges nearby - help to provide important, albeit seasonal, supplies of water to this area.

Given this general overview of the different environmental zones within Murcia, it is easier to understand why the Guadalentín Basin was chosen for the focus of this case study. First of all, the Guadalentín region is part of one of the most extensive and important structural features in the landscape of south-east Spain - the Intra-Bétic Depression. Furthermore, this basin has been a vital, natural route for transport and communication, both in prehistory and in the historical period, and remains so today. More importantly, the Guadalentín Basin lies at the major transition between humid uplands and more arid lowlands. Within a relatively small area all three of the major environmental zones can be found: mountainous upland, interior lowlands and coastal plain. Finally, the choice of a single drainage basin (like the Guadalentín) as the unit of analysis made it possible to: (a) define the boundaries of the survey area more easily, and (b) to examine cultural developments within a well defined environmental catchment.

IV. c. Archaeological Background to the Survey Area

Some of the earliest archaeological work in south-east Spain was begun in the Guadalentín Basin during the 1860's (Inchaurrandieta 1870, 1875). The focus of this research was the large Bronze Age settlement of La Bastida de Totana, which became the first prehistoric site in Murcia to be excavated and published. These preliminary investigations paved the way for a later and more extensive programme of research in the Guadalentín area carried out by the Sirets.

Besides conducting further work at La Bastida, the Sirets pursued a general campaign of excavations and fieldwork in the central part of the Guadalentín drainage which helped to identify a number of new sites. A sketchy outline of these investigations was eventually published by the Sirets (1887), along with a more detailed account of the research which they had undertaken in the neighbouring coastal zone around Mazarrón. While the Sirets provided only very sparse details about their work in the Guadalentín, the information they collected remained the primary source of settlement data in this region for many years.

Later enquiries in the area by Cuadrado Ruiz (1930,1935,1947) included both excavation and fieldwork. Although Cuadrado's investigations helped to locate new sites, he generally provided even less detailed information about his finding than the Sirets. The one exceptional case was his excavation of the complex of Copper Age cave burials known as Los Blanquizares de Lébor which lies a short distance downstream from La Bastida. The material from these burial caves constitutes the best known and most complete Copper Age burial assemblage in the Guadalentín Basin (Cuadrado Ruiz, 1930; Arribas 1956).

During the 1940's a more systematic and detailed series of excavations was initiated by the Seminario de Historia Primitiva of Almería and Murcia. These excavations were again concentrated in the Totana area, on the banks of the Rambla de Lébor. Two sites were selected for excavation: La Bastida, and El Campico de Lébor - the latter being a Copper Age settlement associated with the nearby cave burials of Los Blanquizares. Several campaigns of fairly large scale, area excavation at La Bastida provided a wealth of information about ceramics, metallurgy, tool production, settlement architecture and burials (Martínez Santa Olalla _et. al_. 1947; Ruiz Argiles 1948; Ruiz Argiles _et. al_. 1954-1955). The quality and quantity of data from these investigations is unique within the Guadalentín Basin, and has yet to be surpassed - even to the present day. Excavations at Campico de Lébor (Val Caturla 1948), on the other hand, were neither as detailed, productive nor sustained, as those at La Bastida. While the wide range of materials from Campico de Lébor provides some basis for comparing local Copper and Bronze Age assemblages, the lack of information about structural features or activities areas within the settlement makes it difficult to pursue this comparison in a more comprehensive way. Aside from these two excavations, some reconnaissance work was undertaken around the Rambla de Lébor in order to locate further traces of prehistoric activity (Martínez Santa Olalla et. al. 1947: 16, Figure B). Although this fieldwork was unsystematic and covered a restricted area, it nevertheless represents one of the few attempts to examine the relationship between prehistoric sites in the Guadalentín Basin.

Rather than continue to develop the tradition of intensive, 'micro-regional' research, pioneered by the Seminario de Historia Primitiva, more recent investigations have focused attention exclusively on individual sites. Excavations at the Argaric settlements of Puntarron Chico (García Sandoval 1962; García Sandoval et. al. 1962), El Rincón (García del Toro and Ayala Juan 1978, García del Toro 1983) and La Ceñuela (Aubet et. al. 1979) have gradually helped to improve our understanding of Bronze Age communities in the region, but the question of how these sites are related to one another and to sites of other periods remains problematic. The need to address these more general problems is particularly important given that individual excavations such as El Rincón, Cobatilla la Vieja and El Castellar are currently underway in the Guadalentín Basin.

The combination of regional survey (represented by this case study) and the programme of excavations now being carried out in this area by the University of Murcia should help to provide two necessary and complementary forms of settlement data:

(a) contextual evidence at a general scale - derived from systematic surveys

(b) specific, detailed evidence from individual sites - obtained by excavation

IV. d. Survey Objectives and Methodology

Although regional surveys have gradually 'diffused' to nearly all parts of the Mediterranean over the last fifteen years, their popularity in Iberia has been minimal. A recent review of Mediterranean surveys, for example, lists only two projects in the whole of the Peninsula (Keller and Rupp 1983: 9, Figure 1). As the Spanish Tourist Bureau proclaimed some time ago, 'Spain is different'. Indeed, the different, and often idiosyncratic, approaches used by prehistorians in Mediterranean Spain have helped to create an archaeological terra incognita in many regions - particularly with respect to settlement evidence.

In south-east Spain many of the major questions about later prehistoric settlement have arisen, not so much because the volume of information is insufficient, but because it is still not clear how representative or reliable our existing data is - either in terms of localized areas or in the region as a whole. As a result, the primary objectives in the Guadalentín survey were to:

(a) collect regional data in a rigorous and controlled manner

(b) examine the full range of prehistoric activities within the survey area (focusing not only on settlements, but also other possible 'off-site', seasonal and non-residential activities such as mining, transhumance, etc.)

(c) systematically define and sample different ecological-topographic zones

(d) compare the range, distribution and number of sites in each of these zones - during specific periods, and more generally through time

With these objectives in mind, the first step was to determine the spatial limits of the survey. In order to sample a wide range of ecological zones, and presumably an equally wide variety of site types, a large area (measuring 30 x 15 km.) was chosen for this investigation. Terrain within the area varies from lowland, riverine areas at c. 100 m above sea level to the peaks of the Sierra Espuña reaching over 1500 m (Appendix 4:4). It was felt that this region was sufficiently large and diverse, that by using systematic sampling, it would be possible to monitor significant regional variations in settlement, rather than simply measuring very localized ones. This large-scale approach seemed to be the most appropriate one, given the preliminary character of these investigations and the lack of regional data throughout the south-east.

Because of the emphasis on investigating a wide area, relatively small quadrats of 500 m square were adopted as the unit of analysis. The small size of these sampling units not only helped to achieve a more uniform distribution across the area, but they also helped to ensure greater accuracy in estimating the density and frequency of sites. A stratified random sample strategy using these 500 m quadrats was chosen largely because it provided: (1) good aerial coverage of specific ecological-topographic zones within the survey area, as well as good coverage overall; (2) the opportunity to examine spatial variations within individual sampling strata; and (3) an excellent chance systematically to compare, and contrast, settlement in different parts of the Guadalentín Basin.

Other sampling methods would either have compromised the general objectives of the survey (e.g. systematic quadrats), or involved a reduction in efficiency (e.g. simple random sampling). Transect sampling, which has proven to be more successful in some tests on real and simulated site distributions (Haggett 1963; Plog 1976; Judge et. al. 1975), was felt to be inappropriate for this study largely because the surface area which would have been sampled in each of the various sampling strata (defined below) could not have been easily controlled. As a result of using transect sampling some topographic-ecological zones would be better represented than others. On the contrary, the use of a quadrat system ensured that the proportion of sampling units in each zone could be carefully regulated by adding such units individually as they were required. Moreover, the a priori knowledge that many sites in south-east Spain are small, occur in localized clusters, and are frequently distributed in a linear fashion (along rivers and ramblas), suggested that transect sampling would not have been a suitable or cost-effective strategy in this context. Finally, in comparison with 500 m wide transects, for example, sampling with 500 m square quadrats involves smaller, and hence more numerous sampling units, and as Plog (1976: 151) has pointed out:

> "... the greater the number of sampling units the greater the precision of the estimate".

Further details concerning the sampling strategy employed in this case study are included later in this section, following an explanation of the various sampling strata. It is worth stressing here, however, that under the circumstances stratified random sampling, using small quadrats, appeared to be the best means of satisfying the survey objectives outlined above.

Definition of Survey Strata

Since one of the principal objectives in this case study was to evaluate prehistoric activity in a variety of ecological zones, it was necessary to find some criteria for dividing the survey area into different regions or 'stratum' for sampling purposes. In other surveys, soils, vegetation, geology, and relief have been amongst the most common variables to be used for this purpose (Mueller 1974, 1975; Cherry et. al. 1978; Cochran 1963; Redman 1974). Irrespective of which variable is selected, there are three essential conditions which must be satisfied before any one of them can be used to define a series of sampling strata:

(a) that the information is sufficiently detailed and widespread to make clear distinctions between any proposed zones (e.g. upland vs. lowland), and between individual sampling units

(b) that the variable or variables selected will not have changed significantly over the period to be investigated

(c) that there is a significant relationship between the variable(s) chosen and the activities of prehistoric/historic communities

Within the Guadalentín Basin only one variable was able to satisfy all of these conditions - physical relief. Other variables were unsuitable either because information about them was inadequate, or because they failed to provide a reliable basis for establishing zones which would be applicable to the prehistoric period. For example, in some areas the combination of modern land use, erosion, flooding and other factors has produced a significant change in the nature and distribution of soil types and plant species.

Using relief as the basis for defining the sampling strata in this survey had several important advantages. First, the detailed information from topographic maps ensured that the first condition (a) above, was fulfilled without any difficulty. By using this topographic data at a sufficiently general scale - in this case 1:50,000 maps, the second condition (b) was also satisfied with reasonable certainty. With regard to the third condition (c), it is clear that topography would have had several important effects on prehistoric activity in the region. In the first place, the major topographic zones within the survey area (mountains, foothills, and lowlands) would have presented a number of distinct ecological niches, each with a different mixture of resources. The resources available in these various zones would, inevitably, have had a significant bearing on prehistoric settlement and exploitation. In addition, the pattern of typographic variation would have had further importance for human communities in the Guadalentín Basin, in terms of defence, communication, exchange and transportation.

Having chosen relief as the cornerstone of the sampling strategy it was necessary to devise a system which would break down the range of topographic relief within the survey area into a series of different categories or strata. It was apparent from topographic maps and air photographs that there were three general types of terrain within the survey area: the mountainous uplands, the intermediate foothills, and the lowlands of the valley floor. It was therefore hoped that this tri-partite division would be reflected in the system of sampling units designed for this area. Indeed, these 3 major types of terrain provided a useful starting point for defining general topographic zones, and hence, sampling strata, within the Guadalentín Basin.

Amongst the variety of techniques for defining different types of terrain it was difficult to find an existing method which was adequate for the needs of this investigation. Although altitude categories are one of the simplest and most popular methods, they can, nevertheless, often disguise considerable variations in the slope and 'ruggedness' of the terrain even in situations where the altitude is constant. In such cases, the comparability of sampling units - both within individual stratum and between them - can be seriously challenged. In order to arrive at a more comprehensive and representative measure of the terrain, and hence create sampling units which were more comparable with one another, it was necessary to consider three main characteristics of the terrain: altitude, slope, and 'ruggedness' (i.e. the relative evenness of the terrain surface).

While measuring altitude did not present any real difficulties, the other two variables presented more serious problems. Although a number of techniques have been devised to estimate slope and ruggedness from topographic maps (Monkhouse and Wilkinson 1973: 129-165), most of these are extremely laborious to calculate and are fairly impractical when investigating large areas. Furthermore, they present considerable analytical problems since most of them are designed to measure maximum, rather than average, values. Because most sampling strategies involve some form of regular, rectilinear sampling units (either the use of quadrats or transects) there are inherent problems in trying to arrive at an average value for slope or ruggedness within such units. In this case study, given that the survey area comprised some 3248 sampling units (of 500 m square each), the technique used to calculate values for these variables had to be - for practical reasons - relatively quick and easy to apply. As the necessity for a simple solution became the mother-of-invention, a decision was made to measure something which

I have termed a 'dissection index'.[1] This index is actually an average measure of the evenness of the terrain and strictly speaking does not measure slope. However, as one can see below, it can give some broad indication of what the slope of the terrain may be like within a 500 m square sampling unit, in the sense that there is often a positive relationship between increasingly greater slope and increasingly uneven or broken relief.

The method used to calculate the 'dissection index' for each sampling unit was as follows:

(a) first, to locate the 500 m square sampling unit on a 1:50,000 topographic map

(b) to count the number of times each contour line made contact with the 4 sides of the 500 m square

(c) to divide the number of contour intercept points (stage b above) by the number of sides (i.e. 4)

The illustrations in Figure 4:1 (A - I) help to show how this method was used to characterize different kinds of terrain.

Figure 4:1 (A - I)

Terrain evaluation using the 'Dissection Index'

Figure 4:1 A.

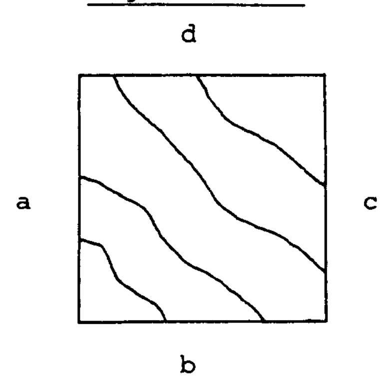

Figure 4:1 A represents a 500 m square with contour intervals of 20 m. The number of contour intercept or contact points between the sides of the square and the contour lines is equal to 2 on each of the 4 sides (a,b,c and d), with a total of 8 overall. The figure of 8 is then divided by the number of sides (i.e. 4), which gives a dissection index of 2.00.

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1. I would like to extend a special thanks to Dr. David Gilbertson of the Department of Archaeology and Prehistory at Sheffield University for his generous help and advice in devising this system.

A similar but not identical method of terrain definition would be to simply count the number of separate contour lines within each square. The advantages of this system would be simplicity and relative ease in application. Its main drawback however, is that it is not sensitive to the kind of terrain differences illustrated by the two examples below:

Figure 4:1 B.

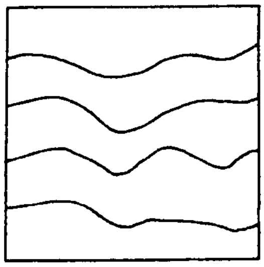
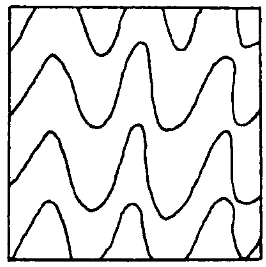


Figure 4:1 C.



In each case the number of contour lines is the same, so that a system which merely counted the total number of contours would characterize both Figures 4:1 B. and C. as identical. However, using the dissection method the figures for these two examples would be quite different, and would more accurately reflect the variations in terrain between the two areas; dissection values for Figure 4:1 B. would be 2.00, while the values for Figure 4:1 C. would be 5.00. As one can see from these examples, the higher the dissection value the more dissected or uneven the terrain will be.

In the next set of examples, it is clear that it was absolutely necessary to calculate the number of times contour lines crossed each of the four sides of the square, since there are a number of cases where measuring from only two sides (a & b) or three sides (a, b & c) would have introduced unacceptable errors in determining an average dissection value.

Figure 4:1 D.

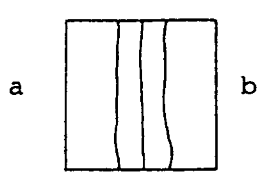


Figure 4:1 E.

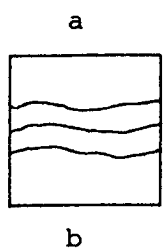


Figure 4:1 F.

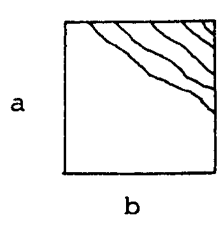
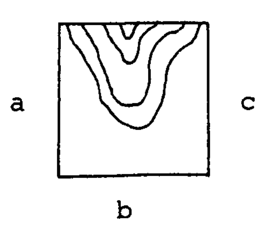
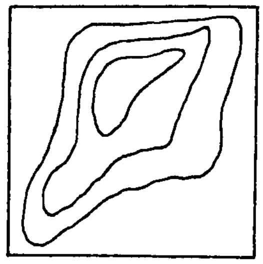


Figure 4:1 G.



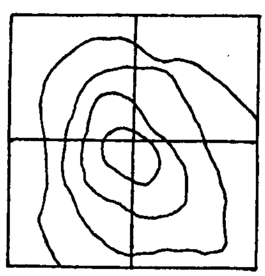
Another possible source of error using this system (Figure 4:1 H, below) was largely overcome by using a small sampling unit. The use of 500 m squares minimized the chances of any small hills or individual contour lines being completely incorporated within the sampling unit in such a way that they failed to touch the edge of the square.

Figure 4:1 H.



In addition, the Guadalentín Basin lacks any significant geological or geographic features which might escape detection in this manner - that is to say, structures which are tall, steep and spatially concentrated. Larger sampling units would have increased the probability of absorbing hills and contour lines within the square, unless certain adjustments were made. One simple alteration which would make this method applicable to larger sampling units would be to calculate the dissection index for a number of smaller, sub-units within a single, large unit. Figure 4:1 I, below, demonstrates how such a system could be employed when using kilometre squares as the sampling unit. In this case, the dissection index would be calculated for each of the 4 500 m squares within it, and the total would be divided by 4.

Figure 4:1 I.



In addition to establishing the dissection index for each sampling unit, a height value was also assigned to each square. Trying to determine the height of each square again raised the question of how to measure average values, and again, a fairly straightforward and elementary method was developed to resolve this problem. For simplicity, the height value given for each square was based on the altitude (above sea level) for the centre of that square, estimated from a 1:50,000 map with 20 m contour intervals. All heights were rounded to the nearest 10 m.

After dissection and height values were determined for each of the 3248 squares in the sample, an attempt was made to establish distinct terrain categories using these two variables. Because of the considerable size of this data set and the limited capacity of clustering programmes to deal with such a large number of cases, it was necessary to reduce the volume of data by splitting it into two halves. To do this a random sample of 1624 squares was drawn from the original total of 3248, thereby creating two sets of information which could be accommodated - one at a time - by a PMMD clustering programme (whose maximum capacity was 2000 cases). Attempts to cluster these two data sets, however, did not produce any significant results, as most of the variation appeared to be continuous - something which was not entirely unexpected.

In the absence of any clear cut boundaries based on height and dissection it was felt that a series of relatively arbitrary, but quantitatively defined, categories would be the best means of establishing general topographic units, and hence sampling strata, for the region. Turning first to dissection, 3 major divisions were created - each of them spanning an identical range of values. These three categories were intended to reflect the general types of terrain found within the Guadalentín Basin: that is, areas of low, moderate, and high dissection. The characteristics of these different categories are given in Table 4:1.

TABLE 4: 1. Dissection Index Categories used to define Sampling Strata

Dissection Index	Typical Type of Terrain
0 - 3.75	Areas with fairly even, unbroken surfaces and generally low slopes
4.00 - 7.75	Areas with more highly dissected surfaces, and generally greater slopes
8.00 -11.75	Areas with extremely dissected surfaces, and steep slopes

Alongside these dissection categories, a separate, but complementary, system of height categories was developed. This system represents a four part topographic division with the following characteristics:

TABLE 4: 2 — Height Categories used to define Sampling Strata

Height	Typical Type of Terrain
0 - 300 m	Valley floor, lowlands
310 - 600 m	Lower Foothills
610 - 900 m	Upper Foothills
over 900 m	Mountainous Upland

In combination, these two systems of defining relief helped to form a four tiered sampling strategy with three sub-divisions within each tier. Individual tiers were based on altitude categories, while sub-divisions were based on the different dissection classes. Overall, this produced 12 distinct sampling strata which are shown in Table 4:3.

TABLE 4: 3 — Definition of Sampling Strata in Survey Area - Preliminary Categories

TIER	STRATUM	HEIGHT	DISSECTION
ONE	1	0 - 300 m	0 - 3.75
	2	0 - 300 m	4.00 - 7.75
	3	0 - 300 m	8.00 - 11.75
TWO	4	310 - 600 m	0 - 3.75
	5	310 - 600 m	4.00 - 7.75
	6	310 - 600 m	8.00 - 11.75
THREE	7	610 - 900 m	0 - 3.75
	8	610 - 900 m	4.00 - 7.75
	9	610 - 900 m	8.00 - 11.75
FOUR	10	over 900 m	0 - 3.75
	11	over 900 m	4.00 - 7.75
	12	over 900 m	8.00 - 11.75

Ultimately, however, several modifications were made to this basic sampling design in order to make it more sensitive to the objectives of the survey. First, in Tier 4 there were no examples of squares with the height and dissection values specified in Statum 10. Consequently, this stratum was eliminated.

Another important adjustment was made in Tier 1, where none of the dissection values exceeded 7.75. Since the vast majority of squares within this tier have extremely low dissection values (below 2.00) a decision was made to further sub-divide the lowest dissection category (0 - 3.75) into two, so that:

(a) the 0 - 1.75 dissection range pertained to Stratum 1

and

(b) the 2.00 - 3.75 range to Stratum 2

This procedure was applied only in the case of Tier 1, and was employed largely as an attempt to improve the distinctions between various kinds of terrain within this extensive lowland area.

One final, and significant, alteration was made - again within Tier 1. An additional stratum, 1A, was added to this tier so it would be possible to monitor the development of settlement alongside the largest drainage in the region: the Guadalentín River. Previous reconnaissance in a part of the Guadalentín River near the town of Librilla, together with Dr. M.J.Walker[2.], had identified a number of Copper Age settlements immediately adjacent to the river. This information, together with site location data from other parts of the south-east, suggested that riverine areas constituted a particularly important focus for prehistoric settlement and exploitation. However, without defining a specific stratum which would incorporate this riverine 'fringe', this important zone would have been absorbed into the large area of the valley floor formed by Strata 1. As a result, the probability of sampling areas next to the river without having created such a stratum would have been very small. Rather than lose the opportunity to systematically examine this important zone, it was decided that a 'riverine stratum' would have to be added.

This new stratum (1A) consisted of an area roughly one kilometre either side of the river bed. The exact area of this stratum surrounding the Guadalentín river varies from one sector to another because of the

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2. I would like to acknowledge my thanks to Dr. Walker for bringing to my attention the Copper Age site near Reguerón Bridge, south of Librilla, and for his collaboration in locating a further site nearby, on the Rambla de Orón or Rambla de Librilla.

meandering course of the river, and because of the difficulty of controlling surface areas precisely using square sampling units. In practice, the system used to define this stratum was as follows (Figure 4:2):

(a) the first, or 'primary', squares to be included were those in which the course (or bed) of the river was present (Figure 4:2 A. below)

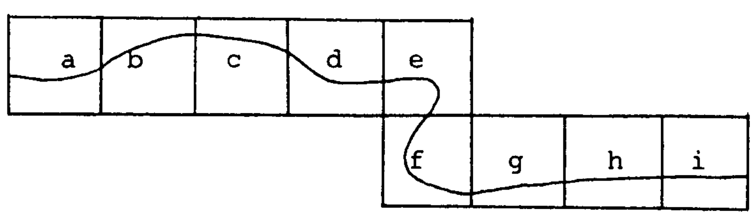
(b) additional, or 'secondary' squares were then added in a matrix around each 'primary' square (see area around square a in Figure 4:2 B. below)

(c) in cases where the river fell on the boundary between two squares, the 2 squares adjacent to the river (i.e. one on each side) were selected as 'primary' units (see Figure 4:2 C. below)

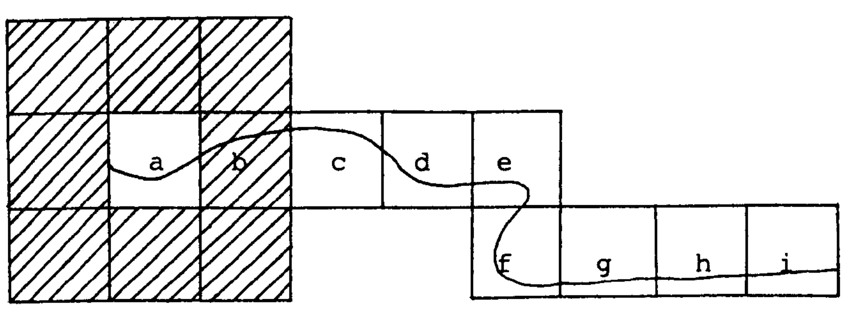
Figure 4:2 (A - C)

Definition of Stratum 1A

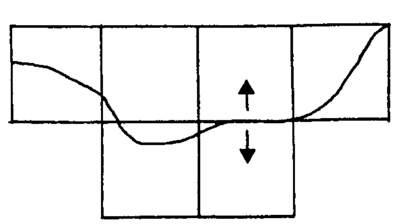
A.



B.



C.



Within Stratum 1A the vast majority of squares (327 out of a total of 341) had dissection values characteristic of Stratum 1. The remaining 14 squares had dissection values equivalent to Stratum 2. The more dissected terrain in the latter squares was the result of trenching by the Guadalentín and its tributaries, and the presence of various localized meanders. With a few exceptions, therefore, Stratum 1A is much the same as Stratum 1 in terms of dissection, and identical in terms of height.

Having completed these additions and revisions, the sampling strata used in the survey took the form outlined in Appendix 4:5.

Stratified Random Sampling: Objectives, Constraints and Methods

The principal problem, after defining the sampling strata, was one of sampling emphasis - that is to say, what proportion of the survey area should (or indeed, could) be sampled, and how. In order to arrive at a satisfactory solution it was necessary to consider both the overall aims of the investigation and a variety of practical constraints (on time, money and manpower).

A range of different sampling options were available - bearing in mind the intention to use the graded series of strata outlined above. Some of these options included: (1) sampling each zone in exactly equal proportions; (2) selective sampling, concentrating in some zones and ignoring others; (3) sampling all strata, but placing more emphasis on some zones (where site densities were perceived to be high) than others (where densities were thought to be low). Given that the main objective of the survey was to obtain a representative sample of ecological, topographic, and hopefully, settlement, variability within the Guadalentín Basin, none of these options appeared to be particularly satisfactory. Instead, the best method of achieving these objectives appeared to be a two-stage strategy involving, first, a general programme of sampling across the whole region (in each stratum), followed by more selective sampling in specific zones.

In the first stage of the investigation each stratum was sampled in proportion to its surface area within the boundaries of the survey. As a result, the largest stratum, in terms of land area, was subjected to the most intensive sampling. To make it easier to translate the percentage figures for each strata into sampling units, it was decided that in the first part of the survey 100 units would be selected for analysis. Therefore, since there were 1058 units in Stratum 1, out of a total of

3248 (i.e. 33% of the survey area), 33 units were selected from Stratum 1. All of the sampling units from each stratum were chosen using a random numbers table (Lindley and Miller 1953: 12-13, Table 8).

Some stratum, such as 6, 9 and 12, each occupied less than 1% of the survey area but were, nevertheless, allocated one sampling unit each. As a consequence, the total number of squares was increased from 100 to 101. This slight increase resulted from the fact that there was not an exact balance between percentage figures which were rounded downwards (i.e. less than 0.50%) and those rounded upwards (i.e. more than 0.50%).

Having obtained a good general overview of the survey area with the first 100 units, the second stage of sampling was designed to examine some areas in greater detail. This part of the investigation, therefore, involved selective sampling in stratum which either: (1) covered a large proportion of the survey area; (2) had produced a significant number of sites during the initial stages of sampling; (3) were known (from previous research) to contain site types, or site densities, worthy of more thorough evaluation. Moreover, an attempt was made to obtain a sample of 30 units in a number of stratum which fulfilled one or all of the conditions above. The figure of 30 sampling units was used as a target because it constitutes the established minimum for using various probability statistics on data drawn from cluster samples (Cochran 1963: 157). As in the first stage of sampling, units from each strata were chosen using a random numbers table.

Leaving aside the general objectives of this project, the survey design was also profoundly influenced by available time, money and labour. The most important of these factors were manpower and finances - both of which were limited. As a result, the responsibility for completing the survey was almost exclusively my own[3.] - a fact which had obvious repercussions for both aims and methodology. In these circumstances, for example, small sampling units were not only advantageous for interpreting data, but also for collecting it. 500 m square sampling units could be surveyed and recorded by one person in one day in all but the most difficult types of terrain, and were therefore, ideally suited to this investigation. Consequently, the logistical efficiency of this method

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3. Here, I would like to acknowledge the brave efforts of Sue Stallibrass, Sheila Sutherland and Robin Zvelebil during three weeks of fieldwalking-cum-mountain climbing in 1982.

was similar to using transect sampling with large teams.

Another methodological consideration, given the shortage of manpower, was how best to record data in the field. In order to overcome the problem of laborious and time-consuming methods of gathering data, a relatively standardized, check-list type of format was introduced on all recording sheets (see Appendix 4:6, for the range of data included on these sheets). Perhaps one of the 'silver linings' or hidden advantages in one man surveys such as this is that there is a general degree of continuity and consistency throughout the data collection process.

Time constraints, which are an ever present problem in all surveys, also had an important effect on the size of the area which could be sampled, the intensity of fieldwalking, and the range of data which could be recorded.

The Role of Air Photographs

As many people know, the advantages of small quadrat sampling units often appear to be greater on paper than they are in practice. This attitude is largely the result of the difficulty in finding such units on the ground and in ensuring that one is always within their boundaries. Precise location is, therefore, often tedious and time-consuming, and all too often involves losing valuable time wandering lost in unforgiving terrain.

In many parts of temperate Europe and the Mediterannean, topographic maps are accurate and are available at a scale which minimizes much of the problem in locating units the size of a 500 m square (e.g. 1:10,000 or 1: 25,000). The coverage of Spain in general, and the Guadalentín in particular, however, is less satisfactory. Sheets of the 1:50,000 Mapas Militar de España series offer the most complete and detailed set of topographic information for the area.[4] This situation caused obvious obstacles to any sampling design using 500 m squares, since the detail on most 1:50,000 maps made it difficult to locate squares on the ground, and even more difficult to define the boundaries of those units.

Fortunately, additional information is available for this area in the

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4. Some 1:25,000 maps of the Guadalentín area were published between 1942 and 1951, but the series was unfortunately abandoned before completion. A new 1:25,000 series has been initiated recently but at the time of the survey no sheet in that series included any part of the survey area.

form of fly-overs by the United States Air Force during the 1950's, and more recent coverage by the Spanish Air Force in the 1970's, which together provide a very complete and high quality series of oblique air photographs of the region. These photographs generally vary in scale from 1:25,000 to 1:30,000. In the absence of any detailed maps, these photographs seemed to offer the only good opportunity to identify small sampling units in the field. The main problem was how to use these air photographs for that purpose.

Ultimately, the solution to the problem appeared to be to use 1:50,000 topographic maps together with the more detailed air photos. First, topographic maps were used to locate each 500 m square and its general boundaries. This information was then used to estimate the borders of that 500 m square on the air photo. In all but a few cases, establishing the edges of each sampling unit on the air photographs did not present any real difficulties since houses, roads, reservoirs, and other physical features marked on the topographic maps were easily identified on the air photographs. Mountainous areas, where such reference points were less frequent and more widely scattered, presented greater - though not insurmountable - problems.

However, since the air photographs were oblique and involved some distortion it was necessary to be certain that the borders which were being defined for each sampling unit were accurate. Several points need to be stressed here about the precision of those boundaries. First, the reference points mentioned above did help to narrow the margin of error in locating the boundaries, even if the shape of the square, plotted on the photograph, was slightly distorted. In most cases, such distortion was barely perceptible since a square-shaped figure often defined the boundaries of a sampling unit on the air photo accurately. Secondly, even in cases where the shape of the square was slightly irregular, the most important consideration was where the boundaries were, and whether they were an accurate reflection, both of the boundaries of a given unit on the 1:50,000 topographic maps, and in reality. Finally, a test of several sample units, plotted on to the air photos and measured on the ground, demonstrated that the method could be used to accurately define a 500 m sampling unit in the field.

The advantages of using air photos in the field, rather than topographic maps, were enormous, especially when an enlarged air photo of each sampling unit was used (see Appendix 4:7). In the first instance, air photos provided scores of reference points within each square, as well as many more outside of it, so that individual squares were easy to locate, and the boundaries of those squares easy to follow. In many cases, the edges of squares could be located to within 1-2 m, thanks to variations in terraces, soil colour, houses, roads, vegetation cover and so on. In many cases these photographs also served as a useful guide to recent changes in land use such as the excavation of hill sides for terracing, the construction of small reservoirs, etc..

Perhaps one of the greatest advantages of using air photos in the field, however, was as an aid in data recording. The use of these photographs made it possible to distinguish different zones within a 500 m square (highlighted by different types of terrain, land use, etc.), and hence, sub-divide a single sampling unit into a variety of sub-sections. The boundaries of these sub-sections were then traced with a coloured Chinagraph pencil and assigned a distinct number. Each number corresponded to a data sheet which provided various details about soil, land use, surface conditions, archaeological materials, etc. within each sub-section. In the course of completing a 500 m square sampling unit this system of defining sub-sections, tracing boundaries and assigning numbers - all on the air photograph - also made it possible to see at a glance which parts of the square had been completed and which parts remained - something which was very useful in planning the step-by-step sequence of fieldwalking in each sampling unit.

Another important aspect of using air photos was the amount of time which was saved drawing various features of specific interest within or around the square, since these could merely be indicated on the photograph. It was not necessary to draw individual fields or groups of fields, for example, since these could easily be marked on the photograph. Moreover, a perspective from the air was much more valuable than trying to represent fields or other features from a ground perspective. Despite some possible distortion effects the relative size of features within the square were much more accurately reflected by the photograph than any sketch drawings made in the field. Air photographs also provide a useful visual, rather than written, record of a sampling unit which is extremely valuable in later analyses.

Finally, it was easy to indicate on air photographs which areas could not be surveyed - because of irrigation, unfriendly guard dogs, glass encrusted barrier walls, aggressive honey bees and other obstacles. Marking these unwalked areas on an air photograph made it possible to estimate how much of the surface area was actually covered in any one square. This data was crucial in ensuring that the percentage of surface area walked in each of the sampling strata would be roughly the same. For example, if in a sample of 30 squares, 5% of each square could not be investigated, the total surface area would be equivalent to 28.5 squares (with the equivalent of 1.5 squares left unwalked). In order to compare this sample with another sample of 30 from a different stratum- where no areas were left uninvestigated - it would be necessary to survey an additional 1.5 squares. Consequently, it was extremely important to keep track of the amount of area walked, and unwalked, in each unit, and in each stratum so that ultimately, different strata could be compared on an equal basis.

Assessing Site 'Visibility'

Over the past 15 years survey projects in temperate Europe and the Mediterranean have begun to devote more attention to the range of factors affecting the visibility of archaeological materials - specifically geomorphological processes, land use and fieldwork intensity (Shennan 1985; Cherry et. al. eds. 1978; Cherry 1982; Bintliff 1977; Dancey 1974; Wagstaff 1981; Keller and Rupp 1983; Ammermann and Schaffer 1981; Ammermann and Feldmann 1978). Since all of these factors affect the results of archaeological surveys, as well as their interpretation, it was necessary to take account of how site visibility may have been influenced in this particular case study.

With regard to the intensity of fieldwork, standardized intervals of 5m between individuals (or individual 'paths') was maintained throughout the survey. This relatively intensive coverage helped to ensure that small, low density concentrations of material would have a better chance of being identified. Therefore, the results of the survey should be reasonably reliable even in cases where artefacts were fairly sparse and spatially concentrated.

Attempting to monitor the effects of geomorphic processes on site visibility within the Guadalentín Basin was a particularly acute problem because of the absence of any systematic research. The traditional wisdom that ecosystems in the semi-arid regions of the south-east have been profoundly affected by geomorphological processes and human interference, has been challenged recently by data collected in a wide range of south-eastern environments (Wise, et. al. 1982; Gilman and Thornes 1984). These investigations suggest that major alterations of the landscape due to erosion and aggradation are often very localized.

Furthermore, they indicate that the magnitude of geomorphological change, from the later prehistoric period (c. 5000 b.c.) to the present day, has frequently been exaggerated. Without undertaking a separate geomorphological investigation in the Guadalentín Basin, it was only possible to make general observations about those zones which would have been especially susceptible to geomorphological changes that might have helped to obscure or obliterate evidence of prehistoric activity. A discussion of the major geomorphological processes operating in this area, and their possible effects on the survey results, is included later in this chapter. It should be said, however, that obviously this is an imperfect and strictly preliminary way of addressing a far more complex phenomenon. Hopefully, follow-up research and survey in the Guadalentín region will include the kind of specialist investigations by geomorphologists, historians and others, which will provide a detailed record of landscape development.

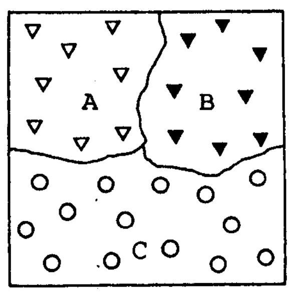
A variety of other factors including land use, soils (moisture and stone content, colour, texture), weather conditions, vegetation cover, and archaeological materials were measured in a qualitative way for each sub-section of each sampling unit. This information was collected in an effort to establish whether there was any systematic relationship between different types of field conditions and various classes of archaeological sites or materials. A facsimile of the recording sheet used for this purpose, and a general explanation of the different measurements are included in Appendix 4:6.

The indices listed on these sheets were intended to measure general, unambiguous differences in artefact classes (i.e. raw materials), artefact densities, and field conditions. Above all, these measurements were designed for quick and easy application in the field. Since information about field conditions was recorded for each sub-section within each sampling unit, it was possible to determine the range of variability at a variety of different scales, including: sub-sections of 500 m squares, 500 m squares as a whole, within individual strata, and between strata.

The best way of determining the influence of different factors on site visibility appeared to be general measurement of the surface area of each sub-section. Using a Haff planimeter (model 315E) the surface area of individual sub-sections was calculated by tracing their boundaries - all of which had been drawn onto each air photograph. This system, therefore, helped to establish a gross measure of the <u>relative</u> surface area of each sub-section within a 500 m square sampling unit. So, for example, in the 500 m square illustrated in Figure 4:3), Area A and B each represent approximately 25% of the area, and Area C = approximately 50%. Despite some of the distorting effects of the oblique air photographs on the true value of surface area in any given case, this method still appeared to be the best one available for measuring relative surface areas. In turn, these values provided a means of determining the relative contribution of different factors to site visibility. Again, taking the square below as an example, if Area A had dense vegetation, while plant cover was relatively sparse in areas B and C, the ratio of dense to sparse vegetation would be 1:3. Overall, therefore, the effects of vegetation cover on the visibility of material in this square will not have been very pronounced, and comparatively speaking, the effects will have been greater in A, than in either B or C.

Figure 4:3:

Evaluation of Site Visibility within a Sampling Unit



The only alternative methods involved detailed and laborious measurements - either to correct the distortion on the air photographs and then measure surface area, or to carry out measurements in the field - neither of which were practical.

A detailed statistical analysis has yet to be carried out on the visibility data collected during the survey, but raw totals for each of the variables have been calculated, and will be presented in a more comprehensive way in an article to be published shortly (Mathers and Jimenez Loriente, forthcoming).

IV. e. Dating of Survey Material

Archaeological surveys, even in the most favourable circumstances, inevitably involve problems in establishing the chronology of surface materials. These difficulties are magnified in areas where detailed material culture sequences are not available, and where diagnostic, period-specific artefacts are often lacking. Because these problems exist in many parts of south-east Spain it is perhaps not surprising that systematic regional surveys have been slow to develop in this area. Indeed, in the opinion of some investigators (Gilman and Thornes 1984: 47) the obstacles to field survey in the south-east are insurmountable at the present time - particularly with respect to dating surface collections. While this case study cannot offer an easy or comprehensive solution to these problems, it does try to overcome some of the major difficulties in distinguishing artefacts and assemblages of different periods.

Given the unequal quality and quantity of information about settlement in the Guadalentín Basin, and the preliminary nature of this investigation, it was clear that the materials recovered in the survey ought to be assigned to fairly broad chronological periods. Since excavations in Murcia and neighbouring provinces have provided little evidence with which to accurately sub-divide periods such as the Copper Age or Argaric, the use of generalized periods seemed to offer the most satisfactory way of characterizing different artefacts and sites. Although this approach precludes any systematic evaluation of assemblage variations within individual periods, it does, nevertheless, make it possible to examine long-term trends and developments. In addition, it helps to minimize the errors which might result from using a more detailed chronological scheme for characterizing sites.

The high proportion of sites in the Guadalentín Basin with single period occupations also helped to play an important role in distinguishing assemblages of different periods. In the course of the survey it became clear that many sites, particularly Copper Age and Argaric settlements, were established at one period but were not reoccupied subsequently. Surprisingly perhaps, settlements which had been established during the Copper Age bore no apparent traces of Argaric materials, and vice versa - despite the fact that settlements of these two periods were often found adjacent to one another on opposite sides of a ravine or rambla.

Although the Guadalentín Basin was something of an unknown area prior to the survey, and has yet to produce any long, continuous stratigraphic sequences like those from Andalucia and the Levante (Martí Oliver 1977; Martí Oliver et. al. 1980; Pellicer Catalán 1963 and 1964a), information from the province of Murcia and surrounding area does help to provide some guidelines with which to evaluate the chronology of surface collections. Sources of data from both inside and outside the Guadalentín Basin, therefore, can be used to establish a general set of criteria for dating materials collected in the survey. These criteria are listed, period-by-period, in Appendix 4:8. Although these features provide valuable information about the chronology of various assemblages, many of the characteristic elements listed for each period are relatively rare and only become apparent after excavation. For survey purposes, therefore, they do not always offer a practical solution to the problem of dating artefacts and assemblages. Pilot investigations in the Guadalentín prior to the survey proper, confirmed that pottery was by far the most common form of material for every period. Consequently, if the survey was to be successful, it was necessary to develop a system for dating sites based on variations in ceramic assemblages.

In most cases, the features listed in Appendix 4:8 were sufficient to distinguish materials of one period from those of another. However, as Gilman and Thornes (1984: 47) have noted:

> "... decorated ceramics are infrequently and unevenly represented in Copper and Bronze Age collections. Thus, the main type fossils are either metal and other intrinsically valuable items or ritual objects, both artefact categories that are rare in general, very rare in habitation deposits and correspondingly unlikely to be found in surface collections from settlement sites. In the absence of abundantly represented diagnostic types to indicate the age of a site by inspection, test excavations would be required to place the site in the cultural sequence".

Clearly, therefore, it was unwise to rely on traditional ceramic (and other) type fossils as the sole basis for distinguishing Copper Age and Argaric assemblages because of the low probability that they would be represented on the surface. Since plain wares are far more common, and make up the vast majority of material from Copper and Bronze Age sites (from both excavations and surface collections), an attempt was made to define a set of general characteristics which could be used to compare ceramic assemblages from these two periods. These characteristics, presented in Appendix 4:9, range from:

(a) ceramic elements which are exclusive to one period

to

(b) ceramic features which are more common in one period than another

Together with the less common type fossils noted (Appendix 4:8) these ceramic characteristics helped to separate Copper Age and Argaric assemblages in a large number of cases.[5] It should be emphasized that while this method by no means solves the problem of distinguishing 2nd and 3rd millennia assemblages in this region (or in south-east Spain generally), it does provide a useful tool for evaluating Copper and Bronze Age settlement in the Guadalentín Basin. Moreover, it gives some idea of the long-term changes in ceramic assemblages through time. Whether or not this scheme is applicable to other parts of south-east Spain, the information it has produced may be of value in comparing the development of assemblages within the Guadalentín Basin with those in other regions.

Overall, Copper Age ceramics are characterized by a wide variety of fabric and surface colours, clays, tempering material, surface treatment and firing, as well as a diverse range of decorative techniques, motifs, and vessel forms. Irregularity and diversity are, therefore, the hallmarks of these assemblages. By contrast, the vessel forms and manufacturing techniques which characterize Argaric ceramic assemblages are far more regular and standardized. For example, Argaric vessels display considerably less variation in composition, firing, and surface treatment than Copper Age pottery. Decoration is almost completely absent, except for 'metallic' burnish, a few simple types of lugs and very rarely, some incised motifs (Lull 1983: 142-146). More importantly perhaps, the range of Bronze Age vessel forms is much more limited than in the previous period.

Within the Guadalentín Basin, the characteristics which proved to be the most effective in distinguishing Copper Age and Argaric assemblages were the following:

(1) Vessels with rims bevelled sharply towards the interior (exclusively Copper Age)

(2) Esparto and fibre impressed pottery(exclusively Copper Age)

(3) Ceramic assemblages dominated by irregularly manufactured vessels - crude tempering, irregular form, rough finishing (predominantly, and perhaps exclusively, Copper Age)

(4) Very light and buff coloured pottery - light yellowish, light reddish, beige (predominantly, and perhaps exclusively, Copper Age)

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5. Isolated finds and the small quantities of material from some rock/ shelter/cave sites presented greater difficulties, however, and could only be labelled as Copper Age and/or Argaric.

(5) wide variety of lug forms - particularly perforated types (exclusively Copper Age)

(6) Chalice and urn fragments (exclusively Bronze Age)

(7) Assemblages dominated by darker coloured wares (dark brown, reddish brown, black), with fairly fine surface finishing - including high quality burnishing, and a general absence of lugs (exclusively Bronze Age)

As something of a footnote, it should be made clear that as a result of using the scheme outlined in Appendix 4:9, three major sites (Las Anchuras, La Tira del Lienzo and Cueva de la Moneda) emerge as anomalous. It is necessary, therefore, to briefly examine the unusual characteristics of these sites before moving on to discuss the survey results.

First, the site of Las Anchuras, which has been regarded by a number of investigators as Argaric (Carriazo 1963: 825; Lull 1983: 311), differs in a number of important respects from the nearby settlement of La Bastida; the two sites face each other on opposite sides of the Rambla de Lébor, separated by only a few hundred metres. Unlike La Bastida, investigations at Las Anchuras (Siret and Siret 1887: 97-99) produced no traces of burials. More significantly perhaps, the ceramic assemblages from these two sites are markedly different from one another. Although the upper part of most vessels from Las Anchuras display the 'C-shaped' or concave profile typical of Argaric ceramics, the firing, texture and colour of these vessels is not at all similar to the pottery from La Bastida. Comparatively speaking, the material from Las Anchuras is more crudely manufactured (with respect to firing and surface treatment) and more irregular or variable (with regard to tempering materials and colour). Generally, however, the quality of ceramic production and the regularity of vessel form at Las Anchuras is greater than that of Copper Age assemblages from this area. Also, many characteristic Copper Age features are missing in the Las Anchuras ceramic assemblage, notably: bevelled rims; a range of perforated and unperforated lug types; vessels with impressions of basketry, etc.. On the other hand, however, light coloured wares - similar (but not identical) to the buff toned pottery characteristic of local Copper Age settlements - are common at Las Anchuras. At La Bastida and other Argaric sites in the Guadalentín Basin these light coloured wares are almost completely, if not entirely, absent.

It is clear, therefore, that Las Anchuras does not have either a typical

Copper Age, or a typical Argaric ceramic assemblage, but nevertheless has some similarities with material from both periods. Given that the occupation of La Bastida appears to have been relatively short-lived (judging by the shallowness of the deposit - Martínez Santa Olalla et. al. 1947), and has been generally dated to the Middle Bronze Age (Lull 1983: 324; Hernández Hernández and Dug Gudoy 1975: 113), Las Anchuras may well represent a transitional phase between the Late Copper Age and Middle Bronze Age. Alternatively, the unusual character of the Las Anchuras assemblage may indicate that it belongs to the later or final stages of the Argaric, a possibility which is reinforced by the fragments of 2 decorated Late Bronze Age vessels found at this site in the last century (Siret and Siret 1887: Plate XIII, nos. 15 and 16). As a result of the ambiguity surrounding the Las Anchuras materials this site has simply been regarded, in this study, as Argaric - along with La Bastida - despite the fact that these sites are clearly not contemporary with one another.

The sites of La Tira del Lienzo and Cueva de la Moneda present a different type of problem, but one which is just as difficult to resolve conclusively. Both settlements have produced a wide range of ceramic vessels which are distinct from the typical or 'classic' Argaric assemblages found at sites like La Bastida. On the other hand, La Tira del Lienzo at least, has some vessel forms which resemble those at La Bastida and Las Anchuras (Appendix 4:42). Moreover, vessels found recently at this site (D. Sr. F. Guerao Navarro and Dra. M.M. Ayala Juan, pers. comm. 13.3.86) include two Argaric forms: a 'copa' or chalice and a carinated, tulip-shaped pot (Siret Form 5).[6.] On balance, therefore, available evidence suggests that the site is a transitional one between the Late Copper Age and Middle Bronze Age - a conclusion which is shared by Dra. M.M. Ayala Juan at the University of Murcia (pers. comm.). If this small site does, indeed, date to the early part of the Bronze Age, it would appear to pre-date the larger

6. Apparently a small number of 'bevelled' rims were also found recently at La Tira del Lienzo, but since I have yet to see this material it is impossible to say whether or not they match the type of bevelled rims found in local Copper Age assemblages (i.e. rims which are steeply inclined towards the interior of the vessel). If indeed, the bevelled rims from La Tira del Lienzo are similar (or identical to) Copper Age types, this fact would not alter the conclusions or chronology of other sites identified in the survey. Other features, such as the absence of esparto and other crudely impressed pottery, and the lack of perforated lugs, for example, distinguish the material from La Tira del Lienzo from local Copper Age ceramic assemblages. Finally, it is worth noting that exposed sections at this site reveal only a shallow and uniform deposit which suggests that it is a single phase, rather than multi-period, occupation.

settlement of Cabezo Gordo nearby; the ceramic assemblages from Cabezo Gordo and La Bastida are very similar to one another and both appear to date to the Middle Bronze Age. The evidence from La Tira del Lienzo, together with the data from Las Anchuras, suggests that Argaric development in this area may be split into 2 distinct phases, represented by: (1) Las Anchuras and La Tira del Lienzo, and (2) La Bastida and Cabezo Gordo. In both cases there is only a minor shift in settlement location between these two phases (i.e. between Las Anchuras and La Bastida - c. 0.5 km; and between La Tira del Lienzo and Cabezo Gordo - c. 1 km.).

The site of Cueva de la Moneda is perhaps the most problematic of all of these sites since the ceramic material recovered thus far does not point clearly to either a Copper Age or Bronze Age date. On the one hand, several features of this assemblage are consistent with a Copper Age date, such as (1) the crude and variable manufacture of vessels (especially the wide range of fabric and surface colours) and (b) the diversity of tempering materials and clays. However, the ceramic material from this site lacks any clearly diagnostic Copper Age features. On the other hand, the general form of the vessels from Cueva de la Moneda is similar to the ceramic assemblage from La Tira del Lienzo and Las Anchuras, but distinct from 'classic' Argaric sites in the area such as La Bastida and Cabezo Gordo. Tentatively, therefore, this site has been assigned to the Argaric, and to a phase roughly contemporary with La Tira del Lienzo and Las Anchuras.

When taken together, data from these three sites imply that the Argaric Bronze Age in this area can be split into two distinct phases. This also implies that Argaric development in at least some parts of the Guadalentín Basin was more gradual, or more retarded, than in other parts of lowland zone where the Argaric developed more rapidly (e.g. in north-eastern Almería). Within the geographic boundaries of this case study, the 'classic' development of the Argaric appears to have taken place in the Middle, rather than the Early, Bronze Age - a problem which deserves more careful attention in the future.

IV. f. Survey Results

For a variety of reasons the results of this survey are only a preliminary step towards understanding prehistoric settlement in the Guadalentín Basin. The lack of a detailed relative or absolute chronology for this region, for example, has made it necessary to discuss settlement development in broad periods - some of which may incorporate a considerable degree of temporal and spatial variability with respect to settlement. The size of the sampling fraction (c. 5%) is also relatively small in comparison with the survey area as a whole. Moreover, this research inevitably lacked the specialist support often associated with larger, better financed projects (cf. critique by Cherry 1983: 386-387). All of these factors should be borne in mind when evaluating the results presented here.

On the other hand, the evidence presented below indicates that surveys in south-east Spain are not only possible, but that they are capable of making a valuable contribution to our knowledge of later prehistoric settlement. First of all, surveys in general, and this study in particular, focus on the changing relationships between sites, rather than the characteristics of individual sites in isolation. The large body of new and systematically collected data arising from this investigation has made it possible to compare, and combine, older information from excavations, etc., with new data from the survey - using one to complement the other.

Given the widespread destruction of sites throughout south-east Spain over the last few decades, it has become absolutely essential to obtain detailed records of the rich archaeological data in many regions before it disappears completely. Without evidence from systematic, large-scale surveys the regional context of many of our sites, and the data necessary for building generalized models, may be irretrievably lost.

Although the terra incognita character of the Guadalentín Basin, and the poorly developed chronology of this region have made it unwise to read too much into a preliminary investigation such as this, it is also clear that evaluating long-term, generalized trends is an important first step towards understanding settlement development in more detail. In this sense, the broad cultural periods adopted in the discussion below are both necessary, and at the same time useful and instructive. Indeed, one of the primary aims of regional surveys is to provide information about such long-term, general patterns.

Finally, some of the chronological problems which have hindered the development of archaeological surveys in the south-east (Gilman and Thornes 1984: 47) have been overcome during the course of this research. Material produced in this survey was instrumental in establishing a set of typological criteria which can be used to identify sites of different periods. This scheme, which was cross-checked with excavated evidence, includes characteristics which are either more common in one period than another, or features which are exclusive to individual periods (see Appendices 4:8 and 4:9). Of particular significance is the range of characteristics used to differentiate Copper and Bronze Age ceramic assemblages - a scheme which may have wider applications within the Guadalentín region, and perhaps in other parts of the south-east (Appendix 4:9).

In the following section the results of the survey are discussed for each of the different sampling strata. This includes details about the ecological and geographic characteristics of each strata, the first and second stage of sampling, as well as a comparison of data before and after the survey.

Results of Stratified Sampling

Because one of the primary objectives of this survey was to evaluate settlement patterns in different ecological and topographic zones, it is appropriate to examine the results of each one of the sampling strata before making any comparisons between them. The first part of this section, therefore, is devoted to a brief discussion of the results from individual strata. This zone-by-zone summary is followed by a more general discussion of the evidence from the survey area as a whole.

STRATUM 1 (Appendices 4:10 - 4:15; 4:38)

In general, this stratum is dominated by relatively flat, low lying terrain, 100 - 200 m above sea level. As Appendix 4:10 indicates, this region takes the form of a wide, elongated band which runs roughly through the central part of the Guadalentín Basin. Much of this stratum lies in the driest part of the survey area, with respect to both rainfall (Appendix 4:2) and surface water supplies. Inputs of water - other than by direct rainfall - are very limited. Runoff is rare in most areas largely because of the low slopes and small degree of dissection characteristic of the region. The exceptions to this general pattern are the parts of Stratum 1 fringing the various upland zones (Sierra Espuña, Tercia, Muela, Cura, Almenara and Carascoy), and the squares immediately adjacent to the Rambla de Librilla and the Rambla de Algeciras in the north-eastern corner of the survey area (Appendix 4:10).

Prior to the survey there was no sign of pre-Iron Age (i.e. pre-Iberian) activity in any part of Stratum 1. On the other hand, some Roman and Medieval occupation was known in the area in and around the village of Librilla in the north-east part of the survey area, notably between the two major ramblas mentioned above (see Appendix 4:14). The first phase of sampling in Stratum 1 produced 1 small Roman farmstead, one small settlement - possibly of Late or Final Bronze date, and several distinctive Copper Age sherds. The Copper Age material is especially notable since it was found in a deposit underneath the municipal prison in the town of Totana. The small number of additional squares added during the second stage of sampling produced no further evidence of any kind.

On the basis of previous information <u>and</u> the data collected during this survey the density of settlement and other activities in this region appears to have been relatively low. The scarcity of materials from this area is a feature which is constant throughout - from early prehistory to the Medieval period (Appendix 4:38). In addition, it is worth noting that, by and large, this zone continues to be characterized by low density settlement to the present day. Some of the possible reasons for these patterns will be discussed later in this section.

<u>STRATUM 1A</u> (Appendices 4:10 - 4:15; 4:38)

The narrow corridor formed by this strata follows the course of the Guadalentín River along the south-eastern border of the survey area. Aside from those areas immediately opposite the banks of the river, the terrain here is very similar to that of Stratum 1. Water supplies within Stratum 1A, however, are some of the largest and most reliable in the entire lowland region of the Guadalentín Basin (i.e. within Tier 1). One area, south of Librilla, is particularly well endowed with water since the Guadalentín River and two of its tributaries all converge within a radius of less than 3 kms.. Other major water courses such as the Rambla de Lébor and the Rambla de Totana originate in the mountainous area around Sierra Espuña and fail to supply water to the Guadalentín River further to the south and east because they peter out and become desiccated before reaching it. Consequently, within the survey area, and indeed, between the cities of Lorca and Murcia, the Guadalentín is only recharged by the two major tributaries in the vicinity of Librilla.

Before the survey began, very little information existed about the area alongside the Guadalentín River. Some preliminary reconnaissance around Librilla, guided by the discovery of a Copper Age site at Reguerón Bridge by Dr. Michael Walker, ultimately led to the location of another two Copper Age sites further to the north-east, which were also adjacent to the river. Indeed, these discoveries were one of the main reasons for creating this stratum. Apart from these three, riverine Copper Age sites, other evidence of historic and prehistoric activity in the area was lacking.

The first stage of sampling found evidence of Roman farmsteads in both the north-east and south-east parts of Stratum 1A. Further sampling in Stage 2 found additional evidence of Iberian and Roman occupations in both of these areas, as well as further traces of the Copper Age sites around Librilla and a small Medieval farmstead south-west of Totana (see Appendices 4:13 and 4:15). All of the sites found in this stratum (Copper Age, Iberian, Roman and Medieval) have upland regions in close proximity to them. In the central part of Stratum 1A, where the lowland region widens out to form a broad plain, no evidence of activity was found during the survey. Similarly, there is no data from previous investigations to suggest any occupations in this central area.

It is also notable that the only evidence of occupation in Stratum 1A during the Neolithic-Bronze Age period was a tight cluster of sites at, or near, the confluence of the Guadalentín and its two principal tributaries. Not only did this location provide a choice of several major water supplies, but it also forms a topographic 'bottle-neck' with upland areas lying close to the river to the north and south. This 'bottle-neck' is a unique feature within the survey area, since it is the point at which there is least distance between the river and the uplands along the valley side.

STRATUM 2 (Appendices 4:10 - 4:15; 4:38)

The more dissected lowland regions which comprise this strata are generally concentrated towards the eastern end of the survey area in a large pocket of low, but relatively uneven relief. Other parts of Stratum 2 form a series of narrow strips which run parallel with one another on opposite sides of the Guadalentín River - below the Sierra Espuna to the north, and at the foot of the Sierra Carrascoy to the south. The availability of water varies from one part of this stratum to the other, but generally the areas nearest to the upland zone receive the largest and most frequent supplies. The 'ribbon-like' areas of

Stratum 2 which are found below Sierra Espuña and Sierra Carrascoy, for example, lie near, or on top of, alluvial and colluvial fans which are watered periodically by ramblas which originate at higher altitudes.

A number of sites were known in Stratum 2 from previous work, most of them dating to the proto-historic and historic periods. Only one of these settlements, El Castellar - which lies on a low range of hills north of Librilla - had any traces of prehistoric occupation. Evidence collected in the first stage of sampling added very little information about activity within this strata; Stage 2 was impossible because of limited time and resources. Despite some minor traces of Copper Age or Bronze Age ceramics, and a small number of worked flints (i.e. 6), evidence of prehistoric activity in this zone was relatively sparse (see Appendix 4:38). Within Stratum 2 the favoured area for settlement in the historical period (and based on present evidence, in the prehistoric period as well), appears to have been the fringe of low hills on the northern side of the Guadalentín River.

STRATUM 3 (Appendices 4:10 - 4:15; 4:38)

Relief within this stratum is the most dissected and irregular in the whole of the lowland zone (i.e. Tier 1). The largest concentration of Stratum 3 type terrain is the extensive area of 'badlands' north of Alhama de Murcia and the Sierra de la Muela. Other scattered examples of this kind of dissected lowland topography occur sporadically around the slopes of Carrascoy, Espuña and Cura. The availability of water is largely conditioned by proximity to major ramblas and to upland areas at higher altitudes. As in Stratum 2, the northern side of the Guadalentín River appears to offer the largest and most regular water supplies.

The alluvial and colluvial deposits which have accumulated within Strata 2 and 3 have been promoted by various factors - notably the large meanders present in some water courses (such as the Rambla de Lébor), and especially the considerable break of slope which occurs below the 300 m contour throughout the survey area. As ramblas descend from higher altitudes towards this lower relief they lose a significant degree of momentum so that they begin to deposit their 'bedload', as well as dissolved and suspended sediment. The build-up of alluvial material (around ramblas) and colluvial deposits (near foot slopes in interfluvial areas) has been significant in a number of areas within Strata 2 and 3. Many of these fine grained deposits receive consistent inputs of water from either runoff or from ramblas, and hence are a particularly attractive zone for cultivation.

Evidence of occupation in Stratum 3 prior to the survey was restricted to two areas: a promontory above Alhama de Murcia occupied during the Medieval period and the hilltop site of Cabezo Gordo, north-east of Totana, occupied in the Bronze Age. Although the latter is one of only two Argaric sites known within the entire lowland zone of Tier 1, its characteristics are, nevertheless, very similar to other Argaric sites which fall into Strata 4 and 5 (Appendix 4:40).

Limited sampling of this strata, together with evidence collected outside the survey sampling units, produced a number of important prehistoric sites: a Copper Age cave burial in the foothills north of Sierra de Carrascoy, and the Bronze Age settlement of La Tira del Lienzo, located a short distance south-west of Cabezo Gordo. No other evidence of prehistoric activity was found in Stratum 3.

Overall, sites within this zone tend to cluster in hilly terrain at the transition between the foothills and the valley floor - especially in the area north of Guadalentín River.

STRATUM 4 (Appendices 4:16 - 4:23, 4:38)

Characterized by gently rolling hills and fairly even relief, this zone marks the beginning of the foothills which fringe the lowland zone of Tier 1 throughout much of the survey area. Most of the area which comprises Stratum 4 occurs in an irregular line between the Espuna and Tercia ranges to the north, and the Guadalentín River to the south. Other small pockets of Stratum 4 type terrain are found in the Almenara and Carrascoy ranges south of the river. The supply of water in this stratum is particularly favourable and is derived from 4 main sources: (1) runoff from small hills within this strata; (2) runoff from hillsides and mountains in nearby regions, belonging to other strata; (3) major and minor water courses, and (4) springs. The latter two sources are particularly abundant in this strata.

In addition, there are deposits of fine alluvial and colluvial soils immediately adjacent to this well watered foothill zone. Moreover, like other parts of Tier 2, there is fairly easy access from Stratum 4 to both the upland and lowland zones of the Guadalentín Basin.

Before the survey was undertaken, very few sites were known within Stratum 4 (Appendix 4:38). Besides two Ibero-Roman sites, the only other evidence of occupation in this zone was the Palaeolithic/Epipalaeolithic site of Los Mortolitos (Pericot and Cuadrado 1952) and the complex of Copper Age cave burials at Los Blanquizares de Lébor (Cuadrado 1930; Arribas 1956) - both near Totana. After a preliminary, and then secondary, stage of sampling, however, a significant number of sites were located within this strata, including Medieval, Ibero-Roman, Bronze Age and Copper Age occupations.

The Ibero-Roman and Medieval sites found in the survey consisted exclusively of farmsteads and were found in a wide variety of locations on the north side of the Guadalentín River. Copper Age cemeteries on the contrary, were concentrated in a tight cluster along the limestone outcrops which run south-west to north-east above Totana and Alhama. As a consequence of the survey, the number of Copper Age cemeteries known in this strata increased from 1 to 5. In the neighbouring region of La Anchurica, near the sites of La Bastida, Juan Climaco and Las Anchuras, another Copper Age occupation was found approximately 1 km. north of the Rambla de Lébor. On the southern side of the Guadalentín River, on the south-eastern edge of the survey, an Argaric settlement was found overlooking a small enclosed valley within the Loma de Baraunda.

Although the ratio of Copper Age to Argaric sites in Stratum 4 is relatively high (c. 3:1), the number of settlements for each period is the same. The difference in total site numbers - at least on the basis of present evidence - is due to the fact that Copper Age cemeteries and settlements are distinct from one another, while in the Argaric they are one and the same site.

Together the settlement and cemetery evidence from this stratum indicates that Copper Age and Argaric activity was focused in very localized areas. All of these areas are well watered (either by run-off and/or ramblas), and all have easy access to both the uplands and to arable lowlands along the edge of the foothill zone. The combined totals for sites of all periods within this zone (Appendix 4:38), suggests that Stratum 4 is one of the most densely occupied regions in the survey area, both in the historic and prehistoric periods.

<u>STRATUM 5</u> (Appendices 4:16 - 4:23, 4:38)

Although this zone is characterized by more dissected and uneven terrain than in Stratum 4, the distribution of these two strata is generally the same throughout the survey area. Like Stratum 4, this area is well watered and lies only a short distance from fairly flat tracts of arable land on the edge of the valley, and more mountainous upland regions.

Thanks to previous research, some of it dating to the mid-nineteenth century, a large number of sites were known from Stratum 5, covering the full range of periods from the Epipalaeolithic to the Medieval. The best known group of Copper and Bronze Age sites in the region lies along the Rambla de Lébor and includes 4 major settlements (Juan Climaco, Campico de Lébor, La Bastida and Las Anchuras). The only other settlement of this period known before the survey was an Argaric site on the edge of the Loma de Baraunda, south of the Guadalentín River near Hinojar.

Evidence produced during the survey confirmed the high densities of settlement and other activities suggested by existing sources of data. Copper Age sites were particularly abundant, though again the fact that many of these were cemeteries tends to exaggerate the differences between Copper Age and Argaric Bronze Age site totals.

One of the most important results to emerge from investigations in this zone was the fact that the relatively clustered pattern of Copper Age sites in Stratum 4 was repeated again in Stratum 5. Furthermore, there was often a tendency for Argaric sites to occur in areas previously occupied in the Copper Age. There are a number of striking examples in which sites of one period are found only a short distance from sites of the succeeding period: Juan Climaco - Las Anchuras - La Bastida, two unnamed sites near La Hoya, and La Tira del Lienzo-Cabezo Gordo. In the case of the two former pairs, the distance between sites is 0.25 km. or less. This clustering phenomenon will be discussed in more detail later in this section, but in this context it is sufficient to demonstrate that sites belonging to successive periods often occur in close proximity to one another - apparently without overlapping.

Consequently, the pattern of Copper Age and Argaric settlement in this zone and in Stratum 4 appears to be one of clustered settlement, with localized 'nodes' or core areas where the density of occupation is high, while intervening areas are characterized by little or no occupation. Again, the greatest densities of activity during the 2nd and 3rd millennia b.c. appears to have been in the line of hills skirting the edge of the lowlands. Copper Age and Argaric site totals for Stratum 5, as well as those for the Epipalaeolithic, Late-Final Bronze Age and Medieval periods are the highest of any stratum in the survey; the total of Ibero-Roman sites is the same in Stratum 1A and Stratum 5 (see Appendix 4:38).

STRATUM 6 (Appendices 4:16 - 4:23; 4:38)

This zone is the steepest and most dissected within Tier 1, and is found only sporadically in the sierras of Espuña, Tercia and Carrascoy. Although water is available in this area in the form of springs, runoff and ramblas, the steep slopes characteristic of this stratum make it difficult to control for agricultural purposes (such as irrigation). In the Carrascoy range, attempts have been made recently to check the destructive effects of the torrents which scour this zone (and land at lower altitudes) after heavy rains. Areas of arable land within Stratum 6, therefore, are limited not only because of the steep, dissected terrain, but also by the potential damage and destruction brought on by fast flowing water and flash flooding.

Prior to the survey only one site was reported in this area: the Argaric site of Los Picarios. The lack of information about this site, however, makes it difficult to evaluate whether or not the site is Argaric, and for that matter, whether the site is, indeed, a settlement. Attempts to locate this site on the ground were unsuccessful.

Only one sampling unit in Stratum 6 was investigated during the survey and no further evidence of prehistoric or historic activity was obtained. It does appear, however, that given: (1) the general lack of evidence for occupation in this stratum, and (2) the various factors (above) which would have adversely affected at least agricultural activity in the region, that Stratum 6 was sparsely occupied throughout the historic and prehistoric period.

STRATUM 7 (Appendices 4:24 - 4:31: 4:38)

This stratum marks the beginning of the upper hillzone or foothill area above 600 m and is characterized by fairly uniform and gently undulating terrain. The availability of water in this stratum is similar to conditions which are predominant in the lower foothills of Tier 2. Most of Stratum 7 is concentrated in the north-west corner of the survey area on the edge of the small upland basin which lies west of the town of

Aledo. Surface water supplies within Stratum 7 are not as plentiful as those in many other parts of the upland zone, but rainfall is generally greater in this area than in many lower lying strata.

No sites of any period were known in this stratum prior to the survey. Limited sampling and reconaissance in this zone, however, produced one Epipalaeolithic rockshelter, a Roman farmstead, and some isolated fragments of prehistoric pottery which could be either Copper Age or Bronze Age in date. Without further investigations it would be difficult to reach any firm conclusions about general activity in this stratum but at present at least, there is no evidence of any major concentration of settlement in Stratum 7.

STRATUM 8 (Appendices 4:24 - 4:31; 4:38)

The relatively steep and irregular terrain which makes up this stratum extends over a wider area than the previous strata, and is found not only in the Sierra Espuña and Sierra de la Tercia, but also along the upper slopes of the Carrascoy range. Like most of the upland region, water supplies are fairly abundant here, particularly near the peaks of the Sierra Espuña where rainfall reaches its maximum values within the Guadalentín Basin. Arable land, on the contrary, is less common in this zone and is restricted to fairly small pockets found between steep sided hills.

Sites known in this region before the survey include the prehistoric settlement above Cueva de la Moneda (which probably dates to the Bronze Age) and an Ibero-Roman/Medieval settlement at Aledo. Limited work in this stratum, on the other hand, produced evidence of Epipalaeolithic, Copper Age, and possibly Late-Final Bronze Age activity. The possible post-Argaric Bronze Age settlement, which was difficult to characterize precisely because of the small amount of material recovered, was located only a short distance from another Bronze Age settlement - the Cueva de la Moneda (which presented similar interpretive problems). An isolated example of Copper Age pottery was found in the Sierra de Carrascoy, along with a Roman/Medieval farmstead found in another part of the same range, just south of the Guadalentín River.

Although the density of occupation in this strata is not particularly high, it is significant that there are a variety of different types, and different periods of activity represented in this zone. The presence of an Epipalaeolithic rockshelter and two later prehistoric settlements in Stratum 8 suggests that further evidence from these periods may be forthcoming in the future.

STRATUM 9 (Appendices 4:24 - 4:31; 4:38)

Terrain in this stratum has the most abrupt and broken relief in Tier 3, and forms the uppermost part of the foothill zone. Stratum 9 is found in essentially the same areas as the previous strata but is much less extensive. Water supplies here are generally abundant, but arable land is very limited, and water control for agricultural purposes is difficult because of the accented relief and the torrential nature of many of the water sources.

No traces of historic or prehistoric activity had been found in this area before the survey, and limited sampling of this strata failed to find any evidence of occupation.

STRATUM 10 None of the 3248 500 m squares within the survey area had the characteristics of Stratum 10 (see Table 4:5)

STRATUM 11 (Appendices 4:32 - 4:38)

Above 900 m there are no areas in the survey which have dissection values below 4.00, since steep, dissected terrain dominates the whole of Tier 4. The first stratum in this mountainous upland region, therefore, is Stratum 11, which is concentrated near the peaks of the Sierra Espuña and Sierra de Carrascoy. Water is particularly abundant in the Espuña area, especially in the form of rainfall and natural springs - both of which are common in this zone; the Carrascoy region on the other hand is significantly drier. Many of the ramblas which flow through Tiers 3, 2 and 1 originate in this stratum.

Archaeological evidence was absent in this area prior to the survey, but the small number of sampling units devoted to this region did produce a rockshelter site with Medieval, Roman and prehistoric material (the last of these being hand-made coarse wares which appear to date to the Copper or Bronze Age). This small rockshelter, however, is the only site known in this stratum at the present time. Although the function (or functions) of the site are not clear, rockshelters of this kind are currently used by shepherds moving sheep and goat back and forth from seasonal mountain pastures. Equally, however, the site may have been used by small groups exploiting other resources in this region such as game, wood, and so on. A spring close to the site would have provided a reliable source of water for any individual or group using this shelter.

Without further research in this stratum it is obviously difficult to say how many more of these sites, or indeed other types of sites, there may be in Stratum 11. It is clear, though, from the evidence at this rockshelter that this part of the upland, at least, had been exploited at a variety of different periods.

STRATUM 12 (Appendices 4:32 - 4:38)

The last, and most severely dissected, stratum in this survey, is found exclusively in the Sierra Espuña at some of the highest points in the Guadalentín Basin. Although Stratum 12 is less extensive than previous strata, it shares many of its environmental characteristics such as abundant surface water supplies, high rainfall, and generally cool temperatures.

No sites were known in this stratum before the survey, and none were found in the one square which was investigated within this zone. The generally low density of occupation in both Strata 11 and 12 is also reflected in the pattern of present day settlement and land use in these mountainous regions.

IV. g. An Overview of Survey Results

The results of this survey, like many other regional studies, have confirmed some ideas and evidence, and challenged others. Bearing in mind the data from each stratum, therefore, it is useful to assess the impact of the survey - within the Guadalentín Basin itself, and, from a comparative perspective, in south-east Spain generally.

Beginning with the early prehistoric period the survey helped to identify a number of new Epipalaeolithic sites in the upland zones north of the Guadalentín River (Appendices 4:19 and 4:27). These sites consist of small rockshelters with backed blades and other microlithic tools and waste material. In a number of cases there are horse remains associated with these assemblages. All of these sites lie along the major routes of communication between the coastal lowlands and the more mountainous uplands. Likewise, all of them are located near areas which receive regular supplies of water - either through local rainfall or via ramblas. Furthermore, they are nearly always found at transitional points between low, uniform terrain and more dissected foothills. Judging by the quantity and variety of material from these sites it does seem likely that they were used as residential sites, if only on a seasonal or more temporary basis. Excavations will no doubt define the character of these occupations more precisely.

The location of the sites in well watered foothill zones and on major routes of access between upland and lowland suggests that they may be related to the exploitation of migratory herd animals. Herds of deer and horse, especially, would have been supported more easily in the Early Post-Glacial environments of this region, because of the more humid conditions which seemed to have prevailed at this time. Some confirmation of these conditions was provided by a Palaeolithic and Epipalaeolithic site found outside the survey area, to the north of Zúñiga.[7.]

The rockshelter of Zúñiga, some 1.5 km north-west of the village of the same name, lies just outside the survey area and only a short distance from the Epipalaeolithic sites found in Squares 81 and 146 (see Appendix 4:27). The schematic section of the rockshelter (illustrated below) indicates that the lower 4.5 m of occupation is dominated by a light coloured sediment with little organic material.[8.] Further up the profile, this light sediment was covered by a massive collapse of rock from the roof of the shelter. The rock collapse is in turn overlain by a darker grey-brown deposit containing enormous quantities of the terrestrial gastropod, <u>Helix</u> <u>nemoralis</u>.[9.] A similar sequence of deposits is known at other south-eastern Palaeolithic and Epipalaeolithic sites (Fortea Pérez 1973), one of which is the nearby site of Cueva Ambrosio, just across the border in Almería (Jiménez Navarro 1962; Ripoll Perello 1960-1961).

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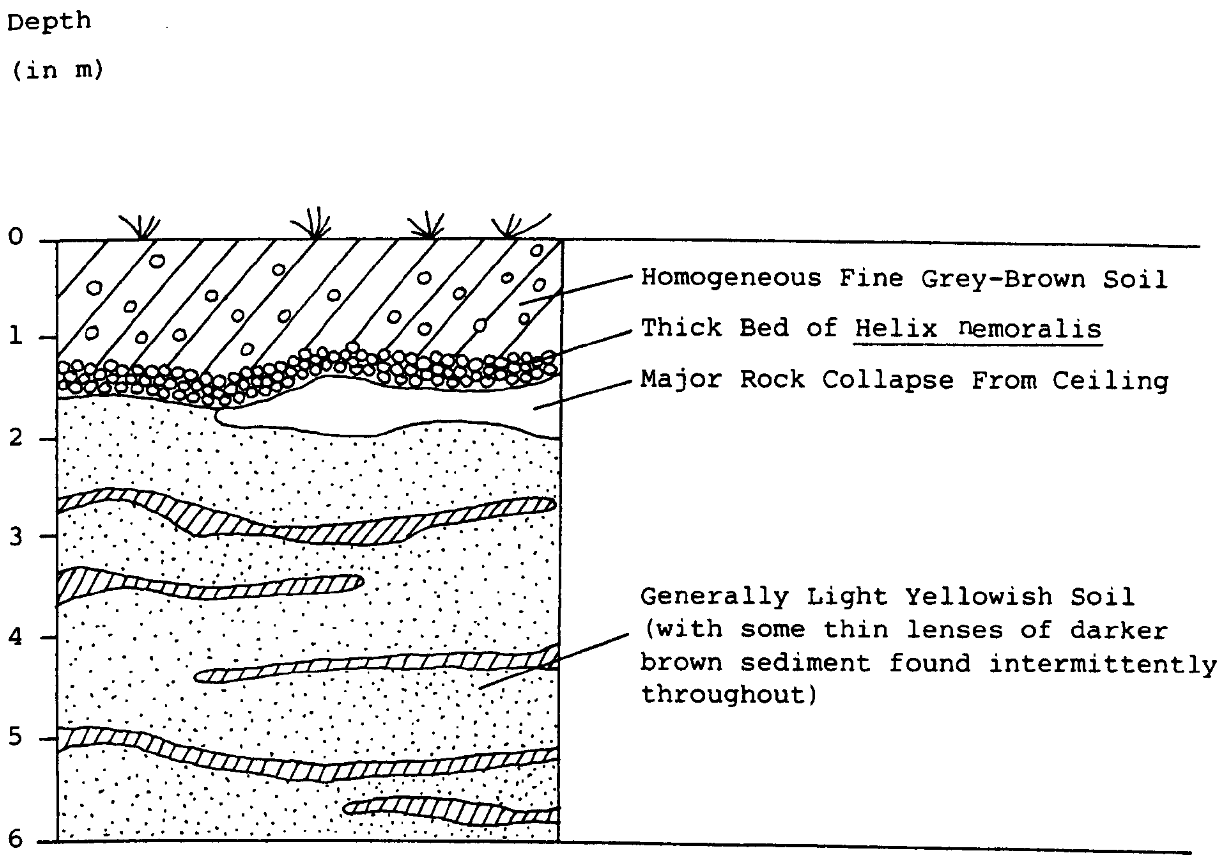
7. I owe a special thanks to Fernando and Jose Guerao Navarro for bringing this site to my attention and for their help in investigating the area in and around Zúñiga.
8. This large section, which measures some 1.5 x 1.5 m at the surface and c. 6.0 m deep, was the result of clandestine excavations at the site over a considerable period of time.
9. The differences between the lighter (lower) deposit, and the darker (upper) one, with respect to organic content, were measured by a loss on ignition test (Avery and Bascomb 1974) on several samples from these horizons. The difference between organic percentages in the upper, and lower, horizons was 1.58% and 0.72% respectively.

Figure 4:4

Schematic Section of Zúñiga rockshelter



One of the most significant aspects of this deposit is the fact that Helix nemoralis are indicative of warm, moist conditions and that they are characteristic of Early Post-Glacial occupations in many parts of Mediterranean Spain (Fortea Pérez 1973). Moreover, it is worth stressing that Helix was entirely absent in the lower 4.5m of this deposit, in contrast to the several thousand examples of this gastropod found in the upper, darker level. This sequence suggests that: (a) the lower deposit is Late Glacial and the upper one Early Holocene; (b) that during the Early Post-Glacial local conditions were both warm, and moist; and (c) that the change from cool, dry Late Glacial climatic conditions to those of the Early Holocene may have been fairly rapid.

A significant number of sites (some of which were found during the survey) lie outside the survey area in the vicinity of Zúñiga. Indeed, at least 5 other sites exist within 3 kms. of the Zúñiga rockshelter - one of them only 100 m away; some of these sites were reported recently by Lillo Carpio, M.J. and Lillo Carpio, P.A. (1983). Together with several of the sites found within the survey area (Squares 81 and 146 near Aledo), there is a clear pattern of Epipalaeolithic occupation in a wide 'horse-shoe' shaped arc around the upland basin between Lorca and Aledo. Furthermore, information from local collectors in the area suggests that more sites of this period are located near Lorca, on the edge of the basin, in a position which is very similar to those around Zúñiga.

Because this area constitutes one of the largest and most direct routes of access from the coast to the interior, it would have provided an ideal area for exploiting migratory herds - particularly since the wide gap in the mountains around Lorca (Appendix 4:1) gradually gives way to a series of small cul-de-sacs with narrow exit points cut by the ramblas which drain into this region. These ramblas lead out of the basin towards the upland pastures of the Sierra Espuña and other ranges (to the north/north-east) and the Almerian sierras (to the north/north-west). As Lillo Carpio M.J. and Lillo Carpio, P.A. (1983:3, 7) have noted, the Barranco de la Hoz, where the Zúñiga rockshelter is found, has historically provided one of the main transhumance routes between the coastal zone and nearby upland pastures. The consistent location of Epipalaeolithic sites at these topographic 'constriction' points on the edge of this upland basin suggests that these sites may have been used to control or monitor the movement of herds in a manner similar to that described by Sturdy (1975). Other sites in the foothill zone north of the Guadalentín River occur at similar constriction points and access routes, particularly around the Rincón de Yéchar and Rambla de Lébor near Totana.

At the present time, there is no evidence of Palaeolithic of Epipalaeolithic activity in contexts other than caves and rockshelters. While it could be argued that a range of open-air sites may have been obscured by geomorphic processes, or overlooked due to a lack of sufficiently intensive fieldwork, the results of this survey are consistent with a broader pattern of Epipalaeolithic occupation in many neighbouring regions of the south-east. In other parts of Murcia, as well as in the nearby provinces of Albacete, Alicante, Jaén and Almería, Epipalaeolithic settlement is heavily concentrated in the humid, upland areas and is sparse in drier, lowland zones (Fortea Pérez 1970, 1973; Aparicio Pérez 1979; Sarrion Montañana 1980; Asquerino and López 1981). This widespread pattern appears to have more to do with the ecological diversity and stability of the upland zone, rather than simply being the result of bias due to geomorphic processes and data collection methods. Furthermore, this pattern is confirmed by the distribution of Levantine rock-art in these same areas (Béltran 1982; 1968; Walker 1969; Ripoll

Perello 1967).

Further investigation of the Guadalentín, and Lorca-Aledo, basins is obviously a high priority and promises to produce a wealth of valuable information about the Late Glacial and Early Holocene - two periods which are still very poorly understood. In the meantime, survey work carried out in the Guadalentín Basin, as well as preliminary reconaissance in the Lorca-Aledo area, has: (1) helped to identify a considerable number of new sites; (2) offered some insights into exploitation and settlement of these regions during the Early Post-Glacial, and (3) hopefully, identified some fruitful areas for future research.

Neolithic

No mention has been made of this period thus far, largely because material of this period has not been identified in any part of the Guadalentín Basin during the course of the survey. Indeed, Neolithic occupation in Murcia as a whole has only been reported at two sites: first, the Abrigo Grande del Barranco de los Grajos near Cieza in the upper part of the Segura Basin (Fortea Pérez 1973: 237-239; Walker 1977: 363-377), and secondly, the Cueva de los Tollos, located on the Loma Negra near the coastal area of Mazarrón (Siret and Siret 1887: 17-20, Plate 2). Both of these sites produced small assemblages which may have been mixed with materials from other periods. However, both caves also produced examples of Cardial impressed pottery - one nearly complete vessel from Cueva de los Tollos and one fragment from Abrigo Grande. The latter site has produced a controversial date of 5480 ± 160 b.c., based on a combined sample of bone material from levels 1 and 2 - with Cardial and plain ware pottery respectively. Given the size of these two sites, and the quantity of material which they have produced, there is very little evidence of extended occupation in these areas during the Neolithic.

It might be argued that this general absence of Neolithic material is more apparent than real, and that sites of this period (particularly in the lowland zone) have not been identified because of the following factors:

(a) insufficient, and unsystematic, fieldwork

(b) site destruction by modern land use, construction, etc.

(c) the burial, or destruction, of sites by geomorphic processes

(d) a lack of information about the character of Neolithic assemblages and, hence, the absence of any distinctive 'type fossils' for identifying sites of this period

Turning to the first problem, while no evidence of Neolithic activity was found after systematic work in the Guadalentín Basin, it is certainly true that a great deal of unsystematic work has been carried out in the rest of the south-east. Nonetheless, this unsystematic research has consistently produced evidence of pre-Neolithic and post-Neolithic activity in many zones. Systematic work, in the form of excavations, has produced similar results.

Site destruction is another possible reason why so little Neolithic material is known in the south-eastern lowlands. In order to pursue this line of argument, however, it is necessary to assume that Neolithic settlement and exploitation patterns were somehow markedly different from those of other periods - and while this is possible, one needs to establish some reasons for believing this to be the case, either empirically or theoretically. In the upland zone of the south-east there is no evidence to suggest that the locations of Early and Middle Neolithic settlements were dramatically different from earlier periods - indeed quite the opposite. During the Late-Final Neolithic settlements are either: (1) subsequently occupied in the Copper Age (e.g. Los Castillejos - Arribas and Molina 1978) or (2) are found in positions which are similar to those of later settlements. It is worth noting that the sites in the arid lowlands which have tentatively been assigned to the Neolithic (e.g. Tres Cabezos, El Gárcel, Tabernas) also fit into this same pattern. The first two sites lie in hilltop positions very similar to those of later Millaran settlements - indeed, El Gárcel lies only a short distance downstream from the Millaran site of La Gerundia (Siret and Siret 1887; Gilman and Thornes 1984). The third site, Terrera Ventura, contains a deep Copper Age occupation (Gusi Jener 1975, 1976). Since Early, Middle and Late-Final Neolithic occupations throughout south-east Spain occur in areas which are also occupied in other periods, there is no good reason, at present, for suggesting that the general absence of Neolithic activity in the lowland zone is simply the result of the differential destruction and concealment of sites.

In other respects, the argument about site destruction can be turned on its head, since intensive tilling and exposure of lowland landscapes could just as easily be responsible for increasing Neolithic site totals, as reducing them. The fact that no Neolithic sites other than the two mentioned above have been reported in Murcia after more than one hundred years - and this in an area where agricultural activity and archaeological interest are both considerable - suggests that the low density of Neolithic activity in this region is genuine.

Some lowland Neolithic sites are known in the south-east, such as the Cardial site of Casa de Lara (Fortea Pérez 1973: 383-391; Soler García 1961). This site, however, is situated next to a former lagoon in a region which is considerably more favourable for settlement and exploitation than much of the coastal plain of Murcia and Almería. Moist climatic conditions (Neumann 1960) and diverse ecosystems predominate in the Villena area in contrast with the monotonous semi-arid steppes which characterize lowland environments further south. Indeed, within the semi-arid zones of the south-east, agricultural settlements have consistently been located in areas with large, reliable sources of water - throughout the prehistoric period (Gilman 1976; Chapman 1975, 1978; Mathers 1984a; Gilman and Thornes 1984). Therefore, it appears unlikely that Neolithic occupation in the south-eastern lowlands was not subject to similar constraints. On the contrary, it could be argued that early agricultural economies would have been particularly sensitive to the major limiting factors which characterize the drier lowland zones - especially the shortages of surface water.

Geomorphic processes - notably erosion and aggradation - have obviously played some role in the preservation and 'visibility' of different kinds of prehistoric sites and, consequently, must be considered as a possible reason for the small number of Neolithic sites known in the lowland zone at the present time. As studies by Gilman and Thornes (1984) have shown, however, these effects vary according to lithology, local relief, rainfall, and so on. Yet, despite the variety of local conditions which exist within the Guadalentín Basin, and within the semi-arid lowlands generally, there is still an absence of Neolithic sites in the area which cannot be explained away as the result of geomorphic processes. In fact, the reverse may well be true, since many sites are exposed by sheet wash, gullying and other forms of erosion. Thus, whilst, geomorphic processes are no doubt responsible for obscuring some types of sites, in some parts of the landscape, the systematic 'masking' of sites of a particular period is an entirely different kind of proposition. In order to adequately assess the impact of geomorphic processes it is necessary to have some idea of:

(a) what type(s) of sites are likely to have been obscured

(b) what factors influence the location of sites of different periods

(c) how effective various geomorphic agents may have been in erasing or concealing evidence of these sites

More importantly perhaps, arguments about the nature and effects of landscape change must be confined to specific, local circumstances and to local sources of variability. Arguments which hold true in such localized areas should not, however, be applied indiscriminately to an area the size of the Murcian and Almerian lowlands. While geomorphic factors may be responsible for the low density or absence of Neolithic materials in particular, localized areas, there is: (1) no reason to believe that this influence is any greater for sites of the Neolithic, than for any other prehistoric period; and that (2) the consistent absence of Neolithic activity in an area as large as the south-eastern lowlands suggests that alterations of the landscape in specific areas are insufficient to explain such a widespread pattern.

Finally, it might be argued that the apparent lack of Neolithic assemblages in the lowlands is due to the absence of any reliable or diagnostic materials with which to identify sites of this date. Following this argument, Neolithic artefacts may not have been recognized amidst the various assemblages which have been recovered thus far. However, Neolithic sites in neighbouring provinces such as Granada, Jaén, and Alicante, as well as upland regions of Almería, offer a reasonable guide to the type of assemblages one might expect in the coastal lowlands (Asquerino 1972; Martí et. al. 1980; Jiménez Navarro 1962; Olaría de Gusí 1974; Botella et. al. 1981; Arribas and Molina 1978; Menjíbar Silva et. al. 1981; Molina González 1970; Navarrete Enciso 1976; Rodriguez 1979; Asquerino and López 1981; Sarrion Montañana 1980). Evidence from Los Castillejos in western Granada (Arribas and Molina 1978), for example suggests that microlithic/microblade assemblages continued into the 3rd millennium, along with Impressed Ware type motifs on pottery, almagra wares and various Middle-Late Neolithic vessel forms. These features were entirely absent from the material collected in the Guadalentín survey, and to my knowledge, are absent in Murcia at the present time - except for the two sites mentioned previously.

There may be a case for suggesting that Neolithic occupation in lowland Almería and Murcia was somewhat different from Neolithic communities in the surrounding area (in terms of material culture), but at present no reliable evidence has been offered in support of such a proposition. A small number of sites, like Tres Cabezos and El Gárcel, have often been assigned to the Late or Final Neolithic, primarily on the basis that they are unlike Copper Age sites in the lowland zone, rather than on their similarities with demonstrably Later Neolithic assemblages (e.g. Gossé 1941; Bosch Gimpera 1969; Savory 1968). One feature which is anomalous in a Copper Age context, and consistent with a Late-Final Neolithic chronology, is the microlithic/microblade lithic industry at El Gárcel (Gilman and Thornes 1984: 19) - which includes geometric microliths as well as microburins. Two points need to be stressed, however, with regard to these sites. First, very few settlements fall into the category of possible Late-Final Neolithic sites (ibid). Secondly, it is worth bearing in mind that recent excavations at El Gárcel (Acosta 1976) have produced copper slag and other evidence of post-Neolithic occupation, as well as two radiocarbon dates which further reinforce the later (i.e. Copper Age) chronology for at least some levels of this site: (SUA-1173) 2170 ± 100 b.c. and (SUA-2145) 1900 ± 70 b.c.-(Walker 1985: 800).[10] Even if it can be demonstrated that a few sites like El Gárcel, Tres Cabezos and Terrera Ventura do date to the Late or Final Neolithic, there is only one site (indeed, only one vessel) from the whole of the lowland zone in Almería and Murcia which can be assigned confidently to either the Middle, or the Early, Neolithic (i.e. Cueva de los Tollos).

The argument here is not that Neolithic occupation is absent from the lowland zone, only that activities in this region appear to have been very sparse - in comparison with neighbouring upland zones - throughout the sixth, fifth and fourth millennia b.c.. Widespread, permanent agricultural settlement in the semi-arid lowlands appears to have been delayed until at least the terminal stages of the Neolithic, judging by available radiocarbon dates and artefact assemblages, (cf. Mathers 1984a). Even if sites such as El Gárcel and Tres Cabezos are classified as Late-Final Neolithic settlements, the density of occupation in the lowlands during the early third millennium would still be extremely low. Whether or not these ambiguous assemblages do date to the Late-Final Neolithic (i.e. before 2600 b.c. - using the Arribas/Molina chronology), there is a major expansion of agricultural settlement in the semi-arid lowlands shortly before the middle of the third millennium b.c. (see concluding chapter, and below). The question which arises, therefore, is why agricultural settlement in the Murcian and Almerian lowlands was delayed for such a long period. This important problem will be discussed in detail in the final chapter.

Copper Age

While no traces of Neolithic occupation were found within the research

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10. This evidence does not preclude the idea of earlier occupation at El Gárcel, however, as emphasized by Arribas and Molina (1978: 131).

area, evidence of Copper Age activity appeared consistently throughout the survey (Appendix 4:40). Before my fieldwork began in the Guadalentín Basin in 1980 only a small cluster of Copper Age settlements and one cemetery were known in this region - all from a restricted area along the Rambla de Lébor (Val Caturla 1948; Martínez Santa Olalla et. al. 1947: 13-23; Arribas 1956; Cuadrado 1930). Data collected in the survey, however, helped to produce additional information about Copper Age activity - not only around the Rambla de Lébor, but also in other parts of the Guadalentín Basin.

One of these areas, immediately adjacent to the Guadalentín River (i.e. Stratum 1A), produced some particularly valuable and unexpected results. The discovery of Copper Age occupation, first at Regueron Bridge (by Dr. M. Walker) and subsequently in other areas nearby, helped to confirm that, contrary to models of Copper Age settlement in the Guadalentín Basin, and in Murcia generally, some riverine areas were densely occupied during the third millennium b.c.. Furthermore, the high density and extensive nature of Copper Age settlement in the Librilla area contrasts sharply with other parts of the Guadalentín River (within the survey area) where there was no evidence of Copper Age materials.

This localized clustering of activity raises questions about why the distribution of sites along the river ought to be so restricted, and furthermore, whether this distribution does, in fact, accurately reflect Copper Age settlement and exploitation in this riverine zone. In addition, the reliability of this clustered pattern is called into question by the fact that fluvial zones - like those around Librilla - are often characterized by major episodes of 'cut and fill', which can both erode and bury evidence of prehistoric activity. Therefore, it is necessary to determine how Copper Age settlement in one part of the Guadalentín River relates to Copper Age activities in the riverine zone as a whole (i.e. within Stratum 1A). In order to evaluate this relationship it is useful to examine:

(a) details about the Librilla sites

(b) the nature of the physical environment immediately around these sites

(c) the characteristics of the riverine zone generally, and the long-term pattern of settlement there

One of the most important considerations in evaluating the visibility of Copper Age settlements around the Guadalentín River is the incidence, and magnitude, of flooding in this zone. Detailed, historical records of flooding are not available for the Guadalentín, but records for the nearby Segura River (Appendix 4:41) indicate that major floods have been a long-term and consistent hazard in the region. In October 1879, for example, the Guadalentín River overflowed its banks in a massive flood which is the largest ever recorded in Spain. This flood destroyed over 24,000 hectares of arable land, damaged or destroyed more than 3000 residential dwellings, and killed nearly 1000 people (Thornes 1976: 44; López Bermúdez et. al. 1978 - 1979; Torres Fontes 1962; Torras Uriarte 1946).

By keeping the water table at an artificially high level, irrigation has contributed to the increased incidence, and perhaps also the scale, of flooding in various parts of south-east (cf. Thornes 1976: 44-45). With such high ground water levels, the sudden input of rainwater in the form of torrential storms is often sufficient to overload the storage capacity of the local terrain and thereby initiate flooding. Whether or not irrigation was a major factor in promoting floods during the prehistoric period, the antiquity of floods and flood damage in the Guadalentín Basin is considerable, and undeniable.

The long-term impact of flooding by the Guadalentín River is well illustrated by the deep burial of all the Copper Age sites found around Librilla. The depth of the deposits on top of Copper Age occupation horizons varies from a minimum of around 4 - 5 metres to a maximum of about 15 metres. Most of the sediment overlying these Copper Age sites is a fine alluvium, but in some cases (e.g. along the Rambla de Librilla (or Orón)) coarse gravel deposits are also found. These deposits are generally composed of fine, horizontally stratified layers which suggest a regular pattern of inundation and deposition over an extended period of time, rather than low frequency events involving large quantities of deposited sediment. In one particular area, on the left bank of the Rambla de Librilla/Orón, an exposed section cut by this rambla has revealed a deposit which is some 10 m deep - containing Copper Age material throughout. This enormous amount of deposition suggests that landscape changes were quite marked in this area during the 3rd millennium b.c..

Several factors may be responsible for this colossal amount of deposition. First, the area in and around the Guadalentín River is still active tectonically (Montenat 1970), so that the periodic depression or sinking of areas near the river may have allowed them to accumulate unusually large amounts of sediment in a relatively short period of time (Cuenca Payá and Walker 1977: 72). More importantly, however, is the fact that two major tributaries join the Guadalentín River in precisely the areas where all of the Copper Age sites are found. The sediment load carried by these two ramblas and by the river is considerable (Gil Ocina 1968), owing to: (1) the large, turbulent flows of water which periodically occupy these water courses, and (2) the erodibility of the soft Quaternary alluvium cut by these different drainages. One factor which should be borne in mind when assessing the cluster of sites around the Rambla de Librilla/Orón and Rambla de Algeciras is the fact that despite the impressive accumulation of sediment in this zone, Copper Age materials are more abundant here than in any other part of the Guadalentín River. Inspection of large sections along the Guadalentín River suggest that the build-up of sediments in the Librilla area is not surpassed in any other part of the survey area. On the contrary, there are few areas which have anything like the accumulations of sediment at Librilla. Finally, as Butzer (1976:147) points out, alluviation tends to be dominant in downstream positions (like Librilla), because of less turbulent flows, gentler gradients, and reduced channel roughness. The longitudinal profile of the Guadalentín River (García Tornel 1968: 118, Figure 3) indicates that there is a fairly gradual slope in its bed between Lorca (upstream) and Librilla (some 45 kilometers downstream) - measuring 0.46%. Only a short distance further downstream from Librilla there are even more gentle slopes of 0.34%.

One point which should be clarified before any further discussion of the Copper Age sites at Librilla, is that there is no question of these materials being derived from another area, nor is there any doubt as to whether these assemblages were sorted or 'winnowed' in any significant way by fluvial processes.

Large objects such as querns, rubbers, whetstones, axes and other heavy tools are regularly found in these deposits, as well as very large fragments of pottery (c. 30 x 30 cms.). All of these large artefacts are associated with a range of smaller items including flint, human and animal bone, pottery and various deposits of organic material. None of this material exhibits the kind of 'rolled' edges or worn surfaces that one would expect from materials transported over long distances by water. In no case is there any evidence of lighter materials being deposited in one area, and heavy items in another. Likewise, the appearance of ash lenes and rubbish pits which contain Copper Age assemblages, or are directly associated with them, suggests that these materials have not been transported, but are part of in situ occupations.

Taking a broader view for a moment, and returning to the evidence gathered in the survey, intensive random sampling in Stratum 1A produced no evidence of Copper Age materials except around Librilla, and no Copper Age sites have been reported in other areas alongside the Guadalentín - either inside or outside the survey area. Interestingly though, evidence of later settlement found in Stratum 1A does help to shed some light on the possible reasons why Copper Age sites are concentrated around Librilla.

Iberian and Roman farmsteads, for example, cluster in two main areas within Stratum 1A. One of these clusters of farmsteads lies in close proximity to the Copper Age sites around Librilla. Another cluster of farmsteads, composed exclusively of Roman sites, is found on the opposite end of the survey area, north of the Sierra de Almenara. Each of these farmstead clusters lie in areas where the Guadalentín River passes only a short distance from the foothill zone. In between these groupings of farmsteads, the distance between the river and the surrounding uplands widens enormously, and in this sector no evidence of prehistoric or historic activity was detected. It is worth adding that in this sector, the land around the Guadalentín River is considerably drier than elsewhere, since there are no ramblas to contribute additional supplies of water, and no runoff from neighbouring foothills. This pattern suggests that riverine areas with upland zones nearby were particularly favourable for exploitation and settlement in the historic period, and judging by the Librilla sites - in the prehistoric period as well (albeit in a more restricted or selective way).

Coming full circle, and again raising the question of whether the sites around Librilla are a genuine reflection of Copper Age settlement in the riverine zone, it is worth asking whether there are any particular features about the Librilla area which would help to explain such a concentrated distribution of sites. Two outstanding and unique features of this area have already been mentioned: (1) the presence, and convergence, of two major tributaries within this zone, and (2) the narrow 'bottle-neck' with upland areas close by the river on both sides. Rainfall in this part of the Guadalentín drainage is also higher than in areas to the south-west (Appendix 4:2). In addition, there are several major curves or meanders both in the Guadalentín River and in the two ramblas (Algeciras and Librilla/Orón), which occur in and around the areas with Copper Age occupation (Appendix 4:13). These features would have helped to reduce the speed of the water passing through these drainages, and hence, would have made it easier, and safer, to utilize the large volumes of water emptying into this zone. Furthermore, the reduction in water velocity brought about by these bends or meanders helps to encourage the loss of dissolved or suspended sediment. This process can, periodically, make an important contribution to the fertility of riverine areas by depositing fresh layers of organic and inorganic materials. These depositional processes are yet another reason why there are such large accumulations of sediment in the Librilla area.

Given the unusual physical and environmental characteristics of the Librilla area, and the unique economic opportunities afforded by this zone, the high density of Copper Age settlement here begins to make more sense. Like many other 3rd millennium riverine sites in the lowlands (El Gárcel, El Barranquete, Los Millares, etc.), the settlements in the Librilla area appear to be using water control techniques for irrigating alluvial soils around the Guadalentín River. The extensive nature of occupation in this zone, and the apparently close spacing of sites, may have much to do with this pattern of exploitation. First, the 'linear' spread of occupation - especially along the Guadalentín River and the Rambla de Librilla/Orón (the latter for almost 1 km. in a fairly continuous line) - suggests that settlement tended to follow areas of cultivation. Secondly, the close spacing of individual sites may indicate either: (1) settlements which are composed of a series of discrete zones, occupied contemporaneously; or (2) short-lived shifts in the focus of settlement from one part of the riverine area to another. A similar type of settlement appears to have characterized the riverine cultivators of the Lower Colorado region in the American south-west:

> "The more permanent settlements were often situated on eminences in the valley which escaped inundation by the flood, or where projecting spurs of the mesas approached close to the river. According to the condition of the river sporadic seasonal movements took place. They were straggly settlements, sometimes of considerable size, but consisting of a few solid houses and more numerous shelters apparently scattered without plan".
>
> (Daryll Forde 1956: 249)

Whether these settlements represent seasonal residence sites like some of the Yuma occupations (above) still remains an open question. The settlements around Librilla also bear a close resemblance to the early agricultural communities described by Sherratt (1980: 315):

"Clusters of agricultural settlement were often widely scattered, but within them population was locally concentrated around critical resources such as fine-grained, well-watered soils. The implication of all this is that early agriculturalists occupied a narrow zone of maximum productivity, in an essentially small-scale though locally intensive system of cultivation".

The coincidence of fine alluvial soils and large, reliable water sources in the Librilla area would have made it a particularly attractive zone for cultivation if only on a seasonal basis.

Another major advantage of the Librilla area was its proximity to upland areas which could have supplied a variety of different resources including browse for animals, fuel, and raw materials for tool manufacture and construction. Indeed, it is significant that the only upland regions near the river which produced Copper Age materials were those in the vicinity of Librilla. Evidence from the upland zone around Librilla includes a major Copper Age cemetery in the foothills of Sierra de Carrascoy and an isolated Copper Age vessel from the upper slopes of the same range (see Appendices 4:13 and 4:28). This material provides further evidence that the high concentration of Copper Age activity around Librilla is genuine.

Before moving on to discuss the evidence for Copper Age occupation elsewhere in the survey area it should be noted that outside of Strata 1A, and throughout the lowlands of Tier 1, the volume of Copper Age material is extremely low. This generally low density of material is also reflected in a number of sites of other periods known in this region (Appendix 4:38). Generally speaking, when evidence of settlement and other activities is found in the lowland zone it is derived from areas closely associated with major water courses.

By contrast with the riverine area and the lowlands, Copper Age activity in the lower and upper foothill zones (Tiers 2 and 3 respectively), is more common and more evenly distributed. Within the foothills, however, Copper Age settlements are concentrated in areas with a specific set of characteristics. In general, these characteristics include:

(a) Major water courses

(b) A significant change in slope from irregular. dissected terrain to flatter, more even ground

(c) a concentration of low hills of various shapes and sizes (marking the edge of the topographic discontinuity noted in (b))

These Copper Age sites appear to be located in positions which make use of the largest and most reliable water sources in the foothill region. In addition, all of these sites appear to take advantage of their central position with respect to other major ecological-topographic zones: the lowlands of the valley floor and the more mountainous uplands. The major economic attraction of the former were the well-watered colluvial and alluvial deposits built up along the fringe of the foothill zone. Mountainous areas on the other hand, offer a variety of subsistence and other resources such as game, nuts, fuel, pasture and raw materials. Within the foothill zone itself a variety of locations were suitable for cultivation and water control, both in and around ramblas, and in small catchment areas watered by runoff. At the present time, Copper Age settlement in the foothill region of the Guadalentín Basin is restricted to the area north of the river.

The spatial relationship between Copper Age settlements and cemeteries in the survey area is a complex and variable one. In some cases, such as Los Blanquizares-El Campico de Lébor this relationship is a close one with only a few hundred metres between one and the other. A similar situation occurs in the case of the Copper Age settlement and cemetery found in Square 133, in the Sierra de la Tercia above La Hoya. Elsewhere, the relationship between settlements and cemeteries is less straightforward. For example, the densely clustered cemeteries around the Rincón de Yéchar, Mortí, and Alto de Cancari north/north-west of Totana do not appear to have any settlements directly associated with them. Several Copper Age settlements are found in the general area, however, including Juan Climaco, and an unnamed site a short distance away to the north-east (in Square 441). Since all of the Copper Age burials within the survey area were found within small rockshelters, the large distance between settlements and burial areas may simply reflect the lack of suitable rockshelter sites in the vicinity of the settlement. Certainly, where rockshelters lie near the site, the distance between a settlement and its cemetery tends to be relatively short. Generally, however, the distance between settlements and cemeteries appears to depend upon the distance between areas of arable land and areas with rockshelters.

The size, orientation and clustering of these rockshelter burials varies considerably from one area to the next. Besides human bone, some of the burials found in the survey contained marine shell; bone needles and spatula; perforated necklace beads of stone, bone and shell; flint blades, cores and debitage; and ceramics. A more detailed discussion of Copper Age burial practices in this area, and in the southeast generally, is included in the next chapter.

One of the most important facts about Copper Age settlement to emerge from the survey was the close proximity of Copper Age and Argaric sites throughout the foothill zone. The results from Strata 4 and 5, especially, indicate that in a number of cases there are negligible differences between the locations of Copper Age and Argaric sites and in some cases sites from these two periods are separated by a distance of only 100 m or so. This interesting relationship is outlined in more detail below, after a brief discussion of Argaric activity in the survey area.

Sporadic finds of various types were made in other parts of the survey area - notably in and around rockshelters in the foothill zone, where there is the greatest concentration of Copper Age and Argaric activity. These finds represent a range of different activities, and may date to either of these two periods. Generally, however, the sites are not large and do not appear to contain any large quantities of material. One interesting example of an isolated find which can be assigned to the Copper Age (because of the distinctive bevelled rim pottery discussed earlier) was found in an apparently mixed deposit of Medieval and prehistoric materials under the municipal prison in Totana. Further inspection of this section, however, would have been difficult without raising suspicions about my motives.

Bronze Age

Information about the Argaric Bronze Age in the Guadalentín Basin has accumulated gradually for more than 100 years. In addition to the well known sites of La Bastida and Cabezo Gordo, data about various other sites has gradually been added in an ad hoc way during the last 30 years or so. Unfortunately, much of this evidence has remained unpublished. Although only a few new Argaric sites were discovered in the survey, it is hoped that drawing together this new and old information will help to create a better, and more complete, understanding of Argaric settlement in the Guadalentín Basin (Appendix 4:40).

Like most of the classic Argaric sites along the coast of Murcia and Almeria, settlements in the Guadalentín Basin are generally situated on steep-sided conical hills. Access to these sites is often extremely difficult, and many of these hilltop sites present vertical faces on one or more sides (e.g. La Hoya and La Bastida). These locations contrast with Copper Age settlements which usually lie on low, flat-topped hills with easier access. Some Argaric occupations found in the survey, however, are not located in such steep and inaccessible positions. For example, the Argaric settlement on the south side of the Loma de Baraunda (south of the Guadalentín River) and the Argaric settlement?/occupation found near La Bastida (Square 440) both lie on fairly gentle and gradually sloping hillsides which do not appear to be defended by any natural or man-made features. Also, unlike Copper Age sites - which extend in an irregular fashion over large areas - Argaric occupations are characterized by dense and spatially concentrated settlement. In cases such as La Bastida (Martínez Santa Olalla et. al. 1947), and other Argaric sites outside the Guadalentín region (Lull 1983), there is evidence that hilltop sites have been artificially terraced in order to accommodate such densely packed occupation.

Another major difference between Copper Age and Argaric occupation within the survey area is the apparent lack of occupation in the lowland and riverine areas (Tier 1) throughout the Bronze Age. Evidence of Bronze Age activity is absent even in the lowland areas around Librilla where Copper Age occupation is particularly dense. Rather than focusing on the lowland or riverine areas of the Guadalentín, Argaric settlement appears exclusively in foothill zones. This emphasis on the hillzone areas of Tier 2 and 3, and the position of some Argaric sites in areas where there are no major water sources immediately around the site, suggests that an important shift may have taken place in economic strategies. Rather than focusing specifically or exclusively on ramblas and rivers as the main supply of water for irrigating crops, Argaric occupation in the hillzone area may reflect a change in emphasis towards the use of alternative water supplies - notably runoff from hillsides in the immediate vicinity of the site. (see discussion below).

Despite some of the clear differences between Copper Age and Argaric settlements, there are also a number of striking similarities which came to light as a result of the survey. First, Argaric sites, like the vast majority of Copper Age settlements, are concentrated in the foothill zone in localities which mark the transition between the lowlands and the mountainous uplands.

More importantly perhaps, many Argaric sites lie on the fringe of foothills at the edge of the valley - directly opposite, or in close proximity to, earlier Copper Age settlements. In such clusters or 'pairs' of sites, Copper Age settlements generally cover a larger area and are more accessible than the nearby Argaric occupations. This small scale shift in settlement from one hilltop to another may involve several possible considerations such as:

(a) the increased concern for defence (hence the choice of less accessible locations with a small, compact perimeter to defend)

(b) the advantage of cutting house foundations and other features (e.g. cisterns, water channels, etc.) into hard, less permeable sediments at a new site, rather than trying to construct such features in less consolidated, and more porous man-made deposits at a site which had already been occupied for a considerable period

(c) the maximization of land which could be used for cultivation by minimizing the surface area occupied by the settlement

The defensive character of both Copper Age and Argaric site locations should be emphasized, however, since traditionally, there has been a tendency to see dramatic differences between the two. Although Argaric settlements are consistently found in less accessible positions than Copper Age settlements, within the Guadalentín Basin and in south-east Spain generally - the differences between these two periods are those of degree, not of kind.

Within the foothill zone of the Guadalentín Basin the close proximity of many Copper Age and Argaric sites underlines the high degree of spatial continuity in settlement throughout the mid-third to the mid-second millennium b.c.. Indeed, when the settlement distributions for all periods are compared it can be seen that there are a limited number of areas that are consistently occupied throughout the historic and prehistoric period. Overall, these patterns suggest that there are only a few areas with favourable conditions for permanent settlement (i.e. with fertile arable soils and reliable water supplies), and that these areas are the foci for agricultural settlement over several millennia. Outside these favourable 'core' areas the opportunities for settlement were constrained by:

(a) less concentrated tracts of arable land

(b) less abundant and less reliable water supplies

(c) the substantial capital investments necessary to ensure consistent and stable production

In the past, the hillzone location of Argaric settlements has often been seen in strictly defensive terms with little or no consideration as to how the choice of such sites would have affected agricultural strategies (e.g. Hernández Hernández and Dug Godoy 1975). Gilman and Thornes (1984) have criticized this view suggesting that in choosing these hilltop sites, Argaric communities were making a compromise between (1) proximity to arable land (especially irrigable land) and (2) defence. It has already been argued above, that within the Guadalentín Basin the hillzone offers a variety of soil and water conditions which make it the most favourable area for agricultural settlement. In addition, settlements located in this zone would have had easy access to both lowland and upland resources.

The compromise between defence and proximity to irrigable land which Gilman and Thornes (1984: 180-181) speak of with respect to Argaric settlement strategies, therefore, depends very much on how one interprets cultivation methods. Although they give considerable emphasis to flood water farming (boquera) and irrigation (regadio) using flows from rivers and ramblas, Gilman and Thornes do not explicitly mention the use of more localized sources of water such as runoff from the hills surrounding many Argaric settlements. In their recent book, for example, Gilman and Thornes (1984:90, Figure 5.4) illustrate the site territories for La Bastida and El Campico de Lébor, in which footslope areas on the edge of the valley are listed as 'secano' or dry arable. The supply of runoff water from these areas, however, if harnessed, could have produced some significant (albeit localized) crop yields within some of these small natural 'catchments' - a practice which I have seen employed in the Guadalentín Basin and in the neighbouring Mula Valley. Moreover, within the hillzone area itself, there are a number of opportunities to utilize such runoff, particularly around the aforementioned sites where dissected terrain creates ample supplies of runoff and, equally, creates localized opportunities for cultivation. By employing techniques such as simple stone alignments, gridding, or small water channels, together with some rudimentary techniques of terracing[11.], supplies of runoff rainwater could have provided a useful supplement to other methods of gravity fed irrigation and water control. This is not to suggest that water control methods using runoff were of equal, or greater, importance than those using flows from rivers and ramblas, only that the range of techniques used to irrigate crops may have been more diverse, and have been used in a more spatially extensive way than Gilman and Thornes have suggested.

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11. Bearing in mind that there is evidence of terracing at many Argaric settlements (Lull 1983), though in the context of house construction rather than for agricultural purposes.

In this sense, the location of Argaric sites in hillzone areas may have involved certain economic advantages and opportunities, as well as strategic or defensive ones. Hence, the compromise between defence and irrigable land may not have been as great or absolute as Gilman and Thornes suggest. This point is emphasized by a number of Argaric settlements in the Guadalentín Basin[12.] which are not found near major water courses and do not appear to be in particularly defensive positions, but nevertheless are found in footslope positions where more extensive methods of water control (using runoff from nearby hills) may have been undertaken. Climatic conditions in and around the Campo de Lorca, where these sites are found, are virtually identical to the coastal area of Mazarrón where Gilman and Thornes (1984: 91-99) have stressed the importance of irrigation agriculture; rainfall in both areas is below 300 mm/year (see Appendix 4:2). While water control systems in the Mazarrón area may have been concentrated primarily around major water courses (e.g. at La Ceñuela, Cabezo Negro, and Ifre - ibid), this does not appear to be the case for many of the low lying Argaric sites in the Campo de Lorca (see list of sites below). Given the necessity for some form of water control in the latter area, and the general lack of major water courses in the vicinity of these sites, an alternative system of watering crops may have been developed. One such system could have involved using a number of small, dispersed catchments, rather than concentrating production in and around a river or rambla - a system which would have been spatially extensive, but energy intensive. While short-term energy investments may have been low, the cumulative costs of establishing, and maintaining, small, scattered 'facilities' (such as terraces, water channels, stone grids, etc.) would have been considerable. These costs would have been offset to some extent by spreading, and hence reducing, economic risks. Small, dispersed fields in the hillzone area (as opposed to large, concentrated ones in riverine areas) would have been less susceptible to major production failures due to crop diseases, pests and especially destructive episodes of flooding.

Later Settlement

Since the focus of this investigation is the period between the Neolithic

12. These sites include a range of settlements on the western fringe of the Sierra Almenara including La Alcanara, Cabezo Liron, Cabezo de las Piedras, Cerro del Moro and Pino Real (Ayala Juan 1977-1978; 1979-1980; Lull 1983: 303-307) and another low lying Argaric settlement found in the survey on the north-western edge of the Sierra Almenara.

and Middle Bronze Age, only a brief summary of the settlement evidence from later periods is presented below.

Late-Final Bronze Age activity in the Guadalentín Basin was difficult to evaluate in a detailed manner owing to the low numbers of sites which could be reliably assigned to this period. Although the Late and Final Bronze Age settlements from south-east Spain have been reviewed recently (Molina González 1978; Molina González and Roldán Herváz 1983) there are still very few sites in Murcia which provide any reliable data for this period. Excavations now underway at the site of El Castellar, however, will hopefully provide a better understanding of Late and post-Argaric development in the Guadalentín Basin.

Some of the sites which have been tentatively assigned to this period, like those near La Bastida and Cueva de la Moneda are in extremely defensive positions which make earlier, Argaric settlements look positively vulnerable by comparison. Both sites are situated on high and very steep hills. The former is protected by a large bedrock outcrop which almost completely encircles the settlement area. The latter, on the contrary, consists of a settlement mid-way up a steep slope, and a large enclosure on the summit of the hill. The enclosure is formed by a massive stone wall more that 50 m long and several metres wide, which protects the approach to this hilltop from nearby peaks which rise above it. No evidence of occupation was found within this enclosure. Other Late-Final Bronze Age sites, such as El Castellar, are not as inaccessible and lie on low hilltops near the edge of the valley.

Nearly all of the sites which appear to belong to this period were found in the foothill zone on the north side of the Guadalentín River, and apparently lack Early-Middle Bronze Age materials. The one low lying site which may belong to this period was found on the footslopes of the Loma de Baraunda south of Hinojar, some 2.5 km north-east of the Argaric site of Cerro de la Cueva de Palica.

Ibero-Roman sites were the most abundant in the survey area (Appendix 4:38) and were found over an extremely wide area. Farmsteads were particularly common and widespread. In the lowland zone (Tier 1) a major concentration of farmsteads was found near the Guadalentín River (i.e. Stratum 1A). Major settlements, however, again cluster in the foothill zone on the northern edge of the valley. Consequently, although Ibero-Roman settlement is more dispersed than in previous periods, this dispersion is largely due to the abundance of small farmsteads which form a network of secondary or satellite sites around major settlements like those at Librilla and Totana.

While Medieval sites were also found over a large part of the survey area, the distribution of these sites is somewhat more restricted than in the Ibero-Roman period. This may be due to the growth of large urban centres and the development of a more centralized pattern of settlement, resulting in a smaller number of isolated farmsteads. Part of the decline in farmsteads is reflected in the reduced number of sites in riverine areas (i.e. Stratum 1A). Major settlements, as in all previous periods, are concentrated on the northern edge of the valley.

CHAPTER V

SOCIAL EVOLUTION AND MORTUARY PRACTICES

After honest reflection it must be said that however detailed and systematic they may be, regional surveys, such as the one presented in the last chapter, ultimately provide a limited range of information about a fairly restricted area. In assessing survey evidence - particularly from the later prehistoric period - all of us are painfully aware that even the best case study reflects only a small part of a larger and more complex pattern. While the sore footed practitioners of field survey may find such appraisals humbling and unwelcome, there is no need to be unduly pessimistic about the contribution of survey evidence, providing it is used in combination with other types of data. In the case of south-east Spain, at least, it is rather defeatist and unproductive to argue that only more detailed field surveys and excavations will provide an adequate basis for tackling important large-scale problems. An alternative, and more positive, approach is to address such general questions by integrating various types of existing data: old and new, local and regional, domestic and funerary. In combination this body of data is greater than its individual parts and can be used to evaluate a range of different developments. There is little doubt, for example, that the survey evidence from the Guadalentín Basin has significantly greater value when placed in its wider cultural and geographic context. Consequently, the problem, and indeed the aim of this chapter, is to find an accurate way of evaluating this 'wider context'.

For a variety of reasons the prehistory of south-east Spain has, over more than a century, focused a disproportionate amount of attention on cemeteries and mortuary practices. Although more recent investigations have begun to adjust the balance of research towards questions of settlement and economy (Chapman 1975, 1978, 1984; Gilman 1976; Gilman and Thornes 1985; Lull 1983), funerary data is still by far the most widespread and abundant form of evidence from this area. In all, more than 2000 Copper and Bronze Age tombs have been excavated and published. The wide variety, and large numbers, of later prehistoric cemeteries in the south-east has made it one of the richest and most important sources of funerary data in the Mediterranean and temperate Europe. Logically, therefore, as I have argued elsewhere (Mathers 1984a), tombs are one of the best 'common denominators' with which to assess the cultural variability between different regions within south-east Spain.

In order to understand the diversity of mortuary practices in south-east Spain between the 6th and 2nd millennia b.c. attention must be paid to both the patterns of regional variation and the processes which brought about those patterns. As a result, it is essential to examine:

(a) differences between contemporary communities

(b) differences in the long-term patterns of development within various regions

In the following discussion a preliminary analysis of 2185 tombs (747 Copper Age and 1447 Bronze Age) reveals that there are pronounced regional differences in mortuary practices within south-east Spain - with respect to tomb contents, tomb architecture and mortuary ritual generally. Although these regional differences are particularly apparent when viewed from a long-term perspective, it is also clear that there are marked variations between contemporary groups. More significantly perhaps, is the fact that the processes which brought about regional differences in mortuary practices can be linked with other social, political and economic developments taking place at the same time. It is, therefore, the wide implications of mortuary ritual which are the ultimate objective of this chapter.

V. a. The Development of Mortuary Ritual (c. 6000-1500 b.c.)

Neolithic

Up until about the end of the 4th millennium b.c. it is difficult to evaluate funerary practices in any detailed or systematic way because of the limited amount of burial evidence from earlier Neolithic sites. Scattered human bones mixed with occupation debris have been reported from a number of Impressed and Incised Ware Neolithic sites in Andalucia and the Levante - all of these either caves or rockshelters (Pellicer Catalán 1964a; Martí Oliver *et. al*. 1980; Martí Oliver 1977; Asquerino Fernández 1975, 1976; Menjíbar Silva *et. al*. 1983). Evidence from these sites has led a number of investigators to conclude that many Neolithic sites in the south-east were used as both residential sites and cemeteries (Martí Oliver 1978; Asquerino Fernández 1976; Casanova Vaño 1978). In most cases human remains from these contexts do not appear to be associated with any recognizable features (such as stone settings, posts, etc.) nor do many appear to have been accompanied by grave goods. During the Early and Middle Neolithic it is usually a small number of bones - often in a very fragmented state - which are represented in any one horizon, rather than a complete, or nearly complete, skeleton.

Given the fact that at most earlier Neolithic sites human remains do not appear to be associated with any distinctive features or materials it is difficult to offer any definitive conclusions about mortuary rituals during this period. It may be that the sporadic occurrence of human bone in these cave and rockshelter sites is related to a preliminary stage in body treatment (such as defleshing by open-air exposure) rather than the final disposal of the corpse (cf. Barfield 1985). Whatever the case may be, the presence of human skeletal material on these sites deserves more careful attention.

In a few cases, however, there is less ambigious evidence of burial practices during the Early-Middle Neolithic. For example, at the Cueva del Agua, near Alhama in western Granada, Pellicer Catalán (1964a: 326) discovered a number of individual pit burials with bodies arranged in a crouched position. Grave goods associated with these interments included fragments of almagra pottery, bone and shell beads, as well as various limestone bracelets and 'anklets' (tobilleras). Molina González and Roldán Herváz (1983: 42) have noted that on the ankle of one of these inhumations was a typical limestone 'bracelet' decorated with incised parallel lines. Another clear example of an Early-Middle Neolithic burial is the double interment from La Sarsa (Casanova Vaño 1978; Asquerino Fernández 1976), described in Chapter III. Both La Sarsa and Cueva del Agua were used as residential sites as well as cemeteries, though it is not yet possible to tell whether these two activities were contemporaneous.

Despite the poor quality of data from the earlier part of the Neolithic in south-east Spain (c. 6000-3500 b.c.), it is possible to reach some general conclusions about mortuary practices during this period. First, residential sites are closely, and consistently, linked with the disposal of human remains, either in the form of:

(a) 'burial areas' immediately adjacent to occupation zones

<u>or</u>

(b) isolated pieces of skeletal material incorporated into levels primarily composed of domestic debris

In some cases, such as La Sarsa (Casanova Vaño 1978), both sets of circumstances are found at the same site (i.e. a and b above). Secondly, there is no evidence at this time to support the existence of other types of designated burial areas which were not directly associated with residential occupations - such as separate caves or rockshelters devoted exclusively to intering the dead. Finally, there is little sign of any pronounced differences in status amongst the burials from this period - though the burials from La Sarsa and Cueva del Agua suggest that we need to look more carefully at the problem of social ranking during this period. Most burials, however, show little sign of major energy expenditure, either with respect to the mode of burial or the type of grave goods which accompany them.[1.] This apparent lack of investment, together with the absence of any permanent visual marker for burials, does suggest that Early-Middle Neolithic groups in the south-east did not place a great deal of emphasis on institutionalized social ranking or on the veneration of ancestors. On the basis of similar evidence from Early Neolithic contexts at Franchthi Cave in the Greek Argolid, Jacobsen and Cullen (1981: 90) have concluded that:

> "Although negative evidence in part, the unmarked, intramural burials with relatively little indication of ritual elaboration or excessive expenditure of time and labour, viewed in conjunction with the apparent absence of a cemetery, may indicate that authority was personally attributed rather than vested in corporate descent groups..."

Mortuary data from the Late-Final Neolithic (c. 3500-2600 b.c.) is generally more abundant than in the preceding millennia, but unfortunately no less problematic (see discussion in Chapter III). Although a number of major problems are still unresolved, such as the chronology of Almerian round graves and the earliest use of megalithic tombs, available evidence does suggest that there may have been several different types of burial in use during this period - though not necessarily contemporary with one another. These various forms of burial include:

(a) pit/trench graves (Los Castillejos)
(b) passage graves (Río de Gor)
(c) round graves (Almanzora Basin)
(d) caves/rockshelters (Carigüela, Tontas, Majolicas)

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1. As a means of investigating material expressions of rank and status greater attention could be paid to the treatment of the skeleton itself, in so far as this might indicate different levels of energy expenditure on different groups or individuals - e.g. pre-burial exposure, partial cremation, or defleshing.

Regrettably, at the present time, the only one of these types for which there is any general information is (d).

Burials in caves and rockshelters continue into the Late-Final Neolithic and appear to be the most common form of interment during this period (Molina González 1970; Pellicer Catalán 1983; Botella 1973; Olaría de Gusí 1975, 1977a.). Like evidence from the previous 2 millennia or so, information about the arrangement and content of Late-Final Neolithic burials is not particularly detailed, so it is difficult to generalize about this period as a whole. Nevertheless, residential occupations in caves and rockshelters continue to be associated with the disposal of human remains.

As in the earlier Neolithic, there are some examples of sites with 'burial areas' which are distinct from occupation zones - even though both types of activity are found within a single cave or rockshelter. In the karst regions of Alhama on the western edge of Granada, for example, several caves and subterranean fissures have produced deposits of human bones and grave goods from their innermost recesses - areas which, according to Menjíbar Silva et. al. (1981: 64), 'are not appropriate for habitation'. One of the rock fissures from this area, known as Sima Rica, contained several individual burials - each associated with one or more ceramic vessels (Botella López et. al. 1981). A similar series of sites has been reported recently on the Granadan coast east of Motril (Menjíbar Silva et. al.1983), where again there are various habitation levels associated with non-descript scatters of human bone. The same association of occupation debris and skeletal material has been found at the Cueva de los Botijos and the Cueva de la Zorrera in the neighbouring coastal region of Benalmádena in Málaga (Olaría de Gusí 1977a). All of the sites above have produced a distinctive ceramic assemblage typical of the Andaluz 'Cave Culture'. On the basis of these assemblages, and in the absence of any absolute dates, these sites have been assigned to an 'advanced stage of the Neolithic' by their respective investigators.

Finally, there is evidence from a number of sites which suggests that corpses may have received considerably more preparation and attention in the Late-Final Neolithic than in previous periods. Botella (1973) has noted that a number of cranium and long bones from Cueva de las Tontas and Cueva de la Carigüela have traces of incisions and other markings made by removing flesh and muscle from a corpse. Molina González and Roldán Hervás (1983: 50-51) note that the 'ossuary' at Las Majolicas - associated with a level of ash - also contained a large number of bones with these types of cut marks. In addition, the upper part of a cranium from the Cueva de la

Carigüela appears to have been fashioned into a chalice or vessel (Botella 1973). Although this object was unstratified, Molina González and Roldán Herváz (1983: 51) state that its general context within the site suggests that it was derived from a relatively late phase of Neolithic occupation.

Whether this evidence indicates a general trend towards greater energy expenditure in mortuary ritual is uncertain. Systematic analyses of human remains from Early, Middle and Late-Final Neolithic contexts may help to provide a more conclusive answer. Certainly, by the time megalithic tombs are in widespread use, the manipulation of human remains for ritual purposes was common place, both in south-east Spain (e.g. the arrangement of skeletal parts in the El Barranquete tombs - Almagro Gorbea, M.J. 1973) and elsewhere (Shanks and Tilley 1982; Bradley 1984). Whether or not the Carigüela chalice represents a move in that direction has to be a matter for future research.

The significance of pit or trench graves in the Late-Final Neolithic is more problematic. Arribas and Molina (1978: 95) have made a brief reference to burials of this type from the Final Neolithic levels (VB) at Los Castillejos, noting that these interments are found within the settlement. The general importance of this form of burial in south-east Spain, however, cannot be evaluated in any detail until more complete evidence has been published. Nevertheless, it is significant that burials of this kind are found in Late-Final Neolithic contexts elsewhere in the Peninsula.

In Cataluña, for example, burials in pits and trenches are so common that they have given rise to the term 'Fosa Grave Culture' to describe Late Neolithic communities in this region (Muñoz Amilibia 1963, 1965; Ripoll Perelló and Llongueras Campaña 1963). More interesting is the fact that pit/trench graves also occur at the Final Neolithic site of Campo Real in Sevilla (Bonsor 1899). Here, there are two types of burial within the settlement area:

(a) single, extended inhumations in narrow, rectangular trenches (Bonsor 1899: 39, figure 39)

(b) disarticulated single (?) burials in silos (ibid: 38-39, figs. 37-38)

Given the recent suggestions that there is a close relationship between Central Andalucia and Western Granada - with respect to Late-Final Neolithic ceramic assemblages (Arribas and Molina 1978, 1979), and in a later context, megalithic architecture (Ferrer Palma 1981) - it is feasible that the connections between these two areas may also have been reflected in burial practices. Whether the tradition of pit/trench burials within settlements extended to other Late-Final Neolithic communities within south-east Spain is not clear at present. However, bearing in mind the somewhat peripheral geographic position of western Granada and central Andalucia vis-a-vis developments in eastern Granada, Almería and Murcia, it is possible that these burial practices were simply a localized phenomenon which did not affect other parts of the south-east. Indeed, during the subsequent Millaran period, western Granada and central Andalucia maintain close ties with one another (Arribas and Molina 1978: 134-136) and follow a pattern of development which is distinct from that of areas further east within the Millaran 'complex'.

The divergent character of development in central Andalucia, at least, is further emphasised by the Neolithic cemetery at Marchena discovered in the early part of this century (Mélida 1918). The Marchena cemetery consisted of at least 50 stone cists containing a range of grave goods which included numerous stone axes, flint blades and arrowheads, as well as ceramic vessels (Harrison 1977: 50).[2.] According to Harrison (1980: 151) the Marchena tombs appear to constitute 'a large cist cemetery of individual burials of Neolithic date'. Any possible relationship between these tombs and the round graves of eastern Almería - in terms of tomb architecture, grave goods and chronology - is, however, obscure.

Overall, Late-Final Neolithic mortuary practices show signs of both continuity and discontinuity with earlier periods. On the one hand, burials in caves, rockshelters, and fissures, appear to follow a similar pattern to that of the earlier Neolithic, as they continue to be associated with residential occupations. Remains from some Late-Final Neolithic sites, however, suggest considerable care and attention was given to the treatment of bodies before final burial - a development, which for the moment at least, has no parallel in the Early or Middle Neolithic. The significance of other types of burial evidence - including the interments at Campo Real and Los Castillejos, possible Late-Final Neolithic materials in megalithic tombs, and Almerian round graves - is difficult to evaluate in any definitive way at the present time. In general terms, however, available evidence does suggest that mortuary rituals were becoming more diverse, if not more complex, by the end of the Neolithic.

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2. Amongst these cists was one example of a Ciempozuelos Beaker (Harrison 1977: 50) which apparently belongs to a later phase of burial at the cemetery.

Evidence of major expenditures of energy (other than the evidence of defleshing above) is not particularly apparent in the funerary date for this period, nor is there any clear sign that social divisions were any more marked in this period than in the earlier Neolithic - either between groups or individuals. It is also worth noting that the burials of this period (excluding the possibility of interment in round graves and megalithic tombs) continue to lack any permanent visual marker with which to identify them above ground. Later Copper Age burials, in contrast to Late-Final Neolithic burials, were meant 'to be seen - not interred'.

Copper Age

Burial data from Copper Age contexts in south-east Spain (c. 2600-1800 b.c.) is widespread, fairly evenly distributed and extremely abundant. When taken as a whole this data confirms the fact that the funerary practices of Neolithic and Copper Age communities were substantially different from one another. On closer inspection, however, the contrasts in funerary ritual between these two periods are more difficult to evaluate - largely because so little is known about the transition between the Final Neolithic (c. 2900-2600 b.c.) and the Early Copper Age (c. 2600-2400 b.c.).

Despite this ambiguity, there is no doubt that the tradition of communal burial in megalithic tombs is the most prominent characteristic of Copper Age mortuary practices. Over the years, a number of investigators have argued that the construction of megalithic funerary monuments began - at least in some parts of the south-east - during the Final Neolithic (Leisner and Leisner 1943; Bosch Gimpera 1969; Molina González and Roldán Herváz 1983). These claims are based, not on absolute dates, but on the presence in some tombs of so-called 'early' materials, such as gypsum vessels, cruciform idols, flint trapezes, engraved plaques, 'Cave culture' pottery and shell bracelets. However, only a small number of megalithic tomb inventories published thus far (out of a total of more than 750) show any signs of such materials. Furthermore, all or nearly all of these artefacts are also known in later, Copper Age contexts (Leisner and Leisner 1943; Almagro Gorbea, M.J. 1973; García Sánchez and Spahni 1959).[3.] So,

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3. Perhaps the best argument for the use of megalithic tombs in south-east Spain during the Final Neolithic is the presence of impressed pottery 'recalling the styles of the Cave Culture' (Molina González and Roldán Herváz 1983: 66). However, this material is found in only one tomb - Los Castellones 6 - in the Río do Gor area of eastern Granada (Leisner and Leisner 1943: Taf.38, nos. 7-10). What is more, even if this ceramic material is indeed derived from, or related to, Cave Culture motifs, it should be remembered that decorated wares of Neolithic tradition survived into the earliest Copper Age levels at Los Castillejos (Arribas and Molina 1978: 55, fig. 14).

irrespective of whether or not megalithic tombs were used in south-east Spain during the Final Neolithic, it is clear that mortuary practices of this kind only became widespread in the latter half of the 3rd millenium b.c..

Megalithic tombs, like other types of burial practised during the Copper Age, display tremendous variability in tomb form, construction techniques, building materials, grave goods and energy expenditure. All of these features vary not only between regions and between communities, but also within individual cemeteries. Amidst this variability it is possible to detect a predominance of certain tomb types in some areas, such as:

Málaga	- large, elongated gallery graves
Southern Almería	- passage graves with circular/ovoid chambers and medium-long passages (often with additional internal and external features such as fore-courts, side chambers, baetyl enclosures, etc.)
Eastern Granada	- passage graves with pentagonal chambers and short passages
Eastern Almería	- small round graves without passage[4].

However the types of tombs used in all of these areas are by no means restricted to the form noted above - a fact which can be clearly demonstrated by the differences between tombs in the Los Millares cemetery (Leisner and Leisner 1943; Almagro Basch and Arribas 1963), and by the variability within, and between, cemeteries in the Gor-Gorafe region of eastern Granada (García Sánchez and Spahni 1959).

Other types of burial include interments in rock-cut tombs, fissures, caves and rockshelters (Pellicer Catalán 1957-1958, 1963; Fernández de Aviles 1946; Cuadrado Ruiz 1930; Berdichewsky Scher 1964; Nieto Gallo 1959; Soler García 1981). Generally, these types of burials are found in areas where megalithic tombs are sparse or absent. It would be overly simplistic, however, to suggest that the presence or absence of megalithic tombs in a given area was conditioned purely by local geological formations. On the one hand, megalithic tombs frequently occur in areas where there are numerous, alternative burial sites in the form of natural caves, rockshelters and fissures. As Los Millares, for example, Tomb 39 is a megalithic construction which actually utilizes a rockshelter in order to form the western half of its burial chamber (Leisner and Leisner 1943: 23,

4. Whether or not these tombs date to the Final Neolithic, at least some of them appear to contain later, Copper Age materials (Olaría de Gusí 1977 b).

no. 10); the Los Millares cemetary also includes a rockshelter burial in the strict sense (i.e. Tomb 56, Leisner and Leisner 1943: 54). In other cases, such as the Cueva del Plomo in coastal Murcia, burial is in megalithic tombs (A.M. Muñoz Amilibia pers. comm.), despite the possibilities of interment in rockshelters near the site. On the other hand, Copper Age burials in caves and rockshelters are common over much of Murcia, Alicante and Valencia (García del Toro and Lillo Carpio 1977; Ballester Tormo 1928, 1945; Arribas 1956; Fletcher Valls 1957; Pla Ballester 1958), even though raw materials for constructing megalithic tombs were available in many of these zones.

No doubt the type of burial adopted by Copper Age communities in any one region - whether in natural features (caves, fissures, etc.) or artificial constructions (rock-cut tombs and megaliths) - was influenced, to some extent at least, by local geology. A more powerful influence, however, was the level of energy expenditure which communities were willing to devote to funerary constructions, and to mortuary rituals generally. In this sense, burial in caves, rockshelters and other natural features is significant because it represents a more simplified, and less labour intensive, form of burial, when compared, for example, with that of megalithic tombs - a theme which will be returned to later in this chapter.

Despite the large number of cave and rockshelter burials which have been excavated in south-east Spain, there is little sign of any significant modification of these sites for funerary purposes. The only common form of man-made construction associated with sites of this type are the small retaining walls, or enclosures, which block off parts of a cave or rockshelter - or alternatively, seal their entrances completely. Revetment walls and blocked entrances, for example, are characteristic of the Copper Age burials found in the Guadalentín survey and in neighbouring areas (Soler García 1981). Of the few rock fissure burial sites known in the south-east, none, to my knowledge, have produced any clear signs of artificial enclosures, sealed entrances or other forms of construction. The apparent absence of such construction features may be due to the fact that the natural formation of many sites, with narrow and constricted passages, may have provided a sufficient physical barrier - in some cases making access extremely difficult (e.g. at Los Alcores - García del Toro (1980: 258)).

In comparison with burials in rockshelters, fissures and caves, interments in rock-cut tombs represent considerably greater investments of energy.

Burials of this kind are fairly uncommon in the south-east, however, and usually occur either as single, isolated tombs or in small groups (Berdichewsky Scher 1964: 100-121, 128-137, 143-147; Pellicer Catalán 1957-1958; Fernández de Aviles 1946; Espantaleón y Jubes 1957; Giménez Reyna 1946: 49-52). Generally, these rock-cut tombs are characterized by narrow trapezoidal or rectangular passages measuring some 2.0 - 5.0 m. long, and circular or ovoid chambers c. 1.5 - 3.0 m in diameter - dimensions which are equivalent to many megalithic tombs. As an additional feature, many rock-cut tombs have one or more small niches which have been carved out of the main chamber, like those in the Alcaide cemetery (Berdichewsky Scher 1964: 100, fig. 42, nos. 1-3, 5, 6). Other tombs of this type, such as the Cueva de la Loma de los Peregrinos in Murcia (Fernández de Aviles 1946) or the Cueva del Niño in Jaén (Espantaleón y Jubes 1957) have a niche or 'antechamber' associated with the passage. In some cases, there is evidence of a slab blocking the chamber entrance, or the opening of a niche. The complexity of burial rituals in rock-cut tombs is further enhanced by the fact that some tombs have been joined together by a small intermediate chamber or niche which links the main chamber of one tomb to the main chamber of the other. In effect this creates a single tomb with separate passages and several different chambers/niches (e.g. Alcaide III - Berdichewsky Scher 1964: 100, fig. 42, no. 6; and the Cueva del Niño/ Cueva de la Columna - Espantaleón y Jubes 1957).

Taken as a whole the skeletal evidence from rock-cut tombs suggests that several distinct types of interment were associated with these tombs:

(a) individual, extended inhumation burials located in chamber niches (both adults and children)[5].

(b) disarticulated child burials in passage niches

(c) crouched adult burials in the main chamber

In the 'twinned' rock-cut tombs of Cueva del Niño and Cueva de la Columna at Marroquíes Altos, all three types of burial were present. It is also notable that at both the Cueva de la Columna and the Cueva del Cerro del Greal (Pellicer Catalán 1957-1958), the crania of the dead were arranged in a radial pattern around the walls of the main chamber. Moreover, many of the skulls in the Cueva de la Columna were accompanied by ceramic dishes or bowls (Espantaleón y Jubes 1957: 167). Further evidence of body treatment, such as defleshing or cremation, is not available at this time.

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5. Niches associated with the chamber (as well as those connected with the passage) only contain the remains of adults <u>or</u> children, but not both.

Turning to mortuary practices generally, one particularly important development during the Copper Age is the emergence of formalized burial areas or cemeteries (Chapman 1981) - especially those containing tombs which were visible above ground. Although the distance between cemeteries and settlements varies from site to site, Copper Age burials are habitually found outside habitation areas in discrete, designated areas. Throughout much of the south-east, cemeteries are located in positions which are easily visible from the settlements with which they were associated. At some sites, such as Los Millares, Cueva del Plomo and others, there is a cluster of megalithic tombs located immediately adjacent to the fortified walls of the settlement. In other cases, such as the many rockshelter burials in the Guadalentín Basin (Chapter 4), or megalithic tombs in the Vélez Blanco and Gor-Gorafe areas (Motos 1918; García Sánchez and Spahni 1959), the spatial relationship between settlements and cemeteries is less direct. The location of cemeteries with respect to settlements, however, is difficult to evaluate in any general way at present because of the lack of reliable survey evidence.

For similar reasons, it is often difficult to determine which tombs or burial areas are related with which settlement - a fact which frustrates any attempt to systematically compare the 'size' of different cemeteries. Cemetery size in any case can be defined in several different ways (according to the number of bodies interred, the number of tombs, the spatial boundaries of the burial area, etc.) and there are numerous methodological problems in comparing cemeteries which are composed of different tomb types. Moreover, the dispersed character of many Copper Age funerary sites in the south-east, makes it difficult to tell when one cemetery begins and another ends. In spite of these difficulties it is clear that the large megalithic cemetery of Los Millares - with some 80 - 100 tombs - is unique within south-east Spain, if not within Western Europe. The unusual size of this cemetery, as well as some of its other distinguishing characteristics are discussed in more detail later in this chapter.

Like other aspects of Copper Age funerary ritual, the treatment and arrangement of corpses varies not only between cemeteries, but also within individual tombs. Appendix 5:2 for example, demonstrates how - in the Los Millares cemetery - the practice of partial cremation varied between tombs, and within them. While the incidence of burning and cremation is fairly low at Los Millares, this practice is found at a number of other Copper Age cemeteries in the south-east (Almagro Gorbea, M.J. 1965, 1973;

Arribas 1956). The presence of large deposits of ash, burnt bone and calcined grave goods suggests that at least some burning took place within the tomb at a time when there were exposed corpses or skeletons on the surface.[6]

Generally, the skeletons found in Copper Age burials are disarticulated and dispersed in an apparently disordered fashion. In many cases this scattering of human remains seems to have been a deliberate practice, perhaps linked with the symbolic loss of individual identity (cf. Bloch 1971). However, in other contexts the systematic arrangement of corpses or individual skeletal parts (such as crania or long bones) within a tomb may have been disturbed or destroyed by post-depositional factors such as:

(a) the subsequent reuse of a tomb for additional interments - which frequently involved the destruction or displacement of earlier burials

(b) the poor quality of research (excavation, recording and analyses) which is often associated with funerary sites in the south-east

Recent excavations at the megalithic cemetery of El Barranquete in southern Almería (Almagro Gorbea, M.J.1973) have indicated that although the vast majority of cadavers were disarticulated (either completely or in part), individual portions of the body were often arranged in a systematic way. The alignment of more than a dozen crania against the chamber wall of Tomb 7 (ibid: Plate XXIII), for example, demonstrates that at least some parts of the body were distributed in a consistent and organized manner. Although the grouping of skulls alongside the chamber wall is less common in the other 10 tombs excavated so far, there are some examples of this practice in nearly all of the Barranquete tombs (compare with evidence from rock-cut tombs above). Another common feature in this cemetery which points to the orderly arrangement and disposal of corpses is the presence of disarticulated interments which have been gathered together to form discrete clusters or bundles of human bone. These clusters are composed of post-cranial bones (mainly limbs and other large bones), together with a skull. The latter is frequently associated with one or more irregular, unworked stones which appear to be designed as a protective barrier around the head - especially in Tombs 4 and 5 (ibid: Plates X-XIII, and XV-XVIII, respectively).

In addition to the data from the El Barranquete cemetery, there is further

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6. This does not, however, rule out the possibility of preliminary burning of the corpse before final deposition in the tomb.

evidence of regular or prescribed patterns of body arrangement at Los Millares in the form of infant burials from several megalithic tombs. Although children make up only a small percentage of the total number of interments at Los Millares, and indeed from Copper Age cemeteries in south-east Spain as a whole, the importance of child burials is not so much in their numbers, but their consistent location within the tomb interior. At present, only three tombs at Los Millares have produced remains of children, but in each of these three cases child burials were associated exclusively with niches or side chambers immediately adjacent to the passage (Almagro Basch and Arribas 1963: 173). Because some passage niches and side chambers contain adult burials it is clear that these areas were not always reserved for children (ibid: 173). However, when burials of both children and adults are found in the same tomb, the two age groups are almost always separated from one another.[7.] Furthermore, child burials rarely occur in parts of the tomb where the interment of adults is common, such as compartments within the passage, the main chamber, or niches and side chambers associated with the main tomb chamber. Taken together, the evidence outlined above does suggest that, far from being an exercise in random bone dispersal, the distribution and arrangement of skeletons within Copper Age tombs often involved a considerable degree of structure and consistency.

Other information about the arrangement and treatment of corpses - either in megalithic tombs or in other forms of Copper Age burial - is lacking at present. Whether the flesh was cut away from the skeleton before final deposition, for example (as in earlier periods - see above), is unclear as osteological analyses of Copper Age remains have yet to reveal any clear signs of post-mortem incisions connected with defleshing (García Sánchez 1961; Botella 1973).[8.]

In some regions, Copper Age funerary rituals are associated not only with the interior of the tomb, but also the exterior - that is, in zones not directly connected with interments (such as forecourts, tumuli, and the general vicinity of the tomb perimeter). Evidence of ritual activity outside of the tomb or burial area, however, is relatively rare and is confined almost exclusively, at present, to passage graves in lowland

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7. See parallels for this practice in rock-cut tombs, see above.
8. Although Botella (1973) considers that the incised bone material from the Cueva de las Tontas (Montefrío), Cueva de la Carigüela (Piñar), and Las Majolicas (Alfacar), all dates to the Copper Age, Molina González and Roldán Herváz (1983: 52) have recently argued that the remains from all of these sites belong instead to the latter part of the Neolithic.

areas of Almería. These 'external' rituals take on a variety of different forms, including:

(1) stone stelae or pylons (located near the entrance or in some cases a considerable distance from it)

(2) stone forecourts (with or without pavements)

(3) baetyls and baetyl enclosures (attached to the tumulus or separate from it)

(4) linear stone alignments or 'avenues'

(5) deposits of broken pottery in and around the tomb entrance

(6) 'stone circles' or stone rows

A more detailed discussion of these features and their significance is included later in this chapter. It is interesting to note, however, that many of the more elaborate forms of external funerary ritual are associated with precisely the same cemeteries which have the most elaborate forms of internal funerary rituals (such as corbel vaulted chambers, stone roof supports, and painted plaster walls).

Finally, the grave goods from Copper Age cemeteries represent an aspect of mortuary ritual which deserves special attention. Throughout the later 3rd and early 2nd millennium b.c. in south-east Spain, funerary assemblages are characterized by a tremendous variety of objects. The diversity of material in individual cemeteries, and frequently within individual tombs, is often quite striking.

One important source of variability, for example, is the extensive range of raw materials found in Copper Age cemeteries (see Table 5:1). The most common types of raw materials are clay, flint, shell and bone. More 'exotic' items made of metal, semi-precious stone, ivory and so on are less frequent and have a more limited distribution. In some cases these 'exotic' materials appear to be restricted to one or two major cemeteries (such as ostrich eggshell, amber and jet - see Appendix 5.8).

While there are a large number of different raw materials present in Copper Age tombs, the range of artefacts which were made from these materials is greater still. Moreover, there is considerable variability within different artefact categories. The range of arrowhead types, ceramic-bone-stone vessel designs, decorative motifs and idols all provide examples of the tremendous diversity of form in Copper Age funerary assemblages.

Another major source of variability in grave assemblages is the distribution of different artefacts and raw materials, which is far from uniform

TYPES OF RAW MATERIALS FROM COPPER AGE CEMETERIES

Marine Shell

Decorated and Undecorated Animal Bone

Alabaster

Jet

Callais

Gypsum

Ostrich Eggshell

Ivory

Polished Stone

Ground Stone

Flint

Quartz

Copper

Arsenical Bronze

Decorated and Undecorated Clay*

Asbestos

Talc

Animal Teeth

Horn

Antler

Crab Claw

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* Mainly ceramic vessels, but also plaques, idols and other assorted objects.

in south-east Spain, especially when one considers the presence or absence of 'exotic' materials in different regions. The analysis of megalithic tombs later in this chapter makes it clear that only a few cemeteries contain any significant accumulations of exotic prestige items such as jet, amber, metal, alabaster, ivory or ostrich eggshell. This evidence points not only to the existence of local hierarchies based on economic and political power, but also the possibility of regional hierarchies connected with the control and exchange of prestige goods. In this context, however, it should be stressed that the marked differences in mortuary practices between the humid and semi-arid zones of south-east Spain (discussed in more detail below) provide the most striking example of hierarchization and differential development on a large scale.

Overall, Copper Age mortuary practices represent several major developments with respect to earlier periods. These developments can be briefly summarized as follows:

(1) the widespread emergence of formalized burial areas or cemeteries

(2) the growth of various regional funerary traditions (in tomb construction, grave goods, etc.)

(3) the increasing social divisions within individual communities, and between them (as illustrated by, for example, the different levels of energy expenditure on tomb construction, the differential access to raw materials, and so on)

(4) the intensification of exchange and the proliferation of prestige raw materials

(5) the significantly greater investments of energy in mortuary ritual generally

(6) the diversification of burial types, grave goods and methods of corpse disposal

Bronze Age

The emergence of individualized burial traditions in south-east Spain during the Early Bronze Age represents one of the most significant developments in the later prehistory of the region. By the first several centuries of the 2nd millennium b.c. the longstanding collective funerary rituals of Copper Age communities had been replaced by a new and very different set of mortuary practices. Although considerable emphasis has been placed on the transition from communal to individualized tombs (Chapman 1975, 1981a; Gilman 1976, 1981; Mathers 1984a & b), the structural differences between tombs provides only one of the many contrasts between Copper and Bronze Age mortuary practices. A comprehensive review of Copper and Bronze Age funerary data suggests that there are also major differences in body treatment, grave goods, social ranking, energy expenditure and standardization between these two peridos. The fundamental and widespread changes which characterize Bronze Age funerary rituals are briefly outlined below.

For many years, the chronology of different Bronze Age tomb types has been a matter of considerable debate and controversy. One of the most influential schemes for ordering Early and Middle Bronze Age tombs in south-east Spain has been put forward by Blance (1964, 1971) who divided the Argaric into an early phase characterized by cist burial (Argar A) and a later stage with predominantly pithoi or urn burials (Argar B). However, the widespread absence of dated materials and reliable stratigraphies, together with the fact that cist and urn burials frequently occur in the same horizon (e.g. at La Bastida - Martínez Santa Olalla _et. al_. 1947), have made it difficult to assess even the general accuracy of Blance's proposal, quite apart from the more specific, and controversial, arguments included in this scheme (cf. Coles and Harding 1979; Lull 1982, 1983; Chapman 1975). Recent excavations at the site of Fuente Álamo in eastern Almería (Schubart and Arteaga 1978, 1980, 1983; Arteaga and Schubart 1980, 1981), however, have provided a useful baseline for interpreting the evolution of tomb types in south-east Spain over much of the 2nd millennium b.c..

The earliest levels at Fuente Alamo, dating to c. 1800 b.c.[9], contain both rock-cut tombs (artificial 'covachos') and large stone cists (Schubart and Arteaga 1983; 63). Artificial 'covachos' consist of relatively small chambers which have been cut into the rocky slopes in and around Argaric settlements. The entrances to these tombs vary from small circular openings (e.g. Fuente Álamo Tomb 58 - Arteaga and Schubart 1981: 17, fig. 2), and wider, rounded, elongated ones (e.g. Zapata Tomb 1 - Siret and Siret 1887: Album, Plate 21), to those with a triangular form (e.g. Lugarico Viejo Tomb 3 - Siret and Siret 1887: Album, Plate 15). Details about the dimensions and internal appearance of these tombs are generally not available. However, all 'covacho' burials appear to have been sealed by one or more large slabs, which were designed to be placed at a slight angle, tilting towards the rear of these tombs. Artificial 'covachos' at Fuente

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9. Radiocarbon dates for the overlying horizons (composed of 3 levels - nos. 7-9) are 1730 $\pm$ 70 b.c. and 1650 $\pm$ 70 b.c., from Levels 7 and 8 respectively. The earliest horizon at the site (which includes 6 levels), has yet to be dated but Schubart and Arteaga (1983: 61) place the initial occupation of the site at or before 1800 b.c..

Alamo and other Argaric sites[10.] fall into 2 major types:

(a) individual burials (apparently of adult males)

(b) 'double' burials (one male and one female)[11.]

The artificial 'covachos' of the Early and Middle Bronze Age differ from the rock-cut tombs of the previous period in three major respects:

(1) 'covacho' burials are intimately associated with settlements

(2) the form of Bronze Age 'covachos' is far simpler than Copper Age rock-cut tombs

(3) Argaric 'covachos' rarely contain more than two or three individuals, and never more than four

Despite these differences, Schubart and Arteaga (1983; 62) have drawn attention to the fact that Early Bronze Age 'covacho' tombs may have arisen out of local Copper Age traditions of cave and rockshelter burial. They see Argaric 'covachos' as essentially a form of burial similar to the previous period but adapted to individualized interment. Moreover, they argue that the early chronology of 'covacho' burials is confirmed not only by their position in the Fuente Álamo stratigraphic sequence, but also by the presence of archàic items such as wristguards, 'V' perforated buttons, and a single stone 'idol' (resembling a baetyl) in these tombs - elements which can be paralleled in many Copper Age funerary assemblages. However, the number of these items in Argaric contexts, and indeed the number of 'covacho' burials, is still very small. The longevity of 'covacho' burials in south-east Spain is uncertain at present, but they are clearly contemporary with the earliest cist tombs. On the other hand, judging by the evidence from Fuente Álamo, pithoi or urn burials are absent in the initial stages of the Argaric.

Later levels in the Fuente Álamo sequence reveal an increase in the number of cist tombs but a general decrease in their size. These smaller cists persist into still later levels when ceramic pithoi appear for the first time. Schubart and Arteaga (1983: 63) have noted that within the third horizon at Fuente Alamo - dated to c. 1650-1550 b.c. - there is a notable increase in the number of female interments, to the extent that burials of women make up the majority of tombs in this horizon. Somewhat later, at a time when cist tombs are still present and pithoi burials are first

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10. For a list of such sites see Arteaga and Schubart (1981: 20-21)

11. The double burials from the recent campaign of excavations at Fuente Alamo have each contained one adult male and one juvenile female (Schubart and Arteaga 1983: 63).

beginning to appear, there is a predominance of infant burials, which are entirely lacking in the previous horizons.[12.]

Despite the preliminary nature of the investigations at Fuente Álamo, the deep and continuous deposits at this site, together with the published radiocarbon dates, have finally made it possible to trace the development of Bronze Age mortuary practices in a controlled context. Effectively this sequence represents evolution of the three major types of burial in the south-east during the Argaric. Furthermore, it helps to clarify the chronological relationships between 'covacho', cist and pithoi burials. While this developmental sequence can, no doubt, be applied to many Early and Middle Bronze Age sites in the core area of the Argaric (situated in the lowlands of eastern Almería and southern Murcia) it is likely to be less suitable in other areas where there are significant differences in mortuary practices - particularly with respect to tomb types.

Apart from cist tombs, which are common throughout south-east Spain during the Bronze Age, there are some notable differences between the types of tombs used in the coastal zone and those in the upland interior. In Granada, for example, 'covacho' tombs appear in considerably greater proportions than in littoral regions, and unlike examples from the latter area were generally cut into sterile soil rather than rock (e.g. Cuesta del Negro - Molina and Pareja 1975; Molina González and Roldán Hervàz 1983: 95-98; Cerro de la Encina - Cabré Aguiló 1922; Torre Peña and Saéz Perez 1975; Cerro del Culantrillo - García Sánchez 1863: 72, 75, 76). Another significant characteristic of Argaric funerary traditions in Granada is the almost total absence of burials in pithoi - at present only found at the sites of Cerro de la Virgen (Schüle and Pellicer 1966) and Cerro del Culantrillo (García Sánchez 1863). Finally, the variety of tombs used in Granada during the Early and Middle Bronze Age seems to have been far wider than in the drier coastal regions nearby. Carrasco Rus (1979: 268) notes that there are a dozen or more different forms of burial in this area during the Argaric. The vast majority of tombs in Granada, however, do appear to be either cists or 'covacho'/pit burials.

Moving north-northwest from Orihuela to the Segura Basin and finally into Jaén, Argaric tombs are characterized mainly by cists and pithoi - as in the 'core' area further south (Vañó Silvestre 1962: 103-105; Fúrgus 1909,

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12. Schubart and Arteaga (1983: 63) stress that these results are based on a fairly small number of tombs (17 in all) and are therefore only tentative.

1937; Torre Peña and Aguayo de Hoyos 1979; Malaquer de Motos 1974: 63-64; Ayala Juan 1979; Cuadrado Díaz 1945-1946). In regions of the south-east which were peripheral to the central area of Argaric development - both in geographic and cultural terms - Bronze Age interments are often found in 'archaic' types of burials which were commonly used in the Copper Age, such as caves (e.g. Nerja - Pellicer 1963) and megalithic tombs (e.g. Los Castellones 14 - Leisner and Leisner 1943: Taf. 48, no. 1). Areas such as western Granada and Málaga, where these burials are found, generally exhibit greater continuity between the Late Copper Age and Early Bronze Age, than many regions further east. Within the 'core area' of the Argaric, centred on eastern Almería and southern Murcia, there is no clear evidence of Copper Age cemeteries (either megalithic tombs or caves/ rockshelters) being used in the Argaric. In light of this fact, it is interesting to note that Argaric materials are found in two important Copper Age cemeteries in southern Almería - El Barranquete (Almagro Gorbea, M.J. 1973) and Los Millares (Almagro Basch and Arribas 1963; Leisner and Leisner 1943).

One final point about Early and Middle Bronze Age tomb types which should be emphasized is that even within the Argaric 'core zone' there is some limited variation in the kinds of tombs used. Some of the less typical forms of burial here include the following:

(a) cadavers lacking any form of protection (e.g. La Bastida Tomb 70 -Martínez Santa Olalla *et. al*. 1947: 108-109)

(b) interments covered by a single slab (e.g. La Bastida Tomb 58; ibid: 105)

(c) bodies surrounded by a small, low stone enclosure (e.g. La Bastida Tombs 85 and 100 - ibid: 113-115) or larger, higher enclosures (e.g. at Cerro de la Virgen - Molina González and Roldán Hervåz 1983: 94)

(d) individuals laid out on a triangular or ovoid platform of irregular, unworked stones at the base of a 'covacho'/ pit burial (e.g. El Picacho 'Fosa' 2 and 3 - Hernández Hernández and Dug Godoy 1975: 92-99)

Overall, however, the number of these burials is very small indeed, since many of the tomb types above occur only at one site, or as single, isolated examples[13].

The treatment and arrangement of cadavers in the Argaric is essentially

13. The so-called 'tumuli' burials from San Anton de Orihuela in Alicante (Fúrgus 1909, 1937) may simply be a case of mistaken identification since the standard of excavation was very poor, the tombs were not illustrated, and as Lull (1983: 337) points out, the debris overlying these interments may simply be the result of a wall collapse. In any case, 'tumulus' burials of this type are not found at any other Argaric site.

the same for each type of tomb, and in each different geographic area. Almost without exception, bodies are found on their side in a crouched or fetal position. In nearly all cases where the arrangement of skeletons has been recorded, the bones are in positions which are anatomically correct and show no signs of deliberate disarticulation. The only disarticulated remains from Argaric contexts are the result of double burials which involve two phases of interment. In such cases, the burial of the second (or later) corpse often destroyed or disturbed the original position of the primary interment. Despite the large numbers of Early and Middle Bronze Age tombs which have been published there is no clear evidence of defleshing or cremation during this period.

Grave goods generally occur at either the head or feet, and often both. In addition, objects such as daggers, halberds, knives and other weapons are found around the waist, or across the chest. In some cases, funerary goods associated with an individual include various animal bones which appear to be offerings of food (see Appendix 5:5). Preliminary reports from the recent excavations at the Argaric settlement of Cuesta del Negro indicate that animal remains are particularly abundant in the tombs from this site.

> "In the richest tombs at Cuesta del Negro there are large quantities of foodstuffs, which in one case consists of 8 lambs, or small goats, together with a cut of beef. Although the scale of provisions in other tombs is not as great, the majority of burials do have a leg of lamb or goat associated with them. It is notable that two tombs from the same house produced several eagle bones, which according to A. von den Driesch could have some mystical-religious significance".
>
> (Molina González and Roldán Hervás 1983: 98)

The dog skull found in an Argaric tomb near Ubeda in Jaén (Vano Silvestre 1962), may also be related to funerary rituals which involve more abstract or complex symbolism, since the animal remains in this context do not appear to be offerings of food. At present, the use of unmodified animal remains in Argaric tombs - either for the provision of food or for other symbolic purposes - is confined to the more humid upland regions of the south-east (see Appendix 5:3). On the contrary, evidence of this kind is entirely absent in the semi-arid lowlands of the Argaric hearland.

The number of individuals contained in Argaric tombs varies from a minimum of one to a maximum of four[14]. Individual burial is by far the most common, however, followed by a significant number of double interments, and finally by a handful of tombs containing 3 or 4 individuals. Status differences between individuals of different age and sex can be seen in a number of cemeteries (e.g. Cuesta del Negro - Molina and Pareja 1975; Molina González and Roldán Herváz 1983; and El Argar - Siret and Siret 1887; Lull 1983). There are also clear differences between individuals of the same age and sex, for example, the widely variable funerary inventories of adult males at El Argar, or the contrast between the extremely rich child burial at Cerro de la Encina (Molina González and Roldán Herváz 1983: 104) and other infant burials which are devoid of grave goods (e.g. La Bastida - Martínez Santa Olalla et. al. 1947). Although they are present in the Copper Age, child burial becomes a systematic and widespread feature only in the Middle Bronze Age. Present evidence from south-east Spain suggests that infant burials are rare or absent in the Early Bronze Age. The proliferation of child burials in the latter part of the Argaric suggests important social and political changes which will be discussed shortly.

Another consistent feature of Argaric tombs is their location within the settlement area itself, usually under the floors of domestic dwellings or near their foundations. Except in 'peripheral' regions such as western Granada and Málaga (where Argaric burials are sometimes found in caves, rockshelters and megalithic tombs), there is a direct spatial connection between cemeteries and settlements. Indeed, the association of burials with occupation areas is characteristic of Argaric communities in the south-east. In addition, Argaric interments, unlike earlier Copper ones, were not intended to be visible above ground.

Finally, the grave goods included in Argaric tombs provide a rich and detailed source of information about mortuary rituals and social development during the Early and Middle Bronze Age. To begin with there are several outstanding characteristics which distinguish Argaric grave goods from those found in Copper Age collective cemeteries. Some of these characteristics include:

(1) the almost total absence of decoration on shell, bone, metal, ceramic and stone objects

(2) the disappearance of ritual objects such as idols, plaques, vessels of stone, bone, gypsum, ivory and alabaster, and figurines

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14. The only Argaric burial known at present with four individuals is a 'covacho'/pit interment (Tomb 1) from the site of Cerro del Culantrillo in Granada (García Sánchez 1963: 26).

(3) the proliferation of new types of objects - particularly weapons (e.g. halberds, swords, spiral bracelets, headbands, and new forms of axes and daggers)

(4) the general elimination of more common types of raw materials such as shell, bone, flint and ground/polished stone

(5) greater standardization of artefact types and artefact forms

(6) greater quantities of metal including copper, arsenical bronze, tin bronze, silver and gold

(7) greater quantitative and qualitative differences between individuals (e.g. with respect to the number of prestige items contained in each tomb, the diversity of raw materials, etc.)

(8) Ceramic assemblages dominated by carinated vessels - many with a metallic-like burnish

(9) the appearance of new ceramic vessel forms such as Argaric 'copa' or chalices, and 'tulip' form pots

Although some objects such as the stone idol from Tomb 58 at Fuente Alamo (Schubart and Arteaga 1983: 62-63), and the 'V' perforated buttons from Tombs 202 and 407 at El Argar (Siret and Siret 1887: Plates 41, and 48) represent some degree of continuity between Late Copper Age funerary assemblages and the earliest Argaric ones, the differences in the form and content of grave goods in these two periods is far more striking (Appendix 5:1). Many artefacts commonly associated with Copper Age tombs, for example, disappear completely and abruptly in the Bronze Age: fine flint blades; concave based, and other forms, of flint arrowheads; bone spatula, combs and segmented pins; decorated ceramic vessels; objects made of ostrich eggshell, talc, asbestos, amber, and jet; bangles of marine shell; and stone bracelets, plaques, discs, polishers and hammers. Other items such as bone awls, polished axes and flint flakes are almost non-existent in Argaric funerary contexts. The artefacts and structural features which had been associated with 'external' tomb rituals in the Copper Age (including baetyls, external stone enclosures, stelae, stone rows or circles, and 'avenues') are also absent. The only evidence of ritual activity outside Argaric tombs is the presence of objects such as ceramic vessels - often fragmented chalices - immediately beside or above the burial.

The range of raw materials in Argaric tombs also shifts dramatically towards more 'exotic' items which are generally rarer in the natural environment and more difficult to produce - especially metal artefacts. Gold, copper, and arsenical bronze objects are found in significantly larger numbers in Argaric tombs, while silver and tin-bronze items which now appear in tombs for the first time), also become widespread.

Finally, despite improvements in technology (especially metal and ceramic production) and the introduction of some new raw materials and artefact types, the diversity of Argaric funerary assemblages is considerably less than in the Copper Age. The standardization of grave goods in south-east Spain during the Early and Middle Bronze Age can be seen not only in the elimination of many raw material types previously used in the Copper Age, but also the 'streamlining' of artefact types into a fairly limited number of categories. Interestingly, the standardization of mortuary practices generally, and grave goods in particular, appears to be most developed in the semi-arid lowlands of eastern Almería and southern Murcia. Elsewhere, and particularly in more peripheral areas such as western Granada and Málaga, the uniformity of tomb types and grave goods is considerably less pronounced.

In summary, Bronze Age burials represent fundamental and rapid changes in all aspects of mortuary rituals: from tomb construction and cemetery location, to body treatment and grave goods. The displacement and elimination of many features associated with collective burial practices is not so much a process marked by slow or gradual shifts in material culture, but rather one which is punctuated by fairly swift, discontinuous changes.

The social and political reorientation represented by these developments is extremely important, and as most investigators agree, indicates significantly greater levels of social differentiation and inequality (Chapman 1975, 1981a; Gilman 1976, 1981; Mathers 1984a and b; Molina González and Roldán Herváz 1983; Lull 1983). As Lull (1983) has pointed out, the process of hierarchization continues throughout the Argaric, with the social divisions between individuals growing larger through time. He sees this process culminating with the emergence of child burials, and particularly rich child burials, in the terminal stages of the Argaric. Since the chronology of Argaric tombs and funerary assemblages is not very precise, and because Lull's conclusions are largely based on date from one cemetery (i.e. El Argar), it would be unwise to apply this scheme uncritically to the whole of the Argaric. Nevertheless the rich inventories from many Argaric tombs do indicates that wealth and status had become increasingly concentrated and centralized by the first centuries of the 2nd millennium b.c. - a process which showed little or no signs of slackening until the latter part of the same millennium.

Throughout this discussion of Early and Middle Bronze Age funerary practices it has been clear that although the Argaric represents a greater degree of uniformity in material culture than in previous periods, there are still important regional differences - particularly between the humid and semi-arid zones of the south-east. In the next section, which focuses specifically on a comparison and contrast of Copper and Bronze Age mortuary practices, these regional differences are treated in more detail. The main objective here is to evaluate 2nd and 3rd millennia funerary rituals from an inter-regional perspective, paying special attention to two main themes:

(a) the spatial and temporal differences between various parts of south-east Spain

(b) some of the processes which brought about these differences

V.b. Inter-Regional Variability in Copper and Bronze Age Mortuary Practices: An Assessment of Spatial and Temporal Patterning

Over the past ten to fifteen years archaeological analyses of funerary rituals have undergone a certain 'loss of innocence' as various well-rooted assumptions have been disturbed or abandoned altogether. More recent attempts to understand the complexity and significance of mortuary practices have made it clear just how difficult this task can be, even when data has been collected in a controlled and systematic way (Bloch 1971; Bloch and Parry (eds.) 1982; Huntington and Metcalf 1979; Humphreys and King (eds.) 1981; Bradley 1984; Hodder (ed.) 1982; Chapman *et. al*. (eds.) 1981; Tainter 1975, 1978; Bartel 1982).

The quality of mortuary data from south-east Spain makes this task even more problematic for several reasons, among them:

(a) the lack of a precise chronology for ordering tomb types and funerary assemblages

(b) the reuse of collective burials over a long period of time, and consequently, the difficulty of relating particular objects to particular individuals

(c) the less than ideal methods of excavation and recording which were used in collecting much of this data

On a more positive note, however, there is a very large quantity of information about Copper and Bronze Age burials in south-east Spain. Moreover, in geographic terms the data covers different areas within the south-east fairly evenly, and is therefore likely to give a reasonably accurate impression of regional variability. Rather than discard this enormous volume of data in a 'baby and bathwater' fashion, the following discussion attempts to identify several general patterns in time and space which should be reliable despite the myriad of interpretive obstacles noted above. These general patterns are based on a preliminary analysis of 747 Copper Age tombs[15] and 1447 Bronze Age ones.

In order to evaluate the development and variability of 2nd and 3rd millennia mortuary practices, the next section has been divided into several sub-sections, beginning with a discussion of spatial patterning - first in the Copper Age, and then in the Argaric. This is followed by a detailed evaluation of funerary rituals through time, and finally, by a general assessment of the processes behind these spatial and temporal patterns. The latter section is an attempt to link developments in ritual to a range of social, political and economic changes taking place at the same time.

Despite the amount of attention which has been devoted to interpreting mortuary practices in south-east Spain during the 2nd and 3rd millennia b.c., there have been few systematic syntheses of 'raw' data, and no comprehensive or comparative analyses of regional variations. Given the bewildering volume of information available, and the variety of interpretive problems presented by this data, the lack of such research is perhaps not surprising. The problem in the past has been that regional variability has been discussed in terms of typological features, rather than the cause-and-effect of cultural processes. Smaller scale, and more detailed, investigations such as Chapman's (1975, 1981a) study of the Los Millares cemetery, however, have pointed to the value, and potential, of mortuary data from this area - 'warts' and all. Inevitably, examination of the rather unique and complex site of Los Millares has raised a host of questions about the nature of other cemeteries in its immediate vicinity, and in the region as a whole. Consequently, it

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15. Because some traditions of tomb construction are widespread in south-east Spain and others are not, it has been impossible to ensure that all types of Copper Age burial are equally represented in this data set. In this analysis passage graves are the predominent form of burial because they are more abundant than other types (fissures, rockshelters, caves and rock-cut tombs) throughout much of the south-east, and because a large, and extremely valuable catalogue of such tombs was already available (i.e. the 1943 corpus by G. and V. Leisner). Future work will hopefully incorporate a wider range of burial types and a broader geographic area.

is essential to address the problem of how important centres like Los Millares are related to other cemeteries in the south-east, and on a more general level, how funerary traditions vary from one region to another. In order to examine these issues, the following discussion focuses on 3 general, but related, themes:

(a) the amount of energy devoted to funerary rituals in different geographic areas

(b) the complexity or diversity of those rituals

(c) the acquisition and consumption of resources on a local, regional and inter-regional scale

Energy Expenditure and Funerary Rituals

Ever since the pioneering cross-cultural investigation of Saxe (1970) and Binford (1971), studies of mortuary practices have consistently emphasized the importance of labour investments for understanding social ranking, status and organizational complexity generally (Kinnes 1975; Renfrew 1973; Startin and Bradley 1981). In a series of recent studies using 103 enthnographic case studies Tainter (1975, 1977, 1978) has reaffirmed Binford's proposition that:

> "...the form of mortuary ritual will be determined by, among other factors, the size and composition of the social aggregate recognizing obligatory responsibilities to the deceased... Directionally, higher social rank of a deceased individual will correspond to greater amounts of corporate involvement and activity disruption and this should result in the expenditure of greater amounts of energy in the interment ritual. Energy expenditure should in turn be reflected in such features of burial as size and elaborateness of the interment facility, method of handling and disposal of the corpse, and the nature of grave associations".
>
> (Tainter 1978: 125)

While different methods have been used to calculate the number of man-hours involved in constructing funerary monuments (e.g. Ashbee 1970, Atkinson 1955, 1961) as yet none of these have been applied to the construction of Copper and Bronze Age tombs in south-east Spain. In any case, measures of this kind are normally used to rank individual interments or individual tombs. The approach used below focuses not so much on the different levels of energy expenditure within a cemetery, but on the variations between cemeteries. This more generalized view of ranking is not only more practicable given the data at hand, but also shifts the focus of research to a problem which, to date, has received very little attention - i.e. the ranking of cemeteries on a regional scale.

In order to address this question it was necessary to find some generalized measure of energy investment which would be appropriate to the mortuary evidence used in this analysis. The assumption made in the following discussion is that three variables can be used as a gross indication of energy investment in Copper Age cemeteries:

(a) Tomb Size
(Dimensions of internal features such as the chamber and passage)[16].

(b) Tomb Construction
(the range of internal and external features)

(c) Tomb Contents
(the range of artefact types and raw materials)

Within an individual cemetery, the overall scale, complexity and diversity of these variables is taken as an indication of the investments made in funerary rituals.

It should be noted that there is not always a direct relationship between the size of a tomb, the complexity of its construction and the range of grave goods it contains - even within a single cemetery. Nevertheless, it needs to be emphasized that all of these variables must be taken together as a measure of energy investment, rather than used selectively or in isolation. Moreover, when comparisons are made between cemeteries rather than between individual tombs, the patterns of regional variation become clearer. Finally, it should be stressed that these three measures are only designed to detect gross differences in energy investment between regions.[17].

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16. The dimensions of mounds or tumuli are difficult to calculate in most cases either because they have been badly eroded or destroyed completely.

17. Inevitably these proxy measures of energy expenditure involve certain methodological problems, since some or all of the variables would have changed through time. For example, the size and complexity of a tomb might have increased because of periodic additions or modifications, while the diversity of grave goods could have been altered by the constant addition of new materials. Moreover, the degree of change in any of the three variables above would have been affected by the amount of time that a particular tomb or cemetery was in use. While not wishing to explain away these difficulties, this analysis is mainly concerned with the Copper Age as a whole, rather than particular phases within it. Also, with regard to the longevity of various cemeteries, there is little sign of any radical local or regional shifts from one type of burial to another within the Copper Age. This fact, together with the incidence of the same characteristic artefact types at more than one site (e.g. Beakers, decorated plaques, phalange idols and concave based arrowheads) supports the idea that most of the Copper Age cemeteries in South-east Spain were roughly contemporary with one another.

Tomb Size and Funerary Rituals

The results of the analysis of tomb sizes are shown in Table 5:2 and Appendix 5:5. Obviously, measures of the interior surface area or the total length of walling would have been a more accurate and satisfactory way of comparing tomb sizes, but until better quality data is available this general calculation offers one of the most useful, and reliable, ways of assessing size differences. While this measure is fairly crude, it does provide us with the opportunity to compare the general level of energy expenditure in different Copper Age cemeteries.[18]

Several major conclusions emerge from this analysis. First, larger tombs (i.e. those with a total value of 9.0 m or more) consistently occur in the more arid regions of south-east Spain. Both the average and the maximum size values reach their peak in this drier zone. Furthermore, cemeteries in areas of low rainfall appear to be either very large (i.e. 9.0 m or more) or fairly small (i.e. 5.0 m or less), with few cemeteries displaying values in between. In more humid areas the average tomb sizes are considerably smaller, and generally have a more even spread of values. A few large tombs do occur in these moister regions but they are usually isolated examples in cemeteries dominated by smaller tombs, and overall are not nearly as numerous or concentrated as they are in the drier areas.

Collectively, this data strongly suggests that the amount of energy devoted to tomb construction did vary significantly from one area to another within south-east Spain, and that the scale of labour investment was greatest in areas with the lowest rainfall. It is also significant that the largest of these tombs are associated with the most elaborate and labour intensive construction features - both inside and outside the tomb.

Tomb Construction

The different levels of investment in funerary ritual are also clearly visible in the diversity of tomb construction features found within the

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18. The measurement of tomb size is based on a gross calculation of Maximum Tomb Length (i.e. maximum passage length + maximum chamber length) + Maximum Tomb Width (i.e. maximum chamber width). This general formula was used because of the difficulty of applying other more exact measures of tomb size uniformly throughout the whole of this data set. Due to the variable, and often poor, quality of data concerning tomb dimensions more precise methods of measurement were not appropriate.

INVENTORY OF CEMETERIES WITH LARGE SIZE VALUES

Cemeteries with Average Size Value of 9.0 m or more (based on 3 or more graves)	Cemeteries with Average Size Value of 9.0 m or more (based on 1 or 2 tombs)
Los Millares (82)	Cerro de la Graja (1)
Loma del Campo de Mojácar (3)	Cabecito de Aguilar (1)
Las Peñicas (3)	Loma de la Rambla de Huéchar (1)
El Barranquete (10)	Loma de Belmonte (1)
Los Ruriallos (3)	Loma del Llano de las Eras (1)
	Rambla de los Pozicos (1)
	Llano del Juncal (1)
	Cañada del Muro (1)
	El Charcón (1)

(Figures in brackets refer to the number of tombs on which this calculation was based)

NB. Nearly 80% (i.e. 79.27%) of the tombs from Los Millares, for which there are figures available, had size values of 9.0 m or more

Also, 60% of the tombs at El Barranquete, for which there are figures, had size values of 9.0 m or more south-east. In the more humid regions of Granada and Almería most tombs lack any complicated internal features and fewer still have any traces of external construction (Appendices 5:6 and 5:7). On the other hand, cemeteries in the semi-arid lowland zone often contain tombs with elaborate internal and external features (Appendices 5:6 and 5:7). Millaran Copper Age cemeteries in eastern and southern Almería, for example, are characterized by a wide range of elements inside and outside of the tomb proper. Without any doubt, the diversity of internal and external components associated with these tombs make them the most complex funerary constructions in south-east Spain.

One particularly important aspect of tomb elaboration is that cemeteries which have a large number of labour intensive construction features - such as side chambers, forecourts, blocking slabs and portholes - tend to be fairly rare. What is more, cemeteries of this kind are generally concentrated in the more arid regions of the south-east. Indeed, the most notable examples of complex, labour intensive constructions all come from areas which average less than 300 mm of rainfall per annum, namely: Los Millares, Loma de Belmonte, Almizaraque, El Barranquete, Las Peñicas, Rambla de Tejera and Cabecico de Aguilar. More significantly perhaps, the greatest proportion of these elaborate tomb constructions are found in zones where the rainfall is at its lowest - that is to say, the Upper Andarax Basin (Santa Fe de Mondújar, Alhama de Almería, Rambla de Huéchar) where rainfall averages 240 mm/yr., and the Níjar Desert where it falls to 230 mm/yr., both in southern Almería. Elsewhere, such as Purchena in the Almanzora Basin, and Laborcillas and Fonelas in northeastern Granada, there are also examples of tombs with complex constructions, though they are less frequent and generally less labour intensive than tombs in the more arid zones.

Another significant aspect of tomb elaboration which varies between different regions is the division of space within the tomb. In many of the more humid zones of the south-east (i.e. with an average annual rainfall above 300 mm/yr), tomb interiors are relatively simple and in most cases have not been divided into sub-sections, nor do many of them contain physical barriers such as sealing slabs, portholes, or masonry blocking walls. The situation in areas with less than 300 mm of rainfall is very different. Here, the segmentation of tomb interiors is commonplace. Often passages are divided into several compartments which are separated from one another by portholes, and these are in turn sealed with masonry or stone slabs. Further examples of segmentation include side chambers, niches and ante-chambers, stone dividing walls or dividing slabs associated with the main chamber and the blocking of forecourts, passages, chambers, ante-chambers, niches and side chambers. This 'compartmentalization' is a pronounced feature of Copper Age funerary constructions in the more arid zones of the south-east, but is almost completely absent elsewhere.

The same dichotomy between humid and semi-arid zones can be seen in the frequency of external tomb features and external funerary rituals (exemplified by large deposits of ash and pottery in and around the tomb entrance). Again the vast majority of cemeteries which show signs of these external constructions and rituals are concentrated in areas with low rainfall. Although the number of cemeteries in which these features occur is fairly small, in the more arid zones at least the majority of tombs in these cemeteries have some form of external feature - especially Los Millares. In moister regions of the south-east, examples of funerary constructions and ritual activities outside of the tomb proper are confined to a very small number of cemeteries and tombs.

Tomb Contents

Grave goods represent the final, and most problematic source of information about the expenditure of energy in funerary rituals. Unlike the other two types of data discussed above, calculations of labour investment based on grave goods have a number of problems associated with them, and hence provide less clear-cut results. Part of the difficulty of assessing the level of energy expenditure represented by grave assemblages is the fact that there is very little information about the source of various raw materials. Consequently, it is difficult or impossible to determine the relative cost of procuring each material. Moreover, there has been little experimental work to determine the amount of energy necessary to produce different items. Nevertheless, it is possible to compare the range of materials deposited in different cemeteries, and come to some general conclusions about the overall energy investments in various areas.

One important regional pattern which emerges from a comparison of grave assemblages in different regions is the fairly dramatic difference between higher order centres in the semi-arid zone (e.g. Los Millares and Almizaraque) and other contemporary cemeteries in the same region (see Appendix 5: 8). The former are characterized by a wide variety of decorated items and 'exotic' raw materials which include, among other items, ivory and ostrich eggshell imported from the Maghreb in north-west Africa (Gilman 1975, Harrison and Gilman 1977). Lower order centres, which are far more common in the semi-arid zone, contain fewer exotic objects and raw material types. In the humid zones, however, the differences between cemeteries are less sharply defined. Unlike sites in the semi-arid lowlands, cemeteries in the moister uplands show little sign of any marked concentration of prestige goods. Moreover, cemeteries in the uplands tend to have, on average, a greater range of materials per site than in the lowlands.

An overall comparison of 'exotic' raw materials and artefact types reveals that there are clear differences between the humid and more arid regions of the south-east, at least on a presence-absence basis. Although materials such as jet, amber and ostrich eggshell are restricted to cemeteries in the semi-arid zone[19.], the quantity of these materials is low, and their distribution is limited to one or two major cemeteries. Other prestige materials such as ivory, copper, alabaster, gypsum, Beakers, flint daggers, and so on, are either more abundant, more evenly distributed, or both.

Although still in its initial stage, a preliminary analysis of selected types of exotic artefacts and raw materials - based on the total number of objects rather than on presence-absence data - has produced results which are broadly similar to those presented in Appendix 5:8. That is to say, generally speaking, figures for the total number of objects support the conclusion that exotic materials and artefacts are more evenly distributed in humid areas than in drier areas. In the latter, a small number of sites contain a very large percentage of the total for any given object or type of material. For example, the two sites of Los Millares and Almizaraque alone, account for almost exactly 50% of all metal objects found in cemeteries in the semi-arid region (99 out of 199). Other examples of this pattern and a more detailed discussion can be found later in this section in the context of resource procurement and 'consumption'.

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19. One discoidal ostrich eggshell bead was found in Level VIII at the Cueva de la Carigüela near Piñar in eastern Granada (Pellicer Catalán 1964b: 39). Although this level was originally considered by its excavator to belong to the Early Copper Age, a more recent evaluation of the Carigüela stratigraphy has placed this horizon in the Late Neolithic - that is, in the second half of the 4th millennium b.c. (Molina González and Roldán Herváz 1983: 36). The precise context of the bead was not given, but it appears to have been associated with occupation debris rather than with funerary activities.

Finally, it is particularly significant that in the drier parts of south-east Spain many of the largest, and most elaborate tomb constructions are found in cemeteries which contain a high proportion of exotic artefacts and raw materials. The significance of these relationships will be taken up at the end of this section.

Complexity and Diversity of Funerary Rituals

As the preceding discussion has demonstrated, the elaboration of Copper Age funerary rituals varies significantly within south-east Spain. While the focus of attention has been primarily on regional variations in tomb size, construction features and grave goods, there is also significant variability on a more localized level. This type of diversity is clearly visible, for example, in some of the larger tomb groups in the south-east, such as those in the Upper Andarax and Lower Almanzora Basins in Almería, and those near Gor, Gorafe, Fonelas, and Laborcillas in Granada.

Apart from the four main elements of funerary ritual discussed above (tomb size, internal and external construction features, external funerary rituals, and exotic artefacts/raw materials), there are several other major sources of variability in Copper Age funerary traditions. These can be briefly summarized as follows:

(1) the distance between a settlement and its respective cemetery

(2) the orientation and distribution of individual tombs within a cemetery

(3) the raw materials used to construct tombs

(4) the different types of tombs found in a single cemetery[20].

(5) various types of body treatment given to individuals in a single tomb, or in a cemetery generally

(6) the range of artefact types and variants of those types (with regard to form and raw material type)

(7) the arrangement of specific skeletal parts or the position of the body as a whole

(8) the composition of a tomb with regard to the age of those intered and the number of individuals present

(9) the number of tombs per cemetery

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20. For example, at Los Millares there are round graves, gallery graves, passage graves and rockshelter burials together in one cemetery.

Nearly all of these characteristics vary widely between tombs, or between cemeteries. The only exception appears to be the orientation of tombs in some cemeteries (i.e. the general direction in which tomb entrances are facing). In many of the cemeteries in the Gor-Gorafe region, for example, large numbers of tombs share a common orientation (García Sánchez and Spahni 1959; Leisner and Leisner 1943). Similarly, at Los Millares there are clear signs of a preferred orientation in the construction of tomb entrances (Leisner and Leisner 1943; Almagro Basch and Arribas 1963). Other variables, especially grave goods, display considerable diversity throughout south-east Spain during the Copper Age (see earlier discussion).

When all of these funerary characteristics have been taken into account, there is little doubt that the overall complexity or diversity of funerary rituals is significantly greater in the more marginal climatic and ecological zones of south-east Spain. While the degree of elaboration in funerary ritual is related to different inputs of energy, it is ultimately related to a particular type of organizational and ideological pattern. Consequently, differences in the amount of energy devoted to funerary rituals are not so much a measure of the potential labour available, but the way in which labour was organized and the activities to which it was directed. The final part of the discussion (following the next section) is devoted - in part- to the problem of why mortuary rituals ought to be more elaborate in some areas than in others, and in this same context, how differences in energy investment are linked with different ideologies and patterns of organization. The argument presented below is that differences in the elaboration of Copper Age funerary rituals is a measure of the social and political divisions within Copper Age communities, and that as such, the diversity present in Copper Age cemeteries is one expression of the competition, and often inequalities, between different social groups.

Resource Acquisition, Prestige Displays and Funerary Ritual

Because of the historical bias towards the investigation of cemeteries rather than settlements, it is difficult to evaluate how different raw materials and artefacts were controlled and displayed in contexts other than funerary ones. In any case, evidence from the excavation of domestic occupation areas suggests that the deposition of exotic artefacts is fairly rare in zones associated with residential activities (Arribas and Molina 1978, 1979, 1982; Val Caturla 1948; Aguayo de Hoyo 1977; Arribas et. al. 1977, 1978, 1979, 1983;Botella 1980; Schüle and Pellicer 1966; Almagro Gorbea, M.J. 1973, 1976, 1977; Siret and Siret 1887).

Moreover, there is no evidence to suggest that the few exotic artefacts which have been found in settlement contexts represent intentional deposits, rather than accidental losses.

It must be said, however, that because grave goods from collective tombs represent accumulations over a long period of time, they are only a general indication of resource acquisition and display during the Copper Age. At the present time at least, evidence from communal burials in south-east Spain does not provide the kind of detailed data necessary to identify, or interpret, short-term changes in the concentration of resources - either locally, or on a larger scale. As a result, it is more appropriate to discuss long-term patterns of resource acquisition and consumption.

Using specific types of 'status' objects and raw materials[21.], it is possible to examine the relative concentration of prestige valuables in different areas, the differences in access to various materials, and in very general terms, the investments made in funerary ritual. While the data in Appendix 5:8 was used to identify some gross regional differences in energy expenditure, the same information can be used (less ambiguously perhaps) to assess the distribution of different resources. The concentration of exotic materials in the more arid zone of the south-eastern littoral has already been suggested on the basis of the presence-absence data included in Appendix 5:8. More detailed information about the distribution of exotic materials reinforces the contrast between the semi-arid zone, where these objects are restricted to a few major sites, and moister upland zones where their distribution is more even.

Several examples can be used to illustrate this point. First, the large quantity of metal objects from Los Millares (i.e. 71 objects) becomes even more significant when one considers that local ore sources do not occur in the vicinity of this site. The cemetery with the second highest total of metal artefacts in the semi-arid zone is Almizaraque (Leisner and Leisner 1943; Almagro Gorbea, M.J. 1965). Yet despite its proximity

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21. These objects are defined as prestige or status objects on the basis of three general criteria: (a) the widespread absence of these objects except in funerary contexts; (b) the restricted distribution of these items within, and between, cemeteries; (c) their tendency to be found with other fairly rare and elaborate objects/materials. Moreover, these objects often display a highly stylized form, despite the fact that they are found over a wide geographic area (e.g. 'eye-idol' motifs and Beakers. Finally, they are frequently associated with elaborate, labour intensive tomb constructions and funerary rituals.

to copper and argentiferous ore sources, the tombs at Almizaraque contain significantly fewer metal objects than the Los Millares cemetery[22]. The restricted distribution of Bell Beaker pottery in funerary contexts - both in the humid and arid zones - is another example of how particular regions managed to attract exotic goods while others did not (cf. Harrison 1977: 74, Fig 29). Early Bell Beakers (i.e. comb-decorated Maritime forms) provide a particularly striking example, since they are only found in 3 cemeteries in the semi-arid zone: Terrera Ventura, Los Millares and Loma de Belmonte. Further examples of the concentrated distribution of exotic materials are as follows:

Ivory:	-	only 3 cemeteries contain this material, and one site (Los Millares) has 24 out of a total of 26 of these objects
Jet:	-	found in only 2 cemeteries (Los Millares and Almizaraque)
Amber and Ostrich Eggshell:	-	present in only one cemetery (Los Millares)
Alabaster:	-	found in only 4 cemeteries, and two of these (Los Millares and Las Peñicas) account for 37 out of a total of 43 objects
Flint Daggers:	-	found in 6 cemeteries, and one of which (i.e. Los Millares) represents nearly half of the total (i.e. 6 out of 13)

On the other hand, in moister regions of the south-east, exotic items such as those listed above are either absent altogether or occur in much smaller quantities. Moreover, it is more difficult to rank cemeteries on the basis of prestige grave goods because the concentration of materials in different cemeteries, and the contrasts between them, are not nearly as pronounced as in drier, lowland areas (see Appendix 5:8).

Spatial Dimensions of Bronze Age Funerary Rituals

For continuity, as well as for comparative purposes, this evaluation of Bronze Age mortuary practices will follow the same general pattern as that used in the preceding Copper Age section. The following discussion is therefore divided into the same three general themes as before:

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22. The number of tombs at Almizaraque is considerably smaller than at Los Millares, but there are no indications that the former was substantially larger than the three tombs which have been documented thus far.

(a) the energy devoted to funerary rituals in different geographic areas

(b) the complexity or diversity of those rituals

(c) the control of resources on various different geographic scales

Energy Expenditure and Funerary Ritual

Tomb Size

Whether one chooses to look at Bronze Age burials in cists, urns or 'covachos', the size differences between cemeteries are more or less equivalent to the size differences within cemeteries - judging by the data from sites such as La Bastida (Martínez Santa Olalla et. al. 1947; Ruiz Argiles 1948; Ruiz Argiles and Posac Mon 1954-1955), Puntarron Chico (García Sandoval et. al. 1962) and Fuente Álamo (Arteaga and Schubart 1980; Schubart and Arteaga 1983; Siret and Siret 1887).[23.]

Turning first to cists, there is little sign of any systematic variations between sites which would have any significance in terms of energy expenditure. Most cists are relatively small, rectangular or quadrangular constructions made of slabs or masonry, measuring, on average, 0.50 -1. 50 m long and 0.50 - 1.0 m wide. Their form is usually box-like with a covering slab resting on top of four wall slabs. In some cases an additional slab has been placed at the base of the cist creating a stone floor in place of the earth one. Apart from this, the only additional construction feature associated with cists are the piles of irregular stones which surround the exterior of these tombs, providing protection and support for the side slabs (e.g. at El Rincon - García del Toro and Ayala Juan 1978), or the cist as a whole.

At Fuente Álamo, Schubart and Arteaga (1983) have suggested that cists decrease in size through time, though they admit that this conclusion is only a tentative one because of the small number of tombs which they have investigated thus far; the relative chronology and dimensions of the cist tombs excavated by the Sirets (1887: Plates 65-66) at Fuente Álamo have yet to be determined. Whether there is in fact any systematic

23. Unlike many other Argaric cemeteries in the south-east, there are a significant number of published tombs from all of these sites, together with details about the dimensions of tombs. Burial data from El Argar and other cemeteries investigated by the Sirets generally lack information about tomb size.

reduction in cist size, and how large this reduction may be, remains to be seen. What is significant, however, is that available information about the size and construction of Argaric cists does not suggest that there are any major differences in energy expenditure between sites.

Finally, it is also clear from existing data that there is no simple link between the size of a cist and the richness of its contents. In some cases large cists contain little or no material (e.g. La Bastida Tomb 65 - Martínez Santa Olalla et. al. 1947: 107). Generally, however, when rich burials do occur in cists the size of the tomb tends towards the larger end of the size range. One spectacular example of this phenomenon is Fuente Álamo Tomb 1 (Siret and Siret 1887: Plate 66). This tomb, which measures 2.25 m long, is the largest cist known to date and contained the following items: 1 large dagger (or small sword) with 4 longitudinal incisions, 1 halberd, 2 metal bars or rods, 1 gold pendant and 2 ceramic vessels. This unique tomb is more that twice the average size for Argaric cists, but apart from its abnormal size it does not appear to have any unusual construction features which might indicate any further elaboration or energy investment.[24]

Urn burials have a wider range of variability than cists, largely due to the appearance of small urns for the interment of children in the later phases of the Argaric (e.g. at La Bastida - Martínez Santa Olalla et. al. 1947; and Cabezo de las Viñas - Ayala Juan 1979). The size of urns varies from larger ones (averaging 0.60 - 8.0 m high and 0.5 - 0.6 m wide) to the smallest (averaging 0.15 - 0.30 m high and 0.1 - 0.3 m wide). Some urn burials are blocked with stone slabs or querns, or covered by other, smaller vessels which have been inverted and placed over the mouth of the urn. In a few cases urns are protected by stone slabs, or surrounded with a protective covering of irregular stones, but in most cases they are only protected by the stone foundations of dwellings which lie near or against them.

The appearance of funerary urns - with respect to form, composition, firing and surface treatment - is much the same as many other domestic or utilitarian wares such as storage vessels. Indeed, some investigators have suggested that some ceramic vessels were used for storing

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24. The enclosure which is shown surrounding this tomb on the Sirets' plan is, according to them, part of a domestic structure which was apparently not related to the construction of the cist.

food and other provisions and were later reused as funerary urns. Whilst the vessels within urn burials were finely produced and often highly burnished, urns themselves were relatively crude and do not appear to have been given any special treatment.

Many large urns contain little or no material which could be regarded as 'exotic' or indicative of high status (e.g. La Bastida Tomb 9 - Martínez Santa Olalla _et_. _al_. 1947: 95 and Tomb 2 - Ruiz Argiles 1948: 132). On the other hand, when they occur, rich burials in urns do appear to be associated with the larger types of urns (e.g. La Bastida Tombs 37 and 83 (Martínez Santa Olalla _et_. _al_. 1947: 100-101, 113). Having said this, it is not possible to establish any direct link between the size of urns and their richness.

Information about 'covacho' and other miscellaneous types of burial is not sufficiently large or detailed enough for any conclusions to be made about size or energy expenditure. The proportion of these tomb types in comparison with either cists or urns is very small, however, and consequently should not alter the general conclusions about energy investments made on the basis of data from urns and cists.

Tomb Construction

Overall, Argaric tomb constructions do not appear to have been particularly large or labour intensive, especially when compared with the previous period.

There also do not appear to have been great differences in the amount of energy devoted to tomb construction in different cemeteries, nor any marked contrasts in tomb size. Energy investment in tomb elaboration appears to be minimal. External features - with the exception of the various forms of protective covering mentioned above - are virtually non-existent throughout south-east Spain during the Argaric. 'Externalized rituals' or funerary activities associated with areas outside of the tomb, are relatively simple, limited in scale and not very labour intensive. These rituals consist of two basic types:

(a) whole objects, particularly ceramic vessels, outside the tomb but immediately next to it

(b) the distribution of broken pottery over the outside of the tomb (usually chalices)

In any case, both types of externalized rituals are rare throughout the Early and Middle Bronze Age. As a whole, the simplified or 'rationalized' forms of tomb construction which characterize the Argaric represent a sharp contrast with the elaborate megalithic traditions of the Copper Age.

Tomb Contents

Within the Argaric itself, the relatively small investments of energy in tomb construction contrast markedly with the altogether higher level of investment in grave goods. One of the most dramatic indications of this difference is the large quantity of metal objects found in Early and Middle Bronze Age tombs in south-east Spain. The scale of investment represented by these objects is significantly different from many other raw materials because of the various 'costs' involved in producing artefacts of this type. These costs include:

(a) the location of suitable ore sources
(b) the extraction of ores
(c) the manual reduction of ores
(d) smelting
(e) casting
(f) annealing and hammering
(g) production of moulds
(h) manufacture of tools for stages 2-7
(i) the provision of fuel supplies

Despite their considerable costs, metal artefacts are by far the most common type of objects in Argaric funerary assemblages (see Appendix 5:10); the range of metals includes native copper, arsenical bronze, tin-bronze, silver and gold.

The general size of metal objects in Argaric funerary contexts is also significantly greater than in the Copper Age. While megalithic and other collective tombs are generally dominated by smaller metal items such as copper pendants, awls, needles and rings, Bronze Age tombs contain many large weapons and ornaments such as axes, halberds, daggers, knives and bracelets. The quantity of axes, for example, at El Argar far exceeds the total for the whole of south-east Spain for the duration of the Copper Age.

The Complexity and Diversity of Funerary Rituals

One of the most notable characteristics of Early and Middle Bronze Age funerary traditions in the south-east is their regularity. In contrast to the previous period both regional and local variations in mortuary practices are considerably less pronounced. This regularity or uniformity is reflected not only in the choice of tomb type, but also:

(a) the location of interments (nearly always within the settlement area, and near the foundations of houses)

(b) the treatment and positioning of the corpse (articulated, crouched inhumations)

(c) the range of raw materials found in tombs (normally limited to metal and ceramics, with only a minor component of other materials - e.g. bone, ivory, animal teeth or shell)

(d) the range of variation within different artefact types (e.g. daggers, axes, diadems, chalices, etc.)

(e) the absence of decorated items, so common in the previous period (such as pottery, bone, stone, ivory, and so on)

While there are some differences in Argaric mortuary practices in different parts of the south-east (e.g. in the distribution of ivory objects or pithoi burials - both concentrated in the semi-arid zone), the general consistency and regularity of these rituals are far more striking. The standardization of funerary ritual which was so pronounced during the Argaric is discussed from a more long-term perspective at the end of this chapter.

Resource Acquisition, Prestige Displays and Funerary Ritual

Although the objects used in Argaric funerary rituals are generally distinct from those associated with Copper Age mortuary practices, there are some similarities between these two periods. In particular, the presence of various prestige or 'exotic' materials in Argaric cemeteries suggests some degree of continuity with earlier patterns of resource acquisition and display. The continued presence of ivory, for example, indicates that the long-distance exchange link with North Africa - through which this material was obtained (either directly or by proxy) - survived into the Argaric. On the basis of present evidence, ivory appears to be found exclusively in the more arid zones of south-east Spain during the Argaric (see Appendix 5:10), specifically in the lowlands of eastern Almería, southern Murcia and southern Alicante. Silver, though not exclusive to the semi-arid zone, nevertheless appears to be more prolific there than in more humid regions. Although not very abundant in Argaric tombs, gold too, appears to be concentrated in the drier lowland regions. As Gilman and Thornes (1984: 22) have noted:

> "The relative wealth of (Argaric) burials has not been studied in detail, but it is clear that extreme contrasts exist in the quality and quantity of grave goods. That many of the wealthy burials are of women suggests that the superordinate status reflected by them was ascribed rather than achieved. No published burials at any of the upland sites, however, approach the degree of wealth concentration exhibited at some of the coastal lowland sites..."[25].

Consequently, current information about the distribution and consumption of various exotic objects and raw materials suggests that the general dichotomy between semi-arid and humid regions (with respect to the concentration of prestige valuables) was maintained during the Bronze Age.

Other aspects of resource acquisition and prestige display during the Argaric, however, show clear signs of discontinuity with the preceding period. The absence of many long-standing forms of artefacts, decorative motifs, and raw materials in Argaric funerary contexts is one particularly striking example of how traditional patterns of procuring and 'consuming' prestige valuables were altered in the Early Bronze Age. In particular, this change is marked by the elimination of objects such as decorated pottery, idols of various descriptions, stone axes and bracelets, and flint. Another important shift in the nature of prestige displays in the Early Bronze Age is the heavy emphasis placed on metal objects, and the shift away from other types of materials such as flint, bone, stone and shell (Appendix 5:1), indicate a fundamental change in pre-existing systems of defining and exchanging prestige objects. Moreover, the distribution of 'exotic' objects appears to have shifted from a Copper Age pattern in which only a few sites emerged as major centres, to an Argaric one in which the quantity and diversity of prestige objects was less variable between sites. For example, despite the fact that El Argar represents nearly three times the number of Argaric tombs published from the rest of south-east Spain put together, many cemeteries (with a much smaller number of published tombs), contain a very similar range of materials (Appendix 5:10). In light of this fact, it is worthwhile

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25. Some caution needs to be exercised in the interpretation of this data, however, given the disparity in the number of published tombs from the lowlands (c. 1360) and the uplands (c.90) - representing a difference of more than 15:1 in favour of the former (see Appendix 5:9). In view of this disparity it would be premature to draw too great a contrast between the richness of burials in one zone and the poverty of burials in the other.

examining how El Argar and other Argaric cemeteries differ from one another with respect to the material they contain.

As the type-site of the Early and Middle Bronze Age in south-east Spain, El Argar is important for one particularly outstanding characteristic - the high proportion of tombs which contain copper/bronze objects, and indeed, the large quantity of these objects overall (Appendix 5:12). In comparison with other cemeteries where a substantial number of tombs have been excavated and published (e.g. La Bastida, Fuente Álamo, Zapata and Puntarron Chico), the El Argar values are superior - something which is especially significant when one considers the close proximity of some of these sites to local ore sources (e.g. La Bastida and Zapata) and the lack of such ore deposits in the vicinity of El Argar. Whether one compares the percentage of tombs with copper/bronze objects, or the average number of these objects per tomb (Appendix 5:12), El Argar emerges each time as the site with the highest values. Moreover, although the weights of metal objects have usually not been recorded, data from El Argar, El Oficio and Fuente Álamo (Siret and Siret 1887: 409-413)[26]. indicate that the average weight per copper/bronze object at these three sites is very similar (Appendix 5:13). While some of this data can be used to confirm the unusual character of El Argar, at least with respect to the concentration of copper/bronze objects there, it should be emphasized that there are some considerations, with respect to sampling, which ought to be raised in this context before any attempt is made to rank different Argaric sites or cemeteries.

First, the extremely large number of tombs from the site of El Argar indicates than an extensive part of the site was investigated - judging by the density of tombs per house, and tombs per unit area, for example, on Plate XV in Siret and Siret (1887). The excavation of other sites, such as La Bastida and Puntarron Chico, on the other hand, was fairly localized so that the area investigated was only a small proportion of the total surface area for the site. Also, the relatively low number of tombs from other Argaric sites such as Zapata, Lugarico, Viejo, Fuente Vermeja, and Gatas - all investigated by the Sirets - suggests that the excavated area at each of these sites was relatively small in comparison with the scale of work at El Argar. The point here is not only that the El Argar cemetery was investigated more systematically

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26. These weights are based on a total of the objects from both settlement and funerary contexts.

(in spatial terms) than any other site, but also that the localized nature of excavations at other sites would not necessarily have provided evidence which was representative of the cemetery as a whole.

The inadequate and restricted sampling of most Argaric cemeteries is a fact which assumes greater importance if one allows for the possibility of any spatial patterning of wealth, such that there are well defined areas of 'rich' and 'poor' tombs within any given cemetery. Using the plans of various areas within the El Argar settlement (Siret and Siret 1887: Plate XV), it is clear that some areas contained a substantially higher percentage of:

(a) tombs with silver objects
(b) tombs with a large number of copper/bronze objects
(c) tombs with a large number of objects generally
(d) 'poorer' tombs (i.e. those with only pottery or no material at all)

While this data is instructive, rather than conclusive, it does suggest that there are important spatial variations in the El Argar cemetery (with regard to wealth), and that the extensive investigations at this site are likely to have produced a fairly representative sample of these variations. It is not clear, however, whether or not there are any marked differences in the spatial distribution of 'rich' and 'poor' tombs in other Argaric cemeteries - largely due to the small scale, and spatially concentrated, excavations at these sites. These facts raise important questions about the comparability of the El Argar funerary data with other contemporary cemeteries - questions which, for the present time at least, remain unresolved.

Turning from copper/bronze objects to other prestige materials, the predominant position of El Argar is more questionable. Data presented in Appendix 5.12, for example, shows that the values for silver objects are comparable with a number of other Argaric sites. Moreover, the number of gold objects from the El Argar cemetery is very small (only 2 objects) - a total which is matched, or surpassed, by other cemeteries which have been investigated in considerably less detail. In the case of ivory, Las Laderas del Castillo in Alicante (Fúrgus 1909) may contain more ivory objects in one tomb than the entire El Argar cemetery; Colominas, cited in Lull 1983: 340, however identifies these objects as bone. Finally, the ratio of copper/bronze to silver, to tin, and to gold (by weight), was calculated by Siret and Siret (1887: 409-413) for the sites of El Argar, El Oficio and Fuente Álamo. As we can see in Appendix 5:13, the ratios of the first three metals to one another match closely at all three sites, implying that the proportions of these exotic materials were roughly the same. In fact, turning to gold, these figures suggest that there is proportionately more gold, by weight, at both El Oficio and Fuente Álamo than at El Argar.

To conclude, while there is some evidence to suggest that El Argar was an important centre during the Argaric Bronze Age, its position relative to other contemporary sites is not entirely clear at present. The concentration of metal objects at the site, despite the lack of local ore sources, is significant and adds weight to the argument that this site was closely linked with communities in areas like Mazarrón in southern Murcia which had plentiful supplies of ores. Lull (1983) sees El Argar as an influential centre controlling metal, and other resources, from a distance. He does not make it clear, however, what this control was based on, how it operated, or how it was maintained. Moreover, he does not establish any clear link between El Argar and other regions except by stating that one has metal, and the other does not, and _ipso facto_, they are connected.

The distribution of gold, silver and ivory objects raises serious questions about the degree to which El Argar controlled the production, exchange or consumption of prestige goods in south-east Spain - questions which are only reinforced by the fact that the size of the El Argar settlement (i.e. the surface area) is comparable to a number of other Argaric sites in the south-east. Moreover, there is nothing unusual about the architecture or defences at the site; the latter appear to be natural rather than man-made, unlike the large fortifications found at many Argaric sites (Siret and Siret 1887; Arribas _et_. _al_. 1974; Lull 1983, 1984).

Recent discussion of resource acquisition, prestige exchange and settlement ranking in the Argaric have been very general and have tended to assume that various sites and regions were dominated by other (e.g. Lull 1983, 1984; Corral Cañon 1984). These discussions, however, have not made it clear what criteria they are using to arrive at these conclusions, nor do they take account of the marked differences in the quality and quantity of information in different areas. The danger here is that sites which have been investigated in a fairly major way (e.g. El Argar, La Bastida, Fuente Álamo) are seen as dominant sites, while other settlements (where work has been less systematic and extensive) are seen as the 'poorer relation'. As a result, existing models have left a number of unanswered questions about the relationship amongst various Argaric sites, especially with regard to the scale, and the nature, of inequality between El Argar and other contemporary communities.

One particular problem in this context, for example, concerns the volume of metal objects which were produced and consumed (both for domestic purposes and prestige displays). Given the fairly low level of metal production in south-east Spain during the Argaric (Chapman 1984), it is appropriate to ask whether the level of control exercised by sites like El Argar (with respect to the production and acquisition of metal objects) was really as systematic or as great as some would have us believe. Considering the total number of metal objects recovered from the settlement and cemetery at El Argar, and the number of years that the site was likely to have been occupied (i.e. c. 500), the number of items deposited per year reaches a value of only 3.56. Furthermore, as Table 5:3 indicates, the vast majority of these objects are small tools and ornaments which would have required only small amounts of metal to produce.

With this evidence in mind, we need to look again at our models of the scale of economic and political power exercised by various Argaric sites. Equally, it is worth looking in more detail at: (1) the criteria we are using to measure settlement ranking; (2) the effectiveness and reliability of these indices; and (3) whether the results of using different measures are consistent with one another.

Copper Age and Bronze Age Mortuary Practices in Context

The preceding sections have made it clear that there are several major and consistent patterns in funerary rituals through time. These patterns can be summarized as follows:

(a) increasing status differentiation between individuals

(b) increasing standardization of tomb constructions, grave goods and mortuary rituals generally

(c) the concentration of exotic objects and materials in the semi-arid zone (with lower concentrations in the humid zone)

Although these three general developments are related to mortuary ritual, all of them form part of a much larger series of changes which began in the early part of the second millennium b.c.. This last section, there-

TABLE 5:3 Inventory of Copper/Bronze Objects from El Argar: Totals from Cemetery and Settlement Combined

Objects	No. of Objects	Average Wt. of Objects
Bracelets	115	-
Pendants/Rings	530	-
Necklace Beads	139	-
Arrowheads	30	13.33 gm.
Chisels	10	70.00 gm.
Awls	290	2.74 gm.
Swords	3	518.33 gm.
Axes	78	197.82 gm.
Halberds	10	160.00 gm.
Daggers	250	32.00 gm.
TOTAL NO. OF OBJECTS	1455	

fore, is devoted to the relationship between changes in funerary practices and other forms of societal transformation - particularly between the Late Copper Age and Early Bronze Age. It also concerns the reasons why cultural development varies so markedly between the humid and semi-arid regions of south-east Spain.

The pronounced shift from communal to individualized burial, around 2000-1800 b.c., is accompanied by a variety of other changes. There are significant alterations, for example, in metal, ceramic, bone and flint technology which are in turn associated with important typological changes. Settlement also undergoes several transformations including a major increase in the number and density of sites, a general shift to more defensive locations, and the development of more compact or condensed residential areas. Moreover, there are some signs of a change in the emphasis of subsistence strategies - at least in some regions. In combination with the patterns in burial practices noted above, these transformations reflect a series of fairly dramatic and widespread organizational changes. The reasons why these changes occurred and the processes involved in bringing them about are discussed below in terms of first environmental, and then social factors.

The Role of Environmental Factors in the Copper Age to Bronze Age Transition

The most important ecological-environmental dichotomy in south-east Spain as a whole is the contrast between the humid and semi-arid zones, above and below 300 mm of rainfall per year respectively. As the previous discussion has emphasized, the diversity of mortuary rituals, and the degree of intra-cemetery variability, differentiation, and elaboration, are all greatest in areas of low rainfall. Indeed, areas associated with a high degree of uncertainty with respect to agricultural production (i.e. zones below 300 mm) are closely linked with:

(a) the procurement and control of a wide range of raw materials

(b) a diverse range of mortuary rituals

(c) large investments of energy in those rituals

(d) high levels of intra- and inter-group competition and ranking

The general link between economic uncertainty and investments in ritual have been investigated from a number of different perspectives by anthropologists and archaeologists (e.g. Shennan 1982; Rappaport 1968;

Geertz 1963; Braun and Plog 1982; Banton (ed.) 1966; Lessa and Vogt (eds.) 1972). As Gilman and Thornes (1984:184) have suggested, the functionalist view of ritual is that it provides an effective means of minimizing the intra-community stresses associated with economic risks, social conflict and other sources of instability. This perspective is a very valuable one in understanding ritual elaboration in south-east Spain during the 3rd millennium b.c. since it postulates a positive relationship between uncertainty and irregularity (in terms of both social and economic systems) and investments in ritual. From this point of view, the complexity, diversity, and scale of funerary rituals in the semi-arid zone can be seen as the product of sustained periods of risk and instability associated, by and large, with the problems of intensive agricultural production.

In addition to these differences, there are other contrasts between the development of Copper Age communities in the humid and semi-arid zones. For example, capital intensive subsistence economies using water control techniques are characteristic of the semi-arid zone during this period, while less labour intensive economic strategies were employed in more humid regions (cf. Chapman 1978; Gilman and Thornes 1984, Mathers 1984). Another significant difference between these two areas is the linear pattern of settlement in the semi-arid zone (following major water courses with reliable water supplies), and the more dispersed forms of settlement in the humid uplands (see below).

The greatest general difference between these two zones in environmental terms is the nature and regularity of their respective climatic regimes, and their different degrees of ecological 'resilience'. Turning first to the differences in climate, rainfall patterns in the humid zone are characterized by significantly greater and more regular contributions of water than in the semi-arid zone (Neumann 1960). In addition to low and unpredictable rainfall, the semi-arid zone is often subjected to destructive torrential storms which may bring the equivalent of a normal year's rainfall in a matter of days, or even hours (e.g. see López Bermúdez 1973; Thornes 1976). In the humid zone rainfall distribution is more even throughout the year and hence is more suited to dry farming strategies with low energy costs.

The resilience of ecosystems - partly as a result of differences in rainfall - varies considerably between the humid and semi-arid zone. Because of higher rainfall, more complete vegetation cover, lower evapo-transpiration, better developed soils, and more effective pedological nutrient cycling, ecosystems in the humid zone are able to recover or regenerate far more rapidly in the face of damage or degradation (either by human or natural agents) than ecosystems in the semi-arid zone. Indeed, in many of the drier regions the possibility of regeneration is often negligible. Due to the irreversible effects of repeatedly removing vegetation in these semi-arid contexts, the damage inflicted on the drier types of ecosystems made it unlikely that the original appearance and composition of those systems could ever be restored.

The environmental constraints outlined above had several important repercussions on the development of Copper Age communities in south-east Spain. First, the stability of agricultural production in the semi-arid zone was far more precarious than in humid regions. For this reason, capital intensive subsistence strategies, such as irrigation, were a necessary investment in order to ensure a consistent and reliable yield (e.g. Llobet 1958; Kleinpennig 1965). Moreover, because of the limited number of locations with sufficiently large and reliable water supplies, settlement in the semi-arid zone is largely restricted to the major fluvial drainages in the area. In addition, only a small proportion of the area along these drainages was suitable for irrigation agriculture. Overall, therefore, settlement in the semi-arid zone was distributed in a linear fashion, with a fairly small number of settlements per drainage (e.g. in the Andarax or Guadalentín Basins), and a low density of settlement in the region as a whole.

The location of major Copper Age centres like Terra Ventura and Los Millares is particularly significant since they occur in the upper parts of major drainage systems, rather than in downstream positions where higher temperatures, greater evapo-transpiration, and lower rainfall all combine to make conditions very arid indeed, even within the fluvial courses themselves. The predominance of extremely dry inter-fluvial areas in the semi-arid zone, and the difficulties of supplying water to such areas, severely limited the expansion of agricultural production in these situations.

Taken together, these constraints presented a formidable range of problems for the stability, and even existence, of long-term and large scale agricultural production in the semi-arid zone. To summarize, these difficulties included:

(a) short-term climatic fluctuations (seasonal, annual and inter-annual)

(b) flooding and erosion due to torrential storms

(c) inherent instabilities in the nature of intensive irrigation systems when used over long periods (e.g. changes in fluvial profiles, terraces, channels and general water flow due to gullying and silting; salinization; etc.)

(d) limited expansion potential

(e) progressively higher labour costs associated with the maintenance of water control facilities

(f) the strong positive relationship between economic intensification (i.e. spatially concentrated production) and serious, or irreversible, environmental degradation

In the long-term, therefore, many of the Copper Age communities in the semi-arid zone faced serious obstacles in trying to pursue intensive agricultural production. In general, these problems concerned not only the maintenance of existing facilities (check dams, channels, etc.), but the difficulties associated with any expansion of those facilities. The spatially concentrated form of production which characterized Copper Age subsistence strategies in the semi-arid zone was particularly vulnerable to periodic climatic and geomorphic phenomena such as flash flooding (e.g. see López Bermúdez 1973, and Chapter 2) or extended droughts. Moreover, concentrated production of this type is also vulnerable to destruction by insect pests and plant diseases (cf. Rindos 1983).

By contrast, subsistence agriculture in the more humid uplands of the south-east was less intensive (spatially), less labour intensive, and subject to less severe and less frequent fluctuations with respect to yields. Also, because of the greater regenerative capacity of ecosystems in this zone, long term agricultural production did not have the same consequences, nor present the same hazards, as in the semi-arid zone.

Finally, unlike the more dispersed pattern of site distribution in the humid zone, the 'linear clustering' of settlement in the semi-arid zone created a number of logistical problems for communication, alliances, exchanges and other contacts between communities - problems which became increasingly important towards the end of the third millennium b.c.. The implications of these 'linear' settlement patterns will be discussed in more detail below.

The Role of Social Factors in the Copper Age to Bronze Age Transition

The breakdown of collective rituals, status and authority during the

Late Copper Age and the emergence of a very different, and more centralized form of organization in the Early Bronze Age marks one of the most significant structural changes in south-east Spain during later prehistory. In order to understand this transition from a perspective of social change it is necessary to examine the general types of organization involved, what they were based on, and finally how one was transformed into the other.

In overall terms, Copper Age communities in the south-east are characterised by a form of organization which is similar to some of the 'segmentary' societies and many of the chiefdoms known from ethnographic sources (e.g. Smith 1974; Davenport 1969). Communities of this type are broken down into various competing groups or lineages each of which try to maintain their separate corporate identities. Using ethnographic examples of segmentary societies and chiefdoms as a baseline, the widely variable forms of objects, raw materials, and tomb constructions found in the Copper Age cemeteries of south-east Spain can be seen as the product of competition between different corporate groups, and the relatively 'unstructured' nature of that competition. The tremendous diversity of symbols and materials used to express rank and status in the Copper Age, therefore, suggests that there were few formalized or institutionalized controls with which to regulate the form of funerary rituals used in any given context - be it within an individual community or on a regional basis. The competition between different lineages,or groups within individual Copper Age communities, appears to have involved a considerable degree of latitude with respect to defining the character and content of funerary displays. Consequently, the level of social control within any one community does not seem to have been sufficiently well developed to define a set of consistent 'rules' to structure competitive displays. Although there is some limited evidence of standardization in Copper Age mortuary rituals - such as Beakers, some forms of idols, and a limited number of decorative motifs (e.g. 'ocular or eye-idol' designs), examples of this type are limited in number and are in no way comparable to the scale of uniformity in later Argaric assemblages and rituals (cf. Mathers 1984).

By contrast, the standardization of mortuary ritual is one of the most prominent features of Early Bronze Age communities in south-east Spain. As previous sections have demonstrated this standardization took several forms, including the widespread use of individualized burial, a reduction in the range of raw materials, the elimination of decorative motifs, the uniformity of artefact types, the consistent position and treatment of the cadaver, the location of tombs with respect to settlements, the size of tombs, and the types of tomb construction. These changes reflect not only a fundamental change in mortuary ritual, but also mark significant social and political changes.

In particular, the development of more standardized mortuary rituals emphasizes the greater degree of social control which was exercised in the Argaric. The centralized and hierarchical forms of organization which emerged in the Early Bronze Age replaced an earlier communal or kin-based system of attributing rank and status, and gave elites more scope to manipulate materials and symbols. In the context of a system which emphasized individual rank and status, a standardized system of displaying different types of raw materials and artefact types made it possible to create more exclusive and more easily identifiable categories of rank and status. Hence, standardization could be used to protect the position of existing elites by establishing a more structured, or rationalized system of prestige displays. The large quantities of metal objects and the elimination of other less exotic, or less labour intensive, objects/materials represents a further attempt by elites to distance themselves from the rest of the community. The rarity value of metal and the high costs of producing it made this material particularly effective as an object of 'exclusion'.

The problem raised by the standardization of Argaric mortuary rituals, however, concerns social and political organization at a regional level as well as at a local one. The type of standardization found in any given Argaric community, after all, does not vary significantly from one site to another, but represents a type of uniformity and regularity which encompasses much of the south-eastern region. A satisfactory explanation of this standardization process must also be sought therefore , on a regional scale.

The role of regional exchange systems and settlement geography are crucial for understanding why standardization emerged with such force in the Early Bronze Age. By the end of 3rd millennium b.c. there was a considerable expansion of settlement, particularly into interfluvial areas of the semi-arid zone (e.g. in the Guadalentín Basin). This expansion continued into the Argaric and appears to have been promoted by the widespread use of traction ploughing, and by systems of water control based on runoff from hillslopes rather than rivers or ramblas.

The expansion created a higher density of settlement in many areas, and as a result, substantially reduced the distance between one settlement and another. In the more arid regions, however, expansion was negligible or non-existent, and in areas such as southern Almería (where los Millares, El Barranquete, Las Peñicas and other major Copper Age centres are found) there appears to be a major contraction of settlement due to the widespread abandonment of settlements in riverine areas. In areas where settlement expanded, the potential for more effective contacts and communication was increased by reducing the distances between sites and lowering the logistical 'costs' of maintaining régular and sustained external links. While the potential for greater regional integration may have been made possible by the increase in settlement density, other developments appear to have played a more direct role in stimulating such linkages.

Since as far back as the Late Neolithic, local and long-distance exchange networks had been established in southern Iberia, moving exotic goods in and out of various regions (Harrison 1977; Harrison and Gilman 1977; Harrison 1980). Until the latter part of the Beaker period, most exotic goods were concentrated in only a small number of major centres (e.g. see the distributions of ivory, alabaster, jet, amber and ostrich eggshell in Appendix 5:8). The contrast between the early and later Beaker periods is significant, however, since Maritime Beakers have a very restricted distribution and later Ciempozuelos types occur far more widely (see Appendix 3.30). Of particular importance is the fact that later Beakers appear to be sparse or absent at Los Millares (ibid). From the later Beaker period to the beginning of the Bronze Age various prestige raw materials and artefacts occur over an increasingly wide area (e.g. chalices, diadems, gold, halberds, etc.).

During the early 2nd millennium a new social order emerged with an emphasis on individual prestige, conspicuous display and consumption of wealth (largely in the form of personal ornamentation and weaponry), and marked differentiation with respect to rank and status. A high value was placed on the control of various raw materials and artefact types - especially metals. Within south-east Spain the exchange of exotic goods between communities in both the Copper Age and Bronze Age resembles what Friedman and Rowlands (1979) refer to as a 'prestige goods economy'. The exchange of prestige objects between elites in different communities appears to have begun in the late Beaker period, and was later intensified in the Early Bronze Age - as exemplified by the standardized form of many funerary objects and assemblages in use during these two periods.

These developments represent the gradual integration of different parts of south-east Spain into a regional system of exchange and interaction which has to do not only with increased settlement densities, but also the development of a socio-political system which had the potential and incentive to control prestige raw materials, artefact forms, and artefact production.

Another social development which can be related to increased settlement densities, more portable prestige objects, and spatially concentrated production, is the importance of defence. Copper and Bronze Age sites both have some defensive characteristics, so the differences between them are more of degree than of kind.

<u>Causal Links in the Copper Age - Bronze Age Transition</u>

Turning first to the problem of why Copper Age centres in many parts of the south-east decline during the early part of the 2nd millennium, there appear to be several major contributory factors.

(a) the increasing risks and instability of intensive agricultural production in the semi-arid zone

(b) limited potential for expansion and diversification

(c) spiralling energy costs associated with maintaining agricultural stability and productivity

(d) the logistical difficulties of maintaining consistent, long-term external contacts given (1), (2) and (3), and the 'linear' distribution of settlement

All of these problems were exacerbated by the expansion of settlements into other, more favourable areas of south-east Spain. In these areas, the higher density of settlement and the lower logistical costs of maintaining alliances, sharing labour, transporting goods, exchanging information and so on, left many of the drier regions (like southern Almería) at a distinct disadvantage. Furthermore, since the nature of prestige competition had been altered in such a way as to disrupt traditional exchange patterns, the control of raw materials by centres such as Los Millares was seriously undermined. The emphasis on metal, and the elimination of many other prestige materials and objects, had a decisive impact. Settlements in many of the drier areas, such as the Andarax Basin and the Níjar Desert, where the Millaran Copper Age had been so well developed, soon became cut off as the result of a regional shift in the balance of power towards areas with:

(a) a fairly high density of settlement

(b) plentiful supplies of metal ores

The core area of the Argaric in southern Murcia and eastern Almería, was characterized by both (a) and (b). In this way, the dominant position of a few sites such as Terrera Ventura, Los Millares, El Barranquete and Almizaraque was broken down, and the control of resources diffused to a larger number of sites, so that overall differences between sites appear to have been reduced.

The expansion of Argaric settlement into both the humid and semi-arid zones seems to have been the result of applying traction ploughing and water control techniques to a wider geographic area. The position of many Argaric sites (e.g. in the Guadalentín Basin or in the coastal region of Mazarrón - in Murcia) suggests that riverine irrigation strategies were abandoned on a large scale in favour of either:

(a) the use of smaller water courses

(b) the diversion of runoff from hillzone areas into small catchments

(c) a combination of (a) and (b)

No doubt this expansion of settlement was stimulated by different factors in different areas. In the semi-arid zone it may have been brought about in part by the problems associated with riverine irrigation agriculture, and in part by the possibilities of expanding existing technologies (the plough, water control techniques) to new territories. The motivation for settlement expansion in the humid zones, however, is less clear but may be related to the lower risks and energy costs of 'fissioning' (i.e. establishing new settlements) as a result of using traction ploughing or water diversion to exploit previously unoccupied areas.

To summarize, the preceding discussion has emphasized that regional transformations in the late third and early second millennia - not only in mortuary rituals but in many other areas - are closely linked with one another. The different sets of factors involved in these transformations can be generally summarized as follows:

(a) the stability and variability of local ecosystems

(b) the intensity of economic strategies

(c) the opportunities available for diversifying or expanding subsistence production

(d) the growth of regional exchange systems

(e) the widespread expansion of settlement

Copper Age systems of mortuary rituals, economic strategies and social organization appear to have been weakened by the reorientation of exchange systems, the wider application of traction ploughing and water control techniques, the decline of riverine irrigation systems, and the general expansion of settlement in many areas. The more centralized systems of community organization which emerged in the Argaric, on the other hand, were based on much greater social divisions within communities and generally speaking, more equality between settlements. The standardization of burial practices and artefact production generally, are linked not only with the development of more exclusive, and easily identifiable symbols of rank, but also greater regional integration. The greater densities of settlement and the more intensified prestige exchanges between elites helped to promote a widespread pattern of uniformity in material culture throughout south-east Spain during the Early and Middle Bronze Age.

CONCLUSION

Throughout this investigation particular emphasis has been placed on the interaction between prehistoric communities and ecological-environmental constraints. However, given the complexity of this problem, and the wide ranging nature of the research generally, it seems appropriate to discuss the conclusions of this study in terms of separate, but inter-related, themes. In short, therefore the aim is to identify the major issues raised in the preceding chapter, evaluate several hypotheses related to these issues, and finally offer a series of conclusions which draw together the most important themes. This discussion is also devoted to seeing how far the models and concepts developed during the course of this research can be applied to problems outside of south-east Spain, and how the results obtained in this study can be used to understand cultural development in other geographic and environmental contexts.

In order to accomplish this the chapter is divided into five sub-sections - all of which are devoted to important themes in this research. Each sub-section begins with a hypothesis which is subsequently evaluated using the data already presented in previous chapters. This is followed by a short summary of the conclusions and some of their wider implications. This thematic format is an attempt to bring together, and summarize, a wide variety of evidence from previous chapters.

Early Agricultural Settlement and Development

In the past decade it has become increasingly clear that the appearance of domesticated stock and cereals in the Early Neolithic economies of West Mediterranean Europe did not immediately stimulate rapid or wide-spread cultural changes (Lewthwaite 1981, 1985; Phillips 1982; Mills 1983; Walker 1977; Jarman 1976; Mathers 1984a). Instead, there is mounting evidence for the continuity of Epipalaeolithic settlement patterns, economies, and technologies in many areas well into the Neolithic. In south-east Spain, pronounced changes in community organization such as large cemeteries, permanent open air settlements and marked social differentiation are generally not found until at least the Later Neolithic. The timing of these changes is significant, and raises the problem of explaining not how the initial adoption of agriculture brought about such changes, but why mixed farming had such a long development before these cultural transformations occurred.

The transition from hunting and gathering to fully agricultural communities appears to be a gradual, but geographically uneven, process in south-east Spain since the earliest use of domesticated cereals and stock was restricted to zones with considerable ecological and topographic diversity, more stable ecosystems, and more predictable climatic regimes. Well watered upland zones were particularly favoured because of their high species diversity (for both plants and animals), and their generally high, regular and well distributed rainfall. These zones were also favoured for their greater resilience (or potential for recovery) when subjected to anthropogenic and other environmental disturbances. By contrast, lowland zones of south-east Spain were much less stable (see Chapter 2). Largely because of their low and irregular rainfall, these lowland zones were characterized by unpredictable environmental fluctuations which were both frequent and severe,lower ecological resilience, and far less potential for economic diversification or expansion.

From this perspective, it is argued that permanent agricultural settlement in the more arid and unpredictable lowland environments of south-east Spain was substantially later than in many of the more stable and productive areas of the upland zone. More specifically, agricultural communities appear to be generally absent from the semi-arid zone of south-east Spain until about the middle of the 2nd millennium b.c. (cf. Mathers 1984a). Furthermore, it is suggested that the expansion of agricultural communities out of the more favoured environmental zones only came after an extended period of familiarization and experimentation with different resource combinations and strategies, prior to a 'full blown' commitment to agriculture.

Three different sources of data can be used to test this proposition:

(a) radiocarbon dates for settlements in different ecological-environmental zones

(b) the presence or absence of particular, period-specific assemblages or artefacts in different zones

(c) the regional survey undertaken in the Guadalentín Basin

Turning first to the radiocarbon dates from humid and semi-arid zones of the south-east there is a widespread lack of Early, Middle, Late and Final Neolithic dates for the latter area (Appendix 3:1). Despite the fact that Early Neolithic assemblages in south-eastern and southern

Spain have been dated to the early 6th millennium b.c. (Pellicer and Acosta 1982; Acosta 1983), and that the Final Neolithic extends well into the third millennium (Arribas and Molina 1979), radiocarbon dates for the period c. 6000-2600 b.c. are almost entirely lacking in the semi-arid zone. Thus far only 4 dates can be placed in this time range and all of them can be challenged for a variety of reasons (see Appendix 3:1). Other dates for prehistoric occupation in the semi-arid zone either belong to the period before 6000 b.c. (i.e. Palaeolithic and Epipalaeolithic) or after c. 2600 b.c. (i.e. Copper Age or later). Apart from the four instances noted above the earliest agricultural settlements in the semi-arid zone date to the second half of the 3rd millennium b.c..

By contrast, radiocarbon dates for the period 6000-2600 b.c. are far more common in the humid uplands of the south-east, and indicate a continuous occupation of these areas throughout the Neolithic. Together with data from the semi-arid zone, this evidence strongly suggests that there was a major delay in the 'colonization' or settlement of the drier regions of the south-east. These dates also suggest that there was a significant expansion of settlement and mixed farming strategies around the middle of the 3rd millennium b.c..

Another test of this proposition are the sites and assemblages whose general chronology can be reliably established even though no absolute dates are associated with them. In this particular context, it is the ability to differentiate between Neolithic and Copper Age assemblages which is most crucial. Diagnostic 'Cave Culture' items such as true almagra wares, cardial and other impressed wares, spout handles, incised stone bracelets and other features, help to positively identify Neolithic assemblages. On the other hand, there are a variety of features (Appendix 4:8) which can be used to distinguish Copper Age assemblages. Generally, therefore, the distinctions between Neolithic and Copper Age materials are sufficiently clear to make the identification of an assemblage as either one or the other, relatively straightforward.

Having said this, the only conclusive proof of Neolithic occupation in the semi-arid lowlands is the single Cardial Impressed Ware vessel found by Siret and Siret (1887: Plate 2) at Cueva de los Tollos in the coastal zone of Mazarrón (Murcia). Meanwhile, Neolithic occupation is extremely abundant in the more humid uplands of Almería, Murcia, Granada, Alicante, Valencia, Jaén, Málaga, Córdoba, Cádiz and Sevilla (Navarrete Enciso 1975, 1976; Giménez Reyna and Laza Palacios 1962; Rojano et. al. 1979; Mora Figueroa 1976; Braun 1963; Pellicer 1963; Martí Oliver 1978; Asquerino 1972; Soler García 1961; Olaría de Gusí 1974; Walker 1977;

Vicent and Muñoz 1973; Botella _et_. _al_.1981; McPherson 1870; Menjíbar Silva _et_. _al_. 1981; Molina González 1970; Asquerino and López 1981; Sarrion Montañana 1980).

Finally, the survey evidence from the Guadalentín Basin adds further support to the proposition that widespread, permanent settlement of the semi-arid zone did not occur until the later 3rd millennium b.c.. Whilst this detailed and extensive regional survey provided ample evidence of Copper Age settlement and activity - and indeed, Epipalaeolithic occupation - it produced absolutely no evidence whatsoever of Neolithic materials. Information collected during previous archaeological investigations in the Guadalentín Basin also includes no traces of Neolithic occupation.

It is worth noting in this context that in comparison with many areas of the semi-arid lowlands - particularly southern Almería - the Guadalentín Basin generally receives higher rainfall, has more abundant surface water, and is subject to less severe climatic fluctuations. Consequently, the barriers to early agricultural 'colonization' would have been even more severe in many of the other parts of the dry, lowland zone of Murcia and Almería. Hence, if Neolithic occupation is lacking in the Guadalentín Basin where ecological and climatic conditions were comparatively favourable, this pattern is even more likely to be found in the drier, and less stable parts of the semi-arid zone. The general implications of these conclusions are briefly outlined below.

Judging by the evidence from sites such as Nerja, Cueva del Parralejo, Coveta de l'Or, La Sarsa, Nacimiento and Valldecuevas, the commitment to cereal cultivation in the initial stages of the Neolithic was negligible. Instead, remains from these sites suggest that early agricultural strategies were primarily based on domesticated stock (cattle, pig, sheep, goat), and wild species (red and roe deer, boar, ibex). By the Middle Neolithic cereals were more significant in quantitative terms, but the use of these resources still does not appear to have had any major impact on social, economic or settlement organization. It is only in the Late and Final Neolithic in south-east Spain that spatially intensive cereal economies begin to emerge - alongside the appearance of the first open-air settlements. Consequently, it would be wrong to equate evidence of Neolithic occupation with evidence of fully developed cereal cultivation, or even mixed farming strategies. Instead, available evidence suggests that:

(a) <u>the stability, productivity and diversity of</u>

ecosystems in the humid upland zone would have favoured the gradual development of early farming economies
(This is due in large measure to the fact that agricultural production in these circumstances involved a minimum of risk, and low levels of energy investment. Moreover, in addition to domesticated stock and cereals upland ecosystems offered a wide variety of alternative plant and animal resources which may have helped to delay any resource specific or spatially concentrated form of agricultural intensification)

(b) When spatially intensive cultivation did become widespread in the Later Neolithic and Copper Age, agricultural production in the humid uplands of south-east Spain was, in general, still characterized by fewer risks, lower energy investments and more opportunities for expansion and/or diversification than the drier lowlands

(c) The concentration of Neolithic activity in the humid uplands and the general lack of such activity in the semi-arid zones is largely the result of the differential productivity and stability of these two zones

(d) The stability, diversity and productivity which characterizes the humid zone ensured that the disruption of social and economic systems did not occur as frequently, nor on the same scale, as in the semi-arid zone
(Consequently, the adjustments made by agricultural communities in more humid regions were relatively infrequent and insignificant when compared with communities in the drier regions)

(e) In contrast to the humid uplands, the dry lowland areas of south-east Spain would not have been particularly attractive for occupation during the Neolithic because of their low species diversity, unpredictable climatic regime and considerable ecological instability
(All of these factors would have presented serious obstacles to agricultural economies, and appear to have delayed the widespread establishment of agricultural communities in this area until the middle of the third millennium b.c.)

(f) Resource specific and spatially concentrated forms of agricultural intensification emerge not at the beginning, but rather at the end, of the Neolithic
(The Early and Middle Neolithic appear to be characterized by the use of domesticated plant and animal resources, but in the context of an economic strategy based on a considerable degree of residential mobility and a fairly wide spectrum of resources. By the terminal stages of the Neolithic both the degree of mobility and the range of resources exploited appears to have been reduced)

It is clear, therefore, that early agricultural strategies were initially developed in ecological-environmental zones where risks (e.g. variations, or failures, in production) were minimal, and only later were applied to circumstances where risks were more frequent, severe, and unpredictable.

The stimulus for the widespread expansion of agricultural communities into the drier regions of the south-east, however, is considerably less clear.

Several possible factors may be involved in this development. For example, the wider application of techniques such as ploughing or water control may have helped to stimulate the expansion of settlement into previously 'marginal' or unoccupied regions (cf. Sherratt 1980, 1981). Either of these techniques could have been employed initially to stabilize or supplement existing production, and only later have been applied as methods of expanding production or settlement. While the role of demography, new cultigens, long-term invironmental degradation and climatic changes at various scales may also have made important contributions towards the expansion of settlement in the mid third millennium b.c., there is little concrete data at present with which to evaluate either the factors, or the processes, involved in this development. However, what has become increasingly clear in the last few years - especially with the proliferation of radiocarbon dates recently - is the fact that the beginning of the Copper Age (c. 2600 b.c.) is roughly contemporary with the major extension of agricultural settlement into the more arid lowlands.

Given this marked discontinuity, future evaluations and models of the Final Neolithic to Early Copper Age transition will hopefully focus on the processes which not only brought about localized changes in settlement, material culture, organization, etc., but also stimulated major regional changes. Perhaps too, more attention should be paid to the role of community organization in helping to facilitate such a large scale expansion of settlement into previously 'marginal' areas. Finally, as Dean et. al. (1985) have demonstrated, settlement expansion (and contraction) can also be stimulated by various 'windows of opportunity' created by shifts in climate, hydrological conditions and geomorphic processes. While it is too early to implicate any of these factors in the 3rd millennium expansion of agricultural settlement in south-east Spain, more detailed investigations along these lines are essential.

In more general terms, the development of early agricultural economies in south-east Spain has a number of implications with respect to evaluating the evolution of mixed farming in other areas of the Mediterranean, temperate Europe and beyond. First of all, the evidence from south-east Spain demonstrates how certain types of ecological and climatic conditions (in this case fairly extreme ones) could create effective, long-term barriers to the expansion of agricultural settlement. Moreover, the restricted distribution of early stock and cereal economies in this area provides clear evidence that agricultural strategies developed gradually, and that during an extended period of 'trial and error' (with different mixes of resources, technologies, mobility patterns, etc.) agricultural economies were restricted to areas with 'favourable' climatic and ecological conditions - i.e. conditions which minimized risk and energy investments, and maximized the diversity, productivity and density of exploitable resources. This long period of development and experimentation is characteristic of agricultural development throughout much of the West Mediterranean (Mills 1980, 1983; Lewthwaite 1981, 1985; Phillips 1982; Geddes 1983, 1984, 1985). A similar general pattern is also well documented in the Americas, where long periods of development and experimentation are commonplace (Flannery 1973; Reed (ed.) 1977; Bray 1977; Byers (ed.) 1967). For example, Plog (1978: 366) has noted that:

> "The oldest remains of corn in the Southwest are indeed 4000 to 5000 years old. But, there are ethnographically known groups in the Southwest that planted crops and did not tend them but returned to see if there was a harvest in the fall. And there is certainly no evidence of agriculture for many thousands of years after the first corn cob.. In short, there is no firm evidence of subsistence strategies based on agriculture until well into the Christian era, perhaps no earlier than around A.D. 1000. In this sense, the southwestern populations even at contact time should not be considered as developed agriculturalists but as populations that were still experimenting with agricultural subsistence strategies".

Seen from this broader perspective, the continuity between the Late Epipalaeolithic and Neolithic in the West Mediterranean - with respect to technology, site location, mobility and organization - becomes more explicable.

The long delay between the first appearance of domesticated plants and animals in the West Mediterranean and the adoption of spatially concentrated and resource specific intensification (such as cereal cultivation) contrasts markedly with many areas of the central and eastern Mediterranean where the Early Neolithic is more directly linked to the 'sedentary village' mode of mixed farming (Jarman and Webley 1975; Tringham 1971; Dennell 1978, 1979; Renfrew 1971, 1972; Rodden 1965; Evans 1971; Mellart 1975). The reasons for these contrasts are likely to be complex, and variable, but should be connected with several major factors including:

(a) the opportunities available locally to pursue strategies other than agricultural ones

(b) the different time scales at which various domesticated resources were available in one region as opposed to another (cf. Lewthwaite 1985)

(c) the variety and spatial distribution of domesticated resources (plants and animals) in any given area (ibid)

(d) the degree of 'closure' or circumscription of territory in a region due to: increasing population densities, environmental degradation or simplification (e.g. land losses due to the Flandrian transgression), and the effects of climatic change

More comprehensive and comparative research on this problem will no doubt clarify the causal relationships between these and other factors, not only in the Mediterranean Basin, but also in other geographic and environmental contexts.

RANKING AND RITUAL ELABORATION

Until recently, discussions of the cultural sequence in south-east Spain have concentrated on a descriptive classification of exotic artefacts and monumental architecture, rather than explicit analyses of their behavioural significance. By contrast, more recent investigations have tried to evaluate these features in terms of social inequalities, status competition, and ritual intensification (Gilman 1976, 1981; Gilman and Thornes 1984; Chapman 1975, 1981; Lull 1983; Mathers 1984a and b). However, little attention has been devoted to evaluating differences in ranking or ritual elaboration on a regional scale. In the previous chapter discussion centred on an assessment of these differences and a systematic examination of their significance - in the context of both the Millaran Copper Age and Argaric Bronze Age. In light of these analyses, the following section is devoted to a more specific understanding of the processes which accelerated the development of ranking and ritual elaboration in south-east Spain in the 3rd millennium b.c.. The discussion, therefore, focuses on the evolution of hierarchial social organization and complex funerary rituals during the Copper Age.

The proposition to be examined here is that during the Copper Age <u>social ranking and ritual elaboration (both within communities and between them) was greatest, and developed most rapidly, in the driest and most unstable environmental zones in south-east Spain</u>. The evidence used to evaluate this proposition is of two general types: first, funerary data (discussed at length in the last chapter), and secondly, information about regional settlement.

With respect to funerary data it is sufficient to simply review some of the major conclusions reached in the preceding chapter, and then supplement them with some additional data relevant to this argument. On the basis of three general criteria (overall tomb size, internal and external features, and the presence/absence of exotic materials and artefacts), Copper Age cemeteries in the semi-arid zone consistently proved to be the largest, as well as the most labour intensive, complex and diverse. Moreover, there was a tendency for tombs in the driest areas of the semi-arid zone (e.g. Los Millares, Las Peñicas, El Barranquete, Loma de Belmonte, etc.) to be larger, more elaborate and more labour intensive than elsewhere. The wider range of raw materials, artefact types, decorative motifs, tomb forms, tomb features and so on, found in Copper Age cemeteries in the drier parts of the semi-arid zone has been interpreted as evidence for greater social differentiation and ranking.

Another aspect of Copper Age mortuary practices which lends support to this interpretation is that of internal tomb morphology. The segmentation of tomb interiors by various means - from masonry walls, portholes and blocking slabs in the passage, to partition walls, dividing slabs, and stone compartments in the main chamber - again occurs most frequently in the semi-arid zone, and significantly, is most common in the drier portions of this zone (Appendices 5:6 and 5:7). Because many cemeteries have not been investigated in a sufficiently controlled or systematic way the internal segmentation or 'compartmentalization' of tombs is often difficult to evaluate in behavioural terms. However, in all of the well documented cases of tombs with side chambers and identifiable human remains there is clear evidence of the spatial differentiation of interments on the basis of age. That is to say, infants and juveniles are not found together with adults in the same side chamber[1.]. The tomb of Cueva del Niño at Marroquíes Altos (Espantaleón y Jubes 1957), Tombs 20, XIII, and XXI at Los Millares (Almagro Basch and Arribas 1963: 173) and Tomb 8 at El Barranquete (Almagro Gorbea 1973: 121) all have

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1. While younger and older individuals did not occur together in these side chambers, it is important to distinguish the burials belonging to one phase of interment from those belonging to another, since the separation of individuals by age may vary through time. Consequently, adults and infants/juveniles may occur in the same side chamber, but in mutually exclusive phases of burial. At present, this type of temporal variability has not been documented.

side chambers which contain only infant/juvenile interments.[2] At least in some cases, therefore, it can be demonstrated that side chambers were used as a means of segregating different individuals on the basis of age - and arguably too, on the basis of status. More systematic analyses of the differences within Copper Age collective tombs will help to further clarify the significance of side chambers and other features associated with internal segmentation. When such analyses have been undertaken it will be instructive to examine:

(a) differences in the age, sex, grave goods, body arrangement and method of body treatment between various parts of an individual tomb (i.e. niches, side chambers, main chamber, passage compartments, etc.)

(b) the patterning of these variables in the cemetery as a whole

(c) the patterning of these variables between cemeteries

Although mortuary data is a richer and more varied source of information about social ranking and ritual elaboration, there is some limited information from Copper Age settlements which can be used to evaluate the proposition put forward above. Over the years a series of investigations at Los Millares (Almagro Basch and Arribas 1963; Arribas _et_. _al_. 1978, 1979, 1983; Arribas and Molina 1982) have revealed an impressive series of forts and fortifications whose scale and complexity cannot be matched at any other Copper Age site in the south-east. While the size, complexity and diversity of the Los Millares cemetery provide a graphic demonstration of the importance of this site (vis-a-vis other Copper Age sites in the south-east), the architectural features of the settlement further reinforce the idea of its important, indeed dominant, position in the region. The fact that Los Millares occurs in the semi-arid zone, and is associated with such large, complex and labour intensive architectural features provides further support for the proposition that ranking (between settlements and within them) and ritual elaboration are most fully developed in the drier portions of the south-east. Leaving Los Millares aside, an evaluation of other Copper Age settlements in the humid and semi-arid zone is more problematic given the lack of detailed investigation and information regarding the form, scale and complexity of settlement plans. Overall, however, present evidence from Copper Age settlements and cemeteries does support the argument outlined above.

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2. Adult and juvenile/infant burials are not always separated from one another as is demonstrated by the interments in Tomb 5 (level III) at El Barranquete (Almagro Gorbea 1973: 91).

Up to this point, the discussion of Copper Age ranking and ritual has focused on questions of scale and spatial variability, rather than on why particular developments took place and what factors were involved. Now that an argument has been put forward for differential development in the humid and semi-arid zones, it is necessary to briefly examine some of the processes which underlie this variability.

In general terms, the unusual and accelerated development of social ranking and ritual elaboration in the semi-arid lowlands can be related to several key factors - factors which are inapplicable to, or had a negligible impact on, the evolution of Copper Age communities in the humid zone. These factors include:

(a) the high degree of risk and uncertainty associated with agricultural production

(b) the spatial and temporal concentration of activities related to cereal production

(c) the high labour costs due to a capital intensive subsistence strategy based on the construction and maintenance of facilities

(d) the limited availability of large and reliable water supplies

As Gilman (1981) has emphasized, intensive cereal based agriculture in the semi-arid zone created considerable opportunities for the development of social and political control because of the large amount of labour invested by various communities in the land (in the form of water channels, terraces, cisterns and check dams). He argues that given the fixed nature of these labour investments, individuals and groups within such communities were loathe to abandon such valuable assets, and as a result, their fortunes were very much bound up with the land. Furthermore, he suggests that elites were able to capitalize on these long-term investments in a way which maintained and strengthened their positions of status and authority.

However, in stressing that it is the investments in land that are essential for the growth of social stratification, Gilman (1981: 4) virtually dismisses the role of circumscription in this process:

> "Broad stretches of uninhabited, but habitable, wilderness existed in Europe and the Mediterranean well into the Medieval and early modern period. In later prehistoric times, when population densities must have been far lower, there would have been plenty of land into which people could move to avoid unwanted masters. The shift towards social complexity occurs, furthermore, on too

broad and diverse, a front for the resource-circumscription argument to be viable".

In this way, Gilman seems to imply that the productivity, density and diversity of resources did not vary significantly from one area to another, nor was such variability taken into account in the choice of settlement location. Similarly, he seems to imply that the risks which may have been encountered in different areas would not have been an effective barrier to settlement segmentation - an argument which is contradicted by evidence presented in the discussion at the beginning of this chapter. Also contrary to Gilman's suggestion is the argument, presented here, that a wide range of cultural and ecological constraints would have reduced the probability of settlement segmentation - particularly in the semi-arid lowlands of south-east Spain. Some of these constraints include:

(a) the fluctuating nature of resource productivity in many areas (due to climatic variability and geomorphic events)

(b) the consistently large labour investments necessary to maintain a stable level of production

(c) the considerable level of manpower required to establish new and successful settlements

(d) the need to have additional manpower for defence and/or defensive constructions (given that small communities would have been vulnerable to raiding or other forms of attack, particularly in thosecircumstances where productive land was available, but where opportunities for defence were limited)[3].

In any case, the model put forward by Gilman (1981) does not explain why a spatially intensive, facility oriented agricultural strategy developed in the first place, or indeed, why it continued to be maintained for such long periods. If as Gilman argues, resource circumscription was not taking place it is necessary to point out why other types of production strategies - especially less energy intensive ones - were not employed (cf. Dean et. al. 1985). It is also somewhat ironic that Gilman (1976) argues that water resources were severely restricted in the lowland zone of south-east Spain, while at the same time maintaining that land suitable for occupation was available in abundance.

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3. For ethnographic examples of small communities which are vulnerable in both the military and economic sense see Chagnon 1968; Heider 1969 and Strathern 1971.

In the context of the semi-arid zone of south-east Spain, Gilman's (1981 proposal that capital investments in production help to retard settlement segmentation (or 'fissioning') is both applicable and useful, but is not the only factor which ought to be considered in this respect. Clearly the ecological constraints of the semi-arid zone (especially the scarcity of reliable water supplies) placed an effective brake on settlement segmentation. Outside of a few favourable areas with large, reliable water supplies the semi-arid zone presented a hostile, unpredictable and high risk area for agricultural production even after high energy investments in facilities. Opportunities for the expansion of settlement into these areas were therefore limited. On the other hand, in the neighbouring uplands the range of options for subsistence and settlement strategies would have been significantly greater: manpower constraints and energy investments would have been reduced, risks decreased, opportunities for diversification, expansion and intensification increased, and the probability of irreversible degradation reduced.

In the semi-arid zone of south-east Spain, therefore, the restricted opportunities for agricultural settlement (i.e. circumscription) <u>and</u> the capital intensive, facility oriented form of production helped to create circumstances in which a considerable degree of social control could be exercised.

The settlement of Los Millares, for example, provides an excellent illustration of how all of the different factors discussed above (p. a-d), helped to stimulate such unusual developments with respect to social ranking and ritual elaboration within the semi-arid zone. First, the site is located in an extremely favourable position with regard to water resources, lying at the confluence of the Andarax River and one of its principal tributaries (the Rambla de Huéchar). The former is one of the few drainages in the semi-arid zone with a perennial flow, and as Gilman and Thornes (1984: 114-118) have noted the site is well suited for flood water farming and other water control strategies. The large bend in the river, immediately upstream from the site would have considerably increased the surface area of fine alluvial soils near the site, as well as helping to slow the velocity of the flow (making it easier to manage) and encouraging the loss of dissolved and suspended sediments.[4]

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4. See Chapman (1978) and Mathers (1984a) for a list of Copper Age settlements in similar positions. The Librilla sites in the Guadalentín Basin also occur near similar irregularities in the course of the river (Appendix 4:13).

Moreover, the upstream location of this site ensured that it had a large and consistent supply of water.

The number of favourable areas of this kind in the semi-arid zone were literally 'few and far between'. As a result, this region was characterized by aggregated centres of population clustered around reliable water sources, and relatively large areas in between with little or no occupation.

As in other parts of the semi-arid zone, the large capital intensive investments necessary in and around the Los Millares settlement were necessary to maintain stability and productivity. Because of annual and and inter-annual irregularities in rainfall crucial water supplies could arrive in a matter of days or hours. Consequently, agricultural communities like Los Millares were placed under considerable stress and often had to focus their labour inputs in a short period of time in order to ensure that crops received adequate watering, that water was used efficiently, and that facilities were not threatened or damaged by a superabundance of water.

In these circumstances - where settlement mobility and segregation were limited, large population aggregations common, labour investments high, and the organization and mobilization of labour crucial - social ranking and intra-community competition would have been particularly pronounced. In addition, these circumstances made it possible to develop and maintain social control more easily (albeit on a fairly localized level). Resource circumscription on a regional scale, and capital intensive investments on the site level would have provided effective 'levers' with which to effectively control resources and communal behaviour.

What is more, long-term control of resources on a regional scale could have been effected more easily in the semi-arid zone because of the relatively static nature of settlement patterns and exchange networks in the region. The limitations on settlement segmentation and the necessity of overland transportation ensured that the dominant position of settlements like Los Millares was not compromised by the constant expansion of settlements. As a result, the probability that competitor settlements would be established nearby or that exchange and alliance networks would be reoriented, were minimized - a situation which would have helped to further strengthen the long-term dominance of Los Millares and other major Copper Age centres in the dry zone.

Moreover, as various archaeologists and anthropologists (Keesing 1976; Chagnon 1968; Lessa and Vogt (eds) 1972; Shennan 1982; Gilman and Thornes 1984) have pointed out that part of the function of ritual is as a means of coping with uncertainty and as a means of conflict resolution. In light of the uncertainties associated with agricultural production at Los Millares, and other Copper Age settlements in the semi-arid zone, the large material investments in tomb constructions, grave goods, and funerary rituals can be seen not so much as an index of economic stability, but rather as a sign of the increasing vulnerability of both social and economic systems. In this sense, systems of social and economic organization - like those in the semi-arid zone - which were consistently being unbalanced or disrupted by fluctuations in production (due to climatic and geomorphic events, the long-term effects of agricultural production, pests, etc.) would have been unstable. This instability, it is argued, would have given rise to a considerable degree of group competition and conflict, much of which would have been harmful or destructive if not mediated in some way. Instead of a method of enforced control based on armed force or the threat of such force, an institutionalized form of ritual competition may have offered a way of reducing social conflicts by channelling them into a stylized form of activity which did not involve open, or direct conflict. Moreover, given the time stressed nature of agricultural production, such institutionalized forms of competition could have been conveniently scheduled and controlled in a way which was clearly not possible with unrestrained forms of dispute, competiton and conflict. Hence, institutionalized rituals of this kind may represent a way of containing or restricting the scope of conflict, so that it causes a minimum of disruption during crucial periods of subsistence activities, and helps to prevent serious breakdowns in community order generally.

While ranking and ritual elaboration obviously developed in more humid regions, the pace and magnitude of change was altogether different than in the more arid regions. In these circumstances, the constraints on social and economic systems were considerably less severe. For example, conflicts could have been resolved without the necessity for major organizational changes because of the greater opportunities for establishing new settlements. Moreover, control over resources - unlike the semi-arid zone - was not monopolistic, due to the fact that the spatial distribution and diversity of resources in these areas made it difficult or impossible to exert such centralized control. Consequently, individual settlements in the humid uplands did not reach the same level of dominance achieved by Los Millares. The main reasons for this are as follows:

(a) the more even distribution of resources

(b) the lower economic risks

(c) the greater opportunities for diversification, expansion, and intensification

(d) the possibilities for less energy intensive production

(e) given a-d (above), the nature and diversity of settlement was more fluid and less constrained than in the semi-arid zone, and hence, less likely to result in an unchanging pattern of alliances/exchanges, or a static hierarchy of dominance

From this perspective, the model developed here is consistent with Copper Age developments in many parts of the West Mediterranean and temperate Europe, in so far as social control, ranking, and ritual elaboration are less marked than in the semi-arid zone of south-east Spain. In general, the characteristics of the former areas appear to resemble the conditions outlined in a-e above, and are completely distinct from those of the drier lowlands of the south-east. It is, therefore, arguable that in much of the West Mediterranean and temperate Europe many of the conditions which would have favoured the rapid development of centralized social and political control were lacking during the Copper Age. Indeed, the pattern of social and economic evolution in many of these less arid regions was in the direction of small, decentralized and relatively autonomous units rather than large, powerful and centralized ones. Obviously, these ideas need to be more adequately investigated and tested, but they do offer 'the germ of potential' which may be usefully exploited in constructing more rigourous and comparative models of social, political and economic organization in later prehistory. The problem of why communities in the semi-arid zone of south-east Spain did not develop along the same lines as some of the eastern Mediterranean 'civilizations' is discussed in the final part of this chapter when another aspect of this argument will be followed up.

STANDARDIZATION

As several of the preceding chapters have emphasized, a major cultural transformation occurred in south-east Spain in the early part of the 2nd millennium b.c.. One of the most significant aspects of this transformation is the abrupt series of changes in material culture which marks the initiation of the Argaric Bronze Age. In general these changes reflect a greater degree of regularity or uniformity in both funerary and domestic assemblages. Using this evidence as a baseline, the argument put forward in this section is that the <u>standardization characteristic of Argaric Bronze Age assemblages represents locally centralized power (within individual sites) as well as intensified interaction and integration at a regional scale</u>.

In the previous chapter a variety of evidence was presented linking the process of standardization with a range of other cultural developments - all of which point to the emergence of a more centralized system of social control and a more hierarchical division of society in the Early Bronze Age. Funerary evidence, in particular, provides a number of clear indications of these developments, including:

(a) the replacement of collective tombs by more individual ones

(b) the rapid, and nearly total, exclusion of ritual activities, symbols and other paraphernalia associated with Copper Age burial practices

(c) the rationalization of prestige competition via the removal, or reduction, of many types of raw materials and artefact types

(d) the uniformity of tomb types, sizes and forms

(e) the standardization of artefact forms and funerary rituals (e.g. body arrangement, body treatment, etc.)

(f) the extreme contrasts in wealth between different burials in the same cemetery.

Other evidence of increased social control is suggested by the disparity between the large numbers of metal objects found in tombs and the scarcity of such objects in domestic contexts. Furthermore, the general lack of diversity in the form and manufacture of utilitarian wares, as well as the almost total absence of decorated pottery, may also provide additional support for the idea of intensified social control.

Given their emphasis on conspicuous display and consumption of wealth by individuals, Argaric communities have much in common with the ideologies and systems of social organization which prevailed in much of the Mediterranean and temperate Europe during the Bronze Age (Coles and Harding 1979; Champion <u>et</u>. <u>al</u>. 1984; Randsborg 1974; Renfrew 1972; Kristiansen 1978; Gilman 1981; Shennan 1982; Bradley 1984). In comparison with these other areas, the Argaric is fairly unique in having such a limited, and uniform, range of artefacts, while at the same time being spread over such a wide area. This obviously raises the question of why standardization was such an outstanding feature of Argaric communities, how it was maintained over such a large area, and indeed, why it occurred at all.

Certainly the energy investment and resource circumscription arguments (discussed earlier) can be used to suggest reasons why social controls were becoming more centralized during the Bronze Age. Resource circumscription appears to have become more acute, with increased population densities in many areas, as demonstrated by data from the Guadalentín Basin (Chapter 4) and by settlement in the previously unoccupied foothill zone of the Sierra Nevada (García Sánchez 1963). Settlement continuity in many of the lowland and upland areas of the south-east would also reinforce the argument put forward by Gilman (1981) that long-term capital investments could be used as 'levers' by local elites to promote and maintain greater control. Moreover, recent work by Gilman and Thornes (1984) suggests that by the Early-Middle Bronze Age, intensive water control techniques had spread into many parts of the uplands, where extensive, low energy investment production strategies had previously been the norm.

Another relevant factor which may have helped to promote greater social control (and hence, have paved the way for standardization), is the increased importance of defence. This is reflected as much in the extremely defensive locations of most Argaric settlements (Siret and Siret 1887; Lull 1983), as in the fortified constructions (e.g. Arribas et. al. 1974) and emphasis on weaponry (Cuadrado Díaz 1950). In such circumstances, the armed force necessary to defend settlements may have been the same armed force mobilized to enforce the social norms advocated by emergent elites (cf. Gilman 1976, 1981). The size of Argaric communities, and hence the scale of direct control by elites was fairly limited, however, and certainly did not extend beyond one or a handful of settlements. Nevertheless, the emergence of a military elite, or an elite backed with armed force, may have been instrumental in breaking the long-standing traditions of communal status and authority characteristic of the Millaran Copper Age. This in turn could have led to a level of social control which enabled elites not only to restructure the nature of funerary traditions and prestige competition in a major way, but also alter societal organization as a whole.

In the last chapter, it was argued that standardization occurs at two levels: within individual communities and in large areas encompassing many different communities. In the former, standardization appears to have been used as a means of rationalizing the tremendous diversity and variability of Copper Age rituals associated with the display and consumption of wealth (e.g. in funerary contexts, the range of: artefact types; raw materials; tomb forms, features and construction techniques; and decorative motifs). As the discussion in Chapter 5 pointed out, standardization within individual communities provided a means of controlling prestige competition more effectively by establishing a more structured and more uniform system of defining social rank. Indeed, standardization seems to have been employed in order to establish a formalized system of objects and symbols which could define different, perhaps even exclusive, levels of rank and status. It is clear, therefore, that standardization offered a useful tool for promoting and maintaining social control since it graphically defined the boundaries of different social ranks by strictly limiting the number, and variability, of symbols which could be used for display. Moreover, the regular occurrence of particular combinations of materials and objects in tombs, the consistent positioning and treatment of corpses, and the repeated interment of individuals in specific areas within the settlement, suggests that the content and context of funerary rituals was now subject to considerably greater control. Finally, these controls would have been useful in protecting the 'integrity' of higher order positions by defining them more rigidly and absolutely, thereby reducing the possibilities of confusing different levels of rank and status.

The role of metal objects in this context was particularly important (see Chapter 5). As a prestige raw material, metal possessed three outstanding characteristics which made it particularly attractive for defining and distinguishing status in the Bronze Age:

(a) scarcity value
(b) high production costs
(c) the ability to be cast, or worked, into a wide variety of new forms which could not be produced using other materials (e.g. diadems, spiral bracelets, riveted daggers, halberds, swords, etc.)

Together with the reduction in the diversity of other more common raw materials (flint, bone, shell and stone), the increased use of metal objects helped to widen the gap between the elites and their followers, and indeed, maintain that gap. The former was a particularly useful way of controlling the 'inflation' of prestige symbols, since it effectively excluded many raw materials and objects, and thus helped to minimize the distortion or ambiguity that may have resulted from a more flexible system of defining status and social rank. Placing greater emphasis on raw materials which were not readily available in the environment, particularly those scarce items which also required considerable labour investment and technological skill, enabled elites to regulate both the production and 'definition' of prestige items in a more effective and efficient manner.

While standardization was an important way of controlling behaviour within individual settlements, the uniformity of funerary assemblages (and to a lesser extent domestic ones) in south-east Spain cannot be explained by merely focusing on the internal organization of individual sites. Consequently, the use of standardization as a control mechanism within communities was one aspect of a more complex and widespread development. Standardization on a regional scale, on the other hand, appears to have more to do with the intensification of social and economic contacts between communities during the early 2nd millennium b.c..

Several major, and inter-related developments helped to promote standardization at the regional level:

(a) the growth and intensification of exchanges involving prestige goods (i.e. the development of a 'prestige goods economy' - cf. Friedman and Rowlands (eds) 1978)

(b) increased regional site densities (resulting in a shorter distance between sites, and hence, a reduction in the logistical costs of maintaining exchanges, alliances, etc.)

(c) the proliferation of metal objects - representing a portable, concentrated form of prestige, ideal for exchanges over long distances

(d) the uncertainties associated with intensive agricultural production (especially in the semi-arid zone)

In the case of the latter (i.e. d), it is significant that the greatest degree of standardization in both funerary and domestic assemblages is achieved in the semi-arid region. This fact in particular, and regional integration in general, appear to be related to the risks associated with intensive, spatially concentrated production and the decreasing size of the territories which any given community could exploit independently. External linkages of various types (for communication, exchange, marriages or manpower) would have been extremely valuable buffering mechanisms given the fluctuating and unpredictable nature of production - especially in the drier areas. As Braun and Plog (1982:

518) have suggested from investigations in the American mid-west and south-west:

> ".. tribal social integration appears to have been more intense as risks arising from local environmental unpredictability increase".

Formalized external buffering mechanisms of this type are well documented in the ethnographic literature (Suttles 1968; Ford 1972; Rappaport 1967; Dalton 1977) and have also been claimed by archaeologists in various prehistoric contexts (Plog 1978; Dean et. al. 1985; Halstead 1980; O'Shea 1980; Jorde 1977; Upham 1982, 1983). While various external buffering mechanisms would have existed in the Copper and Bronze Age in south-east Spain, their accelerated development during the Argaric would have been particularly favoured by the four factors listed above.

While all these points help us to understand how and why standardization was used within individual Bronze Age settlements to control both resources and behaviour, there are still unanswered questions about the long-term processes which led to the development of standardization.

One final question about standardization in south-east Spain, and for that matter about the Copper Age to Bronze Age transition generally, is why there is such a sharp break in the material culture sequence between the end of the Millaran and the beginning of the Argaric. While some arguments can be made for a certain degree of continuity between these two periods (e.g. Lull 1983; Ayala Juan 1979-1980), many aspects of Argaric material culture and ritual have no clear antecedent in the Copper Age (e.g. individual tombs, chalices, swords, halberds, silver production, etc.).

With respect to standardization, Beakers and eye-idol decorations provide some examples of uniformity and regularity in Copper Age assemblages. However, in most cases items of this type are either very scarce (like the former) or were applied to a wide variety of different artefact and raw material types (like the latter). In both qualitative and quantitave terms, therefore, the scale of standardization in Argaric Bronze Age assemblages is fundamentally distinct from earlier Copper Age ones. Nevertheless, it is interesting that standardized items like Beakers occur towards the end of the Copper Age, which suggests that these objects may represent a development towards greater uniformity in prestige goods prior to the beginning of the Argaric.

Although communal burial practices were still in use up to the end of the Copper Age in the south-east, there is some evidence to suggest that the strength of communal rituals and authority may have been considerably weakened or diluted by the early 2nd millennium b.c.. For example, in Chapter 5 it was noted that the segmentation of megalithic tombs appears to be associated with the practice of differentiating individuals within the same tomb. Also, as Chapman (1981: 397) has pointed out, the segmentation of Copper Age tombs may represent the breakdown of communal burial and its replacement by more individual tombs. Finally, Harrison (1977:72) has noted that rich Beaker burials from the megalithic tombs of Llano de Atalaya 6 and Loma de Belmonte 1 (Leisner and Leisner 1943) - both in eastern Almería, may be the 'remains of disturbed single burials'. Obviously this data is tentative, but it does suggest, at least, that the cohesion of Copper Age collective rituals and funerary practices may have been breaking down prior to their widespread elimination in the Early Bronze Age.

By contrast with these communal traditions, the characteristically individual forms of burial, hierarchical ranking, and standarized assemblages of the Early Bronze Age signal that a crucial threshold had been crossed - especially with regard to social, ritual and ideological systems. In this sense, therefore, the changes in material culture and organization which characterize the Early Bronze Age appear to represent the rapid adjustment of material culture to long-term, incremental changes in social organization, agricultural production, exchange networks, and settlement densities.

Despite the fact that there were abrupt changes in the form of mortuary practices, and in many aspects of material culture during the Argaric, these transformations, nevertheless, appear to reflect a pattern of gradual and incremental changes which ultimately result in a series of rapid and discontinuous transformations. From this perspective, relatively minor increases in the level of social control (through increased investments in facilities, greater manipulation of resources, increased subsistence risks, etc.) may have been sufficient to stimulate the major shifts in material culture which characterize the beginning of the Bronze Age. The emergence and rapid growth of more individualized wealth and prestige competition in the Early Bronze Age appears to have stimulated a number of rapid transformations in material culture - including widespread standardization.

From a more general perspective, there is good evidence from a range of different prehistoric contexts to suggest that the proliferation of standardized objects over a wide area is connected with some form of regional integration (e.g. Gamble 1982; Hodder 1979; Braun and Plog 1982; Fry (ed.) 1980; Struever 1972). Moreover, in contexts where standardization and uniformity develop within a more localized area, and are found in a wider range of artefacts and symbols, there is strong evidence to suggest that centralized control is involved. The stylized form of monumental art and architecture in Egyptian, Mesopotamian and Mayan 'civilizations' (Edwards 1958; Adams 1965; Oppenheim 1964; Lloyd 1978; Kramer 1963; Weaver 1972; Sanders and Price 1968), provide particularly striking examples of this phenomenon. In European and Mediterranean contexts, these concepts have yet to be applied to general problems such as the Beaker or Impressed Ware developments, but there is certainly some scope for trying to do so in the future.

INSTABILITY, RISK AND DISCONTINUITY

The first three sections of this conclusion have been arranged chronologically and have each dealt with a theme from one of the major periods emphasized in this investigation - that is, the Neolithic, Copper Age and Bronze Age respectively. Rather than focus on a period-specific theme, however, this section is devoted to a more general problem: the long-term development of agricultural communities in south-east Spain. The aim, therefore, is to draw together many of the points raised in earlier sections using a diachronic and developmental perspective. In adopting this wider view, a special importance is attached to the dynamic interaction between farming communities and the ecological/environmental systems in which they operated. Of particular interest are the long-term consequences of cultural-environmental interaction, and their significance in the overall pattern of cultural development in this area.

The proposition to be examined in this section is that <u>long-term agricultural settlement in the semi-arid zone is characterized by a 'boom and bust' pattern of development marked by periods of low density settlement and activity, and punctuated by phases of high density occupation and rapid cultural development</u>. Furthermore, it is argued that the economic risks and ecological instability associated with agricultural production in the semi-arid zone helped to play a major role in creating this discontinuous sequence of development. Conversely, agricultural development in humid regions of the south-east is more gradual and continuous, and less prone to the alternating cycles of large scale expansion and contraction which characterize the semi-arid zone.

As we have seen earlier in this conclusion, and in preceding chapters, the reasons behind the expansion of agricultural settlement into the semi-arid zone are not clear. Some or all of the following factors may be involved:

(a) the appearance and application of new resources (e.g. new cultigens or hybrids) or productive technologies (the plough, 'secondary products', water control, etc.)

(b) favourable hydrological conditions in the semi-arid zone

(c) changes in social organization (e.g. with respect to the way in which labour was organized, and deployed)

(d) pressure on resources in the upland zone (e.g. due to increasing population densities

(e) the advantages of long growing seasons and the general absence of frost in the semi-arid lowlands

Although it is difficult to explain why this expansion occurred, it is possible to make several general points about the initial establishment of agricultural communities in the semi-arid zone. First, the nature of early farming in the upland and lowland zones was fundamentally different because agriculture subsistence strategies, in one form or another, had developed for some three millennia before they spread to the lowlands. Moreover, the different problems and opportunities in these two zones help to create differences in techniques and strategies used in each area.

Secondly, during the initial period of expansion into the semi-arid zone (c. 2600 b.c.) the productivity and stability of local ecosystems would have been considerably greater than it was several centuries later, by which time intensive cereal production, clearance, and grazing would have created major ecological disturbances (cf. Geddes 1983) and serious economic problems. For example, Driesch and Morales (1977) have suggested that during the early occupation of the site of Terrera Ventura (Tabernas, Almeria) the environment in the immediate vicinity of the settlement was characterized by a high species diversity which was progressively reduced as the gallery woodland was eliminated by demands for fuel, construction materials and new land, and the scrub vegetation was reduced by over-grazing. Although there are some problems with the details of this interpretation (see Chapter 2), the general conclusion appears to be a sound one - that is, that an initially favourable soil-water-plant relationship was eventually disturbed, and ultimately destroyed by long-term occupation and agricultural production around the site. From this perspective, expansion into a few of the more favourable areas of the semi-arid zone may initially have offered many advantages - advantages, which in the short-term at least, offset or obscured the long-term disadvantages of continued exploitation.

Finally, given the low density and low overall level of occupation in the semi-arid zone during the period between 6000-2600 b.c., ecosystems in localized areas (such as those around major water courses) may have been able to achieve a certain level of stability and diversity which was uncommon in the dry lowland regions as a whole. These isolated 'islands' or pockets of ecological diversity and productivity would have offered particularly advantageous conditions for economic production in the early stages of occupation, but over a relatively short period of time could have been dramatically transformed into zones which were significantly less diverse, less stable, and demanded considerably higher labour inputs in order to sustain the original level of productivity.

In the longer term, agricultural production had important repercussions, especially in the semi-arid zone where the scale and magnitude of these changes were greatest. In order to understand why both ecological and cultural changes were so rapid here it is necessary to examine the ecological dynamics of semi-arid ecosystems generally.

One important point about semi-arid ecosystems - in south-east Spain and elsewhere - is their lack of stability and 'resilience' when subjected to persistent interference, either in the form of natural processes, human activities, or a combination of both. When they are compared globally with other types of ecosystems (tropical, temperate, sub-arctic, arctic), semi-arid systems are the most vulnerable to major disturbance, and once disturbed, are amongst the most likely to result in long-term, and in many cases irreversible, degradation (Dregne (ed.) 1970; Butzer 1976b; Hills (ed.) 1966; Garner 1974). Another point about the dynamics of ecosystems generally, and semi-arid zones in particular, is that simplification - by whatever agency - can result in:

(a) a reduction in the diversity of plants and animals

(b) greater instability

(c) lower productivity

In this sense, long-term agricultural production is one of the most effective methods of creating, and sustaining ecosystems at a simple level. This is largely due to the fact that maintenance of conditions which are suitable for domesticated plants and animals tends to progressively eliminate the niches and habitats suitable for their wild counterparts (cf. Rindos 1983). As a consequence, the continued efforts to maintain an 'agro-ecosystem' reduce the diversity of local plant and animal populations to a minimum. This fact, together with the vulnerability of simplified ecosystems to the destabilizing effects of climatic fluctuations, geomorphic events, pests and plant diseases, would have made agricultural production a particularly hazardous proposition - even if technological and organizational adjustments were made to cope with problems on a short-term basis. As Rindos (ibid) has suggested, such short-term alterations are just that, since the 'solutions' they provide are ultimately only temporary ones which prove to be inadequate for resolving a new series of problems.

Aside from the spiralling costs of production, one major and potentially destabilizing factor in the long-term pursuit of agriculture in a semi-arid context is the inability of ecosystems to regenerate. In this sense, once the local landscape has been repeatedly modified to suit the requirements of agricultural production (i.e. converted to an 'agro-ecosystem'), its capacity to return to its previous state, or for that matter to regenerate in any major way would have been seriously impaired. What is more, the process of ecological simplification and environmental degradation can take place very rapidly in the semi-arid zone. A classic example of this comes from the American south-west where Butzer (1976b: 136) has noted that in Arizona and New Mexico:

> "... ephemeral streams once flowed across broad, shallow draws that were grown over with grasses and shaded by trees. Even during the dry season, ponds were common along the stream beds, and descriptions of this kind were provided by the earliest American ranchers during the 1860s and 1870s... However, during the 1880s a climatic change set in at about the same time that large herds of cattle and sheep were introduced. The beneficial winter rains declined. The summer rains persist as before - but these come as brief, violent downpours that flow off rapidly and evaporate without soaking the ground or recharging the groundwater. As a result of both the declining winter rains and increasing grazing pressures, vegetation was gradually reduced, the ground water table fell, and runoff was accelerated. As the water surged into the stream channels, it began to erode the older alluvium, cutting deep

gullies into relatively steep alluvial surfaces. Shade trees died off, and grassland changed to desert shrub and brush country".

Persistent interference with the vegetation cover and soil surface can be particularly damaging in semi-arid zones and can help to create a rapid decline in the stability, productivity, and diversity of local ecosystems - whether or not these changes are accompanied by fluctuations in climate. Intensive agriculture, of course, not only interrupts the regenerative processes of local vegetation, but also leaves more of the soil surface exposed to ultraviolet radiation, rain and wind.

Once intensive agriculture is established in a semi-arid context a complex series of inter-related processes are set in motion, all of them leading to a major simplification and degradation of the ecosystem. These processes include:

(a) a reduction in vegetation cover

(b) greater exposure of the soil surface, resulting in greater deflation by winds and greater evapo-transpiration

(c) a reduction in soil organisms because of increasingly desiccated soil

(d) less effective nutrient cycling due to poorly developed soil structure and the reduction in soil organisms

(e) increasing vulnerability of soil humus layer to erosion by torrential storms and wind - particularly after crops were harvested and the binding of soil by plant roots was minimal

(f) desiccation of organic matter before it can be effectively incorporated into the humus layer (often organic debris is dried out and transported elsewhere by wind)

(g) smaller accumulations of organic matter due to (f)

(h) greater capilliary action caused by intense evapo-transpiration, often resulting in the precipitation of solutes at or near the soil surface in the form of salt pans or caliche layers

(i) baking of the soil surface and formation of hard crust which inhibits the infiltration of water

(j) increased runoff due to poor infiltration rates

(k) striping, rilling and gullying of the soil surface, which in turn, would have had impact on water tables and drainage patterns

Given these ecological processes, it is clear that long-term agricultural production in semi-arid ecosystems stimulates a variety of changes which can very rapidly become irreversible. This would have presented a consistent threat to the stability of farming communities in such areas. Moreover, the rapidity, and magnitude of these changes would have stimulated technological and organizational adjustments which were not only more frequent than in other environmental contexts, but also fundamentally different in scale. It has been argued, therefore, that the highly dynamic relationship between cultural and ecological systems in the semi-arid zone brought about a situation where both systems were regularly making an attempt to adjust to the other, and that, in general terms, neither was particularly stable.

Returning to the cultural sequence in south-east Spain, the contraction of Copper Age settlement in southern Almería provides an example of how the long-term consequences of intensive agriculture eventually resulted in a collapse. Argaric occupation is minimal or absent in many areas where the Millaran Copper Age flourished, for example, in the Andarax Basin and Níjar Desert. Large settlements like Los Millares, El Tarajal and Terrera Ventura do not appear to be occupied in the Bronze Age, and as a whole the importance of southern Almería in the Argaric period is not great. The decline of riverine Copper Age settlements in southern Almeria and elsewhere (e.g. the Guadalentín Basin), is another development which can be related to the problems of intensive production and its ecological consequences (Mathers 1984a and b).

It is too simplistic, however, to see the contraction of settlement in southern Almería as merely the result of long-term agricultural intensification and degradation. Other factors, such as the expansion and increased density of settlement in neighbouring regions, the intensified interaction between communites, the growth of prestige exchanges, access to metal sources, and so on, were also involved in these changes. However in southern Almería (the 'core area' of the Millaran Copper Age) the difficulties associated with long-term economic instability appear to have been the principal problem - a problem which was further exacerbated by the host of factors noted above. Weakened by the instability of intensive production, the limited opportunities for expansion and diversification, the problems with irreversible degradation, and perhaps most significantly, the increasing competition from a network of settlements in peripheral areas, these supplementary factors appear to have been sufficient to finally break the back of the traditional centres of power in a fairly dramatic fashion - a theme which will be returned to at the end of this chapter.

In a somewhat later context, and one which is beyond the scope of this investigation, the collapse of the Argaric network (after c. 1300 b.c.) appears to have been brought about by a similar range of factors: limited potential for expansion/diversification; problems associated with intensive production and degradation; and competition from peripheral areas.[5] Again, however, too much emphasis can be placed on ecological/environmental factors since the impact of imported prestige goods and intensified maritime activity may have had a catastrophic effect on regional settlement hierarchies, alliances and exchange networks.

In contrast with the fluctuations and irregularities which characterize cultural evolution in the drier lowland regions, upland areas of the south-east exhibit a more regular and gradual pattern of development from the Neolithic to the end of the Bronze Age. The continuity of development in the upland zone is best reflected by the long-term overlapping of settlements on a regional scale, and the generally uninterrupted pattern of occupation at many individual sites.

From a general perspective, it is clear that semi-arid regions display marked phases of flourescence and collapse, one often following close on the heels of the other. Examples of this pattern can be found in the following areas: the American south-west (Upham 1982; Dean et. al. 1985; Berry 1982; Jorde 1977); Mesopotamia (Oppenheim 1964; Jacobsen and Adams 1958); Egypt (Butzer 1976a); and North Africa (Shaw 1981). These cycles of development and collapse have their own complex series of cause-and-effect linkages, and their own historical paths of development, but they do, nevertheless, demonstrate a common feature of agricultural exploitation and settlement in semi-arid zones: that is, instability and change. Constructing more rigorous, comparative models of these developments, and the processes which underlie them must be a high priority for future research.

EVOLUTION AND DEVOLUTION

One of the most interesting problems posed by the cultural sequence in south-east Spain is why centralized state levels of organization did not emerge in this area, as they did in the eastern Mediterranean. Although traditionally, considerable attention has been paid to both the Millaran

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5. Many of the many centres during the Late Bronze Age and Proto-historic periods (i.e. Iberian/Early Iron Age) appear to be in coastal locations - such as Cartagena (Cuadrado Díaz 1952); Almuñécar (Pellicer Catalán 1962); Morro de la Mezuitilla (Schubart 1979) or near navigable rivers (Schüle 1969).

Copper Age and the Argaric Bronze Age, the development from one to the other has usually been seen as little more than the transition from communal to more individualized and hierarchical organization. Because the implicit emphasis has been on levels of organization within individual communities, rather than on the nature of organization on a larger scale, a number of significant points have been overlooked.

First, and perhaps most significant of all, is the fact that although intra-community organization is more hierarchical and centralized in the Argaric, the degree of centralization and ranking on a regional level appears to be considerably more pronounced during the Copper Age. Secondly, while it has often been assumed that the Millaran and Argaric develop in the same geographic areas (e.g. Harrison 1980: 156), there has been little or no attempt to explain why sites such as Los Millares, Terrera Ventura and other major centres are not reoccupied in the Argaric. Indeed, the idea that the geographic boundaries of the Millaran and Argaric complexes directly coincide is somewhat puzzling given that most investigators agree that the classic Millaran development was centred on southern Almería (Almagro Basch and Arribas 1963; Arribas 1959; Castillo 1963 ; Almagro Gorbea M.J. 1973), and that the 'core area' of the Argaric was centred on southern Murcia and north-east Almería (Blance 1960; Savory 1968; Lull 1983; Schubart and Arteaga 1983). To date, however, very little emphasis has been given to this geographic shift. Moreover, since Gilman's (1981) model of social stratification depends to a large extent on the ability of elites to manipulate long-term capital investments, the continuity of occupation at individual sites (between the Copper and Bronze Ages) is an important aspect of this argument. Finally, there is the general questions of why the so-called 'proto-urban' developments of the Millaran Copper Age did not continue to evolve into an even more complex, centralized and integrated socio-political unit. All of these issues are related to the general evolution or trajectory of later prehistoric communities in the south-east, and hence, can all be addressed collectively.

The proposition put forward in this final section is that further development of the Millaran complex was stifled by various social, geographic and environmental factors, which in combination helped to undermine the centralized systems of regional control and economic power which began to develop in the latter part of the third millennium b.c.. Moreover, it is argued that Copper Age centres like Los Millares were based on a localized form of control and power (with respect to manpower, resources and exchange) which could not be easily extended, and was, therefore, ultimately threatened by, and vulnerable to, competition from other quarters.

In light of the discussion in the preceding section, it is clear that Copper Age communities pursuing intensive agricultural production in southern Almería (the driest part of the semi-arid zone) would have faced the most severe, unpredictable and consistent difficulties. To summarize briefly, these difficulties included:

(a) low, unpredictable, and often torrential rainfall

(b) limited opportunities for expansion and diversification

(c) a scarcity of large, reliable surface water supplies

(d) the vulnerability of ecosystems to progressive simplification and degradation

Geographically, agricultural settlements in southern Almería, and in many parts of the semi-arid zone, resemble the settlement patterns of early farming communities in temperate Europe, which Sherratt (1980: 315) has described as follows:

> "Clusters of agricultural settlement were often widely scattered, but within them population was locally concentrated around critical resources such as fine-grained, well-watered soils".

As various investigators have pointed out Millaran sites cluster around the few areas which possess large and predictable water supplies (Chapman 1975, 1978; Gilman 1976; Mathers 1984a and b). Moreover, only a fairly small percentage of any given drainage would have been suitable for water control techniques because of factors such as the surface area of irrigable land within the regular exploitation territory of a site, flood hazards, water velocity, drainage, and so on. Throughout much of the semi-arid zone this pattern of riverine settlement is characterized by site clusters around secure water sources; wide spacing between settlements; dense, nucleated occupation; and a lack of interfluvial sites. As the discussion at the end of Chapter 5 pointed out, these geographic and environmental factors made traditional Copper Age centres in southern Almería particularly vulnerable.

By the early 2nd millennium b.c., this vulnerability was increased by the accelerated development of prestige exchanges, the expansion of settlement in many neighbouring regions (eastern Granada, north-east

Almería, and central-southern Murcia), and the widespread use and production of metal objects. This combination of factors had several important effects. First, the increased site densities brought about by settlement expansion in many areas helped to lower the logistical costs of maintaining various types of contact and interaction between communities (exchanges, communication, alliances, manpower sharing, etc.). However, in areas like southern Almería site densities were considerably lower, and as a consequence, the costs of maintaining contacts between communities were higher. Moreover, because of the differences in settlement densities in the two regions, the density of human and other resources per unit area was significantly lower in drier regions (see Appendix 3:1). In the other parts of the south-east where settlement expansion was taking place (both in the uplands and selective parts of the lowlands), communities were not only able to interact more easily and more regularly than in southern Almería, but also had better logistical access to resources.

While changes in settlement densities provided opportunities for greater control and regional integration, the intensification of prestige exchanges provided one of the prime stimuli for such developments. Access to metal resources was particularly important in the early part of the 2nd millennium b.c., and because traditional centres like Los Millares lacked local ore sources they were at a double disadvantage: that is, they had to rely on non-local supplies of these raw materials, and had an inefficient means of procuring them. On the contrary, much of the 'core area' of the Argaric is characterized by both high density settlement and plentiful ore sources - especially the coastal area of Mazarrón in Murcia (Ayala Juan 1980; Lull 1983). Given these two factors - the expansion of settlement in areas outside the traditional centres of power, and the considerable emphasis placed on the production and exchange of metal objects - southern Almería was placed in an increasingly marginal position. In combination with the problems of agricultural production in the latter area, it is perhaps not surprising that the importance of southern Almería declined significantly during the Argaric.

Returning to some of the points raised at the beginning of this section, it is clear that there is a considerable shift in the geographic focus of economic and political power at the beginning of the Bronze Age. In many parts of southern Almería, and elsewhere (e.g. riverine areas of the Guadalentín Basin) Copper Age settlements were not reoccupied in the Bronze Age, so that the argument put forward by Gilman (1981) to explain the more individualized and stratified systems of organization of the Early Bronze Age does not seem to apply. Long-term capital investments in these cases seem to have been abandoned rather than used as 'levers' for the promotion of individualized elites.

On the other hand, Gilman's arguments are applicable to many of the areas where the Argaric is most fully developed - that is, north-east Almería and central-southern Murcia. The case study from the Guadalentín Basin, for example, demonstrated that in hill-zone areas at least, there is often a very close spatial relationship between Copper Age and Bronze Age sites. This data reinforces the idea of continuity between these two periods in many parts of the south-east, and the argument put forward by Gilman that long-term investments would have been an effective tool in the hands of an upwardly mobile, centralizing elite.

During the Millaran Copper Age economic and political power on a regional scale was concentrated at a few major centres which controlled most of the exotic resources in the south-east as a whole (e.g. Los Millares, Almizaraque, the Purchena and Mojácar regions, etc.). By contrast, the same level of dominance by any one site is difficult to detect during the Argaric.

Differences in raw materials, settlement size, wealth and other criteria on which some ranking of settlements might be established only succeeds (on the basis of present evidence at least) in confirming the general equality of Argaric sites. This is not to say that all of these sites were of precisely equal status; it has already been pointed out that there is some evidence to suggest that Early-Middle Bronze Age sites in the semi-arid zone were able to attract a wider range of exotic materials than elsewhere. However, in general, the differences between Argaric sites appear to be quantitative, not qualitative. Consequently, despite their hierarchical and stratified internal organization, Argaric communities were not linked by any formal or pronounced hierarchy at an inter-community level. While the integration of Argaric communities was based on the existence of prestige exchanges, and other possible contacts (alliances, etc.), none of these linkages appear to have been strong enough, or of sufficient duration, to result in any lasting economic-political federation.

* * * * *

From a comparative perspective there appear to be several important variables which were lacking in south-east Spain, but which helped to promote more integrated, and complex, economic and political organization in other contexts such as the East Mediterranean and Near East.

(a) The development of large scale maritime activities - including exchange, fishing, long-distance communication, warfare/ piracy, and transportation. In the Aegean, the Levant and Mesopotamia water borne transport provided not only opportunities for rapid communication, but also bulk, low cost transport of commodities, labour, armed forces, etc.

By contrast, south-east Spain was land-locked to a large extent, since most areas were covered by a network of rivers and ramblas with only perennial flows. Transport and communication was, therefore, almost exclusively overland. As a result, the frequency and scale of contacts between communities was comparatively low. Until the Phoenicians and Greek colonies of the 1st millennium, there is little sign of any major centres developing on the south-eastern coast as a consequence of maritime activity or any other factor (Molina González and Roldán Hervás 1983; Tapia Garrido 1981).

(b) Critical resources such as surface water, rainfall and arable land in plentiful supplies

While potentially arable land was available in many parts of south-east Spain, limitations on production were not so much the result of a shortage of suitable land, but a scarcity of surface water supplies and rainfall. Even at the peak of prehistoric, and even historic, occupation of the south-east, the density of settlement in many regions was extremely low (e.g. in southern Almería, the Campo de Cartagena in Murcia, and lowland areas in much of the Guadalentín Basin). It is notable too, that in areas like the Guadalentín Basin, settlement in the Roman and Medieval periods does not expand very far beyond those areas previously occupied by prehistoric communities. Moreover, it is not until the 1st millennium b.c. that true 'urban' centres actually emerge in the south-east, and even then their development was sporadic and uneven.

Throughout much of south-east Spain the patchy distribution and small spatial extent of areas with both arable land and adequate water supplies placed significant obstacles in the way of any large scale development towards political or economic centralization. Some of these obstacles include:

(1) the economic difficulties of establishing and sustaining large urban centres

(2) the large capital investments necessary to expand and stabilize production

(3) the strong positive relationship between the scale and intensity of land use, and the potential for major degradation

(c) Regular and predictable supplies of water - either in the form of snow-melt, rainfall, or surface water supplies

In the semi-arid zone of the south-east, not only was water crucial and in scarce supply, but its occurrence was often subject to unpredictable and severe fluctuations. In some cases, these irregularities were manifest in destructive, low frequency events such as catastrophic floods or extended droughts (see Chapter 3 for historical documentation of these events). High frequency irregularities, such as annual variations in the quantity, or temporal distribution, of rainfall are also characteristic of lowland areas in the south-east, and would have had important effects on settlement size, density and long-term stability.

By contrast, the scale of economic development in many parts of the Eastern Mediterranean and Middle East was altogether different from that of south-east Spain. The dichotomy between these regions is reflected, for example, in the widespread expansion of polyculture in the Aegean (Renfrew 1972) and the extension of irrigation networks in Upper Egypt (Butzer 1976a) and Mesopotamia (Adams 1965; Jacobsen and Adams 1965). In the latter two areas local rainfall was relatively low, but surface water supplies - in the form of large 'exotic' rivers made it possible to exploit extensive areas of rich alluvium.

Clearly, therefore, it is not simply a matter of having sufficient water for cultivation, but of having supplies which are sufficient, reliable and well distributed (in time and space). When one or all of these conditions are not met, there can often be serious consequences. Daryll Forde (1956: 225), for example, describes some of the difficulties arising from flood water farming in New Mexico in the early part of this century:

> "An excess of water at considerable velocity will wash out the crops, while a heavy silt load may bury them. Neither of these dangers can be entirely averted, and destructive floods are the second hazard of Hopi cultivation. Severe storms, bringing heavy rains on the

> plateau may, even though there is little or no fall in the vicinity of the villages, destroy whole fields. The run-off is so rapid that even deeper channels cut in the flats during recent years are unable to contain the flood which rushes down after these storms. The waters may sweep violently over the fields, temporarily reducing them to a spongy marsh and uprooting every plant.
>
> The conditions of run-off have, moreover, been considerably modified in recent years by the trenching of the washes. This cutting of steep-sided channels or arroyos, often twenty to thirty feet deep, has reduced the cultivable value of much land that was formerly subject to natural irrigation. The arroyos have cut across old field sites, and by the erosion of the concave banks they continue to encroach on the fields in their vicinity. The concentration of the surface flow in miniature canyons well below the field level has often seriously reduced the amount of water received by the fields themselves, and mere scraps of land on the floors of the arroyos are valued on account of their superior water supply".

Periodic fluctuations in water supply also affected the efficiency and productivity of Egyptian and Mesopotamian irrigation systems (Butzer 1976a, and Adams 1965, respectively). However, the frequency and impact of these irregularities was, on the whole, significantly lower than in regions like south-east Spain. In all but the very large scale events such as region-wide floods or droughts, the sheer size and density of Egyptian and Mesopotamian irrigation systems would have provided an effective buffer against production failures in any one, localized area.

(d) <u>High density clusters of resources and manpower</u>

In contrast to the classic developments of 'civilization' in the eastern Mediterranean, the overall densities of population, and hence resources generally, was very much smaller in south-east Spain. From a logistical perspective, the high densities of resources and manpower which characterize political and economic evolution in the east Mediterranean provided greater opportunities for centralized control over manpower, subsistence resources, prestige goods, and behaviour generally. On the other hand, the smaller and more dispersed communities of the later prehistoric period in south-east Spain presented two major obstacles to such complex and well developed systems of regional control:

(1) the logistical problems of integrating settlements which were so spatially isolated from one another

(2) the difficulties of controlling any significant volume of resources or manpower

(e) Stimulus effects from the development of other complex social-political units - through warfare, exchange, etc.

The scale of interaction, integration, conflict and competition present in the east Mediterranean between the 3rd and 1st millennia B.C. is, at least, some testimony to the fact that so many different areas began to develop complex social and political institutions (Minoan Crete; Mycenean Greece; Dynastic Egypt; Sumer, Assyria, Elam and Akkad in Mesopotamia; the Hittites in Anatolia; the Mitanni in Syria, etc.). Imported material found in various parts of the Cyclades, Anatolia and the Levant is indicative of the widespread nature of exchange, contact and communications in these areas during the Bronze Age (Renfrew 1972; Warren 1975). By contrast, the West Mediterranean is characterized by considerable regional insularity, and in south-east Spain external stimuli in the Copper and Bronze Ages (in the form of exchange, etc.) appear to have been minimal.

The real significance of these factors, and others, is not so much in understanding development or decline in south-east Spain, but their potential for examining long-term processes of cultural evolution in a comparative way. All too often it seems that it is the 'eye-catching' developments of states and civilization which attracts our attention, rather than systems which for one reason or another 'failed'. Taking a somewhat different perspective, Stephen Pile (1979: 11-12) has suggested in his recent book, The Book of Heroic Failures, that:

> "Success is overrated. Everyone craves it despite daily proof that man's real genius lies in quite the opposite direction. Incompetence is what we are good at: it is the quality that marks us off from animals and we should learn to revere it... This being the case it seems that Mankind spends a disproportionate amount of time talking about the things he does well, when these few blades of grass are surrounded by vast prairies of inadequacy which are much more interesting".

In this sense, the lowland steppe of south-east Spain, and a variety of other areas, offer us an opportunity to look more carefully at that vast and more interesting 'prairie'. In doing so, perhaps we can shed some light on the general problem of evaluating complex societies and their long-term evolution.

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