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Continuity in the Epipaleolithic of Northern Africa with Emphasis on the Maghreb

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INTRODUCTION

This article is primarily a review and reinterpretation of the Epipaleolithic prehistory of the Maghreb. However, in view of the similarities to other parts of North Africa, we include some discussion of areas outside the Maghreb proper, specifically Cyrenaica and the Nile Valley. Research on Maghreb prehistory has been undertaken for close to a century. The vast majority of published information is in French and is not always familiar to or well understood by Anglophone scholars. Archaeology in the Maghreb has been dominated by a typological approach, both in terms of artifacts and human skeletal remains. This approach has provided most of the data from which our reinterpretations are derived. It has also, inevitably perhaps, fostered the division of prehistory into segments that, while they may have some reality for the archaeologist trying to understand the geographic and chronological patterning of remains, do not necessarily tell one very much about the cultural interrelationships of the people those remains represent. It is our basic contention in this essay that one should never propose direct correspondences between archaeological industries and ethnic groups, or "races," without clear and indisputable evidence. Such correspondences have been made many times for the Maghreb and it is this, if nothing else, that we hope to show to be unlikely. Our basic premise throughout this essay is that differences have been emphasized over similarities and that the identification of distinctions has been the preferred method of describing variability in the prehistoric record.

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The main focus in this essay is on the evidence for a transition between the two major Epipaleolithic industries found in the Maghreb, the Iberomaurusian and the Capsian. For the most part we restrict discussion to archaeological evidence that is well dated by radiocarbon and to those materials of which we either have firsthand knowledge or for which extensive published data are available. This is not, however, a synthesis of North African prehistory. That would require far more time, space, and modern data than we have available.

PRESENT AND PAST ENVIRONMENTS

The Maghreb can best be defined as those parts of Morocco, Algeria, and Tunisia lying between about 27° N on the west at the Atlantic coast and 34° N on the east at the Gulf of Gabès (Figure 3.1). This region constitutes nearly 90% of Mediterranean Africa (Quézel 1978:485), which also includes a narrow strip along the Libyan and Egyptian coastlines. Although the Maghreb falls within the Mediterranean Holarctic Floristic Region (Lauer and Frankenberg 1980:306, Figure 1), it is characterized by considerable phytogeographical diversity (cf. Quézel 1978:484, Figure 1), a result of topography, precipitation patterns, soil types, and, in at least the past 2000 years, human interference with the natural vegetation patterns. Following Clark (1967:Map 5), we can distinguish five major phytogeographical zones from south to north:

1. *Mixed grassland* characterizing the northern fringes of the Sahara up to, and sometimes including, the Saharan Atlas and the more southerly of the high interior plateaus.
2. *Dry deciduous savanna woodland* at higher elevations (both montane and plateau) but south of the Coastal Atlas, which may in places prevent precipitation from reaching more inland areas.
3. *Cape macchia and Mediterranean vegetation* to the north of these in regions where winter precipitation is consistent.
4. *Grass steppe* in restricted zones that are generally more arid areas within the Mediterranean vegetation zone.
5. *Deciduous Mediterranean forest*, which is almost entirely restricted to the humid coastal plain and northern slopes of the Coastal Atlas.

The entire region is considered to have a Mediterranean climate with winter rainfall (or sometimes snow at higher elevations and on the interior plateaus). Summers are hot and dry, with frequent winds coming off the Sahara, although humidity along the coast can be very high. The general pattern is well summarized by de Vos (1975:60–68), and phytogeographical diversity is readily apparent from the UNESCO Map of Mediterranean Vegetation (Bagnouls and Gaussen 1968).

It is worth emphasizing here that the modern phytogeography of the Maghreb may bear little relationship to that which existed even as late as 2000 years ago.

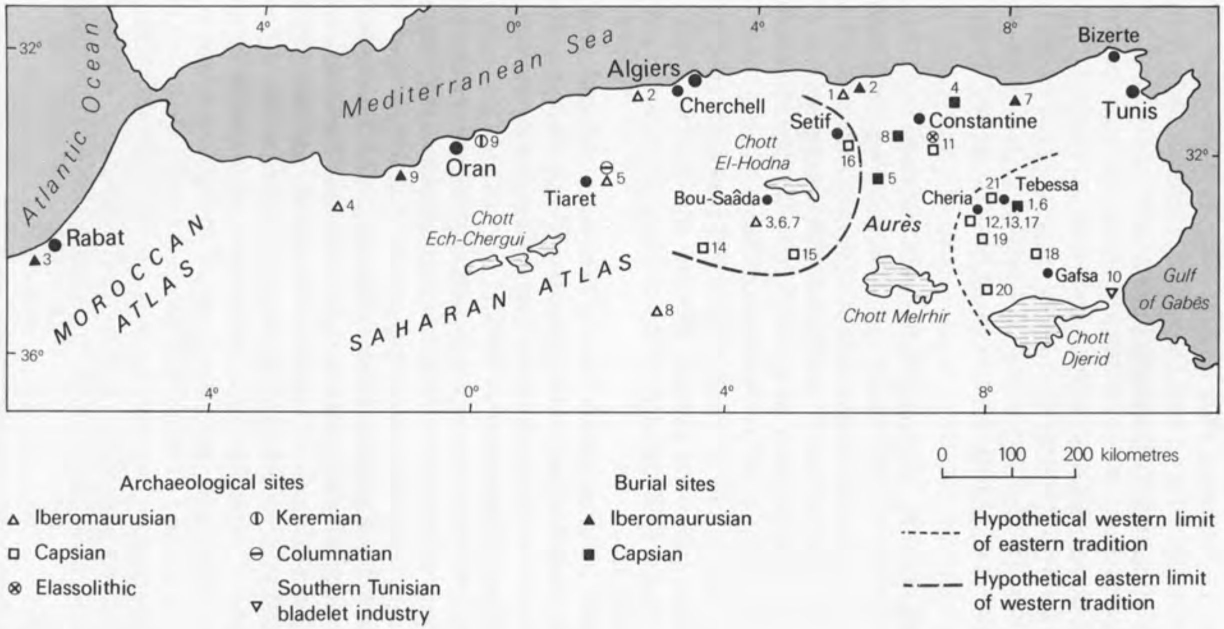

Figure 3.1 Epipaleolithic sites and regional traditions in the Maghreb. *Sites discussed primarily for archaeology:* (1) Tamar Hat, (2) Grotte Rassel, (3) Es-Sayar, (4) Taforalt, (5) Columnata, (6) El-Onçor, (7) El-Hamel, (8) El-Haouita, (9) Bou Aïchem, (10) Oued el-Akarit, (11) Koudiat Kifène Lahda, (12) Aïn Misteheyia, (13) Kef Zoura D, (14) Aïn Naga, (15) Rabah, (16) Medjez II, (17) Relilaï, (18) El Mekta, (19) Djebel el-Outed C, (20) Bortal Fakher, (21) R'Fana. *Sites discussed primarily for osteology:* (1) Aïn Dokkara, (2) Afalou bou Rhummel, (3) Dar es Soltan, (4) Gambetta, (5) Grotte des Hyènes, (6) Kanguet el-Mouhaâd, (7) Kef oum Touiza, (8) Mechta el-Arbi, (9) Rachgoun.

The entire region has been markedly affected by overgrazing and deforestation since at least Roman times, and it is generally agreed that the modern pattern is a highly degraded one (Le Houerou 1970; de Vos 1975), as is the case elsewhere in the circum-Mediterranean (Naveh and Dan 1973). Unfortunately there have been few systematic studies of prehistoric phytogeography in the Maghreb, with the result that all reconstructions are tentative at best and rely more on interpolation from surrounding regions than on reliable and well-controlled data from the Maghreb proper. The following sequence is based on recent summaries by Dorize (1979), Rognon (1976, 1979), Rognon and Williams (1977), and a number of the papers in Sarntheim *et al.* (1980), as well as on our own research in Algeria since 1972.

1. Prior to circa 15,000 B.P., the northern Sahara was cold and wet, with active stream flow from areas such as the Moroccan Atlas feeding permanent soft-water lakes. During this period the southern and central Sahara appears to have been hyperarid. In the Télidjène Valley, southwest of Tebessa (Figure 3.1), there was a major period of erosion prior to circa 15,000 B.P. that "evacuated an extensive basin fill under relatively dry conditions" (Farrand *et al.* 1982). In the Aurès (Figure 3.1), slightly to the west and with higher elevations, there may be evidence for gelifraction and wind erosion (Ballais and Roubet 1982). Taken together, these data suggest cold and dry conditions in at least part of the region to the north of the Sahara.
2. By circa 13,000 B.P., the northern Sahara became more arid and eolian deposits formed as far north as Bou Saâda (Amara 1977:67). In the region near Tebessa there is evidence for alluviation in major valleys under moister conditions by at least 12,000 B.P. (Farrand *et al.* 1982).
3. By circa 9000 B.P. in the Tebessa region, conditions became moister, though still semiarid, and larger valleys were incised contemporaneously with alluviation in the upper reaches of smaller streams (Farrand *et al.* 1982). Arid to semiarid conditions appear to have prevailed throughout much of the Maghreb until about 7000 B.P., and accumulating data suggest this was a generalized phenomenon across northern Africa (cf. Haynes 1982; Sarntheim *et al.* 1980).
4. Between circa 7000 and 5000 B.P., quite wet conditions seem to have prevailed in many regions. Couvert's (1972) analyses of archaeological charcoal indicate that by about 5000 years ago mean annual precipitation was 600 mm (well above modern values) and mean annual temperatures were below modern values. In the Tebessa region, valley alluviation is attested to by torrential, cross-bedded gravels intercalated with marsh sediments (Farrand *et al.* 1982; Lubell *et al.* 1975). Similar deposits form today under the current semiarid conditions with degraded vegetation.

It is worth reiterating that this reconstruction is a very generalized one, that there were important local and regional episodes of both humid and arid conditions, and that in many cases the temporal control over these data is less than perfect. Other than those already referred to, the following references are useful:

Boyé *et al.* (1978); Conrad (1969); Estorges *et al.* (1969); Jäkel (1979); Lubell *et al.*, in press; Sharpenseel *et al.* (1980); Williams (1970); and Zaouli (1976).

THE PREHISTORIC SEQUENCE

During the long history of archaeological research in the Maghreb there have been three major syntheses (Balout 1955; Camps 1974; Vaufrey 1955), all of which have tended to emphasize the differences among the known industries. The basis for industry definition has been largely typological (cf. Camps-Fabrer 1966; Tixier 1963, 1967) in concert with the available data on chronology and geographical dispersion (e.g., Camps and Camps-Fabrer 1972). Although there are occurrences of both Lower and Middle Paleolithic industries in the Maghreb, the emphasis among researchers has been on the later, Epipaleolithic, industries. The recognized Epipaleolithic variants are Iberomaurusian, Capsian (both Typical Capsian and Upper Capsian), the Southern Tunisian Bladelet Industry, Columnatian, Elassolithic, Keremian, and probably the Eastern Oranian and Libyco-Capsian of Cyrenaica (McBurney 1967).

The Current Synthesis

The most recent overview of the Maghreb Epipaleolithic (Camps 1974) is based upon two major principles. The first is that the Iberomaurusian and Capsian represent distinct cultural traditions produced by biologically different populations, the Mechta-Afalou and Protomediterranean, respectively. Camps supports the contention (1974:194), also advanced by others (e.g., Balout 1955; Chamla 1978), that the Capsian was introduced toward the end of the Pleistocene by a migration (or "invasion") of populations from the east.

The second, less-explicitly formulated premise (Camps 1974:53), is that adaptive radiation or *évolution buissonnante* within the major traditions (Iberomaurusian and Capsian) was responsible for the large amount of regional variation that is recognized within the Maghreb Epipaleolithic. With these two principles as a base, Camps develops the following synthesis.

1. The Iberomaurusian preceded the Capsian with some overlap toward the end of the former.
2. While the Iberomaurusian and Capsian developed separately, in the High Constantine Plains the latter was influenced by the former, perhaps through intermarriage (Camps 1974:132).
3. In western Algeria, where there is no conclusive evidence for early Capsian industries, the Iberomaurusian influenced and perhaps even developed into the Columnatian and Keremian. Camps (1974:56, 151, 203) is not clear on this point.
4. Elassolithic (hypermicrolithic [cf. Roubet 1968]) traditions developed in

western and central Algeria after 10,000 B.P. and, with the Columnatian, lasted until circa 8000 B.P.

5. The Capsian entered the Maghreb from the east circa 10,000 B.P. (both the Natufian and several of the Nilotic Late Paleolithic industries are considered possibilities) and developed into two regional traditions: the Typical Capsian in Tunisia and eastern Algeria (especially around Tebessa), and the Upper Capsian to the west (central Algeria, the region around Setif) and south (Camps 1974:116, 194).
6. While there was a local development from Typical Capsian to Upper Capsian in the Tebessa region, the Typical Capsian lasted there until circa 7000 B.P. (Camps 1974).
7. As Capsian populations moved west, or as the Capsian tradition diffused westward, local traditions such as the Elassolithic (ca. 8000 B.P. around Ain M'lila) were "capsianized" (Camps 1974:130) and also influenced by Iberomaurusian populations still living on the Tell and in the mountains to the north of the interior high plateaus (e.g., the Columnatian). These regional differences, Camps argues, resulted in the recognized geographic facies of the Capsian.
8. The subsequent development of neolithic economies reflects these regional differences, with the Iberomaurusian leading directly to the Coastal Neolithic while the Capsian is seen to develop into the Neolithic of Capsian Tradition in the interior (Camps 1974:219; Roubet 1979).

A Revised Synthesis

The synthesis summarized above is based almost entirely on detailed studies of bone and stone artifacts recovered from trench-style excavations. With few exceptions (Camps-Fabrer 1975; Couvert 1972, 1976; Lubell *et al.* 1975, 1976, in press; Morel 1974; Pond *et al.* 1938; Roubet 1979; Saxon *et al.* 1974), little or no attention has been paid to faunal and floral remains or to detailed analysis of the ecological setting and economies of Maghreb Epipaleolithic sites. Furthermore, recent research on North African Late Pleistocene environments (cited earlier) now provides a much better framework within which one can attempt to interpret cultural developments in the region. Although the view we take here is, in many ways, a logical extension of Camps's synthesis, it differs in that we stress continuity of development within regions from the Iberomaurusian to the Neolithic. The main points we argue are these:

1. The Capsian developed from the Iberomaurusian and not as a result of migration or diffusion from the east.
2. If outside influences did occur, they are far more likely to have come from the Nile Valley during or prior to the Iberomaurusian than from the Near East, but it is equally likely that the Iberomaurusian influenced late Paleolithic developments in the Nile Valley.

3. There was a sharp increase in the interior (Iberomaurusian) population density toward the end of a Late Pleistocene phase of aridity.
4. This increase resulted from the movement of coastal populations to the interior and led to increased differentiation due to isolation within what had been a relatively homogeneous (both culturally and biologically) population.
5. The development of distinctive regional styles resulted from accentuation of differences originally present among local Iberomaurusian variants (cf. Brahimi 1970) together with regional differences in the areas newly occupied (e.g., flint resources, new ecological conditions); this differentiation may be seen as analogous to adaptive radiation (founder effect plus local environmental conditions).
6. Beginning about 8000 B.P., the development, use, and spread of a primary pressure technique for bladelet production (Tixier 1976) led to general technological similarity throughout the area where Capsian sites are known, obscuring the differences that had heretofore been evident.

THE INDUSTRIES

Iberomaurusian

Definition

The Iberomaurusian was first defined by Pallary (1909), and the essential characteristics of the definition have remained unchanged (Camps 1974:57). It is a microlithic industry characterized by high (≥40%) frequencies of backed bladelets (Tixier 1967). Partially backed, obtuse-ended forms (the blunt backed bladelets of Close 1977:36) often constitute a high percentage; other forms include straight backed bladelets, scalene bladelets, bladelets pointed with a microburin facet (La Mouillah points), and backed bladelets with Ouchtata retouch. Retouch is generally obverse and is found preferentially on proximal ends (Gobert 1962:285). Burins and geometrics generally constitute less than 1% of an assemblage. When geometrics are present, segments predominate. Microburins are present in all assemblages. One tool form that seems to be restricted to the Iberomaurusian is the scaled piece (Camps 1974:64). Endscrapers made on flakes are always present and can form up to 9.5% of an assemblage.

Tools are made from a wide selection of raw material including flint, limestone, sandstone, quartzite, and various igneous rocks. This can be accounted for, in part, by the difficulty of obtaining adequate supplies of high-quality flint along the Maghreb littoral where the majority of sites are located. The non-siliceous rocks are commonly used in the manufacture of a heavy duty chopping–scraping tool kit that is a component of many assemblages.

Cores are generally small, with single platforms. They are often made on only partially utilized flint pebbles (Brahimi 1970). Pyramidal forms are very rare and fluted (*cannelé*) cores such as those found in Capsian assemblages are absent (Camps 1974:66).

As a rule, the only constants in Iberomaurusian lithic assemblages are high percentages of backed bladelets and a virtual absence of burins. In Table 3.1 we give the range of percentage variation for major tool classes from 9 Iberomaurusian assemblages (eight sites), as well as from 19 other Epipaleolithic assemblages that Camps (1974) believes provide reliable data, or that we have analyzed ourselves.

The Iberomaurusian bone industry contains few tool forms ($N = 27$) compared to industries such as the Upper Capsian. A characteristic form is the oblique bevel-edged knife (*tranchet à biseau oblique*), which is unknown in either the Typical or the Upper Capsian outside of the Tiaret region (Camps-Fabrer 1966:171).

Developmental Stages

Although much assemblage variability can be correlated with developmental or temporal changes, spatial variability is also reflected. Scalene bladelets and geometric forms are particularly common in Tunisia and eastern Algeria, whereas scaled pieces are most abundant along the coast between Cherchell in Algeria and Bizerte in Tunisia (Camps 1974:64). Such regional and temporal variability has suggested to some (e.g., Brahimi 1970; Gobert 1962; Tixier 1963) that the Iberomaurusian should be divided into regional facies (see also Brahimi 1969b, 1972). However, at present it is divided only into developmental stages that are believed to hold true from the Atlantic coast to the Gulf of Gabès.

Camps (1974) has based his chronological division of the Iberomaurusian primarily upon the dated sequences from Taforalt, Rassel, Tamar Hat (1967 excavations), El Hamel, Columnata, and El Haouita. At Taforalt, backed bladelets increase in frequency from the bottom to the top of the deposits, whereas at the more recent sites of Columnata and El Haouita (ca. 10,800 to 8200 B.P.) low percentages are recorded. Using these sites as a guide, Camps (1974:72) has divided the Iberomaurusian into three phases: Early, Classic, and Evolved. The Classic phase is characterized by high percentages of backed bladelets (74.1–90.4%) and little else. The Early and Evolved phases have higher frequencies of endscrapers, notches, and truncations than the Classic. Burins, backed flakes and blades, and geometrics all undergo varying rates of gradual increase throughout the sequence (Camps 1974:76).

Research subsequent to Camps's formulation indicates that the Early phase may have lasted much longer (8000 years) than the other phases and remained relatively stable throughout (Close 1977:85; Roche 1976). However, given the lack of dates for most Classic sites, it is possible that the division of sites into Classic and Evolved phases masks a great deal of contemporaneous variation in tool percentages, as is suggested by the recent date for El Hamel, which Camps places in the Classic.

TABLE 3.1

Tool Frequencies

	Edge tools						Geometrics			
Site and industry[a]	Burins (%)	Endscrapers (%)	Notched[b] (%)	Sidescrapers[c] (%)	Backed bladelets (%)	Restricted N	Segments (%)	Triangles (%)	Trapezes (%)	N
Iberomaurusian										
Tamar Hat 15	0.7	10.5	3.7	1.2	76.3	409	—	—	—	0
Tamar Hat 5–7	1.1	10.6	2.8	2.8	75.8	178	—	—	—	0
Grotte Rassel	0.6	6.8	4.9	3.8	53.4	1036	100.0	—	—	1
Es Sayar	—	1.4	9.4	0.8	77.3	349	—	—	—	0
Tarforalt 1	0.1	3.8	2.5	1.7	90.8	2098	100.0	—	—	12
Columnata 1969	0.3	7.0	16.5	14.7	50.5	1311	90.6	9.4	—	64
El Onçor couche[d]	4.8	9.9	10.6	3.2	33.7	311	50.0	50.0	—	4
El Hamel Level E	0.7	2.6	6.3	—	74.8	1458	77.7	—	33.3	9
El Haouita terrasse[d]	0.7	7.7	18.8	17.2	43.9	764	—	—	100.0	1
Keremian, Columnatian, Elassolithic										
Bou Aïchem	—	33.1	10.9	?	33.1	510	93.2	4.2	2.6	118
Columnata sous abri[d]	16.1	7.2	19.1	?	30.4	742	91.0	9.0	—	89
Koudiat Kifène Lahda	1.8	6.2	23.2	4.3	37.4	481	92.0	8.0	—	102
Capsian										
Aïn Misteheyia lower	13.7	6.3	14.2	14.1	33.1	1471	56.8	24.3	18.9	37
Kef Zoura D (typique)[d]	29.0	6.5	19.9	17.4	26.5	746	61.5	38.4	—	13
Aïn Naga	0.9	12.7	19.1	10.2	30.9	1118	13.5	79.2	7.3	237
Rabah Level 1	23.8	3.8	10.8	16.1	38.5	130	—	100.0	—	3
Medjez II Phase 1	4.2	4.6	40.6	19.6	23.2	2768	33.3	33.3	33.3	12
Relilaï Phase 1	21.0	3.1	10.7	22.6	21.4	252	72.7	27.3	—	11
El Mekta tranchée[d]	17.4	5.7	6.3	2.1	40.6	758	25.3	69.3	5.3	75
Relilaï Phase 3	22.9	6.2	14.8	24.6	30.4	568	50.0	45.0	5.0	20
Relilaï Phase 2	36.3	2.0	6.1	14.0	31.9	408	70.0	20.0	10.0	10
Koudiat Kifene Lahda B	2.3	7.3	23.9	3.0	42.8	259	88.8	11.2	—	27
El Outed C Phase 1	21.0	5.3	21.4	9.4	26.7	266	30.0	70.0	—	10
El Outed C Phase 2	43.8	4.5	16.9	7.7	16.6	634	23.8	42.8	23.8	21
Relilaï Phase 4	41.6	6.1	8.5	16.1	20.8	1612	27.3	63.6	9.1	11
Bortal Fakher abri[d]	49.6	6.3	2.2	2.6	26.7	2898	20.2	79.8	—	114
R'Fana inférieur[d]	7.6	5.1	35.6	13.5	30.5	118	50.0	—	50.0	2
Oued El Akarit C	4.5	4.6	5.1	4.6	47.7	795	15.8	84.2	—	171

[a] Chronological order.
[b] Includes notches and denticulates.
[c] Includes sidescrapers and continuously retouched pieces.
[d] Common terms in the francophone archaeological literature are defined in the Glossary at the end of the chapter.

Capsian

Definition

The Capsian has been the subject of considerable research since it was first defined by de Morgan (1910), who divided it into two variants that until the late 1960s were thought to form a developmental sequence. This view was supported by several sites at which there was superposition of Upper Capsian above Typical Capsian (Tixier 1963), as well as by an evolutionary view that assumed that nonmicrolithic blade tools (Typical Capsian) were the forerunners of microlithic bladelet tools (Upper Capsian). Recent research has shown that the Typical Capsian and Upper Capsian are contemporaneous, leading Camps (1974:154) to refer to both a regional facies and a distinct industry within the Capsian. But, since the Typical Capsian is clearly much more distinctive than the other regional facies defined by Camps, it is still treated as the second major variant of the Capsian.

Typical Capsian

The Typical Capsian is defined essentially by the presence of large numbers of abruptly backed tools made on macrolithic flakes and blades, as well as by high frequencies of truncation burins (average of 16 sites = 27.3% burins; Camps 1974:104). Characteristic tool forms include backed blades and endscrapers on blades or large flakes. Backed bladelets are always abundant (±20%), while geometrics are rarely important (≤10%). When present, geometrics are generally dominated by segments and short triangles and are not as well made as those in the late stages of the Upper Capsian. Microburins are always present and are inversely correlated with the presence of burins (Camps 1974:109).

The bone industry is considered by Camps-Fabrer (1966) to be the poorest in the Maghreb Epipaleolithic, with only six types represented and these in small numbers. It is distinguished from the Iberomaurusian by the appearance of very narrow (≤3mm), bipointed awls (*alênes*) (Camps-Fabrer 1966:172). However, it should be noted that the relatively small sample of excavated Typical Capsian sites (when compared to the Upper Capsian or the Iberomaurusian), as well as the poor conditions for bone preservation in southern Tunisia (where most of the sites are found), make generalizations about the bone industry tenuous at best.

Many Typical Capsian sites have been investigated in the past 70 years, but Camps (1974) lists only nine for which reliable dates are available. To these we can now add the Kef Zoura D rockshelter (Grébénart 1976:80; Lubell and Jackes 1982; Lubell *et al.*, in press). While it is probable that earlier excavations have been biased against selection of some of the less formalized tools (e.g., notches, the varia category), it is clear that some systematic variation does exist within the Typical Capsian.

Tixier (1968) has identified a distinct kind of Typical Capsian, the Bortal Fakher variant, characterized by high frequencies of burins (28.7–48.7%), and limited variety in other tool classes. Camps (1974:114) has noted that dated Bortal Fakher assemblages are, on average, more recent than other Typical Capsian assemblages, suggesting a possible chronological distinction. However, the apparent interstratification of these variants at Relilaï (Grébénart 1976) suggests that their chronological significance may be limited.

Upper Capsian

Definition. The Upper Capsian is characterized by abundant and varied geometric microliths (triangles and trapezes) and other tools made on light bladelets that contrast with the heavier forms of the Typical Capsian. However, in the Typical Capsian zone (the Tebessa–Gafsa region), large tools do appear in Upper Capsian assemblages. The controlling factor seems to be the presence of abundant sources of large flint nodules. As well, in the Typical Capsian region the most important defining criteria of the Upper Capsian are low frequencies of burins and relatively abundant notches, denticulates, and geometrics.

Although burins are considered a hallmark of the Typical Capsian, they are known sometimes to occur with relatively high frequencies in assemblages that would ordinarily be classified as Upper Capsian. Thus, in certain instances, and especially outside the normal boundaries of the Typical Capsian zone, other distinguishing criteria, such as blank size, have been used (cf. Grébénart 1976:289). The distinction between Typical Capsian and Upper Capsian has become more and more blurred as Typical Capsian assemblages with few burins and Upper Capsian assemblages with abundant burins have been identified. At least one assemblage in the Typical Capsian zone cannot be easily classified into either the Typical Capsian or the Upper Capsian (Djebel el-Outed C; Grébénart 1976:136).

Phases and Facies. The Upper Capsian has been grouped into three phases and five regional facies by Camps (1974:154). The phases (Early, Middle, and Recent) are more or less common to all five facies. Camps (1974:155) believes that although most facies developed from distinct individual "substrates," they all followed the same developmental "programs."

The Early phase (pre-8000 B.P., nine sites) is represented by a group of assemblages that share high percentages of backed bladelets and a general equilibrium among tool classes. At present, Camps (1974:156) believes that these assemblages developed from at least three regional substrates onto which were "grafted or developed Upper Capsian characteristics."[1] The first substratum is a very early Typical Capsian tradition; the second "an Epipaleolithic industry derived from the Iberomaurusian"; the third is an unknown southern variety epitomized by Aïn Naga, which "seems to have specialized very early in the fabrication of triangles."

[1]This and all other quotations from the French are translations by the present author.

The Middle phase (8000–7000 B.P., 15 sites) is characterized by pronounced homogeneity throughout the Capsian region. Notches, denticulates, and geometrics increase; segments become less common and triangles more so (Camps 1974:157).

In the Recent phase (7000–6500 B.P., 15 sites), the industry is dominated by notches and denticulates, particularly in the region of Setif. Geometrics increase further and trapezes are very abundant. The percentage of burins, low throughout, often falls to zero in this phase.

Regional Facies. Camps has proposed five regional facies (Tebessa, Setif, Central, Tiaret, and Southern) that are, to a large extent, artificial constructs used to organize the data (Camps 1974:120). While the facies are not discrete homogeneous units, each has one or several distinguishing characteristics. These are found most often in the portable art (engraved ostrich eggshell, bone, stone; Camps 1974:154), although certain facies are characterized by specific forms of backed bladelets or geometrics. Clear divisions on the basis of tool class percentages are generally not apparent, although the Saharan-edge Southern facies does have higher percentages of geometrics and lower frequencies of notches and denticulates than are commonly found elsewhere.

Although Camps stresses the somewhat arbitrary nature of these facies, he is clearly attempting to construct a model of regional development from local substrates that will replace the old model of development from the Typical Capsian. Unfortunately, data capable of substantiating these divisions are not yet available in sufficient quantity or quality.

Southern Tunisian Bladelet Industry

The Southern Tunisian Bladelet industry (eight sites) was originally called Iberomaurusian by Gobert and Howe (1952), but it has a number of characteristics that later led Gobert (1962) to consider it to be distinct. Although the high frequencies of backed bladelets (generally above 50%) are similar to the Iberomaurusian, the absence of obtuse backed bladelets with proximal retouch or those pointed with a microburin facet, and the scarcity of scaled pieces and microburins, make these assemblages quite different from the Iberomaurusian. Other characteristics include relatively high frequencies of endscrapers (0.9–10.6%), geometrics (0.0–18.9%) or scalene backed bladelets (0.0–20.0%) (Camps 1974:198).

Camps was apparently unaware of the dates published by Page (1972:21) for deposits associated with Oued Akarit Station C, one of the assemblages in this group. While not from the archaeological deposits themselves, the dates do provide some measure of radiometric control. They are 8415 B.P. ± 80 (Gx1415) and 8235 B.P. ± 180 (Gx1414), both on *Cardium* shell, and 8635 B.P. ± 260 (Gx1413) and 9185 B.P. ± 210 (Gx1416), both on land snail shell. While the land snail shell dates may be erroneously old (cf. Evin *et al.* 1980), all the dates are in basic agreement with a placement of these assemblages closer to the Capsian than to the Iberomaurusian (certainly to the latest phases of the latter). However, the very high frequencies of backed bladelets suggest comparison with the Eastern Oranian, where frequencies of over 90% are common (McBurney 1967). Any case for a developmental sequence within the Southern Tunisian bladelet industry (cf. Camps 1974:196; Coque 1962) remains unproven.

Columnatian

Definition

The Columnatian is known only from two sites, Columnata and Cubitus, both located near Tiaret in western Algeria. The dominant character of the industry is the high frequency of microlithic artifacts: a large number of tool forms, and especially backed bladelets, are made on microbladelets that Roubet (1968:63) defines as ≤26 mm long and ≤5.5 mm wide.

Distinctive tool forms include long, narrow microsegments, and trapezes with three retouched sides. Burins are also common (10.0–20.0%), as are endscrapers (5.0–8.2%) and microburins (23.0–32.1%). Segments are the major geometric form.

The bone industry is characterized by the oblique bevel-edged knife generally associated with the Iberomaurusian (Camps 1974:206).

The Columnatian is not subdivided, although there is a three-level sequence at Cubitus.

Elassolithic

The tendency to hypermicrolithic artifacts present in the Columnatian is also found at the site of Koudiat Kifène Lahda, where the industry is called Elassolithic. It contains the same microbladelets, backed microbladelets, and microsegments found in the Columnatian. However, Roubet (1968) and Camps (1974) argue for its separate status because of the much lower frequency of burins (1.3%), and more abundant backed bladelets (26.2%) and geometrics (14.8%).

A nearly identical assemblage is found in Level A at El Hamel, midway between Columnata and Koudiat Kifène Lahda (Tixier 1954). Camps (1974:208) suggests it would be imprudent to ignore the presence of two trapezes and a rectangle at El Hamel, especially in view of the associated pottery that suggests a Neolithic occupation in Level A. However, Tixier (1954:117) says the level may have been disturbed, and one of the trapezes does have three retouched sides recalling those found in the Columnatian.

In general, it seems that in this area of western Algeria, many early (pre-8000 B.P.) sites are characterized by distinct microblade assemblages that are collected under the term Elassolithic. Few of these sites have been excavated, which should have precluded their recognition as a separate industry. Furthermore, their differences have been emphasized over their similarities (cf. Camps 1974:209).

Keremian

Kef El-Kerem, the type site of the Keremian, was excavated by Cadenat and Vuillemot (1944), but the industry was first defined by Tixier (1967) when he noted the similarity between Kef El-Kerem and two sites in the Tiaret region, Bois des Pins and La Jumenterie (and see Bayle des Hermens and Tixier 1972). A fourth site has now been identified: Zaccar I near Bou Saâda, 250 km southeast of Tiaret (Ferhat 1977).

Tixier (1967:807) defined the Keremian as having more than 40% endscrapers. However, the excavation at Zaccar I has shown that there can be great horizontal variation in endscraper frequencies between two contiguous portions of a site (33 vs 20%; Ferhat 1977:94), a general situation also found in the Capsian (Morel 1978). Thus, Ferhat has relaxed the definition to include assemblages such as Zaccar I, which are dominated by endscrapers.

Aside from endscrapers, the most abundant tools in these assemblages are backed bladelets (30% to 12–31% at Zaccar I; 18% at La Jumenterie, where notches represent 17%) and these are often rather small in size (Camps 1974:211). At Zaccar I they are comparable to those found in the Elassolithic, and a similar size range seems to occur at Kef El-Kerem (Cadenat and Vuillemot 1944:61; Ferhat 1977:95). Furthermore, the most common geometric form is the segment, as is the case for both the Elassolithic and the Columnatian.

Another site, Bou Aïchem, which Camps (1974:213) defines as "a Keremian of elassolithic tendency with a low frequency of endscrapers," also has a strong resemblance to Zaccar I (Ferhat 1977:96). Bou Aïchem is located on the Mediterranean coast near Oran, and thus, together with Zaccar I, indicates that a hypermicrolithic technology was common to all the Epipaleolithic industries found in western Algeria (at least in the area south of Oran).

Although little is known about the Keremian bone industry, the oblique bevel-edged knife, characteristic of both the Columnatian and Iberomaurusian, is present.

Eastern Oranian

The Eastern Oranian was defined by McBurney (1960, 1967) using assemblages from the Libyan sites of Haua Fteah, Hagfet et Tera, and Marble Arch. The name was chosen to emphasize the affinity of these materials to the Iberomaurusian (or Oranian) of the Maghreb. The Eastern Oranian is characterized by extremely high percentages of backed bladelets (81–94%), of which Ouchtata and scalene (backed and truncated) varieties form an important component (Close 1977:71). Other distinctive characteristics include a high frequency of inverse retouch on bladelets (McBurney 1967:186) and the predominance of flattened rectangular cores (1967:195), both of which are not common in the Maghreb *sensu stricto*.

The consistently high frequencies of backed bladelets in the long sequence at Haua Fteah mask similarities to the developmental phases of the Iberomaurusian, but the higher percentages of endscrapers, burins, notches, truncations, and varia in the early spits at Haua Fteah suggest some correspondence with Camps's Early phase. In late spits there are very high frequencies of backed bladelets (Classic?), and these are followed by spits in which there are again high frequencies of endscrapers and truncations, and the introduction of geometrics (primarily segments) (Close 1977:71).

Libyco–Capsian

The Libyco–Capsian was defined by McBurney (1967) using assemblages that overlay the Eastern Oranian at Haua Fteah. As with the Eastern Oranian, the name suggests affinity with the Capsian.

McBurney distinguished the Libyco–Capsian from the Eastern Oranian on the basis of a sudden drop in the frequency of backed bladelets (90 to 70%) and a sharp increase in the number of endscrapers (up to 12% in Spit 55/77) and burins (up to 7% in Spit 55/77) (Close 1977:71; McBurney 1967:229). He also emphasized the significance of the appearance of a truly microlithic subclass of backed bladelets with a width distribution peaking at 5 mm (McBurney 1967:229).

Despite these changes there are numerous continuities between the Eastern Oranian and the Libyco–Capsian. Inverse retouch remains common, as do scalene bladelets and core forms (Close 1977:72). To a large extent, Libyco–Capsian tool forms are identical to Eastern Oranian ones (Close 1977:73).

Close (1977) suggests a functional explanation for the changes seen in the lithic assemblages of early Holocene age at Haua Fteah. Camps (1974:152), while noting major differences between the Capsian and Libyco–Capsian lithic artifacts, stresses similarities in the development of both the bone industry and engravings on stone and ostrich eggshell. These are all features that appear first, or are significantly developed, in the Capsian and Libyco–Capsian, suggesting some degree of cultural relationship between the two industries. However, detailed attribute analysis by Sheppard of the Libyco–Capsian (Spits 55/77 and 53/05) and several Maghreb Capsian assemblages shows very little resemblance between them.

THE CASE FOR CONTINUITY

Human Skeletal Remains

Human skeletal remains dating to the Epipaleolithic are common in the Maghreb and often occur in large numbers at any one site. At least three cemeteries or ossuaries are known: Taforalt (N = 183), Afalou (N = 50), and Columnata (N = 114) (see Table 13 in Camps [1974:81] for a partial summary).

For the most part these remains have been analyzed using statistical comparison of the cranial and facial metric traits of individual specimens. These comparisons have then been the basis for classifying specimens into types (sometimes referred to as races). This approach goes back at least to the work of Vallois (Arambourg *et al.* 1934), is the basis for studies by Briggs (1955) and Ferembach (1962, 1965), and is continued in a series of papers and monographs by Chamla (e.g., 1970, 1978).

Because the human remains have always been found in association with archaeological materials, there is a long tradition of trying to draw correlations between archaeological industries and the human types identified by osteologists. This has led to the view that the populations who made and used Iberomaurusian artifacts were biologically distinct from those responsible for the Capsian industry. This view is accepted and elaborated in Camps's (1974) synthesis.

The latest formulation by Chamla (1978) proposes a slight revision of earlier typologies. The Iberomaurusian is linked to two types, the common Mechta–Afalou as defined by both Vallois and Briggs, and the gracile, more evolved Mechtoid type. Both are said to be highly variable, with pronounced sexual dimorphism in Mechta-Afalou populations. Chamla assigns later populations, especially those associated with Capsian assemblages, to two types, each of which has two subtypes: Mechta-Afalou (Typical Capsian and Mechtoid), and Protomediterranean (Types I and II). There is evidence for both major types in at least one site (Medjez II), and the Mechta-Afalou type is far from rare in Capsian sites (Chamla 1978:393).

Data and Methods

In an as-yet-unpublished study using both published data and his own observations, Christopher Meiklejohn of the University of Winnipeg has analyzed the individuals from 11 sites (Iberomaurusian, Capsian, Columnatian, and Neolithic) by multivariate analysis of 14 cranial and 14 facial variables. We are grateful to Meiklejohn for allowing us to use his data for further examination here. We have added data for four skulls from Medjez II (Chabeuf 1975).

In an attempt to test the assumption that there is biological continuity between Iberomaurusian and Capsian populations, we used stepwise discriminant analysis (BMDP-7M; Dixon *et al.* 1979) on a number of relatively uncorrelated variables (six cranial and six or four facial).

In distinguishing groups and sexes we first used only Iberomaurusians and Capsians. The Iberomaurusian male sample consisted of 6 specimens from Taforalt, the skull from Kef Oum Touiza, and a random sample of 7 of the 18 Afalou specimens (1, 3, 9, 11, 32, 36, 43). The Capsian male sample included Medjez II H1 and H3, Aïn Dokkara, and Gambetta 2. While Gambetta is called "uncertain Iberomaurusian" by Chamla (1970, 1978), all our tests showed this specimen to group with the Capsian. We used all females for which facial data were available.

Sex Assignment

Our initial analyses were done to test sex assignment. The complete list of individuals used is given in Table 3.2. In all but a few cases our sex assignments agree with published ones. Among the Iberomaurusians the cases of disagreement are as follows: we are convinced that Afalou 32 is male, not female as published; Arambourg *et al*. (1934), Briggs (1955), and Chamla (1970) all refer to Afalou 13 as a female, but Meiklejohn called it a male and our tests confirm his assessment; Ferembach considered Taforalt XX C1 male, but we agree with Meiklejohn that it is more likely a female; although both Briggs and Vallois called Afalou 3 a female, Meiklejohn considers it a male and on balance we believe this to be correct, although the individual is borderline on some tests. Our analysis of Capsians confirms the published sex assignments. The Neolithic of Capsian Tradition specimen from Grotte des Hyènes A was published as male by Chamla (1970) but as female by Briggs (1955). Since we cannot say which might be correct on the basis of one specimen, we have excluded it from any tests specifically relating to sexual dimorphism.

Sexual Dimorphism

We chose 29 skulls to represent the Iberomaurusian and Capsian populations, and our results show that they are adequately discriminated among by maximum cranial length and frontal breadth. Capsian males and females are well

TABLE 3.2

Skulls Used in Analyses

Males	Females
Iberomaurusian	
Afalou	
1, 2, 3, 5, 9, 10, 11, 12, 13, 14, 15, 17, 20, 23, 28, 31, 32, 36, 40, 43, 46, 47, 48	18, 27, 29, 30, 33, 44
Taforalt	
Ia, IX, X CA, XI C1, XII C1, XII C4, XIV, XV C2, XV C4, XV C5, XVII C2, XXV C3	VIII C, XVII C1, XX C1, XX C2, XXV C4, XXVII C1
Kem oum Touiza	Rachgoun
Dar es Soltan C1	
Capsian	
Gambetta 2; Mechta 8; Medjez II H1 and H3; Aïn Dokkara	Gambetta 3; Mechta 9, 13, 32; Mouhaâd 5; Medjez II H2 and H4
Columnatian	
Columnata 3a, 4b, 10a	Columnata 8a, 22
Neolithic of Capsian Tradition	
—	Grotte des Hyènes A

separated and the Iberomaurusian sexes also cluster separately, although there is less distance between them than for the Capsian. This is interesting in view of the fact that Chamla (1978) believes the Iberomaurusians to be more strongly sexually dimorphic than the Capsians. The explanation lies in the fact that the maximum length is an overwhelmingly strong discriminator of sex (confirmed by testing Afalou and Taforalt males and females alone). Figure 3.2C,D demonstrates that, in the vault, maximum length is the most dimorphic character and is more dimorphic for Capsians in this analysis. When the same type of analysis is done on facial characters alone (two groups each with two sexes using six variables), basion–prosthion length and height are such strongly dimorphic characters among the Capsians that the apparent Capsian dimorphism is much greater than for the Iberomaurusian, in which the male and female distributions actually overlap. If by *dimorphic* Chamla means that the Iberomaurusian males were larger overall than the females and that this was not the case with the Capsians, she is of course correct. Capsian dimorphism is complex and bears further study.

Tooth Evulsion

The whole question of sexual dimorphism is complicated by the cultural practice of incisor evulsion, practiced all through the period under consideration. The dimorphic characters in the face are measures specifically based on prosthion, an osteometric point that is affected by incisor evulsion. Meiklejohn estimated the position of prosthion in a number of cases but he was not able to compensate for the long-term effects of often extensive anterior tooth loss at about age 15 (Camps 1974:97–98) or earlier (Briggs 1955). Possibly Iberomaurusian males had tooth evulsion more often than females (Camps 1974:97–98), but of the Afalou males used for Figure 3.2, all had tooth evulsion (from Meiklejohn's notes and from Arambourg *et al.* 1934). On the other hand, it seems likely that none of the Capsian males used in the analysis had tooth evulsion, whereas so far as we know all the Capsian females did.

Arambourg *et al.* (1934:131) have estimated a basion–alveolare loss of 5 to 10 mm and a possible loss of up to 6 mm in the nasion–alveolare height as a result of incisor loss. Our data show that Iberomaurusian males, as expected on the basis of tooth evulsion, are at least 4 mm smaller in the prosthion-based measurements than one would predict. More dramatic evidence of the effect of tooth evulsion, bearing directly on the question of sexual dimorphism, is that the mean basion–prosthion length for Capsian females is nearly 17 mm shorter than for Capsian males. The corresponding Iberomaurusian difference is 5.6 mm. The coefficient of variation (CV) for the Iberomaurusians on this variable is 5.2%, but that for the Capsians is 10.2%, an extremely high figure for biological data (though the male CV is only 4.2% and the female a high but possible 5.9%).

Prosthion-based measurements should thus be excluded from any discussion of Maghrebian types because characters of the lower face will be affected radically by sexually dependent cultural factors.

Facial Data

Because basion–prosthion length and nasion–prosthion height are "false" variables for Maghreb populations of this period, we excluded these two measures and, using four variables only, tested "group" and "group and sex" discrimination. When the sexes are pooled, the distinction between Capsian and Iberomaurusian is based on nasal breadth, orbital height, and zygomatic breadth, with Afalou 3 the Iberomaurusian mostly closely approaching the Capsians. Two Capsians fall within the Iberomaurusian distribution: Mouhaâd 5 and Mechta 13. This is because both have extremely broad nasal apertures, although their zygomatic breadths are at opposite poles of the Capsian range.

When the sexes are not pooled, discrimination is based solely on zygomatic breadth. This leads to complete overlap of Capsians and Iberomaurusian females, although the Iberomaurusian males in general cluster separately.

It is our belief, on the basis of these tests and examination of the means and standard deviations for group and sex, that with the facial data available to us it is not possible to discriminate clearly between Capsians and Iberomaurusians, and especially not between Iberomaurusian females and Capsians.

Vault Data

We have other indications that Capsian and Iberomaurusian females were in fact fairly similar, whereas the respective males differed (Figure 3.2A,B). Reference to Figure 3.3, which is based on a later analysis in which all individuals were tested on six vault variables, gives an idea of the extent of the overlap between Iberomaurusian and Capsian females. In fact, if females alone are tested on vault variables, no discrimination is possible.

On the other hand, although males of the two groups do not overlap, Figure 3.3 shows that overlap is present when all Maghreb individuals are analyzed. Medjez II H1 (a Capsian male) falls within the Iberomaurusian distribution, and Afalou 3 and 47 (Iberomaurusian males) group with Mechta 9, a Capsian female (Briggs 1955; Christopher Meiklejohn, personal communication, 1983) who had an abnormally long skull.

To summarize the sample tests: (1) on vault characters female distributions overlap but the two male groups are distinct from each other and from the females; (2) on facial characters the Capsian males are far removed from the females of either group only because they lack tooth evulsion, and the Iberomaurusian males slightly overlap both female distributions. The Capsians did not have short skulls in comparison with the Iberomaurusians; rather they had extremely narrow skulls. The most extreme Iberomaurusian female in Figure 3.3 is Afalou 27, whose breadth is remarkable (Meiklejohn [personal communication, 1983] believes that artificial deformation might be involved). The most extreme Iberomaurusian male, lying below the Capsian male distribution, is Afalou 28, a skeleton with a narrow skull buried beneath a sterile deposit and 2 m below the other Afalou individuals (Arambourg *et al.* 1934:17–22).

The general characteristic of Iberomaurusian males in comparison with

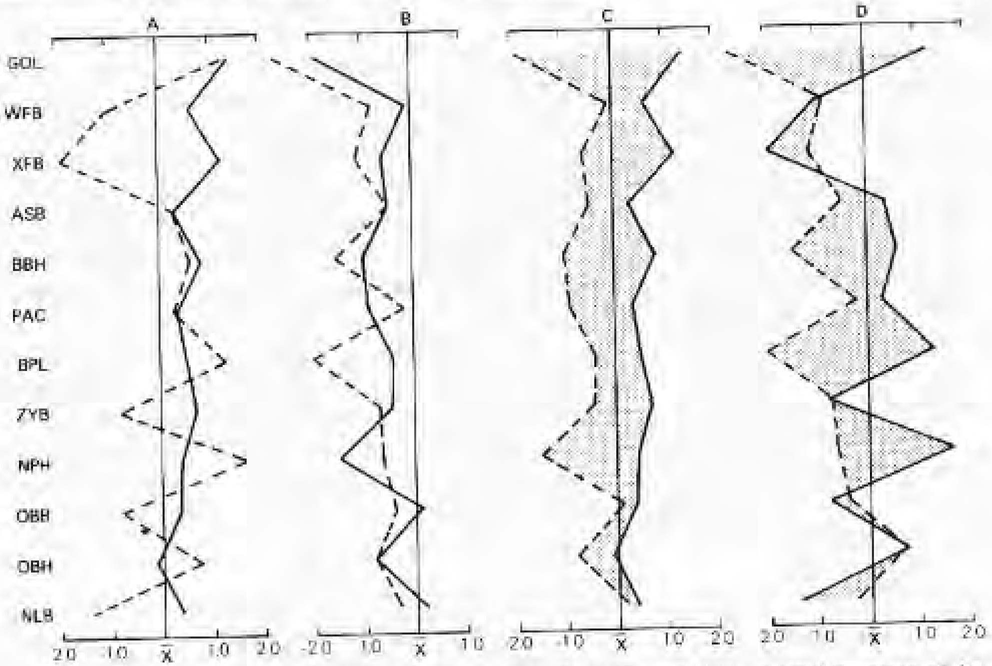

Figure 3.2 Standardized deviations around the overall means plotted for selected measures of the skull vault and face: comparison of Iberomaurusian (solid lines) and Capsian (dashed lines) males (A) and females (B); sexual dimorphism (solid lines, males; dashed lines, females) in (C) Iberomaurusians and (D) Capsians (note the prosthion-based values). Iberomaurusian: 14 males, 6 females; Capsian: 4 males, 5 females. GOL, cranial length; WFB, minimum frontal breadth; XFB, maximum frontal breadth; ASB, biasterionic breadth; BBH, basion–bregma height; PAC, parietal chord; BPL, basion-prosthion length; ZYB, bizygomatic breadth; NPH, upper facial height; OBB, orbital breadth; OBH, orbital height; NLB, nasal breadth.

females is the length of the skull, but in comparison with Capsians it is the breadth of the skull. The metric characters of the face are much more complex, but it appears that Capsian males generally had a longer, narrower face than Iberomaurusians. Further study of facial characters is necessary. For example, Iberomaurusian males and Capsian females are surprisingly variable on zygomatic breadth.

Our conclusion must be that (1) Iberomaurusian males were more distinct from later populations than Iberomaurusian females; (2) sexual dimorphism in terms of size was marked in the earlier populations and decreased through time; and (3) biological continuity is the likely explanation for the similarities seen in the females of the two groups. The heterogeneity seen in these populations (on the basis of the examination of CV over numbers of variables) is more or less the same. For example, the mean CV over six vault variables for the five Capsian males is 3.5%, despite the fact that the Medjez II skulls may represent as much as 1000 radiocarbon years. This is hardly more than the CV of 3.4% for 12 Taforalt males. The Afalou male value is 3.9% on a sample of 23 skulls.

Briggs (1955) stressed the variability within Afalou, saying that each of his four types was present, and it therefore seems necessary to compare the nature of the heterogeneity at Afalou with Taforalt, which so far as we can determine probably dates to about the same time.

As may be expected from a coastal site, Afalou is more heterogeneous than an inland site like Taforalt (Ferembach 1962); the mean CV over six vault variables for Afalou is 3.9% for males and 3.6% for females, whereas for Taforalt it is 3.4% for males and 3.5% for females. Briggs's Groups A, B and D, however, are not distinct. Their distributions on Figure 3.3 overlap completely. Briggs's Group C does appear to form something of a cluster, but some of his B (e.g., Afalou 29) and D (e.g., Afalou 15) group individuals are included. It is clear that some

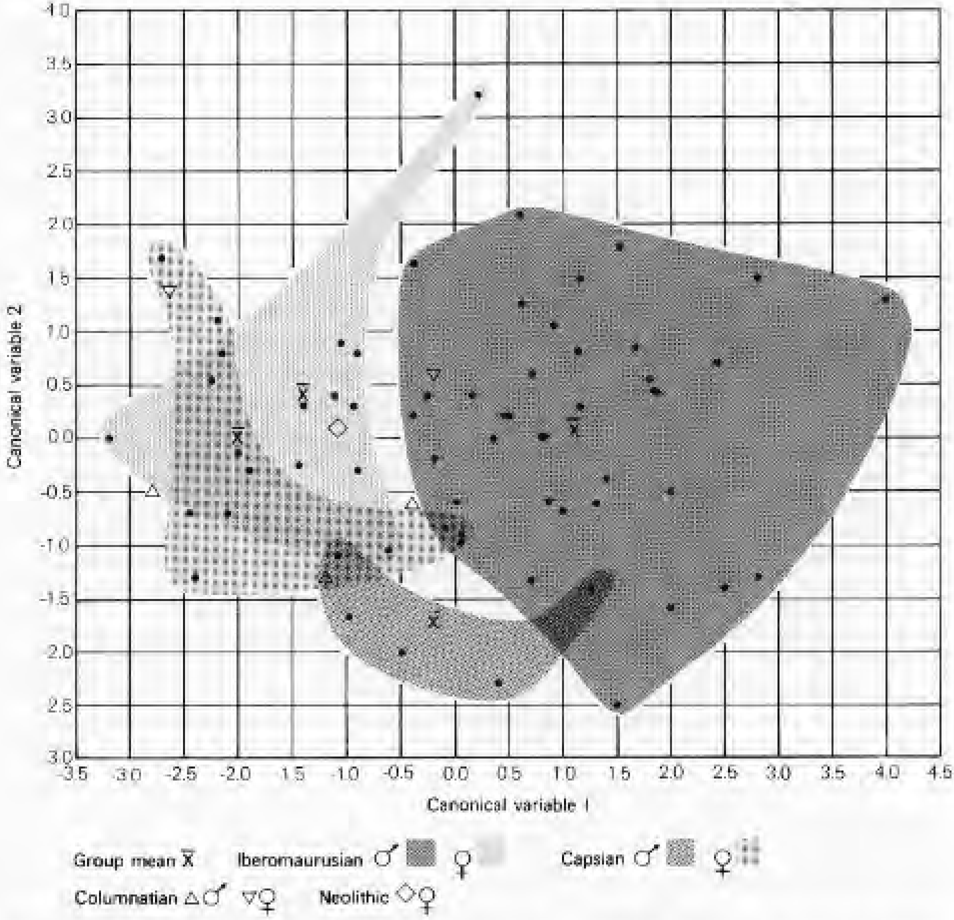

Figure 3.3 Distribution of Maghreb Epipaleolithic populations based on stepwise discriminant analysis of selected cranial and facial measurements of 68 skulls and showing overlap among groups. For list of individuals used see Table 3.1.

Afalou individuals had a tendency to broad skulls, a characteristic shared by very few Taforalt individuals. Ferembach (1962) and Chamla (1970) have both criticized Briggs's types as not based on reality, and we also see no reason to separate out one portion of the range of variation of the Afalou and Taforalt populations and label it a "type."

Although Afalou is heterogeneous, its males still group closely with those from Taforalt in the general, rather homogeneous, Iberomaurusian male group. Discrimination based on six vault characters among all Afalou and Taforalt specimens is achieved solely on the basis of cranial length. Distribution of length measurements for males from the two sites is virtually identical although the Afalou distribution is skewed slightly to the left. It seems possible that there is less sexual dimorphism at Afalou. What we chiefly learn from this comparison is that the discriminating metric trait for sex is cranial length. As Chamla (1978:389) has said, there are "marked supraorbital arcades meeting in a prominent glabella." Such supraorbital tori contribute significantly to maximum cranial length and, in a population that is undergoing change in this trait, variability is to be expected.

Although Iberomaurusian males do form a distinct, relatively homogeneous and identifiable group, there is little difference between Iberomaurusian and Capsian females (Figure 3.2B). In fact, all Maghreb populations in this study, other than Iberomaurusian males, constitute an almost indistinguishable mass. This highly unlikely contention may be confirmed by examination of Figure 3.3, for which maximum cranial length and maximum frontal breadth provided the basis. It was proven by an attempt to discriminate groups (Iberomaurusian females, Capsian males and females, Columnatian males and females, and Neolithic of Capsian Tradition) using six vault variables. No discrimination was possible, although minimum frontal breadth and parietal chord had the highest F values.

In our opinion, each of the groups forms no more than a section of the total range of variation covered by the populations examined. These populations lived in an area of roughly 900,000 km^2, and may represent as much as 16,000 years. Since we can see these 68 skulls as occupying a series of overlapping ranges (Figure 3.3), we conclude that the same general population is sampled throughout. The fact that the Medjez II males are similar to both Iberomaurusian and Columnatian–Capsian males confirms this. Medjez II H1 (from Phase III) lies well within the Iberomaurusian distribution, whereas Medjez II H3 (from Phase IV) approaches most closely the other pole of the total Maghreb distribution. However, Chamla has said (1978:393) that both these males were Type I Protomediterraneans.

We thus believe that it is pointless to attempt to distinguish "types" within Epipaleolithic Maghreb skulls. The imposition of type classifications is highly questionable in a situation in which sexual dimorphism possibly decreases and changes its nature over time. Furthermore, the population may well have been expanding over wider areas, thus tending to split into more genetically isolated groups. Until we have better Capsian samples, the nature and amount of population heterogeneity cannot be established with confidence, although our data on four facial variables show Capsian females to be quite variable (mean CV = 6.4%). Analysis of nonmetric data collected by Meiklejohn may help solve this problem.

We envisage a population with marked sexual dimorphism in which male size slowly decreased. We postulate a population in which there were some inland isolates and some, more variable, coastal groups. As coastal groups expanded into the interior at the end of the Pleistocene and early in the Holocene, the coastal variability (which had probably been maintained by transcoastal contacts in a rich environment that could support many small groups) changed its nature. Variability within groups was reduced because (1) sexual dimorphism was decreasing, and (2) geographic isolation reduced gene flow. At the same time, geographic isolation may have led to increased variability between groups.

Only additional study of more skeletal material can confirm this hypothesis, but, on the basis of Figure 3.3, we are convinced that there is no need to call upon "new arrivals belonging to a robust protomediterranean type who brought with them a new culture, the origin of which is probably Near Eastern" (Chamla 1978:397).

Chronology, Geographic Separation and Paleoenvironments: Possible Outside Influences

Chronology

At one time it was thought that there was a chronological hiatus between the Iberomaurusian and the Capsian, and perhaps also between the Typical Capsian and Upper Capsian (e.g., Tixier 1963). As more and more radiocarbon dates have become available it is now clear that chronological overlap is present.

Close (1980) gives an excellent overview of the situation as it was known up to about 1979 for all of northern Africa, and an updated review is now in preparation (Lubell *et al.* n.d.). While it is not necessary to detail the information in these papers here, it does seem to us important to note the implications of the data presented in them.

We now know that the Iberomaurusian began earlier (20,600 B.P. ± 500 in Tamar Hat 84/5; Saxon *et al.* 1974:50) and lasted later (8220 B.P. ± 820 for El Haouita Terrasse; Estorges *et al.* 1969:87) than was expected. The latest dates for the Iberomaurusian now overlap with the earliest ones for the Capsian (e.g., 9805 B.P. ± 160 at Aïn Misteheyia; Lubell 1977:70) (and see Figure 3.4). In addition, the evidence from Kef Zoura D (Lubell and Jackes 1982), where a Typical Capsian assemblage is stratigraphically and chronologically earlier than a Upper Capsian one, makes us wonder about the relationship between these two varieties of the Capsian despite the fact that there is no question the two were contemporaneous in the region (Camps *et al.* 1973).

If there is no chronological hiatus between the Iberomaurusian and the Capsian, and if we are correct in our interpretation of the human skeletal remains, the case for continuity appears strong.

Geographic Separation and Paleoenvironments

It has long been argued that Iberomaurusian and Capsian sites are found in different, nonoverlapping, regions, Iberomaurusian only on or near the coast and Capsian only in the interior. There are still no Capsian sites known from modern coastal regions, but there is now evidence for late Iberomaurusian occupations of the interior. Although there are only a handful of known sites, their significance cannot be ignored.

Three recently published sites near Bou Saâda in central Algeria are said to be Iberomaurusian, or Iberomaurusian related: Es-Sayar is dated at 13,100 B.P. ± 250 (Amara 1977), El-Onçor at 10,040 B.P. ± 190 (Heddouche 1977), and Zaccar I, a Keremian site, is estimated to date about 10,000 B.P. by comparison with the site of Bou Aïchem (Ferhat 1977:96). Farther south, in the northern fringes of the Sahara, the Iberomaurusian assemblage at El Haouita is dated to 8220 B.P. ± 820 (Estorges *et al.* 1969). In eastern Algeria, southwest of Tebessa in the Wadi Mezeraa, we have recently dated two *in situ* hearths in a deep alluvial section. The dates are far too old for any known Capsian occupation in the region (11,588 B.P. ± 99 [SMU 655] and 11,879 B.P. ± 286 [SMU 738]). Although no diagnostic artifacts were recovered, we are inclined to view them as indicative of occupation by people contemporaneous to those for whom we have evidence just to the west around Bou Saâda.

If we can take these scant data as an indication of late Iberomaurusian occupation of the interior, the question becomes twofold. Was there earlier occupation and, if not, why did groups move inland at the end of the Pleistocene? We cannot answer the first part of the question with the data available. While there is evidence for Aterian and earlier industries in the interior, almost nothing is known of the period between about 25,000 and 10,000 B.P. It is possible that most sites were destroyed by extensive erosion and pediment formation during this time (Coque 1962; Farrand *et al.* 1982; Williams 1970). On the other hand, one could just as easily argue that the interior was unattractive to hunter–gatherers; it seems to have been cold and arid whereas the littoral was a more hospitable environment. Although raised sea levels at the end of the Pleistocene would have inundated only small portions of the coast (except in the Gulf of Gabès, see Thiede 1980), there is an indication that changing sea levels affected Iberomaurusian subsistence and settlement at sites such as Tamar Hat (Saxon *et al.* 1974). As sea levels rose and the interior regions became more attractive for both game animals and people, Iberomaurusian groups may well have begun to move inland (seasonally?). The absence of preserved (or studied) fauna from any of these sites makes it impossible to do anything but speculate on subsistence–settlement patterns.

Those groups who moved inland certainly encountered a new range of local and regional ecological conditions, and these posed new adaptive problems. This is reflected in the change that took place in tool kits; interior assemblages contain more edge tools (Table 3.1). Also, movement of groups into a larger area that contained numerous physical barriers to communication may well have reduced the degree of social interaction among them, as it seems to have reduced gene flow. A reduction in the spread of ideas may well have accelerated the development of local traditions. We think this can be seen in the emergence of several lithic industries (Keremian, Columnatian, varieties of the Capsian).

The Capsian is a particularly interesting case because there are two possible explanations for the variability. On the one hand, in eastern Algeria, geometrics continued to be abundant as they had been in the Iberomaurusian. Balout

TABLE 3.3

Percentages of Characteristic Iberomaurusian Backed Bladelets

	Type number[b]									
Industry and site[a]	62	63	65	67	68	69	70	71	72	N
Iberomaurusian										
Tamar Hat 15	—	7.6	—	10.6	1.2	—	0.9	—	4.0	328
Tamar Hat 5–7	—	11.2	—	3.7	—	—	—	5.9	5.1	135
Grotte Rassel	0.5	14.8	—	4.1	0.3	3.5	3.5	2.1	2.1	797
Es-Sayar	4.8	2.9	—	0.7	0.3	0.3	—	0.3	4.4	270
Taforalt 1	0.1	4.5	—	1.1	1.3	—	—	—	—	1775
Columnata 1969	1.6	4.8	0.3	1.6	1.6	0.7	1.0	5.2	3.3	663
El Onçor couche	—	1.9	1.0	3.8	—	—	0.9	5.7	—	105
El Haouita terrasse	0.6	12.5	0.3	1.1	0.6	—	5.6	—	2.6	331
Keremian, Elassolithic										
Bou Aïchem	5.3	—	19.5	—	—	—	6.5	—	—	169
Koudiat Kifène Lahda	6.5	7.2	—	1.1	0.6	0.6	6.1	5.5	5.0	180
Capsian										
Aïn Misteheyia lower	1.8	11.0	0.2	2.4	1.6	—	0.2	0.2	0.6	488
Kef Zoura D (typique)	0.5	4.1	—	1.1	1.7	1.1	1.7	—	0.5	167
Aïn Naga	5.4	19.6	0.5	—	0.3	0.3	0.3	1.4	1.1	346
Rabah Level 1	2.0	12.0	—	—	—	—	—	—	—	50
Medjez II Phase 1	1.8	6.2	—	2.9	0.7	0.1	2.7	5.4	9.9	643
Relilaï Phase 1	—	3.7	1.8	—	—	—	—	—	—	54
Relilaï Phase 3	8.5	9.4	0.8	—	—	0.8	—	0.8	—	117
Relilaï Phase 2	2.3	5.4	0.8	—	—	—	—	—	—	130
Koudiat Kifène Lahda B	4.5	6.3	—	2.7	0.9	0.9	—	5.4	5.4	111
El Outed C Phase 1	1.4	5.6	—	—	—	1.4	—	2.8	—	71
El Outed C Phase 2	0.9	0.9	—	—	—	0.9	—	1.9	—	105
Relilaï Phase 4	2.4	3.0	0.3	0.9	—	0.3	—	0.9	—	331

[a] The following sites are not included in this table because available data are not sufficient for type determination: El Hamel Level E, Columnata sous abri, El Mekta tranchée, Bortal Fakher abri, R'Fana inférieur, Oued el Akarit C.

[b] Types follow the definitions of Tixier (1963).

(1955:380) distinguishes between the Iberomaurusian of eastern and western Algeria on this basis. On the other hand, the restricted zone in which Typical Capsian assemblages are found is the region in which flint is most abundant and one is tempted to see this as a causal relationship (i.e., abundant flint + large nodules = ability to make large tools). Just as research on Libyan materials (Close 1977) suggests local development from Eastern Oranian to Libyco-Capsian, so, we think, the data from the Maghreb suggest continuity between the Iberomaurusian and succeeding industries.

An Eastern Connection?

The Eastern Oranian and Libyco-Capsian of Cyrenaica are not the only late Paleolithic industries in northern Africa that can be shown to have similarities with the Maghreb. Schild *et al.* (1968) first pointed to this possibility when they described two industries (both dated to about 9000 B.P.) from near Old Wadi Halfa on the Sudanese–Egyptian border. They considered the Shamarkian to be strongly related to the Capsian, and the Arkinian to bear a close resemblance to the Keremian. Subsequently, Phillips (1975) showed that several assemblages from the vicinity of Isna in Egypt, dated to about 17,000 B.P., were very much like the Iberomaurusian. In both instances, the similarities were sufficiently strong that the typology developed by Tixier (1963) for the Maghreb could be used with minor modification on the analysis of Nilotic assemblages and this has since become standard practice. Considerable research (e.g., Bar-Yosef and Phillips 1977) has failed to demonstrate strong similarities between Levantine and Nilotic Late Paleolithic industries. Therefore, if there is any likelihood of connections, the Nile Valley is far more probable than the Near East.

Close (1977; Close *et al.* 1979) has developed a method of stylistic analysis to investigate further the nature of the similarities among Iberomaurusian assemblages from several sites in Algeria, the Eastern Oranian, and Libyco–Capsian from Haua Fteah, and a number of the industries identified in the Nile Valley (most of which date prior to 10,000 B.P.). The great merit of her work is that she has personally analyzed or reanalyzed all the assemblages used so that observer error is minimized or eliminated. Her studies show that there are close similarities for many "apparently stylistic variables" among assemblages from the three areas (Close 1977:232–258; Close *et al.* 1979:217–232).

In the absence of equivalent data from other Maghreb assemblages it is impossible to duplicate the kinds of analyses undertaken by Close, and to incorporate, for example, the Capsian. Using her published data for tool type percentages, we have used average linkage clustering to investigate the degree of general similarity between various Maghreb, Cyrenaican, Nilotic, and Siwan assemblages. The material from Siwa Oasis is partially published by Hassan (1976) and we are grateful to him for providing us with additional data (from Gross 1980). We find that there are four reasonably good clusters for the Nilotic material (including Siwa) and three for the Maghreb (the latter are discussed in detail in a later section). They group together by pairs as shown in Table 3.4.

TABLE 3.4

Mean Percentage Frequencies for Tool Groups among Nilotic and Maghreb Clusters

Cluster and range of dates[a]	Endscrapers	Perforators	Burins	Backed blades	Backed bladelets	Notches and denticulates	Truncations	Geometric microliths	Varia
Pair 1									
Nilotic 1									
(ca. 18,000–7700 B.P.)	4.9	4.2	5.2	1.2	51.7	8.4	10.0	1.8	12.1
Maghreb 2									
(ca. 10,800–7500 B.P.)	8.9	1.6	3.8	2.3	37.2	21.4	2.3	10.7	10.5
Pair 2									
Nilotic 4									
(ca. 8000 B.P.)	6.5	6.5	36.0	2.0	10.5	7.5	0.0	1.5	30.5
Maghreb 1									
(ca. 9800–7500 B.P.)	4.8	0.4	28.2	6.9	27.8	12.1	1.6	3.5	13.7
Pair 3									
Nilotic 3									
(ca. 18,000–17,000 B.P.)	1.5	0.2	1.5	0.0	88.5	2.2	1.2	0.0	4.5
Maghreb 3									
(ca. 17,000–8500 B.P.)	6.3	0.5	1.1	1.1	80.0	5.2	1.8	0.4	3.0

[a] The clusters are composed of the following assemblages. Nilotic 1: Afian (E71K18A), Ballanan (Site 8956), Industry D (E71K12), Fakhurian (E71K4, E71K5), Shamarkian (Debeira West 51), Kubbaniya (E-78-7, Trenches 6 and 9), Siwa (75/5, 75/27). Maghreb 2: Upper Capsian (R'Fana inf., Kifène sup. B, Medjez II/1, Aïn Naga, O. Akarit C?), Keremian (Bou Aïchem), Elassolithic (Kifène inf.), Columnatian (Columnata sous abri), Iberomaurusian (Columnata 1969, El Haouita terr.). Nilotic 4: Siwa (75/31, 76/24A2). Maghreb 1: Typical Capsian (El Mekta grd. tr., Relilaï I–IV, Kef Zoura lower, El Outed C I–II, Aïn Misteheyia lower, Bortal Fakher abri), Upper Capsian (Rabah I). Nilotic 3: Industry E (E71K13), Halfan (Sites 443 and 1028), Kubbaniya (E-78-3, Layer 1 and surface). Maghreb 3: Iberomaurusian (Taforalt 1, Tamar Hat 15 and 5–7, Rassel, Es Sayar, El Onçor, El Hamel), Eastern Oranian (Haua Fteah 55/78 and 55/79), Libyco-Capsian (Haua Fteah 55/77).

Data for all Nilotic assemblages, Haua Fteah, Tamar Hat, and Rassel are from Close (1977), except data for Siwa, which were provided by Hassan. Data for all other Maghreb assemblages are from Camps (1974), Heddouche (1977), Amara (1977), or personal observations.

The first pair (Nilotic 1 and Maghreb 2) are clearly something of a mixed bag. The range of dates for Nilotic 1 is large, and the assemblages come from a widespread area covering Egyptian Nubia, Upper Egypt, and Siwa Oasis. Maghreb 2 contains many of the assemblages that, as we discuss below, seem to have characteristics of both the Capsian and the Iberomaurusian. They appear to group together primarily on the basis of the frequencies of endscrapers, burins, and varia that have the lowest *F* ratios (0.0498, 0.0045, and 0.0155, respectively; cf. Close 1977:241). There are, however, quite marked differences. Perforators, backed bladelets and truncations are far more common in Nilotic 1, whereas endscrapers and notched pieces are more frequent in Maghreb 2. Furthermore, among the backed bladelets, pieces with Ouchtata retouch are far more abundant in Nilotic 1. The significance of this clustering clearly requires more detailed analysis in the future.

Although not shown here, a third group (Nilotic 2), which is composed entirely of two Arkinian assemblages from Debeira West 1 (Concentrations G and H, and I), dated to about 9400 B.P., stands more or less alone, although it does group most closely with the Nilotic 1–Maghreb 2 pair.

The second pair (Nilotic 4 and Maghreb 1) is also, to our mind, rather dubious. Clustering here seems to be on the basis of endscrapers, notched pieces, and burins, with *F* ratios of 0.0090, 0.1105, and 0.1427, respectively. However, Nilotic 4, which is composed of two assemblages from Siwa with very small sample sizes, also contains within the varia a number of points and bifaces that are not found in the Maghreb until the Neolithic of Capsian Tradition. Hassan (1976:30–31) suggests similarities to both the Qarunian in the Fayum (cf. Wendorf and Schild 1976) and later materials at Haua Fteah. Here again we think more detailed analyses are required and that a larger sample from Siwa is necessary.

The third pair (Nilotic 3 and Maghreb 3) is the most closely associated. Clustering appears to be primarily on the basis of burins, geometrics, and perforators, with respective *F*-ratios of 0.0004, 0.0061, and 0.0076. This pair is characterized by very high frequencies of backed bladelets, including those made with Ouchtata retouch. The assemblages in Nilotic 3 come from a fairly restricted area and have a short time range. This is not the case for Maghreb 3, the assemblages of which cover a wide range of both time and space (see Figure 3.1; the Haua Fteah is quite far to the east of the area shown in the map).

On the basis of this (admittedly preliminary) analysis, one could argue that the Iberomaurusian was introduced to the Maghreb from the east. On the other hand, and given the very early dates for the Iberomaurusian at Tamar Hat, one could just as easily say that the Iberomaurusian is the source for at least some of the Nilotic industries. The cemetery at Jebel Sahaba in the Sudan, which is dated between 14,000 and 12,000 B.P. (Wendorf 1968:954), and in which the human remains show strong resemblances to those from the Maghreb (Anderson 1968), would allow for either possibility.

The studies done by Close (1977; Close *et al.* 1979) tend to reinforce the idea of separate but similar traditions in the Nile Valley, Cyrenaica, and the Maghreb. Thus, a third option is to postulate some as-yet-unidentified pan–North African tradition (or traditions) that could be a result of population movements, or of diffusion of ideas, or of adaptive solutions to analogous problems. The data presently available do not allow us to test this thought. Only additional studies in northern Africa, utilizing the kind of approach advocated by Close allied with interdisciplinary investigations such as those that we have used in Algeria and that Wendorf has employed in the Nile Valley and the eastern Sahara (e.g., Wendorf and Schild 1980), will provide the information necessary to investigate the problem of an "eastern connection".

Technological and Typological Variation

We return then to the central focus of this essay, the investigation of continuity in the Maghreb (*sensu stricto*). Two major questions remain. To what extent are those tool forms and assemblage characteristics that are considered diagnostic of the Iberomaurusian found also in the Capsian, Keremian, Columnatian, and Elassolithic? How different are these five industries, especially the late Iberomaurusian and the early Capsian?

Figure 3.4 illustrates percentages of major tool classes in assemblages that are dated between circa 17,000 and 8000 B.P. These assemblages seriate remarkably well even though we have grouped them in chronological order and by industry rather than seriating them by percentage variation in each tool class. There is definite continuity in the frequencies of endscrapers, perforators, notches and denticulates, truncations, and sidescrapers and continuously retouched pieces. Backed bladelets, a diagnostic Iberomaurusian form, have a much more varied distribution, but they are less common in several of the more recent Iberomaurusian assemblages from sites located within the Capsian region. Geometrics, although not common in the Iberomaurusian, do appear late in the sequence and especially at interior sites. Burins are almost absent in the Iberomaurusian; however, they are present at El-Onçor and their distribution suggests gradual development beginning in the very late Iberomaurusian.

The dendrogram in Figure 3.5 is based on an average linkage cluster analysis (using CLUSTAN 1C; Wishart 1978) of the percentage frequencies illustrated in Figure 3.4. It shows three major clusters: Capsian (Cluster 1), Iberomaurusian (Cluster 3), and a third group (Cluster 2), which contains a variety of assemblages: Keremian; Columnatian; Elassolithic; a Capsian assemblage from the northern fringe of the Sahara (Aïn Naga); the lowest assemblage from Medjez II, which Camps-Fabrer (1975:206–207) says has certain Iberomaurusian affinities; R'Fana (Middle phase, Tebessa facies of the Upper Capsian); Koudiat Kifène Lahda B (Early phase, Central facies of the Upper Capsian); the very late Iberomaurusian assemblage from El-Haouita Terrasse in the northern Sahara; and the Iberomaurusian assemblage from the 1969 excavations at Columnata (Brahimi 1972).

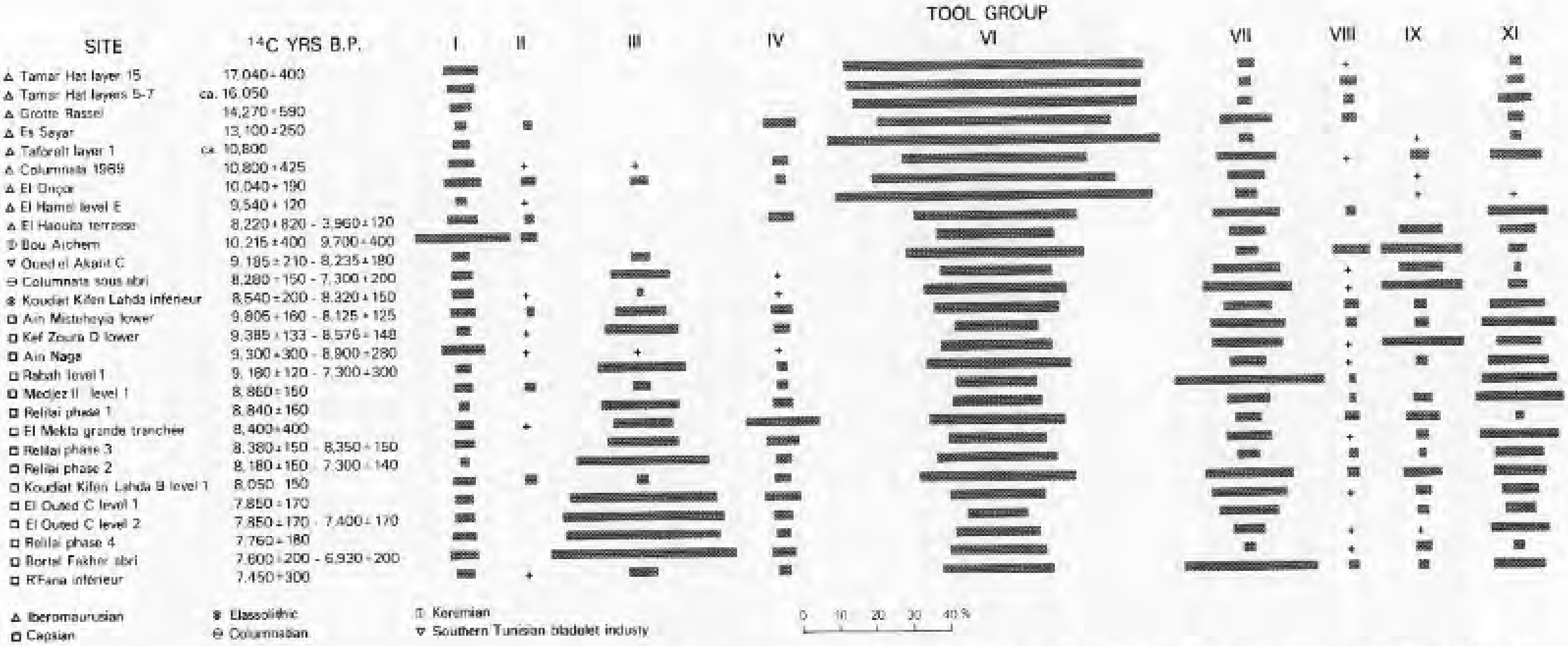

Figure 3.4 Percentage occurrence of major tool groups in later Iberomaurusian and earlier post-Iberomaurusian assemblages, arranged in chronological order by industry. I, endscrapers; II, perforators; III, burins; IV, backed blades; VI, backed bladelets; VII, notches and denticulates; VIII, truncations; IX, geometric microliths; XI, varia, including sidescrapers and continuously retouched pieces. Usage follows Tixier (1963).

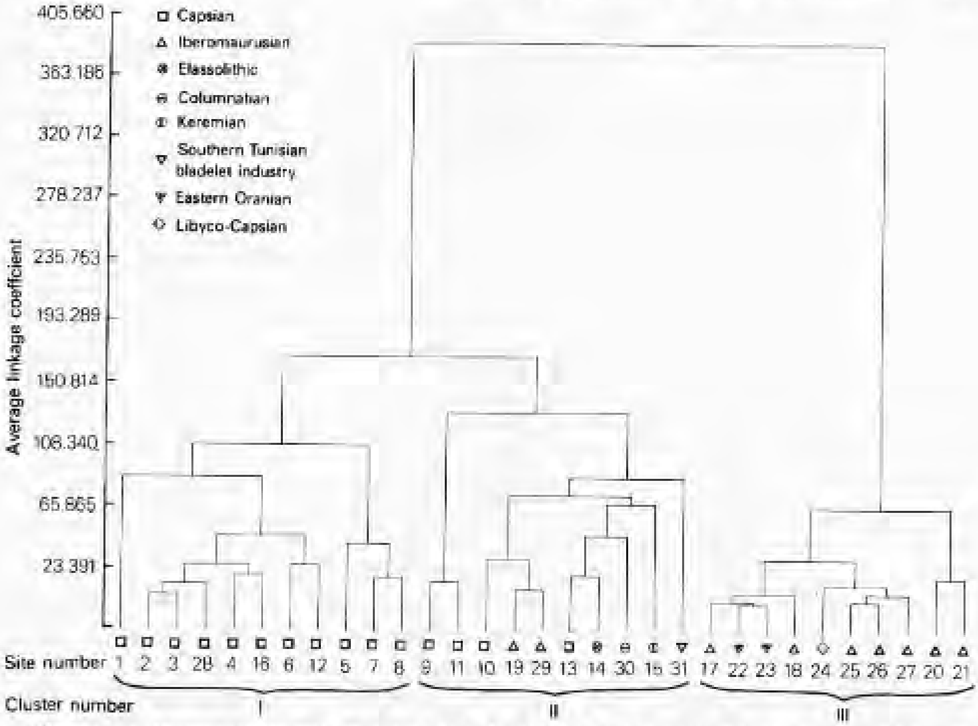

Figure 3.5 Average linkage dendrogram of Maghreb Epipaleolithic assemblages based on data used to construct Figure 3.4 plus additional data from Haua Fteah. 1, El Mekta grande tranchée; 2, Relilaï Phase 1; 3, Relilaï Phase 3; 4, Djebel el-Outed C Phase 1; 5, Bortal Fakher abri; 6, Relilaï Phase 2; 7, Relilaï Phase 4; 8, Djebel el-Outed C Phase 2; 9, R'Fana inférieur; 10, Koudiat Kifène Lahda B Level 1; 11, Medjez II Phase 1; 12, Rabah 1; 13, Aïn Naga; 14, Koudiat Kifène Lahda inférieur; 15, Bou Aïchem; 16, Aïn Misteheyia lower; 17, Taforalt 1; 18, El-Hamel Level E; 19, El-Haouita terrasse; 20, Es-Sayar; 21, El-Onçor; 22, Haua Fteah 55/79; 23, Haua Fteah 55/78; 24, Haua Fteah 55/77, 25, Tamar Hat 15; 26, Tamar Hat 5–7; 27, Grotte Rassel; 28, Kef Zoura D lower; 29, Columnata 1969; 30, Columnata sous abri; 31, Oued el-Akarit C.

If we examine the composition of these three clusters an interesting pattern emerges (Figure 3.6). When the means and ±1 standard deviation are plotted for tool classes and clusters, it becomes clear that in all but two cases there is considerable overlap among clusters. The two exceptions are burins and backed bladelets. In four cases there appear to be trends: burins, backed blades, and varia decrease from Clusters 1 to 3, whereas backed bladelets increase. The implication, since (except for varia) these are all considered diagnostic tool classes, is that Cluster 2 might somehow be viewed as intermediate between Cluster 1 (Capsian) and Cluster 3 (Iberomaurusian).

High frequencies of backed bladelets (≥40%) are the dominant characteristic of Iberomaurusian assemblages. However, both Figure 3.4 and Table 3.3 show the presence of late Iberomaurusian assemblages with comparatively low fre-

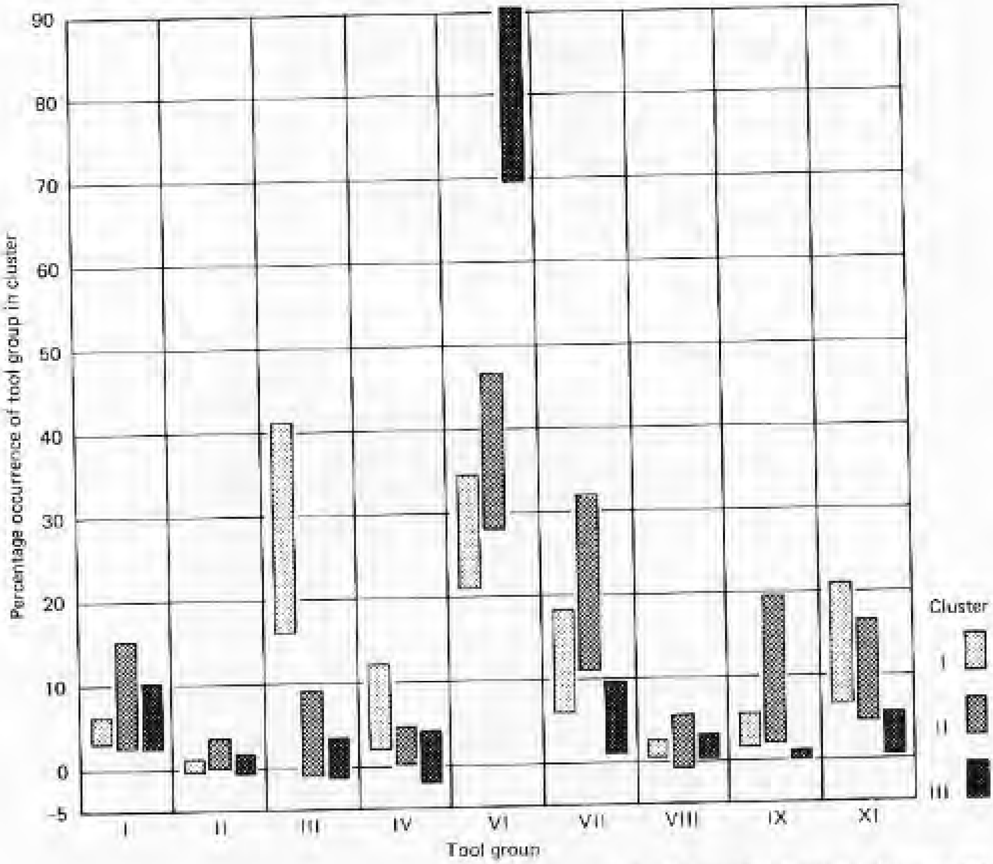

Figure 3.6 Range of variation (mean ± 1 sd) of tool groups by clusters. For key to tool groups see Figure 3.4 and for key to clusters see Figure 3.5.

quencies of backed bladelets. While there is a marked decline in the average percentage of backed bladelets in the early Holocene, it is clear this trend begins in earlier (or in contemporaneous) Iberomaurusian assemblages. Thus, although there were new conditions to be dealt with as a result of the move to the interior at about 10,000 B.P., marked continuity can still be seen between the Iberomaurusian and the Capsian.

Table 3.3 compares the percentages of backed bladelet types that are considered to be characteristic (Camps 1974:63; Tixier 1963) yet minor components of both the Iberomaurusian and early Holocene industries. There are no significant differences among these. However, the small size of the sample should caution us against too ready acceptance. Much depends upon the skill of the analyst; technical accidents may produce forms identical to established types, or types may be created during stages of manufacture of other tool forms (Tixier

1963:110). Nonetheless, the fact remains that with the evidence available, we cannot distinguish between Iberomaurusian and other Maghreb Epipaleolithic industries using these types.

The quality, abundance and variety of geometrics is considered a hallmark of the Capsian (Balout 1955:380; Camps 1974:64), in marked contrast to the Iberomaurusian where they are rare. This distinction holds true if one contrasts the middle phases of both industries, but it is much less obvious when they overlap in time. Table 3.1 lists the percentages of major geometric forms found in each site, arranged chronologically. Segments dominate in the Iberomaurusian and western Algerian industries (Columnatian, Keremian, Elassolithic), and are gradually replaced by triangles in the early Capsian. Furthermore, while geometrics are more frequent in the Capsian, all the major forms are present in the Iberomaurusian. We suggest that the expansion and development of a geometric tradition in the Capsian was based on earlier patterns in the Iberomaurusian.

Limited comparisons can also be made among technological characteristics such as core technology, retouch types, and manufacturing techniques.

Core technology appears to have remained constant throughout all the assemblages under consideration here. The predominant core form in both the Iberomaurusian (Close 1977) and the Capsian (Camps-Fabrer 1975; Lubell *et al.*, in press) was a single-platform core, often worked only on one side if the cobble was small (Brahimi 1969a:36) and generally having a smooth or roughly faceted (large scars) platform. These cores appear to have been worked by direct or indirect percussion. At circa 8000 to 7600 B.P., a new technique for bladelet production, possibly by pressure (Tixier 1976), spread throughout the Capsian area. Bladelets from assemblages dating after this time are narrower and more regular than those from earlier assemblages, and appear to be related directly to the presence of the new technique that produced fluted cores.

Retouch type on backed bladelets shows a complex pattern of variation (Table 3.5). Ouchtata retouch, considered characteristic of the Iberomaurusian, appears to decline in importance through time (Close 1977:76). It is often a minor component in late Iberomaurusian, western Algerian, or early Capsian assemblages.

TABLE 3.5

Retouch on Backed Bladelets

Site	*Sur enclume* (%)	Abrupt (%)	Other (%)	*N*
Medjez II (lower)	57.0	34.8	9.2	1051
Kef Zoura D (typique)	35.3	58.9	5.6	180
El Mekta (typique)	45.4	38.3	16.3	522
Abri Clariond (typique)	65.8	34.2	0.0	38
Aïn Misteheyia (lower)	56.2	43.8	N/A	390
Relilaï (typique)	52.1	44.8	3.1	163
Columnata (1969)	32.0	57.6	10.4	727

The major forms of retouch during this period are abrupt (including semi-abrupt) and *sur enclume* ("on anvil," or bipolar, retouch, which produces a very abrupt backed edge). The percentage of *sur enclume* is influenced in part by the thickness of the blank (Close 1977:180; Goetz 1967:34; Roche 1963:53; Tixier 1954:88) and by the degree of modification desired (Close 1977:161; Lubell *et al.*, in press). At Tamar Hat, Close (1977) has noted that straight backed bladelets have more *sur enclume* retouch than do curved backed bladelets; therefore, form and retouch may not be entirely independent. However, although the percentages of straight backed bladelets are similar at Tamar Hat and in the lower assemblage from Aïn Mistheyia (early Capsian), there is much more *sur enclume* retouch at Aïn Misteheyia (Lubell *et al.*, in press). Although this appears to indicate a substantial difference between the Iberomaurusian and the Capsian, we note that some recent Iberomaurusian assemblages, such as Columnata 1969 and El Haouita, have relatively high frequencies of *sur enclume* retouch, whereas others such as El-Onçor (Heddouche 1977:75) have very little. This pattern also appears in the Capsian, and it may be that Typical Capsian assemblages (especially those with high frequencies of burins, such as Kef Zoura D), have a very low frequency of *sur enclume* retouch. The pattern is complex, and may be related to intersite activity variation.

Although there is clearly more *sur enclume* retouch in the Capsian, it seems reasonable to suggest that it began to increase during the late Iberomaurusian. In addition, it is probable that industrial variants with both high and low frequencies of *sur enclume* retouch existed in the late Iberomaurusian and that this pattern continued into the Capsian. Unfortunately, more data are required to confirm this.

The microburin technique is present in all Maghreb Epipaleolithic industries, but the tool forms that resulted from its use changed through time: La Mouillah points and arch-backed bladelets in the Iberomaurusian (Tixier 1954:104), geometrics in western Algerian industries (Roubet 1968:87), and the Capsian (Tixier 1963:141). Microburin percentages form neither a chronological nor an industrial pattern; both high and low frequencies are found in all industries (e.g., 7.0% in Medjez II Phase 1; 30.1% at Aïn Naga; 0.9% in Taforalt 1; 35.2% for Es-Sayar couche).

The data on typology and technology can be summarized as follows:

1. All tool forms or techniques are found in all the Maghreb Epipaleolithic industries.
2. Late Iberomaurusian assemblages contain, to some degree, the typological characteristics of western Algerian and Capsian assemblages (Figures 3.4, 3.5, and 3.6).
3. Some major changes do occur in the early Holocene (increase in burins and geometrics, decrease in backed bladelets), but these tool forms are characteristic of assemblages attributed to all industries and the changes can be seen to have begun earlier.

In sum, on the basis of the available information from lithics, we see no reason to reject a hypothesis of continuity from the Iberomaurusian to the early Holocene Epipaleolithic industries.

REGIONAL TRADITIONS

We think it is possible to group the five recognized industries into two major (Western and Eastern) regional traditions. We hypothesize that the divergence of these two traditions was a result of both relative geographic isolation and a history of development from regional Iberomaurusian populations who had slightly divergent lithic and bone tool traditions. We contend that earlier differences were amplified by the effects of increased isolation and changes in adaptation in response to new local conditions.

We see no firm boundary between the Western and Eastern traditions (Figure 3.1). Instead, there is a continuum with the western pole in the region of Tiaret and the eastern pole in the vicinity of Gafsa. The Western Tradition was centered on the western Algerian steppes around Tiaret and the Hodna Basin. The locus of the Eastern Tradition was on the Tunisian steppes and adjacent areas in the Nementcha Mountains and the Constantine High Plains. The transition zone between these appears to have been in the western part of the High Constantine Plains, southwest of Constantine. Movement between these zones would also have been constrained by the ranges of the Saharan Atlas, the very arid desert south of the Hodna Basin, and the broken uplands of western Algeria.

The Western Tradition

The Western Tradition includes the Columnatian, Keremian, and Elassolithic. Although each of these has distinctive characteristics, they also have a number of traits in common. Each has assemblages characterized by the presence of microbladelets (Roubet 1968) and/or very small tools made upon these (Columnata, Cubitus, Koudiat Kifène Lahda, El Hamel, Kef el Kerem, Bou Aïchem). Segments predominate over all other geometric forms; of the 371 geometrics from all reported Western Tradition assemblages (except Kef el Kerem, for which the data are poor), 83% are segments. Geometric percentages reported from Eastern Tradition sites (Table 3.6), show that while segments may sometimes dominate, trapezes and triangles are far more common. Furthermore, all types of geometrics are more numerous and varied in the Eastern Tradition.

Although trapezes are not uncommon in the west (7.5%), there is one distinctive form of three-sided trapeze (Camps 1974:204) that is found only in the Western Tradition at Columnata, Cubitus, Aïn Cherita, and Kef Dahmouni. While this form is primarily Columnatian, Cadenat (1968:108) describes Kef Dahmouni as an "evolved Keremian" and Aïn Cherita is considered Capsian. In addition to the trapeze, another form common to many Western Tradition assemblages is the microsegment (Roubet 1968).

One very distinctive bone tool, the oblique bevel-edged knife, is found only in the Iberomaurusian and Western Tradition sites. It is reported from Columnata, Cubitus, and Kef El-Kerem, thus being present in both the Columnatian and the Keremian (Camps-Fabrer 1966:62).

Assemblages of the Western Tradition generally have higher frequencies of endscrapers than those of the Eastern Tradition. Only at El Hamel does the percentage of endscrapers fall below 7.0 to 6.4%. Table 3.1 suggests that percentages of this magnitude are exceptional in the Eastern Tradition, but a much larger sample is required to prove this.

In summary, industries of the Western Tradition are interrelated by the presence of a distinctive microbladelet technology, certain geometric forms, one type of bone tool, low percentages of geometrics, and relatively high frequencies of endscrapers.

The Eastern Tradition

During the early Holocene, the Typical and Upper Capsian industries coexisted in the eastern region. To a large degree the only differences between them are the percentages of various tool types. Studies by Sheppard indicate very little difference in tool form, which suggests that differences in frequencies reflect activity, rather than ethnic, distinctions.

The Capsian can be distinguished from the Western Tradition by the presence of high frequencies of geometrics and a wide variety of geometric forms (Table 3.1). During the early Holocene (prior to 8000 B.P.), various forms of triangles were common; they were almost totally absent in the west at this time.

In the west, the Keremian is defined primarily by a high frequency of endscrapers. In the east, the Typical Capsian is characterized by abundant burins. Both kinds of tools were probably designed for and used in manufacturing tasks. The presence, in separate areas, of industries characterized by such tool classes is very interesting because it is a pattern common to both traditions but distinctive in each.

In summary, the Eastern Tradition has few common characteristics other than the importance of geometrics and the absence of those features that distinguish the Western Tradition (microbladelets, endscrapers, oblique bevel-edged knives). This is certainly due, in part at least, to small-scale local variations within this large region. Given this variety, it might seem more reasonable to consider the central and western High Constantine Plains a separate unit (the Setif and Southern facies of Camps). However, the assemblages in this region are considered to be Capsian (with the exception of Koudiat Kifène Lahda, which is Elassolithic). Since our intent here is to construct a broad synthesis, we include this transitional region in the Eastern Tradition.

Development

The development of two regional traditions was a consequence of three factors: (1) relative geographic isolation, (2) development from distinct Iberomaurusian traditions, and (3) adaptation to local conditions. We have already shown the extent to which these two traditions were geographically isolated, but their geographic relationship to the Iberomaurusian has now to be discussed.

In the west, there are numerous Iberomaurusian sites along the Mediterranean coast, especially in the regions of Oran, Algiers, and Bejaïa (Camps 1974:60). There are also a number of inland sites south of Oran (El-Kçar), near Tiaret (Columnata), and on the northern fringe of the Sahara near Bou Saâda (El Hamel, El Haouita, Es-Sayar, El-Onçor). Most of these appear to date to the late Iberomaurusian (Figure 3.4).

In the east, Iberomaurusian sites (*sensu stricto*) are found only along the coast of eastern Algeria and northern Tunisia. The absence of sites along the coast of the Gulf of Gabès may be explained in part by subsidence of the coastline (cf. Thiede 1980:220, Figure 5); however Camps (1974:61–62) rightly comments that this does not explain the absence of inland sites. The major question is whether the southern Tunisian backed bladelet industries (Oued el Akarit, Mareth, Aïn el Atrous, Menchia), or the pre-Capsian backed bladelet industries of the "Horizon Collignon" near Gafsa, should be considered Iberomaurusian, as they have been in the past (cf. Tixier 1963). Other than the high frequencies of geometrics found at the Oued el Akarit sites, there is little difference between tool percentages from these sites and those from the Iberomaurusian. Gobert (1962) has, however, separated them from the Iberomaurusian because they lack certain backed bladelet forms. The Gafsa sites are most like the Iberomaurusian, but they lack microburins, La Mouillah points, or backed bladelets pointed with a microburin facet (Gobert 1954:449; Tixier 1963). The Oued el Akarit sites are missing both La Mouillah points and obtuse bladelets with right proximal retouch, and Gobert (1954, 1962) therefore considers them a distinct industry.

On the basis of stratigraphy the Gafsa materials are clearly pre-Capsian. The Oued el Akarit sites probably date a bit earlier, around 9500 to 10,000 B.P. (cf. Page 1972:17–22). Thus, pre-Capsian populations did exist along the northern Tunisian coast, the coast of the Gulf of Gabès, and in the vicinity of Gafsa.

The situation on the Constantine High Plains is even more uncertain. A number of excavated sites (Bou Nouara, Mechta-el-Arbi, Châteaudun-du-Rhumel) contain assemblages that are said to bear a strong resemblance to the Iberomaurusian (Camps 1955). Vaufrey (1935) noted that, except for the presence of geometrics, Mechta-el-Arbi would be considered Iberomaurusian, but Balout (1955) states that later excavations have failed to recover more than a few geometrics in the lower part of the site. Bou Nouara, considered originally by Camps (1955) as late Iberomaurusian, is now reclassified as very early Capsian with Iberomaurusian characteristics (Camps 1974:128). Thus it seems there are some early assemblages in the vicinity of Constantine and Setif which show many Iberomaurusian features. Since it appears that there were pre-Capsian industries in both the eastern and western regions, it then becomes of considerable interest to know the extent to which differences in these can account for later divergence during the early Holocene.

There is general agreement that the industries we are grouping in the Western

TABLE 3.6

Geometric Percentages from Pre-Capsian Assemblages, Eastern Tradition

Site	Segments	Triangles	Trapezes	Scalene	Restricted *N*
Aïn Khiar	0.7	0.5	0.3	0.6	4978
Er Recheda es Souda	1.2	0.6	0.0	0.0	2396
Ouchtata (rive gauche)	2.6	2.5	0.8	2.6	2396
Sidi Mansour	0.0	0.0	0.0	20.0	216
Lalla	0.0	0.0	0.0	18.3	1072
Oued el Akarit C	3.4	18.1	0.0	0.0	795
Oued el Akarit A	4.9	6.1	0.2	?	2053
Oued el Akarit B	1.1	16.7	1.7	?	179

Tradition are derived from, or somehow related to, the Iberomaurusian (Cadenat 1966; Camps 1974; Camps-Fabrer 1966; Goetz 1967). Unquestionable Iberomaurusian sites exist in the region, and in two cases (Columnata and El Hamel) there is a confirmed stratigraphic relationship to later industries.

Continuity is also seen in the presence of the oblique bevel-edged knife in both the Iberomaurusian (where it is confined to sites in the west), and sites of the Western Tradition (cf. Camps-Fabrer 1966:62).

As noted earlier, the major difference between the Eastern and Western traditions is the importance of geometrics, especially triangles, in the east. Table 3.6 shows that some Iberomaurusian and pre-Capsian assemblages in the east have many geometrics (notably triangles) and scalene backed bladelets (the latter are essentially scalene triangles that retain the bulb of percussion [cf. Tixier 1963:113–114]). Geometrics are far less variable in the west; of the 95 geometrics reported from 10 recent western Iberomaurusian assemblages, 71 (74.7%) are segments (Camps 1974:80). Although the sample is small, the fact remains that in the few well-excavated sites, triangles and triangular forms are more abundant in the east than in the west (Balout 1955:380). This suggests that a major reason for the importance of geometric forms in the Eastern Tradition can be sought in the history of development of the Eastern and Western traditions from local late Pleistocene and early Holocene traditions that had already diverged to some extent. We do not yet know why this divergence occurred.

Early Holocene Development of Edge Tools

We use the term *edge tools* to describe a group of tool classes that increased in frequency during the very late Pleistocene and early Holocene (Table 3.1). These tool classes (endscrapers, burins, notches, sidescrapers, and continuously retouched pieces) are generally assumed to have been used in heavy maintenance or manufacturing tasks. They lack the edge–point configuration and are larger than tools, such as backed bladelets and geometrics, that were designed to pierce and cut, and that are assumed (and in some cases known) to have been mounted and used for hunting or for food processing.

All these edge tools can be used in a scraping fashion. A convincing case has been made for the use of burins as scraping tools (Bordes 1965; Rigaud 1972; White 1982), and numerous ethnographic, archaeological, and experimental studies have shown the same for endscrapers, notches, and sidescrapers. Burins are abundant in the Typical Capsian, and judging from European data one would assume that bone working would also be common. This is not the case; the bone industry is sparse and not well developed. The opposite is true for the Upper Capsian, where burins are very rare but there is an abundant bone industry and a well-documented groove-and-splinter technique (Morel 1974). In addition, examination by Sheppard of thousands of Capsian burins has revealed that macrodamage occurs more often on the edge of the burin facet than at the tip. Taken together, these data suggest the possibility that burins may have served the same general function as other edge tools and should not be considered functional variants.

It would appear that early Holocene populations throughout the Maghreb were faced with a common adaptive problem (as yet undefined) that made the use of more edge tools advantageous. The selection of forms would have depended upon both the past history of selection and the uses for which the tools were intended, as well as upon design factors such as the use life of a tool and the size and availability of raw material. In the western region the endscraper was selected; in the Constantine Plains, the notch; and in the Typical Capsian zone, the burin.

It is unfortunate that with the data available we cannot evaluate the extent to which the pre-Holocene history of form selection in each region is related to later patterns. The increase in endscrapers in late Iberomaurusian and pre-Capsian industries is a pan-Maghreb phenomenon; its earlier distribution cannot be used as an explanation. Pre-Capsian burins are only found in appreciable percentages at the Iberomaurusian site of El-Onçor and in the Columnatian, both in the western region. No immediately pre-Capsian sites have been excavated in the Typical Capsian region. The abundance of flint in the lower Eocene (Suessonian) and Cretaceous limestones (Savorin 1930:268) in east central Algeria (south of Tebessa) and southwest Tunisia, must have some bearing on the presence of Typical Capsian assemblages and, consequently, abundant burins. Bedrock flint resources elsewhere in Algeria and Tunisia are not as abundant, and flint is usually found as small rolled cobbles in stream beds. We suggest that it was only in the Typical Capsian zone that it was both possible and economical to manufacture robust scraping tools on blades in the form of burins.

These loose hypotheses regarding edge tools are obviously tentative. However, we believe they could be tested by experimentation, use-wear studies, and, above all, further systematic excavation. Investigation of these hypotheses would go a long way toward finding an explanation for much of the variation that until now has been used as the basis for distinguishing a plethora of industries.

Technological Change circa 8000 to 7600 B.P.

It has long been realized that two techniques of bladelet production exist in the Capsian. It was assumed originally that an earlier, cruder, Typical Capsian technique was followed in the Upper Capsian by development of a technique that allowed production of thin, narrow, parallel-sided bladelets. Tixier (1976) believes this new technique was pressure.

Since the Typical Capsian and Upper Capsian are now known to be contemporaneous, the age of the Upper Capsian technique is now in question (Tixier 1976). Research by Sheppard indicates that the "pressure" technique proliferated, if it did not originate, some time between 8000 and 7600 B.P. Figure 3.7 illustrates change in mean width and thickness of blade blanks used in the manufacture of notches and denticulates and continuously retouched pieces at Medjez II and Aïn Misteheyia (unretouched débitage was not available for study). In both cases there is a decrease in mean width and thickness in the upper levels, and this correlates with changes in platform characteristics (greater faceting and edge preparation) and blank shape (more parallel-sided blanks). Figure 3.7 shows that these changes take place at both sites between approximately 8000 and 7500 B.P., about 1000 years later than a decrease in the frequency of larger mammals in the faunal assemblage that we relate to changing environmental conditions (Lubell, in press; Lubell *et al.*, in press). Why this time lag occurs, if in fact the data are accurate, is a question requiring further field work and laboratory analyses.

The dating of this transition is corroborated by two new dates on charcoal from Site 12 (excavated in 1930 by Pond), located near Aïn Beidha on the eastern Constantine Plains. The technological transition at Site 12 occurs between Levels III and IV. Level IV dates to 7780 B.P. ± 247 (SMU 1135), and Level III to 7330 B.P. ± 387 (SMU 1132).

Available data on the frequencies of fluted cores strongly support the contention that they were rare or absent before 8000 B.P. (Kef Zoura D; Koudiat Kifène Lahda [Roubet 1968]; Relilaï [Grébénart 1976]). At Medjez II, Camps-Fabrer (1975:186) found few fluted cores in the early phases, but reports that 20% of cores were fluted in the final phase, which dates after 8000 B.P. Reanalysis of this material by Sheppard revealed that 85.7% of all cores in the site showing series of parallel-sided bladelet scars occurred in the upper 1.5 m of deposit. The occurrence of fluted cores in earlier levels could be due to mixing as a result of intrusive burials (cf. Camps-Fabrer 1975:302, Figure 130).

This new technique for producing thin, parallel-sided bladelets of a standard width ($\bar{X}$ = 12 mm) appears to have spread rapidly throughout Algeria and Tunisia. It does not occur in the Libyco-Capsian at Haua Fteah, suggesting that its spread may have been limited to the Maghreb.

The date of the spread coincides with the expansion of the Capsian into western Algeria (Camps 1974:152)—in this case *Capsian* is synonymous with assemblages containing many geometric forms (especially trapezes) and large numbers of notches (Cadenat 1966, 1968). It is at this time that Camps (1974:157) notes a sudden increase in the "cohesion" of all the Capsian and the formation of a *koïné*, or a common tradition, that cuts across facies differences. It seems to us that a reasonable explanation for the apparent expansion of the Capsian and the formation of a "common tradition" has much to do with the spread of a technique that facilitated the manufacture of geometric forms by the microburin technique and lent a superficial similarity in form to all tools made on bladelet

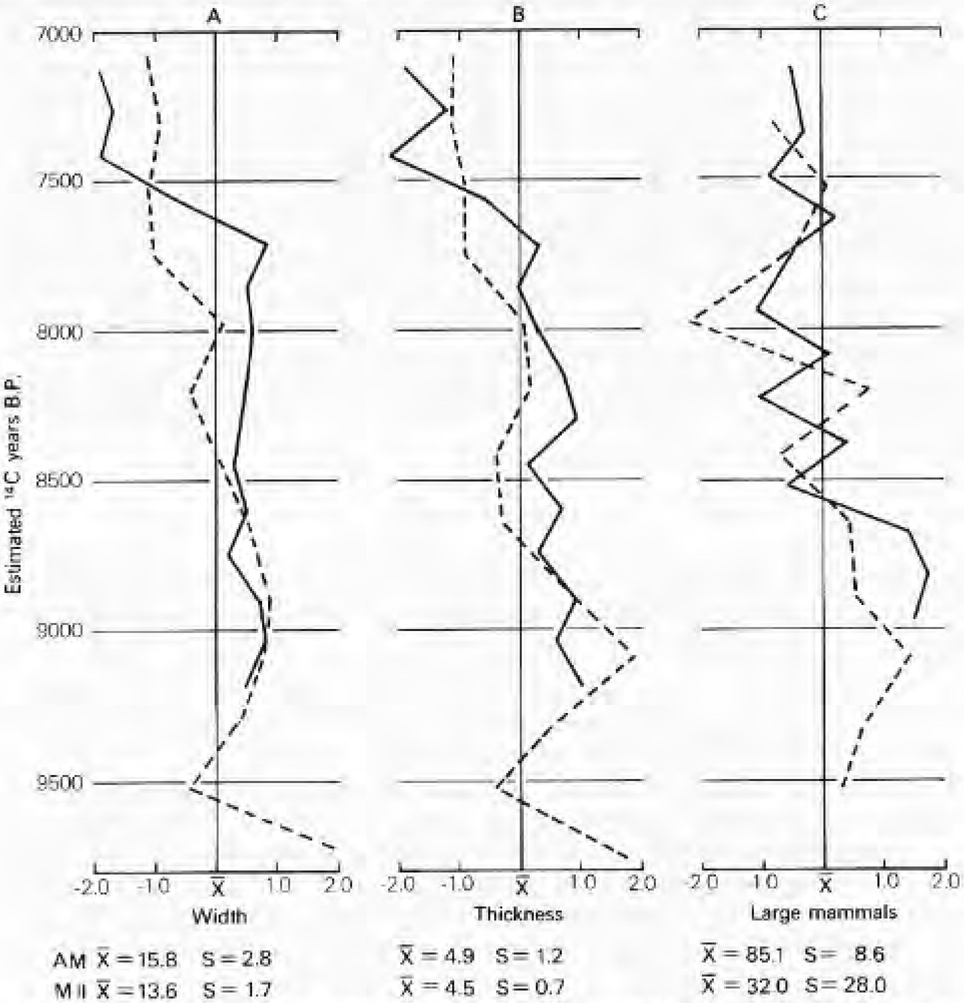

Figure 3.7 Technological and dietary change at Aïn Misteheyia and Medjez II. A and B plot standardized deviations around the mean for width and thickness of blades used in the manufacture of notches, denticulates, and continuously retouched pieces. A 50% random sample was used for Medjez II and all available pieces for Aïn Misteheyia. C plots standardized deviations around the mean for percentage frequencies of *Bos* + *Alcelaphus* + *Equus* for Aïn Misteheyia, and large bovids + *Alcelaphus* + *Ammotragus* for Medjez II. Temporal scale determined by regression using the Gif series for Medjez II and all dates for Aïn Misteheyia. AM, Aïn Misteheyia (dashed line); MII, Medjez II (solid line).

blanks. These "events" also coincided with the sharp trend toward aridity that began about 8000 B.P. (Couvert 1972; Lubell, in press; Lubell *et al.*, in press). The extent to which technological and climatic changes were correlated is not yet known, but evidence from Aïn Misteheyia, Kef Zoura D, and Medjez II suggests a relationship between changing technology and alteration of subsistence practices.

At each of these sites, the technological change is preceded by or is contemporary with a change in the faunal assemblage. At Aïn Misteheyia this can be seen in the increased frequencies of smaller, more arid-adapted species of both mammals and land snails after 8000 B.P. (Lubell *et al.*, in press). At Medjez II sufficient data are available only for mammals (Bouchud 1975), but the pattern is very similar (Figure 3.7). At Kef Zoura D, preliminary data indicate an even more dramatic pattern. An earlier (ca. 9500 B.P.) Typical Capsian assemblage associated with *Bos*, *Equus*, and *Alcelaphus* is followed by a series of Upper Capsian assemblages associated with a mammalian fauna that appears to be restricted to *Gazella* and lagomorphs. In none of these instances, however, do we see clear evidence for a major change in subsistence practices. Rather, it appears that adjustments were made to a long-established and highly successful pattern (cf. Lubell in press), one that may have continued into the Neolithic of Capsian Tradition relatively unchanged despite the introduction of (apparently exotic) domestic animals (Roubet 1979).

CONCLUSIONS

This essay has been an investigation of the hypothesis that the Maghreb Epipaleolithic developed primarily in place and with a minimum of outside influence. Specifically, we have shown that:

1. There is continuity between the late Pleistocene Iberomaurusian and early Holocene Capsian industries, in terms of lithic assemblages, cranial morphology, site location, and chronology.
2. Although similarities can be demonstrated with lithic assemblages from Cyrenaica and the Nile Valley, the degree of cultural interaction that occurred (if it occurred at all), cannot be assessed with the data now available.
3. During the early Holocene in Algeria and Tunisia two traditions developed from the Iberomaurusian, one located in the west (vicinity of Setif and west) and the other in the east (eastern Constantine Plains and the Tebessa–Gafsa region).
4. About 8000 to 7600 B.P., a new technique of blank production, probably pressure, proliferated throughout Algeria and Tunisia. The use of this technique tended to homogenize the variability that existed previously and led to what appears to be a uniform Capsian industry.
5. The spread of this new technique coincided with a short period of more

arid climate and a resulting adjustment to the Capsian subsistence regime. Lubell (in press) has argued that this adjustment did not represent major change and that the basic Capsian subsistence pattern continued into the Neolithic.

We believe that this new view of the Maghreb Epipaleolithic simplifies what is at present a confusing mixture of multiple local developments and purported migrations, while at the same time stressing the salient factors responsible for large-scale variation within the region.

Much of this new synthesis is based on scanty evidence. Future research should, we believe, be directed toward recovery of immediately pre-Capsian assemblages from eastern Algeria and southern Tunisia. There is strong evidence to suggest that such sites exist, if perhaps only in sheltered locations. This research must be interdisciplinary and include integrated investigations of paleoecology, osteology, archaeozoology, and archaeology if it is to be of any use in answering the questions raised in this essay.

The Maghreb offers an almost unparalleled archaeological laboratory that can be used to investigate many theoretical problems of general archaeological interest. We hope that important insights will be forthcoming from future research in this region.

GLOSSARY

For those readers not familiar with French archaeological terminology, and especially the literature for North Africa, the following glossary of terms may prove useful.

abri	A rockshelter. Thus, *sous abri* refers to those deposits within the shelter as opposed to those outside it.
couche	The buried archaeological deposit in a site which also has material on the surface.
inférieur	Literally "lower," and used to distinguish major stratigraphic divisions within a site (may be abbreviated as *inf.*).
rive gauche	Literally "left bank." Used, in the case of Ouchtata, to distinguish one area of the site from others.
supérieur	Literally "upper," and used in stratigraphic distinctions (may be abbreviated as *sup.*).
terrasse	Literally "terrace" and used, as with *rive gauche*, to distinguish an area within a site (may be abbreviated as *terr.*).
tranchée	A trench. Thus, *grande tranchée* is the large trench.
typique	Refers to the Typical Capsian and used in those sites where both Typical and Upper Capsian occurs to distinguish the assemblage being discussed.

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