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The Late Upper Paleolithic in Italy: An Overview

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Previous studies of the Italian late Upper Paleolithic, or "Epigravettian," have been primarily chronostratigraphic and typological. Only recently has attention been paid to environmental and behavioral data. The Epigravettian covers some 10,000 years, from about 20,000 B.P. (beginning of the last Wurm stadial) to about 10,000 B.P. (end of Dryas III and beginning of the Holocene). Traditionally, it has been divided into three phases: Early (20,000–16,000 B.P.), Evolved (16,000–14,000 B.P.), and Final (14,000–10,000 B.P.). The Evolved and Final Epigravettian have five regional facies: northern Tyrrhenian, central and southern Tyrrhenian, northern and central Adriatic, southern Adriatic and Sicilian. After an extensive summary of the available environmental data and traditional artifact analyses, we illustrate the present status of more behaviorally oriented research and discusss the consistency of the subdivisions in space and time. Suggestions are made of possible directions for future research.

KEY WORDS: Italy; Epigravettian; Upper Paleolithic; behavioral analysis; chronotypology.

INTRODUCTION

The Italian Upper Paleolithic is traditionally subdivided into cultures, or archaeological facies, which parallel the subdivisions of the classic French sequence. Thus, the Uluzzian (ca. 35,000–30,000 B.P.) corresponds to the French Châtelperronian, while the Aurignacian and Gravettian are more or less parallel to the French Aurignacian and Perigordian (although with no evidence of interstratification in Italy). The late Upper Paleolithic, or Epigravettian, is subdivided into Early, Evolved, and Final phases (following Laplace, 1964b), which reflect the French Solutrean, Magdalenian, and Azilian.

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This parallelism has a historical basis. The first work on the Italian Upper Paleolithic was done by French scholars (Boule *et al.*, 1906–1919; Cartailhac, 1907; Rivière, 1887; de Mortillet, 1891). At this time, the leading Italian authority firmly believed that there was no culture in Italy between the Mousterian and the Neolithic (Pigorini, 1886), and it was some years before Mochi's ideas to the contrary (1911) came to be widely accepted. Nevertheless, the first major synthesis of the Italian Upper Paleolithic in this century was still written by a French scientist (Vaufrey, 1928). Vaufrey classified the industries as "Grimaldian" but observed that the material from Sicily was very different and suggested that it might be derived from North Africa.

After the discovery of "true" Aurignacian complexes in Italy (Blanc, 1938), use of the term Grimaldian for the entire peninsula became increasingly untenable. Following Blanc's (1928) work at Grotta Romanelli, Sauter (another French scientist!) introduced the term "Romanellian" for the late Upper Paleolithic (Sauter, 1948) and applied it also to contemporaneous industries in the French Mediterranean. Graziosi (1951) and Leonardi (1951) used "Gravettian" to refer to all the Italian post-Aurignacian industries characterized by numerous backed points and backed blades; this term was later used by Cardini (1962) in a general review of the Italian Paleolithic. Radmilli (1954) used "Romanellian" extensively but also introduced the term "Bertonian" for some assemblages in Abruzzo.

The terminology of the Italian Upper Paleolithic was, thus, confused at the beginning of the 1960s when Laplace, another French scientist, reclassified it, using "analytical typology." He divided it into the *synthétotype* (corresponding to the French Châtelperronian), Aurignacian, Gravettian, and Tardigravettian (the late Upper Paleolithic), which he further subdivided into Early, Evolved, and Final (Laplace, 1964a, b, 1966). The Early Tardigravettian was further subdivided into three levels (*niveaux*): with unifacial foliate points (*pointes à face plane*), with bifacial foliates, and with shouldered (*à cran*) tools. Shouldered pieces are more frequent on the Adriatic coast and in Sicily than on the Tyrrhenian coast. These three levels correspond exactly to the classic division of the French Solutrean, although the bifacial foliates in Level 2 are represented by only one specimen from one site [Trene, in Veneto (Leonardi *et al.*, 1958–1959)]. Laplace divided the Evolved and Final Tardigravettian into several regional facies: Liguria, Veneto, Tuscany, Abruzzi, Latium, Apulia, and Sicily.

The most striking feature of this classification is that it is based purely on typology (taking into account, one hopes, the stratigraphy of the various sites), with no reference to environmental parameters or absolute dates: it is a classic example of a traditional chronotypological approach. Further, no technological or metric aspects of the artifacts were considered: notches on blades, bladelets, and flakes are lumped together, as are backed blades, backed bladelets, gravettes, and microgravettes.

More than 10 years later, the classification of Broglio and Palma di Cesnola (by Bartolomei *et al.*, 1979) fell within essentially the same paradigm, although more sites had been excavated and absolute dates were available. Their major change was to use "Epigravettian" instead of Tardigravettian; Broglio argued that "Tardigravettian" implies typological continuity from the Gravettian, thus denying the autonomous evolution of post-Gravettian industries (Broglio, 1969, p. 138). To me, this is a statement of one of the pillars of the chronotypological paradigm: cultures (meaning lithic industries) must evolve through time, so that they can be sliced into phases and subphases, and the "slices" should be temporally as thin as possible.

There was also a minor change in chronology. Laplace gave no specific indication of age, while Bartolomei and others (1979) placed the onset of the Early Epigravettian at about 20,000 B.P., of the Evolved Epigravettian at about 16,000 B.P., while the Final Epigravettian was about 14,000–10,000 B.P. However, some sites are radiocarbon dated to the Holocene but fall within the Final Epigravettian on the basis of lithic industry. The Early Epigravettian was still regarded as a unit throughout Italy, but only two levels were defined, one with foliates (Laplace's first and second levels) and one with shouldered tools. Two sequential phases of the Evolved Epigravettian were identified throughout Italy (Bartolomei *et al.*, 1979, p. 313), while the Final Epigravettian was divided into five regional facies: northern Tyrrhenian (Liguria and Tuscany), middle and southern Tyrrhenian (Latium, Campania and Calabria), northern and middle Adriatic (Veneto, Marche, Abruzzi and northern Apulia), southern Adriatic and Ionian (the Salento peninsula), and Sicilian. The characteristics of these facies were essentially the same as in Laplace's scheme.

The classification was, again, based only on lithic typology and no real attention was paid to behavioral data, although Bartolomei wrote an entire section devoted to environmental data (Bartolomei *et al.*, 1979).

The most recent classification (Palma di Cesnola, 1983a) is of the same kind and is discussed in more detail below. The only noteworthy changes are the introduction of an initial Early Epigravettian and a common subdivision into regional facies for the Evolved and Final Epigravettian.

I emphasize that, for some of the papers with multiple authors referred to below, the different authors are responsible for different sections, particularly in the case of Bartolomei and others (1979), Bietti and others (1983b), Palma di Cesnola and Bietti (1983), Palma di Cesnola and others (1983), and Segre and Vigliardi (1983).

THE DATA

Principal Sites and Their Absolute Chronology

Figure 1 shows the distribution of the main Epigravettian sites in Italy (modified from Palma di Cesnola, 1983a). Purely Gravettian sites have been omitted, as have chronologically or typologically Mesolithic sites, such as the Holocene sites in the Adige valley, near Trento. Many surface finds have been omitted, because they are chronologically unreliable, and sites such as Cavernette Falische (Rellini, 1920; Barra Incardona, 1969; Mussi and Zampetti, 1985), Valle Ottara in northern Latium (Acanfora, 1962–1963), and Tane del Diavolo in Umbria (Calzoni, 1933) have been excluded because they are stratigraphically suspect.

The distribution of sites is uneven, with large empty spaces in the Piemonte and Lombardy, the Po valley in northern Italy, most of the interior of southern Italy, and Calabria; the Tyrrhenian coast has many sites, while most of the Adriatic coast is empty. This distribution reflects the geographical situation and, also, the extent of detailed systematic surveys.

In northern Italy, there are no Upper Paleolithic sites in the entire Po valley, comprising Piemonte, Lombardy, Emilia, and the lower Veneto (Fig. 1), for geological reasons: the plain was covered by a thick colluvial deposit after the melting of the Alpine (and some Apennine) ice at the end of Dryas III. Human occupation of the Alps, in Piemonte and Lombardy, seems to begin with the Holocene Mesolithic. However, the lack of Upper Paleolithic even for the late Dryas III, when a substantial regression of the mountain ice cap had already begun, may be due simply to a lack of detailed surveys in the area.

This is not the case in Veneto, where systematic surveys have been conducted for several years and there are many sites, including the Alpine regions (Fig. 1). The earliest sites are Trene and La Paina in the Berici mountains, south of Vicenza. These are low hills [< 500 m above sea level (asl)], so occupation was possible throughout the Last Glaciation. However, no Upper Paleolithic sites are known in the nearby Colli Euganei, which reach a maximum of ca. 600 m asl.

Riparo Tagliente (Fig. 1), an important site described below, is in a valley in the Lessini mountains, which, at about 2000 m asl, form a prealpine group. There are several sites at considerable altitude: Riparo Battaglia at 1050 m, I Fiorentini at about 1500 m, and farther north near Trento, Terlago, Andalo, and Le Viotte di Bondone—the last site is at 1570 m asl (Fig. 1). We have no absolute dates for these sites, but they are typologically assigned to the very final Epigravettian (Bisi *et al.*, 1983), which accords with their geographical position. To the northeast, in the Carnian Alps, are the sites of

Fig. 1. Italian Epigravettian sites. 1, Grotte des Enfants; 2, Riparo Mochi; 3, Arma dello Stefanin, Arma di Nasino; 4, Arene Candide; 5, Andalo; 6, Le Viotte di Bondone; 7, Grotte Verdi di Pradis; 8, Piancavallo; 9, Terlago; 10, Riparo Battaglia; 11, I Fiorentini; 12, Riparo Tagliente; 13, Trene; 14, La Paina; 15, Isola Santa; 16, Le Campane; 17, Poggio alla Malva; 18, Ponte di Pietra; 19, Grotta del Prete; 20, Grotta della Ferrovia; 21, Aia al Colle; 22, Riparo Biedano; 23, Cenciano Diruto; 24, Riparo Maurizio, Grotta C. Tronci; 25, Grotta La Punta, Grotta di C. Felice, Grotta d'Ortucchio, Grotta Maritza; 26, Grotta Polesini; 27, Palidoro; 28, Solforata; 29, Peschio Ranaro; 30, Grotta A. Graziani; 31, Grotta Paglicci; 32, Grotta Jolanda, 33, S. Vito, Molella; 34, Riparo Salvini; 35, Grotta S. Croce; 36, Grotta Erica, Grotta del Mezzogiorno; 37, Grotta delle Mura; 38, Cala della Ossa; 39, Grotta de La Cala; 40, Grotta della Madonna (Praia a Mare); 41, Grotta del Romito; 42, Grotta Romanelli; 43, Grotta del Cavallo, Grotta d'Uluzzo, Grotta C. Cosma; 44, Parabita; 45, Grotta Zinzulusa; 46, Le Cipolliane; 47, Taurisano; 48, Fondo Focone (Ugento); 49, Grotta delle Prazziche; 50, Levanzo; 51, Mangiapane; 52, Grotta dell'Uzzo; 53, Niscemi; 54, Mazzamuto; 55, Riparo del Castello (Termini Imerese); 56, Grotta di S. Teodoro; 57, Grotta dell'Acqua Fitusa; 58, San Corrado; 59, Grotta Giovanna; 60, Canicattini Bagni.

Piancavallo (ca. 1300 m) and Grotte Verdi di Pradis (ca. 600 m), both characterized by Final Epigravettian industries, although the latter site is dated to Allerød (Fig. 2, No. 13). It is likely that the alpine regions were occupied from Allerød onward. Numerous Mesolithic surface sites, dating from the Preboreal to the Atlantic, show continued occupation of the mountains up to 2000 m and above.

The Adriatic coast between the Po and Trieste is also empty (Fig. 1), probably because the Adriatic, as far north as about Ancona, was dry during the Last Glaciation. Important coastal sites on the northern Adriatic, such as the caves near Trieste, are Mesolithic.

In contrast, all the major Upper Paleolithic sites in Liguria are coastal; the glacial seashore, was only about 1 km beyond the modern one. In spite of recent systematic surveys (R. Maggi, personal communication), there are no Upper Paleolithic sites known in the mountains behind the coast, although they are only 1500–1800 m asl. The sites known in interior Liguria, Arma dello Stefanin and Arma di Nasino (Fig. 1), are in a narrow valley at about 500 m and date to the Holocene, although they are typologically Final Epigravettian (Fig. 2). It is curious that there are no Upper Paleolithic sites in eastern Liguria, although this was the source of a red jasper commonly found in sites in Western Liguria (R. Maggi, personal communication). There are several Mesolithic sites in the eastern Ligurian mountains.

The lack of Upper Paleolithic sites in the hills of Emilia (lowland sites are presumably beneath the recent colluvium in the Po plain) may reflect both a lack of systematic surveys and the altitude of the Apennine ridge between here and Tuscany—up to 2120 m (M. Cusna) and 2165 m (M. Cimone). A late Mesolithic occupation has been reported in these Apennines, like that of eastern Liguria.

Isola Santa and Grotta delle Campane in northern Tuscany (Fig. 1) are in valleys in the Apuane mountains (whose maximum altitude is 1945 m) and are assigned to a late phase of the Final Epigravettian. Central and southern Tuscany has a series of low mountains, generally below 900 m, which have yielded several Epigravettian surface finds, of which the most important are Poggio alla Malva and Aia al Colle (Fig. 1).

In the region of Marche to the east, the sites of Ponte di Pietra, Grotta del Prete, and Grotta della Ferrovia are, again, in the interior hills. The absence of coastal sites may probably be explained by the rise of the Adriatic, which would have drowned them.

The same might explain the lack of coastal sites in Abruzzo, but they are more probably buried under the thick colluvia of the Pleistocene–Holocene transition, when the Apennine ice cap melted. Apart from some surface finds and the site of Grotta Graziani (Fig. 1), most Epigravettian sites are in the Fucino basin (Fig. 1), a former lake at about 650 m asl encircled

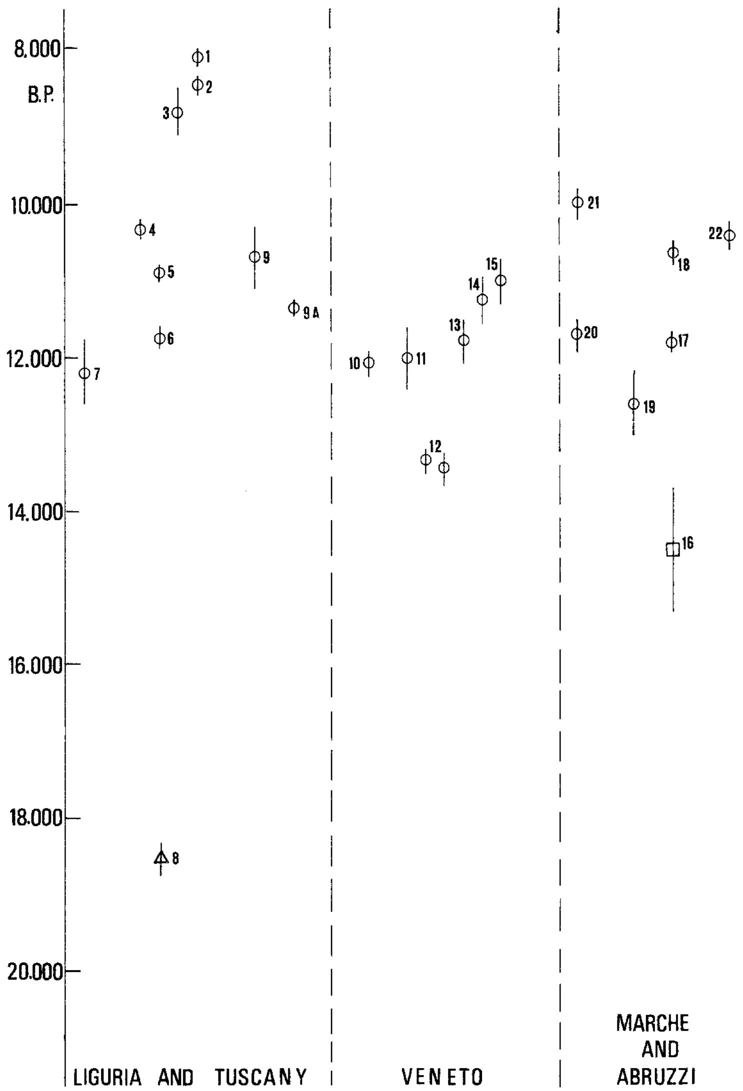


Fig. 2. Radiocarbon dates for the northern Tyrrhenian region and for the northern and central Adriatic. Laboratories: F, Florence; MC, Monaco; Pi, Pisa; R, Rome. 1, Arma dello Stefanin Va (R-126); 2, Arma dello Stefanin Vb (R-148); 3, Arma dello Stefanin IV (R-145); 4, Arene Candide "Mesolitico" (R-100); Arene Candide "Mesolitico" 1–2 (R-740α); 6, Arene Candide "Mesolitico" 3–4 (R-743α); 7, Enfants B (MC-402); 8, Arene Candide "Paleolitico" 1 (R-745); 9, Isola Santa 5 (R-1524); 9A, Vado all'Arancio 11 (R-1333); 10, Rip. Tagliente 8–10 (R-371); 11, Rip. Tagliente 14 (R-604); 12, Rip. Tagliente 15–16 (R-605 and R-605α); 13, Grotte Verdi di Pradis II, A-2 (F-84); 14, G. Verdi di Pradis IV, 1b (F-85); 15, G. Verdi di Pradis IV, 1 (F-86); 16, Grotta La Punta 39 (Pi-152); 17, G. La Punta 27–31 (R-1272); 18, G. La Punta 25 (Pi-153); 19, Grotta d'Ortucchio 11 (Pi-23); 20, Grotta della Ferrovia 2–4 (R-1005); 21, Grotta del Prete G-6 (R-645); 22, Grotta Maritza 30–39 (R-1270 and R-1271). Triangles, Early Epigravettian; squares, Evolved Epigravettian; circles, Final Epigravettian and Mesolithic.

by mountains at > 2000 m. Occupation of the basin was made possible, even during the Last Glaciation, by a favorable microclimate due to the presence of the lake.

Umbria is separated from Abruzzo and Marche by the Sibillini mountains. Apart from Tane del Diavolo, the Epigravettian of this region is poorly known because there have been no systematic surveys.

The Epigravettian is fairly well known in Latium, from both surface finds and caves. In Viterbo, in the north, there are several sites (Cavernette Falische, Riparo Biedano, and Cenciano Diruto; Fig. 1) in small canyons eroded in the volcanic tuff of the Monti Cimini. Palidoro, closer to the Tyrrhenian coast, is a rock-shelter in a travertine cliff. Throughout southern coastal Latium, there are surface finds on the Late Pleistocene sand dunes (Fig. 1, Nos. 28, 33). The important site of Grotta Polesini is at the foot of the Tiburtini mountains, about 30 km east of Rome.

In southern Latium are two mountain ridges more or less parallel to sea coast, the Simbruini system on the border with Abruzzo and the "preapennine" chain of the Lepini, Ausoni, and Aurunci, rising to about 1500 m asl. At the foot of the Lepini and Ausoni groups are Grotta Jolanda and Riparo Salvini, not far from the surface sites of S. Vito and Molella (Fig. 1). The preapennine group is separated from the Simbruini mountains by the Sacco-Liri valley. Peschio Ranaro, dating to the beginning of the Preboreal (Fig. 3), is at about 600 m asl, at the foot of the Simbruini mountains.

In Campania, the only known Epigravettian sites are on the coast, between Naples and Salerno (Grotta Erica and Grotta del Mezzogiorno) and farther south (Cala delle Ossa and Grotta della Cala), almost at the border with Calabria. Even though these sites are backed by quite high mountains (1443 m for Grotta Erica and Grotta del Mezzogiorno, 1255 and 1898 m for Grotta della Cala), the Volturno, Sele, and Calore valleys form extensive interior lowlands; the absence of Epigravettian there probably reflects the lack of systematic surveys.

Only two Epigravettian sites are known in Calabria: Grotta della Madonna, on the coast, and Grotta del Romito in the interior at about 200 m asl (Fig. 1). High mountains (up to ca. 2000 m) separate the Tyrrhenian and Ionian coasts in Calabria, but it is still strange that no Upper Paleolithic sites have been recorded on the Ionian coast.

Molise and Lucania have not been surveyed and no Epigravettian sites are known.

The situation is different in Apulia. In the north is the well-known site of Grotta Paglicci, followed by sites on the Adriatic coast, such as Grotta S. Croce and Grotta delle Mura, and then a cluster of sites in the Salento area of the Adriatic coast, the Ionian coast, and in the interior (Fig. 1). The region is generally flat, but still no Upper Paleolithic is known in interior northern and middle Apulia; this may be due simply to the lack of field surveys.

The Upper Paleolithic cultures of Sicily are clearly derived from the peninsula; the Messina strait is only about 3 km wide. Nevertheless, they differ from contemporary industries in Calabria and Apulia. The main sites are on the coast, except for Grotta dell'Acqua Fitusa, S. Corrado and Canicattini Bagni (Fig. 1); the last two are not far from the Ionian sea. The highest mountains in Sicily are the Madonie (up to 1912 m) and Nebrodi (up to 1847 m) in the north, backing onto the Tyrrhenian coast where Riparo del Castello is (Fig. 1), and Mount Etna in the east (3323 m), several kilometers north of the Ionian coastal sites (Fig. 1). The site of Cala Genovesi on the island of Levanzo (Fig. 1) shows that the Egadi islands were connected to Sicily during Würm IV.

Figures 2–4 summarize the available absolute dates; most of the sites in Fig. 1 are undated. The attribution of sites to the Early, Evolved, and Final Phases of the Epigravettian is based only on typology.

Figures 2–4 include some dates, which are outside the period considered here, to indicate the lower and upper limits of the Epigravettian as traditionally classified. Since Palma di Cesnola (Palma di Cesnola and Bietti, 1983) defines Layer 18a of Grotta Paglicci as initial Early Epigravettian, the dates for the Final Gravettian of Layer 18b are used as a lower limit. The Uzzo date (Fig. 4) is used as an upper limit, since we have here a real "beginning" of a local Mesolithic (Piperno *et al.*, 1980). However, elsewhere [such as Arma dello Stefanin (Fig. 2) or Peschio Ranaro (Fig. 3)] there are Final Epigravettian industries dated to the Holocene. As I have discussed elsewhere (Bietti, 1980b), such sites should be considered as broadly Mesolithic: the persistence of Epigravettian traits might reflect only a specialized (perhaps seasonal) hunting practice continued after the Pleistocene. We must also remember that there are many possible sources of error in radiocarbon dates (a favorite assertion of traditional archaeologists!).

Environment: Climatic Conditions, Vegetation, and Fauna

Environmental analyses, especially microstratigraphic, sedimentological, and palaeobotanical, are rare in the Italian Paleolithic.

The period under study, Würm IV, is usually seen in the French Mediterranean zone as a sequence of colder and warmer oscillations (Bintz *et al.*, 1974; Renault-Miskowsky, 1983): the warmer Laugerie (around 20,000 B.P.); followed by the colder Dryas Ia?; then the more temperate Lascaux (around 17,000 B.P.); the cold Dryas Ib; one or two more temperate phases—Angles sur Anglin and Prebølling (around 15,000 B.P.); the cold Dryas Ic; the warm Bølling (around 13,000 B.P.); the cold Dryas II (around 12,500–12,000 B.P.); the warmer Allerød (the last temperate oscillation of the Pleistocene) ending

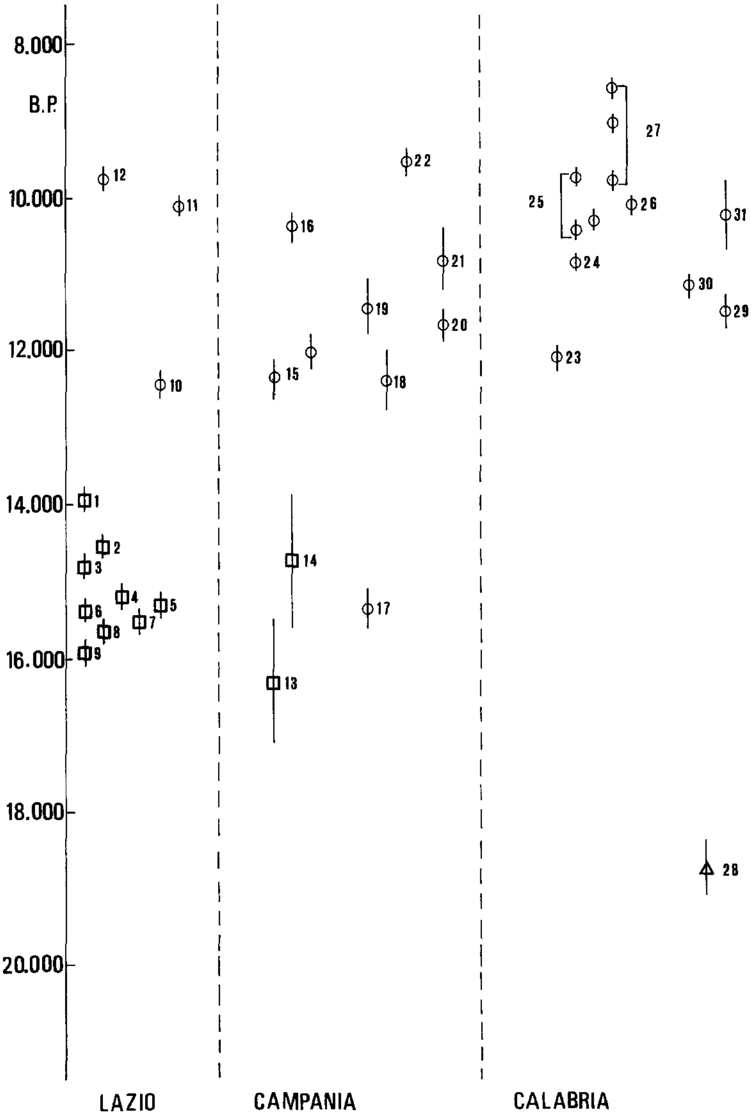


Fig. 3. Radiocarbon dates for the central and southern Tyrrhenian region. Laboratories: F, Florence; R, Rome. 1, Palidoro 1 (R-944a); 2, Palidoro 1 (R-944); 3, Palidoro 2 (R-1066); 4, Palidoro 3 (R-1067); 5, Palidoro 4 (R-945); 6, Palidoro 5 (R-946); 7, Palidoro 8 (R-949); 8, Palidoro 6 (R-947); 9, Palidoro 7 (R-948); 10, Salvini B1, 11–12 (R-1561/A); 11, Grotta Polesini 7 (R-1265); 12, Peschio Ranaro (R-681); 13, Grotta della Cala N (F-113); 14, G. della Cala M (F-112); 15, G. della Cala H (F-110, F-111, and F-21); 16, G. della Cala F (F-109); 17, Grotta Erica C, B, 2 (F-37); 18, G. Erica C, C, 4 (F-40); 19, G. Erica C, B, 3–4 (F-38 and F-39); 20, Nicchia Gamba (F-25); 21, Mezzogiorno 11 (F-35); 22, Mezzogiorno 12 (F-36); 23, Grotta della Madonna 71–72 (R-293); 24, G. della Madonna 64–65 (R-292); 25, G. della Madonna 54–55 (R-289, R-290, and R-291); 26, G. della Madonna 57–58 (R-186); 27, G. della Madonna 49–50 (R-286, R-287, R-288, and R-288A); 28, Grotta del Romito 34 (R-297); 29, G. del Romito 6a (R-300); 30, G. del Romito 7 (R-299); 31, G. del Romito 5 (R-298). Triangles, Early Epigravettian; squares, Evolved Epigravettian; circles, Final Epigravettian and Mesolithic.

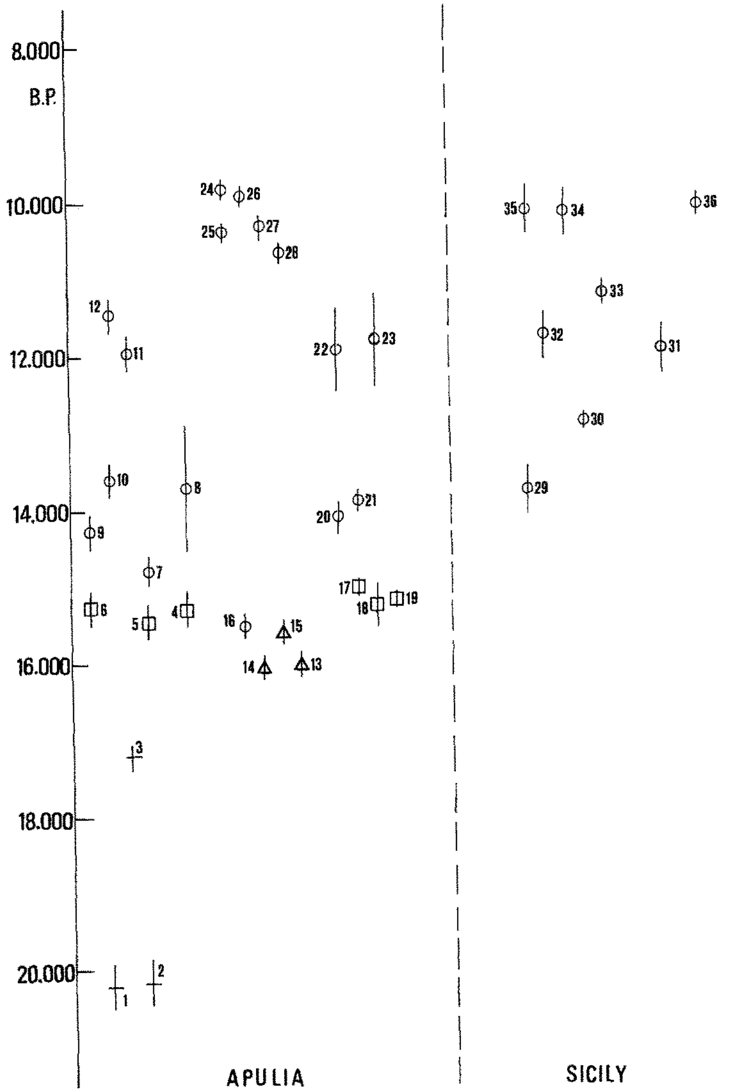


Fig. 4. Radiocarbon dates for Apulia and Sicily. Laboratories: F, Florence; GrN, Groningen: Ly, Lyon; P, Pennsylvania; R, Rome. 1, Paglicci 18b2 (F-44); 2, Paglicci 18b3 (F-45); 3, Paglicci 18b2 (R-1324); 4, Paglicci 10 (F-68); 5, Paglicci 8 (F-66); 6, Paglicci 9 (F-67); 7, Paglicci 7 (F-65); 8, Paglicci 7c (Ly-1628); 9, Paglicci 6 (F-64); 10, Paglicci 5, b, c (F-96); 11, Paglicci 4, a, c (F-95); 12, Paglicci 3, a (F-94); 13, Taurisano 18–22 (R-1064); 14, Taurisano 6–9 (R-1062); 15, Taurisano 10–12 (R-1063); 16, Taurisano 4–5 (R-1061); 17, Cipolliane C3, 1–2 (R-353); 18, Cipolliane C3, 3 (R-355); 19, Cipolliane C3, 6–7 (R-356); 20, Fondo Focone (Pozzo Zecca) 1–2 (R-271); 21, F. Focone (P. Zecca) 3–4; 22, Grotta Romanelli B (R-56); 23, G. Romanelli A (R-58); 24, G. Romanelli C (GrN-2154); 25, G. Romanelli C (GrN-2153); 26, G. Romanelli A (GrN-2056); 27, G. Romanelli A (GrN-2305); 28, G. Romanelli D (GrN-2055); 29, Acqua Fitusa (F-26); 30, Grotta Giovanna (R-484); 31, Grotta Perciata (F-27); 32, Levanzo 6A (F-19); 33, Levanzo 5–6 (R-566); 34, Levanzo 5A (F-18); 35, Levanzo 6 (F-20); 36, Grotta dell'Uzzo G-9 (P-2736). Dashes, Final Gravettian; triangles, Early Epigravettian; squares, Evolved Epigravettian; circles, Final Epigravettian and Mesolithic.

about 10,800 B.P.; the cold Dryas III; and finally, the Preboreal period of the Holocene, around 10,000 B.P.

This scheme holds for Mediterranean France but is difficult to transfer to Italy, where the geographic variability described above resulted in peculiar microenvironments and local climatic variations. We, however, examine how (and whether) the Italian data fit this scheme.

Tables I and II summarize the paleobotanical and sedimentological data for Italian Epigravettian sites; here, as with the absolute dates, the absence of information indicates that there have been no analyses. Tables III–VII present the faunal data; a lack of information on particular species may mean that those species were not found in the site (such as molluscs at Grotta Paglicci). The following is a commentary upon the data given in the tables.

Arene Candide has one of the most complete stratigraphies in northern Italy, from the Würm IV to recent (Fig. 5A). ["M" and "P" in Tables I and

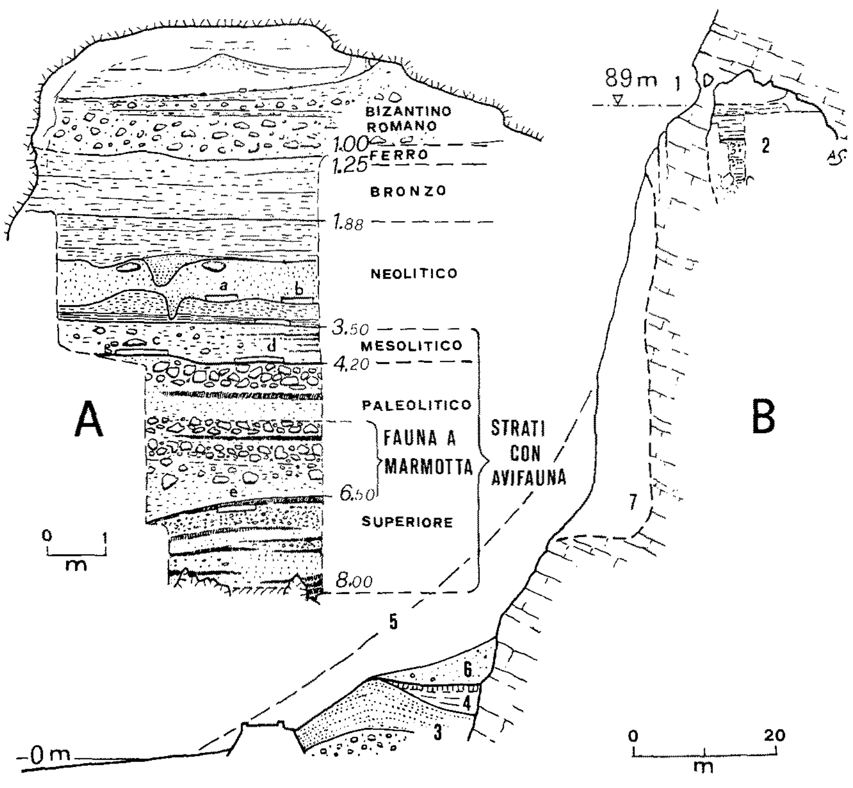


Fig. 5. Arene Candide. (A) Stratigraphy with the position of the burials (a–e). (B) Cross section from the cave to the sea. 1, raised bench; 2, cave deposit; 3 and 4, marine gravels and sands; 5, dune destroyed by the quarry (7); 6, redeposited sand (from Cassoli, 1980).

Table I. Summary of Paleobotanical and Sedimentological Data for the Epigravettian of Northern Italy (Absolute Dates are B.P.)

Site	Sediments	Palaeobotany	Absolute dates	Attribution	Reference(s)
Arene Candide (Liguria) M 1–2	—	Charcoals: *Pinus sylv.*, 25%; *Acer*, 66%; *Quercus robur*, 9%	10,910 ± 90	Allerød—Dryas III	Cardini (1946, 1955, 1980), Fancelli-Galletti (1972), Bietti (1987)
M 2–3	—		11,750 ± 95	Allerød	
P 1	—	—	18,560 ± 210	Laugerie?	
A. Stefanin (Liguria) V–IV	—	Charcoals: *Pinus*, *Picea*, *Quercus*	From 8800 ± 300 to 8100 ± 90	Holocene (Boreal)	Leale Anfossi (1972), Bartolomei *et al.* (1979)
Arma Nasino (Liguria) XIII–XI	—	Charcoals: *Pinus sylv.*, *Quercus*, *Corylus*	—	Holocene?	Bartolomei *et al.* (1979)
Paina (Veneto) G. Azzurra		Steppe-like climate: for both layer 6 and layer 5 the pollens of nonarboreal species are almost exclusive			
layer 6	Soil of loess type with dominance of silt		—	Dryas I?	Bartolomei *et al.* (1988)
layer 5	More termoclastic activity with sand and clay		—	Dryas I?	
Castellaro core (Veneto)	—	Pollens of *Quercus*, *Ephedra*, *Alnus*, *Pinus cembra*	13,200 ± 120	Bølling	Bertoldi (1968), Bartolomei *et al.* (1979)
Riparo Tagliente (Veneto) 1. 16-15	—	Pollens of *Artemisia*, *Pinus sylv.*, *Salix*	About 13,400	Dryas I?	Cattani (1976), Bartolomei *et al.* (1979, 1982)
layers 10d-4	—	More arboreal: *Ostrya*, *Quercus*, *Corylus*	12,040 ± 70 (1. 10-8)	Allerød	

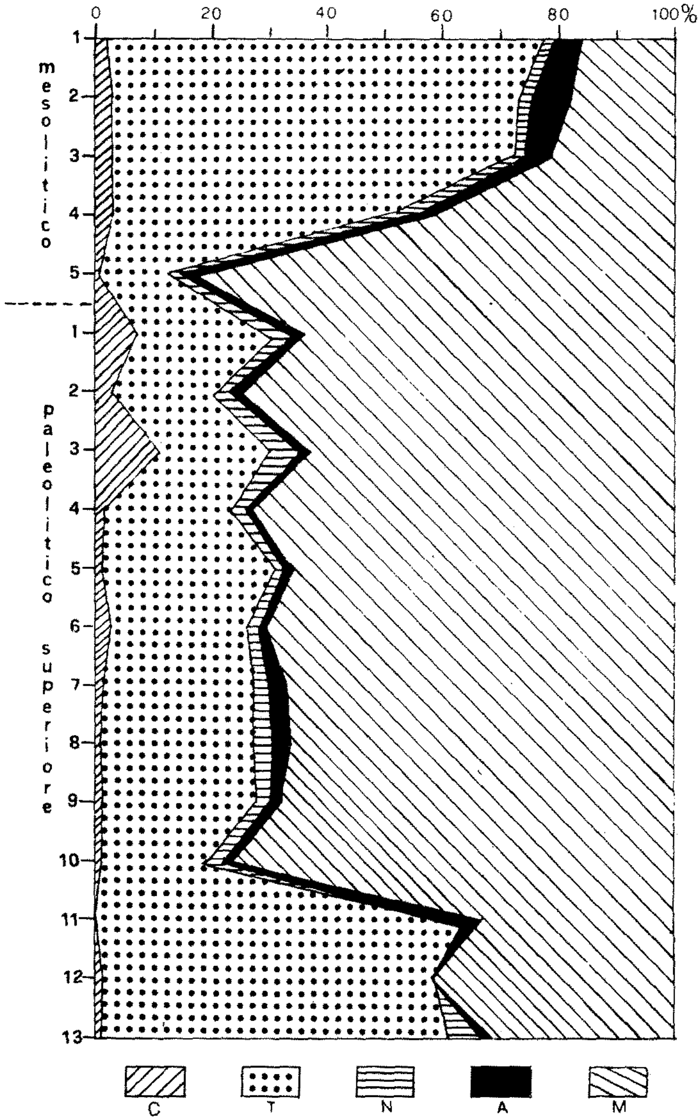


Fig. 6. Arene Candide, frequency diagram of bird species divided into ecological groups. C, warm species; T, temperate; N, nordic; A, arctic; M, mountain (from Cassoli, 1980).

III stand for "Mesolitico" and "Paleolitico" in Fig. 5A, following Cardini's (1946) now outdated terminology.] Figure 6 shows that the distribution of the bird species in the sequence corresponds well to the climatic oscillations of Würm IV, although the dates suggest a hiatus between the P and the M series.

Table II. Summary of Paleobotanical and Sedimentological Data for the Epigravettian of Central and Southern Italy

Site	Sediments	Palaeobotany	Absolute dates	Attribution	Reference(s)
Fucino lake core (Abruzzi)	—	Uprise of pollens of arboreal species vs the nonarboreal.	About 13,000	Bølling?	Follieri *et al.* (1986)
Castiglione core (Latium)	—	Large dominance of nonarboreal species	About 14,200	Dryas Ic?	Follieri *et al.* (1986)
Mezzaluna core (Latium)	Dark clayey peat with macroplant remains throughout all the four samples	All the four samples are related with a maximum of the arboreal component The steppe component is less important			
7.70 m			15,850 ± 500	Angles?	Eisner *et al.* (1986)
6.70 m			13,080 ± 200	Bølling	
6.20 m			11,590 ± 220	Allerød	
4.70 m			9860 ± 130	Dryas III–Preboreal	
Palidoro (Latium) layer B	Lithologic diagram (Fig. 10) shows a temperate oscillation	—	From 15,900 ± 150 to 13,950 ± 100	Angles sur Anglin or Prebølling	Palmieri (1976–1977); Bietti (1976–1977)
Rip. Salvini (Latium) 1. D	Similar percentage of sand, silt, and clay with "plaquettes"	Pollens: dominance of *Phagus*, *Artemisia*, *Quercus*	12,400 ± 170	Dryas II	Bietti (1984b), Lentini (1987)
Cipolliane C shelter (Apulia) layer 3	Granulometric analysis shows a temperate oscillation	—	From 15,270 ± 270 to 15,000 ± 100	Angles sur Anglin or Prebølling	Gambassini (1970)
Grotta Romanelli (Apulia) 1. E	Lenses of eolic sands through all the deposit	Charcoals: *Juniperus*, *Fraxinus ornus*, *Quercus*, *Pinus sylv.*,		Allerød	Blanc (1920); Follieri (1969)
layers D–C		*Fraxinus excelsior*, *Ephedra*	From 10,640 ± 100 to 9790 ± 80	Dryas III	Cassoli *et al.* (1979)
layers B–A		*Populus*, *Fraxinus ornus*	From 10,320 ± 130 to 9880 ± 100	End of Dryas III	
S. Teodoro (Sicily)	—	Charcoals: *Quercus*, *Pirus malus*, *Rhamnus saxatilis*	—	Allerød	Lona (1949), Segre and Vigliardi (1983)

Table III. Summary of Faunal Data for the Epigravettian of Liguria

Site	Mammals and birds	Mollusks	Absolute dates	Attribution	Reference(s)
Grotte des Enfants, layer F	Reindeer, horse	—	—	—	Palma di Cesnola (1979, 1983b)
layers E–B	Red and roe deer, boar	—	12,200 ± 400 (layer B)	Dryas II?	
Arene Candide layers P13–P10	Ibex, red deer, dominance of temperate bird species	—	—	?	See Table I and Cassoli (1980)
layers P9–P5	Presence of Mammoth and elk, dominance of mountain bird species	—	—	?	
layers P4–P1	Growth in warm bird species (see Fig. 6)	—	18,560 ± 210 (layer P1)	Laugerie?	
layer M5	Red deer, elk, dominance of mountain bird species	—	—	Dryas II?	
layers M4–M3	Red and roe deer, boar and raise of temperate birds	*Monodonta*, *Patella*	11,750 ± 95	Allerød	
layers M2–M1	Moderate growth of arctic bird species	*Monodonta*, *Patella*	10,910 ± 90	Allerød–Dryas III	
Arma Stefanin layers V–IV	Ibex, red deer, *Marmota marmota*, *Must. nivalis*	— —	From 8800 ± 300 to 8100 ± 90	Holocene (Boreal)	See Table I
Arma Nasino layers XIII–XI	Ibex, roe deer, boar, *Marmota marmota*	—	—	Holocene?	See Table I

Table IV. Summary of Faunal Data for the Epigravettian of Veneto, Marche, and Abruzzo

Site	Mammals and birds	Mollusks	Absolute dates	Attribution	Reference(s)
Trene	*Microtus nivalis*	—	—	Laugerie?	Leonardi *et al.* (1958–1959)
Paina, old excavations	Cave bear, elk, ibex, red deer, *Marmota marmota*	—	—	Laugerie or Lascaux?	Leonardi *et al.* (1962), Bartolomei *et al.* (1979)
Paina, Gr. Azzurra	Cave bear and elk are dominant	—	—	Dryas I?	See Table I
Rip. Tagliente[a] layers 17–15	Ibex, aurochs and bison, elk, red deer, and roe deer	—	About 13,400	Dryas I?	Sala (1983)
1. 14–13	Raise of the elk, presence of *Microtus nivalis*	—	12,000 ± 400	Dryas II	Sala (1983), Bartolomei *et al.* (1979)
1. 12–11	Elk, aurochs and bison, ibex, chamois, red deer	—	—	Dryas II	Sala (1983), Bartolomei *et al.* (1979)
1. 10–4	Red deer, roe deer, chamois, boar, aurochs, ibex, elk	—	12,040 ± 70 (1. 10–8)	Allerød	Sala (1983), Bartolomei *et al.* (1979)
1. 3–1	Red deer, boar, roe deer	—	—	Allerød	Sala (1983), Bartolomei *et al.* (1979)
Gr. Verdi di Pradis IV–II	*Microtus nivalis*, *Sorex alpinus*, *Marmota marmota*	—	From 11,770 ± 260 to 10,970 ± 290	Allerød	Bartolomei *et al.* (1979)
Gr. della Ferrovia layers 4–3	*Apodemus sylvaticus*, *Glis*, *Eliomys*	—	11,700 ± 200 (1. 3–2)	Allerød	Bartolomei (1966), Lollini (1966)
Fucino basin lower caves	*Equidae*, red deer, aurochs, ibex, chamois, boar, and *Marmota marmota*	—	—	—	Cremonesi (1968), Radmilli (1977), Bartolomei *et al.* (1979)
Upper caves (La Punta, Ortucchio, Maritza)	Horse, ibex, chamois, red deer, boar, roe deer, many aquatic bird species and fish	—	12,615 ± 410 (Ortucchio) 11,800 ± 100 (La Punta I. 27–31) About 10,500 (La Punta 25, Maritza 39–30)	Dryas II Allerød Dryas III	Cremonesi (1968), Grifoni and Radmilli (1964), Bisi *et al.* (1983)

[a]Where frequencies of large mammals are available, species are listed in descending order of importance.

Table V. Summary of Faunal Data for the Epigravettian of Apulia

Site	Mammals and birds	Mollusks	Absolute dates	Attribution	Reference(s)
Gr. Paglicci[a] layer 18a	Horse, ibex, wild ass, aurochs, red deer, boar, *Microtus nivalis*, *Apodemus*	—	—	Laugerie?	Sala (1983), Bartolomei *et al.* (1979), Mezzena and Palma di Cesnola (1967), Palma di Cesnola (1975)
layers 17–15	Ibex, horse, aurochs, wild ass, red deer, boar	—	—	Dryas Ia?	
layers 14–12	Horse, ibex, aurochs, wild ass, red deer	—	—	Lascaux?	
layers 10–8b	Horse, ibex, aurochs, wild ass, boar, red deer, *Pitymys savii*, *Microtus*	—	From 15,460 ± 220 to 15,260 ± 220	Dryas Ib–Angles sur Anglin?	
layers 8a–6d	Ibex, horse, aurochs, wild ass, red deer, boar	—	From 14,820 ± 210 to 13,700 ± 800	Dryas Ic	
layers 6c–4b	Boar, red deer, aurochs, wild ass, ibex, chamois	—	13,590 ± 200 (layer 5)	Bølling	
layer 4a	Wild ass, red deer, aurochs, boar, chamois, ibex, roe deer	—	11,950 ± 190	Dryas II	
layers 3–2	Red deer, aurochs, wild ass	—	11,440 ± 180	Allerød	
Parabita 4–3[a]	Aurochs, horse, wild ass	—	—	—	Radmilli (1966), Sala (1983)
upper levels	Aurochs, red deer, boar, horse	—	—	—	
Taurisano[a] cuts 23–18	Aurochs, horse, red deer, wild ass	—	16,000 ± 150	Dryas Ib or Angles	Bietti (1979)
cuts 17–2	Horse, aurochs, red deer, wild ass	—	From 16,050 ± 160 to 15,500 ± 150		
Cipolliane C layer 3	Aurochs, red deer, horse, wild ass	—	From 15,270 ± 270 to 15,000 ± 100	Angles or Prebølling	Palma di Cesnola (1962, 1967), Gambassini (1970)
layer 2	Horse, aurochs, red deer	—	—	Dryas II?	
layer 1	Aurochs, red and roe deer, boar	*Monodonta*, *Patella*	—	Dryas III or Preboreal	

Ugento P. Zecca	Aurochs, horse, red deer, wild ass	—	From 14,170 ± 170 to 13,870 ± 110	Dryas Ic–Bølling	Cardini (1965)
G. Romanelli layer E	Wild ass, aurochs, red deer, temperate bird species	—	—	Allerød	Blanc (1920), Cassoli *et al.* (1979)
layers D–A	Wild ass, aurochs, red deer, cold bird species (*Alca impennis*)	—	From 10,640 ± 100 to 9790 ± 80	Dryas III	

[a]See Table IV, footnote *a*.

Table VI. Summary of Faunal Data for the Epigravettian of Latium and Campania

Site	Mammals and birds	Mollusks	Absolute dates	Attribution	Reference(s)
Palidoro[a] layer B c. 8–2	Red deer, wild ass, aurochs, boar, horse, *Pyrrhocorax*, *Columba*, gray patridge	—	From 15,900 ± 150 to 14,780 ± 130	Angles sur Anglin or Prebølling transition to Dryas Ic?	Cassoli (1976–1977), Bietti (1976–1977)
cut 1	Aurochs, wild ass, red deer, boar, horse, ibex (one tooth)	—	From 14,580 ± 130 to 13,950 ± 100		
Gr. Polesini[a] layer 12	Red deer, roe deer, boar, wild ass, horse, chamois, aurochs	—	—	Bølling?	Radmilli (1974), Sala (1983)
layers 11–9	Red deer, wild ass, boar, roe deer	—	—	Dryas II?	
layers 8–2	Red deer, roe deer, boar, wild ass, horse, aurochs, chamois, and ibex	—	10,090 ± 80 (layer 7)	Allerød?	Sala (1983)
layer 1	Red deer, boar, wild ass, roe deer	—	—	Dryas III?	
Rip. Salvini[a] layer D	Red deer, wild ass, roe deer, ibex, chamois, aurochs, boar, gray patridge, *Pyrrhocorax*	*Mytilus* (very rare)	12,400 ± 170	Dryas II	Bietti (1984b), Cassoli and Guadagnoli (1987)
Peschio Ranaro	Ibex, red deer, roe deer, *Mustela nivalis*, *Marmota marmota*	—	9730 ± 150	Preboreal	Biddittu (1973), Bietti (1984a)
Gr. della Cala[a] layers P–M	Red deer, boar, chamois, ibex, roe deer, aurochs	—	From 16,320 ± 850 to 14,740 ± 850	Dryas I or Angles?	Martini (1978, 1981), Sala (1983), Bartolomei *et al.* (1975)
layers I–H	Red deer, boar, roe deer, chamois, aurochs, ibex	—	From 12,350 ± 200 to 12,020 ± 210	Dryas II–Allerød?	
layers G–F	Red deer, boar, roe deer, ibex	*Monodonta*, *Patella*	10,390 ± 80	Dryas III?	
Gr. Erica l. C–B	Ibex, boar, red deer, roe deer	*Helix*, *Cerastoderma*	From 12,400 ± 400 to 11,450 ± 350	Dryas II–Allerød?	Bonuccelli (1971), Sala (1983)

Gr. del Mezzogiorno[a] 1. 24–21	Ibex, red deer, boar, roe deer	—	—	Dryas II–Allerød?	Tozzi (1975), Sala (1983)
layers 20–11	Ibex, boar, red deer	*Helix* in majority	From 10,780 ± 405 to 9530 ± 170	Dryas III–Preboreal	
layers 9–4	Ibex, boar, red deer	*Cerastoderma* in majority	From 9320 ± 180 to 7540 ± 135	Boreal–Atlantic	

[a] See Table IV, footnote *a*.

Table VII. Summary of Faunal Data for the Epigravettian of Calabria and Sicily

Site	Mammals and birds	Mollusks	Absolute dates	Attribution	Reference(s)
Gr. della Madonna c. 72–71	Red deer, ibex, roe deer	—	12,100 ± 150	Dryas II	Cardini (1970)
cuts 65–64	Red deer, ibex, roe deer, boar, many bird species	—	10,850 ± 100	Allerød–Dryas III	
cuts 58–54	Red deer, ibex, roe deer, boar, many bird species, and fish	Dominance of *Helix*	From 10,450 ± 100 to 9750 ± 100	Dryas III	
cuts 50–49	Red deer, roe deer, boar, ibex, bird species	Growth of *Monodonta*, *Patella*, *Mytilus*	From 9800 ± 140 to 8600 ± 120	Preboreal–Boreal	
Gr. dell'Acqua Fitusa layer B	Red deer, boar	—	13,760 ± 130	Dryas Ic–Bølling	Bianchini and Gambassini (1973), Segre and Vigliardi (1973)
Gr. Giovanna layer B	Aurochs, wild ass, red deer, boar	—	12,840 ± 100	Bølling	Cardini (1971), Segre and Vigliardi (1983)
Gr. S. Teodoro layers E–A	Red deer, aurochs, boar, wild ass, hyena (1. E)	—	—	—	Vigliardi (1968), Segre and Vigliardi (1983)
Gr. di Levanzo layer 3 (c. 6–5)	Red deer, aurochs, wild ass, *Puffinus*, *Otis tarda*	—	From 11,700 ± 300 to 10,100 ± 250	Allerød–Dryas III	Vigliardi (1982)
Gr. dell'Uzzo A	Red deer, aurochs, boar, birds, and fish	—	10,050 ± 100	Dryas III	Piperno *et al.* (1980)

At Riparo Tagliente, another important northern Italian sequence (Fig. 7), the climatic data in Tables I and IV clearly show the Dryas oscillations in a low prealpine valley.

In Abruzzo to the south, Table IV shows a distinction between the lower and the upper caves in the Fucino basin. The first group (Grotta Tronci, Grotta di Ciccio Felice, and Riparo Maurizio), which are presumably older, are only a few meters above the old lake level and were sealed by detrital cones, perhaps during Dryas I (Bartolomei *et al.*, 1979). The upper caves are about 40 m above the lake level and date to the Final Epigravettian (Table IV, Fig. 2). Layer 39 of Grotta La Punta, dated to 14,488 B.P. ± 800 years, contained a hearth but no fauna or artifacts (Cremonesi, 1968).

In Apulia, Grotta Paglicci has probably the most complete sequence of Epigravettian in Italy (Fig. 8). At Taurisano, in the Salentinian peninsula, the only variation in fauna is the change of predominance from aurochs to horse in Layers 23–18 and 17–2 (Table V); this uniformity is confirmed by the radiocarbon dates, which all fall within a period of 500 years (Fig. 4). At Cipolliane C (Tables II and V), granulometric analyses of Layer 4 (Gambassini, 1970) suggest a colder phase (Dryas Ib?). Grotta Romanelli was the first Italian Paleolithic site to undergo a modern excavation and the first where granulometric analyses were performed (Blanc, 1920).

On the Tyrrhenian coast, Palidoro in Latium shows remarkable agreement between sedimentological and faunal analyses and absolute dates (Tables II and IV, Figs 9–11). Palidoro indicates a uniform climate, except for Cut 1 of Layer B, just before the collapse of the vault (Fig. 9), where the lithology (Fig. 10), fauna (Fig. 11), and dating may indicate the onset of colder conditions.

The Grotta Polesini sequence is divided into four phases (Sala, 1983). However, the single absolute date (Layer 7) suggests Dryas III rather than Allerød; also, the fauna (Radmilli, 1974) includes some very cold species, such as the wolverine (*Gulo gulo*) in Layers 7, 8, and 10—that is, in both the supposed Dryas II and the Allerød phases. As noted by Radmilli (1974, pp. 16–17), the site was excavated under very difficult conditions.

The climatic indications from the Latium caves agree quite well with the results of the pollen core from Mezzaluna (Table II).

In Campania, the environmental data and fauna, including mollusks, from Grotta Erica and Grotta del Mezzogiorno Layers 20–4 are very similar, but the dates are very different. Tozzi (1975) considers the dates for Grotta Erica too old in light of the presence of *Cerastoderma*, which occurs in the Holocene of the nearby Grotta del Mezzogiorno. This mollusk is typical of a lagoon environment, and there are traces of an ancient lagoon in the gulf of Positano in front of the caves (A. G. Segre, personal communication).

Fig. 7. Stratigraphy of the Tagliente shelter: the Mousterian deposit is Layers 43–31; Layer 25 contains Aurignacian; the Epigravettian layers (18–5) are separated by an erosional surface (from Bartolomei *et al.*, 1984). 1, Recently disturbed deposits; 2, previously disturbed deposits (earlier excavations and animal burrows); 3, ash strata; 4, concreted deposits; 5, anthropogenic deposits; 6, pedogenic deposits.

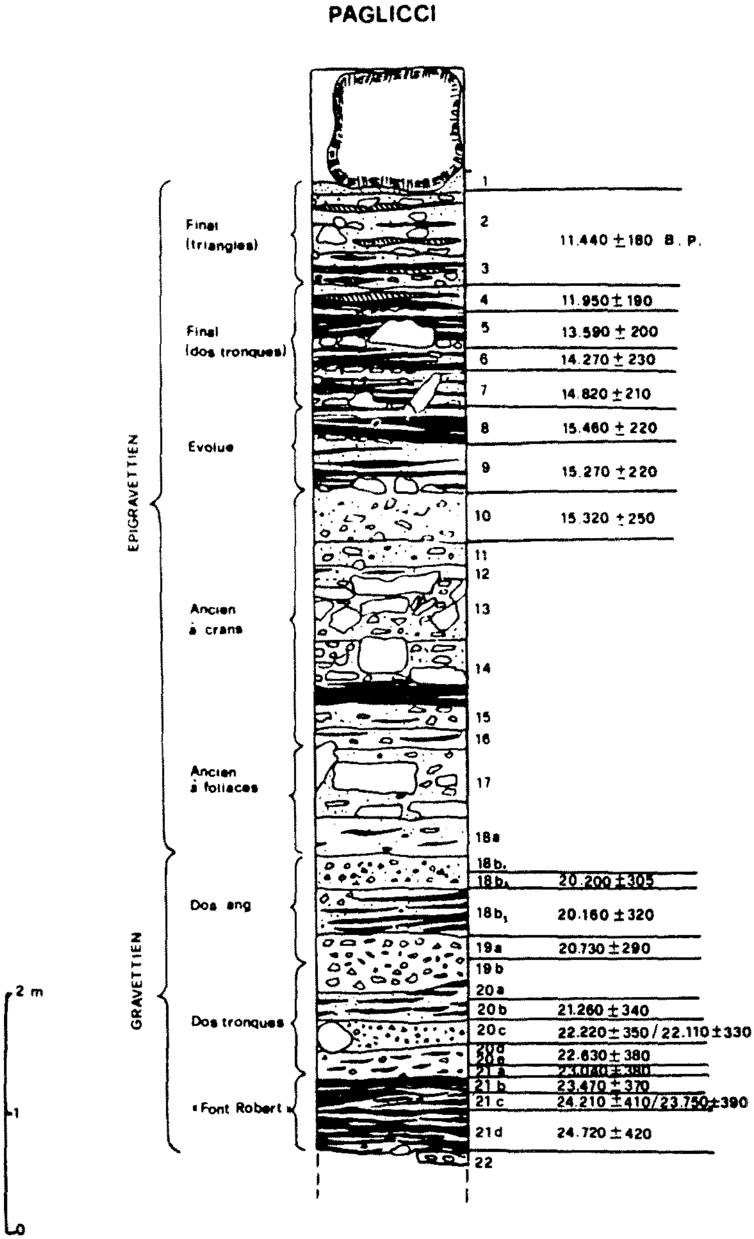


Fig. 8. Schematic stratigraphy of Grotta Paglicci with absolute dates (right) and cultural attributions (left) (from Bartolomei *et al.*, 1979).

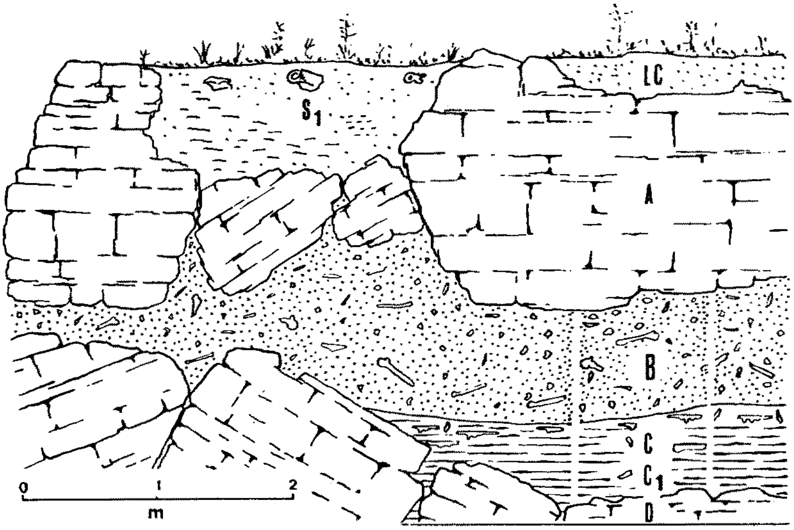


Fig. 9. Schematic east–west cross section of the Palidoro deposit. LC, ceramic levels; A, travertine boulders; B, cultural level; C and C1, sterile layers; D, travertine bedrock; S1, trench of Chappella's (1958–1961) excavations (from Cassoli, 1976–1977).

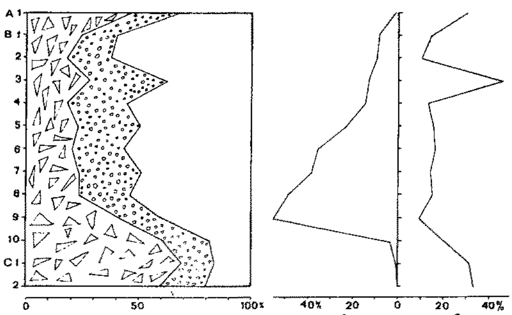


Fig. 10. Palidoro. b, Lithographic diagram (A, B, and C as in Fig. 9); e, intensity of human occupation; g, percentages of *plaquettes* (from Palmieri 1976–1977).

Rock marine mollusks, such as *Monodonta* and *Patella*, are common in the upper layers of most coastal sites (Table VII), and their presence indicates that the sea level was already rising during Dryas III.

Stone Industries

Almost all Italian scholars have focused upon the lithic assemblages of the Epigravettian, and almost exclusively for the purpose of establishing chronotypological sequences.

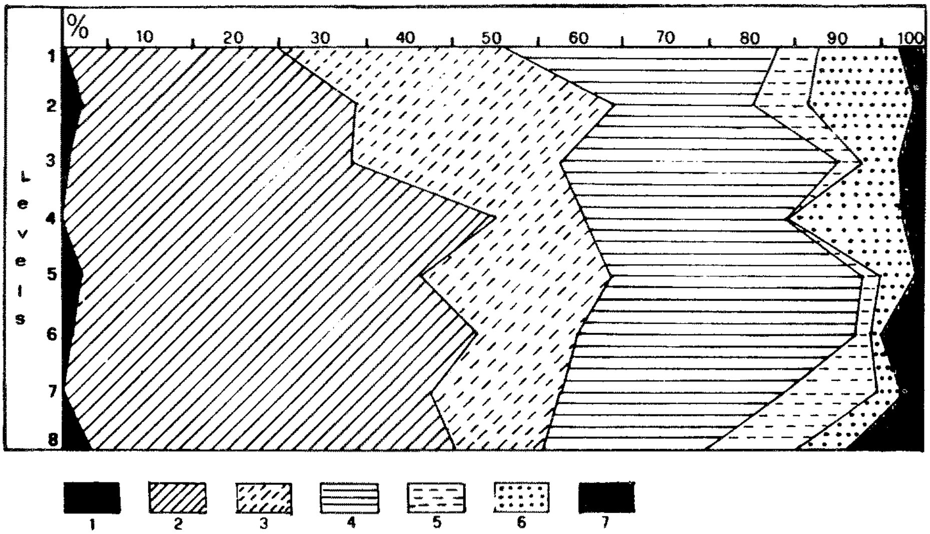


Fig. 11. Palidoro. Percentages of mammalian species. 1, roe deer; 2, red deer; 3, aurochs; 4, wild ass (*Equus hydruntinus*); 5, horse; 6, boar; 7, others (from Cassoli, 1976–1977).

The most recent chronotypological classification is that of Palma di Cesnola (1983a). The Early Epigravettian is still defined for the whole of Italy but includes three phases (Palma di Cesnola and Bietti, 1983): initial, with foliates (*à foliacés*), and shouldered (*à cran*). The Evolved and Final Epigravettian are subdivided into five regional facies: northern Tyrrhenian (Liguria and Tuscany), northern and central Adriatic (Veneto, Marche, and Abruzzo), southern Adriatic (Apulia), central and southern Tyrrhenian (Latium, Campania, and Calabria), and Sicilian.

In the northern and central Adriatic, there is no distinction between the Evolved and the Final Epigravettian (Bisi *et al.*, 1983). For the Abruzzo, Radmilli (1954; Bisi *et al.*, 1983, pp. 252–263) defines a local Bertonian culture, lasting from about 18,000 to about 10,500 B.P. Elsewhere, the Evolved and the Final Epigravettian are differentiated; in central and southern Tyrrhenia, Martini (cited by Bietti *et al.*, 1983b) even defines three subphases for the Evolved and six for the Final Epigravettian.

Definitions of these facies, phases, and subphases are based on the typology of flint tools and, particularly, on a few types and the ratios between them (such as burins : endscrapers or dihedral burins : burins on truncation). We must therefore briefly discuss typology.

A large majority of Italian scholars uses the analytical typology of Laplace (1964a), of which there have been several later versions (Laplace, 1968, 1974), but the Italians still use the original. Laplace's approach is hierarchical, beginning with an essential structure of five typological families: burins, endscrapers, *abrupts différenciés* (various tools with abrupt retouch), foliate pieces, and the *substrat* (by which Laplace meant remnants of earlier industries, such as Mousterian). Subdivision of the *abrupts différenciés* and the *substrat* provides the "elementary structure," made up of typological groups: the *abrupts différenciés* are subdivided into borers, truncated tools, backed points, backed blades, truncated backed tools, and geometrics; the *substrat* is subdivided into pointed tools, retouched blades, sidescrapers, pieces with abrupt retouch (resembling *raclettes*), and notches and denticulates.

Each group is made up of primary types, ranging in number from 2 (for the *abrupts*) to 10 (for the foliates). These primary types are similar to the standard types of the Bordeaux school, but no metrical data are considered; for example, a backed blade, backed bladelet, backed point with a curved back, and microgravette can all be placed in the same primary type. Also, the foliate pieces are not defined as leaf shaped, but only by the presence of flat invasive retouch, independent of the shape or thickness of the tool. There is a more detailed level of analysis, the level of secondary types, where metrical attributes are taken into account, but this is seldom used by Italian scholars. Almost all typological analysis is performed at the level of primary types, which therefore play a role very similar to the standard types of the Bordeaux list (Bietti, 1978).

Tables VIII–XIII summarize the chronotypology of the Italian Epigravettian. We note that the attributions are essentially qualitative; quantitative data are discussed below. The references at the right in the tables are to the original excavators or publishers of the assemblages; they are not always responsible for the chronotypological attribution.

Apart from the initial phase, the subdivision of the Early Epigravettian (Table VIII) is essentially that of Laplace (see above), although it is based on the Paglicci sequence. Trene is assigned to the foliate phase (*à foliacés*) because it yielded the only bifacial foliate found in Italy (Laplace, 1966, p. 502). There are no absolute dates for this phase. Since Layer 18b of Grotta Paglicci (the latest Gravettian) dates to ca. 20,000 B.P. (Palma di Cesnola, 1975) and the first Evolved Epigravettian layers are around 15,000 B.P., we expect dates of about 19,000 for the initial phase and 18,000–17,000 for the foliate phase, in view of the dates of 16,000–15,500 for the shouldered industry of Taurisano. However, the uppermost (P1) shouldered layer of Arene Candide is dated to about 18,500 B.P. We may need to reconsider the concept of overall unity within the Italian Early Epigravettian.

In this respect, we observe that most shouldered pieces come from Apulia and, specifically, from Grotta Paglicci (Fig. 12) and Taurisano. The two yielded quantitatively very similar shouldered pieces, although they are

Table VIII. Early Epigravettian Assemblages, According to Palma di Cesnola (in Palma di Cesnola and Bietti, 1983)

Site	Attribution	Reference(s)
Riparo Mochi, layer C (Liguria)	Initial Early Epigravettian	Blanc (1938), Laplace (1966, 1977)
Aia al Colle (Tuscany)	"	Bartoli and Galiberti (1979)
Grotta Paglicci, layer 18a (Apulia)	"	Mezzena and Palma di Cesnola (1967)
Arene Candide, layers P13–P8 (Liguria)	Early Epigravettian with foliates	Cardini (1946, 1955, 1980), Laplace (1984b, 1966)
Trene (Veneto)	"	Leonardi *et al.* (1958–1959), Laplace (1966)
Cala delle Ossa (Campania)	"	Blanc and Segre (1953), Laplace (1964b, 1966)
Grotta Paglicci, layer 17	"	Mezzena and Palma di Cesnola (1967)
Parabita layer A (Apulia)	"	Radmilli (1966)
Arene Candide 1. P7–P1	Early Epigravettian with tangs	Laplace (1964b, 1966), Bietti (1987)
Grotte des Enfants F (Liguria)	"	Palma di Cesnola (1979)
P. alla Malva (Tuscany)	"	Martini (1982)
La Paina (Veneto)	"	Leonardi *et al.* (1962), Laplace (1966), Bartolomei *et al.* (1988)
Ponte di Pietra (Marche)	"	Broglio and Lollini (1981)
Rip. Maurizio c. 14–12 (Abruzzo)	"	Radmilli (1959), Laplace (1964b, 1966)
Grotta Tronci H–C (Abruzzo)	"	Radmilli (1956a), Laplace (1964b, 1966)
Grotta Paglicci 1. 16–10	"	Mezzena and Palma di Cesnola (1967)
Taurisano c. 23–6 (Apulia)	"	Laplace (1964b, 1966), Bietti (1979)
Gr. delle Mura G (Apulia)	"	Cornaggia Castiglioni and Palma di Cesnola (1964), Laplace (1964b, 1966)
Cipolliane C, layer 4 (Apulia)	"	Palma di Cesnola (1962),
Grotta del Romito, l. 34 (Calabria)		Gambassini (1970), Graziosi (1966)
Canicattini Bagni (Sicily)	"	Bernabò Brea (1950), Laplace (1964b, 1966)
Niscemi (Sicily)	"	Marconi-Bovio (1954–1955), Laplace (1964b, 1966)

> 200 km apart (Bietti, 1980a). All other assemblages attributed to this phase by Palma di Cesnola have much lower frequencies of shouldered pieces, the lowest being Poggio alla Malva. Two Sicilian sites, Canicattini Bagni and Niscemi, are also assigned to it, but the artifacts from the first site are known only from a vaguely labeled box in the Syracuse museum (Bernabò

Table IX. Evolved and Final Epigravettian Assemblages in Northern Tyrrhenia (Liguria and Tuscany), According to Palma di Cesnola (1983b)

Site	Attribution	Reference(s)
Grotte des Enfants E–C3	Evolved Epigravettian	Palma di Cesnola (1979)
Grotte des Enfants D–C	Final Epigravettian	Palma di Cesnola (1979)
Riparo Mochi, layer A	"	Blanc (1938), Laplace (1966, 1977)
Arene Candide, l. M5–M1	"	Laplace (1964b, 1966), Bietti (1987)
Arma Stefanin, l. VI–IV	"	Leale Anfossi (1972)
Arma di Nasino, l. XIII–XI	"	Palma di Cesnola (1974)
Grotta del Sambuco	Evolved–Final Epigravettian	Calattini and Galiberti (1982–1983)
Gotta delle Campane	Final Epigravettian	Palma di Cesnola (1962, 1963a)
Isola Santa, layer 5	"	Tozzi (1980)

Table X. Evolved and Final Epigravettian Assemblages in the Northern and Central Adriatic (Veneto and Marche), According to Bisi *et al.* (1983)

Riparo Tagliente, l. 16–4	Evolved–Final Epigravettian	Bartolomei *et al.* (1982)
Riparo Battaglia	Final Epigravettian	Broglio (1964)
Fiorentini	"	Bartolomei and Broglio (1967); Sala Manservigi (1970), Guerreschi and Pasquali (1978)
Le Viotte di Bondone	"	Bagolini and Guerreschi (1978)
Andalo	"	Bagolini and Guerreschi (1980)
Piancavallo	"	Bartolomei *et al.* (1971), Guerreschi (1975)
Grotte Verdi di Pradis	"	Corai (1980), Guerreschi and Leonardi (1984)
Biarzo, layer 5	"	Bressan *et al.* (1982)
Terlago	"	Bagolini and Dalmeri (1983)
Grotta della Ferrovia	"	Bartolomei (1966), Lollini (1966)
Gotta del Prete	"	Lollini (1966)

Brea, 1950, p. 125), and Marconi-Bovio (1954–1955) notes several backed microliths and even microburins at the second site but no shouldered tools.

Broglio and Lollini (1981, p. 56) identified a generic "Gravettian–Epigravettian" tradition at Ponte di Pietra, but Broglio (personal communication) now assigns this assemblage to the Gravettian.

Inspection of the percentages of the tools given by Palma di Cesnola (1983b) for the Evolved and Final Epigravettian of northern Tyrrhenia (Table IX) shows no basic difference between Grotte des Enfants Layers E–C3 and D–C and Riparo Mochi A. Without absolute dates, I find the search of chronological pattern on the basis of variations in the percentages of tools to be meaningless.

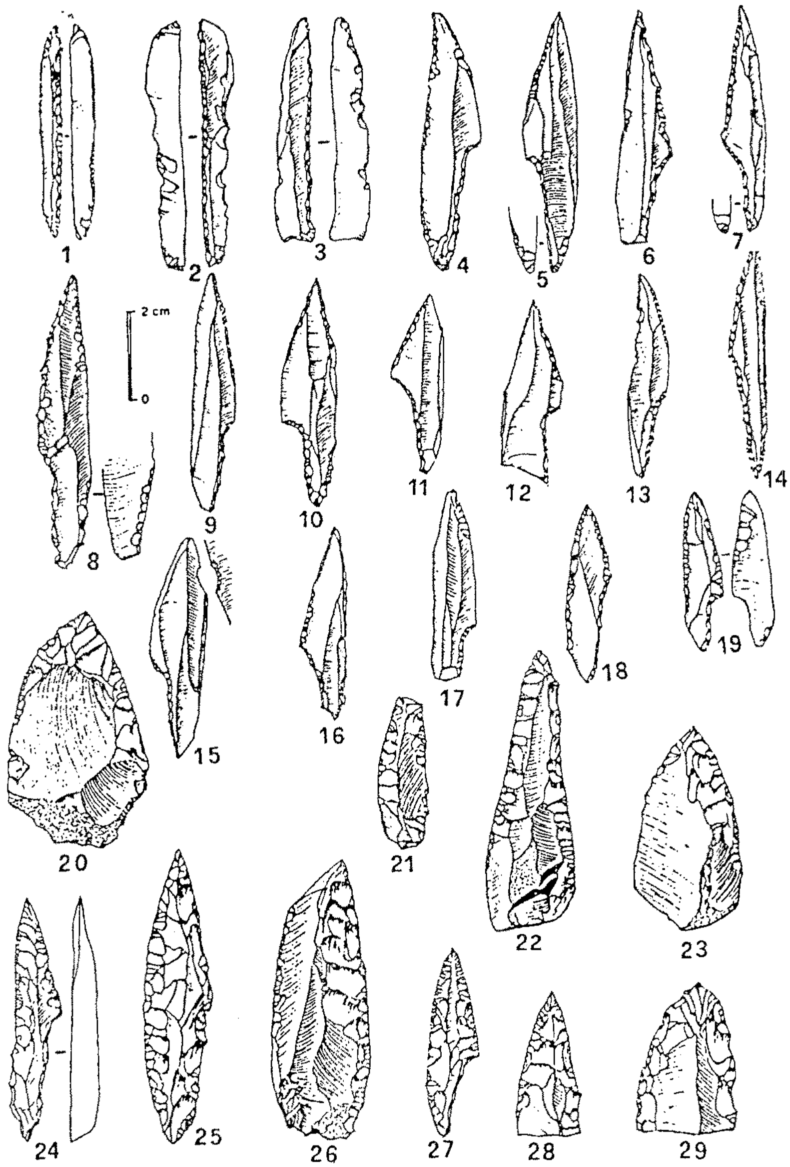


Fig. 12. Early Epigravettian of Grotta Paglicci (Layers 18a–10). 1, backed point; 2 and 3, truncated backed bladelets; 4–14, 16, and 18, shouldered points; 15, 17, and 19, shouldered blades; 20–23, 25, 26, 28, and 29, foliate points; 24 and 27, shouldered foliate tools.

Table XI. Evolved and Final Epigravettian Assemblages in Abruzzo, According to Radmilli (in Bisi *et al.*, 1983), and in Apulia, according to Palma di Cesnola (Palma di Cesnola *et al.*, 1983)

Site	Attribution	Reference(s)
Rip. Maurizio c. 11–3	"Bertonian"	Radmilli (1959), Laplace (1964b, 1966)
Grotta Graziani	"	Radmilli (1955), Laplace (1964b, 1966)
Gr. Ciccio Felice	"	Radmilli (1956b), Laplace (1964b, 1966)
Grotta d'Ortucchio	"	Cremonesi (1968), Laplace (1964b, 1966)
Grotta La Punta	"	Cremonesi (1968)
Grotta Maritza	"	Grifoni and Radmilli (1964)
Grotta Paglicci, 1. 9–8	Evolved Epigravettian	Mezzena and Palma di Cesnola (1967)
Cipolliane C, layer 3	"	Palma di Cesnola (1962), Gambassini (1970)
Grotta Paglicci, 1. 7–1	Final Epigravettian	Mezzena and Palma di Cesnola (1967)
Grotta della Mura, 1. F–D	"	Cornaggia Castiglioni and Palma di Cesnola (1964)
Grotta S. Croce	"	Cardini (1958), Laplace (1964b, 1966)
Taurisano, c. 5–1	"	Laplace (1964b, 1966), Bietti (1979)
Ugento P. Zecca and B. Cesira	"	Cardini (1965), Laplace (1964b, 1966)
Cipolliane C, 1. 2–1	"	Palma di Cesnola (1962), Gambassini (1970)
Grotta Romanelli, 1. E–A	"	Blanc (1928), Taschini and Bietti (1972)
Grotta del Cavallo, 1. BII–I	"	Palma di Cesnola (1963b), Laplace (1984b, 1966)
Parabita, upper layers	"	Radmilli (1966)
Grotta Zinzulusa	"	Laplace (1964b, 1966)
Grotta di Uluzzo	"	Borzatti von Löwenstern (1963)
Grotta C. Cosma	"	Borzatti von Löwenstern (1965)
Grotta delle Prazziche	"	Borzatti von Löwenstern (1969)

Figure 13 shows some characteristic Final Epigravettian tools from Veneto (Riparo Tagliente, Layer 15).

In Abruzzo (Table XI), according to Radmilli, the Bertonian culture lasted up to the Mesolithic. At Grotta Maritza, for instance, "Paleolithic" and "Mesolithic" layers are defined by tool percentages and economy (Grifoni and Radmilli, 1964, pp. 92–94), but both are dated to Dryas III. Radmilli defines the Mesolithic by its economy and not by the artifacts or chronology: thus, the birds and fish in the Fucino upper caves (Table IV) are consistent

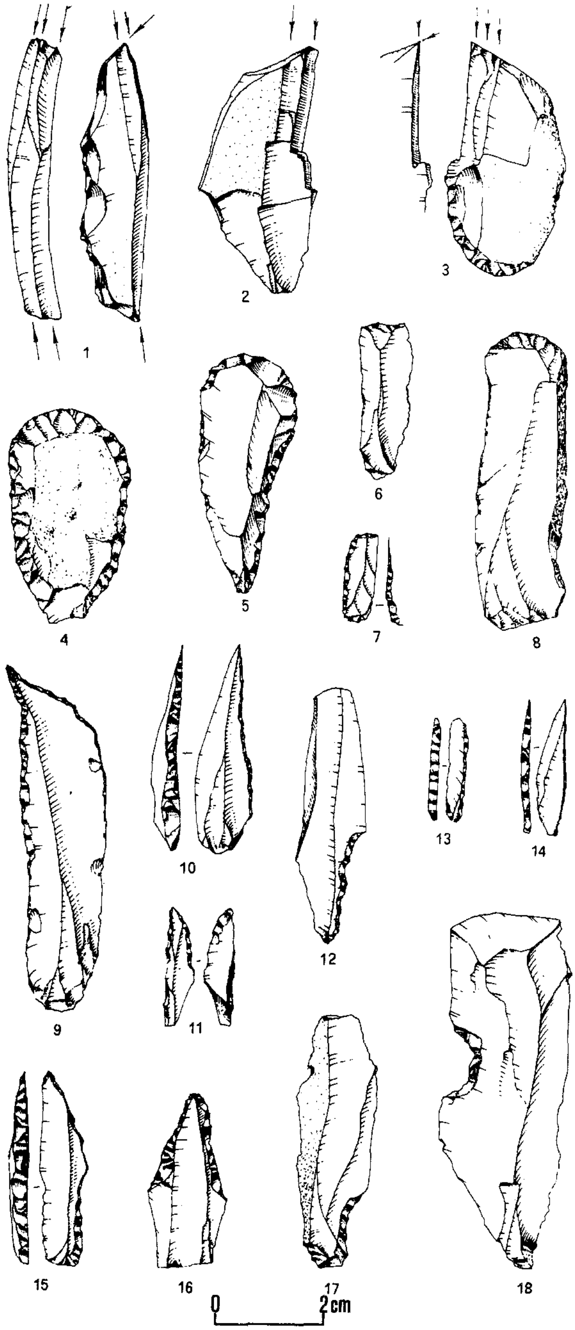


Fig. 13. Industry of Layer 15 of the Tagliente shelter. 1–3, burins; 4, 5, and 8, elongated endscrapers (5 is triangular); 6, truncated bladelet; 7 and 13, truncated backed bladelets; 10, 14, and 15, backed points; 9 and 16, borers and *becs*; 12 and 17, partially backed blades; 11, microburin; 18, notched blade (from Guerreschi and Leonardi, 1984).

Table XII. Evolved and Final Epigravettian Assemblages in Central and Southern Tyrrhenia (Latium, Campania, and Calabria), According to Martini and Tozzi (Bietti *et al.*, 1983)

Site	Attribution	Reference(s)
Palidoro, c. 8–6	Evolved Epigravettian, "subphase" 1	Laplace (1966), Bietti (1976–1977)
Palidoro, c. 5–4	Evolved Epigravettian, "subphase" 2	Laplace (1966), Bietti (1976–1977)
Cenciano Diruto IV–I	Evolved Epigravettian, "subphase" 2	Pennacchioni and Tozzi (1984)
Palidoro, c. 3–1	Evolved Epigravettian, "subphase" 3	Laplace (1966), Bietti (1976–1977)
Rip. Biedano VI–III	Evolved Epigravettian, "subphase" 3	Pennacchioni and Tozzi (1985)
Ponte Sfondato	Evolved Epigravettian *sensu lato*	Bulgarelli and Tagliacozzo (1984)
Tor Vergata	Evolved Epigravettian *sensu lato*	Cazzella and Moscoloni (1984)
Grotta Polesini, l. 12–9	Final Epigravettian, "subphase" 2	Radmilli (1974), Laplace (1964b, 1966)
Rip. Biedano I	Final Epigravettian, "subphase" 2	Pennacchioni and Tozzi (1985)
Rip. Salvini, layer D	Final Epigravettian, "subphase" 2	Bietti (1984b), Avellino *et al.* (1989)
Grotta Polesini, l. 8–1	Final Epigravettian, "subphase" 3	Radmilli (1974), Laplace (1964b, 1966)
Grotta Jolanda	Final Epigravettian, "subphase" 3	Radmilli (1963), Laplace (1964b, 1966)
Peschio Ranaro	Final Epigravettian, "subphase" 5	Biddittu (1973), Bietti (1984a)
Grotta della Cala P–N2	Evolved Epigravettian, "subphase" 2	Martini (1978)
Grotta della Cala N1–M	Evolved Epigravettian, "subphase" 3	Martini (1978)
Grotta della Cala L–I	Final Epigravettian, "subphase" 1	Martini (1981)
Grotta della Cala H–G	Final Epigravettian, "subphase" 2	Martini (1981)
Grotta Erica C–B	Final Epigravettian, "subphase" 2	Bonuccelli (1971)
Gr. del Mezzogiorno c. 23–18	Final Epigravettian, "subphase" 3	Tozzi (1975)
Grotta della Cala F	Final Epigravettian, "subphase" 3	Martini (1981)
Gr. del Mezzogiorno c. 11–7	Final Epigravettian, "subphase" 4	Tozzi (1975)
Gr. del Mezzogiorno c. 9–7	Final Epigravettian, "subphase" 5	Tozzi (1975)
Gr. del Mezzogiorno c. 6–4	Final Epigravettian, "subphase" 6	Tozzi (1975)
Grotta del Romito, l. 7–5	Final Epigravettian *sensu lato*	Graziosi (1966)
Grotta della Madonna layer L (cuts 72–71, cuts 65–50)	Final Epigravettian *sensu lato*	Cardini (1970)

Table XIII. Evolved and Final Epigravettian Assemblages in Sicily, According to Vigliardi (Segre and Vigliardi, 1983)

Site	Attribution	Reference(s)
Riparo S. Corrado	Evolved Epigravettian	Bernabò Brea (1950), Laplace (1964b, 1966)
Mangiapane	"	Vaufrey (1928), Laplace (1964b, 1966)
Grotta dell'Acqua Fitusa	Final Epigravettian, first phase	Bianchini and Gambassini (1973)
S. Teodoro, layers D–C	"	Graziosi and Maviglia (1946), Laplace (1964b, 1966), Vigliardi (1968)
Grotta Giovanna	"	Cardini (1971), Pianese (1968)
Mazzamuto	"	Laplace (1964b, 1966)
Rip. del Castello	Final Epigravettian *sensu lato*	Laplace (1964b, 1966)
S. Teodoro, layers B–A	Final Epigravettian, second phase	Graziosi and Maviglia (1946), Laplace (1964b, 1966), Vigliardi (1968)
Gr. di Levanzo, layer 3	"	Vigliardi (1982)
Gr. dell'Uzzo A, lower layers	"	Piperno *et al.* (1980)

with a Mesolithic. I would prefer to see the Fucino complex as a particular microenvironment, where the lake determined rather broad-spectrum subsistence patterns, rather than invoke more general economic transformations. Laplace (1964b, 1966), assigned Grotta A. Graziani and the lower caves of the Fucino basin (Rip. Maurizio, Grotta di Ciccio Felice) to the Evolved Epigravettian.

In Apulia, Cuts 5–1 of Taurisano are attributed to the Final Epigravettian because there are no shouldered tools, even though there are no differences between Layers 4–5 and Layers 10–12 in absolute dating, fauna, or stratigraphy (Bietti, 1979, Fig. 1); the different tool percentages may result from the limited area of excavation (Bietti, 1979, p. 333). This is a factor ignored by traditional chronotypologists, although there are other cases in Apulia, where different areas of a site have given different tool frequencies, such as the 1962 (Palma di Cesnola, 1962) and 1964 (Gambassini, 1970) excavations at the Cipolliane C shelter.

Technological studies are almost unknown in traditional analyses of lithic industries. One noteworthy technological feature of the Epigravettian in Salento is the consistent presence of splintered or scaled pieces (*pièces esquillées*). They are very common throughout Taurisano; at Cipolliane C, where Gambassini (1970, pp. 176–179) observed a continuum from cores with one or two striking platforms to scaled pieces; and in the Final Epigravettian of Grotta Romanelli. I believe that scaled pieces were cores,

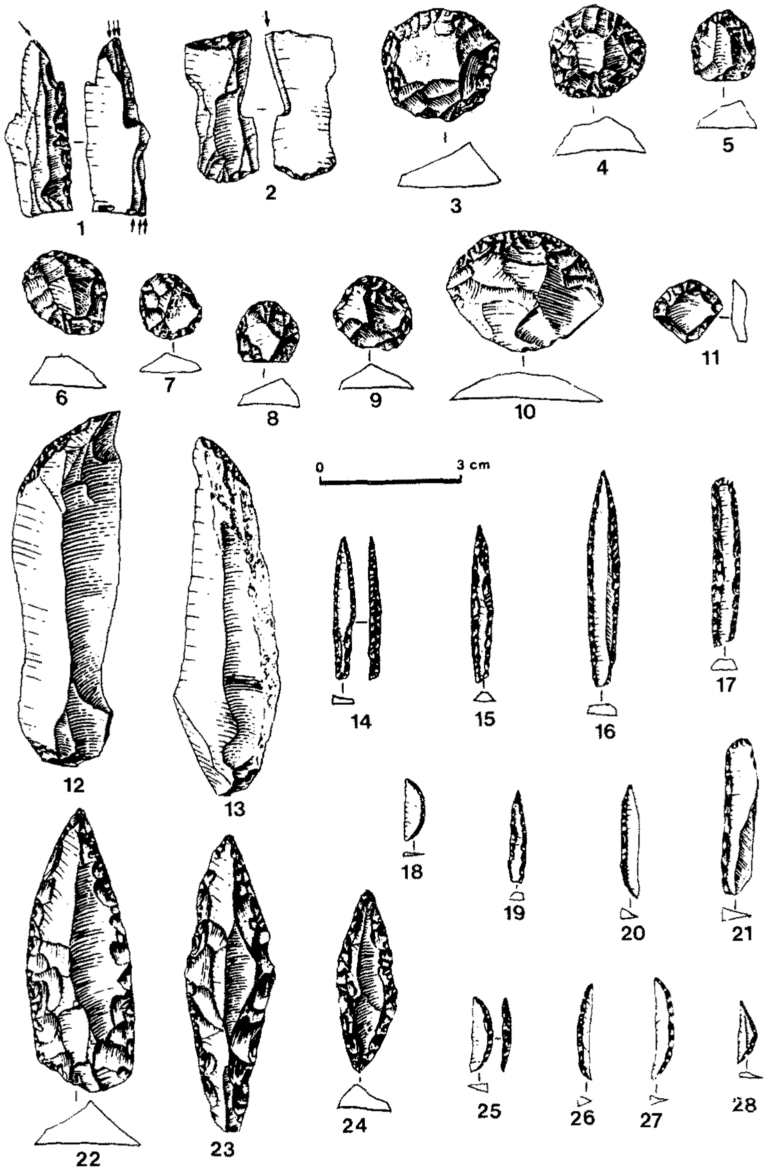


Fig. 14. Industry of Layers E–B of Grotta Romanelli. 1 and 2, burins; 3, 4, 6, and 7, circular endscrapers; 5 and 8–11, endscrapers on small flakes; 12 and 13, truncated blades; 14, shouldered point; 15, 16, and 19, microgravettes; 17 and 21, truncated backed bladelets; 18, 20, and 25–27, crescents; 22–24, Arenian points; 28, triangle (from Blanc, 1928; adapted by Palma di Cesnola, 1983a).

indicating a technology very different from that of the Tyrrhenian coast (see below).

The tools from Grotta Romanelli (Fig. 14) are very different from the Final Epigravettian of the northern Adriatic (Fig. 13). Characteristic types include small circular and subcircular endscrapers, large truncated blades, and Arenian points. The last (named after Arene Candide) resemble some Early Epigravettian foliate points (Fig. 12, No. 22, for instance), and one wonders if they would not have been so classified if found in an Early Epigravettian context.

Palma di Cesnola (1967) still uses the term Romanellian but limits it to the Apulian complexes. He refers to the late complexes of Salento, such as Grotta del Cavallo BII–I, Cipolliane 2–1, and Grotta di Uluzzo (Table XI), as "Epiromanellian." These assemblages are undated but may be attributed to the Dryas III–Holocene transition, if the presence of marine mollusks (Table V) indicates a rise in sea level, as it may on Tyrrhenian coast (Table VI).

In central and southern Tyrrhenia (Table XII), the subdivision of the Evolved and Final Epigravettian into nine subphases is an extreme example of Laplace's "continuous internal evolution" of industrial assemblages. This is particularly evident at Palidoro (Laplace, 1966, pp. 129–132). Analyses of the fauna, sediments, and absolute dates published in 1976–1977 (Tables II, VI) show an essential uniformity throughout the deposit; only Layer 6 is an odd-man-out in tool percentages (Bietti, 1976–1977), perhaps because only 1 m^2 was excavated (Fig. 9). In spite of these data, Martini (cited by Bietti *et al.*, 1983b, pp. 333–337) still follows the traditional procedure of slicing industrial assemblages into as many subphases as possible. The attribution of Layers 6–4 of Grotta del Mezzogiorno, dated to the Boreal (Table VI), to the last subphase of the Final Epigravettian reflects Laplace's denial of the existence of the Mesolithic, since in central and southern Italy it cannot be defined on the basis of artifacts.

Although tool frequencies differ at Palidoro (Fig. 15), Grotta Polesini, and Riparo Salvini, their *style* is similar (such as the forms of endscrapers) and the technology is practically the same, with a predominance of prismatic cores with one or two striking platforms; unlike southern Apulia, scaled pieces are very rare. Radmilli (1974, p. 74) suggested the name Romanellian for the industry of Grotta Polesini, but besides the technological, there are also some basic typological differences: for example, the Polesini endscrapers are mostly elongated and very different from the circular and short types (Fig. 14). The main differences between the Riparo Salvini and the Grotta Polesini industries are the absolute size of the tools (the raw material at Salvini consists of small pebbles) and the high frequency of microburins at Salvini; the latter may reflect the difficult conditions of excavation at Polesini and probable incomplete recovery of artifacts (Radmilli, 1974, pp. 16–17).

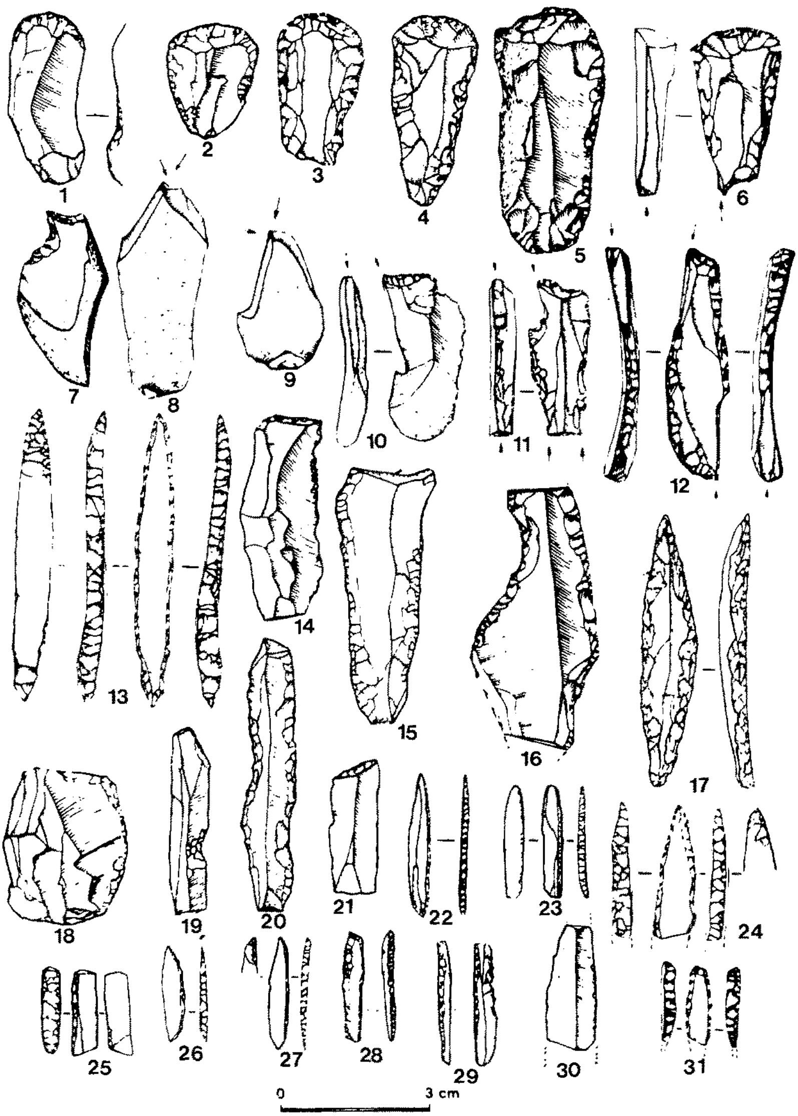


Fig. 15. Epigravettian industry of Palidoro. 1 and 3, endscrapers on blades; 2, thumbnail endscraper; 4, triangular endscraper; 5, double endscraper; 6, burin-endscraper; 7, *bec*; 8–12, burins, 13, double-backed gravette; 14, truncated blade; 15, retouched blade; 16, retouched blade with large notches; 17, Arenian point; 18, sidescraper; 19, notched bladelet; 20, denticulated bladelet; 21, truncated bladelet; 22 and 27, microgravettes; 23 and 25, backed bladelets; 24 and 31, double-backed microliths; 26, crescent; 28, truncated backed bladelet; 29, denticulated backed bladelet; 30, bladelet with marginal retouch (from Bietti, 1976–1977; adapted by Palma di Cesnola, 1983a).

Another difference from the southern Adriatic coast is that the microburins at Riparo Salvini are associated with triangles, while at Grotta Romanelli, for instance, they are associated with crescents (Fig. 14).

There are surface sites throughout Latium, and particularly in the Agro Pontino; Fig. 1 shows three sites with very large concentrations of Upper Paleolithic material; Solforata (Petrassi *et al.*, 1986), S. Vito 1 and 2 (Bietti, 1969), and Molella (Zei, 1973). Unfortunately, their dating remains uncertain: there are no fauna and the artifacts have been mixed by plowing, so that, on simple typological grounds, we may attribute them only to a Gravettian–Epigravettian *sensu lato*.

Laplace (1964b, 1966) was responsible for the chronological attribution of some of the Sicilian sites (S. Corrado, Mangiapane, Mazzamuto, Riparo del Castello). The first and second phases are defined by geometrics, which are more abundant in the first phase; all backed tools are rarer in the second phase (Vigliardi, in Segre and Vigliardi, 1983). Recent analysis of Riparo del Castello (Zampetti, 1989) suggests attribution to the first phase. In general, the Sicilian Epigravettian is distinct from that of continental Italy, particularly in its elongated endscrapers and curved backed tools (Fig. 16).

Bone Artifacts, Ornaments, and Mortuary Practices

This section is very brief, because the data have tended to be treated completely independently of data relating to environment, chronology, and lithic industries.

The bone artifacts are usually treated as secondary to the lithics. They occur in almost all the sites noted above but are described only qualitatively at the end of each publication and percentage frequencies are never given for them. One of the few classifications of Epigravettian bone industry is that for Palidoro (Bietti, 1976–1977, pp. 287–289), using Camps-Fabrer's (1968) typology—the only one available at that time. I believe that this neglect arises, again, from an overemphasis on lithic chronotypology: bone artifacts are seen as more idiosyncratic and so, unlike French Magdalenian, cannot be used for constructing chronotypological sequences.

The same is true for ornaments: they are always listed after the lithic industry, with no attempt to relate them to other archaeological data. Most of them are found in burials, although they occur in almost all Epigravettian sites, independent of the presence of human remains. This pattern accords with their role as personal decorative items. As far as I know, there has been no quantitative correlation analysis (that is, quantity of ornaments vs type of site) for the Epigravettian.

The most common types of ornaments are perforated atrophic canines of deer, perforated stone beads, perforated shells (mostly *Columbella*, *Nassa*,

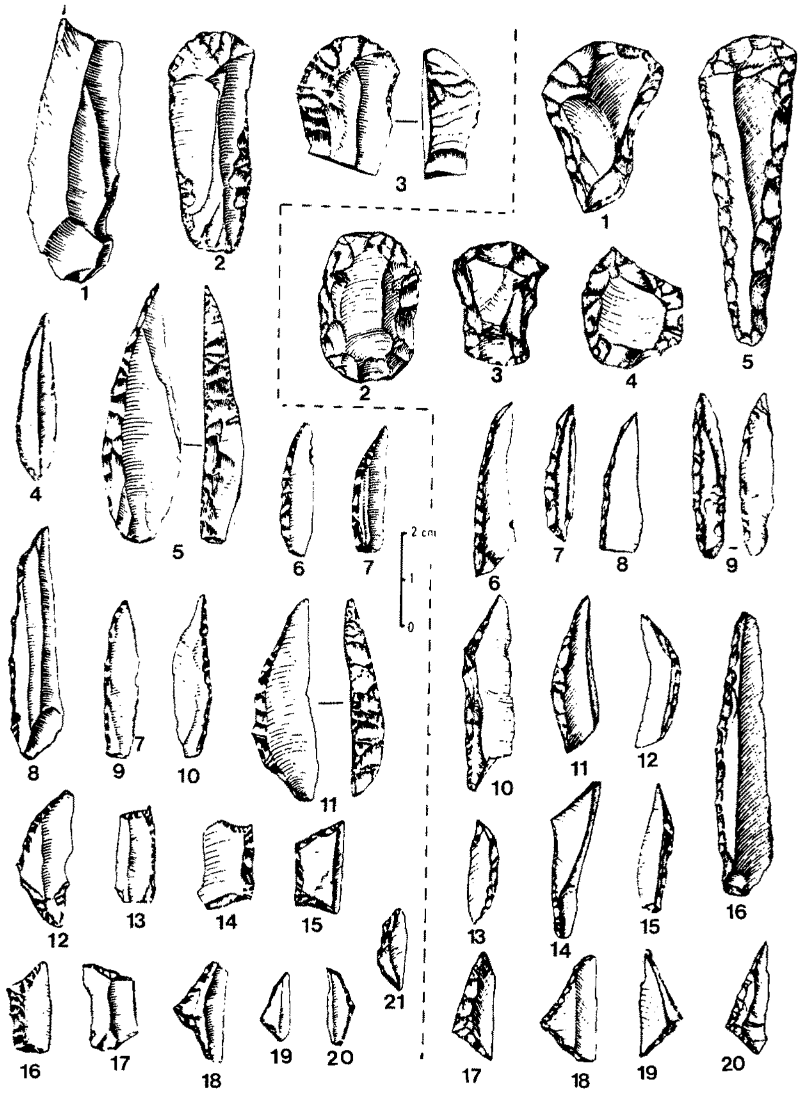


Fig. 16. Industries of the first phase (with geometrics) of the Sicilian Final Epigravettian. Left, Grotta dell'Acqua Fitusa. 1, burin; 2, 3, endscrapers; 4–11, backed points; 12, crescent; 13–16, truncated backed bladelets; 17, trapeze; 18–21, triangles. Right, Grotta di S. Teodoro, Levels D–C. 1 and 5, triangular endscrapers; 2–4, short endscrapers; 6–12, 15, and 16, backed points; 13, crescent; 14, truncated backed bladelet; 17–20, triangles (from Bianchini and Gambassini, 1973; Vigliardi, 1968; adapted by Palma di Cesnola, 1983a).

Pectunculus and, sometimes, *Patella*), bone or stone pendants, and crescents made on *Pectunculus* shell (particularly at Arene Candide). At Arene Candide, there was a concentration of squirrel vertebrae in the upper level burials (Fig. 5A: c, d), and of *bâtons de commandement* in the famous lower burial (Fig. 5A: e) (Cardini, 1980; Sergi *et al.*, 1974).

Painted pebbles and engraved pebbles or bones are usually regarded as art. Such mobiliary art is very common in almost all Epigravettian sites, including Arene Candide, Riparo Tagliente, Paglicci, Romanelli, Grotta Polesini, Grotta del Romito, and Grotta della Madonna. Cave art is less frequent; the most famous sites are Addaura and Levanzo in Sicily and Grotta Romanelli in Apulia. I do not discuss art in this paper. It is always seen as a very specialized study, almost totally unrelated to other variables and concerned mainly with "style"—naturalistic, geometric, Franco-Cantabrian, Mediterranean, and so on. Italian Epigravettian art has been dealt with by Graziosi (1973), Marshack (1969) and others.

Analyses of the burials, however, are more interesting. Human remains are often found in Epigravettian sites but usually as isolated fragments. There are some definite burials, most of them (28) in the Final Epigravettian (Grotte des Enfants Layers C and B, Arene Candide upper layer, Riparo Tagliente, Grotta Maritza, Vado all'Arancio, Grotta del Romito, and Grotta di S. Teodoro) and only three in the Early Epigravettian [Arene Candide lower layer (Fig. 5A: e) and Parabita]. There is no indication of specialized burial sites; the Final Epigravettian burials of Arene Candide (Fig. 5A: c, d) have been incorrectly called a "necropolis" (Cardini, 1980) because the remains of about 18 individuals were found (Paoli *et al.*, 1980), but they were buried in a cave used for normal living activities.

Minellono (Minellono *et al.*, 1980, p. 14) has analyzed 16 Epigravettian and 3 Mesolithic (from Uzzo cave) burials in terms of sex, age, multiplicity of burials, presence of a grave, position and orientation of the body, presence of stones and of ocher, and type of funerary equipment (perforated shells, pendants, worked antlers, etc.). She concludes that all the burials seem to follow to the same type of mortuary practices (Minellono *et al.*, 1980, pp. 13–15).

More recently, Mussi (1986), using the same data, reexamined the same Epigravettian burials (except the 9 from the upper level of Arene Candide, which she sees as Mesolithic), plus 14 Gravettian (or probable Gravettian) burials. Mussi concluded that there are differences between the mortuary practices of the Gravettian–Early Epigravettian and those of the Final Epigravettian. The earlier burials, unlike the later ones, include no children, are rich in grave goods and ocher, and have rather standardized body positions and grave locations (Mussi, 1986, Tables I and II). This suggests a more formal ritual for the first group, with some kind of status assigned to the dead (Mussi, 1986, pp. 548–551).

In fact, it is precisely the exclusion of the upper-level Arene Candide burials that creates the difference between the two groups, but with the new dates for this level (Fig. 2), there is no reason not to consider them Final Epigravettian. Simple χ^2 tests (Table XIV) on some of Mussi's data plus the upper Arene Candide burials show a statistically significant difference between the earlier and the later groups in the age at death but no difference in the frequency of multiple burials, in the quantity of grave goods, in the quantity of ocher, or in the position of the body. However, the main criticism of Mussi's interpretation is one of scale: mortuary practices are considered over the whole of Italy, but a qualitative analysis of the geographic distribution of the burials (Mussi, 1986, Tables I–III) shows that the similar mortuary practices are strongly concentrated in Liguria, independently of chronology. This suggests a need for more attention to regional or local patterns, and more prudence in analyses carried out on larger scale of time and space.

Seasonal, Functional, and Behavioral Studies

Research on the Italian Epigravettian has traditionally focused on the chronotypological classification of sites; environmental data have played no more than a confirmatory role, while problems such as seasonality, site function, or specialized activities, have usually been ignored. Some attempts have been made to approach these problems in Mesolithic studies (Bagolini *et al.*, 1975, 1983; Bietti, 1980b; Broglio and Lunz, 1983).

Interesting results are becoming available for the Final Epigravettian of Riparo Tagliente, in Veneto, where a large concentration of flakes and other debitage products in Level 10 has been interpreted as a flint knapping zone (*atelier*) (Guerreschi and Leonardi, 1984).

The first interpretations of seasonality patterns in the Italian Upper Paleolithic are probably those of Barker (1974, 1981), who postulates that subsistence economy on the Tyrrhenian coast was essentially based on red deer and wild ass (*Equus hydruntinus*), whose seasonal migrations thus led to a kind of transhumance for the Upper Paleolithic groups; sites closer to the coast (Palidoro and Grotta della Cala, for instance) are interpreted as winter settlements, while those in the mountains, such as in the Fucino basin, are seen as summer settlements. Specifically, Barker sees Grotta Polesini as a winter residence (1981, p. 134) and Grotta Maritza in the Fucino as a summer kill site, on the basis of the faunal remains and the tool frequencies. He thus links sites in the Abruzzi to the Tyrrhenian coast, in contrast to the lithic classification discussed above. Barker also underlines the importance of systematic subsistence strategies in the late Upper Paleolithic as opposed to the Middle Paleolithic (1981, pp. 138–139); as an example, he cites the deer mortality ages from Grotta del Poggio (Mousterian), Grotta della Cala, and Grotta della Calanca (Gravettian) in Campania and Grotta Polesini (Epigravettian) in Latium (1974, p. 115, and Fig. 6). I agree completely that the subsistence strategies of Mousterians and late Upper Paleolithic groups differed, although Barker's data are not conclusive.

More recently, Donahue (1985, 1986) has given an interesting functional interpretation for the Level 4a of Grotta Paglicci, which is a cornerstone of the traditional classification. From microwear analysis of the flint tools, he concludes that most of them were used for butchering and for working hides. The burins show no traces of wear and can be interpreted simply as cores. The faunal remains have low percentages of long bones (humeri and femora), which accords with butchering. Donahue suggests that the level should be interpreted partly as an observation point, due to its position at the foot of the Gargano mountains, and partly as a hunting and butchering camp, where parts of the game were selected and, presumably, were sent to the base camp. It is not clear where the base camp was; thus far, there is no evidence of any Upper Paleolithic surface site in the plain of Foggia, in front of Grotta Paglicci.

An interpretation of this kind is derived from the behavioral models of "collectors" postulated by Binford on the basis of his ethnoarchaeological research among the Nunamiut (Binford, 1978a, b, 1980, 1982). However, we do not suppose that the Epigravettian settlement pattern was exactly the same as that of the Nunamiut. Instead, we use Binford's model as a source of ideas and possible patterns of interpretation for past behavior.

Riparo Salvini is a good example of differences from the "extreme logistic" pattern of the Nunamiut. A functional interpretation of the Final Epigravettian of Riparo Salvini has been attempted on the basis of the spatial distribution and specialization of the artifacts (Avellino *et al.*, 1989; Bietti, 1986). The position of the shelter on the edge of two plains, the Agro Pontino and the Fondi basin, makes it ideal as a look out point over red deer and wild ass moving between the plains. The numerous microburins and triangles in Layer D suggest the making and repairing of composite hunting weapons (*armatures*); the entire reduction sequence from the cores to the production of geometrics by the microburin technique took place in the shelter. However, an analysis of seasonality, based on the tooth wear and eruption of the ungulates and the anatomical representation of the fauna, leads us to interpret Riparo Salvini as a late winter (January–March) residential site (Bietti and Stiner, 1989). This, combined with the site's functional and strategic characteristics, places Riparo Salvini in an intermediate position between the extremes of "collectors" and "foragers," as defined by Binford (1980).

A similar analysis of the fauna from Grotta Polesini has yielded results in accord with those of Riparo Salvini. However, the sample was much larger and the season of occupation for Grotta Polesini can be extended into the autumn. Grotta Polesini also is strategically located—on the Aniene river at the opening toward the plain. The technotypological similarities between the two sites (see above) reinforce a common behavioral and functional interpretation for them (Bietti and Stiner, 1989).

On the basis of these results, we may try to reconstruct the subsistence and settlement strategies of the Epigravettians in central and southern Latium. The open-air sites in the plain, such as Solforata, S. Vito, and Molella, show that, in contrast to Grotta Paglicci, there was extensive occupation of the plains in front of the caves. However, it is difficult to determine the function of these sites (spring sites, kill-and-butchering sites, and so on), because no faunal remains are preserved and the sites are mixed (as well as Upper Paleolithic tools, there are also potsherds of indeterminate age). Systematic surveys are now under way on the Pontinan plain (by the University of Amsterdam; Kamermans *et al.*, 1985) and in the Fondi basin (by the University of Rome).

If Grotta Polesini and Riparo Salvini are winter residences (and Grotta Jolanda might also be interpreted as such), where are the summer residences? In principle, they could be in the mountains behind the plains (Monti Tiburtini, Lepini, and Ausoni), following Barker's (1974) ideas. Unfortunately, there is no evidence for occupation of those mountains, although systematic survey of them might show otherwise. It is worthy of note that Peschio Ranaro (Fig. 1), situated at about 600 m asl on the slopes of the Simbruini mountains in interior Latium and dated to the early Preboreal, yielded at least 30 ibex (Cardini, 1969). The location and the numerous backed microliths and microburins suggest that Peschio Ranaro could be interpreted as a spring–summer camp for the hunting of ibex or other animals (Biddittu, 1973; Bietti, 1984a).

DISCUSSION AND CONCLUDING REMARKS

Most of the radiocarbon dates presented above are acceptable. Their number will increase when Italian Paleolithic archaeologists realize that absolute dates are an a priori requirement for paleoethnological research, and not simply an a posteriori confirmation of typological classification.

Environmental studies of the Upper Paleolithic have concentrated on the fauna, using percentages of species to reveal climatic differences which are then used to confirm some subdivision based on the artifacts. Behavioral analyses, such as the distributions of anatomical parts, are generally ignored, since they are irrelevant to climatic and chronological studies.

In terms of the classical French division of Würm IV, in only a few cases (Palidoro, Cipolliane) it is possible to recognize temperate oscillations (Angles sur Anglin, Prebølling) within Dryas I. The Dryas II–Allerød–Dryas III sequence is recognizable almost everywhere in the peninsula, although it is less evident in Sicily. However, these oscillations do not seem to have been very marked, especially at the coastal sites, as would be expected because of the moderating influence of the sea.

The difference in fauna between the Tyrrhenian coast (dominance of red deer and wild ass) and the Adriatic coast (dominance of aurochs and horse) is very marked (Tables V and VI). The northern Italian sites show a definitely colder climate, with arctic birds (Arene Candide) and elk (Arene Candide, Riparo Tagliente) present up to Dryas III. Fishing was not very common and started essentially with Dryas III (Grotta della Madonna, for instance). The abundance of fish remains in the Fucino basin (Grotta di Ortucchio, Grotta La Punta) is obviously to be related with the presence of the lake.

The chronotypological classification described above is qualitative. Apart from the problem of extremely detailed subdivision, which may be based on a single site or even of a single layer of a site (Martini, in Bietti *et al.*, 1983b, pp. 338–341), the whole framework of chronological and regional phases, following Laplace (1964b), is built only on the basis of percentages of tools. In recent years, there have been more quantitative analyses, based on multivariate statistics. The first was that of Ammerman (1971), applying multidimensional scaling to 27 Evolved and Final Epigravettian assemblages; his basic data were the percentages of primary types according to Laplace's (1964b) classification. He found no indication of marked geographical, règional, or chronological trends.

Ammerman and Hodson (1972) then used constellation analysis on a larger set (35) of Evolved and Final Epigravettian assemblages. Again, there was no evidence of regional trends, but there was some evidence of chronological trends, particularly in restricted groups of tools, such as endscrapers or denticulates.

Coverini and others (1982) have proposed a quantitative classification of the Epigravettian using cluster analysis, beginning with a "distance of percentages" similarity coefficient, and using single, complete, average, and centroid linkage procedures. Data sets for the Early, Evolved, and Final Epigravettian were considered. The assemblages are more or less the same as in Palma di Cesnola's classification (1983a). The basic data were, inevitably, the percentages of the "elementary structure" (Laplace's main typological groups). The results are largely independent of the linkage procedure.

Three main clusters have been identified in the Early Epigravettian: the first includes Taurisano, Cuts 23–13 and 12–6, Paglicci Levels 18, 17, 16–15, and 14–12, Cipolliane Level 4, and Grotta delle Mura G; the second, Riparo Maurizio Cuts 14–12, Grotta Tronci Levels H–C, Niscemi, and Canicattini Bagni; and the third, Arene Candide P13–P8 and P7–P1 (called, respectively, F6–F4 and F3–F1 by Laplace). Except for the second, these clusters show geographical and regional but not time trends: the foliate and shouldered phases are mixed, in contradiction to the subdivision accepted by most scholars. Instead, the cluster analysis indicates that the shouldered phase is a local Early Epigravettian, virtually restricted to Apulia (Bietti, 1980a).

The regional and geographical trends disappear in the Evolved Epigravettian, where four main clusters have been identified; the first includes Palidoro Cuts 8–6 and Riparo Maurizio Cuts 7–3; the second, Grotta della Cala Levels O and N, Valle Ottara, Riparo Maurizio Cuts 11–8, Levanzo, and Grotta di C. Felice; the third, Palidoro Cuts 5–1, Paglicci Levels 9–8, Grotta della Cala Levels P and M, and S. Corrado in Sicily; and the fourth, the three cuts of Cipolliane Level 3.

In the Final Epigravettian, there are seven main clusters. One of them is composed of the following three subclusters: first, all the cuts of Grotta Polesini, Grotta delle Campane, Tane del Diavolo, and Riparo Tagliente Cut 4; second, Riparo Tagliente Cut 9 and Riparo Mochi A; and third, Piancavallo. Similarly, another main cluster includes the following subclusters: first, Arene Candide M5–M1 (called CIII–CI by Laplace), Arma dello Stefanin V–IV, and Grotta del Cavallo BI and BIIa; second, Grotta del Cavallo BIIb, Ugento and Grotta Jolanda; third, Grotta Paglicci 6–2; and fourth, Riparo Battaglia, Fiorentini, and Grotta Graziani.

These results agree with the multidimensional scaling and constellation analysis (Ammerman, 1971; Ammerman and Hodson, 1972) and disagree with the traditional classification. It is therefore surprising to read the following conclusions:

> This result confirms the observations of G. Laplace and his concept of subdivision of the final Italian Tardigravettian in regional "facies", with different phases with local evolution (Laplace 1964a, 1966) as well as the results of the more recent studies on the epigravettian industries (Bartolomei *et al.*, 1979; Martini, 1981). (Coverini *et al.*, 1982, p. 31)

The lack of regionalization, particularly in the Evolved and Final Epigravettian, is independent of the particular multivariate procedure employed: a cluster analysis using the same distance similarity coefficient as Coverini and collaborators but different groups of tools produced similar results for 40 Final Epigravettian and Mesolithic assemblages (Bietti, 1980b).

We have also used quantitative methods to analyze data on the Epigravettian of continental Italy presented at the Siena conference in 1983 (Bietti, 1985; Bietti and Burani, 1985). Since the traditional subdivisions are based on percentages of diagnostic types (shouldered tools, circular endscrapers, etc.) or ratios between types (burins: endscrapers, or elongated endscrapers: short endscrapers), we used the Student's t test (at the 99% confidence level) and linear stepwise discriminant analysis, as well as principal-component analysis. The parameters for each assemblage are the usual

Table XIV. Contingency Tables (Observed Frequencies) and Chi-Square Tests for Gravettian and Epigravettian Burials[a]

	Old	Recent	Total	
(a) Age				
Adults	17	16	33	$\chi^2 = 8.6$, $P < 0.005$
Children	0	10	10	$\chi^2(Y) = 5.8$, $0.01 < P < 0.025$
Total	17	26	43	
(b) Multiplicity				
Single burials	10	20	30	
Multiple burials	7	8	15	$\chi^2 = 0.421$, $0.50 < P < 0.75$
Total	17	28	45	
(c) Grave goods				
Rich	9	7	16	
Medium	6	3	9	$\chi^2 = 5.85$, $0.05 < P < 0.1$
Scarce or absent	2	10	12	$\chi^2(Y) = 3.9$, $0.1 < P < 0.25$
Total	17	20	37	
(d) Ocher				
Abundant	11	13	24	
Scarce	2	2	4	$\chi^2 = 0.06$, $0.75 < P < 0.90$
Absent	4	5	9	
Total	17	20	37	
(e) Position of the body				
On the back	10	20	30	$\chi^2 = 4.96$, $0.025 < P < 0.05$
Contracted	3	0	3	$\chi^2(Y) = 2.6$, $0.1 < P < 0.25$
Total	13	20	33	

[a]Old, Gravettian and Early Epigravettian burials; Recent, Final Epigravettian burials; (Y), values with Yates' correction; *P*, significance level for the difference between observed and expected frequencies.

percentages of tools and ratios between tools taken from Palma di Cesnola (1983a) (the abbreviations in parentheses are those in Table XV):

(1) percentage of burins (BUR);
(2) ratio of burins on retouch: simple burins (BR/BS);
(3) percentage of endscrapers (GRA);
(4) ratio of elongated endscrapers: short endscrapers (GL/GC);
(5) restricted index of circular endscrapers (IRC);
(6) ratio of burins: endscrapers (B/G);
(7) percentage of truncated tools (TRONC);
(8) percentage of backed points, bladelets, and fragments (PD–LD);
(9) percentage of truncated backed tools (DT);
(10) percentage of shouldered tools (CRAN);
(11) restricted index of shouldered tools (i.e., using the total of backed tools, borers, and truncated tools) (IRCR);
(12) percentage of geometric microliths (GM);
(13) percentage of foliates (FOL);
(14) percentage of the *substrat* (defined above) (SUBS);

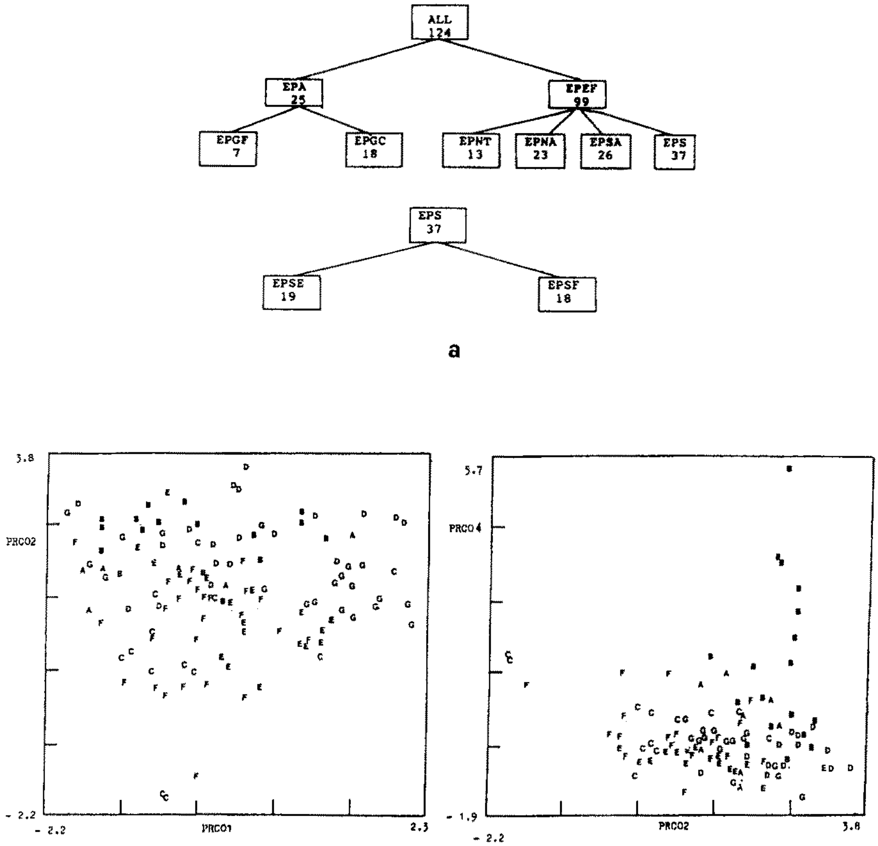
Table XV. Results of *t* Test and Linear Stepwise Discriminant Analysis of Continental Epigravettian Assemblages (from Bietti and Burani, 1985)[a]

Traditional classification (Siena, 1983)	Diagnostic Features	Mean ± SD	
EPGF	EPA–EPEF	EPA	EPEF
FOL important CRAN less important DT important	*t* test		
	GRA	9.84 ± 5.75	15.11 ± 8.37
	GL/GC	3.34 ± 4.31	1.49 ± 2.35
	DT	1.79 ± 3.0	3.71 ± 3.05
	CRAN	3.78 ± 3.39	0.46 ± 0.63
	IRCR	14.20 ± 11.86	1.24 ± 1.77
	FOL	1.37 ± 2.67	0.06 ± 0.16
	SUBS	4.04 ± 12.0	31.84 ± 12.59
EPGC	Stepwise discrimination (1) IRCR, (2) FOL, (3) B/G, (4) GL/GC		
FOL less important CRAN more important DT less important	EPGF–EPGC	EPGF	EPGC
	t test		
	FOL	4.11 ± 3.95	0.31 ± 0.48
EPNT	Stepwise discrimination (1) FOL, (2) TRONC, (3) DT		
B/G < 1, GL/GC from > 1 to < 1, GM present (low), IRC important, DT important	EPNT–EPNA	EPNT	EPNA
	t test		
	GRA	22.87 ± 10.27	10.11 ± 3.15
	IRC	15.98 ± 18.18	0.94 ± 1.64
	CRAN	0.48 ± 0.51	0.07 ± 0.16
	IRCR	1.48 ± 1.69	0.28 ± 0.89
EPNA	Stepwise discrimination (1) GRA, (2) CRAN, (3) IRC, (4) DENT, (5) IRCR, (6) TRONC		
B/G from > 1 to < 1, BR/BS < 1, GL/GC from > 1 to < 1, IRC and GM scarce, TRONC and DT important	EPNT–EPS	EPNT	EPS
	t test		
	BUR	4.68 ± 2.2	10.77 ± 6.09
	GRA	22.87 ± 10.27	12.95 ± 8.19
	IRC	15.98 ± 18.18	1.13 ± 1.92
	GM	1.35 ± 2.11	0.32 ± 0.57
	LR	13.60 ± 6.23	18.14 ± 5.35
	DENT	12.78 ± 7.32	6.92 ± 6.22
EPSA	Stepwise discrimination (1) IRC, (2) GM, (3) DENT, (4) GRA, (5) PD–LD		
B/G < 1 BR/BS > 1 GL/GC > 1 Gargano, < 1 Salento IRC important DT important GM present (low)	EPNT–EPSA	EPNT	EPSA
	t test		
	BUR	4.68 ± 2.2	11.73 ± 7.83
	Stepwise discrimination (1) BUR, (2) LR, (3) DT		

Table XV. Continued

EPSE	EPNA–EPSA	EPNA	EPSA
	t test		
	GRA	10.11 ± 3.15	18.70 ± 6.67
B/G > 1, GL/GC > 1	PD–LD	39.66 ± 18.54	22.93 ± 9.22
BUR abundant	CRAN	0.07 ± 0.16	0.80 ± 0.76
IRC = 0 GM low	IRCR	0.28 ± 0.89	2.14 ± 1.96
POINT and LR important	POINT	1.80 ± 1.89	4.35 ± 3.58
SUBS > PD–LD, DENT	Stepwise discrimination		
not important	(1) GRA, (2) CRAN,		
	(3) FOL, (4) PD–LD,		
	(5) B/G		
	EPNA–EPS	**EPNA**	**EPS**
	t test		
	GL/GC	2.99 ± 3.97	1.10 ± 1.19
EPSF	DT	4.82 ± 3.51	2.31 ± 1.51
	CRAN	0.07 ± 0.16	0.45 ± 0.64
B/G ≲ 1, GL/GC < 1	LR	10.23 ± 7.28	18.14 ± 5.35
BUR less important	Stepwise discrimination		
GRA more important	(1) LR, (2) SUBS,		
IRC and GM low	(3) DT, (4) GL/GC		
DT important			
LR less important	**EPSA–EPS**	**EPSA**	**EPS**
DENT more important			
PD–LD > Subs	*t* test		
	BR/BS	1.41 ± 0.84	0.63 ± 0.37
	GRA	18.70 ± 6.67	12.95 ± 8.19
	IRC	6.83 ± 10.52	1.13 ± 1.92
	PD–LD	22.93 ± 9.22	34.75 ± 15.45
	DT	5.08 ± 3.76	2.31 ± 1.51
	POINT	4.35 ± 3.58	1.87 ± 1.47
	LR	13.60 ± 6.23	18.14 ± 5.35
	Stepwise discrimination		
	(1) BR/BS, (2) PD–LD,		
	(3) LR, (4) CRAN,		
	(5) BUR, (6) FOL		
	EPSE–EPSF	**EPSE**	**EPSF**
	t test		
	IRC[b]	0.	
	GRA	7.23 ± 3.68	18.99 ± 7.24
	TRONC	6.25 ± 3.06	3.67 ± 2.31
	DT	1.62 ± 0.99	3.04 ± 1.64
	DENT	9.92 ± 6.87	3.75 ± 3.37
	Stepwise discrimination		
	(1) GRA, (2) GM,		
	(3) DENT		

[a] For abbreviations, see text.
[b] IRC is obviously diagnostic, being 0 for the group EPSE.



a b c

Fig. 17. (a) Tree structure of the continental Italian Epigravettian. EPA, Early Epigravettian; EPGF, Early Epigravettian with foliates; EPGC, Early Epigravettian with shoulders; EPEF, Evolved and Final Epigravettian of the northern Tyrrhenian (EPNT), central and northern Adriatic (EPNA), southern Adriatic (EPSA), and central and southern Tyrrhenian (EPS) zones; EPSE and EPSF, Evolved and Final Epigravettian of southern Tyrrhenia. (b) Projection of continental Italian Epigravettian assemblages along the first two principal axes. A, EPGF; B, EPGC; C, EPNT; D, EPSE; E, EPSF; F, EPSA; G, EPNA. (c) Projection of continental Italian Epigravettian assemblages along the second and fourth principal axes (from Bietti, 1985).

(15) percentage of points (POINT);
(16) percentage of retouched blades (LR); and
(17) percentage of notches and denticulates (DENT).

Figure 17(a) shows the resulting tree structure. The Early Epigravettian (EPA) has two branches: the initial plus foliate phases (EPGF) and the shouldered phase (EPGC). The Evolved and Final Epigravettian (EPEF) fall into regional facies: northern Tyrrhenian (EPNT), northern and central

Adriatic (EPNA), southern Adriatic (EPSA), and central and southern Tyrrhenian (EPS). For statistical reasons, a further subdivision between the Evolved (EPSE) and the Final Epigravettian (EPSF) was done only for the last region.

Almost all of the sites described above are included in the tree structure. The initial and foliate node includes Riparo Mochi C, Aia al Colle, Paglicci 18a and 17, Arene Candide P13–P8, Cala delle Ossa, and Parabita A. The shouldered node includes Arene Candide P7–P1, Grotte des Enfants F, Poggio alla Malva, Ponte di Pietra, Maurizio 14–12, Tronci H–C, Paglicci 16–12, Taurisano 23–6, Mura G, and Cipolliane 4. The northern Tyrrhenian node includes Grotte des Enfants E–C, Mochi A, Arene Candide M5–M1, Arma dello Stefanin V–IV, Arma del Nasino XIII–XII, and Grotta delle Campane. The northern and central Adriatic node includes Tagliente 16–4, Battaglia, Fiorentini, Viotte, Piancavallo, Andalo, Maurizio 11–3, C. Felice, Graziani, and Ortucchio. The southern Adriatic node includes Paglicci 9–1, Cipolliane 3i–3s, 2, 1, Mura F–D, S. Croce, Taurisano 5–1, Ugento B. Cesira and P. Zecca, Romanelli E–A, and Cavallo BII–I. The central and southern Tyrrhenian Evolved Epigravettian node (EPSE) includes Biedano VI–II, Cenciano Diruto IV–I, Palidoro 7–1, and Grotta della Cala P–M. The Final Epigravettian node (EPSF) includes Grotta della Cala L–G, Mezzogiorno 20–4, Polesini 12–1, Grotta Jolanda, Riparo Salvini Layer D, Square B, Cuts XII–X, and Biedano I. Grotta del Prete, Grotta della Ferrovia, Grotta La Punta, and Grotta Maritza have been omitted from the northern and central Adriatic node because the available data are incomplete. The percentages of the industries of Palidoro, Taurisano, and Riparo Salvini are based upon recent analyses (Bietti, 1976–1977, 1979, 1984b), rewritten in Laplace's terms.

In the principal-component analysis, the first six principal components account for > 92% of the total variance (Bietti, 1985, Table II). For the first principal component (48.8% of the total variance), the features with the highest factor loadings are PD/LD, SUBS, LR, and DENT (the last three are obviously interconnected since retouched blades and denticulates are part of the *substrat*). For the second principal component (15.6% of the total variance), the features with the highest factor loadings are GRA, IRC, IRCR, and again, PD/LD, SUBS, and LR. Figure 17b shows the scatter plot of the 124 assemblages along these first two principal axes: the distribution is very similar to those obtained by Ammerman and Hodson (1972) and Coverini and others (1982), and again, there are no obvious trends. We note the existence of a cluster of two northern Tyrrhenian sites, Arma del Nasino XIII and XII (Fig. 17b, F) and one southern Adriatic site (Romanelli A–B; Fig. 17b, C). The only likely example of geographical clustering is the group of northern Adriatic assemblages at the right of the plot (Fig. 17b, G), which includes several layers of Riparo Tagliente, Viotte, Andalo, and Piancavallo.

Among the minor principal components, the features with the highest factor loadings for the fourth component (6.8% of the total variance) are IRC, CRAN, IRCR (obviously associated with each other), and LR. In the scatter plot of the assemblages along the second and fourth principal axes (Fig. 17c), the three isolated assemblages on the left are the ones at the bottom in Fig. 17b. More interesting is the group of shouldered Early Epigravettian assemblages (B) near the top right; they include layers of Grotta Paglicci, Taurisano, and Riparo Maurizio. Again, as Coverini and others (1982) found, the shouldered Early Epigravettian seems to be restricted to the southern Adriatic zone.

Table XV gives the results of the *t* test and stepwise discriminant analysis. The first column summarizes the traditional diagnostic features and the second column gives the results of the quantitative analyses. Except for the order of importance given by the stepwise discriminant analysis, the features selected by the two quantitative methods are essentially the same, and neither agrees with the traditional qualitative scheme. In accord with the other analyses, the shouldered tools do not differentiate the two Early Epigravettian phases. Surprisingly, the circular endscrapers are not diagnostic between the Early and the Evolved Epigravettian nodes. This may be because according to Laplace (1964b, 1966) there were some circular endscrapers in Riparo Mochi C and because these tools are very rare in the northern and central Adriatic and in central and southern Tyrrhenia. It is interesting that the "shortening" of the endscrapers (the diagnostic value of the ratio GL/GC) is recognized by the quantitative analyses. The discrepancies are even more evident among the subdivisions of the Evolved and Final Epigravettian. In the northern and central (EPNA) and southern (EPSA) Adriatic zones, the *only* diagnostic feature common to the qualitative and quantitative analyses is the burin : endscraper ratio, although this was the last sorted by the discriminant analysis and was not selected by the *t* test. The situation for the northern Tyrrhenian (EPNT) and southern Adriatic (EPSA) nodes is qualitatively in accord with the abundance of short and circular endscrapers in both regions; quantitatively, however, burins, retouched blades, and truncated backed pieces are unexpectedly diagnostic. Comparison of the Evolved (EPSE) and Final (EPSF) Epigravettian of central and southern Tyrrhenia is also discrepant in that there is no quantitative inversion of the B/G and GL/GC ratios, as there was qualitatively. Truncated backed pieces are the only diagnostic feature common to both analyses. Denticulates are more common in the Evolved than in the Final Epigravettian (Table XV), which is the opposite of the traditional analysis.

Overall, the results of the quantitative analyses are very different from traditional classifications, but all of them—*t* test, discriminant analysis, and the four multivariate techniques—are very consistent with each other.

Traditionalists might object that the difference arises from the choice of basic data and that the typological groups are too broad a basis for the detection of regional or temporal differences; as noted above, Ammerman and Hodson (1972) get better results using only one group of tools. The use of only one group of types, however, is in conflict with the traditional approach, and if it were to be used, the features chosen as basic data should involve the more detailed "secondary attributes" of Laplace's scheme. These attributes are often described but have *never* been used quantitatively. I also suspect that analysis of them would refer more to the functional aspects of the tools (Bietti *et al.*, 1983a; Bietti, 1989), as well as technology and reduction sequences, and would thus be completely at odds with the approach of the chronotypologists.

Traditionalists may further object that even though the quantitative analyses do not support the qualitative diagnostic types, this does not mean that they do not exist; we need merely to redefine them on the basis of the results in Table XV. However, all the statistical analyses are based on the unfounded assumption that the assemblages are random samples of larger populations. We have discussed the intrasite variability at Cipolliane and Riparo Salvini, and comparison of the means and standard deviations in the third and fourth columns in Table XV indicates the great variability in the data. This variability arises from functional differences between sites and sampling bias within them (because of the incomplete recovery of material). The qualitative and quantitative analyses, however, are based on the assumption that all the assemblages are equivalent.

I believe that we should regard the Early, Evolved, and Final Epigravettian as a priori chronological divisions based on absolute dates. Many of the difficulties noted throughout this paper arise purely from attempts to make typological definitions of Epigravettian chronological phases and to separate the Epigravettian from both the Gravettian and the Mesolithic.

The essential weakness of chronotypology lies in the forcible division of prehistory into archaeological facies, rather than thinking in terms of processes. In this respect, Radmilli's (in Bisi *et al.*, 1983, p. 252) suggestion of a "Bertonian" culture throughout Würm IV in Abruzzi may be useful, although we do not yet have sufficient data to establish its existence. In the Salento in southern Apulia, there is some evidence of continuity, especially in technology, from sites such as Taurisano up to Grotta Romanelli and the upper layers of Grotta del Cavallo and Cipolliane. Sicily also seems to be a well-defined region. The similarity between the Final Epigravettian of Liguria and the Apulian sites may be more apparent than real, since no comparison has yet been made of the two, other than typological. Onoratini's (1983) proposal to divide the Ligurian sites into Arenian, Protobouverian, and Bouverian facies is simply a francophile version of the traditional Italian subdivision, although Liguria might be culturally closer to Provence than, for example, Tuscany.

However, the basic problems remain methodological. Traditionalist fieldwork is devoted to vertical stratigraphies rather than horizontal variability, and the aim is to find a reference site (such as Paglicci) from which archaeological facies can be defined. I believe, instead, that we should start from the context of each site, considering all possible intrasite variability and trying to correlate the different aspects of the archaeological record (rather than reporting the fauna in an appendix and otherwise ignoring them); only then should we approach intersite variability. It takes time to change a paradigm; there are already a few glimmers of concern with more behavioral approaches, but they are very few. We saw above that, even within a limited area such as central and southern Latium, it took tremendous effort to draw detailed conclusions on the subsistence and settlement pattern. To extend such investigation throughout Italy would be an enormous undertaking, although the results would revolutionize study of the Epigravettian.

I hope that this account of the status of research into the Italian late Upper Paleolithic has given some idea of the strengths and weaknesses within that field and that some scholars may be persuaded to adopt a more behaviorally oriented approach to the study of our hunter-gatherer ancestors.

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