Ten small sites: the diversity of the Italian Aurignacian

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ABSTRACT A minimum of 30 Aurignacian sites are known to exist in Italy, either as stratified cave sites, or as open air settlements, often disturbed by farming activity. Uncalibrated ^{14}C dates range approximately 38 to 30 kyr BP, but most sites are undated. Human groups settled into very different environments, both in peninsular Italy and in Sicily, from sea-level to 1400m asl and more in the Alps and Apennines, and the type of animals exploited (red deer, ibex, equids) varied following these diverse habitats. Flint and other suitable raw-material vary in quantity, quality and size, even within relatively short distances. Accordingly, different reduction sequences were used for the production of blades, bladelets and other blanks. The archeological evidence points to a sparse population, with human groups meeting during seasonal movements, and/or linked by a well-organized network of raw-material exchange.

Introduction

The Aurignacian in Italy is represented by a minimum of 30 sites located in stratified cave deposits or open air surface scatters (Mussi, 2001). A few, as Riparo Mochi and Riparo di Fumane, are major sites which have been long known in the international scientific literature. Most, however, are either recent discoveries, smaller occurrences, or have been published years ago, sometimes only in local journals. To discuss the variability and diversity of the Italian Aurignacian, we will illustrate and briefly describe Barma Grande and Riparo Bombrini, both at the Balzi Rossi in Liguria; Lemignano in the Po valley; Grotta Salomone and the Cinquemiglia open air sites in Abruzzo; Sugherone, Grotta del Fossellone and Grotta Barbara in coastal Latium; Grotta del Cavallo in Apulia and Fontana Nuova di Ragusa in Sicily. Reference to more will be made in the discussion and conclusions.

Radiocarbon chronology is not available at most sites and only a few Aurignacian deposits have been dated at all (Table 1). Given the fluctuation of atmospheric radiocarbon concentration between 40 and 30 kyr BP (Beck et al., 2001; Voelker et al., 2000), the Aurignacian can just be loosely bracketed between 38 and 30 kyr BP.

Depending on habitat, red deer, equids and to some extent ibex, were all frequently hunted (Table 2). Other ungulates found in the archeological deposits are *Sus scrofa*, *Capreolus capreolus*, *Dama dama*, *Megaloceros* cf. *giganteus*, *Bos primigenius*, *Bison priscus*, *Rupicapra* sp. (Alhaique et al., 1998; Boscato, 1994; Cassoli and Tagliacozzo, 1991; Masini and Abbazzi, 1997; see also Mussi, 2001, for references). The carnivores include *Vulpes vulpes*, *Canis lupus*, *Gulo gulo*, *Ursus spelaeus*, *Ursus arctos*, *Crocuta crocuta*, *Felis sylvestris*, *Lynx lynx*, *Panthera (Leo)* sp., *Panthera pardus*. *Alopex lagopus*, the polar fox, is possibly present at Riparo di Fumane.

Information on local vegetation is available at some sites, where palynological or anthracological analysis was done (Riparo Mochi, Riparo Bombrini, Riparo di Fumane, Grotta La Cala, Grotta di Castelcivita). However, palynological sequences for establishing a regional framework are only available in the Latium region of west-central Italy, at low elevation. Over

time, there is a trend from an open woodland to a woodland-steppe, eventually followed by the development of a steppe, with *Artemisia* generally dominant. Weak tree expansions occur at ca.38-36 kyr, at 32 kyr, and again at 30 kyr BP (Follieri et al., 1998).

TABLE 1

Radiocarbon dates of the Aurignacian sites in Italy. Italics: conventional ^{14}C dates made before 1980. Please note that at Grotta di Paina there is just a small amount of archaeological material, from the top of the dated level.

Site and level	*Result*
Mochi level G	32 280±580 BP (OxA-3588)
Mochi level G	33 400±750 BP (OxA-3589)
Mochi level G	34 680±760 BP (OxA-3590)
Mochi level G	35 700±850 BP (OxA-3591)
Mochi level G	34 870±880 BP (OxA-3592)
Fumane D3b	31 700/+1200/-1100 (UtC-1775)
Fumane D3b	32 300±400 (UtC-2045)
Fumane D6	32 300±500 BP (UtC-2046)
Fumane A1	31 900±500 BP (UtC-2049)
Fumane A2 (porch)	32 100±500 (UtC-2047)
Fumane A2 (porch)	31 600±400 (UtC-2044)
Fumane A2 (porch)	32 800±400 (UtC-2051)
Fumane A2 (porch)	40 000/+4000/-3000 (UtC-1774)
Fumane A2 (cave)	36 500±600 (UtC-2048)
Fumane A2 (cave)	36 800/+1200/-1400 (Utc-2688)
Fumane A2 (cave)	35 400/+1100/-1300 (Utc-2689)
Fumane A2 (cave)	34 200/+900/-1000 (UtC-2690)
Grotta di Paina level 9	38 600/+1400/-1800 BP (Utc-2695)
Grotta di Paina level 9	37 900±800 BP (Utc-2042)
Serino	*31 200±650 BP (F-108)*
Grotta di Castelcivita tg 6	32 390±490 BP (CAMS-4622)
Grotta di Castelcivita tg 8	*31 950±650 BP (F-105)*
Grotta di Castelcivita tg 9	*32 930±720 BP (F-72)*
Grotta La Cala	*29 800±870 BP (F-70)*
Grotta Paglicci level 24	29 300±600 (Utrecht)
Grotta Paglicci level 24	34 300±800 (Utrecht)

TABLE 2

Dominant ungulates, with NISP percentages.

	Cervus elaphus NISP%	*Equus caballus* NISP%	*Equus hydruntinus* NISP%	*Capra ibex* NISP%
Riparo di Fumane				47
Grotta del Fossellone	36		53	
Grotta di Castelcivita		40		
Grotta La Cala levels 10-13	57			
Grotta Paglicci level 24			46	
Riparo di Fontana Nuova	93			

Sources: *Grotta La Cala*: Benini et al., 1997. *Grotta di Castelcivita*: Gambassini, 1997. *Riparo di Fontana Nuova*: Chilardi et al., 1996. *Grotta del Fossellone*: Alhaique et al., 1998. *Riparo di Fumane*: Cassoli and Tagliacozzo, 1991. *Grotta Paglicci*: Boscato, 1994.

Aurignacian sites

Barma Grande

Barma Grande (the "Great Cave" in the local dialect) is one of several caves and rockshelters opening on the Mediterranean shore, next to the modern political boundary with France (Fig. 1). It was by far the richest Upper Paleolithic site of the Balzi Rossi cliff. Reference to more than 50 000 lithic implements just from this cave can be found in the literature (Bolduc et al., 1996). This is only a fraction of the finds, as the excavations were performed in the 19th century, well before the age of scientific archeology. Then, approximately half of the Barma Grande was blown-up during quarrying activity (Fig. 2).

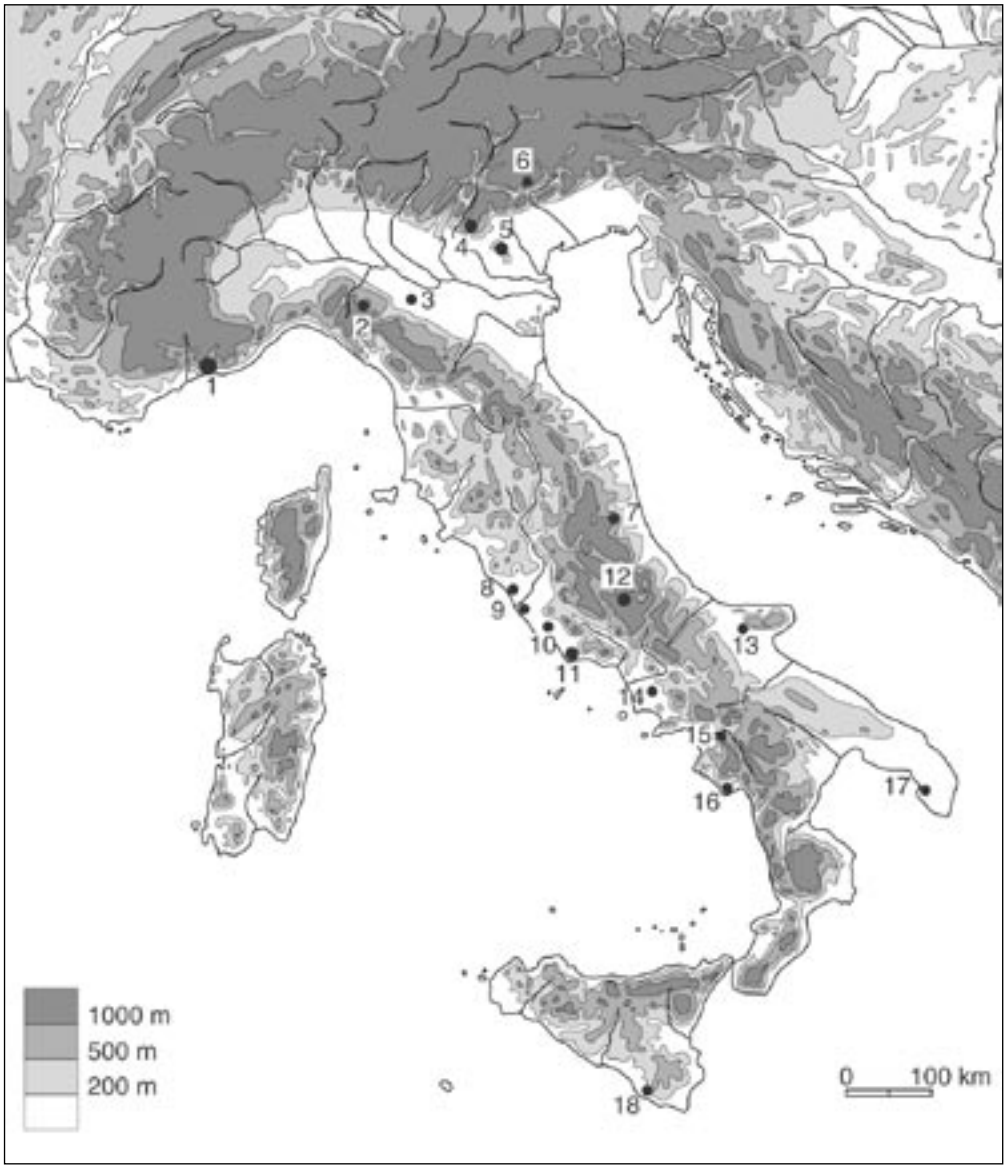

FIG. 1 – Location of Aurignacian sites described or mentioned in the text. 1. Grimaldi or Balzi Rossi sites (Grotta dei Fanciulli, Grotta del Caviglione, Riparo Mochi, Riparo Bombrini, Barma Grande, Baousso da Torre); 2. Ronco del Gatto; 3. Lemignano; 4. Riparo di Fumane; 5. Grotta di Paina; 6. Monte Avena; 7. Grotta Salomone; 8. Maccarese; 9. Sugherone; 10. Canale delle Acque Alte; 11. Grotta del Fossellone, Grotta Barbara; 12. Fonte Chiarano, Pantanello, Le Macerete; 13. Grotta Paglicci; 14. Serino; 15. Grotta di Castelcivita; 16. Grotta La Cala; 17. Grotta del Cavallo, Grotta M. Bernardini, Grotta di Uluzzo, Grotta di Uluzzo C, Grotta di Serra Cicora; 18. Fontana Nuova di Ragusa.

FIG. 2 – Barma Grande and part of the Balzi Rossi cliff. On the left of the extant cave, the lighter coloured rock wall, on which the arrow is superimposed, was produced by 19th century quarrying activity. Other caves and shelters open behind the quarry site and cannot be seen in this picture. In the foreground, the town of Menton, in French territory (photo M. Mussi).

Some evidence can be gained from the study of ca.300 lithic implements excavated by L. A. Jullien[1] in 1883-1884; and of 260 more tools unearthed by Abbo, a quarry-man, in subsequent years[2].

Part of the Jullien collection can be safely attributed to the Aurignacian on a typo-technological basis, including some carinated endscrapers, and endscrapers on an Aurignacian blade, all with a rather glossy patina (Bolduc et al., 1996) (Fig. 3). More Aurignacian blades and endscrapers were illustrated by Cardini (1930), together with two[3] split-based bone points (Fig. 4).

The Aurignacian was originally found nearly everywhere at the Balzi Rossi, above Mousterian layers. The rather mixed deposit of "foyer" K at Grotta dei Fanciulli ("Grotte des Enfants" in the French literature), excavated by the team of Prince Albert I of Monaco, included a couple of bone points with a split base (De Villeneuve et al., 1906-1919), and a few more were previously discovered by E. Rivière at Grotta del Caviglione and at Baousso da Torre (Rivière, 1887) (Fig. 5). Riparo Mochi and Riparo Bombrini, also at the Balzi Rossi, are all that is left to modern archeologists of what must have been a once vast Aurignacian complex.

Riparo Bombrini

Riparo Bombrini is one of the last discovered Upper Paleolithic sites at the Balzi Rossi, as L. Cardini noticed archeological material at this spot in 1938. By then, the rockshelter had already been badly damaged by railway construction. G. Vicino did salvage excavation in 1976, and new research, currently under way, started in 2002 (Vicino, 1984; Holt et al., 2003).

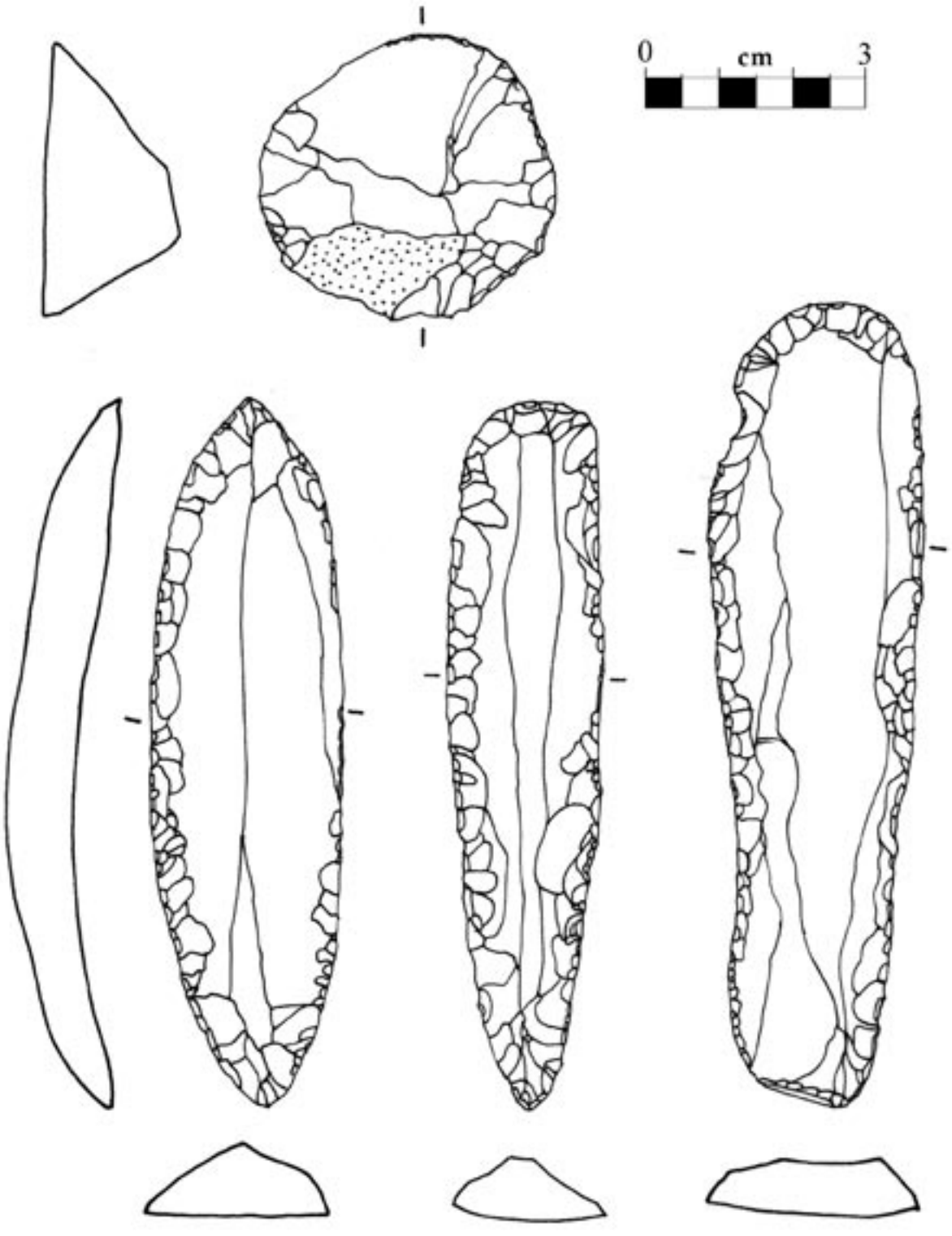

FIG. 3 – Aurignacian lithic industry from Barma Grande (drawings M. Mussi).

FIG. 4 – Bone points from Barma Grande, including two split-based specimens (photo F. Negrino).

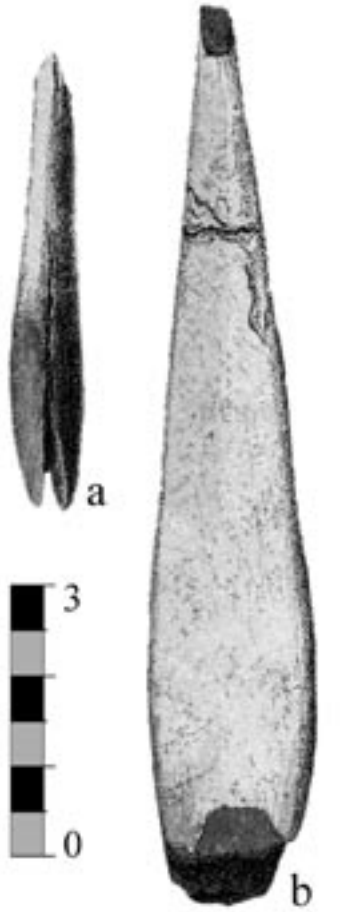

FIG. 5 – Split-based bone points from: a) Grotta del Caviglione; b) Baousso da Torre (after Rivière 1887, with modifications).

A rich Aurignacian deposit, with two hearths, was discovered where the innermost part of the shelter once stood. Mousterian layers were also found, but there is evidence of an erosion phase between the Middle and the Upper Paleolithic.

The lithic assemblage is made mostly by debitage: flakes and bladelets, a few prismatic cores, and some pyramidal cores. There are several Dufour bladelets, some splintered pieces, but only a few formal tools such as endscrapers, burins, and scrapers. Local raw-material was mostly used, but exotic flint was also imported from Vaucluse and Provence, together with ryolithic rocks from the Estérel massif. Some jasper originated from eastern Liguria and from over the Apennines near Parma (Fig. 16) and some tiny bladelets of very characteristic flint (brown to reddish in color) apparently originated from the Scaglia formation of the Marche region, on the Adriatic side of the Italian peninsula, and 350 km away (Negrino and Starnini, 2003).

Bone points (not with a split base), perforated marine shells, a steatite fragment, red ocher, and three tiny incised bird bones (Fig. 6) were also found. Deer and horse remains have been so far identified. A deciduous human lower central incisor was also discovered.

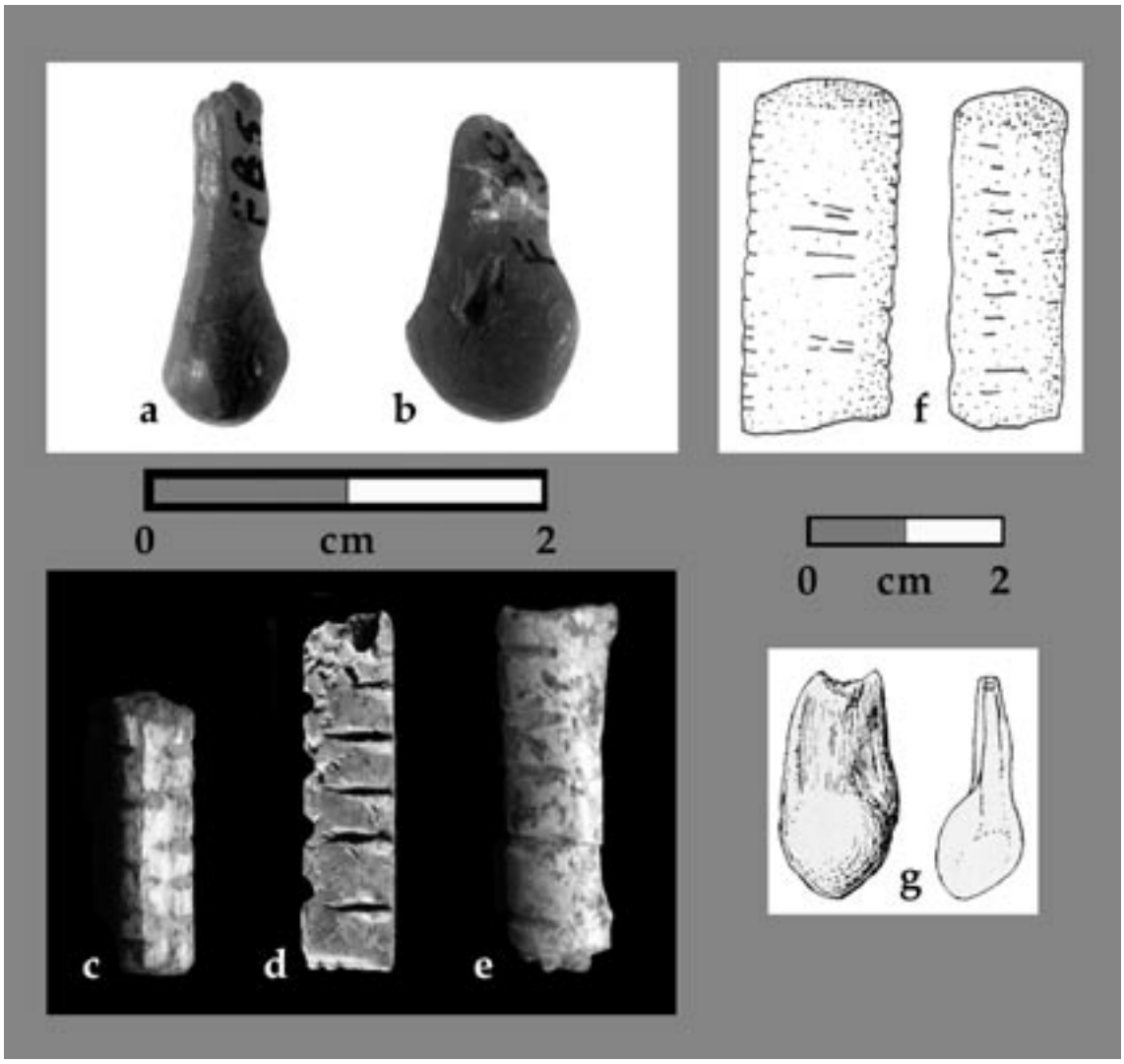

FIG. 6 – Ornaments and decorated items from Aurignacian sites at different scales: a-b. steatite pendants, Grotta del Fossellone; c-e. incised bird bones, Riparo Bombrini; f. incised limestone element, Riparo di Fontana Nuova; g. perforated deer canine, Grotta del Fossellone.

Lemignano

Lemignano is an open air site on the Po plain, near Parma, where lithic implements were collected in great numbers after farming activity: about 3800 over an area of ca.13 000 m² (Ghiretti et al., 1991). The archeological remains were apparently covered by a thin deposit of loess, and were disturbed by plowing. Good quality jasper was available nearby as rather large river pebbles of 10-30 cm and more in length, and was knapped on the spot (87,25%), as evidenced by large numbers of flakes, very often with cortical surface. Some flint (2,35%) also originated from the Scaglia Formation (see above), which from Lemignano outcrops at a distance of some 180 km away. There are just a few blades, including crested ones, and over 50 cores, mostly prismatic and pyramidal. These were reduced to produce elongated flakes and blades.

The retouched tools, 100 in all, were classified as follows: mostly endscrapers, including keeled and nosed forms (Fig. 7); some notches and scrapers; and burins, which are also cari-

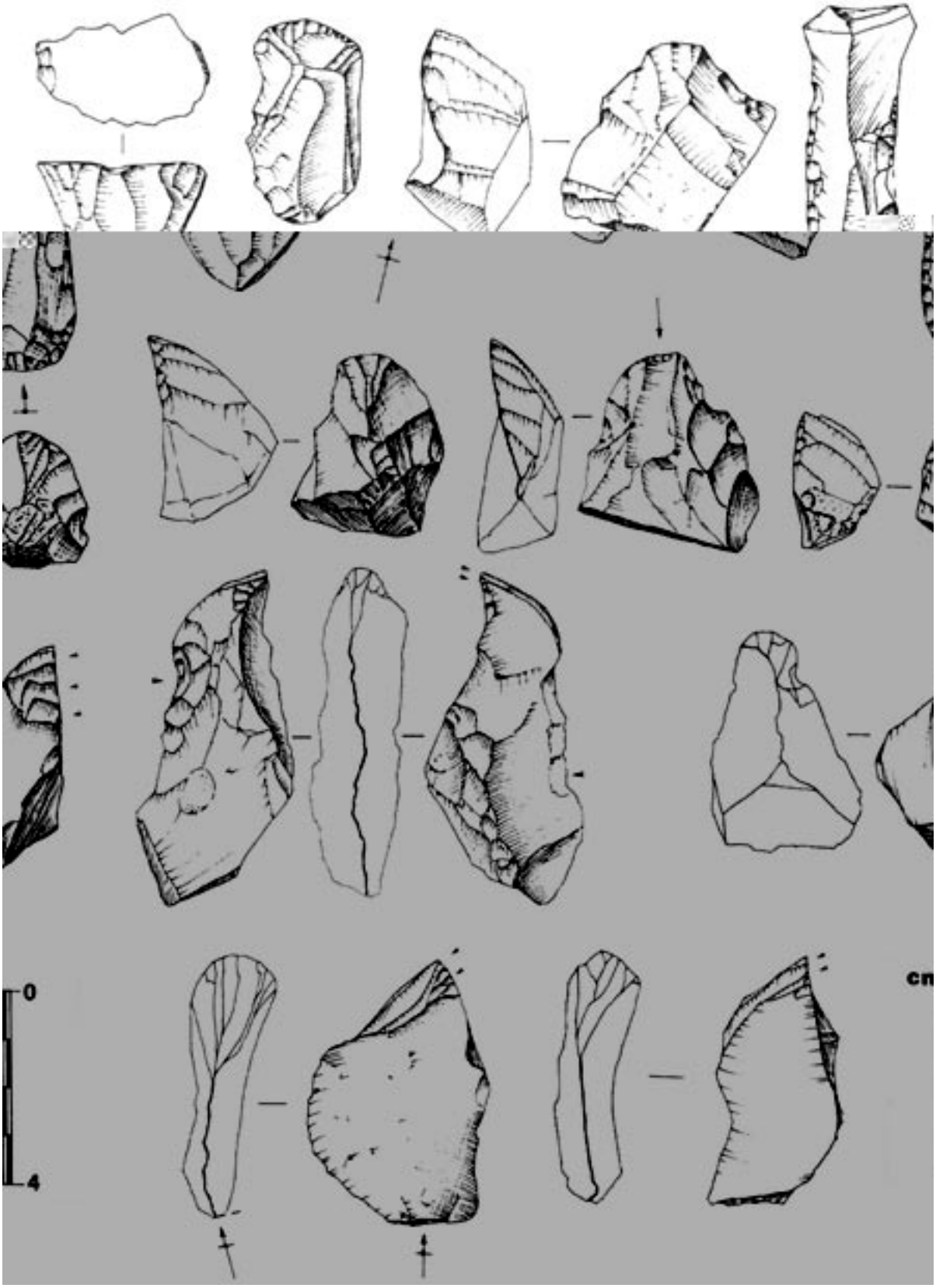

FIG. 7 – Aurignacian lithic industry from Lemignano (drawings F. Negrino).

nated and better interpreted as microblade cores (Le Brun-Ricalens and Brou, 2003). Lithic types such as Vachons burins and busked burins, rarely found in Italy, were also recognized at Lemignano.

Grotta Salomone

Grotta Salomone is a cave on the eastern side of the Apennines, at 590 m asl, not far from the Adriatic shore. The ceiling collapsed in the 16th century, so that the reworked archeological deposit of Grotta Sant'Angelo, which opens just above it, ended in the lower cave. This rather disturbed site was excavated in the sixties of last century by A. M. Radmilli, who eventually published a sketch of the stratigraphy (Radmilli, 1977).

The cave apparently was a cave bear den, and only a handful of implements were reportedly found: some blades and endscrapers, a crested blade and a nearly complete bone point with a split base (117 x 18 x 6 mm) (Fig. 8).

FIG. 8 – Split-based bone point from Grotta Salomone (photo M. Mussi).

The Cinquemiglia open air sites of Abruzzo

Aurignacian lithic implements can be found much higher in the mountains of Abruzzo, and most notably in the Cinquemiglia area, a region of plateaus and rolling mountains at 1000 to 2000 m asl[4]. So far, tools and debitage have been either collected, or retrieved when excavating open air sites which were highly disturbed by diagenic activity. The sites, at an elevation between 1300 and 1600 m asl, include Fonte Chiarano, not far from a flint outcrop, with blades and bladelets generally lacking cortex; Pantanello, next to a marshy area which most probably was a small lake in the final Pleistocene; and Le Macerete, with evidence of quarrying activity and flint exploitation (Fig. 9).

Overall, there is evidence of blade and bladelet production by direct percussion. Hard hammer technique was positively in use during the first steps of core reduction.

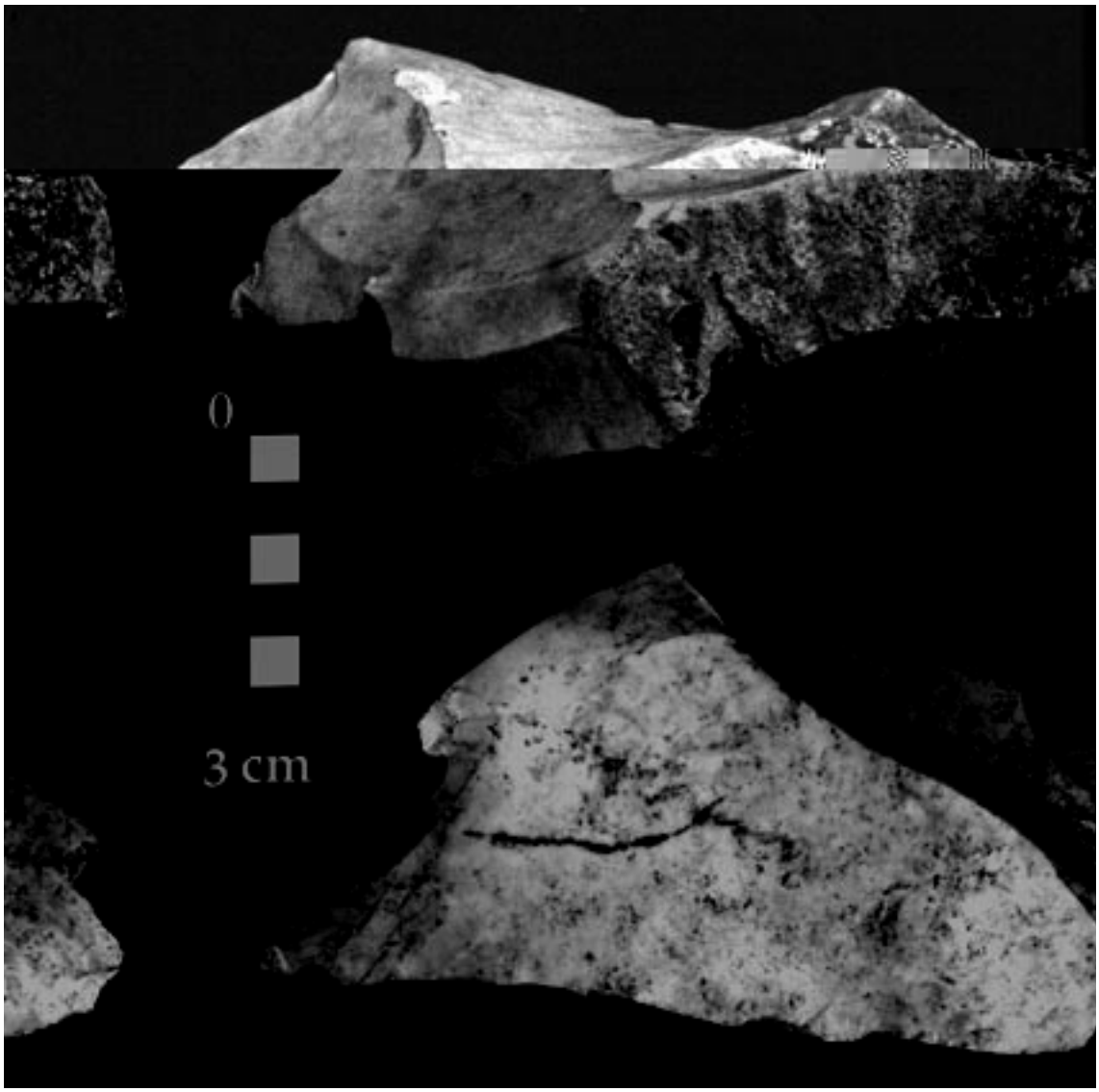

FIG. 9 – Carinated burin or bladelet core from Le Macerete (photo M. Mussi).

Sugherone

In-between Rome and the modern sea shore stands Sugherone, an open air site on an Upper Pleistocene marine terrace at 50-60 m asl. Systematic and repeated surface collections were made a decade ago, and stratigraphic trenches were dug[5] (Arnoldus-Huyzendveld et al., 1996). Over an area of ca.3000 m^2, approximately 2000 artifacts were collected, which can be safely labeled as Aurignacian on typological and technological grounds (Fig. 10). The local stratigraphic sequence included thick deposits of OIS 5, which had been affected by erosional processes (OIS 4?), and eventually capped by sands. The lithic industry, when found *in situ*, was laying at the base of the sands, as well as within the lowermost sand deposit.

Preliminary information is available on a sample of 800 implements. As at most sites of coastal Latium (see below), flint pebbles were knapped, of moderate size. A bipolar flaking technique was often used. Most of the formal tools are endscrapers, which include carinated and nosed types. Burins are few, retouched blades include Aurignacian blades, and notches outnumber denticulates.

Aurignacian artifacts are found in similar stratigraphic situations all over coastal Latium. At Maccarese, where no subsequent sand deposition occurred, the archeological deposit is a palimpsest dating from OIS 5 to OIS 2 (Arnoldus-Huyzendveld et al., 1993). At Canale delle Acque Alte, there is a sequence starting with a Tyrrhenian beach, and covered by sands, which was reported by A. C. A. Blanc (1937a; see also Mussi and Zampetti, 1984-1987).

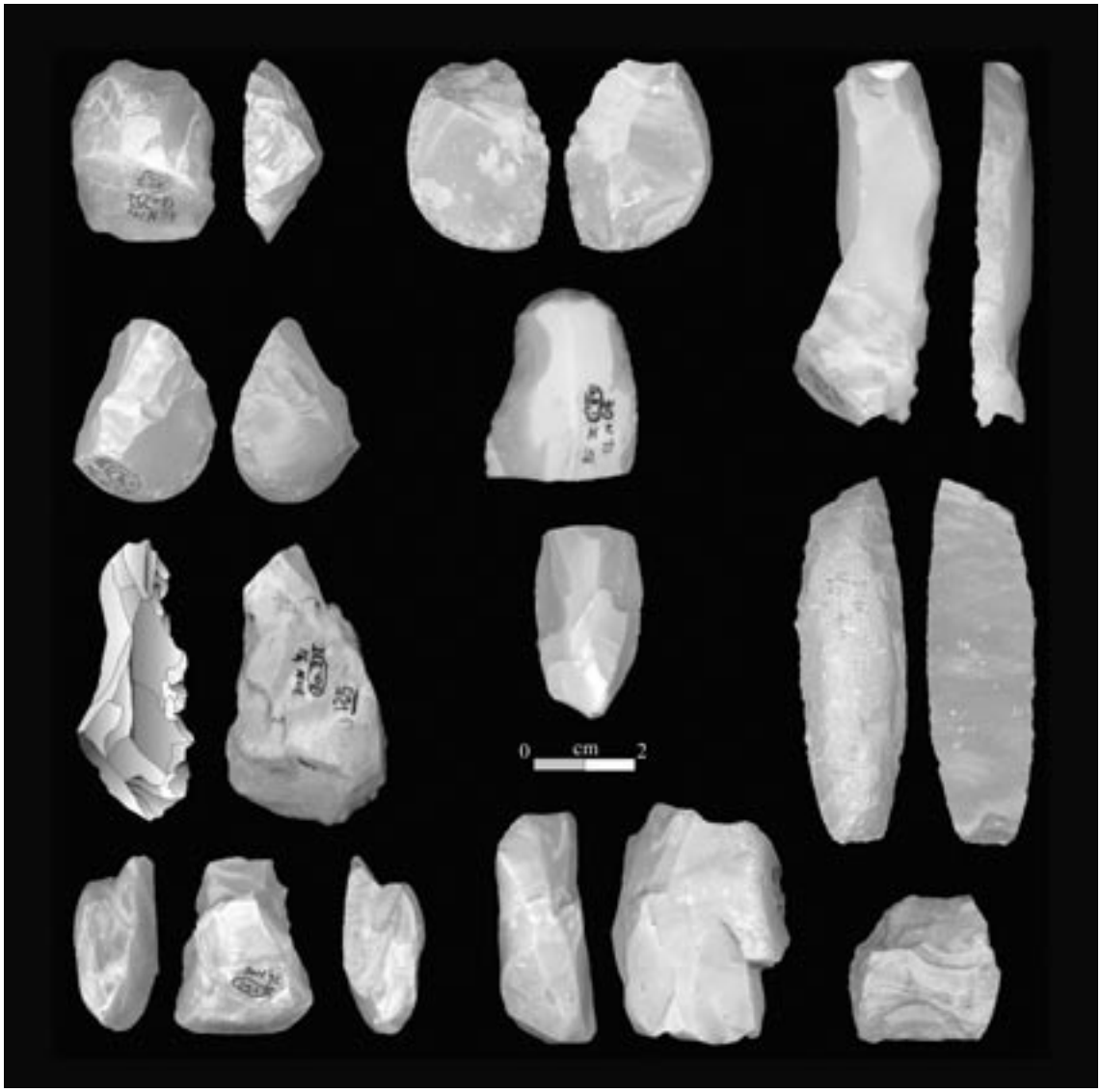

FIG. 10 – Aurignacian lithic industry from Sugherone (photo P. Gioia).

Grotta Barbara

Grotta Barbara is a small cave 12 m long and 4 m wide, opening on the southern cliffs of Monte Circeo, 100 km south of Rome, not far from Grotta del Fossellone (see below). The archeological deposit stands at ca.8 m asl and is currently eroded by stormy waves. Aurignacian layers, which originally accumulated over 50 cm or more, are found as residual deposits in protected parts of the cave, directly on top of Mousterian levels (Mussi and Zampetti, 1995). Remains discovered consist of *Equus hydruntinus, Equus caballus, Dama dama, Cervus elaphus, Bos primigenius/Bison, Capra ibex, Vulpes vulpes, Lepus/Oryctolagus*[6].

As at other sites in coastal Latium, most of the flint derived from small pebbles. Those locally available were of good quality, but hardly more than 60 mm in maximum length, and usually between 20 and 40 mm. Most of the 100 or so formal tools are endscrapers (nosed, shouldered, on an Aurignacian blade), but a few burins, as well as notches, denticulates, borers, truncations, and retouched blades, are all part of the typological inventory. Blades are rare, and quite reduced in size, while carinated endscrapers, which could be the result of bladelet production, are simply not found (Fig. 11). Flaking was very often bipolar, and several reduction sequences have been described, which allowed for the production of bladelets, either plain or with a trihedral section (D'Angelo and Mussi, 2005) (Fig. 12). Other trihedral

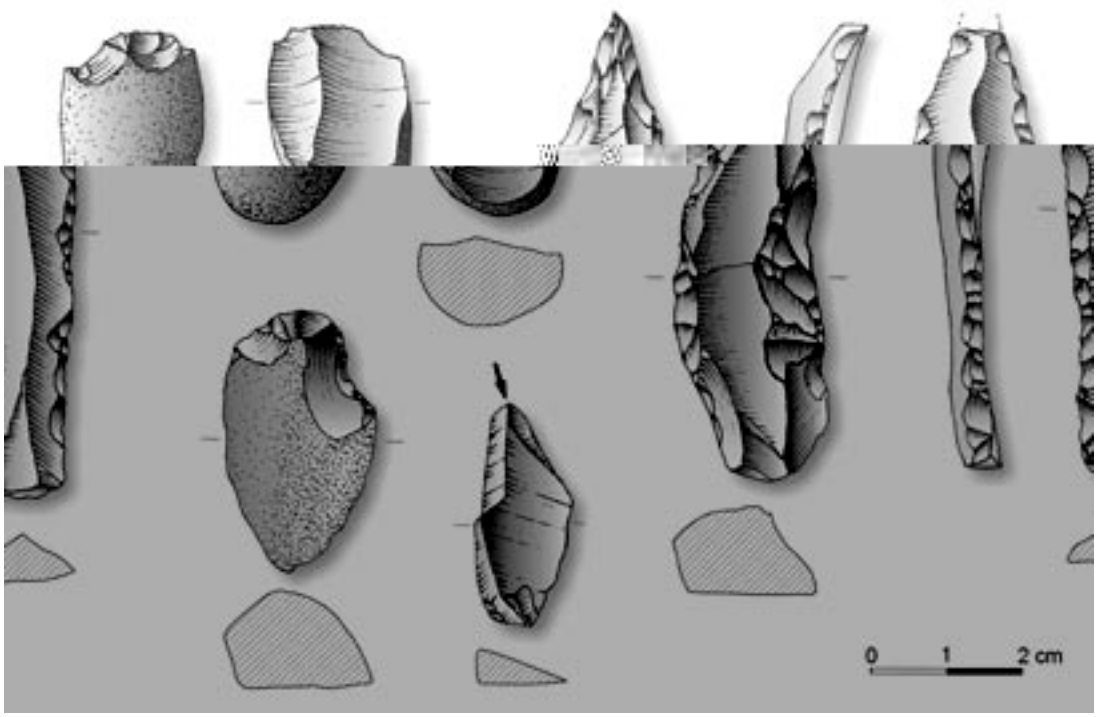

FIG. 11 – Aurignacian lithic industry from Grotta Barbara (drawings P. Gioia).

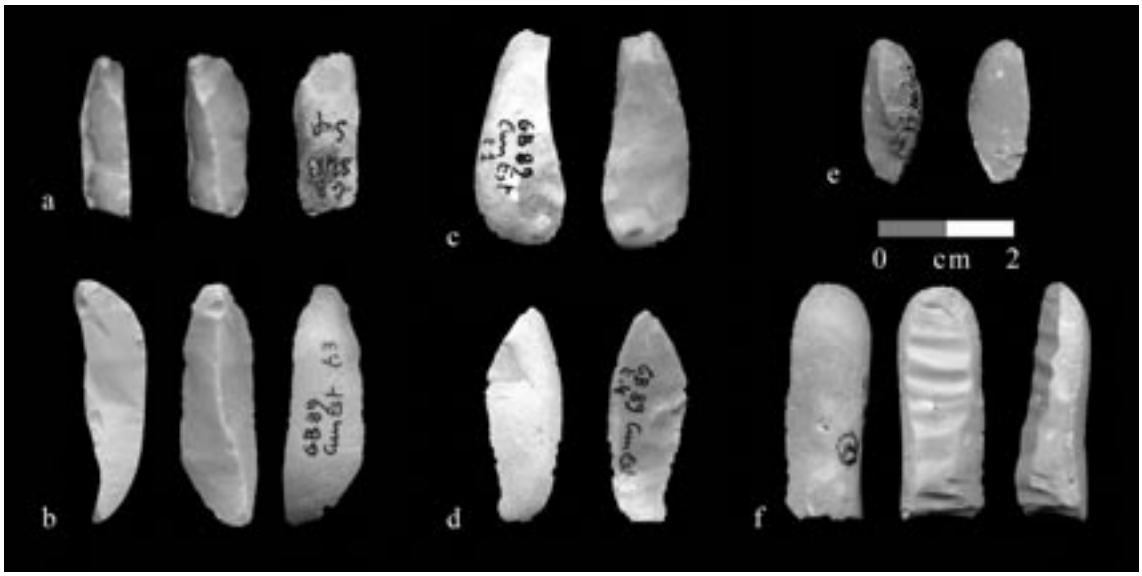

FIG. 12 – Bladelet production at Grotta Barbara, related to bipolar percussion technique: a-b. retouched dihedral bladelets; c-d. corticated bladelets with *en épi* bulb; e. retouched bladelet with distal esquilles; f. exhausted bladelet core (after D'Angelo and Mussi, 2005).

products, larger in width, were sometimes used instead of flakes, and retouched accordingly. Splintered pieces are further evidence of the widespread use of a bipolar flaking technique, which is better explained by the reduced size of the pebbles.

Grotta del Fossellone

Grotta del Fossellone at Monte Circeo, on the coast of Latium, was the first Aurignacian site to be excavated in peninsular Italy, after the pioneering phase at the Balzi Rossi. In 1937, A. C. A. Blanc recognized that there was a layer with Upper Paleolithic implements and "*pointes d'Aurignac*"[7] (Blanc, 1937b), and he dug there over several seasons. Later, Blanc emphasized that the Aurignacian was far richer at Grotta del Fossellone than at Riparo Mochi, that he also excavated (Blanc and Segre, 1953). A long sequence of Mousterian layers is also documented at Grotta del Fossellone, below level 21, which is the Aurignacian one.

Only preliminary reports are available, however. Of the ca.1400 retouched tools of level 21 reported by Laplace[8] (1966), 900 or so are "endscrapers", most of them carinated. Blanc (in Blanc and Segre, 1953) mentions thousands of bladelets, that he describes as byproducts of the "endscrapers", further stating that none are retouched (Fig. 13). There are some 30 burins, probably well over 100 Aurignacian blades, some of them quite large, and also points, scrapers, denticulates, and splintered pieces. The bipolar flaking technique was also fre-

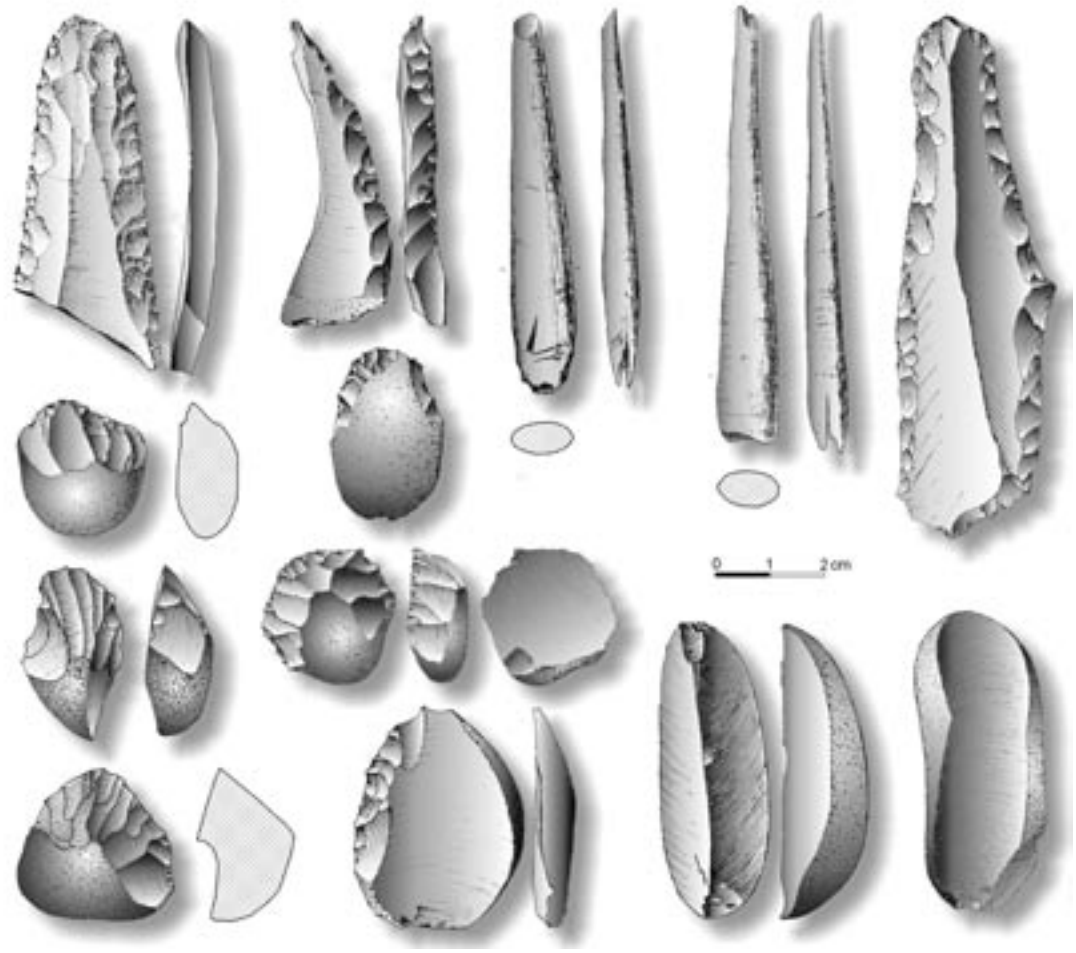

FIG. 13 – Lithic and bone industry from Grotta del Fossellone, level 21 (drawings P. Gioia, after Blanc and Segre, 1953).

quently used (Fig. 13). Most of the lithic implements were produced using flint pebbles, apparently somewhat larger than at Grotta Barbara.

The bone industry is unusually abundant for an Italian site, and includes a number of split-based points (Fig. 13), the southernmost such occurrence. There are also ornaments, represented by perforated deer canines, and two steatite copies of deer canines (Fig. 6). Preliminary observations suggest that perforation was not fully mastered, since a technique *par refouillage*

anthropic and biotic activity, but it can be safely hypothesized that a thin Aurignacian layer was originally deposited on top of the Uluzzian one (Gioia, 1990).

Exotic flint was used, instead of the local one, which is of poor quality. The lithic inventory consists of carinated and nosed endscrapers, endscrapers on Aurignacian blades and retouched blades (including a strangled blade), as well as notches and denticulates (Fig. 14). Splintered pieces occur in great numbers. Marine shells, some of them perforated, and segments of *Dentalium*, are abundant in level D, but cannot be easily sorted between Uluzzian and Aurignacian. This is also true of mammal bones, which include many horse remains.

There is also some evidence of Aurignacian in nearby caves, as Grotta di Serra Cicora, and possibly Grotta di Uluzzo, Grotta di Uluzzo C, and Grotta Mario Bernardini.

Fontana Nuova di Ragusa

Fontana Nuova is a small rockshelter of southern Sicily — the southernmost Aurignacian site in Europe, actually. This was hardly noticed, however, when first excavated by a local nobleman, Baron Vincenzo Grimaldi di Calamenzana, before the first World War. He just collected the flint implements, donated them to the local museum, and reburied the faunal remains. The site was investigated again after the second World War by L. Bernabò Brea, who found it nearly empty, and the collections were systematically studied only a few years ago (Chilardi et al., 1996).

The rockshelter opens at 145 m asl, in a commanding position 80 m above the coastal plain, at some 3 km from the modern sea shore. The extant lithic collection of 224 imple-

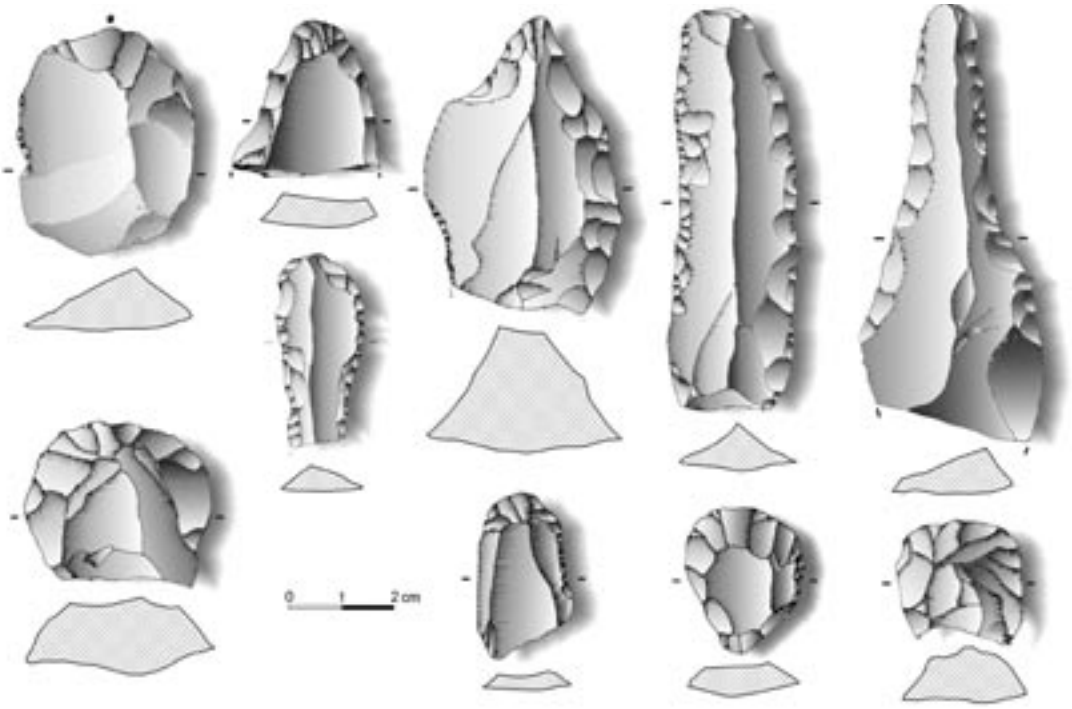

Fig. 15 - Aurignacian lithic industry from Fontana Nuova di Ragusa (drawings P. Gioia).

ments includes a fair percentage of endscrapers (nosed, carinated, on a retouched blade, etc.), as well as many retouched and unretouched blades (Fig. 15). The local Amerillo flint, and the exotic Monte Iudica flint, which outcrops at a distance of some 100 km, were both used to a comparable extent. The Monte Iudica flint, however, was chosen predominantly to make blades, which were apparently produced off-site. Bladelets are not preserved. A limestone element, naturally shaped as a cylinder, was decorated with a row of incisions (Fig. 6).

L. Bernabò Brea located the reburied faunal remains. Of these, red deer bones vastly outnumber any other animal remains (Table 2). This likely reflects the limited number of species able to cross the treacherous Messina Strait and to colonize the island.

Discussion

Raw-material and technological diversity

A variety of reduction sequences are represented, including an emphasis on bipolar percussion at some sites, as in the open air sites of coastal Latium, and in Grotta Barbara and Grotta del Fossellone at Monte Circeo. The technique was also in use at Riparo Bombrini, and is well-suited to take advantage of small pebbles. Different bipolar reduction sequences for the production of bladelets alone have been identified at Grotta Barbara, suggesting unsuspected complexity in this rather unconventional method. The many carinated endscrapers/bladelet cores on small pebbles, also found at Grotta del Fossellone, Sugherone and elsewhere, are evidence of another technological approach to the challenge of local materials. At Lemignano, the busked burins are indicative of yet another *chaîne opératoire*, suited to the exploitation of much larger pebbles.

Raw-material constraints were also evidenced at the Balzi Rossi, and most notably at Riparo Bombrini and Riparo Mochi. Here, bladelets and microbladelets were produced locally, but most blades were imported from France, eastern Liguria and Emilia, where jasper and good-quality flint outcrops were found (Negrino and Starnini, 2003). Finally, the search for suitable micro-crystalline rocks led to establishing seasonal quarry sites in high mountains, as at Monte Avena and at other sites of the Apennine.

Seasonal circulation

Both the geographic distribution of sites and raw-material procurement are indicative of long distance circulation. "Long distance", however, should be related to the morphology and geographic constraints of Italy, which limited traveled distances in an east-west direction.

Aurignacian sites have been located both at high altitude, and in an island environment, i.e. in Sicily. Monte Avena is a quarry site at 1450 m asl in the pre-Alps (Lanzinger and Cremaschi, 1988), Ronco del Gatto is another large quarry site, at 1200 m asl in the northern Apennine[9], while the Cinquemiglia sites mentioned above cluster between 1300 and 1600 m asl in the central Apennine. They are all open air sites without any faunal preservation. However, even assuming that mountain colonization happened during a mild oscillation of OIS 3, there is little doubt that they refer to seasonal exploitation Spring to Fall. The cold part of the year would have been spent at lower elevations, in the range of at least 50 to 100 km away. Grotta del Fossellone, at Monte Circeo on the Tyrrhenian coast, which was occupied from Fall to Spring, is a good example of wintering at sea level. Jasper from Ronco del Gatto, positively

recognized in the Balzi Rossi collections, is possibly further evidence of seasonal circuits linking the coast with distant mountains areas.

Fontana Nuova, the Sicilian site, is also suggestive of substantial movement. The Messina Strait is presently some 3 km wide, but is well-known since Antiquity for its treacherous currents[10]. Notwithstanding its modern depth of 72 m, this active tectonic area was open sea for the entire last glacial, and was not traversed without risk and difficulty, by humans just as by animals (Chilardi et al., 1996). The Strait seems unlikely to have been crossed back and forth again and again, and Aurignacian groups settling in Sicily are, by themselves, evidence of movement over substantial distance.

Flint and other inorganic resources give further detail of circulation — either direct movement, or hand-to-hand exchange. In northwestern Italy, flint and other rocks were transported over 100 to 200 km, from both east and west of the Balzi Rossi (Fig. 16) — not to mention the Scaglia rossa flint, from well over 300 km afar. All over peninsular Italy, movements are usually shorter, given the narrow shape of the country. A minimum of 50 km traveled from the western coast can be inferred after finding inland the nosed endscrapers on small pebbles[11] that are well documented at Monte Circeo and in the coastal plain. At Grotte del Cavallo, there is possible evidence of a limited use of flint from Monte Gargano, 250 km north-west of the cave. The Monte Iudica flint of Fontana Nuova outcropped at a distance of 100 km. At the inland site of Grotta di Fumane, again in the north, high numbers of marine shells were discovered (Bartolomei et al., 1992). If during final OIS 3 the sea level was at least at around –20 m (Alessio et al., 1994), some 150 km would have been traveled, just to reach the Adriatic shore.

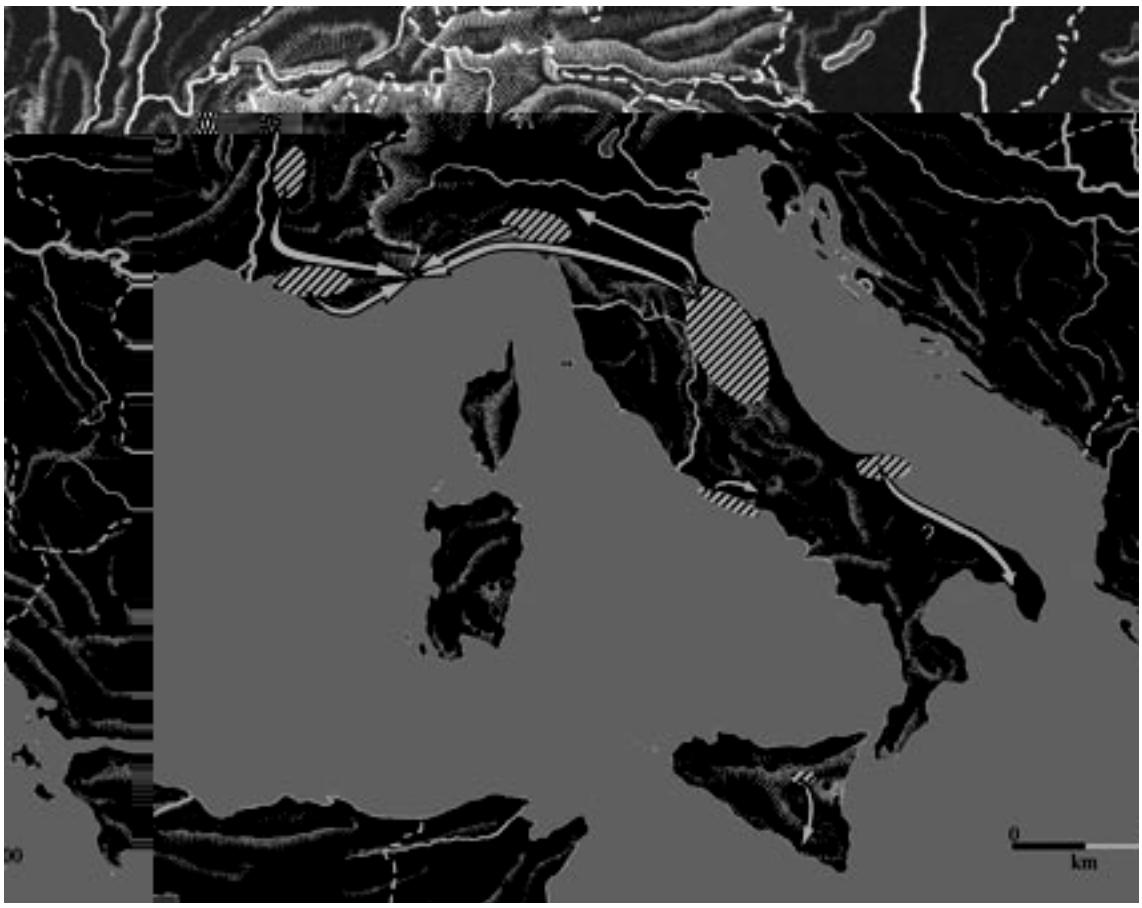

Fig. 16 - The circulation of lithic raw-material, after the evidence of selected Aurignacian sites.

Conclusions

Approximate as it is, the radiocarbon chronology summarized in Table 1 suggests that Italy was inhabited during 5000-10 000 years by human groups producing Aurignacian tools. If new people entered the country, they had to adapt to a different environment: most probably to a milder climate, possibly to a slightly more wooded landscape, and certainly to a more limited variety of animal species (Table 2). Flint resources, often found above 1000 m in the mountain ranges, were unevenly distributed, and at lower elevation sometimes occurred as small-sized pebbles only. Innovative reduction sequences had to be elaborated, while the lack of any split-based bone point south of Monte Circeo is puzzling.

The success of the Aurignacian can only be sketchily estimated by the number of known sites. We assume that many are currently under the sea, a major loss of information in a country, like Italy, where coasts are thousands of kilometers long. More disappeared under expanding glaciers at the LGM, as Monte Avena testifies, which was exceptionally spared, because of the favorable local morphology. Most of the largest Italian plain of the time, which includes the present Po valley, is also beyond investigation, because of extremely marked subsidence rates and thick alluvial deposits inland, and because of rising sea levels further downstream, as the plain extends into the northern Adriatic.

Taking into account preservation problems, we can cautiously compare site density in Italy with the repertoire established by Bocquet-Appel and Demars (2000) for the Aurignacian north of the Alps. The 30 to 40 caves and open air sites in our sample (Mussi, 2001), compare reasonably well with the total of 60 in their "Zone B". The latter is France outside northern Aquitaine, i.e. an area nearly double Italy. Bocquet-Appel and Demars eventually estimated a population of 5400 in northwestern Europe, an area of more than 1 400 000 km, with half the evidence concentrating in the refuge of Aquitaine.

If the density calculated for northwestern Europe is extended to Italy, we get an estimated population of approximately 1000 inhabitants[12]. This, however, is possibly an overestimate, as the general density north of the Alps includes Aquitaine. Not taking into account this refuge, and recalculating accordingly the population of Italy, we rather get some 500 inhabitants.

We emphasize again that these are rough estimates, which are flawed by a number of only partially understood variables. Approximate as they are, however, the numbers calculated above point to a demographic pattern just compatible with a viable and stable population (Wobst, 1974). Some Aurignacian sites exist, in Italy, as thick archeological deposits, with abundant lithic and organic remains, suggestive of human groups returning to favored spots over a long time period. Besides, there are site clusters, as at the Balzi Rossi or at Monte Circeo. But elsewhere, as at Grotta Salomone or Fontana Nuova, there is just a scatter of implements, and evidence of short and occasional stays. Moreover, mountains were presumably visited during the warmer season only. High mobility is suggested by other sites which are scattered and short-lived, while long distance relationships are inferred from shell and raw-material circulation. Evidence exists for regular contacts between lowland and mountains, and between east and west, inside and outside a vast territory, which, for sure, was to no means split into "Italy" and "France". We assume that this was the result of a well-organized network of exchanges, aimed at keeping in contact with each other groups living at exceedingly low demographic density.

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Margherita Mussi examined Barma Grande, Grotta Salomone, the Cinquemiglia sites and Grotta Barbara; Patrizia Gioia analyzed Sugherone, Grotta del Cavallo and Fontana Nuova; Fabio Negrino studied Riparo Bombrini and Lemignano. We thank L. Narisi and F. Scarpelli, Laboratorio di Paletnologia, Università di Roma "La Sapienza", for elaborating the figures in an electronic format. D. W. Frayer most kindly corrected the English text.

NOTES

1 Now at the Peabody Museum of Harvard University, and studied by M.M.
2 Now in Florence and at the Balzi Rossi, and studied by L. Cardini (1930).
3 Cardini identified a third point with a split base, which rather seems a lozenge one, with a natural fracture.
4 Ongoing research directed by Margehrita Mussi.
5 This was part of a project by the Sovraintendenza Comunale di Rome and the Soprintendenza Archeologica di Ostia in 1990-1993, which included systematic investigations ahead of real estate development and of large scale building activity.
6 Preliminary determination by L. Caloi.
7 It was termed "Middle Aurignacian", after the then accepted taxonomy of Abbé Breuil, who was invited to the site by Blanc and personally participated to the research.
8 While débitage is not taken into account, Laplace splits multiple tools in two or three. Any re-examination of his inventories only allows for an approximation of the actual number of implements.
9 Ongoing research by F.N., Angelo Ghiretti and C.Tozzi.
10 The mythological Scylla and Charybdis were notorious for drowning the sailors who passed through the Strait, which was negotiated with great difficulty by Ulysses.
11 Discussion based on implements originally published by Biddittu and Segre (1976-1977).
12 No attempt is made here to correct the effect of lowered sea-level, and of glacial expansion, which probably tend to balance each other. The 24 000 km^2 of Sardinia, however, are subtracted to the 301 000 km^2 of modern Italy.

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