

L'EXPLOITATION DES RESSOURCES SAISONNIÈRES DANS LES MONTAGNES DES ABRUZZES (ITALIE CENTRALE) : DE L'ÉPIGRAVETTIAN AU NÉOLITHIQUE

EXPLOITATION OF SEASONAL RESOURCES IN THE MOUNTAINS OF ABRUZZO (CENTRAL ITALY) : EPIGRAVETTIAN TO NEOLITHIC

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Résumé. – Les résultats de recherches interdisciplinaires effectuées dans deux zones différentes des Apennins (Italie centrale) nous font considérer comme probables des migrations saisonnières de l'une à l'autre. À Grotta di Pozzo, une petite cavité sur le versant méridional du bassin du Fucino (710 m s.n.m.), un dépôt mésolithique daté entre 9 400 et 8 100 BP, contient des restes faunistiques (dont une escargotière) et des restes botaniques qui indiquent une occupation de la fin de l'été, début de l'automne. L'industrie lithique, quoique peu abondante, comporte des éléments diagnostiques (pointes de Sauveterre). À Fonte Chiarano, un site de plein air dans la Valle di Chiarano (Altopiano delle Cinquemiglia) à 1 600 m s.n.m., la faune ne s'est pas conservée, mais des charbons de bois, datés de 6 400 BP, ont été recueillis, alors qu'une abondante industrie lithique a été fouillée dans un dépôt affecté par la bioturbation. Elle comporte des éléments tant néolithiques que mésolithiques, dont des pointes de Sauveterre. L'analyse paléobotanique d'échantillons prélevés à Gr. di Pozzo (ca. 9 400 BP) et de deux dépôts de tourbe découverts au centre du bassin du Fucino (ca. 9 400 BP et ca. 10 000 BP) indique des niveaux lacustres extrêmement bas au début de l'Holocène et un climat frais et modérément aride. L'analyse anthracologique effectuée à Fonte Chiarano sur des charbons datés de 6 400 BP démontre l'expansion du hêtre en altitude. L'industrie lithique de Gr. di Pozzo est peu abondante, généralement de petite taille, et faite sur du silex non disponible localement. À Fonte Chiarano l'outillage est abondant, généralement de plus grandes dimensions, et taillé sur du silex qui affleure sur place et qui est le même qu'à Grotta di Pozzo. Notre hypothèse de travail est donc qu'il y avait des déplacements saisonniers d'une zone à l'autre, entre autres pour se procurer le silex nécessaire. Alors que Grotta di Pozzo paraît avoir été occupée à la fin de l'été, et à l'automne, la fin du printemps et l'été nous semblent une époque d'occupation raisonnable pour Fonte Chiarano, l'hiver étant une époque de fréquentation peu probable à cette altitude.

Mots clés : Italie centrale, Holocène, Mésolithique, Néolithique, paléoenvironnement, paléoeconomie.

Abstract. – Interdisciplinary investigations at sites in two environmental zones in the Apennines of Central Italy have shown that seasonal movement between these zones, in part for the procurement of lithic raw material for stone tool manufacture, was a reasonable working hypothesis. At Grotta di Pozzo, a small cave on the southern margins of the Fucino basin (710 m a.s.l.), mesolithic deposits dating from 9,400 to 8,100 BP contain faunal (including a land snail shell midden) and botanical remains suggesting a late summer-early autumn occupation. The artifact assemblage, while sparse, contains diagnostic elements (sauveterrian points) manufactured on flint which was not locally available. At Fonte Chiarano, an open-air site at the Valle de Chiarano (1,600 m a.s.l.) in the Cinquemiglia, no fauna is preserved, but a rich assemblage of charcoal dated to 6,400 BP has been recovered from a pit, and an abundant artifact assemblage which contains both neolithic and mesolithic stone tools including sauveterrian points has been found in deposits affected by bioturbation. Palaeobotanical analyses of samples from Grotta di Pozzo, and two peat deposits recently discovered in the Fucino basin dated to ca. 9,400 BP and ca. 10,000 BP, show that early holocene lake levels were extremely low and that climate was cool moderately arid. Samples from Fonte Chiarano, dated to ca. 6,400 BP, show an expansion of mixed oak forest at these higher elevations. Studies of the artifact assemblages and the raw materials utilized for artifact manufacture at the two sites show that, at Grotta di Pozzo, artifacts are scarce, generally very small, and made on raw material which does not occur locally. At Fonte Chiarano, artifacts are numerous, tend to be larger, and are made on raw materials which occur locally and are the same as those used at Grotta di Pozzo. Our working hypothesis is, therefore, that there was seasonal movement between the two regions, specifically for the procurement of raw materials to use in the manufacture of stone tools. The available data suggest a late summer to fall occupation at Grotta di Pozzo, while late spring and summer would seem the most likely time for occupation at Fonte Chiarano since we can exclude the use of this site during the winter.

Key Words : Central Italy, Holocene, Mesolithic, Neolithic, palaeoenvironment, palaeoeconomy.

THE RESEARCH PROBLEM, AREA, AND BACKGROUND

During several millennia around the LGM roughly from 20,000 to 16,000 years ago, parts of Europe were unoccupied (Soffer, Gamble, 1990). Re-colonization was only possible once the climate ameliorated, and most inland mountainous areas were only re-occupied at the very end of the Glacial, possibly after 12,000 BP (Bernaldo de Quiros, Neira Campos, 1992; Broglio, 1984; Clottes, 1988; Straus, 1992). However, in the central Apennines of Italy (which include the modern region of Abruzzo), the combination of high altitude and low latitude, and the presence of a large lake, led to a range of local conditions that apparently created a unique set of opportunities for late pleistocene hunter-gatherers. The region is thus an excellent one in which to test models of a re-colonization process which eventually spread widely throughout Europe.

Our research area (the white triangle in fig. 1) includes two quite different biomes. The first is the Fucino basin, where previous archaeological (Barker, 1981; Grifoni, Cremonesi, 1985; Mussi *et al.*, 1995; Radi, Wilkens, 1989; Radmilli, 1977; Skeates, 1987, 1994; Soprintendenza Archeologica dell'Abruzzo, 1989), geomorphological (Giraudi, 1989; Zarlenga, 1987) and palynological (Magri, Follieri, 1991) works provide a sound base for intensive and systematic investigations. The second is the Altipiani Maggiori d'Abruzzo to the SE, which includes the Cinquemiglia plateau, where limited archaeological (Lubell, Mussi 1995; Spagnuolo, 1991) and geomorphological (Frezzotti, Giraudi, 1990) investigations have been undertaken.

The modern arboreal vegetation is primarily beech (*Fagus* sp.) forest, which covers the major part of the region. At higher altitudes, it occurs as a pure (*i.e.* unmixed) formation, but, at lower altitudes, it is associated with hornbeam (*Ostrya carpinifolia*), maple (*Acer opalus*), and flowering ash (*Fraxinus ornus*). Birch (*Betula* sp.) and pine (*Pinus uncinata*) are present sporadically. At low altitudes, *O. carpinifolia* and *F. ornus* are associated with oak, and Mediterranean formations of holly oak (*Quercus ilex*) are developed on exposed slopes.

The Fucino basin lies at an altitude of *ca.* 700 m a.s.l. Until 1875, when it was totally drained and converted to agricultural land,

the basin was filled by a large but shallow lake, 150 km² and 18 m deep, with a limited drainage basin of only 710 km² and no major outlet. As a consequence, the level of water in the lake was highly sensitive to local climatic conditions. The presence of a lake will have had an effect on the microclimate of the basin and on the potential for early recolonization of the region by human groups following the LGM. This apparently simple model is challenged by the evidence for rapidly fluctuating lake levels (Giraudi, 1989). The high lake levels of the Upper Pleistocene (beginning at > 30,000) reached a maximum at the LGM and then declined fairly rapidly until about 11,000, when the lake was just a marshy area (Giraudi, *in press*). Some recovery occurred in the Early Holocene, but until *ca.* 8,000 the lake remained more a marshy than a lacustrine environment.

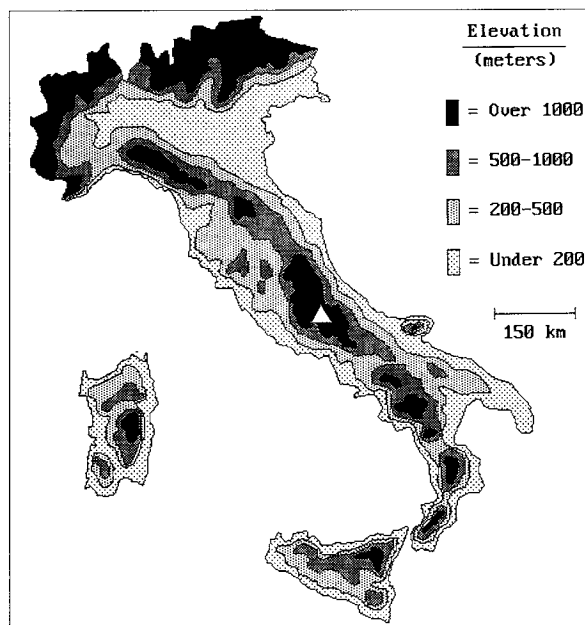


Figure 1. – Italy, showing elevations and the location of the research area.

The surrounding mountains rise to > 2,000 m a.s.l. Within them are a number of high plateaux (the Altipiani Maggiori d'Abruzzo) at elevations around 1,250 m a.s.l. These are separated by limestone ridges which

trend NW-SE. One of these plateaux is the Cinquemiglia, surrounded by karstic depressions in which there was water during the Late Pleistocene-Early Holocene. The limestone ridges which bound the Cinquemiglia contain numerous outcrops of flint. On the W, one of these is cut by a gorge, the Valle di Chiarano, formed by glacial outwash. It is an unusual geomorphological feature in this area of otherwise undulating topography. Within the Valle di Chiarano, there is extensive but as yet incompletely documented evidence for late pleistocene and early holocene occupations at elevations as high as 1,600 m a.s.l. Here, in contrast to the Fucino basin, where there are almost no known sources of flint, and those known are of poor quality, good quality flint is abundant. Our preliminary investigations indicate that these highland sources of raw material were exploited by groups living in both areas. Thus, a focus of our research has been to understand how, and when, prehistoric groups came to the Cinquemiglia to obtain raw material for stone tools. Our working hypothesis is that this was a seasonal activity, one not undertaken during those seasons of the year when snow and cold made this highland region a difficult environment in which to live.

The post-LGM palaeoecology of the area is partially known from a palynological analysis of the upper portion of a long core taken from the deepest part of the Fucino basin (Magri, Follieri, 1991). While it is undated, new evidence from our own research allows us to identify the portion which represents the Pleistocene-Holocene boundary.

Several zones and subzones were defined in the Fucino core. Zone Y represents a steppic environment dominated by *Artemisia*, with grasses and herbs and a very limited tree cover (primarily *Pinus* and *Juniperus*). Above this, subzone Z1 is characterized by a rapid transition from this steppe-like environment to a diversified forest vegetation mixed oak (*Quercus* sp.), beech (*Fagus* sp.), hornbeam (*Carpinus* sp.), and birch (*Betula* sp.). A substantial amount of hazel (*Corylus* sp.) pollen is also found.

Unfortunately, the transition from zone Y to subzone Z1 could not be dated from the original core. However, we are now able to place that transition at no later than 10,000 BP, on the basis of two peat samples taken from a stratigraphic section exposed in a recent canal

in the lowest part of the Fucino basin. They have been dated (Giraudi, *in press*) to $9,370 \pm 140$ BP (UD-455) and $9,950 \pm 140$ BP (UD-453) (NB: all radiocarbon dates in this paper are cited as uncalibrated ages before present [1950] and based on the 5,568 half-life). A preliminary palynological analysis (pers. comm., H. Friebe, 1995) shows that these peats represent a heavily forested environment dominated by oak and birch (fig. 2). Birch is over-represented (up to ca. 40 %, compared to a maximum of 5 % in the Fucino pollen core). This must have been a localized situation, with a thicket of birch growing in the poorly drained central basin.

Samples of charcoal and seeds recovered during our 1992 excavations at Grotta di Pozzo, on the southeast margin of the Fucino basin, provide data for the reconstruction of palaeoenvironments between 9,200 and 8,100 BP. This culturally biased assemblage contains mostly charcoal of Rosaceae-Prunoideae, accompanied by almond (*Prunus amygdalus*), juniper (*Juniperus* sp.), and sporadic deciduous oak (*Quercus* f.c.). Almond is a climatic indicator which has also been found at late glacial sites in Southern France (Bazile-Robert, 1979, 1980; Krauss-Marguet, 1981). This vegetation would have existed under relatively dry and moderately warm conditions which promoted development of transition vegetation complexes characterized by juniper and pine woodlands with thermophile species and deciduous oak (Vernet, 1991).

Seed analyses led to the identification of *Juniperus*, bearberry (*Arctostaphylos Uva-ursi*), bloodtwig dogwood (*Cornus sanguinea*), blackthorn (*Prunus spinosa*), sweet cherry (*Prunus avium*), and probably wild grape (*Vitis sylvestris*). This preliminary evidence suggests that there are most probably two different assemblages: one with *Juniperus* and *Arctostaphylos Uva-ursi*, reflecting an open environment and a cool and moderately dry climate; and a second one, with the remaining species, related to the development of a mixed oak forest and to more humid conditions.

In the Cinquemiglia region, at an altitude of ca. 1,400 m a.s.l., a parallel picture can be seen. Data from the Aremogna plateau (Frez-zotti, Giraudi, 1990) show that at $12,850 \pm 200$ BP (UD-318) vegetation cover was predominantly steppe-like with *Artemisia*, *Juniperus*, *Pinus*, Chichorioideae and Chenopodiaceae. It fits perfectly into zone Y of the Fucino

core. Following this, the picture is unclear due to lack of data. However, 7 km away, at the neolithic site of Fonte Chiarano, at an altitude of 1,600 m a.s.l., analyses of 162 charcoal fragments recovered from a deep pit, and dated at $6,360 \pm 180$ BP (AECV-1996C), show that *Fagus* sp. is dominant (n = 87), followed by *Fraxinus* sp. (n = 50), *Ulmus* sp. (n = 20), *Acer*

sp. (n = 2), Rosaceae/Pomoideae (n = 2) and *Carpinus/Ostrya carpinifolia* (n = 1). All the species, but mostly the beech, are strongly indicative of humid climatic conditions. Maple and ash are indicative of the expansion of the mixed oak forest, which is known to start all over Europe in the Preboreal when the tree line reaches higher elevations.

PRELIMINARY RESULTS AND DISCUSSION

While we have a general idea of palaeoenvironmental conditions, we still lack sufficient data to make a fully accurate reconstruction, and the same applies to any attempt at palaeoeconomic interpretation.

The Cinquemiglia sites we have investigated so far contain no preserved faunal material and have all been affected by extensive bioturbation. In the Fucino, we have one site with excellent preservation of stratigraphy and fauna, but the latter have not yet been analyzed, and so it is not possible yet to attempt a full reconstruction of the subsistence-settlement system.

However, given the differences in elevation and availability of raw material between the Fucino and the Cinquemiglia, a working hypothesis of seasonal residential patterns during both the Mesolithic and the Early Neolithic seems reasonable. Radi and Wilkens (1989) use data from Santo Stefano, an early neolithic site in the Fucino basin, to argue for a varied subsistence base and, probably, a relatively sedentary occupation. While we do not yet have sufficient evidence from mesolithic contexts to confirm such a pattern for prior settlement in the region, we envisage an early neolithic subsistence-settlement system in which permanent or semi-permanent settlements were maintained in the Fucino with seasonal activity specific ones in areas such as the Cinquemiglia. The basis for our preliminary reconstruction comes from two sites, one neighbouring Santa Stefano and a second in the Valle di Chiarano.

Grotta di Pozzo is a small cave at the entrance of Pozzo di Forfora, the same steep-sided, 1.5 km long valley in which Santa Stefano is found. Grotta di Pozzo (ca. $12 \times 3 \times 1.5$ m), at an elevation of 710 m a.s.l. and facing NE, contains complex stratified *in situ*

deposits beginning at the top with a mesolithic (sauveterrian) level dated at $8,110 \pm 90$ BP (TO-3420), underlain by a series of land snail shell middens dated at $9,240 \pm 60$ BP (weighted average of TO-3421, $9,140 \pm 70$ BP and TO-3422, $9,370 \pm 80$ BP). Beneath this are as yet undated levels investigated in 1995, which contain abundant remains of very small fish in association with a sauveterrian industry, in deposits dominated by ash and other organic materials. Beneath these, we have some evidence for deposits containing a late upper palaeolithic assemblage. A few potsherds collected from disturbed contexts within the upper level indicate possible use of the site by neolithic groups.

In addition to the shells of *Helix delpretiana* (pers. comm., A. Hallgass, 1994), the shell midden is composed of charcoal, ash, fire-cracked stones, and a small number of animal bones and flint implements (tools as well as bladelets, trimming flakes and microburins), some of which are burnt, as well as

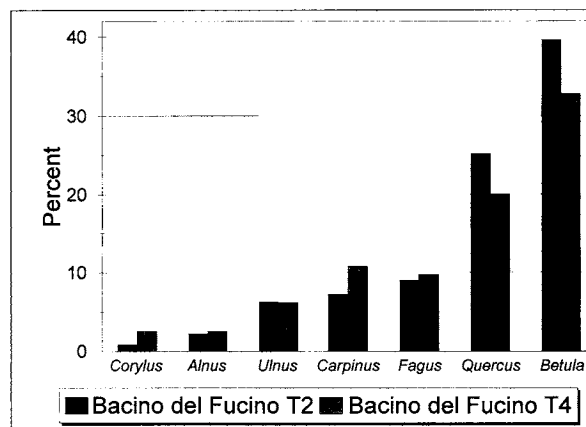


Figure 2. – Percentage frequencies for pollen of major taxa in two peat samples from the deepest part of the Fucino basin.

marine shells (*Columbella rustica* and *Dentalium* sp.). *H. delpretiana* is found today at much higher elevations (1,700-2,000 m a.s.l.) in semi-arid contexts. This is totally unlike the present environment in the Fucino, but is in accord with our evidence for early holocene environments based on analyses of charcoal from Grotta di Pozzo.

The paucity of lithic artifacts in our sample from Grotta di Pozzo, and the small size of those artifacts, appears to reflect the lack of naturally occurring flint in the limestone bedrock in the Fucino region. The assemblage of retouched tools consists primarily of flake endscrapers, geometric microliths and sauveterrian points. There is little primary debitage, and only two cores, both exhausted.

This situation is rather different in the Cinquemiglia. There, at an elevation of 1,572 m a.s.l., we have been investigating an open air site, Fonte Chiarano, at which both finished artifacts as well as primary debitage (some of it quite large) have been recovered. In 1994, we tested a large pit feature, containing abundant charcoal, exposed in an erosional cut. Flint artifacts and a few potsherds were recovered, and a charcoal sample has been dated to $6,360 \pm 180$ BP (AECV-1996C), making the site one of the earliest known neolithic sites at

this altitude. In 1995, we returned to the site and opened a 4 m² area near the test made the previous year. Here we recovered a mixture of neolithic and earlier material (including two sauveterrian points). Another test, 1 m², on a lower terrace near the present spring, recovered another sauveterrian point, a large number of lithic artifacts and a single potsherd. While both areas have been strongly affected by bioturbation, it is clear to us that movement has been vertical rather than horizontal, and that we have evidence for a mesolithic occupation preceding the Neolithic at Fonte Chiarano. While we have no real evidence on which to base a reconstruction of the subsistence-settlement system, it seems to us that the neolithic occupation at Fonte Chiarano was a seasonal camp, perhaps for transhumant herders, perhaps for collection of raw material and manufacture of lithics, perhaps for hunting, perhaps for some combination of all of these. The nature of the mesolithic occupation remains unclear, but, given the presence of typical sauveterrian artifacts at both Grotta di Pozzo and Fonte Chiarano, we believe it most logical at this time to envisage visits to Valle di Chiarano as seasonal, for the exploitation of an essential resource not easily available in the Fucino flint.

FLINT RESOURCES

The lithic artifacts from Grotta di Pozzo and Fonte Chiarano have been studied to determine the variety of flint sources from which they were made (fig. 3). Four classes were identified: grey flint (class 1), beige and pinkish flint (class 2), black flint (class 3), and others (class 4). A substantial amount of material was unidentifiable because of heavy patina or other alterations. Classes 1, 2 and 3 have been sampled at various sources and then used extensively in experimental replication studies to determine their technological qualities.

Class 1 comes from the Maiolica-type limestone of the Upper Jurassic and Lower Cretaceous, not found in the Fucino basin, but very common in the Cinquemiglia region. The color varies from dark grey to light greyish brown. It is more or less opaque, and the texture is generally rough. It sometimes contains lithoclasts, and often presents veins and bands of light brown to red. The cortex is calcareous,

fine grained and chalky. It comes in rather large oval nodules (max. 25 × 15 × 15 cm) and constitutes the majority of flint found in slope

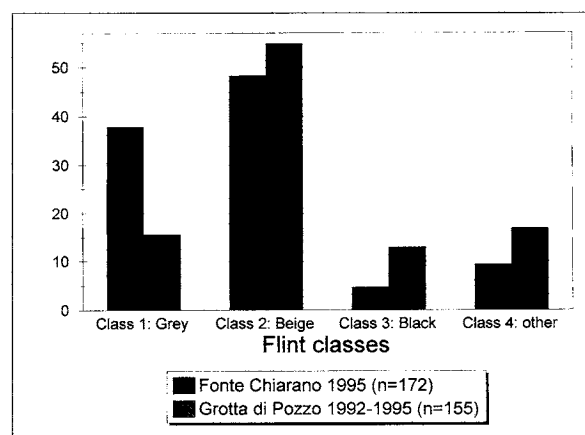


Figure 3. – Percentage frequencies for different classes of flint in the assemblages from Grotta di Pozzo and Fonte Chiarano.

scree in the form of clasts altered and fractured by freezing. It is the least desirable of all four from the point of view of knapping characteristics. It tends to break unpredictably, invisible internal fractures and fracture planes are common, and the rough texture reduces the resilience of the material.

Class 2 comes from the Scaglia-type limestone of the Upper Cretaceous, which is restricted to the area of Toppe Vurgo near Fonte Chiarano. The range of color is wide, and varies from brown to beige to orange and even to pink, but tends to remain consistent on the same piece. The transparency ranges from translucent to semi-translucent, and the grain is fine or very fine. It contains rare chalky inclusions, and sometimes well diagenized fine lithoclasts. The cortex is calcareous and rough but not chalky. It is found in flattened nodules that reach $20 \times 15 \times 10$ cm). It is rare in slope scree. Class 2 fractures predictably, except when found as badly fractured or weathered nodules. It has a very fine grain with a much higher resilience than class 1.

Class 3 comes from the Fucoid marls of the Lower Cretaceous. The color is blackish, the transparency is more or less semi-translucent, and the grain is fine. It often contains inclusions of chalky limestone and lithoclasts that sometimes did not undergo complete diagenesis. The cortex is calcareous, from smooth to

rough, and rarely chalky. It is found in nodules (max. $20 \times 15 \times 10$ cm), and sometimes in tabular form (reaching a width of 5 to 7 cm). It is rare in slope scree. Class 3 has similar qualities to class 2, but tends to contain inclusions which can hamper its use by the knapper.

Class 4 includes both translucent and opaque materials, which are normally fine-grained, and it was used to produce high quality implements by prehistoric flint knappers. Because no sources have as yet been found, we have been unable to experiment with materials of this class.

In 1995, one chip of crystal quartz was found at Grotta di Pozzo, and two tiny unworked quartz crystals were found at Fonte Chiarano. In neither case can the material be considered of local origin.

Preliminary studies of the collections from our 1995 excavations suggest that not only are the quantity and size of material at Grotta di Pozzo considerably smaller than at Fonte Chiarano, but also cortical flakes, cores and other by-products of the manufacture of lithic artifacts are far more common at Fonte Chiarano. This is not surprising, since a source of flint is located less than 5 km away. At Grotta di Pozzo, there seems to have been greater selection of higher quality raw material, since class 1 is not so well represented in the collection from this site.

CONCLUSIONS

Thus, within a relatively restricted geographic region, we have a reasonably well controlled sequence from the Mesolithic to the Early Neolithic at sites in two very different topographic and palaeo-environmental settings: one around the margins of a lake basin at ca. 700 m a.s.l., and the other at 1,400-1,600 m a.s.l. in a nearby plateau-basin setting to the SE, which would have been easily reached by mountain passes over a traverse distance of probably no more than 60 km. However, despite the distance and differences, the setting of both sites is intriguingly similar: each is on the west side of a deep and narrow valley, facing NE, and with easy access to abundant fresh water at nearby springs.

The presence of exotic materials, quartz and marine shell, shows that the populations who inhabited these sites were in long-

distance contact with areas not easily reached because of the topography of the Apennines. Because of its elevation, we assume that the Valle di Chiarano was only occupied during summer. At Grotta di Pozzo, berries and fruit (*Juniperus* sp.), *Arctostaphylos Uva-ursi*, *Prunus spinosa* and *P. avium*), which ripen from July to October, were found in the shell midden levels and indicate a late summer-early autumn occupation. The same holds true for the land snails, which cannot be consumed during aestivation, which takes place during summer and winter (Lubell et al., 1976; Mussi et al., 1995). In July 1995, in a deposit lying under the shell midden and containing no land snails, we recovered abundant remains of small, as yet unidentified, fish. Since these deposits must date to a time when the Fucino basin was a marsh rather than a lake, the fish

probably came from the streams which then flowed into the basin through valleys such as the Pozzo di Forfora, or from karstic springs such as the one which existed at Ortucchio. Work now in progress on the identification of these fish (and other analyses) aims at determining whether these levels represent a specific seasonal occupation, an earlier chronological phase, or both.

Preliminary investigations of lithic sources and characteristics in both areas provide reasonable certainty that raw materials were moving from the Cinquemiglia to the Fucino during this time frame. Logic suggests that the Fucino would have been a pre-

ferred *occupation locale* during those seasons when cold temperatures and heavy snow cover in the Cinquemiglia region precluded occupancy.

We are still a long way from reaching any firm conclusion on our central goal, which is to understand whether use of these different environments by mesolithic and neolithic populations was year-round or restricted to particular seasons. Interpretations by others, on materials from the Fucino (e.g. Wilkens, 1991; Radmilli, 1977), do not seem to us sufficiently well controlled either chronologically or quantitatively to permit reliable reconstructions at this time.

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