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Abstract: Pirro Nord, located in Apricena, Southern Italy, represents one of the earliest records of human dispersal into Europe. The site is dated on a biochronological basis between 1.3 and 1.6 My and a significant vertebrate assemblage (Pirro Nord Faunal Unit) is associated with lithic artefacts which show many similarities with more or less contemporaneous lithic assemblages in Europe and with the African Mode 1.

The reduction sequences are short and always made on local flint (collected as small and medium size cobbles). The knapping strategies are strongly influenced by the initial morphology/dimensions of the raw material, but some features make this lithic assemblage peculiar in the panorama of first European peopling.

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***Cover Letter**

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Dear Editor,

We submit an Article to *Quaternary International* titled “THE PIRRO NORD SITE (APRICENA, FG, SOUTHERN ITALY) IN THE CONTEXT OF THE FIRST EUROPEAN PEOPLING: CONVERGENCES AND DIVERGENCES”.

The recent years of research has better define the conditions of the first peopling of Europe thanks to the discovery of numerous new sites dated between about 1 and 1.5 million years BP. In this context, Pirro Nord supplied one of the most ancient indirect evidences of human presence. For this reasons we think our paper is suitable for the volume “Jaramillo & Early-Middle Pleistocene transition”.

Sincerely Your,

Prof. Marta Arzarello

THE PIRRO NORD SITE (APRICENA, FG, SOUTHERN ITALY) IN THE CONTEXT OF THE FIRST EUROPEAN PEOPLING: CONVERGENCES AND DIVERGENCES

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Abstract

Pirro Nord, located in Apricena, Southern Italy, represents one of the earliest records of human dispersal into Europe. The site is dated on a biochronological basis between 1.3 and 1.6 My and a significant vertebrate assemblage (Pirro Nord Faunal Unit) is associated with lithic artefacts which show many similarities with more or less contemporaneous lithic assemblages in Europe and with the African Mode 1.

The reduction sequences are short and always made on local flint (collected as small and medium size cobbles). The knapping strategies are strongly influenced by the initial morphology/dimensions of the raw material, but some features make this lithic assemblage peculiar in the panorama of first European peopling.

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1. THE PIRRO NORD SITE

The site of Pirro Nord (sometimes also known as Cava Pirro or Cava Dell'Erba) is situated at the northwestern margin of the Gargano promontory, close to the village of Apricena (Foggia District, Apulia, Southern Italy). It represents one of the earliest records of European peopling as it is dated, on a biochronological basis, to 1.3 – 1.6 My (Arzarello et al., 2012, 2009, 2007).

The site is located inside an active limestone quarry and the lithic industry was found within a karst fissure. The P13 shaft is situated at the top of the Mesozoic limestone succession and, during the

Pleistocene, was part of a very complex interconnected karst system. It is the result of a dissolution that was effective along the fractured corezone of the Pliocene fault that bordered the "Apricena horst" to the south (Pavia et al., 2012).

Inside the P13 fissure, the lithic assemblage was found in association with vertebrate fossils of the Pirro Nord Faunal Unit (Abbazzi et al., 1996; Gliozzi et al., 1997). The faunal assemblage is characterized by the earliest occurrence of *Bison degiulii, Capreolus* sp., *Equus altidens* and *Meles meles,* by the presence of 20 species of amphibians and reptiles (Delfino and Bailon, 2000), 47 species of birds (Bedetti, 2003) and over 40 species of mammals such as *Stephanorhinus* sp., *Pachycrocuta brevirostris, Homotherium latidens, Axis sp*., *Praemegaceros obscurus* and *Mammuthus meridionalis*. Among rodents, the arvicolid vole species *Allophaiomys ruffoi* is present (Arzarello et al., 2009; Pavia et al., 2012).

Paleoenvironnmental reconstruction was done on the basis of the faunal remains found at the site. The presence of birds like *Otis tarda, Tetrax tetrax* and *Pterocles oreintalis,* together with other species of Anatidae and Charadriiformes, allows us to infer that there was an open environment, tending to dry, but with a seasonal wetland. Furthermore, the significant presence of Alaudidae indicates that open areas were characterized by a low-type vegetation (Arzarello et al., 2009; Bedetti, 2003).

The stratigraphy of the P13 fissure is characterized by a clay-sandy matrix containing many stones with sharp edges and lacking preferential orientation. The sedimentary filling is derived from the top, by gravity, and followed the emplacement of the large limestone blocks that make up the skeleton of the fissure. The sediments were deposited in a chaotic way (Fig. 1). The lithic industry and the faunal remains were found dispersed arbitrarily within the entire sequence, and no particular concentration was recorded. All materials are characterized by the same taphonomic alterations, mostly Fe-Mn concretions.

The GIS study applied to bones and lithics found in the fissure showed that clearly uniform orientation patterns and random distribution are probably correlated with a rapid, chaotic and massive process like debris-flow (Giusti, 2013).

2. CHRONOLOGY

The chronological attribution of P13 is at present based on biochronology. The fossils are attributed to the late Early Pleistocene and the association represents the last Faunal Unit of the Villafranchian Mammal Age in the Italian biochronological scale (Gliozzi et al., 1997). The Pirro Nord Faunal unit can therefore be attributed to an interval between 1.3 and 1.7 My (Arzarello et al., 2007) or to a slightly lower age (around 1.3 My) according to some other authors (Masini and Sala, 2011, 2007). Some paleomagnetic measurements were made in the fissure P10 (near to the P13 fissure and characterized by the same Faunal Unit). The preliminary results, together with the palaeontological and geological data, suggest that the Pirro Nord sediments can be referred to the Matuyama, post-Olduvai reverse polarity Chron, and as the sediments show a reverse polarity, we can exclude the Jaramillo subchron.

3. THE LITHIC ASSEMBLAGE

Since 2006, 340 artefacts have been found in the Pirro 13 fissure. The lithic industry is here considered as a homogenous assemblage showing a high degree of similarity in terms of taphonomy, technological characteristics and raw material (Arzarello et al., 2012).

All artefacts are characterized by a very good state of preservation, they have sharp edges and don’t show macroscopic evidence of transportation; 35% have traces of manganese on the surface as observed also on more than 70% of the faunal remains. Post-depositional fractures have affected 20% of the lithic material and they are probably related to their falling into the fissure.

Inside the P13 fissure, unknapped flint was also found, but the size of the small pebbles is still considerably lower than that of the lithic material. Indeed the unknapped flint always has a size of between 5 and 20 mm.

Even if the lithics were found in a secondary deposition, the dimensional analysis shows the consistency of the assemblage where all phases of the reduction sequences are represented: from decortication, passing through the production of small waste, to core abandonment (Tab. 1).

3.1 Raw material

The exploited flint cobbles and pebbles have different morphologies and dimensions. The raw material has always been collected in a secondary position (river beds or slope deposits) near the actual location of the deposit, no more than 7 Km from P13. Four main different types of flint were exploited (all coming from the Gargano Cretaceous succession): one brown oolitich flint, one grey homogeneous flint, one grey bedded flint and a black flint. The first three types of flint are of excellent quality, in terms of knapping suitability, while the black flint has several inner fractures of tectonic origin. There is no clear relationship between the type of flint and the method of debitage adopted for the reduction. However, we can observe a relationship between the pebble/cobble morphology/dimension and the debitage method.

The collected pebble/cobble dimensions range between 10 and 3 cm in diameter, with a maximum concentration of cobbles with a maximum length of about 5 cm.

3.2 The reduction sequences

The decortication phase is attested by 133 flakes, among which 31 represent the very first phase of pebble initialization, as they are fully cortical flakes. The pebbles' opening was made in most cases by direct hard hammer percussion, but a bipolar percussion (Grimaldi et al., 2009) is also attested in cases where the perfect spherical shape of the raw material offered no suitable angles on which to start the debitage by direct percussion.

The decortication cannot be seen as an independent segment of the reduction sequence, aimed just at cortex removal, as also, during this phase, functional blanks are obtained. Most of the cortical flakes (38%) have indeed a lateral cortex and a sharp opposite side.

Two main reduction sequences have been adopted in Pirro Nord: an opportunistic debitage (c.f.

S.S:D.A. (Forestier, 1993) used to exploit several (from 1 to 5) striking platforms and debitage surfaces, with the aim of producing flakes of different morphologies but always with at least one cutting edge; and a centripetal debitage aimed, in most cases, at the production of flakes with convergent cutting edges.

3.2.1 Debitage by opportunistic strategies

The opportunistic (S.S.D.A.) reduction sequence has been adopted for the reduction of larger flint cobbles and of the pebbles/cobbles characterized by a parallelepiped morphology (Figg. 2,3). The debitage is always made through direct percussion by hard hammer and all flakes show an evident point of impact: in most cases a pronounced bulb and a cortical or plain butt and, occasionally, a linear one. The flakes have different morphologies in relation to the initial morphology of the core: most of them are quadrangular or trapezoidal with an external angle near to 80-85°. Each debitage surface is only used for very few removals and in most cases each debitage surface is used just once as shown by the fact that flakes with unipolar negatives are the most frequent (*i.e.* 53% of the flakes deriving from an opportunistic debitage). Usually at the end of the core exploitation a new debitage surface is started (Fig. 4). The raw material is almost never fully exploited and most of the cores are abandoned before total exploitation. Usually the reduction sequences on larger cobbles are longer, but they always stop before the full exploitation of the core. These features cannot be due to the size of the blanks searched for, as also blocks of small dimensions have been used and their dimensions are less than those of the final flakes produced from larger blocks.

In some rare cases at Pirro Nord, the use of flint pebbles of poor quality (rich in inner fractures of tectonic origin) is also documented. This data cannot be related to a lack of raw material (which may be ruled out by the evidence that most of the cores were not fully exploited), but it seems to be the result of very opportunistic and expeditious behaviour.

This method of debitage also led to the production of several *debordant* flakes as the knapping is often made in relation with more pronounced convexities. As *debordant* flakes represent 30% of the opportunistic production, we can also speculate that the perpendicular edge was preferred for ease of grasping.

3.2.2. A more complex method: the centripetal debitage

The centripetal debitage is almost exclusively used for the reduction of spherical/ovoid small pebbles and cobbles (maximum length between 20 and 70 mm). All the latter cores (n=12) led to the production of medium-small flakes, mostly *debordant* and with two convergent cutting edges. The centripetal production can be considered as the best/easiest way of exploiting small spherical pebbles but the recurrence and "standardization" in the blanks can also be evidence for a technical choice made by the Pirro Nord' s knappers (Fig. 5).

The centripetal reduction sequence starts with the opening of the pebbles by direct or bipolar percussion: a small cap is removed first. The second removal is often manage perpendicular to the first one and is later used as a striking platform in order to begin the centripetal production (when it is absent it means that the centripetal debitage has been started by using a natural striking platform). The debitage surface is used for manufacturing 3-4 flakes, detached one close to the other and removing usually four-fifths of the initial debitage surface. Then the core is abandoned, even in cases in which the raw material would allow a second phase of production.

The Kombewa *l.s.* (Owen, 1938) debitage is also attested, but it shows the same methods of reduction adopted for the pebbles and cobbles. The big flakes (in most cases completely cortical, n°= 5) are exploited by a centripetal debitage (on the ventral face of the flake-core) or by unipolar debitage using the ventral face of the flake core as a striking platform.

3.3 The retouche

The modification of the functional edges by retouch is very rare in Pirro Nord (Fig. 6), but it is attested by four flakes (all incomplete and two of them showing a bending fracture). The retouched pieces comprise one notch, one denticulate and two side scrapers, both with an inverse retouch, one on the distal edge of the flake and the other one on the lateral edge. All four retouched blank s are issue from an opportunistic S.S.D.A. debitage. We can't make any inferences based on the dimensions of retouched flakes as they are all incomplete. As they have no cortex, however, we can say that those blanks are coming from an advanced phase of debitage, and so probably result from the knapping of medium to large size cobbles.

Pseudo-retouches due to utilization are also attested on a few flakes.

4. THE PIRRO NORD SITE AND THE FIRST EUROPEAN PEOPLING

Discussions about the first European peopling are today supported by numerous sites giving important information about the technical behaviour adopted by the hominids that first populated the continent. Apart from Pirro Nord, the oldest record is Damnisi in Georgia, dated to 1.8 My and much older than Pirro Nord (Baena et al., 2010; Lordkipanidze et al., 2013; Mgeladze et al., 2011), followed by the Spanish sites of Sima del Elefante, Barranco León and Fuente Nueva 3 dated to around 1.2 – 1.0 My (Barsky et al., 2010; Bernal and Moncel, 2004; Carbonell et al., 2008; Mosquera et al., 2013; Parés et al., 2006; Toro-Moyano et al., 2011; 2009) and the French sites of Pont de Lavaud dated to 1.1 My (Despriée et al., 2010, 2009, 2006) and Le Vallonnet dated to 1.1 My (Cauche, 2009; Cauche et al., 2001; de Lumley et al., 2009). In the Italian peninsula, another site attesting an old occupation is Cà Belvedere di Montepoggiolo dated to about 1,0 My (Arzarello and Peretto, 2010; Peretto, 2005; Peretto et al., 1998).

The data obtained from Pirro Nord fits well in this context, but some peculiar features have been found. In general we can say that the lithic production of Pirro Nord is characterized, on the one hand, by opportunistic behaviour suggested by the very short reduction sequences and by the non-exhaustion of cores and, on the other, by a series of products (pointed flakes) that appear to show a strong intentionality in terms of the purpose of the debitage.

The lithic assemblage of Pirro Nord shows many similarities with Barranco León and Fuente Nueva (Toro-Moyano et al., 2011) as in both cases the same production strategies are found (unipolar, bipolar, multidirectional and centripetal) together with a strong derivation from the initial morphology of raw material, the use of both direct and on-anvil percussion (although less representative in Pirro Nord), the exploitation of local raw material and the production of small cutting edges. The main difference between the two sites is represented by the exploitation of limestone alongside flint in the Spanish sites. In Pirro Nord limestone is totally absent, probably precluding the presence of chopper-like tools at this site. Concerning the issue of flake edge modification, it is still doubtful at the Spanish sites but seems to be attested in a very few cases in Pirro Nord.

Compared to Sima del Elefante (Carbonell et al., 2008; Mosquera et al., 2013) the knapping methods used in Pirro Nord seem to be more complex as, in the first site, only one knapping method (unipolar longitudinal with just one striking platform) is employed. The published stone tools from Sima del Elefante, however, are still few and more similarities may emerge in the future.

The lithic assemblage of Pont de Lavaud (Despriée et al., 2010, 2009) is actually the most abundant among the oldest European sites. In this site the production is also strongly conditioned by raw material (morphology and petrography) and the reduction sequences are rather short. The techniques used are direct percussion by hard hammer and bipolar percussion on anvil (here, also, the bipolar percussion is employed more often than in Pirro Nord, probably due to the use of quartz) and the knapping methods are mainly unipolar, bipolar, multidirectional and, in some cases, centripetal. As in the Spanish sites of Barranco León and Fuente Nueva 3, shaping is also attested. The most important convergences with Pirro Nord are found in the presence of retouched flakes, here modified in their longest edge, and of “pointed” end products. The production of “pointed” products follows different reduction sequences at Pirro Nord (centripetal debitage) and Pont de Lavaud (shaping) but can represent a specific and common strategy aimed at a precise use. Unfortunately, usewear analysis could not be conducted for either site and therefore it is not possible, at present, to make more precise hypotheses.

In the Vallonnet cave the lithic pieces (about 100) are made exploiting local raw material (mostly limestone and to a lesser extent flint and quartzite) and show, again, short reduction sequences (de Lumley et al., 2009). At this site too, shaping, for non-siliceous raw materials, is associated with debitage and the main reduction methods are the unipolar, bipolar and multidirectional techniques.

As for Pirro Nord and the other older European sites, here too the reduction sequences are strongly adapted to raw materials.

The site which shows most similarities to Pirro Nord is Cà Belvedere di Montepoggiolo (Arzarello and Peretto, 2010; Peretto, 2005), possibly because in both sites raw material is made of spherical/ovoid flint pebbles/cobbles. The reduction sequences, in terms of chosen debitage methods and techniques, are the same and in both sites shaping is not attested.

On the basis of the technological characteristics of the earliest European lithic industries it is evident that we are faced with a fairly homogeneous technical behavior. All reduction sequences are short and indisputably influenced by both nature and the morphology of raw material.

The major differences (presence/absence of shaping and retouched tools) may be related exclusively to the type of exploited raw material, as shaping is absent when flint is the only knapped material. From a general point of view we can consider these lithic productions as “opportunistic”, which is to be understood as referring to the capacity to exploit opportunities, readily adapting to the circumstances and with the aim of achieving an effective result.

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REFERENCES

Abbazzi, l., Benvenuti, M., Boschian, G., Dominaci, S., Masini, F., Mezzabotta, C., Rook, L., Valleri, G., Torre, D., 1996. The Neogene and Pleistocene succession and the mammal faunal assemblages of an area between Apricena and Poggio Imperiale (Foggia). Mem. della Soc. Geol. Ital. 51, 383–402.

Arzarello, M., Marcolini, F., Pavia, G., Pavia, M., Petronio, C., Petrucci, M., Rook, L., Sardella, R., 2007. Evidence of earliest human occurrence in Europe: the site of Pirro Nord (Southern Italy). Naturwissenschaften 94, 107–112.

Arzarello, M., Marcolini, F., Pavia, G., Pavia, M., Petronio, C., Petrucci, M., Rook, L., Sardella, R., 2009. L'industrie lithique du site Pléistocène inferieur de Pirro Nord (Apricena, Italie du sud) : une occupation humaine entre 1,3 et 1,7 Ma.Anthropologie. 113, 47–58.

Arzarello, M., Pavia, G., Peretto, C., Petronio, C., Sardella, R., 2012. Evidence of an Early Pleistocene hominin presence at Pirro Nord (Apricena, Foggia, southern Italy): P13 site. Quat. Int. 267, 56–61.

Arzarello, M., Peretto, C., 2010. Out of Africa: The first evidence of Italian peninsula occupation. Quat. Int. 223-224, 65–70.

Baena, J., Lordkipanidze, D., Cuartero, F., Ferring, R., Zhvania, D., Martín, D., Shelia, T., Bidzinashuili, G., Roca, M., Rubio, D., 2010. Technical and technological complexity in the beginning: The study of Dmanisi lithic assemblage. Quat. Int. Hum. Expans. Eurasia Favouring Limiting Factors 223-224, 45–53.

Barsky, D., Celiberti, V., Cauche, D., Grégoire, S., Lebègue, F., de Lumley, H., Toro-Moyano, I., 2010. Raw material discernment and technological aspects of the Barranco León and Fuente Nueva 3 stone assemblages (Orce southern Spain). Quat. Int. Hum. Expans. Eurasia Favouring Limiting Factors 223-224, 201–219.

Bedetti, C., 2003. Le avifaune fossili del Plio-Pleistocene italiano: sistematica, paleoecologia ed elementi di biocronologia. Università la Sapienza, Roma.

Bernal, M.T., Moncel, M.-H., 2004. Contribution à l'étude de la technologie du Paléolithique « archaïque » du sud de l'Europe selon le Système Logique Analytique (SLA). Application aux sites du Vallonnet (Roquebrune-Cap-Martin, France), de Gran Dolina TD6 (Burgos, Espagne), de Ca'Belvedere. Anthropologie. 108, 307–329.

Carbonell, E., Bermudez de Castro, J., Pares, J., Perez-Gonzalez, A., Cuenca-Bescos, G., Olle, A., Mosquera, M., Huguet, R., van der Made, J., Rosas, A., Sala, R., Vallverdu, J., Garcýa, N., Granger, D.E., Martinon-Torres, M., Rodrýguez, X., Stock, G.M., Verges, J., Allue, E., Burjachs, F., Caceres, I., Canals, A., Benito, A., Dýez, C., Lozano, C., Mateos, A., Navazo, M., Rodrýguez, J., Rosell, J., Arsuaga, J.L., Bermúdez de Castro, J.M., Parés, J.M., Pérez-González, A., Cuenca-Bescós, G., Ollé, A., Vallverdú, J., García, N., Martinón-Torres, M., Rodríguez, X.P., Vergès, J.M., Allué, E., Cáceres, I., Díez, C., Lozano, M., Rodríguez, J., 2008. The first hominin of Europe. Nature 452, 456–470.

Cauche, D., 2009. Les stratégies de débitage dans les industries lithiques archaïques des premiers habitants de l'Europe. Anthropologie. 113, 178–190.

Cauche, D., Celiberti, V., Barsky, D., Notter, O., Bidittu, I., Lumley, H. de, 2001. Les plus anciennes industries lithiques du Latium, Italie, in: Congrès, L.S. du (Ed.), XIV Congrès UISPP. Liège, pp. 49–57.

David Lordkipanidze, Marcia S. Ponce de León, Ann Margvelashvili, Yoel Rak, G. Philip Rightmire, Abesalom Vekua, Christoph P. E. Zollikofer, 2013. A Complete Skull from

Dmanisi, Georgia, and the Evolutionary Biology of Early Homo. Science (80-.). 342, 326–331.

De Lumley, H., Barsky, D., Cauche, D., 2009. Les premières étapes de la colonisation de l'Europe et l'arrivée de l'Homme sur les rives de la Méditerranée. Anthropologie. 113, 1–46.

Delfino, M., Bailon, S., 2000. Early Pleistocene herpetofauna from Cava Dell'Erba and Cava Pirro (Abulia, southern Italy). Herpert J. 10, 95–110.

Despriée, J., Gageonnet, R., Voinchet, P., Bahain, J.J., Falguères, C., Varache, F., Courcimault, G., Dolo, J.-M., 2006. Une occupation humaine au Pléistocène inférieur sur la bordure nord du Massif Central. Comptes Rendu PALEVOL 5, 821–828.

Despriée, J., Voinchet, P., Gageonnet, R., Dépont, J., Bahain, J.-J.J.-J., Falguères, C., Tissoux, H., Dolo, J.-M.J.-M., Courcimault, G., 2009. Les vagues de peuplements humains au Pléistocène inférieur et moyen dans le bassin de la Loire moyenne, région Centre, France. Apports de l'étude des formations fluviatiles. Anthropologie. doi:10.101, 125–167.

Despriée, J., Voinchet, P., Tissoux, H., Moncel, M.-H., Arzarello, M., Robin, S., Bahain, J.-J., Falguères, C., Courcimault, G., Dépont, J., Gageonnet, R., Marquer, L., Messager, E., Abdessadok, S., Puaud, S., 2010. Lower and middle Pleistocene human settlements in the Middle Loire River Basin, Centre Region, France. Quat. Int. Hum. Expans. Eurasia Favouring Limiting Factors 223-224, 345–359.

Forestier, H., 1993. Le Clactonien: Mise en application d'une nouvelle méthode de débitage s'inscrivant dans la variabilité des systèmes de production lithique du Paléolithique ancien. Paleo 5, 53–82.

Giusti, D., 2013. A GIS apporach to the Paleolithic site of Pirro Nord, Apricena, Italy: from data management to spatial analysis through a Wiki documentation, in: ESHE (Ed.), European Society for the Study of Human Evolution. Vienna, p. 96.

Gliozzi, E., Abbazzi, L., Azzaroli, A., Caloi, L., Capasso Barbaro, L., Di Stefano, G., Esu, D., Ficcarelli, G., Girotti, O., Kotsakis, T., Masini, F., Mazza, P., Mezzabotta, C., Palombo, M.R., Petronio, C., Rook, L., Sala, B., Sardella, R., Zanalda, E., Torre, D., 1997. Biochronologyof selected mammals, molluscs and ostracods from the Middle Pleistocene to the Late Pleistocene in Italy. Riv. Ital. di Strat. Paleontol. 90, 369–388.

Masini, F., Sala, B., 2007. Late Pliocene and Pleistocene small mammal chronology in the Italian peninsula. Quat. Int. 160, 43–56.

Masini, F., Sala, B., 2011. Considerations on an integrated biochronological scale of Italian Quaternary continental mammals. Il Quaternario 24, 193–198.

Mgeladze, A., Lordkipanidze, D., Moncel, M-H., Despriee, J., Chagelishvili, R., Nioradze, M., Nioradze, G., 2011. The hominin occupations at Dmanisi site, Georgia, Southern Caucasus: lithic technical abilities in the first settlements of Eurasia, Journal of Human Evolution, 60 (5), 571-596.(8ème / Top 25).

Mosquera, M., Ollé, A., Rodríguez, X.P., 2013. From Atapuerca to Europe: Tracing the earliest peopling of Europe. Quat. Int. 295, 130–137.

Owen, W., 1938. The Kombewa Culture. Kenya colony 203–205.

Parés, J.M., Pérez-Gonzàlez, A., Rosas, A., Benito, A., Bermùdez de Castro, J.M., Carbonell, E., Huguet, R., 2006. Matuyama-age lithich tools from the Sima del Elefante site, Atapuerca (northenSpain). J. Hum. Evol. 50, 163–169.

Pavia, M., Zunino, M., Coltorti, M., Angelone, C., Arzarello, M., Bagnus, C., Bellucci, L., Colombero, S., Marcolini, F., Peretto, C., Petronio, C., Petrucci, M., Pieruccini, P., Sardella, R., Tema, E., Villier, B., Pavia, G., n.d. Stratigraphical and palaeontological data from the Early Pleistocene Pirro 10 site of Pirro Nord (Puglia, south eastern Italy). Quat. Int. 2012, 40–55.

Peretto, C., 2005. The first peopoling of Southern Europe: the Italian case. Palevol 5, 283–290.

Peretto, C., Amore, O., Antoniazzi, A., Bahain, J.J., Cattani, L., Cavallini, E., Esposito, P., Falguères, C., Hedley, C., Laurent, I., Le Breton, V., Longo, L., Milliken, S., Monegatti, P., Ollé, A., Pugliese, A., Renault-Miskosky, J., Sozzi, M., Ungaro, S., Vannucci, S., Vergés, J.M., Wagner, J.J., Yokoyama, Y., 1998. L'industrie lithique de Cà Belvdere i Monte Poggiolo: stratigraphie, matière première, typologie, remontage et traces d'utilisation. Anthropologie. 102, 343–466.

Rosas, A., Perez-Gonzalez, A., Carbonell, E., Van der Made, J., Sanchez, A., Laplana, C., Cuenca-Bescos, G., Parés, J.M., Huguet, R., 2001. Le gisement pleistocene de la Sima del Elefante, (Sierra de Atapuerca, Espagne). Anthropologie. 105, 301–312.

Toro- Moyano, I., Barsky, D., Cauche, D., Celiberti, V., Grégoire, S., Lebegue, F., Moncel, M.H., de Lumley, H., 2011. The archaic stone tool industry from Barranco León and Fuente Nueva 3, (Orce, Spain): Evidence of the earliest hominin presence in southern Europe. Quat. Int. 243, 80–91.

Toro-Moyano, I., de Lumley, H., Fajardo, B., Barsky, D., Cauche, D., Celiberti, V., Grégoire, S., Martinez-Navarro, B., Patrocinio Espigares, M., Ros-Montoya, S., 2009. L'industrie lithique des gisements du Pléistocène inférieur de Barranco León et Fuente Nueva 3 à Orce, Grenade, Espagne. Anthropologie. 113, 111–124.

FIGURES AND TABLE CAPTIONS

Tab. 1 – Composition of the lithic assemblage of Pirro Nord. The material comes from the stratigraphic units A (9%), B (12%), C (19%) and D (60%); the different amounts of material found in the stratigraphic units are function of the different thickness of each SU. In the table we have named as "debris" the fragments (coming indisputably from a debitage process) that cannot be attributed to a clear technological category. The flakes-cores were divided on the basis of the performed core technology .

Fig. 1 – Localization of the Pirro Nord site inside the "Cave dell'Erba" quarry and synthetic stratigraphy of the excavated area.

Fig. 2 – Core with 3 striking platforms managed by unipolar debitage. The core is not exhausted and has produced a minimum of 12 flakes of middle/big sizes. The scan was made in the UNIFE TekneHub laboratory by Julie Arnaud with a Scanner Breuckmann smartSCAN3D – Duo, with a field of View of 225 mm and a resolution of +/- 9 µm. The data were processed with OPTOCAD 2011.

Fig. 3 – Flakes issued from an opportunistic debitage. The black colour is due to the deposit of Fe/Mn oxides. All flakes are coming from the SU D.

Fig. 4 – Dimensional analysis of complete flakes issued from an opportunistic debitage. The graphic

shows, in relation to flakes with unipolar removals, that the final phase of the reduction sequence is often made by the opening of a new debitage surface.

Fig. 5 – Flakes (on the right) and core attesting a centripetal debitage. The morphology of the flakes is a *déjeté* point with an opposite back (drawings D. Aureli).

Fig. 6 – Retouched flake coming from the SU D, square C4. The retouch is located on the distal edge of the flake and is denticulated. The retouched blank is a flake from the S.S.D.A. core technology. It is a distal fragment and the breakage is probably due to post-depositional processes.

Figure 1

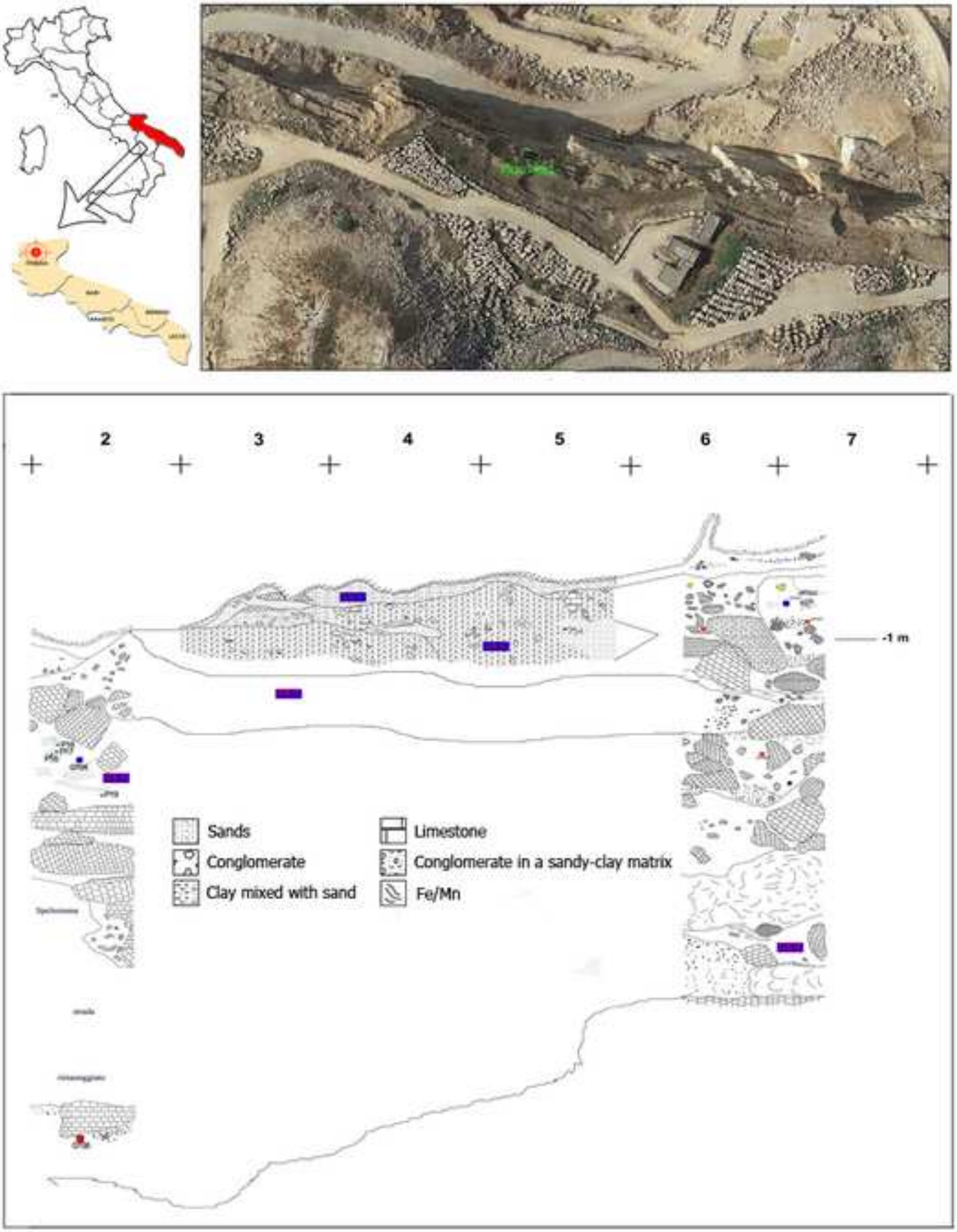
2
3
4
5
6
7
-1 m
Sands
Conglomerate
Clay mixed with sand
Limestone
Conglomerate in a sandy-clay matrix
Fe/Mn

Figure 2

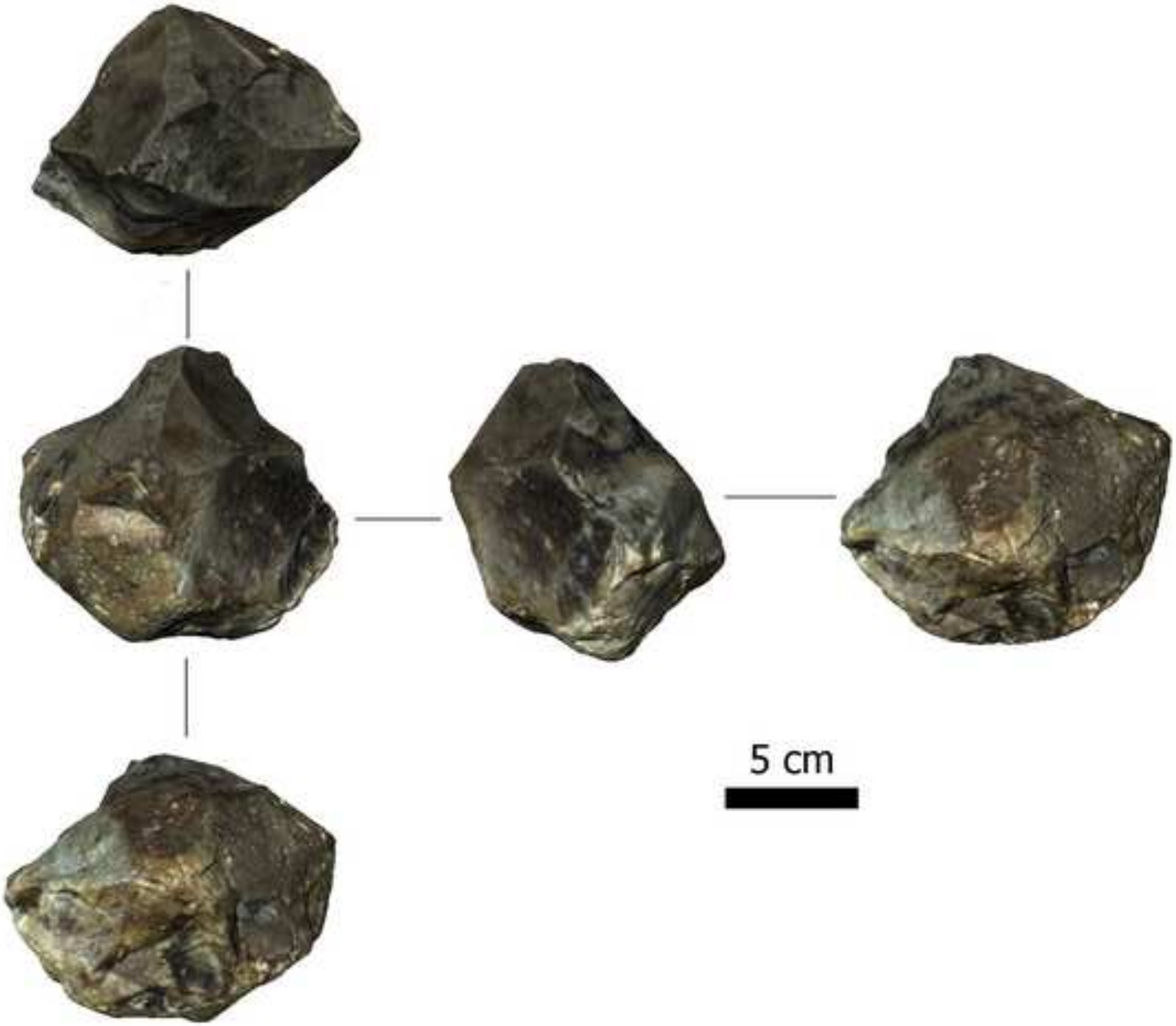

Figure 3

Figure 4

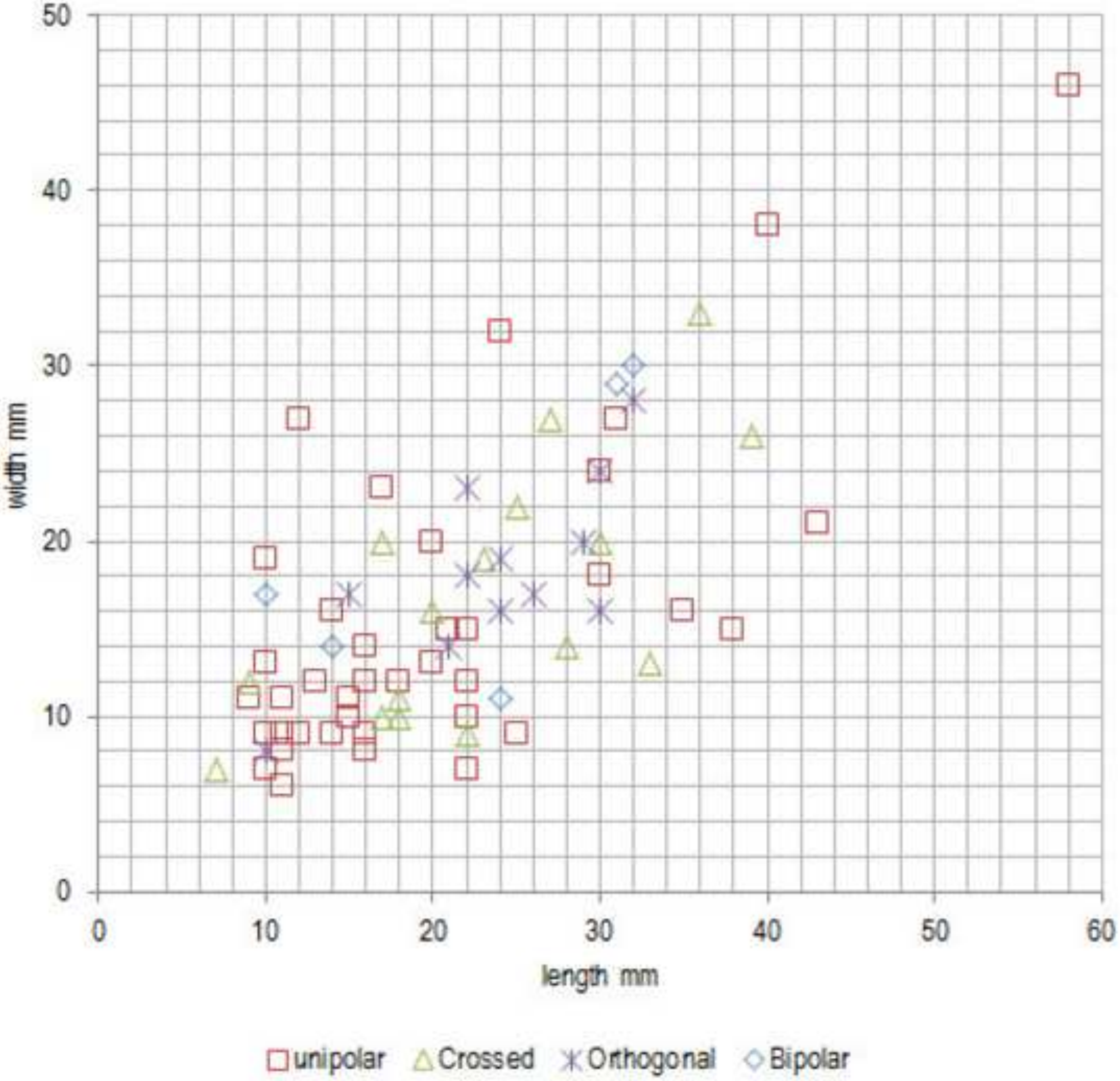
50
40
30
20
10
0
0
10
20
30
40
50
60
width mm
length mm
□ unipolar
△ Crossed
✳ Orthogonal
◇ Bipolar

Figure 5

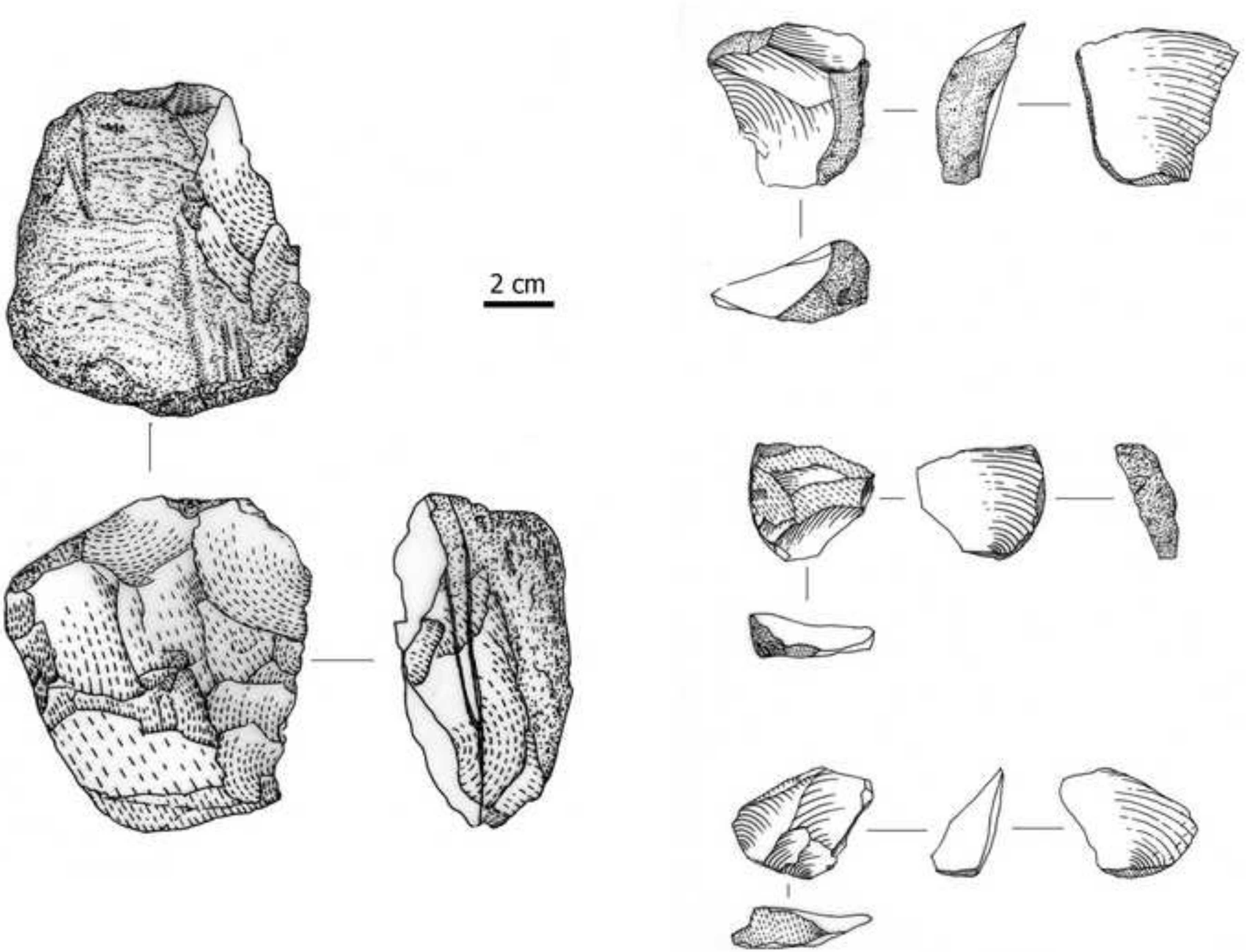

Figure 6

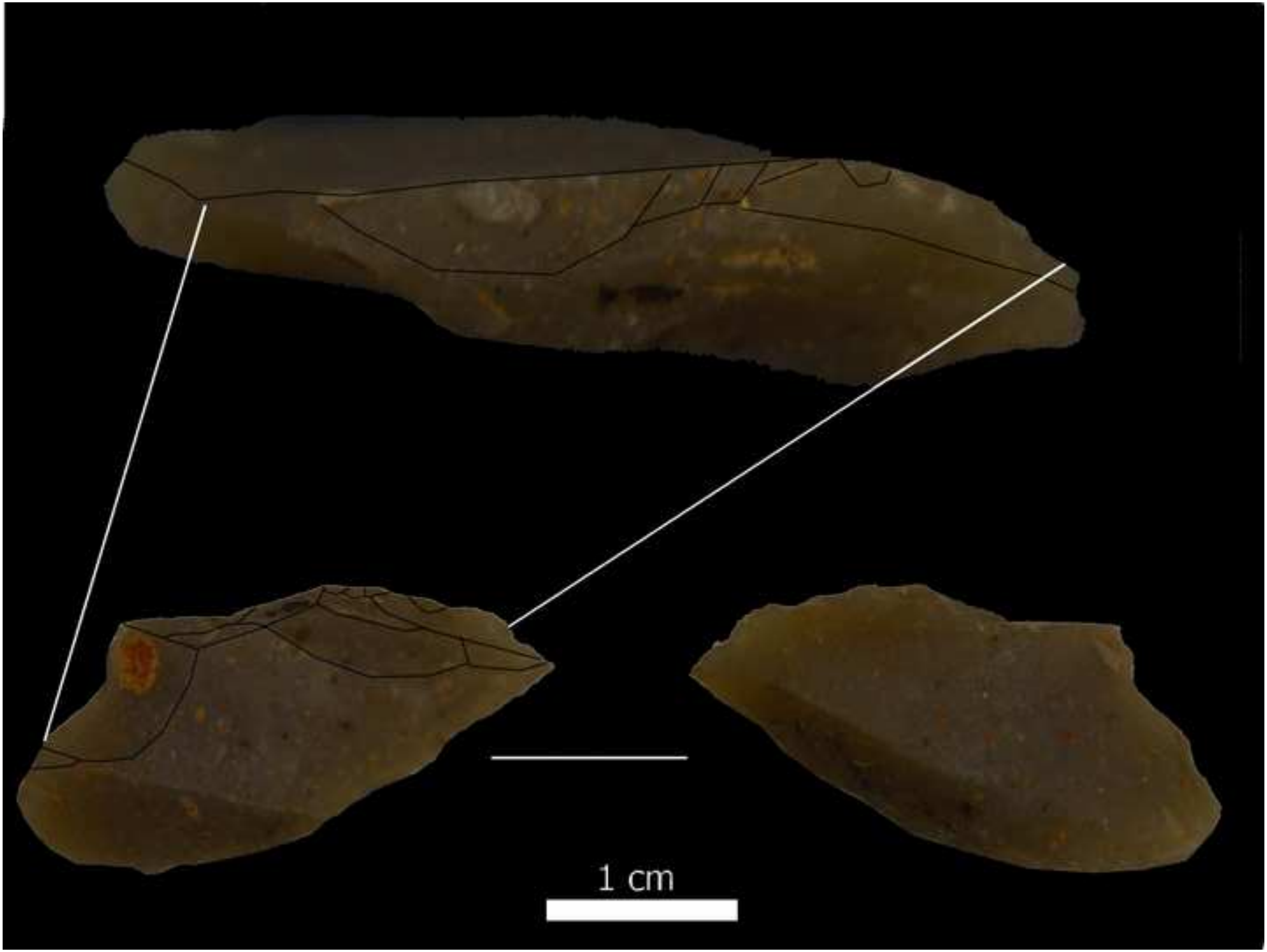

Table 1

Type	N°
Cores	**37**
1 striking platform	6
2 striking platforms	8
3> striking platforms	3
Centripetal exploitation	12
Indet./fragment	8
Flakes	**231**
Unipolar removals	81
Bipolar removals	10
Orthogonal removals	14
Crossed removals	49
Centripetal removals	39
Kombewa l.s.	9
Indet.	29
Debris	**72**
TOT.	**340**