

Lithic raw material procurement and consumption during the Late Neolithic/Early Chalcolithic: the case of Casal dos Matos and Cabeça Gorda 1 (Vila Nova de Ourém, Estremadura, Portugal)

Suministro y consumo de materias primas líticas durante el Neolítico final/Calcolítico inicial: el caso de Casal dos Matos y Cabeça Gorda 1 (Vila Nova de Ourém, Estremadura, Portugal)

Marco António ANDRADE y Henrique MATIAS

UNIARQ – Centro de Arqueologia da Universidade de Lisboa
Alameda da Universidade, 1600-214 Lisbon, Portugal
folha-de-acacia@iol.pt (MAA)
hamatias@gmail.com (HM)

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ABSTRACT

This paper presents the relationship between a potential flint procurement source (Casal dos Matos) and a Neolithic-Chalcolithic site (Cabeça Gorda 1) located in its immediate surroundings. The macroscopical comparison between the raw material used for flaked stone artifacts in Cabeça Gorda 1 and the raw material that occurs in Casal dos Matos suggests at least a spatial relationship between a local procurement area and a specific consumption context – thus reinforcing the evident continuity between local procurement, production and consumption sites in the Prehistory of the ancient peasant communities in the Portuguese Estremadura, between the Late Neolithic and Early Chalcolithic (3100-2600 cal BCE). This paper is not intended to present the exhaustive study of the flaked stone industry of Cabeça Gorda 1, but to set a conceptual framework, based on the currently available data, for a specific model of raw material exploitation by comparing with other instances of flint procurement in the same region. This conceptual framework can then be used not only for the area where these sites are included but also for other regions where similar contexts can be identified.

KEY WORDS: Raw material procurement. Flaked stone artifacts consumption. Neolithic-Chalcolithic. Portuguese Estremadura.

RESUMEN

Este trabajo presenta la relación entre una potencial fuente de suministro de sílex (Casal dos Matos) y un yacimiento neolítico-calcolítico (Cabeça Gorda 1) ubicado en su entorno inmediato. La comparación macroscópica entre la materia prima utilizada para los artefactos de piedra tallada en Cabeça Gorda 1 y la que ocurre en Casal dos Matos sugiere una relación, al menos espacial, entre un área de suministro local y un contexto de consumo específico – reforzando así la evidente continuidad entre sitios de suministro local, producción y consumo en la Prehistoria de las antiguas comunidades campesinas en la Estremadura portuguesa, entre el Neolítico final y el Calcolítico inicial (3100-2600 cal ANE). Este trabajo no pretende presentar el estudio exhaustivo de la industria de la piedra tallada de Cabeça Gorda 1, pero sí establecer un marco conceptual, basado en los datos actualmente disponibles, para un modelo específico de explotación de materias primas mediante la comparación con otros casos de suministro de sílex en la misma región. Este marco conceptual puede utilizarse, no sólo para el área donde estos sitios se incluyen, sino también para otras regiones donde se pueden identificar contextos similares.

PALABRAS CLAVE: Suministro de materias primas. Consumo de artefactos líticos tallados. Neolítico-Calcolítico. Estremadura portuguesa.

1. Presentation

The flint source of Casal dos Matos and the archaeological site of Cabeça Gorda 1, located in a region of vast archaeological potential, were identified by a team from the company Crivarque – Geo-Archaeological Works, Ltd. during the archaeological monitoring of road constructions. Cabeça Gorda 1 was, in this context, subjected to an archaeological intervention (i.e., several test pits) directed by one of the authors (HM), in accordance with the safeguard measures recommended for the site and only (due to contractual limitations) in the area that would be affected by the implementation of the construction project.

A particular type of raw material (primarily translucent flint) identified at Casal dos Matos served as blanks to a part of the lithic industry of Cabeça Gorda 1 and allows us to associate, at least spatially, a possible procurement area and a consumption context of flaked stone artifacts. Furthermore, the sites are located in the same area, separated by about 800 m but connected by the valley of a small watercourse (Ameal Stream). Thus, can we argue that the siliceous material of Casal dos Matos (or siliceous materials from the surrounding area of the same geological context) had functioned as a probable raw material procurement area for lithic artifacts made and used in Cabeça Gorda 1?

The purpose of this paper is not the exhaustive study of the flaked stone industry from Cabeça Gorda 1, but to present the probable relationship between two specific contexts: one of exploitation of lithic raw material and other of production and consumption of flaked stone artifacts by the Neolithic and Chalcolithic communities. Their comparison with other instances of flint procurement located in the same regional area is also discussed, based on the current available data. Thus, the hypotheses formulated here with reference to raw material exploitation and consumption can then be used as a point of comparison not only for the Portuguese Estremadura but also for other geographic regions where similar contexts could be identified.

2. Geographical, Geological and Archaeological Context

The sites here studied are located in Portuguese Estremadura (fig. 1) just north of the town of Vila Nova de Ourém, Casal dos Matos in about 2 km and Cabeça Gorda 1 in about 2,6 km (fig. 2). Casal dos Matos is situated on a soft slope on the left bank of Ameal Stream, in the contact area between the Upper Cenomanian argillaceous limestones and the

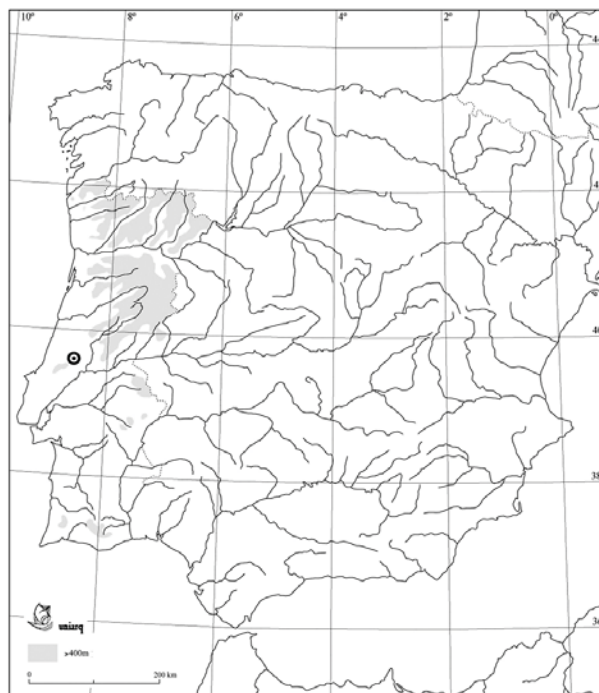


Fig. 1.- Position of Casal dos Matos and Cabeça Gorda 1 in the Iberian Peninsula.

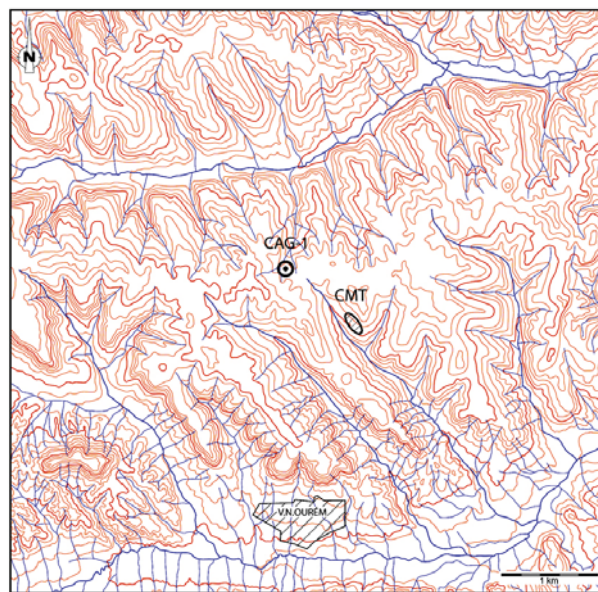


Fig. 2.- Oro-hydrographical context of Casal dos Matos (CMT) and Cabeça Gorda 1 (CAG-1).

Miocene deposits. The excavated area of Cabeça Gorda 1, approximately 800 m northwest of Casal dos Matos (both sites are connected by the Ameal Stream valley), is located near the top of a small hill with a slight slope from south to north, bounded on

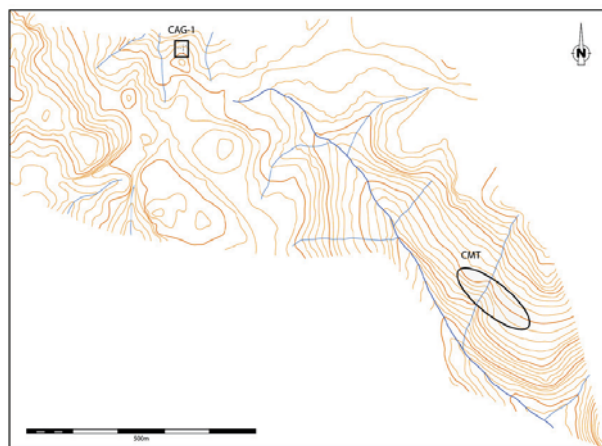


Fig. 3.- Spatial relationship between Casal dos Matos (CMT) and Cabeça Gorda 1 (CAG-1).

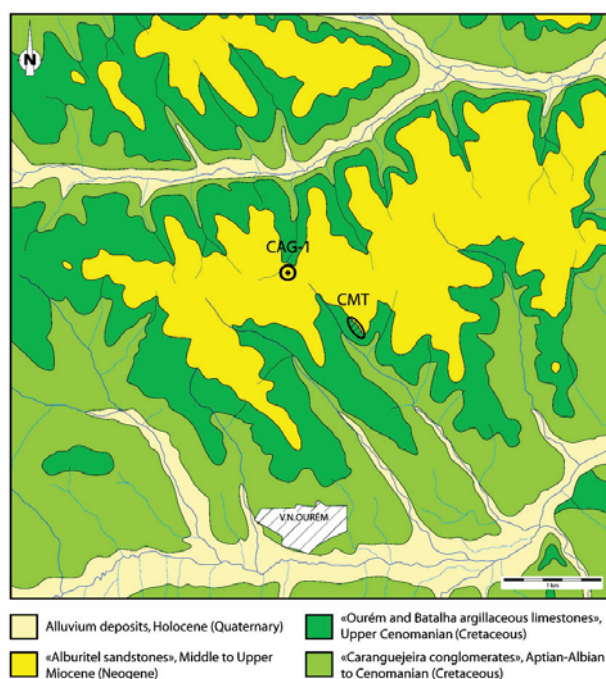


Fig. 4.- Geological context of Casal dos Matos (CMT) and Cabeça Gorda 1 (CAG-1).

the east and west sides by two small watercourses subsidiaries of Almo Stream (fig. 3).

The landscape in which Casal dos Matos and Cabeça Gorda 1 are found is included in the drainage basin of Nabão River, which is characterized by the morphology of Miocene sandstone deposits of continental facies occupying the top of the three main regional plains, inserted into the vast synclinal depression of Vila Nova de Ourém – enclosed in the northwest area by the Vermoil diapir and in the west

area by the synclinal region of Pousos and by the northeastern edge of the Fátima plain.

Surrounding these Miocene deposits are Cretaceous formations of Upper Cenomanian argillaceous limestones and Lower Cenomanian conglomerates. In the Upper Cenomanian formations we can find several flint sources in primary position in the stratigraphic contact between the Cenomanian and the Miocene (Crosaz-Galletu, 1979). Occasionally, Pliocene deposits occupy the top of small hills in the north and northeast areas (fig. 4).

Four main watercourses cross these plains (Caxarias, Olival, Granja and Sorvieira Streams, tributaries of Nabão River) running from west to east with secondary watercourses taking perpendicular course (north-south and south-north).

Despite the archaeological potential of this region, the possible Neolithic and Chalcolithic population networks are insufficiently defined. Nevertheless, we can find, within an area of 15 km radius from Cabeça Gorda 1, several chrono-culturally coeval types of sites.

The settlements, mostly recognized by surface vestiges (unexcavated), are scattered through space without a clear territorial organization. Those are, generally, small sites (with dispersion of archaeological remains never exceeding 1000 m²) implanted on inter-fluvial lines with a relatively good visual dominance over the surrounding landscape. We highlight, in a set of about a dozen other small and poorly characterized sites (Gonçalves and Pereira 2006), the settlements of Cabeço do Cão and Lagoa do Furadouro (about 8 km and 10 km southeast of Cabeça Gorda 1, respectively) and the Late Neolithic/Chalcolithic levels identified in the Bronze Age settlement of Agroal (about 13 km east of Cabeça Gorda 1).

In addition, a Chalcolithic site, within the medieval castle of Ourém (about 4 km south of Cabeça Gorda 1), was recently discovered. Excavations reveal several small pits from which were recovered pottery fragments with decorative motifs typical of the Middle Chalcolithic of the Portuguese Estremadura (including “acacia-leaf” printed decoration and combed decoration). One of these pits is apparently related to an occupation dating to 3859±30 BP (Wk-27463, on a *sus* sp. osteological sample), giving the following 2 sigma calibrated result: 2462-2280 cal BC (Carvalho *et al.* 2010-11).

Burial places are also represented in the region. The cases which stand out are the Azurraque dolmen (about 6 km southeast of Cabeça Gorda 1) and the caves of Lapa dos Furos and Buraca da Moura da Rexaldia (about 12 km east and 10 km south of Cabeça Gorda 1, respectively), which were identified as important funerary sites during Late Neo-

lithic and Chalcolithic (Zilhão 1994b; Andrade *et al.* 2010).

Sites with specific vocations are also represented. The site of Casas de Baixo (about 6,5 km north of Cabeça Gorda 1) corresponds to an extensive workshop located near raw material sources (in secondary position over Miocene deposits), divided into several *loci* where two different operative chains were recognized: one dedicated to the production of blades and bladelets, another dedicated to the production of bifacial artifacts (Zilhão 1994a; Forenbaher 1999, 2006). Note that in the immediate surroundings of this production area, the site of Portela da Mata has been identified (Gonçalves and Pereira 2006), which may correspond to a small residential area related to Casas de Baixo. Another possible workshop, found in the same geological context, was identified at the site of Outeiro do Marco (about 4,5 km northeast of Cabeça Gorda 1) but is only characterized by surface remains (Gonçalves and Pereira 2006). The area of Ribeira da Murta (about 15 km northeast of Cabeça Gorda 1) corresponds to a workshop as well, characterized by the presence of flint blocks in secondary position in detritic deposits where there were found numerous core pre-forms typologically attributable to the Middle/Late Neolithic (Aubry *et al.* 2009: 153).

3. Casal dos Matos flint characteristics

The translucent flint identified in Casal dos Matos was recovered exclusively on the top of a thin yellowish clay level, forming a kind of “pouches”, between the Upper Cenomanian limestone formations and the Miocene detrital deposits composed of sand and

gravel (fig. 5). Generally, the flint presents a tabular morphology, but it can also occur in small-sized amorphous nodules of elongated shape. Although some platelets are of fine knapping quality, many blocks have a very irregular cortex with a high degree of porosity that is sometimes invasive to its core. The cortex is often very thin (less than 1mm), with a calcareous and pulverulent aspect, and it is impregnated by the iron oxides present in the clay deposit where it lies (fig. 6). Some specimens present a thick (± 2 cm) and very pulverulent cortex, with weathered surfaces that can be explained by being in a sub-primary position in the Holocene soil, which is currently used for agriculture. Thus, the interior of the nodules is often porous with some internal flaws (probably due to tectonics) cemented by iron oxides that confer a low knapping quality to some elements.

It presents a wide colour range that goes from yellowish-brown to grayish-green or pinkish-red. These variations can be identified even in the same block, and are a typical characteristic of the Upper Cenomanian flint from the Lusitanian Basin (Aubry *et al.* 2009: 154-157). Other variations can also be seen in some macroscopic characteristics such as grain size (from very fine to coarse) and transparency (from translucent to opaque/translucent, depending on how pronounced its cryptoquartzic qualities are).

The mudstone texture is a homogeneous feature in the sample analysed here, as well as the absence of other observable elements other than iron oxides – like the absence of any bioclastic relicts (probably dependent of the organic origin of the deposit). Some coarse areas are also observed and may correspond to micro and macroquartz zonations (increasing up to the formation of geodes). We can perceive some “cloudy” features (appearing as whitish dots) that

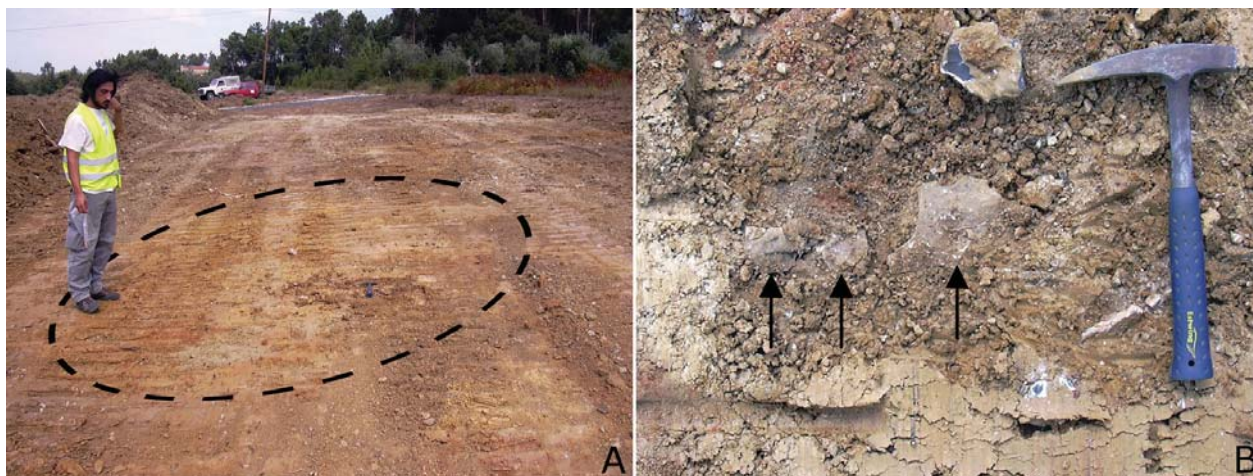


Fig. 5.- Casal dos Matos. A: the translucent flint platelets appear in the yellowish clay «pouches» delimited by the dashed line; B: view of the translucent flint platelets, indicated by arrows, as they appear on the top of the yellowish clay.

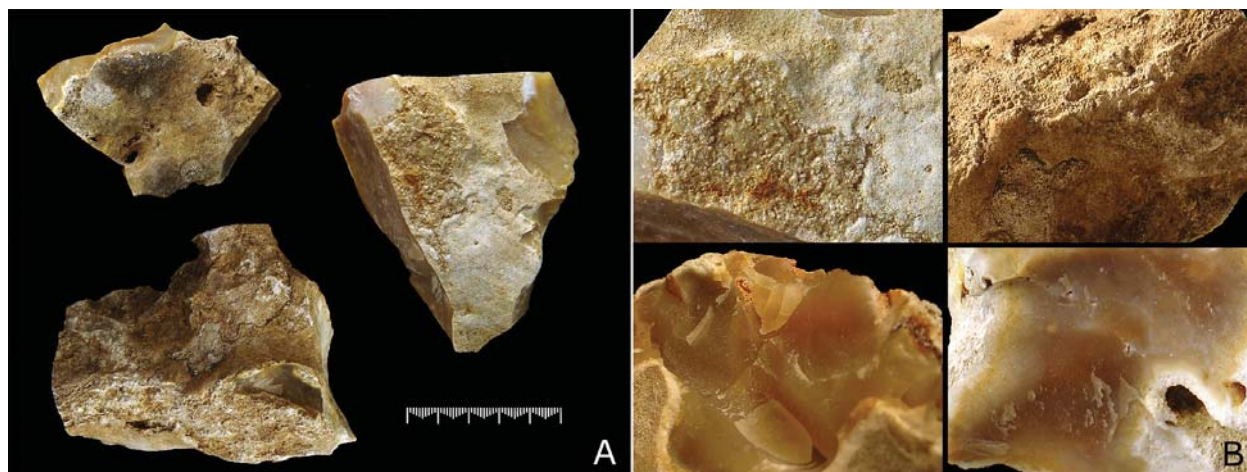


Fig. 6.- Casal dos Matos. A: general aspect of the translucent flint platelets; B: detail of the cortex (top) and of the inside (bottom) of the translucent flint platelets.

may correspond to poorly preserved siliceous fossil relicts (fig. 7).

Although some common features are observable between the Casal dos Matos and the Caxarias flint (like colour variation and general morphological texture), the absence of muscovite elements, detrital sub-rounded quartz grains and fossil relicts may be related to the level of observation applied to the Casal dos Matos flint. Another scale of analysis (namely, microscopical) is likely needed to ascertain whether these characteristics are present on the Casal dos Matos flint as well. Therefore, this must be considered a preliminary description, but regarded as sufficient (in the scope of this particular study) to determine the relation between the Casal

dos Matos flint and its use in the occupation site of Cabeça Gorda 1. Either way, both types of flint are distinguishable by its translucency and porosity, being relatively easy to individualize macroscopically.

It should be noted that no evidences of direct exploitation were recognized in Casal dos Matos, which does not allow to arguably classify this occurrence as a procurement source related to Cabeça Gorda 1. It should therefore be regarded only as a potential procurement source (due to the proximity and similarity of the raw material).

Admittedly, the difficulty lies in attributing the origin of lithic archaeological pieces to specific points within the geological formations; besides, in this case, there may exist other sources closer than Casal dos Matos. However, survey works conducted throughout the geological formation in which this flint is found did not allow the identification of other possible sources. Thus, Casal dos Matos is the only identified source so far and it is assumed to be the only one available for comparison.

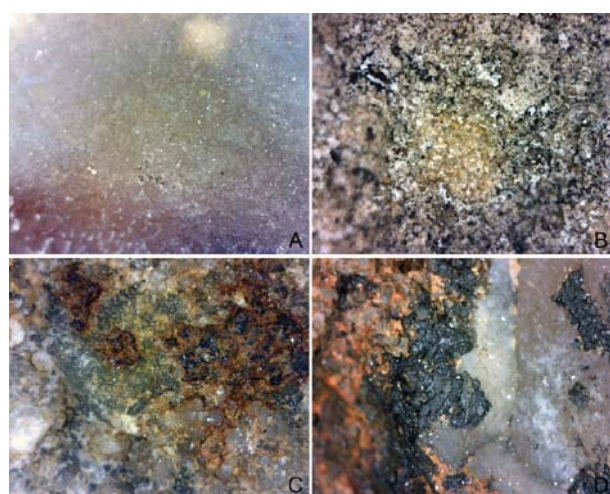


Fig. 7.- Microscopic aspects (x200) of the translucent flint occurring at Casal dos Matos. A: interior aspect, with micro-quartz grains; B: aspect of the cortex; C and D: aspect of the coarse iron oxides present in the cortex.

4. The Late Neolithic/Early Chalcolithic Site of Cabeça Gorda 1

Stratigraphic Set

The test pits excavation revealed the existence of five Stratigraphic Units, described below:

- **Unit 1/2:** Sediments plowed by the previous mechanical removal of surface layer, displayed from loose to slightly compact, composed by the current topsoil (Unit 1, which covers the surroundings of the project area) and by sediments of the underlying layer (Unit 2, slightly affected on top by

the works described above). It has a grayish colouring, consisting of sands, silts and some clay.

- **Unit 2:** Layer of sandy-silty matrix, rather compact, with sub-rounded quartz grains (1-2 mm in size) and some grit, also sub-rounded (2-3 mm in size). It has essentially orange colours, but with some lateral variations in tone and grain size. In the test pits located on upper altimetry, the granulometry is clearly coarser than at those located on lower altimetry. It hosts an abundance of roots due to its proximity to the surface.

- **Unit 3:** Sandy-silty sediments, similar to the overlying layer, mostly bright orange in colour, lighter in depth. Just like Unit 2, presents the same lateral variations in granulometry and colour. Its top is difficult to identify in excavation, because it shows a gradual transition rather than an abrupt differentiation between both layers (diffuse interface). It was defined by an abrupt low density of archaeological finds, as well as by an increase in the rate of sand and grit and by a gradual lightening in colour. It also presents on top some grayish spots (probably decomposing organic matter) that disappear in depth. We can see in profile that these spots are not present in Unit 2, severely affected by roots, hence we can hypothesize that we are facing a palaeo-soil in Unit 3. In the test pit located further south (Test Pit 6), this layer presents grosser elements in its constitution – particularly thin to medium-sized cobbles. It presents archaeological finds in the upper 10 cm, becoming archaeologically poor from top to base. The only exception occurred in Test Pit 3, in which was recovered a globular flint core from the bottom of this layer.

- **Unit 4:** “Pit” filled with grayish sediment that was individualized in Test Pit 3, at the base of Unit 2/top of Unit 3. Instead of the small spots more or less scattered present in Unit 3, this “pouch” is here more homogeneous. Aside from colour, the sediment in Unit 4 did not differ from the matrix of Unit 3, including the position of archaeological finds. It presents a large percentage of pottery fragments.

- **Unit 5:** Base layer, sterile in an archaeological point of view. It is characterized by very compact sediment composed of silt packing sand and quartz grit. It displays a clear heterogeneity in colour range, from light orange (salmon shades) to white. It corresponds to the disaggregation horizon of the Miocene base levels (“Alburitel sandstones”, according to sheet 27C of *Portugal Geological Chart*).

Out of the five defined Units, only four of them contained archaeological finds (Units 1, 2 and top of Units 3 and 4), with Unit 5 as the only archaeo-

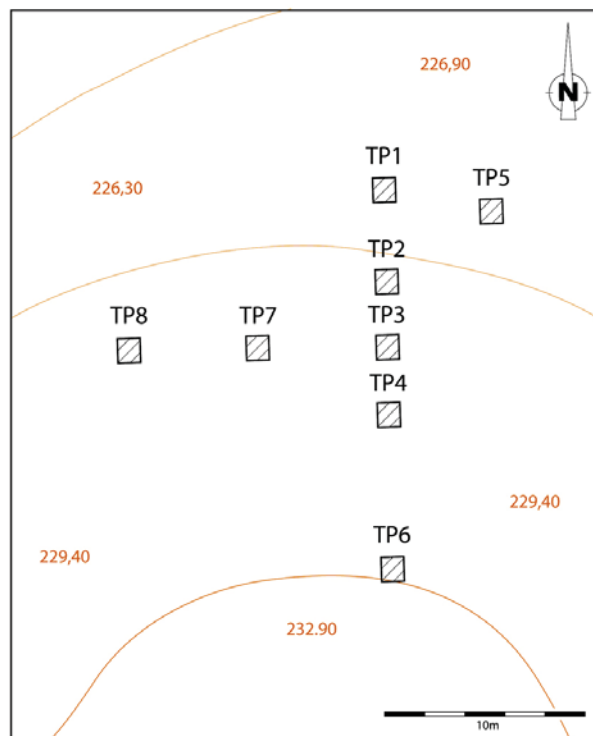


Fig. 8.- Excavated area of Cabeça Gorda 1, indicating the position of the test pits (TP).

logically sterile layer. The largest percentage of artifacts was recovered in Unit 2, but artifacts were also present in small amounts in the surface layer and at the top of Units 3-4. The only exception was observed in Test Pit 3 – Unit 3, in the bottom of which was recovered a globular flint core. This situation can be characterized as a disturbance that was not identified in the excavation or profile analysis (and probably linked to the feature defined as Unit 4).

A superficial interpretation of the archaeological ensemble leads us to consider this group of artifacts that correspond to Late Neolithic/Early Chalcolithic. Another group of artifacts (statistically irrelevant and not taken into account) could point to an earlier chronology, based on the apparent difference in artifact patina. All these assets are mixed in the various excavated strata. The pottery provides the strongest confirmation of this assumption and occurs in relative abundance in Units 1, 2, 3 and 4.

Given the results from the test pits, we determined, with relative accuracy, the dispersion of archaeological finds. Since they are concentrated in Test Pits 1, 2, 3 and 5, we conclude that the largest volume of assets seems to be in the northeastern quadrant of the excavated area (fig. 8).

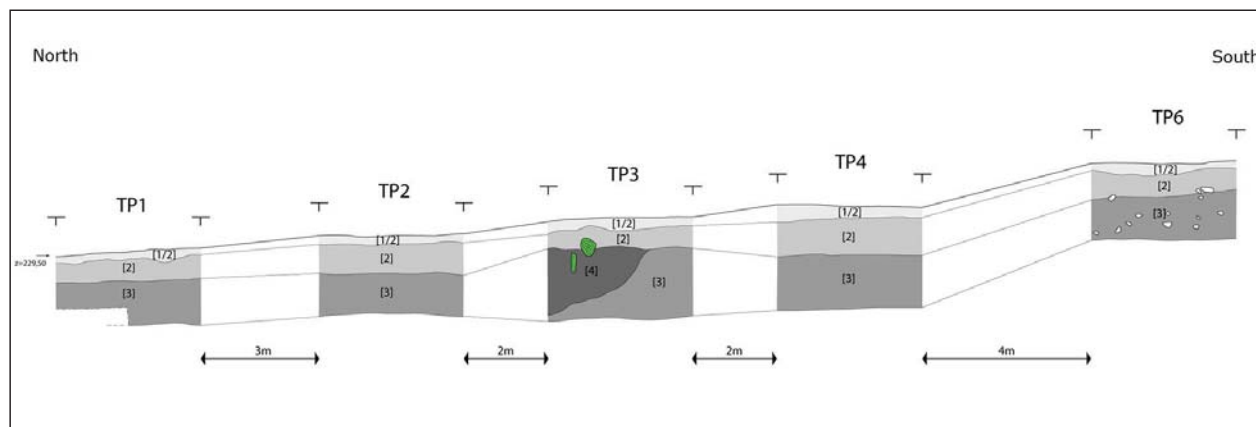


Fig. 9.- Schematic representation of the stratigraphic set identified in Cabeça Gorda 1 (profile South-North).

This conclusion is supported by the granulometric difference registered from south to north in accordance with the slope (coarser material to the south, thinner material to the north), which indicates a process of low intensity colluvial deposition. Otherwise, the thinner archaeological assets have been washed away (fig. 9).

This colluvial process probably had its origin in the higher platform located immediately south of the excavated area – however, a dense vegetation cover prevented a close examination of this platform, as it was not possible to infer supposed occupations in this area based on the surface dispersion of archaeological finds.

Thus, the effective occupation of the site is possibly located in the higher platform to the south. However, it would be referred to as an incipient occupation – a hypothesis based on two factors: 1) the restricted “usable area” offered by this platform (no more than 150m²); and 2) the presence of low density of finds even in the colluvial deposits (understood as a reasonable sample representative of the whole set).

Archaeological Assemblage

As mentioned above, a large percentage of the archaeological finds were recovered in Unit 2, and in smaller amounts in the surface layer and on the top of Units 3-4. We can count among them dozens of pottery fragments and hundreds of lithic artifacts. The lithics include small denticulate flint elements, bladelet cores, flake cores, some flint blades and bladelets, abundant flint and quartzite chips, abundant quartzite and quartz cobbles with heat fractures and some translucent flint blocks (small-sized amorphous nodules and platelets) that were not worked or were in an initial preparation state.

Out of a total of 469 artifacts recovered (in only 8 m² of excavated area, in a ratio of 58,6/m²), we highlight within the different categories defined for the collection the number of flaked stone elements and fire-cracked cobbles (representing respectively 55,9% and 32,4% of the whole sample). Pottery represents about 9,6%, while the burnt clay nodules and the lithic raw material (unworked blocks) are merely residual (Table 1). From a stratigraphic

	Surface		Unit 1/2		Unit 2		Unit 2/3		Unit 3		Unit 4		Total	
	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
Pottery	1	1,3	0	0	17	7,7	13	16,7	2	8,0	12	48,0	45	9,6
Flaked stone	73	96,1	27	60,0	95	43,2	40	51,3	18	72,0	9	36,0	262	55,9
Fire-cracked cobbles	2	2,6	16	35,6	103	46,8	24	30,7	5	20,0	2	8,0	152	32,4
Lithic raw material	0	0	2	4,4	5	2,3	0	0	0	0	0	0	7	1,5
Burnt clay	0	0	0	0	0	0	1	1,3	0	0	2	8,0	3	0,6
Total	76	100	45	100	220	100	78	100	25	100	25	100	469	100

Table 1.- Quantification of Artifact Categories by Stratigraphic Unit.

	Unit 1/2		Unit 2		Unit 2/3		Unit 3		Unit 4		Total	
	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
Test Pit 1	11	24,4	69	31,4	0	0	6	24	0	0	86	21,9
Test Pit 2	0	0	64	29,1	0	0	7	28	0	0	71	18,1
Test Pit 3	11	24,4	0	0	69	88,5	6	24	25	100	111	28,2
Test Pit 4	6	13,4	18	8,2	9	11,5	0	0	0	0	33	8,4
Test Pit 5	11	24,4	49	22,2	0	0	3	12	0	0	63	16
Test Pit 6	5	11,2	7	3,2	0	0	0	0	0	0	12	3,1
Test Pit 7	0	0	6	2,7	0	0	3	12	0	0	9	2,3
Test Pit 8	1	2,2	7	3,2	0	0	0	0	0	0	8	2
Total	45	100	220	100	78	100	25	100	25	100	393	100

Table 2.- Quantification of the recovered artifacts by Test Pit and Stratigraphic Unit.

point of view, the finds are concentrated in Unit 2, although Unit 4 presents an important density of archaeological artifacts (given its small excavated volume) when compared with other Units, especially of pottery elements (about 48% of the total of assets recovered on this layer) in relation to other categories (Table 1).

The recovered artifacts are concentrated in the test pits located in the north and northeast areas (Test Pits 1, 2, 3 and 5) decreasing to the south (Test Pits 4 and 6) and west (Test Pits 7 and 8) – a dispersion consistent with the general inclination of the strata, both in current surface of site's area and in depth, from south to north (Table 2).

Pottery

Out of all the pottery fragments recovered (most of them in the feature defined as Unit 4), in only two were possible to reconstruct the shape of these containers. Morphologically, they correspond to a plain spheroidal pot (Vessel 1) and to a small bowl typologically equivalent to an intermediate form between a high-carinated bowl and an introverted-rim bowl (Vessel 2). The chronological attribution of these containers is mainly evident in Vessel 2, a characteristic form of the regional Late Neolithic/Early Chalcolithic (fig. 10).

Almost all fragments have brittle and lightweight ceramic bodies with very friable pastes. The colour

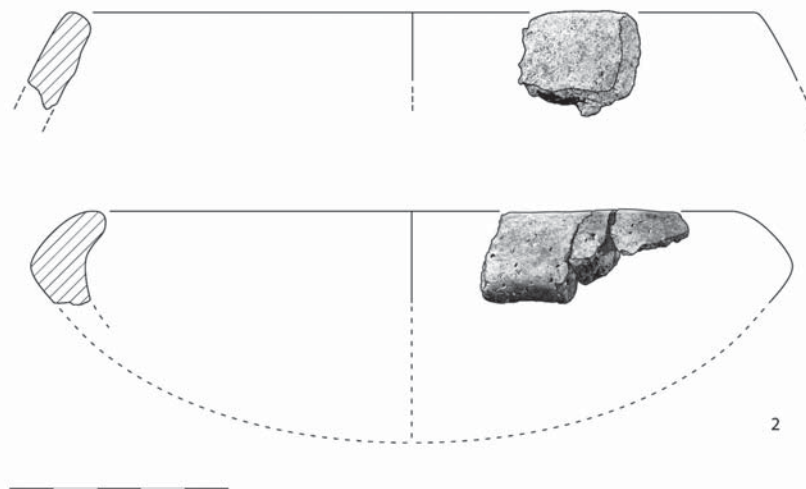


Fig. 10.- Examples of the pottery recovered in Cabeça Gorda 1. 1: plain spheroidal pot (Vessel 1); 2: intermediate form between a high-carinated bowl and an introverted-rim bowl (Vessel 2).

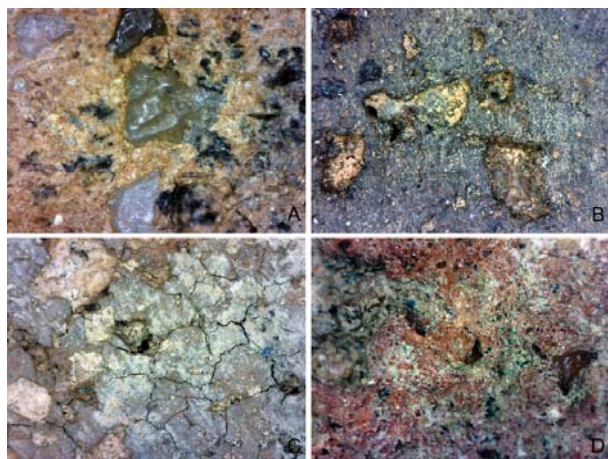


Fig. 11.- Microscopic aspects (x200) of the pottery fragments and burnt clay nodules recovered in Cabeça Gorda 1. A: aspect of the sub-rounded quartz grains present in the paste of Vessel 1; B: aspect of the negatives of the absent calcareous elements deteriorated during firing present in the paste of Vessel 2; C: aspect of the smoothed surface of a burnt clay nodule with heat fissures; D: aspect of the inside of a burnt clay nodule with sub-rounded quartz grains.

of these fragments (mostly dark brown) indicates that the vessels were subjected to firing processes in a reducing atmosphere. A few fragments of reddish-orange colour indicate firing in an oxidative atmosphere.

Despite the presence of some quartz non-plastic elements in the composition of the clay pastes (interestingly, these are the ones that were subjected to firing in an oxidative atmosphere), it can be inferred by a macroscopic analysis of the pottery fragments that the pastes include mostly calcareous non-plastic elements (fig. 11). Their friability and porosity are due precisely to the deterioration of those elements

during firing – more than to physical-chemical alterations of the deposit, as has also been admitted.

The final treatment of the vessels surfaces is characterized mainly by the smoothing of both internal and external surfaces. In a few cases, the application of red slip is present.

Flaked Stone Artifacts

The number of flaked stone artifacts corresponds to 55,9% (262 elements) of the total recovered artifacts. The raw material of these artifacts is divided between flint (with higher percentage by weight), quartz, quartzite and other rocks (lydite, with a very residual use). For the analysis of these artifacts, several technological classes were defined (Juan Cabanilles 2008): *preparation/rejuvenation elements, flakes, blades, bladelets, debris/knapping residues, cores and tools* (Table 3).

Flint artifacts (205 elements using opaque flint and translucent flint as raw material, represented in all the defined technological classes) correspond to 78,3% of the flaked stone industry of Cabeça Gorda 1, against 4,6% of quartz artifacts, 15,6% of quartzite artifacts and 1,5% of lydite artifacts.

A quick reading of Table 4 allows to infer the heterogeneous nature of the lithic industry of Cabeça Gorda 1. However, this techno-typological heterogeneity is more likely due to the specific functional nature proposed for the site, as discussed below.

For example, the typological characteristics of cores show a relative variety that could be explained specifically by the particular functionality of the site. 14 elements in flint were recovered, corresponding to one parallelepiped core, one prismatic flake core with multiple striking platforms, four prismatic bladelet cores (three with a single striking platform and one with crossed striking platforms), two bladelet/small flake cores on flake (one of them

	Cenomanian opaque flint		Cenomanian translucent flint		Oxfordian flint		Undetermined flint		Quartz		Quartzite		Others		Total	
	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
Preparation/rejuvenation	9	6,0	1	2,4	0	0	1	12,5	0	0	0	0	0	0	11	4,2
Flakes	81	54,4	19	44,3	4	80,0	5	62,5	6	50,0	33	80,5	3	75,0	151	57,6
Blades	5	3,4	2	4,6	0	0	0	0	0	0	0	0	0	0	7	2,7
Bladelets	14	9,4	2	4,6	0	0	0	0	1	8,3	0	0	0	0	17	6,5
Debris	19	12,7	15	34,9	1	20,0	0	0	2	16,7	3	7,3	1	25,0	41	15,9
Cores	12	8,1	2	4,6	0	0	1	12,5	2	16,7	1	2,4	0	0	18	6,9
Tools	9	6,0	2	4,6	0	0	1	12,5	1	8,3	4	9,8	0	0	17	6,5
Total	149	100	43	100	5	100	8	100	12	100	41	100	4	100	262	100

Table 3.- Quantification of the Technological Classes by raw material.

		Flint	Quartz	Quartzite	Lydite	Total
Preparation/Rejuvenation	Cortical/semi-cortical flakes	47	4	11	0	62
	Cortical/semi-cortical blades	5	0	0	0	5
	Cortical/semi-cortical bladelets	4	1	0	0	5
	Crested blades	1	0	0	0	1
	Core fronts	8	0	0	0	8
	Tablettes	2	0	0	0	2
Debitage	Non cortical flakes	62	2	22	3	89
	Non cortical blades	2	0	0	0	2
	Non cortical bladelets	12	0	0	0	12
Cores	Parallelepiped cores	1	0	0	0	1
	Prismatic flake cores	1	0	0	0	1
	Prismatic bladelet cores	4	1	0	0	5
	Bladelet/small flake cores on flake	2	0	0	0	2
	Splinter cores	1	0	0	0	1
	Globular cores	1	0	0	0	1
	Uncharacteristic cores	4	0	0	0	4
	Knapped nodules	1	1	0	0	2
	Chopper-type cores	0	0	1	0	1
Tools	Denticulated	2	0	0	0	2
	Notches	0	0	2	0	2
	Perforators	0	1	0	0	1
	Nosed end-scrapers	1	0	0	0	1
	Side-scrapers	2	0	1	0	3
	Burins	2	0	1	0	3
	Flakes with retouch or use-wear traces	4	0	0	0	4
	Fragments	1	0	0	0	1
Debris/knapping residues	Chips	14	1	3	0	18
	Chunks	20	1	0	1	22
	Thermic flakes	1	0	0	0	1
Total		205	12	41	4	262

Table 4.- Inventory of the flaked stone industry.

could also correspond to a thick end-scrapers), one splinter core with alternate striking platforms (to produce barbs), one globular core, four uncharacteristic cores and one knapped nodule (“tabular flake core”). Simultaneously, two quartz cores were recovered, corresponding to one fragment of a prismatic bladelet core and one debited nodule (not certain to be a core preform). Quartzite cores are represented by one single element, corresponding to a chopper-type core.

Similarly, tools present the same typological variety. Flint tools are represented by 12 elements, corresponding to two denticulates (possibly sickle elements, one of them reusing a core-front), one nosed end-scrapers, two side-scrapers, two burins (one multiple dihedral burin and one flat burin), four retouched or with use-wear traces flakes and one uncharacteristic tool fragment, possibly a re-sharpening removal. Quartz tools are represented by one single element, corresponding to one perforator. Tools made out of quartzite are represented by four elements, corresponding to one side-scrapers,

two notches and one diverted dihedral burin (Figs 12 and 13).

Therefore, regarding the definition of a possible techno-complex in Cabeça Gorda 1, the heterogeneous nature of the recovered artifacts does not allow a rigorous evaluation of the set, even with the analysis of some of the most characteristic debitage products (what nevertheless should be undervalued).

In fact, the fragmented state of the elongated products does not allow rigorous technological analysis, although it can be advanced that pressure debitage takes a negligible weight in the production of blades and bladelets, mostly extracted by indirect percussion and direct percussion with soft hammer – evident of the expeditious nature of the lithic technology of Cabeça Gorda 1.

The flint elements are divided between 149 artifacts of Cenomanian opaque flint and 43 artifacts of Cenomanian translucent flint, plus 5 artifacts of Oxfordian flint and 8 artifacts of undetermined flint (heat alterations in some artifacts, as well as their

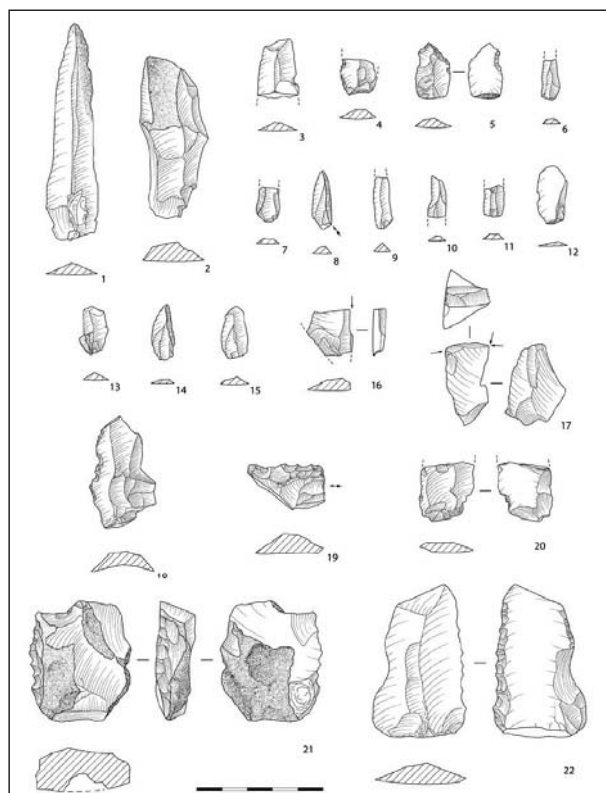


Fig. 12.- Examples of the lithic industry recovered in Cabeça Gorda 1. 1-5: blades; 6-15: bladelets; 16-17: burins; 18: retouched flake; 19: denticulate («sickle element»); 20: retouched flake with low angle removals; 21-22: side-scrapers

fragmented state, do not allow a rigorous definition of the source).

This characterization took into account the strict particularities of raw material and the elements of translucent flint were classified as presenting a more or less pronounced translucent tendency (and thus integrated in the group of opaque or translucent flint, respectively). These general characteristics are a direct reflection of the raw material present in Casal dos Matos – where siliceous rocks occur that represent all the characteristics listed above. There are also artifacts (mainly cores and tools) obtained from the characteristic Caxarias flint (where the workshop of Casas de Baixo is located), recognized by their opaque appearance and the presence of micro iron oxides (Aubry *et al.* 2009: 155), corresponding to about 20% of the set.

The colour of these siliceous rocks offers some variation between yellowish-brown, grayish-green and pinkish-red – representing the general morphology of siliceous rocks formed in Upper Cenomanian geological contexts. Thereby, the importance of these variants is minimal, because, as seen in

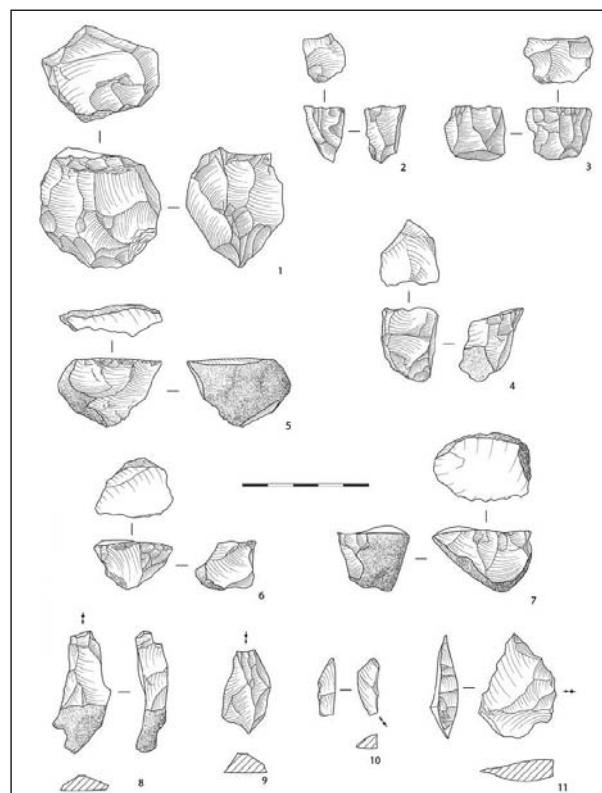


Fig. 13.- Examples of the lithic industry recovered in Cabeça Gorda 1. 1: globular core; 2-3: prismatic bladelet cores with one striking platform; 4: prismatic flake core with multiple striking platforms; 5: knapped platelet («tabular flake core»); 6: prismatic bladelet core with crossed striking platforms; 7: bladelet/splinter core on flake; 8: crested element; 9: core-front; 10-11: tablets.

the example of Casal dos Matos and other contexts (Almeida *et al.* 2003; Andrade and Matias 2011), raw materials of different chromatic characteristics may come from the same source and sometimes even from the same block. The colour alterations could also result from the application of heat treatment, evident in about 30% of flint artifacts from Cabeça Gorda 1.

However, there are artifacts produced in a clearly distinct flint – namely using flint formed in Oxfordian geological contexts. Nevertheless, they have a residual value within the set, corresponding to about 2,4% of total flint artifacts.

The presence of flint chunks with thermic alteration suggests two possible scenarios: the use of initial heat treatment of the blanks to facilitate knapping at the site (fissure formation in flint elements resulting from the uncontrolled application of this technique) or the existence of hearths in the “toss zones” whereby knapping debris are discarded into the fire structures.

The quartzite, quartz and lydite, using cobbles as support, could be procured locally, collected in the alluvial deposits of streams or in quaternary terraces located in the immediate surroundings of the site.

5. Discussion

As said before about another site with similar research contexts, “the identification of raw material procurement sources, exploitation and conformation of blocks for the production of flaked stone tools [and their manufacturing areas] is an indispensable exercise for the study and understanding of territorial occupation patterns of the ancient peasant communities, in the scope of its exploitation and profitability. In this case, [...] the delimitation of resource exploitation areas of identified settlements and the articulation between the various sites of one single settlement system becomes clearly essential to a better understanding of the spatial distribution of Neolithic-Chalcolithic communities. However and unfortunately, this is an exercise rarely undertaken, as the habitat spaces are often regarded as islands closed in on themselves, which ignores the multitude of other small sites that ensured the subsistence of these settlements, without any relation to its surroundings and to other sites located in adjacent areas” (Andrade 2011: 24).

Thus, only truncated information is currently available with regard to this issue; such that, the Portuguese archaeological record of procurement areas/workshops is not directly related to specific settlements, and vice versa. Therefore, any contribution is useful for the circumscription of this research matter. In this sense, the particular case of the relationship Casal dos Matos-Cabeça Gorda 1 appears as a curious occurrence for the definition of this specific connection. However, some circumstances should be clarified.

In the Portuguese Estremadura we do not find clear instances of mining activities related to flint exploitation during Neolithic and Chalcolithic (see the curious case of Casal Barril in Sousa and Gonçalves 2011) such as those recorded in other areas of the Iberian peninsula – like in the region of Murcia (Jimenez Lorente 1983; Jimenez Lorente *et al.* 1999), Casa Montero, Madrid (Consuegra Rodríguez *et al.* 2004; Capote *et al.* 2008; Díaz-del-Río and Consuegra 2011), La Venta, Granada (Ramos Millán *et al.* 1993) or Valle de Los Gallumbares, Granada (Martínez Fernández *et al.* 2006). Moreover, if the superficial excavation of geological debris deposits (such as breccia) were possible, the excavation of galleries or pits for flint extraction in the limestone formations of the Portuguese Es-

tremadura have not been identified so far (Almeida *et al.* 2003).

In fact, recent survey works directed towards the identification of flint sources in this region attest to the existence of flint nodules in secondary position, included in detritic deposits (detached from the limestone formations) and alluvium deposits (naturally transported from the original source). Obviously, those deposits represent a preferential procurement source (rather than excavation from limestone formations), which is largely superficial and easily accessed.

Attending to the available data, we can find four different raw material procurement models during the Neolithic and Chalcolithic in the Portuguese Estremadura (reformulating the schema proposed by Vallespi *et al.* 1988), in sites generally characterized as mines and/or workshops: 1) small exploitation sites with the occasional production of lithic artifacts, such as Pedreira do Aires, Monte das Pedras, Casal Novo and Casal de Rocanes (Andrade 2011; Andrade and Cardoso 2004; Andrade and Matias 2011); 2) extensive exploitation areas with specialized lithic production, such as Casas de Baixo and Arruda de Pisões (Zilhão 1994a; Forenbaher 1998, 1999, 2006; Andrade *et al.* in press); 3) settlements installed near flint sources and directed towards the exploitation and production of lithic artifacts, such as Vila Pouca and Santana, related to the putative Campolide flint mines (Forenbaher 1998, 1999; see Andrade and Matias 2011 about the interpretation of the Campolide “mines”); 4) small campsites installed near a larger settlement with intensive lithic production, such as Barotas and Monte do Castelo, related to the Chalcolithic fortified settlement of Leceia (Cardoso and Costa 1992; Cardoso and Norton 1997-98).

These four different models can be compiled into two basic models, potentially corresponding to a chronological scale: 1) occasional exploitation sites, according to seasonal group movements and the immediate needs of the community, related with the advent and affirmation of the first peasant communities (Neolithic); 2) permanent exploitation sites with specialized artifact production, according to permanent raw materials procurement, related to stable peasant communities and their consolidation (Chalcolithic). Nevertheless, when comparing chrono-culturally coeval sites (regarding the Late Neolithic/Early Chalcolithic in this particular range), it is equally possible to distinguish different strategies of lithic raw material procurement.

Basically, contexts interpreted as procurement areas/workshops can be identified by the following circumstances, reflecting the early stages of the processing of cores and blanks (Carrión Méndez *et al.*

	Model A	Model B	Model C	Model D
Unmodified blocks	?	○	○	○
Roughed out or preformed bifacial pieces	?	?	?	○
Shaped out cores	●	●	○	○
Roughing out and shaping flakes	●	●	○	○
Cores during or after debitage	●	●	?	○
Characteristic flakes	●	●	?	○
Unretouched knapping products	●	●	●	?
Finished tools	●	●	●	●

● Must be present; ? May be present; ○ Left near the «quarry site».

Table 5.- Raw material acquisition strategies as reflected in the archaeological record (adapted from Inizan et al. 1999: 27).

2006; Pelegrin 1995); the proximity to raw material (sites installed near procurement sources) and the presence of exploitation and debitage debris (preparation flakes, reflecting the first stages of prismatic debitage sequences), tested or briefly shaped blocks and the respective cortex removal flakes, core preforms (blocks in which the cortex was totally or partially removed), tool preforms (unfinished), prismatic cores abandoned in an advanced debitage stage due to knapping accidents (not exhausted), core preparation and rejuvenation elements (cortical and partially cortical flakes, crested elements, core-fronts and tablets) and few finished tools (compared with the percentage of debitage debris and core rejuvenation elements).

Subsequent to the initial reduction work carried out near the procurement sources, definable by the presence of the elements described above, the introduction patterns of cores and blanks in settlements

can also be grouped. Therefore, we can recognize several models for raw material introduction to the habitat area (Table 5): “There are many ways in which the transport of raw materials to campsites can be theoretically contemplated, of which we will note four: A) the material is brought to the campsite in its more or less original unworked condition (unmodified or tested by just one or two removals); B) the material is brought to the campsite as prepared cores (unflaked) and/or roughouts of bifacial pieces (unfinished); C) only unretouched debitage products and/or preforms of bifacial pieces are brought to the campsite; D) only the tools (whether retouched or not) and the finished bifacial pieces are brought to the campsite.

“Each of these possibilities or strategies can be detected when conditions allow, and can be plausibly suspected in almost all major archaeological excavations. It is simply a matter of noting the pres-

	Monte das Pedras	Pedreira do Aires	Cabeça Gorda 1
Raw material	42,1%	10,1%	2,8%
Debitated blocks	1,5%	1,9%	0%
Preparation/rejuvenation	34,4%	50,3%	6,3%
Core preforms	0,9%	1,9%	0%
Cores	1%	7,6%	8,5%
Debitage	11,5%	10,7%	75,0%
Tool preforms	0%	0,6%	0%
Tools	8,4%	16,9%	6,8%
Termic flakes	0,2%	0%	0,6%

Table 6.- Percent comparison of the Technological Classes present in Monte das Pedras, Pedreira do Aires and Cabeça Gorda 1.

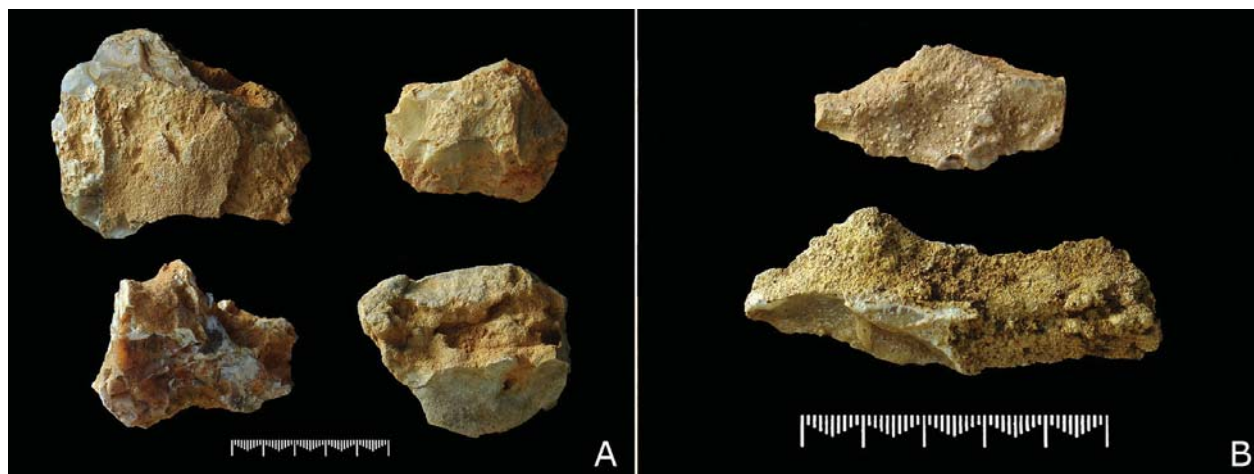


Fig. 14.- Raw material and cortex removal elements from Cabeça Gorda 1. A: rough translucent flint blocks (the two in the bottom present heat alterations); B: cortical elements.

ence of well represented categories of technically well defined pieces. The possible presence of other categories is not a contradictory factor, provided their occurrence is sporadic” (Inizian *et al.* 1999: 26-27).

For the Neolithic and Chalcolithic of the Portuguese Estremadura, according to the available data, only hypotheses B and C are tenable – although hypothesis D is not to be excluded, despite the fact that it is not possible to precisely define it in certain cases – as it is characterized by very specialized lithic production. In this context, when comparing the data collected from two sites that are clearly identified as mines/workshops (even if occasional, such as Pedreira do Aires and Monte das Pedras) and those collected in Cabeça Gorda 1, the differences are evident (Table 6). Thus, we must clarify several aspects in this comparison.

The first point is the large percentage of unworked blocks in exploitation sites: 42,1% in Monte das Pedras and >10,1% in Pedreira do Aires (this is a subjective value, as survey limitations prevented the collection of all unworked blocks at Pedreira do Aires despite their extreme abundance on the site) against 2,8% in Cabeça Gorda 1 (Fig. 14).

The tested/briefly shaped blocks, abandoned due to knapping deficiencies (such as geodes and cleavages) are present both in Monte das Pedras and Pedreira do Aires, but absent in Cabeça Gorda 1. Similarly, cores in an early debitage stage, reflecting the first steps of reduction, are present in Monte das Pedras and Pedreira Aires, abandoned due to the same knapping problems present by the tested blocks mentioned above.

Conversely, there is a high proportion of debitage products (blanks) in Cabeça Gorda 1 (75%), in

contrast to the scarcity of these elements in Monte das Pedras and Pedreira do Aires (11,5% and 10,7%, respectively). On the other hand, there is a high percentage of preparation/rejuvenation elements at Monte das Pedras and Pedreira do Aires (particularly in Pedreira do Aires, where the core maintenance elements correspond to about 50,3% of the total assemblage).

As mentioned, the differences are obvious. However, in defining the possible functional context of Cabeça Gorda 1, we can not ignore the proximity to raw material sources and its morphological characteristics.

What is certain is that the density of finds in Cabeça Gorda 1, even if included in colluvium context, does not allow configuring the hypothesis of a permanent settlement – a concept, in prehistoric times, that already presents an obvious subjective dimension. It would be, therefore, a small campsite – and the use of the translucent flint occurring in Casal dos Matos would only represent the exploitation of a circumstantial resource. Indeed, the flaked stone industry of Cabeça Gorda 1 reveals an expeditious technology that could be almost classified as an “occasional technology”.

In fact, clear contexts of rough flint block manipulation are not attested to (given the apparent lack of preparation flakes, which are abundant in workshop contexts), but that should only be due to two factors: the morphology of the translucent flint blocks itself (mainly of tabular feature), which result in volumes of exiguous thickness after cortex removal and precludes a great deal of subsequent reduction efforts for the knapper; and its internal flaws (purocity and cleavages) do not allow a good development of knapping activities.



Fig. 15.- Artifacts recovered in Cabeça Gorda 1, using translucent flint as raw material. A: «tabular feature side-scraper»; B: knapped platelet («tabular flake core»). Also illustrated in Figures 11: 21 and 12: 5.

The production of tools would thus be constrained by the morphology of the block itself. In the case of the blocks occurring in Casal dos Matos, these would be ideal, after cortex removal, to produce bifacial tools (see the example of Ereta del Pedregal in Juan-Cabanilles *et al.* 2006). However, there is no clear evidences of such production at Cabeça Gorda 1, since neither bifacial tool preforms nor bifacial thinning flakes were recovered (nevertheless, in addition to some suggestive chips, a retouched flake with low angle removals was recovered, here illustrated in Figure 12: 20). There is however a type of “tabular feature side-scraper” with cortex on both faces and a knapped platelet with flake removals (“tabular flake core”), both produced by taking advantage of the tabular morphology of the blocks from Casal dos Matos (fig. 15).

Interestingly, there is an apparent absence of higher quality platelets at Cabeça Gorda 1, while the presence of lower quality elements used for the production of flakes is well documented. We suggest that the best quality material would have left the site with the occupants at the time of its abandonment.

So, can we say that Cabeça Gorda 1 configures to a conformation area of flint nodules related to Casal dos Matos procurement source? Not necessarily, as the typical elements present in the archaeographic record of this kind of context were not found in abundance, such as cortex removal flakes or tested/briefly shaped blocks. So, can we say instead that it configures to a workshop related to Casal dos Matos procurement source, settled nearby and where the cores and tools would arrive briefly shaped (as preforms)? Also, not necessarily,

as we recorded neither a reasonable percentage of debitage debris and core preparation/rejuvenation elements nor preforms or unfinished tools reflecting standardized production. In the specific archaeological context of Cabeça Gorda 1, taking into account the space occupation network in which it is included, Casas de Baixo plays that role.

Cabeça Gorda 1 corresponds, according to our interpretation, to a small campsite, a single sporadic occupation (a few days, no more than one week) possibly held in the context of herd movements: a staging post, taking into account the economic super-structure of these communities, still very much based on hunting activities and transhumant pastoralism of sheep and goats (according to the archaeofaunal data provided by several contemporary settlements), resorting to the occasional raw material resource formed by Casal dos Matos during the short parking period and for immediate needs (probably as a fallback solution).

Obviously, this explanatory hypothesis is based on an educated guess. However, far from being an axiomatic explanation, it is an assumption conceived according to the available data. The low density of finds (in which we emphasize the poor percentage of pottery fragments) and the non-standardization of debitage products concur for this interpretation – reflecting high mobility patterns that significantly influence the number of objects. Following S. Kent, these types of sites are well defined in the archaeographic record: “Simply stated, the more mobile a group, the less material culture they carry and/or abandon. This relationship should be visible cross-culturally between groups, such as nomadic hunter-gatherers and horticulturalists. The relationship should also be visible within groups,

such as societies with year-round base camps and special-activity camps occupied for shorter periods” (Kent 1993: 68).

On the other hand, an occupation of this sort would only result, at best, in the existence of archaeological structures no more complex than hearths – the only kind of structures that we can assume to have existed at this site, since a relatively large number of fire-cracked cobbles have been recovered. Another type of structures could have existed, such as clay-lined hearths, as suggested by the presence of some burnt clay nodules with smoothed surfaces – howsoever, these are also simple structures, of immediate construction and use, consistent with the functionality proposed for the site.

Three other factors justify this explanatory hypothesis regarding the functional nature of the site, understood from a structuralist reading of the immediate landscape based on geo-morphological criteria: 1) it is located over a small hill ideal for an encampment of four/five people for a short period of time; 2) it is located between two small watercourses, with relative visual dominance over them, ideal for parking and controlling a medium size herd; 3) it is located over a ridge line, an obvious movement axis for driving cattle.

Indeed, the natural transit routes consisting of the inter-fluvial lines formed by the Miocene plains, configuring the ridges of the micro-regional watersheds, allow easy movements in the transverse direction of the territory, being the longitudinal circulation axes set up by the secondary watercourses, tributaries of Abadia and Seça Streams.

Similarly, reaffirming the mobility concept inherent to these communities, raw materials similar to those occurring at Casal dos Matos are not exclusive in the lithic set of Cabeça Gorda 1 (fig. 16). Besides the Cenomanian flint from Caxarias, there are also (albeit residual) artifacts produced on Oxfordian flint blanks – which nevertheless must be relativized. This flint can be found about 14 km east from the site, referring to the siliceous occurrences of Azenha-Agroal and Sabacheira (the latter with similar characteristics to the Oxfordian flint blanks present in Cabeça Gorda 1), in addition to the occurrences of Ribeira da Murta, found in secondary position in detrital deposits (Aubry *et al.* 2009: 151-153; Aubry *et al.* 2012; Matias 2012).

Thus, when determining this particular raw material procurement schema, it would be important to know the socio-cultural context in which this site is included and its relationship with specific habitat areas and the consequent territory exploitation strategies.

In the definition of a possible space exploitation network, we can only refer the direct connection of

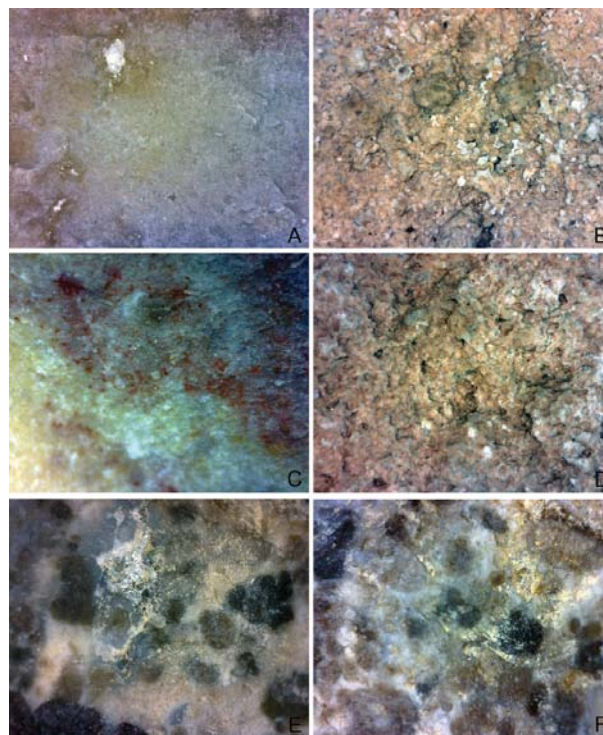


Fig. 16.- Microscopic aspects (x200) of the flint blanks recovered in Cabeça Gorda 1. A: aspect of Cenomanian translucent flint similar to Casal dos Matos, with micro-quartz grains; B: aspect of the cortex of Cenomanian translucent flint similar to Casal dos Matos; C: aspect of Cenomanian opaque flint similar to Caxarias, with micro-iron oxides; D: aspect of the cortex of Cenomanian opaque flint similar to Caxarias; E: aspect of Oxfordian flint similar to Sabacheira; F: aspect of the neo-cortex of Oxfordian flint similar to Sabacheira.

Cabeça Gorda 1 to the workshop of Casas de Baixo, since both sites are separated by about 6,5 km but connected by the water courses of the Almo and Urgueira watersheds. It only remains to identify the settlement (or settlements) from which these two functionally distinct (but contemporary) occupations were probably subsidiaries – as the settlements mentioned above are not particularly useful, given they are poorly characterized, to outline a precise chrono-cultural diagram of the space occupation in this area.

Thus, in the context of the delimitation of a coeval space use, we can only mention here that the site of Cabeça Gorda 1 is chrono-culturally coeval with the workshop of Casas de Baixo, pointing to both sites use episodes relating to Late Neolithic/Early Chalcolithic. However, the only radiocarbon date available to Casas de Baixo is referred to an occupation centered in 5190±60 BP (Foren-

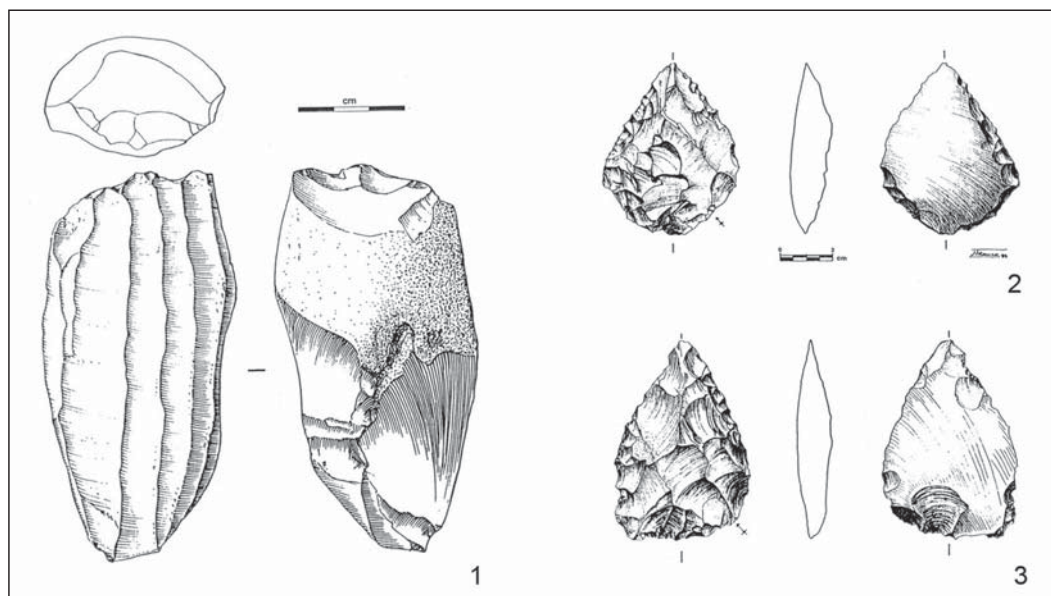


Fig. 17.- Examples of lithic industry recovered in Casas de Baixo. 1: blade core; 2-3: bifacial artifacts preforms (adapted from Zilhão 1994a: 43-44, figs. 3-4).

baher 1999: 53). This date, using the IntCal09.14c curve (Reimer *et al.* 2009, *Radiocarbon* 51: 4) and the program OxCal v4.1.03 (Bronk Ramsey 2009, *Radiocarbon* 51: 1), give the following 2 sigma calibrated result: 4230-3804 cal BC (with 95,4% probability) – which points towards the regional Middle Neolithic, not acceptable according to the characteristics of the main assemblage recovered in this site. This may well indicate a continued use of the site, probably from the Middle Neolithic (4200-3400 cal BCE, with a tenuous and sporadic occupation, suggested by the presence of some geometric armatures) to the Late Neolithic/Early Chalcolithic (3100-2600 cal BCE, with a massive and continuous occupation).

However, as mentioned above, these are sites with clear distinct functional vocations. In fact, Casas de Baixo is a vast area of intense lithic production that probably would supply a large settlement, demonstrating a high specialization level in the production of lithic industry – with two recognized lines of reduction, one based on the production of elongated products, another based on the production of bifacial artifacts (fig.17).

Therefore, the first steps of the debitage sequence would take place in this specialized site – either for the conformation of cores or for the preparation of blanks/preforms of bifacial tools. These elements would be introduced under this form in the habitat spaces to be finished, as evidenced by the scarcity of cortical pieces in settlement contexts. Despite the information gaps in the

analysis region about this matter, this observation is demonstrated by the recent and exhaustive study of the flaked stone industry of Penedo do Lexim, an important Chalcolithic settlement in the lower Portuguese Estremadura (Sousa 2010).

This specialized production can be seen by some notable examples of bifacial artifacts present in funerary contexts, such as the halberds, daggers, spearheads and arrowheads accompanying the burials performed in Lapa dos Furos and Buraca da Moura da Rexaldia, using the closest examples. In fact, a fine alberd was collected from the latter funerary site, produced in flint morphologically similar to that of Caxarias (Andrade *et al.* in press; see the characterization of Caxarias flint in Aubry *et al.* 2009: 155-157).

This indicates (and despite not knowing the central settlement) a well organized community (or several), with well defined patterns of territorial occupation denoting a clear spatial segregation of activities related to the increasing complexity inherent to the consolidation of the Chalcolithic communities. Cabeça Gorda 1, although being a small campsite with scarce archaeological representation, it can never be excluded from the analysis of this settlement system – since it is an integral part of it and contributes to its affirmation.

The cultural relationship of both sites is also evident (besides the presence of the typical Caxarias flint) in the definition of a specific techno-complex of core reduction in Casas de Baixo. S. Forenba-her has individualized a type of small-sized flake

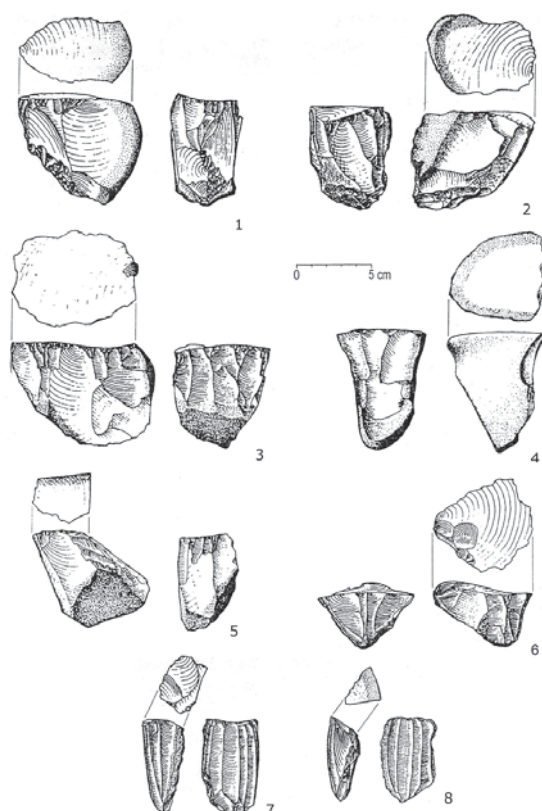


Fig. 18.- Examples of cores recovered in Casas de Baixo. 1-5: blade core preforms; 6: pyramidal single platform flake core; 7-8: exhausted blade cores (adapted from Forenbaher 1999: 51-52, figs. 20-21).

cores, obtained on thick flake often cortical, designated as “pyramidal single platform flake core”, corresponding to about 15,9% of the reduction methods of the Casas de Baixo cores (Fig. 18). This type of core is also present in Cabeça Gorda 1 (here illustrated in Figure 13: 6-7), presenting exactly the same morphological characteristics of those collected in Casas de Baixo.

Anyway, these are sites with clear functional distinctions but possibly part of one single population system, from which the central settlement that brought together the efforts needed to maintain these two distinct spaces remains to identify with certainty (Fig.19) .

6. Conclusion

In short, the case study described here shows a specific model of raw material procurement in the Portuguese Estremadura during de Late Neolithic and Early Chalcolithic. In fact, in the same area and during the same chrono-cultural period two

different strategies of exploitation, acquisition and consumption of lithic raw materials are known.

The first is characterized by a continuous exploitation reflecting well organized patterns, where activities of exploitation, shaping of blocks and manufacture of artifacts are combined in the same place (the consumption of these artifacts undertaken elsewhere, namely in settlement areas). The site of Casas de Baixo, replicating specialization schemas coinciding with the affirmation of the communities of the transition from the Late Neolithic to the Chalcolithic, is a direct example of this model.

In contrast, there are sites that, although contemporary, do not have this level of specialization. These are sites that correspond to occasional exploitation places (according to immediate needs and are developed in the context of other subsistence activities), with an expeditious and immediate consumption, characterized by a rudimentary technology with the production of artifacts for common usage.

Thus, what do these two different strategies indicate? They simply indicate distinct patterns of territorial occupation and land-use during this time in the Portuguese Estremadura. According to R. Chapman (1990), we could say that these sites do not represent a functional distinction within the settlement space (not yet attested with certainty in this geographical region, where clear evidences of spacial segregation of knapping activities are not found so far within habitational areas), but a functional distinction between site components of the same population system. Ultimately, we have to recognize that, along with actual settlements and areas of specialized use, other kind of sites existed – with their own standards and specific occupation models.

Therefore, Cabeça Gorda 1 (and its relationship with Casal dos Matos) configures a small seasonal campsite inside the sphere of influence of a larger settlement, included in a complex population network not yet rigorously defined (but possibly including settlements, funerary sites, resources procurement sites and special purpose sites), outlining specific models/patterns of space occupation and resources exploitation during the Late Neolithic and Chalcolithic (between the last quarter of the 4th millennium and the first half of the 3rd millennium BCE) in the Portuguese Estremadura region.

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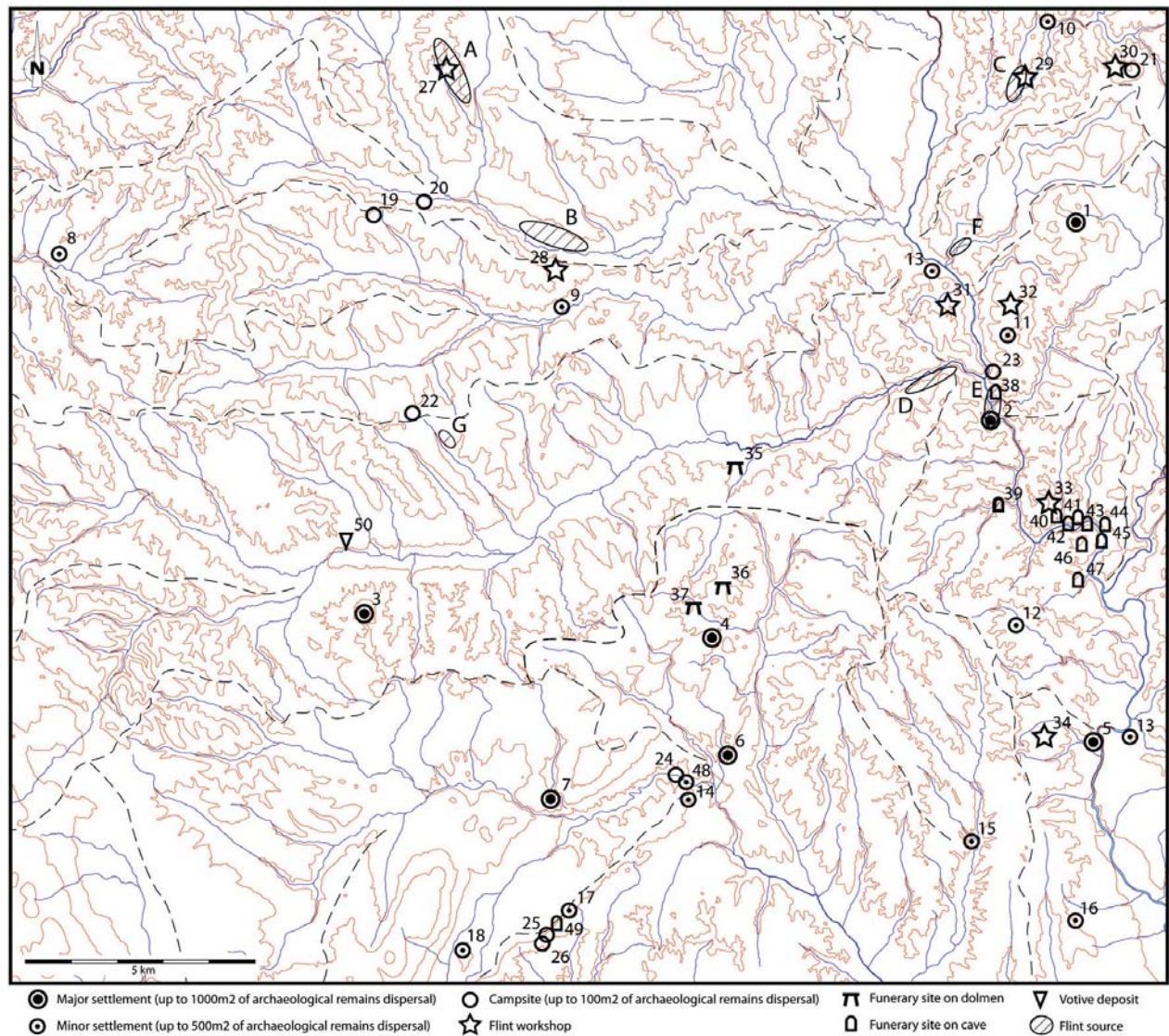


Fig. 19.- Outline of the possible population networks during the Neolithic and Chalcolithic in the synclinal depression of Ourém, between the Fátima plain and the right bank of Nabão River (the dashed lines indicate the main ridgelines). Major settlements: 1: Cumes 1-3; 2: Agroal; 3: Castelo de Ourém; 4: Cabeço do Cão; 5: Fonte Quente (fortified); 6: Fungalvaz; 7: Lagoa do Furadouro. Minor settlements: 8: Abelheira; 9: Casais da Abadia; 10: Poço Moirato; 11: Outeiro do Milho; 12: São Simão; 13: Outeiro dos Frades; 14: Bezelga; 15: Anunciada Velha do Choupal; 16: Juncas de Baixo 1; 17: Casal da Pena; 18: Quinta da Serra. Campsites: 19: Casais dos Montes 1; 20: Portela da Mata; 21: Avecasta 1 (possibly a “sheepfold” on cave); 22: Cabeça Gorda 1; 23: Abrigo do Agroal (rock-shelter); 24: Lapa Escura (rock-shelter); 25: Pena d’Água (rock-shelter); 26: Costa do Pereiro (rock-shelter). Workshops: 27: Casas da Baixo; 28: Outeiro do Marco; 29: Barreiros; 30: Avecasta 2-3; 31: Sobral; 32: Vale Casal 1-2; 33: Cabeço do Morgado; 34: Quinta da Raíz. Funerary Sites: 35: Vale de Ovos (dolmen); 36: Serra da Seara (dolmen); 37: Azuraque 1 (dolmen); 38: Lapa dos Furos (cave); 39: Pedreira do Sobral (cave); 40: Morgado (cave); 41: Nossa Senhora das Lapas (cave); 42: Lapa dos Ossos (cave); 43: Cadaval (cave); 44: Penha da Moura (cave); 45: Sobreirinho (cave); 46: Buraca das Andorinhas (cave); 47: Caldeirão (cave); 48: Curva da Bezelga (cave); 49: Buraca da Moura da Rexaldia (cave). Votive deposits: 50: Quinta da Boa Vista (three isolated stone axes). Major flint sources: A: Pederneira; B: Caxarias; C: Ribeira da Murta; D: Sabacheira; E: Azenha-Agroal. Minor flint sources: F: Ribeira de Gaiteiros; G: Casal dos Matos.

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