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SOCIETÀ TOSCANA
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BRIDGING DISCIPLINES:
SELECTED PAPERS IN HONOUR OF PROFESSOR CARLO TOZZI

Atti della Società Toscana di Scienze Naturali, Memorie, Serie A

Edited by ELISABETTA STARNINI & CRISTIANA PETRINELLI PANNOCCHIA, DCFS, UNIVERSITÀ DI PISA

Per celebrare la lunga e prestigiosa carriera accademica del Prof. Carlo Tozzi, questa parte del volume degli Atti della Società Toscana raccoglie una miscellanea di saggi nelle materie che egli ha per molto tempo insegnato e in cui ha ricercato con approccio multidisciplinare, coniugando in particolare le Scienze della Natura con le Scienze dell'Uomo. I contributi sono quindi necessariamente eterogenei per materia e per autori, spaziando tra giovani allievi dell'Università di Pisa e del Professore, colleghi e amici, ma spiccano tutti per l'attualità degli argomenti trattati e la metodologia utilizzata. Le curatrici auspicano che questo doveroso omaggio alla lunga carriera e all'importante contributo scientifico e didattico del Professore sia a lui gradito.

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Ha svolto ricerche anche sul Neolitico dell'Italia centro-meridionale con scavi in Abruzzo (Catignano - PE), Puglia (Ripa Tetta, Lucera - FG), Toscana (Pianosa e, in Garfagnana, Muraccio e Pian di Cerreto) e Sardegna (Perfugas - SS, Torre Foghe - OR). Oltre allo studio tipologico dei materiali litici e ceramici, ha posto particolare attenzione alla ricostruzione degli aspetti economici e paleoambientali delle culture preistoriche.

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È stato membro della VIII Commissione dell'Unione Internazionale delle Scienze Preistoriche e Protostoriche (UISPP), come rappresentante dell'Italia.

È Socio fin dagli anni Sessanta del secolo scorso della Società Toscana di Scienze Naturali di cui negli anni Ottanta è stato anche Segretario Generale. Dal 2006 al 2018 ha ricoperto il ruolo di Vicepresidente della Società e dal 2019 al 2022 ha svolto l'incarico di Revisore dei conti.

JACOPO CONFORTI ⁽¹⁾, FRANÇOISE LORENZI ⁽²⁾

THE A GUAITA KNAPPED QUARTZ INDUSTRIES. RESILIENCE AND SUBSISTENCE PRACTICES IN A CAP CORSE NEOLITHIC SETTLEMENT

Abstract - J. CONFORTI, F. LORENZI, *The A Guaita knapped quartz industries. Resilience and subsistence practices in a Cap Corse Neolithic settlement.*

Quartz is the only raw material available across the Corse from north to south, used by almost all neolithic groups, between the 6th and the 3rd millennium BC. A Guaita (Morsiglia, Haute-Corse) has given back important evidence of a long frequentation during the end of Early Neolithic (end of the 6th-first half of the 5th millennium BC) and the Middle Neolithic (second half of 5th-4th millennium BC). The analysis of archaeological artifacts shows the inclusion of A Guaita in the long-distance traffic system between Sardinia and Italian peninsula. The knapped lithic industry, in both neolithic phases, shows the clear prevalence of the quartz, probably collected near the village. Quartz has been generally exploited by bipolar knapping on anvil to maximize raw material and obtain pieces essentially used for their naturally sharp edges. The analysis of the few retouched artifacts and the percentage variation of lamellar products show that even the knapped quartz industry, usually poorly considered, reflects diachronic trends occurring during the Neolithic on knapped industries in higher quality raw materials.

Key words - Early Neolithic, Middle Neolithic, quartz, knapped lithic industry, techno-economy, bipolar knapping, Corse, France

Riassunto - J. CONFORTI, F. LORENZI, *Le industrie litiche scheggiate in quarzo di A Guaita. Resilienza e attività di sussistenza in un sito neolitico del Capo Corso.*

Il quarzo rappresenta l'unica materia prima effettivamente disponibile su tutta la Corsica da Nord a Sud, utilizzata da praticamente tutti i gruppi neolitici dell'isola tra il 6° e il 3° millennio BC. Il sito di A Guaita (Morsiglia, Haute-Corse) ha restituito importanti evidenze di una lunga frequentazione durante la fine del Neolitico antico (fine del 6°-prima metà del 5° millennio BC) e il Neolitico medio (seconda metà del 5°-4° millennio BC). L'analisi dei materiali archeologici testimonia l'inclusione dei gruppi di A Guaita nei traffici su lunga distanza tra la Sardegna e la penisola italiana. In entrambe le fasi di frequentazione neolitica del sito, il quarzo rappresenta la materia prima nettamente prevalente, approvvigionata verosimilmente in prossimità del villaggio stesso. Il quarzo è stato generalmente sfruttato per percussione bipolare su incudine al fine di massimizzare i blocchi migliori e ottenere supporti da utilizzare essenzialmente per il loro margine tagliente. L'analisi dei pochi manufatti ritoccati e la variazione percentuale della produzione di supporti allungati evidenzia come anche l'industria litica in quarzo, generalmente poco considerata, rifletta le tendenze diacroniche che si registrano durante il Neolitico sulle industrie scheggiate in materie prime di maggiore qualità.

Parole chiave - Neolitico antico, Neolitico medio, quarzo, industrie litiche scheggiate, techno-economia, percussione bipolare, Corsica, Francia

INTRODUCTION

The Neolithic lithic industries of Corsica have rarely been the subject of in-depth studies focused on knapping techniques and the purposes for which lithic tools were produced (Costa, 2006). Research has generally concentrated on exogenous raw materials, such as chert and obsidian, and on retouched artifacts considered chronological markers, particularly arrowheads (e.g., Camps, 1988). Conversely, local raw materials, especially quartz, which often constitutes the majority of knapped artifacts, have received limited attention. This paper focuses on the abundant quartz industry found at the Neolithic site of A Guaita (Lorenzi *et al.*, 2021). In addition to highlighting the role of this raw material in the subsistence activities of Neolithic human groups at A Guaita, the study demonstrates how a detailed techno-typological and techno-economic analysis of quartz lithic artifacts, often considered of limited significance, can reveal evolutionary patterns in knapped lithic industries between the 6th and 4th millennia BCE.

THE KNAPPED LITHIC INDUSTRIES OF CORSICA BETWEEN THE 6TH AND 4TH MILLENNIA BC

From the second half of the 6th millennium BC, with the arrival of the first Neolithic communities in Corsica, the knapped lithic industries began incorporating allochthonous raw materials, such as chert, especially in the southern regions, and obsidian, though rare and primarily of Sardinian origin from Perfugas and Monte Arci outcrops (Leandri & Fernandes, 2020; Bressy-Leandri *et al.*, 2022). Indigenous raw materials included locally sourced quartz and granitoid rocks, while rhyolites, depending on the site, were collected from both nearby and distant outcrops, such as the fine rhyolites from Monte Cinto (Costa, 2006; Bressy-Leandri *et al.*, 2022). Higher-quality raw materials (fine rhyolite, chert, and obsidian) were used for the production

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of blade and bladelets, sometimes through indirect percussion techniques. Conversely, lower-quality raw materials, such as quartz, were primarily exploited to produce flakes, especially at sites specialized in the exploitation of coastal resources (Costa, 2006). By the end of the 6th millennium, obsidian (particularly in the South) and fine rhyolites (especially in the North) became increasingly common. The pressure technique, used to produce obsidian bladelets, is certainly attested, alongside a modest quartz bladelets production (Costa, 2006).

Transverse arrowheads served as chronological markers. Trapezoidal shapes were present across all industries between the 6th and 4th millennia but were predominantly associated with the earlier phases. Rectangular types were most common in the 6th millennium, decreasing in the 5th millennium and disappearing by the 4th millennium. Conversely, convex-base transverse arrowheads appeared toward the end of the 6th millennium as “U-shaped” morphologies made from flakes. By the 4th millennium, these arrowheads exhibited circle-segment morphologies produced from bladelets (Costa, 2006). Among backed pieces, backed flakes lack chronological significance, while backed-truncated blades predominated during the 6th millennium. “Splintered pieces” were widespread in Corsican Neolithic knapped industries (Costa, 2006). Although these artifacts hold no chronological value, their function remains debated. The prevailing hypothesis suggests that they represent core residues or products of bipolar knapping on anvil (Costa, 2006; see also Hayden, 1980; Shott, 1989).

In the 5th millennium, *perçantes* arrowheads first appeared. Free-hand direct hard percussion and bipolar knapping became the primary techniques, particularly for exploiting quartz and exhausted obsidian cores (Costa, 2006; Tramoni *et al.*, 2007). Production focused almost exclusively on flakes, with a few blades or bladelets likely imported. This period saw a greater reliance on indigenous raw materials and a decline in the use of allochthonous materials, particularly chert (Costa, 2006).

By the 4th millennium, variants of *perçantes* arrowheads became widespread, and obsidian emerged as the dominant raw material, regardless of site location. This shift indicates a further “individualization” of Corsican industries and greater integration into the obsidian trade between Sardinia and the continent (Costa, 2006). Blade and bladelet production, particularly in obsidian, increased significantly, sometimes reaching exceptional levels (Costa, 2006). The generally small size of these pieces suggests that partially exploited obsidian cores were introduced and bladelet production continued to exhaustion. These bladelets appear to have been used mainly as unmodified cutting tools.

THE A GUAITA NEOLITHIC SITE

Site, stratigraphy and structures

The open-air site of A Guaita is located at the northernmost point of Cap Corse, facing the islet of Centuri (Le Bourdonnec *et al.*, 2014; Lorenzi, 2018), on a low coastal hill (107 meters above sea level) composed of a series of folds of blue-gray shale, clearly visible on the western hillside (Lorenzi, 2018; Lorenzi *et al.*, 2021). The eastern slope features a series of terraces, but only the hilltop appears to have been inhabited by prehistoric groups (Lorenzi, 2018; Lorenzi *et al.*, 2021). Between 2004 and 2013, archaeological investigations conducted on two terraces (upper and lower) revealed evidence of continuous Neolithic occupation during an advanced phase of the Early Neolithic (Epicardial) and into the Middle Neolithic.

The stratigraphy of upper terrace is 60 to 80 cm thick and consists of uniformly dark brown clayey silt, frequently disturbed by root activity (Lorenzi *et al.*, 2021). Due to the lack of distinct sedimentary demarcations, the identification of different horizons was guided primarily by archaeological material. Layers 1, 2a, and the upper part of layer 2b are attributed to the Middle Neolithic. Radiometric ^{14}C dating of indeterminate charcoal from different squares of the excavation area (Lyon 10761, C2b, B100 square: 5380 ± 35 BP, cal. 4334-4068 BC / Poznàn 73419, C3, square Z2: 5485 ± 35 BP, cal. 4361-4259 BC / Poznàn73421, C2b, square C3, cuvette du foyer: 5365 ± 35 BP, cal. 4322-4057 BC) placed the Middle Neolithic phase in the second half of the 5th millennium BC in calibrated chronology (Lorenzi *et al.*, 2021). The lower part and base of layer 2b, along with layer 3, belong to the late Early Neolithic, dating, only on the basis of the lithic material and above all on the ceramic one, between the second half of the 6th and the first half of the 5th millennium BC (Lorenzi *et al.*, 2021).

No structural features were identified in the Early Neolithic layers. However, a large quadrangular structure, covering approximately 70 m² and bordered by carefully aligned stone blocks, is associated with the Middle Neolithic. Some of these blocks were already visible on the surface prior to excavation (Lorenzi *et al.*, 2021). Two fireplaces were found in layer 2b, along with adjacent cobblestones interpreted as working surfaces (Lorenzi *et al.*, 2021).

Ceramic and lithic productions

Pottery from layers 2b (lower) and 3 exhibits typical characteristics of the late Early Neolithic of Corsica (late 6th to the first half of the 5th millennium BC) (Lorenzi *et al.*, 2021). Decorations are primarily created using cardium or other types of shell, arranged in geometric motifs on the rim or body, along with im-

pressed or engraved cordons. Handhold handles are attested as prehension elements. Some ceramic sherds from these layers feature incised decorations closely comparable to the linear pottery of the Italian peninsula (Tozzi & Weiss, 2001), and two fragments show traces of pigment. In contrast, pottery from layers 1, 2a, and the upper part of 2b displays typical Middle Neolithic features for Corsica (Lorenzi *et al.*, 2021). The surfaces are polished, rims are flared, and the basins are carinated, with exclusively incised decorations. Prehension elements include ribbon handles, knobs, and double-holed tongue sockets. The vessel bases are either flattened or ring-shaped (Lorenzi *et al.*, 2021).

Knapped lithic industry includes quartz and other local rocks, as well as several non-local lithotypes such as obsidian, rhyolite, chert, and jasper. Although quartz is the predominant raw material, obsidian is the most represented among the exogenous materials, followed by Giunsani rhyolite (Tab. 1a). Chert is less common but is still attested not only as finished artifacts (Lorenzi, 2018).

Most of the obsidian originates from the Monte Arci outcrops in Sardinia, although rare pieces from the Lipari and Palmarola outcrops have also been identified (Le Bourdonnec *et al.*, 2014). Chert analyses, still ongoing, suggest sources from the Perfugas basin in Sardinia as well as continental Italy (*Maiolica* and *Scaglia Rossa* formations) (Lorenzi, 2018; Bressy-Leandri *et al.*, 2022).

From the typological point of view, the Early Neolithic layers contain numerous transverse arrowheads, both trapezoidal and rectangular, typical of this phase. These are crafted from rhyolite, obsidian, chert, and jasper. During the transition to the Middle Neolithic, the lithic industry shows a clear evolution with the introduction of *perçantes* arrowheads made from chert and rhyolite.

Stone ornaments and a wide variety of macro-tools are also attested, particularly in the Middle Neolithic (Lorenzi *et al.*, 2021). Numerous millstones and grindstones have been identified, along with several hammerstones. Some of these, together with anvils, appear to be associated with the use of bipolar percussion in debitage activities (Lorenzi *et al.*, 2021).

This evidence highlights A Guaita's integration into a wide network of medium- to long-range trade connections dating back to the Early Neolithic (Lorenzi, 2018).

METHODS

In this work, the quartz-knapped lithic industry from the Neolithic occupation layers of the upper terrace of the A Guaita site was analyzed from a techno-

typological and techno-economic perspective, aiming to reconstruct the operational sequences and objectives associated with the exploitation of this raw material (Inizan *et al.*, 1995). Given that the raw material is quartz, a specific analytical approach was adopted that took into account its different responses to knapping compared to chert (Mourre, 1996; Tallavaara *et al.*, 2010; de la Peña, 2015), with the aim of identifying the stigmata associated with the various techniques employed. The typometry of complete products was analyzed according to the parameters defined by B. Bagolini (1968), while the typological classification of retouched artefacts was essentially based on the list of primary types developed by G. Laplace (1964).

THE A GUAITA KNAPPED QUARTZ LITHIC INDUSTRY

During excavation campaigns conducted in the large dwelling area on the upper terrace of A Guaita, 3471 quartz artifacts were recovered (Conforti, 2016). Excluding the 165 pieces from surface-level and areas affected by root disturbance, the total rises to 3513 pieces distributed across various layers (Tab. 1a-b). While only a few objects were found in layer 1, the underlying levels yielded a numerically significant lithic industry (Tab. 1a). Quartz is the dominant raw material in all layers, representing over 70% of the industry (Tab. 1a).

The quartz at A Guaita is generally of good quality, exhibiting a crystalline structure with fair homogeneity. Hyaline quartz (rock crystal) accounts for only about 5,1%, while the majority is vein quartz. The scarcity of hyaline quartz suggests its exploitation was occasional rather than systematic, consistently with the availability observed in the quartz outcrops of the A Guaita hill itself (Conforti, 2016). The raw material source appears to be mainly from primary outcrops, as indicated by 965 pieces with cortical residues (27,4% of the total), of which 81,8% show block-vein origins. This conclusion is supported by 73 pieces preserving residues of encasing schist rock. Only 8,1% show pebble neocortical residues, while 10,1% display weakly weathered cortical residues likely from shallow weathering of quartz blocks. These data suggest that quartz supply was strictly local, directly from the quartz veins of the *Schistes Lustrés* formation on A Guaita hill (Caritg *et al.*, 2009). Field surveys on the A Guaita hill confirmed the presence of good quality quartz veins, affected by few natural fracture planes, often quite vitreous and as volumes adequate for the debitage objectives observed in the knapped lithic industry (Conforti, 2016). Analysis of unknapped blanks (Tab. 1b) shows that nearly half (36/78) are pebbles, most under 26 mm in size, suggesting limited selection at the source and sorting at the settlement (Conforti, 2016).

Table 1. a. A Guaita. Raw materials of knapped lithic industries in the layers of Early and Middle Neolithic; b. Knapped quartz lithic industry in the layers of Early and Middle Neolithic; c. Typology of retouched pieces in the layers of Early and Middle Neolithic.

| a | A Guaita | Middle Neolithic | | | | Early Neolithic | | | |
|---|---------------------------|------------------|-----|-------------|-----|-----------------|------|-------------|-----|
| | | 1 | | 2a | | Upper 2b | | Lower 2b-3 | |
| | Raw materials | n. | % | n. | % | n. | % | n. | % |
| | Obsidian | 57 | 28 | 93 | 4,8 | 171 | 15,8 | 76 | 7,5 |
| | Chert | 7 | 3,4 | 12 | 0,6 | 15 | 1,4 | 7 | 0,7 |
| | Jasper | 2 | 1 | 4 | 0,2 | 5 | 0,5 | 2 | 0,2 |
| | Ryolite | 29 | 14 | 78 | 4 | 105 | 9,7 | 46 | 4,5 |
| | Other local raw materials | 3 | 1,5 | 6 | 0,3 | 6 | 0,5 | 1 | 0,1 |
| | Quartz | 105 | 52 | 1741 | 90 | 783 | 72,2 | 884 | 87 |
| | Total | 203 | | 1934 | | 1085 | | 1016 | |

| b | A Guaita | Middle Neolithic | | | | Early Neolithic | | | |
|---|---|------------------|------------|----|-------------|-----------------|------------|------------|------------|
| | | 1 | | 2a | | Upper 2b | | Lower 2b-3 | |
| | <u>Not exploited raw material</u> | | 0 | | 31 | | 16 | | 28 |
| | Blocks (primary-subprimary outcrops) | | 0 | | 20 | | 9 | | 10 |
| | Pebbles (secondary outcrops) | | 0 | | 11 | | 7 | | 18 |
| | <u>Chunks</u> | | 49 | | 785 | | 244 | | 354 |
| | <u>Cores</u> | | 2 | | 47 | | 24 | | 51 |
| | Low exploited cores | | 0 | | 4 | | 0 | | 10 |
| | Full exploited cores | | 0 | | 8 | | 4 | | 11 |
| | Cores residues | | 2 | | 35 | | 20 | | 30 |
| | <u>Unretouched Flakes</u> | | 48 | | 707 | | 406 | | 373 |
| | Cortical and management flakes | | 6 | | 68 | | 70 | | 63 |
| | First choice products | | 42 | | 639 | | 336 | | 310 |
| | <u>Unretouched blade/bladelets</u> | | 5 | | 136 | | 71 | | 52 |
| | Cortical and management blade/bladelets | | 1 | | 20 | | 14 | | 9 |
| | First choice products | | 4 | | 116 | | 57 | | 43 |
| | <u>Retouched pieces</u> | | 1 | | 35 | | 22 | | 26 |
| | Total | | 105 | | 1741 | | 783 | | 884 |

| c | Primary types (Laplace typology, 1964) | Middle Neolithic | | | | Early Neolithic | | | |
|---|---|------------------|----------|----|-----------|-----------------|-----------|------------|-----------|
| | | 1 | | 2a | | Upper 2b | | Lower 2b-3 | |
| | Burins | | | | 1 | | | | |
| | End-scrapers | | | | 1 | | 2 | | |
| | Truncated pieces | | | | 5 | | 2 | | 1 |
| | Drills | | | | 1 | | | | 1 |
| | Backed pieces | | | | 4 | | | | 1 |
| | Backed-truncated pieces | | | | | | | | 1 |
| | Geometrics | | | | | | | | 1 |
| | fr. PD-LD-DT-Gm | | | | 2 | | 1 | | 1 |
| | Points | | | | 1 | | | | |
| | Retouched blades | | | | | | | | 2 |
| | Side-scrapers | | | | 8 | | 4 | | 4 |
| | fr. P-L-R | | | | 1 | | 1 | | |
| | Irregular backed retouches | | | | 3 | | 2 | | 1 |
| | Denticulates | 1 | | | 8 | | 11 | | 13 |
| | "Macrotools" | | | | 1 | | 1 | | 1 |
| | Total | | 1 | | 36 | | 24 | | 27 |

Early Neolithic quartz industry

The Early Neolithic (lower 2b-3 layers) yielded 884 quartz artifacts (Tab. 1a-b). Chunks are abundant, mostly smaller than 26 mm (279/354). Numerous cores, particularly exhausted ones, were found (Tab. 1b). The size and exploitation degree of these cores correlate with raw material quality (Fig. 1 nn. 32-37, Fig. 2a), with the more vitreous blocks and those less affected by natural fracture planes being the object of more intense debitage. Striking platforms are corticate (21), prepared plain (19), or linear-splintered (15), with knapping angles predominantly between 80° and 90°. Bipolar negatives dominate (28), followed by unipolar (13) and orthogonal (9). Only a few cores (17) would appear to be oriented to flake production (Fig. 1 n. 32), generally slightly exploited (13/17). Most blocks were exploited for obtaining elongated products (33) mainly by series of opposite bipolar (20) or unipolar detachments (11). More than half (19) of these cores show exclusively bladelet or laminar flake negatives (Fig. 1 nn. 34, 37).

All stages of exploitation are attested, and flakes predominate among unretouched products (87.8%), with high fragmentation rates (382/425) (Tab. 1b, Fig. 2a,c). Sizes are varied but generally rather small (Fig. 2a-b). Platforms are mainly linear splintered (60) or prepared plain (46). Only few pieces (74) have a measurable knapping angle, and no specific trends are visible. Blade/bladelets are characterized by greater accuracy, with ventral faces generally flat (45/52) and more than half featuring subparallel or convergent edges (31/52) (Fig. 1 n. 39).

Retouched pieces are rare (Tab. 1b,c), with no clear selection for specific product types (Fig. 1 nn. 40-45). Denticulates and side-scrapers predominate (Fig. 1 nn. 42-44) but some backed tools are also attested (Fig. 1 n. 40). Notably, among the artefacts, a small, thick, half-moon-shaped geometric piece made of rock crystal stands out. This small tool, produced by bifacial retouching, abrupt to semi-abrupt on one face and flat on the opposite, can be interpreted as a transverse arrowhead with a convex base. (Fig. 1 n. 45).

Middle Neolithic quartz industry

The Middle Neolithic quartz industry at A Guaita comprises 2629 artifacts (Tab. 1a-b), with most coming from layer 2a (1741 pieces) and the upper part of layer 2b (783 pieces), while only a few come from layer 1 (105 pieces). Chunks are abundant across all levels and predominantly smaller than 26 mm (upper 2b: 205/244; 2a: 661/785; 1: 44/49).

Cores are numerous in the upper 2b and 2a layers, though proportionally less frequent than in the Early Neolithic industry (Tab. 1b). Most cores belong to the residual phase and are small in size (Fig. 1 nn. 1-6,

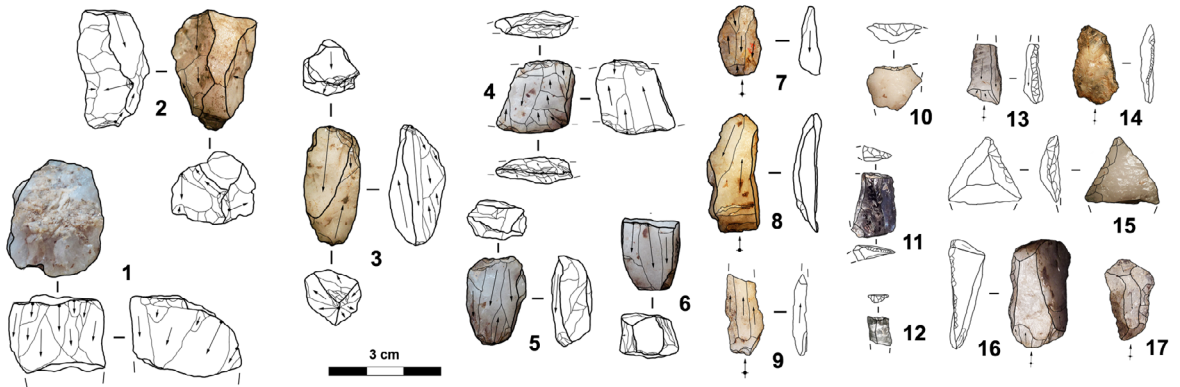
18-23; Fig. 2a). In the upper 2b layer, striking platforms are primarily linear-splintered (14), while in layer 2a, corticated (17), prepared plain (17), and linear-splintered (19) platforms are equally represented. Knapping angles are often unmeasurable, but when present, angles between 80° and 90° predominate. Most cores exhibit opposite bipolar negatives (52), while unipolar (10) and orthogonal face exploitation (9) are less common. Only a few cores (19/73) appear oriented exclusively toward flake production, usually with minimal exploitation (12/19). The majority of blocks were exploited to obtain elongated products (52), mainly by series of opposite bipolar detachments (40). Only 24 cores show exclusively bladelet or laminar flake negatives (Fig. 1 nn. 3, 5-6).

Among unretouched products all stages of knapping are attested, with a strong emphasis on full and residual exploitation. The size of products, especially in layer 2a, is generally smaller than that recorded for the Early Neolithic (Fig. 2a-b). Flakes predominate over blades/bladelets across all layers (upper 2b: 85,1%; 2a: 83,9%; 1: 90,6%), with few complete products (upper 2b: 67/477; 2a: 89/843; 1: 7/53). Platforms are mainly linear-splintered (232) or prepared plain (127). Among measurable knapping angles, those between 70° and 80° (41) and 80° and 90° (90) are most common. Blade/bladelets generally have flat ventral faces (189/212), with about half of the edges being regular (104/212) (Fig. 1 nn. 7-9, 26-27).

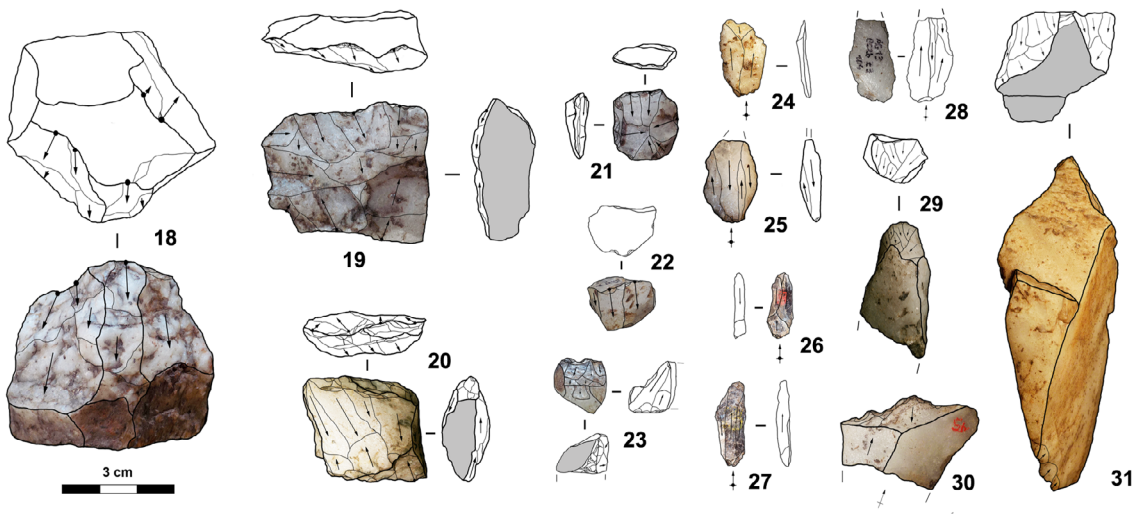
The Middle Neolithic retouched artifacts exhibit similar trends to those of the Early Neolithic (Tab. 1b-c). Tools are relatively few (58 pieces) and rather various in size and typology (Fig. 1 nn. 10-17, 28-31). Denticulates and side-scrapers remain the most common (Fig. 1 nn. 16-17, 28, 30). Backed and truncated tools are relatively frequent (Fig. 1 nn. 11-14), with at least some of these were probably used as cutting tools (Fig. 1 n. 11). Notable finds include a large driller on a naturally elongated fragment (Fig. 1 n. 31) and a fragmentary triangular point with partial covering retouch (Fig. 1 n. 15), possibly representing a sketch for a *perçante* arrowhead.

RESULTS AND COMPARISONS

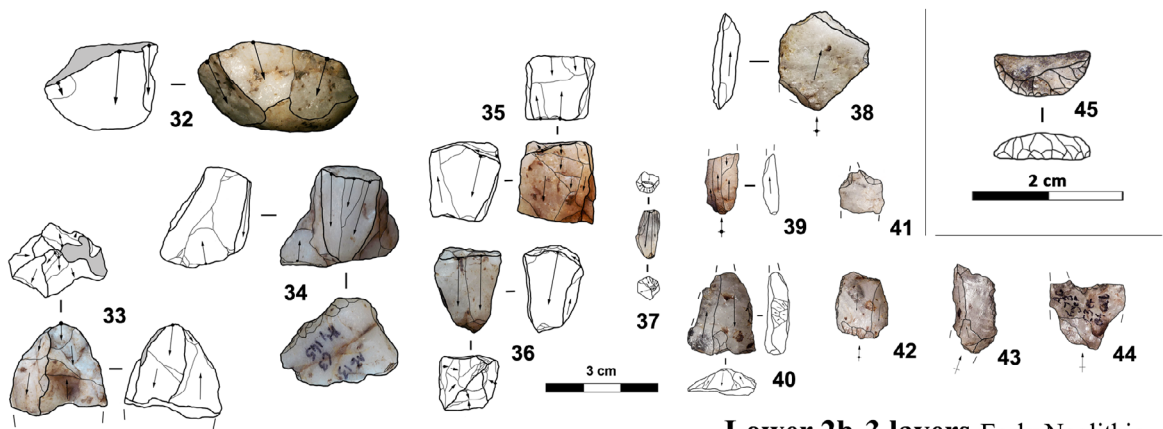
By analyzing the quartz industries produced by the groups that frequented the A Guaita site during the Neolithic, we can identify certain elements and high-light patterns in relation to the landscape of quartz knapped lithic industries on the island (and beyond). The supply of quartz from short or very short distances from the site itself is a common feature of all lithic industries on the island where quartz was used, regardless of chronology (Costa, 2006). In no case is there evidence of medium-to long-range circulation.



2a layer Middle Neolithic



Upper 2b layer Middle Neolithic



Lower 2b-3 layers Early Neolithic

Figure 1. A Guaita quartz knapped lithic industry. Middle Neolithic - 2a (nn. 1-17), Upper 2b (nn. 18-31); Early Neolithic – Lower 2b-3 (nn. 32-44). Cores (nn. 1-6, 18-23, 32-37); unretouched flakes (n. 38), laminar flakes (nn. 7, 24-25) and blade/bladelets (nn. 8-9, 26-27, 39); retouched pieces (nn. 10-17, 28-31, 40-45).

Fragmentation degree is high but consistent with trends that characterize quartz lithic industry, with multiple radial and bending fractures affecting the products (Flenniken, 1981; Tallavaara *et al.*, 2010). The quartz debitage at A Guaita appears clearly oriented, in all layers, toward the production of flakes and, only marginally, blade/bladelets. Within this general trend, however, there is a slight and progressive percentage increase in blade/bladelet production between the Early and Middle Neolithic. This shift is accompanied by a progressive reduction in the size of the products, probably due to increasingly intensive exploitation of the best-quality blocks. Analyzing the elongation index of a few complete products, according to parameters developed by B. Bagolini (1968), the weight of laminar flakes in Middle Neolithic layers seems to increase considerably (Fig. 2c), suggesting a deliberate attempt to produce a greater number of “generically elongated” products.

Looking at the broader context of Corsica’s quartz industries, flakes remain the most common product. However, at some sites, such as Monte Revincu, La Figue (Costa, 2006), Presa Tusiu (Lanfranchi, 2003), and Carcu (Sicurani, 2008), starting from the Middle Neolithic, cores with bladelet negatives and an increase in elongated products are also documented. Extending the comparison to other raw materials used in Corsican Neolithic industries, it is plausible that this increase in elongated quartz products reflects the exponential rise in bladelets and microbladelets production in obsidian, documented from the 4th millennium BC (Costa, 2006).

Regarding techniques, evidence from cores and products suggests that, during all phases of Neolithic activity at A Guaita, free-hand hard direct percussion and, above all, the bipolar technique were employed for quartz knapping. The former was mainly used in the early stages of debitage, while the bipolar technique was applied at every stage of debitage, particularly during residual phases, to fully exploit the best-quality blocks and maximize the number of products, preferably elongated. The bipolar technique seems to have been adopted using either axial percussion or a tangential gesture (Shott, 1989; Soriano *et al.*, 2010; Duke & Pargeter, 2015). The “anvil technique” (Callahan, 1987) or “anvil assisted” (Diez-Martin *et al.*, 2011) variant cannot be ruled out, as its stigmata can be easily confused with those of free-hand direct percussion. Almost all core residues - particularly small ones characterized exclusively by bladelet negatives, sometimes quite regular (Fig. 1, nn. 5-6, 34-37), appear attributable to the bipolar technique. Even when the striking platform does not display clear bipolar-on-anvil stigmata, localized flaking and/or splintering at the opposite end (the edge or surface placed on the anvil) or knapping angles $> 90^\circ$ suggest the probable use of

this technique (de la Pena, 2015). The importance of the bipolar technique for quartz exploitation is further confirmed by the analysis of anvils and hammerstones found at the site (Lorenzi *et al.*, 2021).

The use of free-hand hard direct percussion and bipolar knapping on an anvil for quartz exploitation at A Guaita has parallels in the island’s knapped lithic industries throughout the Neolithic, both for quartz debitage and for the residual exploitation of exogenous raw materials such as obsidian (Costa, 2006; Tramoni *et al.*, 2007). The association between bipolar knapping and quartz exploitation in Corsica is very frequent, dating back to the Early Neolithic (Strette, A Revellata, Torre d’Aquila), but it can almost always be inferred only from the recurrent presence of “splintered pieces” or “splintered cores” and/or from evidence of abundant residual debitage characterized by the production of small flakes and bladelets (Costa, 2006). Outside Corsica, evidence similar to that observed at A Guaita in relation to quartz exploitation is documented at Cala Giovanna Piano on the island of Pianosa (Serradimigni, 2007) and in the Neolithic lithic industries of the island of Giglio (Brandaglia, 1985; 1987).

Denticulates and side-scrapers dominate among quartz retouched artifacts at A Guaita, but they represent only a small percentage of the quartz industry found at the site (Tab. 1b), similar to many other Neolithic quartz industries in Corsica (Costa, 2006). This scarcity, combined with the frequent presence of macrowear (edge damage and pseudo-retouches), on the unretouched edges of numerous products, suggests, despite the lack of a specific use-wear study, that quartz exploitation was probably aimed at obtaining flakes and bladelets to be used *brut*, without further modification, taking advantage of naturally sharp edges. A prevalent use of quartz without further modification is consistent with what is suggested by use-wear analysis, experimental evidence, and ethnographic comparisons (Flenniken, 1981; Knutson *et al.*, 2015).

Isolated but interesting elements include a possible fragmentary sketch of a *perçant* point from layer 2a and the convex-based transversal arrowhead made of rock crystal from layer 3.

The presence of a possible quartz *perçant* point aligns with the chronological attribution of layer 2a to the Middle Neolithic, and this type of arrowhead is also attested at A Guaita among chert, rhyolite, and obsidian industries (Lorenzi, 2018). The discovery of a quartz *perçant* arrowhead is not far-fetched, considering a similar find in A Fuata in the second half of the 5th millennium BC knapped lithic industry (Sicurani, 2008).

The half-moon-shaped rock crystal arrowhead in the Early Neolithic layer 3, on the other hand, appears as an atypical element. Its morphology, tending toward

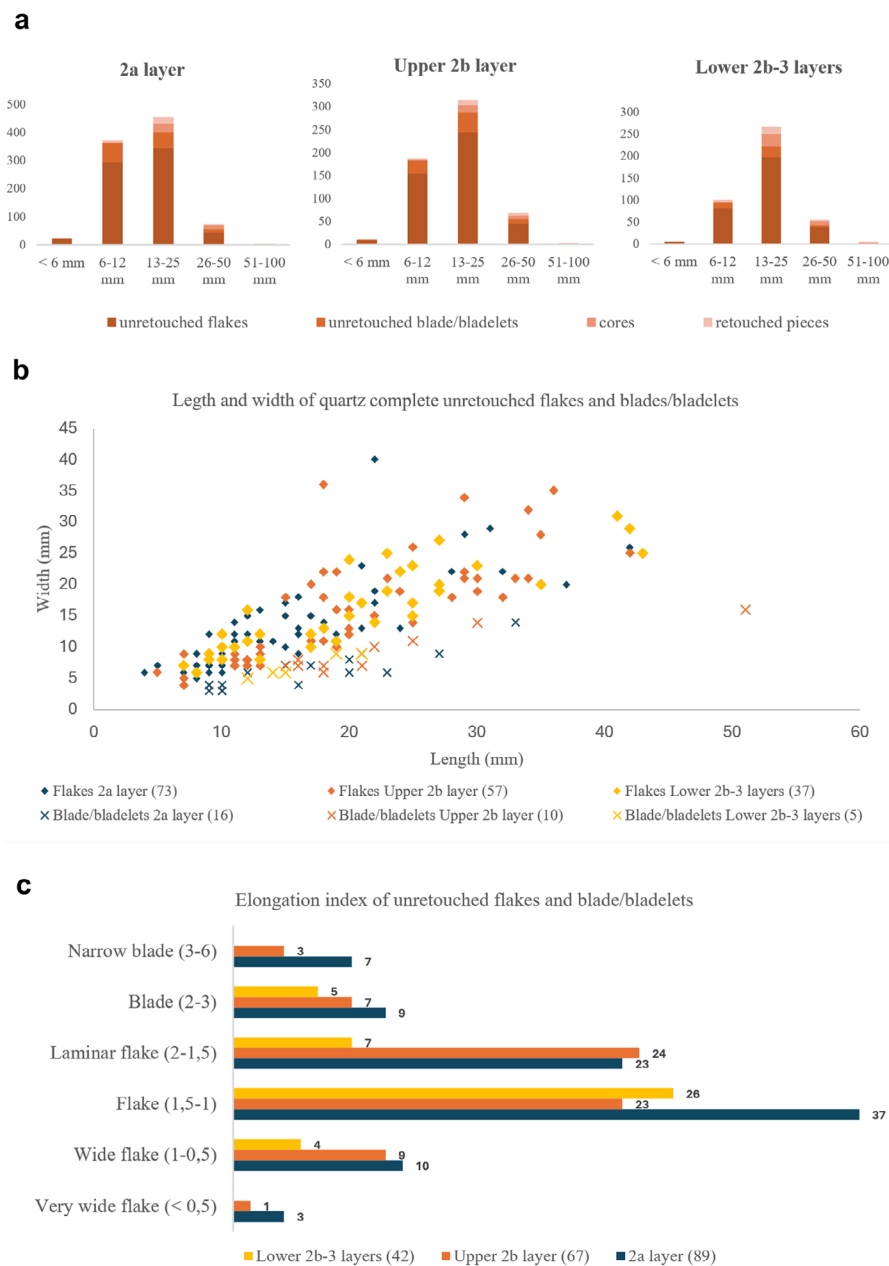


Figure 2. A Guaita quartz lithic industry. Size of flakes, blade/bladelets, core and retouched pieces (a); Length and width (b) and elongation index (c) of complete unretouched flakes and blade/bladelets.

the segment of a circle, is closer to the convex-based arrowheads of Corsican Neolithic industries from the 4th millennium BC rather than those from the 6th-5th millennia BC. Notably, no quartz artifacts of this type are known in the late Middle Neolithic (Costa, 2006). Outside Corsica, precise parallels for the convex-based transversal arrowhead from A Guaita can be found in Early Neolithic lithic industries from Sardinia (Depalmas, 1995; Tanda, 1980). The significant input of raw materials from Sardinia at A Guaita since the Early Neolithic (Lorenzi, 2018) suggests that the atypical morphology of the rock crystal half-

moon-shaped arrowhead may result from a “Sardinian influence”.

CONCLUSIONS

In conclusion, it is clear that the quartz knapped lithic industries at A Guaita, in terms of the techniques employed and the goals of debitage, align closely with the broader context of Corsican Neolithic quartz production. Moreover, a detailed analysis of the lithic assemblages reveals specific

elements within the quartz industries at A Guaita that may reflect chronological markers and evolutionary patterns of Corsican knapped lithic industries from the 6th to the 4th millennium BC. However, to assess the validity and recurrence of these elements, further analysis of quartz industries from other Corsican sites within this chronological range is necessary.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest neither known competing financial interests nor personal relationships that could have appeared to influence the work reported in this paper.

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