



***The Epipaleolithic-Neolithic Transition in North Africa:
A Stratigraphic and Cultural Synthesis of Columnata Site (Tiaret, Algeria)***

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Received: 08/02/2026

Accepted: 09/03/2026

Abstract:

The archaeological site of Columnata, located in the Tiaret Wilaya of Algeria, is a key reference for understanding the Epipaleolithic-Neolithic transition in North Africa. Classified as a historical monument since 1952, this prehistoric deposit features a complex occupation spanning over 7,000 years. This paper examines historical data from the excavations of Cadenat and Brahimi, integrated with recent chronological reassessments. The stratigraphic sequence documents a cultural succession from the Iberomaurusian to the Neolithic, including the "Columnatian" and Upper Capsian industries. Columnata also served as a major necropolis. It yielded the remains of 116 individuals of the Mechta-Afalou type, giving essential insights into funerary practices and the gracilization process of local populations. Despite post-depositional disturbances, radiocarbon dating confirms the sequence's validity. This study highlights the site's archaeological and anthropological importance. It also advocates for urgent conservation and valorization measures to protect this record of human history.

Keywords: *Columnata, Epipaleolithic, Iberomaurusian, Neolithic, Funerary practices, Algeria..*

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I. INTRODUCTION

The transition period from the Late Pleistocene to the Early Holocene in North Africa witnessed the emergence of several prehistoric industries, including the Iberomaurusian (sometimes referred to as Oranian, the Columnatian, and the Keremian) (Camps, 1974). These archaeological sites, whether located in open-air settings, caves, or rock shelters, frequently contain numerous human burials. Fundamentally, these cultures represent hunter-gatherer populations who relied on a subsistence strategy based on a broad faunal spectrum (Lubell, 2005).

The more recent sites such as the Columnatian, Keremian, and Ellassolithic are typically located inland (Chamla et Al, 1970). Ranging in size from a few square meters to several hundred, these deposits consist of occupation debris, lithic and bone artifacts, and faunal remains. They are also characterized by large numbers of fire-cracked stones and significant accumulations of snail shells.

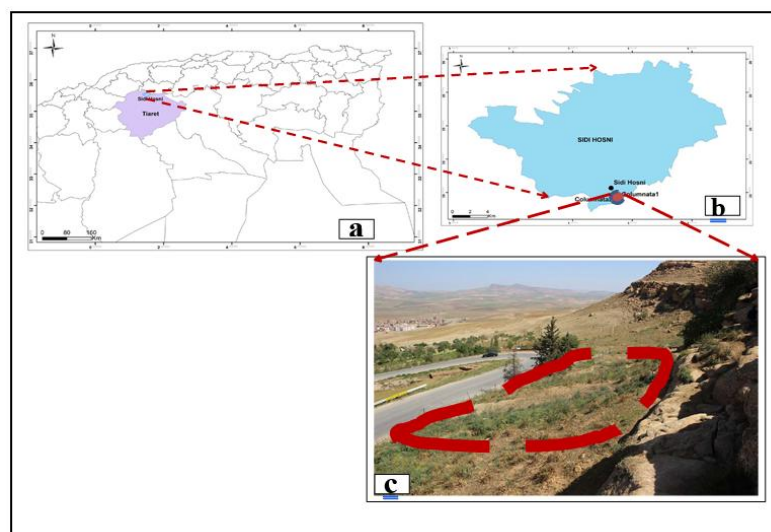
In this context, Columnata, Located in the Tiaret province, stand as a prominent archaeological site, classified since 1952. It preserves a distinct stratigraphic record of two major settlement phases. The prehistoric component reveals a succession of cultures, the oldest exceeding 10,000 years, documenting the region's final hunter-gatherer societies (Merzoug S, 2021; Aoudia-Chouakri L., 2012). In contrast, the site also contains the ruins of a Roman city, a significant hub that once housed a high-ranking praepositus and likely included substantial administrative and religious infrastructure (Cadenat et al., 1994). Consequently, Columnata represents a key element of Algerian heritage.

However, the understanding of this pivotal site has long been fragmented, caught between early excavation data and modern interpretations. This necessitates a synthesis. Specifically, the question arises: How does the stratigraphic and cultural sequence of Columnata, with its local particularities (notably the "Columnatian" facies), contribute to redefining current models of Neolithisation and cultural continuity in the Central Maghreb?

2. Site Location and Description

Geographically, the prehistoric deposit situated on the Sersou high plateau within the Sidi-Hosni municipality (Tiaret). It lies approximately 1,500 meters south-southeast of the village of Sidi-Hosni (formerly Waldeck-Rousseau), along the old road connecting to Algiers (Figure. 1).

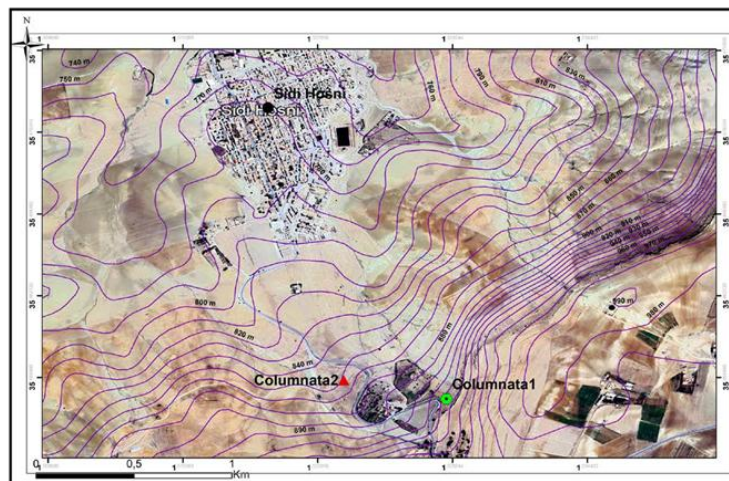
Figure 1: Location of the study area and the Columnata (1) site. (a) Tiaret Wilaya according to the administrative division. (b) Sidi Hosni municipality and location of the sites. (c) Excavation limits of the Columnata (1) prehistoric deposit.



Columnata-1 is an open-air site covering 1,260 m². Positioned at the base of a sandstone cliff in the Djebel Bou Ghezoul range, it sits at an average altitude of 915 m. The site is oriented

north-northwest (Latitude: 35°27.462' N; Longitude: 01° 31.682') and overlooks the Roman ruins by approximately 400 meters (Figure 2).

Figure 2: Location of the prehistoric site of Columnata (1) and the Roman site of Columnata (2).

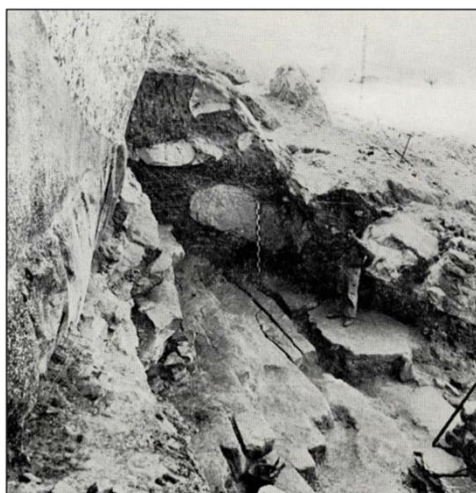


Source: Rabhi Merouane Contour lines overlaid on Google Earth satellite imagery

Topographic analysis, combined with geological and archaeological data, suggests that Columnata-1 originally formed a vast rock shelter at the foot of a Helvetian sandstone cliff ("Tiaret sandstone"). This setting, widely open to the N.N.E., provided protection from the elements and offered occupants an extensive view of the Tiguiguest valley and the southern Ouarsenis foothills (Cadenat et al., 1994).

While the precise timing of the geological collapse that transformed the shelter into an open-air site remains undefined, it established that the event occurred during the Upper Paleolithic (Epipaleolithic). Crucially, this collapse did not terminate human occupation; remains recovered both above and below the rockfall debris. Inhabitants adapted opportunistically, utilizing the fallen blocks and bedrock fissures for funerary purposes. Dozens of burials discovered on the rocky bank and within narrow fissures, with some bodies deposited directly on the ground (Aoudia-Chouakri, 2012) (Figure. 3).

Figure 3: Site bedrock composed of sandstone beds and local faults. The section displays sandstone blocks collapsed from the cliff embedded within the fill.



Source: Cadenat, P. (1957), *Fouilles à Columnata, campagne 1956-57. La nécropole, Libya*, 5, p. 49-81.

The prehistoric deposit of Columnata is crucial in understanding the transition from the Upper Paleolithic to the Epipaleolithic in Northwest Africa. Its significance stems from three key factors:

- **Stratigraphic Continuity:** The site documents a succession of four distinct cultures: the Iberomaurusian, the Columnatian, the Upper Capsian, and the Neolithic. This continuous sequence establishes Columnata as a key reference site for the region.
- **Unique Cultural Sequence:** It is the only site west of the traditional Capsian core zone (Eastern Algeria and Tunisia) where the Neolithic does not immediately follow the Iberomaurusian. Instead, two distinct industries intervene ; the Columnatian and the Upper Capsian.

This discovery provided the first evidence that the Capsian influence extended far beyond its origin. In addition, it identified the "Columnatian" as a distinct local industry intercalated between the Iberomaurusian and the Capsian horizons.

- **Funerary Context:** The site served as a vast necropolis. The high density of burials offers a unique opportunity to analyze the evolution of funerary customs across these successive groups over a span of nearly 7,000 years (Aoudia-Chouakri, 2012).

Recognizing their heritage value, both Columnata-1 and Columnata-2 were designated as historical monuments. They were initially classified by decrees on December 17, 1951, and November 18, 1952, respectively. This protected status was reaffirmed following Algerian independence by the decree of January 23, 1968.

3. History of Research

Discovered in early 1937, the Columnata site was first reported by P. Cadenat in the March 1938 issue of the *Bulletin de la Société de Géographie et d'Archéologie de la province d'Oran* (Cadenat, 1948), under the designation "Waldeck-Rousseau, Columnata hearth." Cadenat subsequently conducted four distinct excavation campaigns: 1937–1939, 1954–1955, 1956–1957, and 1959–1961. These interventions yielded substantial lithic and faunal assemblages spanning approximately 6,000 to 7,000 years, attributed to various cultural facies including the Iberomaurusian, Columnatian, Upper Capsian, and Neolithic (Sari, 2012).

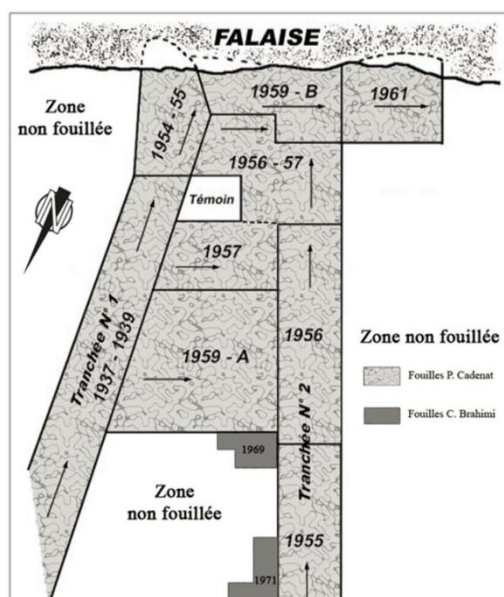
Beyond its settlement layers, Columnata functions as a significant necropolis, regarded as a pivotal site for analyzing Epipaleolithic funerary practices and the transition to the Neolithic. While differentiating between Iberomaurusian and later Columnatian burials initially proved challenging, Cadenat (1957) identified rudimentary architectural features marking specific graves during excavation (Cadenat et al., 1994). The majority of the archaeological material recovered by Cadenat is currently housed at the Ahmed Zabana National Museum in Oran, with the remainder curated at the CNRPAH and the Bardo National Museum in Algiers.

Excavations resumed between 1969 and 1971 by C. Brahimi (Brahimi, 1972). Focusing on the Iberomaurusian sector, Brahimi extended Cadenat's original work by opening two new excavation zones separated by 9 meters along a north-south axis (Figure. 4). This research produced a comprehensive collection of lithic and faunal remains, which are preserved in their entirety at the CNRPAH in Algiers (Sari, 2012).

Recent archaeological excavations were initiated in 2016 by Chaid-Saoudi et al. (2020). These investigations targeted the initial section of the Iberomaurusian level adjacent to the road. The fieldwork yielded remains of nine incomplete individuals (five adults and four children) (Chaid-Saoudi et al., 2022; 2022). The project leaders provided no further data regarding the selection

of the excavated sector, the excavation methodologies employed, or the broader archaeological context.

Figure 4:Excavation plan of Columnata (modified after Cadenat, 1966; Brahim, 1972)



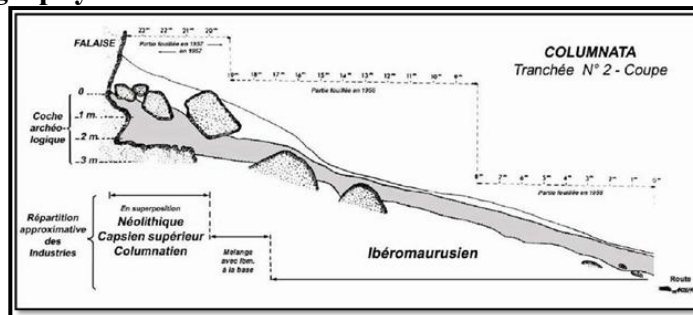
Source: Sari, L (2012). *L'Ibéromaurusien, culture du Paléolithique supérieur tardif : Approche technologique des productions lithiques taillées de Tamar Hat, Rassel et Columnata (Algérie)* [Thèse de doctorat, Université Paris X-Nanterre].

4. Stratigraphic data and dating

The stratigraphy of Columnata is characterized by a sedimentary depth exceeding two meters. Initial research (1937–1962) identified four distinct archaeological horizons based on lithic typology: the Iberomaurusian, the Columnatian, the Upper Capsian, and the Neolithic of Capsian Tradition. However, the interpretation of this sequence is hindered by significant post-depositional disturbances, including rockfalls, gullying, and structural collapses, further complicated by the digging of graves.

A major peculiarity lies in the disposition of the Columnatian level. Unlike typical sequences, this facies does not vertically superimpose the Iberomaurusian but extends horizontally adjacent to it (Figure.5). While P. Cadenat initially hypothesized an anthropogenic clearing of the shelter floor to explain this, G. Camps (1974) later suggested a recession of the cliff face—a theory subsequently debated by Brahim (1971). Despite these taphonomic challenges, radiocarbon dating has confirmed the validity of the stratigraphic sequence established in 1961, cementing Columnata's role in understanding the Neolithization process in the Maghreb.

Figure 5: Stratigraphy of the Columnata site



Source: Cadenat, P (1966). Vues nouvelles sur les industries de Columnata. *Libya : Anthropologie, Préhistoire, Ethnographie*, 14, 189-207.

4.1. Excavations by P. cadenat

P. Cadenat's investigations were conducted through multiple distinct trenches. Trench No. 1 (1937–1939) allowed for the distinction between a Lower and Upper Oranian, the latter described as a "dwarfed" regional facies containing microburins. Trench No. 2 (1955–1957) led to the identification of an "Archaic Iberomaurusian," and subsequent trenches A and B (1957–1961) were opened to connect these zones.

Using a meticulous excavation method in 10 cm spits, Cadenat established a tripartite sedimentary sequence totaling approximately 2 meters. The lower layers (approx. 1 m) are composed of black earth with burnt stones, containing the Upper and Lower Oranian levels. This is overlain by an intermediate layer (max. 30 cm) of yellowish-brown sandy-clay soil. The sequence terminates with an upper layer (1 to 1.10 m) consisting of ash-grey sediment, which yielded Lower and Upper Neolithic material.

In his revised 1966 sequence, Cadenat defined four horizons. The "Typical" Iberomaurusian constitutes the undated final phase, extending over 15 meters in length and 0.80 meters in thickness. This is followed by the Columnatian (8280 ± 200 BP – 7300 ± 200 BP), a transitional facies initially termed "Transitional Epipaleolithic" by Cadenat and later renamed by Camps (1974). Following this, the Upper Capsian of Tiaretian Facies (6850 ± 300 BP – 6340 ± 300 BP) overlies the Columnatian, occupying the same surface area at the foot of the cliff. Finally, the Neolithic (5850 ± 100 BP) rests directly upon the Upper Capsian, occupying the smallest surface area.

4.2. Excavations by C. Brahimi

Resuming research in 1969 and 1971, C. Brahimi focused on the Iberomaurusian sector to refine the understanding of the basal levels. These excavations covered a total of 9 m² divided into two zones spaced 9 meters apart, effectively extending Cadenat's connection trench. Excavating in 5 cm layers, Brahimi reached depths of approximately 1 meter in the 1969 zone and 1.5 meters in the 1971 zone, excluding the disturbed upper 15 centimeters.

Although no sedimentological analysis was performed, the lithostratigraphy appeared consistent across both zones, featuring alternating stone layers and sand. A notable difference was observed in the distribution of *Unio* shells: abundant in the 1969 sector but virtually absent in the 1971 zone. In the absence of charcoal, these shells provided a radiocarbon date of $10,850 \pm 425$ BP, confirming the Late Pleistocene age of the Iberomaurusian occupation.

5. Archaeological data

Despite identification challenges caused by post-depositional disturbances (rockfalls, infiltrations, runoff, burials), Radiocarbon dating has validated the stratigraphic sequence established in 1961. This scientific method provided concrete confirmation of the chronology for the Columnata site, defined as follows:

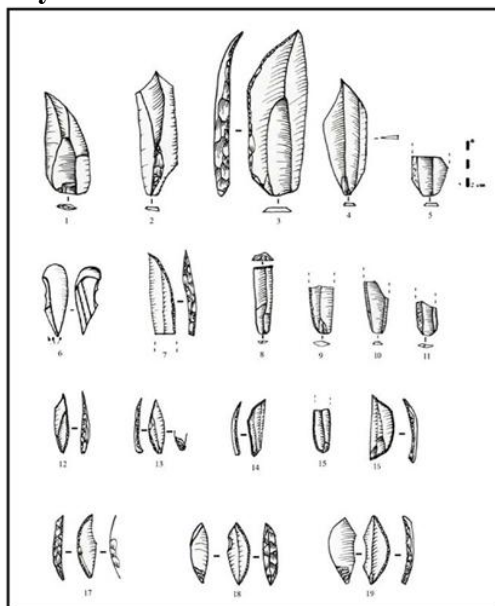
- Neolithic: 3300 and 3900 BC.
- Upper Capsian: 4390, 4850, and 4900 BC.
- Columnatian: 5350, 6190, and 6330 BC.
- Evolved Iberomaurusian: 8850 BC (Brahimi excavations).

Each period is distinguished by a rich assemblage of artifacts and specific characteristics:

The Iberomaurusian assemblage is primarily characterized by a predominance of backed bladelets. Conversely, end-scrapers, notches, and burins are scarce within this level. With the exception of rare segments (lunates), geometric microliths are notably absent. The bone industry remains coarse during this phase, while the faunal remains indicate a subsistence strategy focused on large herbivores such as oxen, horses, and antelopes.

In contrast, the Columnatian facies exhibits a marked shift toward microlithization, featuring a hyper-microlithic industry (Figure. 6). The toolkit includes micro-bladelets, micro-segments, and abundant small angle burins, but lacks the trapezes typical of the Capsian culture. Bone tooling diversifies with oblique-edged tranchets. Faunal evidence suggests a dietary transition, showing a decline in large mammals and increased consumption of smaller species.

Figure 6: Lithic industry of the Columnata site



Source: Sari, L (2012). *L'Ibéromaurusien, culture du Paléolithique supérieur tardif : Approche technologique des productions lithiques taillées de Tamar Hat, Rassel et Columnata (Algérie)* [Thèse de doctorat, Université Paris X-Nanterre].

The subsequent Upper Capsian (Tiaretian facies) introduces new tool types, including scalene borers and points. This phase sees the emergence of classic geometric forms such as triangles and trapezes, coinciding with a reduction in micro-tools. The bone industry becomes more sophisticated, featuring polished awls and bodkins (Figure. 7). Notably, this level yields sickle inserts, elaborate adornments, and evidence of human bone utilization.

Figure 7: Bone industry from the Columnata site

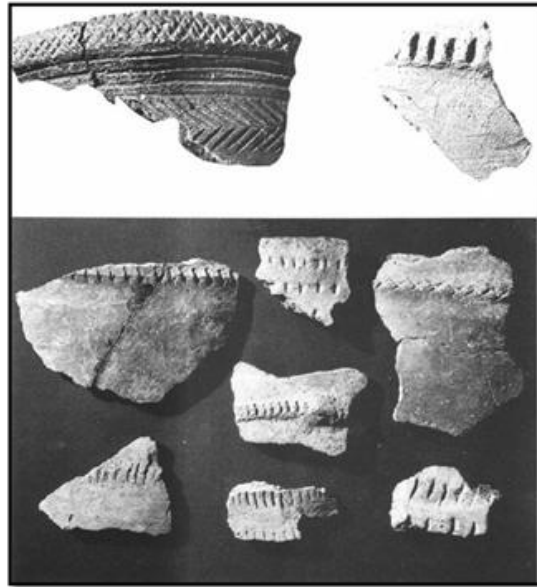


Source : Cadenat, P. (1948). La station préhistorique de Columnata, Commune mixte de Tiaret, dept. d'Oran. *Bulletin de la Société de Géographie et d'Archéologie d'Oran*, 70(224), 3-66.

Finally, the Neolithic horizon is distinguished by lithic assemblages containing notched and denticulated blades alongside tanged and barbed arrowheads. The presence of bifacial armatures suggests a perceptible Saharan influence. Material culture expands to include

decorated conical-based pottery, similar to Oranian coastal types (Figure. 8). While polished bone tools become rare, symbolic activity is evident through engraved ostrich eggshells and ornaments crafted from turtle scutes.

Figure 8: Neolithic ceramics from the Columnata site



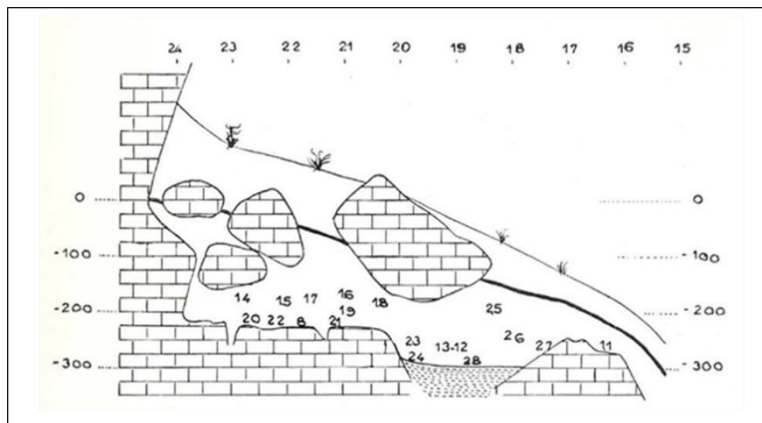
Source : Cadenat, P., and Al. (1994). Columnata. In *Encyclopédie berbère* (Vol. 13, pp. 2073-2079). Edisud. <http://journals.openedition.org/encyclopedieberbere/2316>

Overall, Columnata offers a compelling record of the populations and cultures that occupied the site over millennia, illustrating remarkable technological evolutions and adaptations.

6. The necropolis of columnata

Beyond its settlement data, Columnata ranks among North Africa's three largest prehistoric necropolises. To date, excavations have recovered the remains of 116 individuals: 48 adults and 68 children. These are primarily associated with the "Columnatian" culture and were studied by M.-C. Chamla (Chamla et Al, 1970). Some burials were accompanied by funerary monuments, occasionally marked by rudimentary stelae (Figures. 9 and 10).

Figure 9: Cross-sectional view of the distribution of a portion of the Columnata burials. Hatched areas indicate the rock wall.

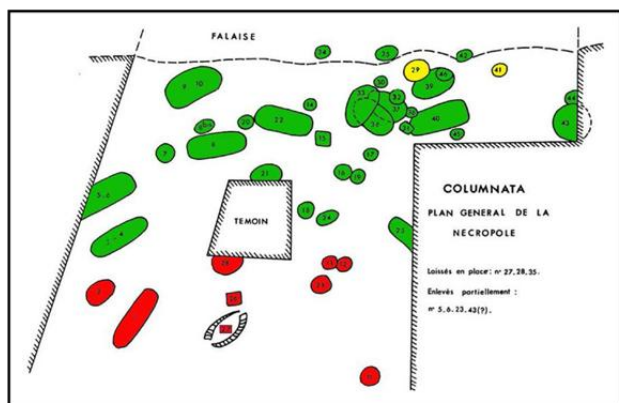


Source : Cadenat, P. (1957), Fouilles à Columnata, campagne 1956-57. La nécropole, *Libyca*, 5, p. 49-81.

Osteological analysis revealed that the Columnata population belonged to the Mechta-Afalou type (Plate. 1). Compared to the older Iberomaurusians, they exhibited signs of evolutionary change and gracilization.

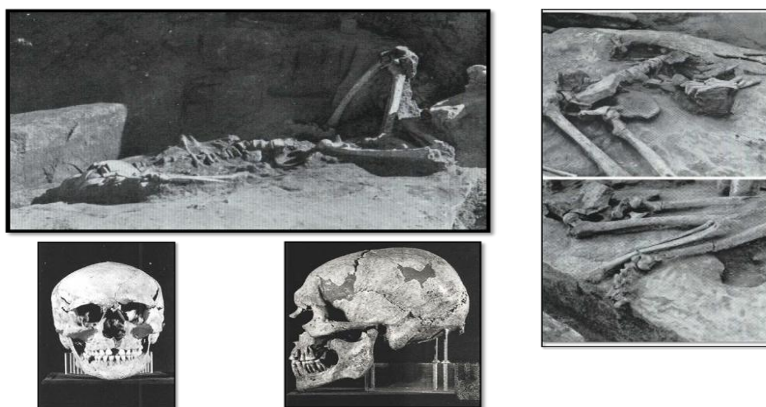
The average life expectancy was approximately 21–22 years, with a high infant mortality rate. The practice of dental avulsion (tooth removal), often involving all eight incisors, was common.

Figure 10: Spatial distribution of burials. Red: burials attributed to the Iberomaurusian; Green: burials attributed to the Columnatian; Yellow: Neolithic burials.



Source : Maître, J.P. (1965). Inventaire des hommes fossiles de Columnata (Tiaret), déposés au C.R.A.P.E, Libya, 13, p. 9-26.

Plate 1. Bone remains recovered from the various archaeological levels of the Columnata site



Source : Chamla, M. Cl., et Al., (1970). *Les hommes épipaléolithiques de Columnata (Algérie occidentale) : Etude Anthropologique* (Mémoires du CRAPE, Vol. 15). Arts et Métiers Graphiques.

Despite these harsh living conditions, the inhabitants of Columnata appear to have led a relatively peaceful existence. This hypothesis is supported by the low incidence of skeletal trauma observed (Cadenat et al., 1994).

7. Conclusion and Recommendations

The stratigraphic and cultural sequence of Columnata offers a rare continuous record of the Epipaleolithic-Neolithic transition in the Central Maghreb. By synthesizing historical data from Cadenat and Brahimi with recent absolute dating, this study confirms the status of the "Columnatian" as a distinct, autochthonous facies marking the shift towards microlithization and broad-spectrum subsistence strategies prior to the Capsian arrival. Furthermore, the anthropological data from the necropolis evidences a gradual gracilization of the Mechta-Afalou type, suggesting local biological continuity rather than population replacement. Future

research should prioritize two axes: firstly, the application of modern bio-archaeological methods (ancient DNA, stable isotopes) to the existing collection to refine models of diet and mobility; secondly, the implementation of urgent conservation measures to stabilize the remaining stratigraphy against erosion, ensuring that this pivotal archive remains accessible for re-evaluation.

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