

REPORT OF NEW ARCHAEOLOGICAL INVESTIGATIONS AT AIN HANECH, ALGERIA

BY Mohamed Sahnouni *,
Abdelkader Derradji**,
and Mohamed Medig**

INTRODUCTION

The Ain Hanech site was discovered in 1947 by the French paleontologist Camille Arambourg in the course of his paleontological survey of the region around the town of Setif in northeastern Algeria. This site yielded an Upper Villafranchian fauna (= Lower Pleistocene) associated with artifacts of a Mode I (Oldowan-like) technology. Estimates of the age here have ranged from 1.0 to 1.2 million years ago, based upon faunal correlations with East Africa (Coppens, 1972).

The fauna included elephants (*E. moghrebiensis*), equid (*E. asinus tabeti*), bovids, (*Bos bubaloides*, *Numidocapra crassicornis*, *Gazela pomeli* etc.) hippo (*H. amphibus*), rhino (*Ceratotherium simum mauritanicum*) etc. (Arambourg, 1970 and 1979). The artifacts consisted primarily of polyhedrons flaked, but not battered subspheroids, and spheroids similar to some known at Olduvai Gorge (Upper Bed I/Lower Bed II) (Sahnouni, 1987, and 1992). This was the first time that an early Pleistocene fauna was found associated with Lower Palaeolithic artifacts in North Africa.

However, this site was excavated with paleontological rather than archaeological questions in mind, and without systematic excavation techniques and forms of documentation. Therefore several questions still remain unresolved surrounding this site such as :

- 1) Accurate stratigraphic information and the dating of the sediments and associated materials ;
- 2) The nature of the association between the fossil fauna and the stone artifacts; and
- 3) The vertical and horizontal spatial distribution of the archaeological materials, and whether behavioral or geological agencies are primarily responsible for their patterning.

* Director of the research Project # 1601 / 05/92

** Members of the research Project

New archaeological investigations have begun at this Lower Palaeolithic site in an attempt to answer these unresolved questions. During the past summer (July and August 1992) a season of field work was initiated to survey and map the Ain Hanech area, to study the stratigraphy and collect samples for sedimentological and paleomagnetic analysis, to conduct an exploratory test excavation near Arambourg's original trench.

The specific objectives of this study are : 1 -) to determine the stratigraphic sequence at the primary archaeological / paleontological locality and correlate these with other localities found within one kilometer of the vicinity; 2 -) to ascertain the precise stratigraphic provenience of the palaeolithic artifactual level (s) and their relationships with the Early Pleistocene fauna previously retrieved from the site and 3-) to establish the geochronological context of the artifacts and bones, and 4) to explore the possible behavioral implications of the site and assess the site formation processes responsible for the deposit; 5) to identify new localities with archaeological and/or paleontological potential in the immediate vicinity; and 6) to help establish a firmer chronology for the site.

SURVEY AND MAPPING

An area with a radius of 1 km around the Ain Hanech site has been systematically surveyed and mapped. A quantity of surface fragmented animal bones and stone artifacts from major surface have been plotted, documented, and then collected. It was clear that the original Ain Hanech site in the study area, still had one of the densest concentrations of surface stone artifacts and fossil bones.

The stone artifacts found during this survey included specimens characteristic of both mode I technology (Oldowan) and mode II technology (Acheulean). They include unifacial and bifacial choppers, polyhedrons, subspheroids, flakes, and bifaces, bifacial trimming flakes, and very large flakes. Faunal remains included fragmented bone and isolated teeth. Stone artifacts and bones were retrieved primarily in four main localities : El - Kherba, Ain Boucherit, Ain Hanech, and El-Beida. The highest density occurred within Ain Hanech area.

Besides the mode I and II industries, it is worthwhile to note that in the course of the survey two Upper Pleistocene archaeological sites were discovered. The first is located south Ain Hanech site at the Djenane Douadi locality. Here a well preserved part of a deer antler was associated with flint blade artifacts (Mode IV technology). The second represents a Capsian site situated east Ain Hanech, where Mode IV and V technologies (blades and microlith), bone points, mammal bone, and engraved limestone slabs were found.

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Based on this survey, the surface archaeological materials were delineated and mapped, and several localities of dense concentration were selected for stratigraphic and archaeological test trenches (fig. 1) including :

1) There geological trenches were dug with mechanical equipment borrowed from local authorities (P1, P2, and P4),

2) two thick natural geological sections were cleaned for detailed stratigraphic information (S1 and P4),

3) two test trenches were dug for delineation of the archaeological occurrences (P6 and P7), and

4) one major horizontal archaeological excavation was conducted in the Ain Hanech area.

P1, P 2, P 3, P 6, and P 7 are situated on the east side of the Ain Boucherit stream, as P5 is the test excavation adjacent to Arambourg's trench. P4 and S1 located in the west side of the stream.

In addition to the stratigraphic information, these test trenches yield fossil animal bones and/or stone artifacts in situ. Stone artifacts were recovered in test trenches P1, P6. The test trench P7 has yielded elephant bones and one limestone flake (fig. 2). The cleaned sections (P4 and S1) contained fossil animal bones in two distinctive clay horizons; but no artifacts were recovered. The lower clay stratum in these sections may be correlated with the fauna level at the Ain Boucherit locality (Lower Villafranchian), while the upper clay horizon may correspond to the Ain Hanech faunal level. Stone artifacts recovered in the test trenches are mode I type technology (Oldowan) including core/tools and flakes with no evidence of Acheulean bifaces or biface trimming flake.

T. Trench .	P1	P2	P3	P4	P6	P 7	S1
F.Bones .	/	/	2 horns fragments	2	33 teeth other	elph. bones+ phaco	Several bones+ tooth+ horn
S. Artif	3	/	/	/	9	1	/

Table 1 : Fossil bones and stone artifacts found in situ in the different test trenches.

The survey and mapping investigations allowed : 1) delineation of the spatial density of archaeological materials in the Ain Hanech area; 2) selection of several localities for stratigraphic and archaeological test trenches; and 3) construction of preliminary stratigraphic and archaeological correlations.

STRATIGRAPHY

Basin deposits occur in pockets throughout the Eastern Algerian high plateau (fig. 3). They consist of a very thick sequence of sediments sometimes reaching a depth of 250 meters (Savornin, 1920). Their ages range from the Upper Miocene to Upper Pleistocene. Archaeological and paleontological sites such as Ain Boucherit, Ain Hanech, Ain Jourdel, and Mansourah dated to Late pliocene and Early pleistocene, are contained within these deposits.

The Ain Hanech site was formed within the fluvio-lacustrine deposits of the Beni Fouda basin located to the northeast of the town of Setif. These deposits are characterized by localized conglomerates, layers of red clay with pebbles, and layers of very fine gray clays. Deposition of this sedimentary sequence appears to have started in the Upper Miocene and continued through the pliocene and pleistocene periods (Savornin, 1920). The fauna recovered in the immediate vicinity of Ain Hanech, first by A. Pomel (at Ain Boucherit) in 1885 (Pomel, 1895) and later by Arambourg (at both Ain Boucherit and Ain Hanech), has been dated to the plio-pleistocene period (Arambourg, 1947).

As Arambourg had been primarily interested in the evolutionary sequence of fossil mammals, he had provided very schematic stratigraphic information of the Ain Boucherit/Ain Hanech sequence. Consequently, several important questions still surround these deposits : 1) the precise stratigraphic relationship between the two major localities identified: (Ain Boucherit and Ain Hanech); 2) the nature of the association between the fossil animal bones and the stone artifacts found at the Ain Hanech site; and 3) the stratigraphic position of mode II (Acheulean) technological occurrences in this region and their relationship with the cruder mode I archaeological materials excavated from Ain Hanech.

During the field work season we undertook at Ain Hanech this past summer (July and August 1992), an important part of the work was devoted to studying the stratigraphy in order to shed light on the above questions. The stratigraphic study was not restricted to the Ain Hanech site it self; but it was extended to include the overall sequence of deposits within the local sedimentary basin. The excavation of seven test trenches and the cleaning of two natural stratigraphic sections within a radius of one km around the Ain Hanech site revealed a succession of alternation of fluvial and lacustrine deposits. Based upon the Ain Boucherit section (S1) and its correlation with the trenches, the following stratigraphic sequence can be outlined : (fig. 4)

(1) - At the base of the exposed section, a 1 meter thick conglomerate with a silty clay matrix. Pebbles are large in the bottom and become smaller towards the top of this stratum.

(2) - A thick (3.2 m) sand lenses towards the top levels.

(3) - A thin (0.20 m) layer.

(4) - A reddish-brown clay.

(5) - A conglomerate with a silty matrix.

(6) - A 0.60 m thick layer of pebbles.

(7) - A conglomerate with a silty matrix.

Between the 2 and 3 alternating deposits of sand and clay.

(8) - A very fine gray clay with fragments of flint, mammal bones including a layer.

(9) - A very thick (1.5 m) layer.

(10) - A fine gray clay.

(11) - A banded (0.50 m) layer.

(12) - A thin gray clay.

(13) - A banded (0.50 m) layer.

(14) - Another gray clay becoming banded near the top stratigraphic layer with pebbles on the other side of the trench in the Ain Boucherit section.

(15) - A thick (3.2 m) layer.

The deposition of this sequence of alternating sand and clay.

(17) - A brown clay layer (19), and another (20).

(21) - A thick (1.5 m) horizon with calcareous pebbles.

(22) - A calcrete layer.

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(2) - A thick (3.30m), fine grained, and banded clay, which contains sand lenses towards its base and becomes very compact in its upper levels.

(3) - A thin (0.20m) gravel layer.

(4) - A reddish-brown, compact clay (1.40m).

(5) - A conglomerate composed of small pebbles in a red sandy matrix.

(6) - A 0.60 m thick layer of gray clay containing some sands and pebbles.

(7) - A conglomerate consisting of small pebbles in a coarse sandy matrix.

Between the 2 conglomerate formations (7) and (16) occur alternating deposits of gray and brown clay. They are in order :

(8) - A very fine gray clay with some small pebbles, natural fragments of flint, invertebrate organisms (i. e. mollusc), and fossil mammal bones including within original Ain Boucherit mammalian layer.

(9) - A very thick (4.25m), fine brown clay.

(10) - A fine gray clay.

(11) - A banded brown clay.

(12) - A thin gray clay layer.

(13) - A banded, mottled brown clay.

(14) - Another gray clay, 2 m thick, compact in its lower part becoming banded near the top. We have provisionally correlated this stratigraphic layer with archaeological horizon at the Ain Hanech site on the other side of the stream; no artifacts have yet been found in this gray clay in the Ain Boucherit locality.

(15) - A thick (3.20 m) green sandy clay layer.

The deposition of layer (16), a conglomerate, initiates another sequence of alternating finer and coarser deposits :

(17) - A brown clay followed by a conglomerate (18), a sandy clay layer (19), and another conglomerate (20).

(21) - A thick layer (2m) of brown silty clay representing a soil horizon with calcareous nodules.

(22) - A calcrete formation capping the entire stratigraphic sequence.

Provisional stratigraphic correlations suggest that the gray clay layer (14), presents in the Ain Boucherit section, could correspond to the Ain Hanech archaeological gray clay based on : 1) the distinctive sediments in color, size, and grain;

2) the stratigraphic position over a large area; 3) it does not repeat itself. The layers (16) to (22) are absent in the Ain Hanech site. The absence of these deposits could be due to the erosion of these sediments during the Pleistocene or afterwards. It might also explain the absence of stratigraphic context for the mode II technology artifacts in the local site area. In fact, several bifaces and flakes picked up from the surface bear calccrete concretions. They probably belong to either the locally eroded strata underneath the calccrete formation or to the calccrete it self. It might be possible to look for deposits with bifaces in situ in these calcareous strata which are still present at the east, west, and south of the Ain Hanech area. If this tentative stratigraphic correlation proves to be justified, it appears that the gray clay (14) occurs on both sides of the stream, the stratified archaeological occurrences with mode I technology are present only on the east side where Arambourg dug (fig. 5).

Several samples have been collected along the cleaned natural geologic section (the Ain Boucherit side), and at the Ain Hanech site for paleomagnetic study and clay analysis. Both analyses are currently being processed at the University of Utah by Dr. F. Brown (for paleomagnetism) and at Indiana University (Geological Sciences) for clay analysis.

In conclusion, the study of the stratigraphy of the basin in which the palaeolithic site of Ain Hanech occurs indicates an alternation between lacustrine and fluvio-lacustrine deposits. A calccrete formation caps the entire stratigraphic sequence. The Lower Pleistocene archaeological materials are found within lake margin deposits suggesting that Ain Hanech site was formed near an ancient lake with small stream draining into it. The Acheulean materials post date the Oldowan ones, and so far are not found in situ within stratigraphic context because of the local erosion.

ARCHAEOLOGICAL EXCAVATION

A limited archaeological excavation was carried out next to Arambourg's trench (fig. 6), exposing fresh archaeological remains within a very fine and compact gray clay layer (fig. 7). This suggest a relatively low energy deposits. In an excavation of 20 m², a total of 115 archaeological items were recovered in this clay horizon, indicating a relatively low density spatial distribution of prehistoric materials.

The stone artifacts include not only polyhedral cores similar to those previously recovered by Arambourg; but also flakes and fragments (not

collected by Arambourg. A total of 36 stone artifacts, 22 flakes and fragments. The core-tools are on an average of 87 x 75 mm, trimmed and bearing. Some of them have a diameter exceeding sometimes 100 mm and display a most

A total of 77 animal bones were recovered during the excavation, including 10 identifiable elements. 3 cm long are not included. The bones (basicall) are represented. In addition to this test excavation, an articulated position was found with several stone tools. This find, in addition to the disturbance of the

In terms of spatial distribution, the bones combined with the stone tools occurrences are concentrated on a depression on a circular spatial pattern indicating a total of 5 items by square meter. The cobbles distributed on the eastern side. The small animal bones (including cobbles in low density) were investigated further

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collected by Arambourg because of his excavation technique) (fig. 8). A total of 36 stone artifacts were recovered including 14 polyhedral cores, 22 flakes and fragments, one of which is slightly retouched scraper like. The core-tools are characterized by a polyhedral shape and measuring an average of 87 x75 x65 cm. Technologically they are not extensively trimmed and bear distinctive primarily cortical striking platforms. Most of them have a distinctive edge characterized by a very obtuse angle, exceeding sometimes 110 degrees. The flakes are variable in dimensions and display a mostly cortical dorsal face and cortical striking platforms.

A total of 79 fossil animal bones was recovered in the test excavation, including 10 isolated teeth (4 of which are fragmented), 44 identifiable elements, and 25 bone fragments. Small fragments less than 3 cm long are not included in these counts. Preliminary examination of the bones (basically teeth) shows that primarily equids and bovids are represented . In addition, the most exciting faunal remains revealed by this test excavation was the partial skeleton of a small bovid laying in articulated position and somewhat reflexed or "curled up", and associated with several stone artifacts (fig. 9, square J2). Bones of the animal include mainly axial elements such as the scapula, vertebrae, and pelvis. This find, in addition to the stratigraphic context, suggests a minimal disturbance of the site;

In terms of spatial distribution, the vertical dispersion of artifacts and bones combined with the stratigraphy show that the archaeological occurrences are concentrated in a single horizon, and might represent deposition on a contemporaneous land surface (fig. 10). The horizontal spatial pattern indicates a relatively low density distribution (an average of 5 items by square meter) (fig. 9). There is also a quantity of natural cobbles distributed across one side of the excavation; but absent on the eastern side. The significance of the co-occurrence of the stone artifacts, animal bones (including the partial, articulated skeleton), and unmodified cobbles in low densities in a fine grained clay context will be investigated further next field season.

CONCLUSION

The field work undertaken at Ain Hanech over this past summer has produced the following results and preliminary conclusions :

- 1) Detailed stratigraphic sections of the site were drawn.
 - 2) Samples of fine-grained sediments were taken for paleomagnetic analysis, which is currently being conducted by Dr Frank Brown at the University of Utah.
 - 3) Identification of the Lower Pleistocene archaeological occurrences were made, including a fine-grained clay horizon which extends laterally for hundreds of meters.
 - 4) The mode II (Acheulean technology artifacts do not appear to be associated with the Oldowan materials stratigraphically. They appear to represent a later phase of another hominid occupation that has eroded from a higher strata. Because of erosion near the Ain Hanech site it was not found in situ; but probably can be found in context at the top of the Ain Boucherit section lateral to the Ain Hanech site.
 - 5) The lower Pleistocene archaeological materials, including polyhedral cores, flakes, and fossil animal bones, occur in situ within a very fine gray clay deposit, suggesting relative low energy deposits. The artifacts uncovered in situ were in very good, fresh condition, and did not have the weathered, abraded appearance of some of this surface finds.
 - 6 -) The Ain Hanech site is likely to be among North Africa's earliest evidence of hominid behavioral occupation patterns that will be studied including technological abilities, raw materials manufacture and transport, cognition, subsistence, and land use.
- In sum, the 1992 field season has established the foundation for continued archaeological research at Ain Hanech. Next year we plan to expand the excavation adjacent to this year's dig to incorporate much a larger spatial area, and retrieve larger sample of stone artifacts and fossil mammalian bones. With further excavations, it is likely that hominid fossils of *Homo erectus* will be also be uncovered in the future.

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8 - SAHNOU
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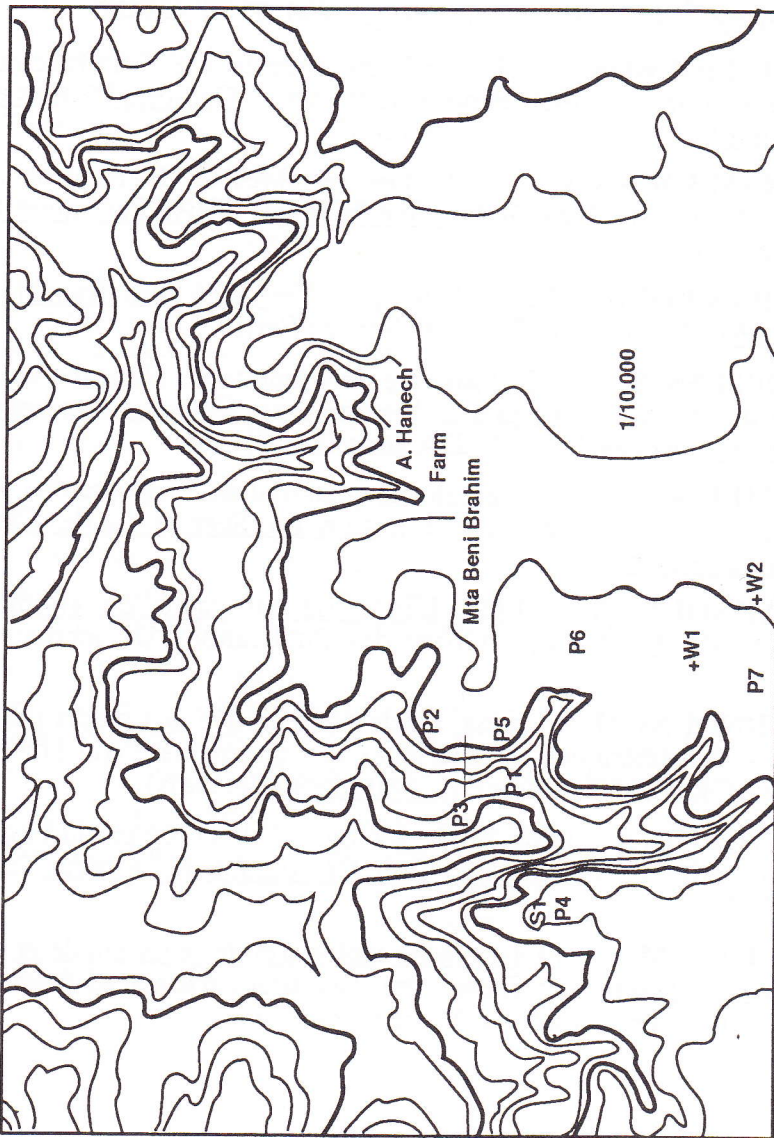
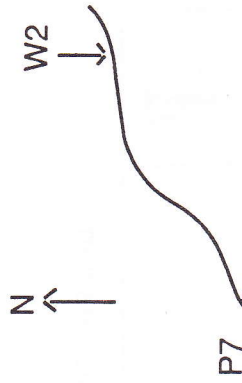


Figure 1: Topographic map showing the location of the different test trenches and cleaned naturel geologic sections.



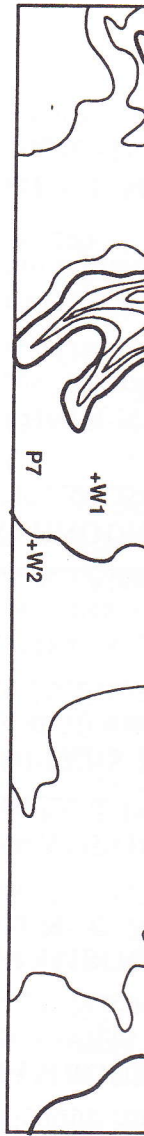


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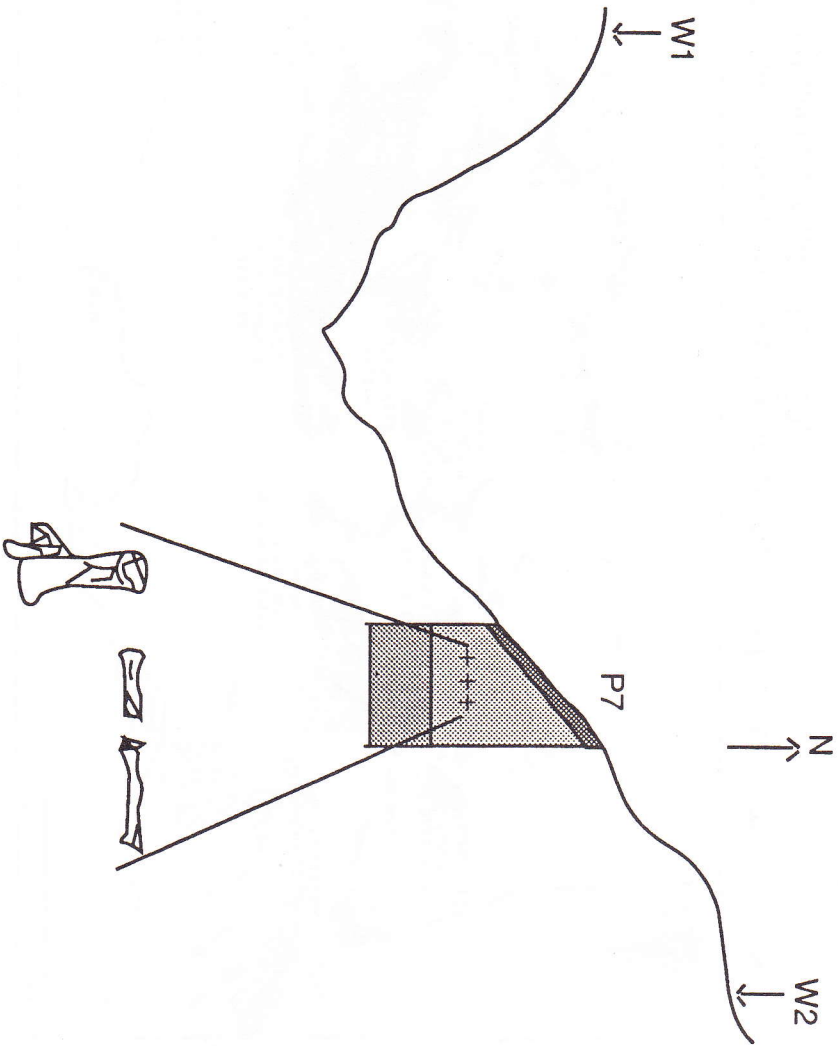


Figure 2: Elephant bones recovered in situ at the test trench P7

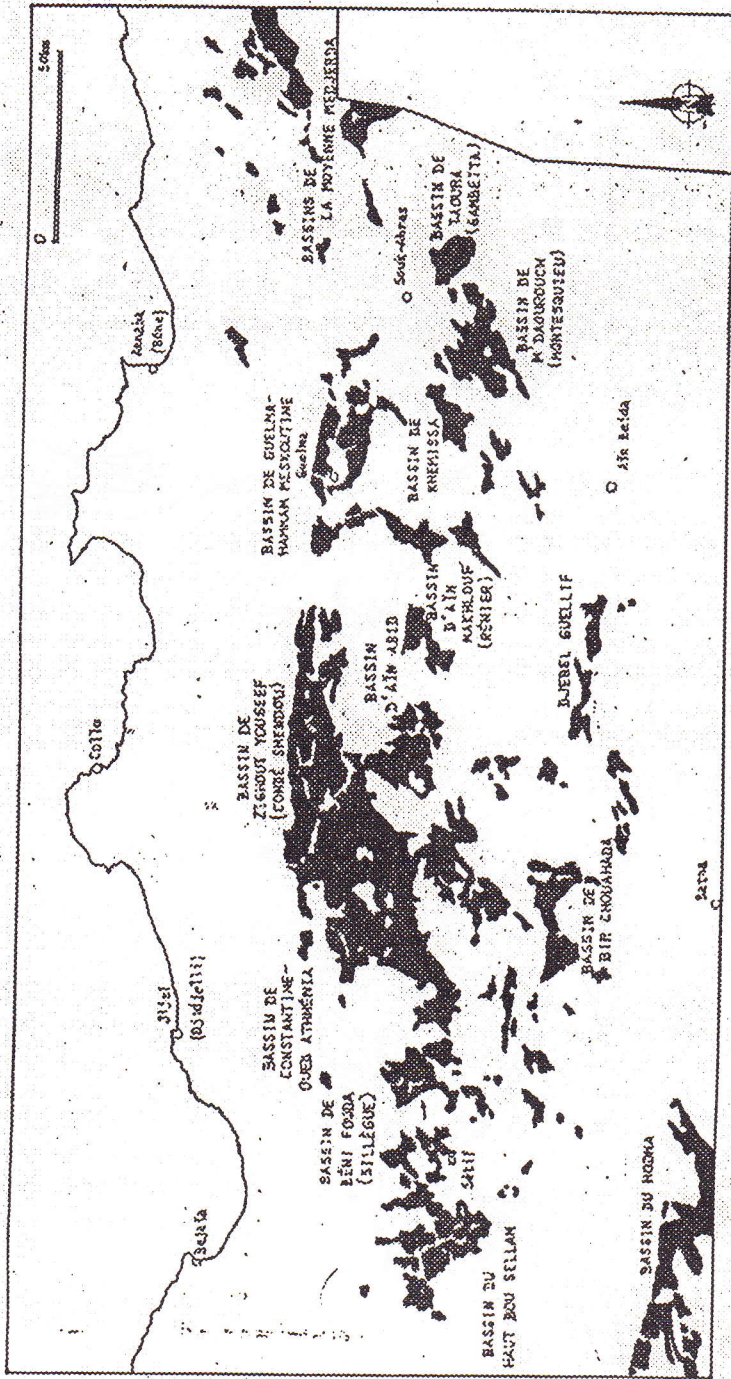


Figure 3 : Miocene-Plio-Pleistocene basin deposits throughout the Northeastern Algerian high plateau (redrawn after J.M. Vila, 1980).

- 1- calcrete
- 2- colluvium
- 3- slope down formation
- 4- soil with calcareous nodules
- 5- green silty clay
- 6- gray clay
- 7- brown clay
- 8- conglomerate

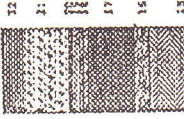
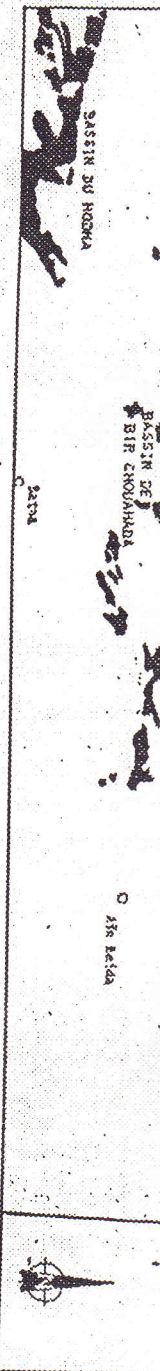


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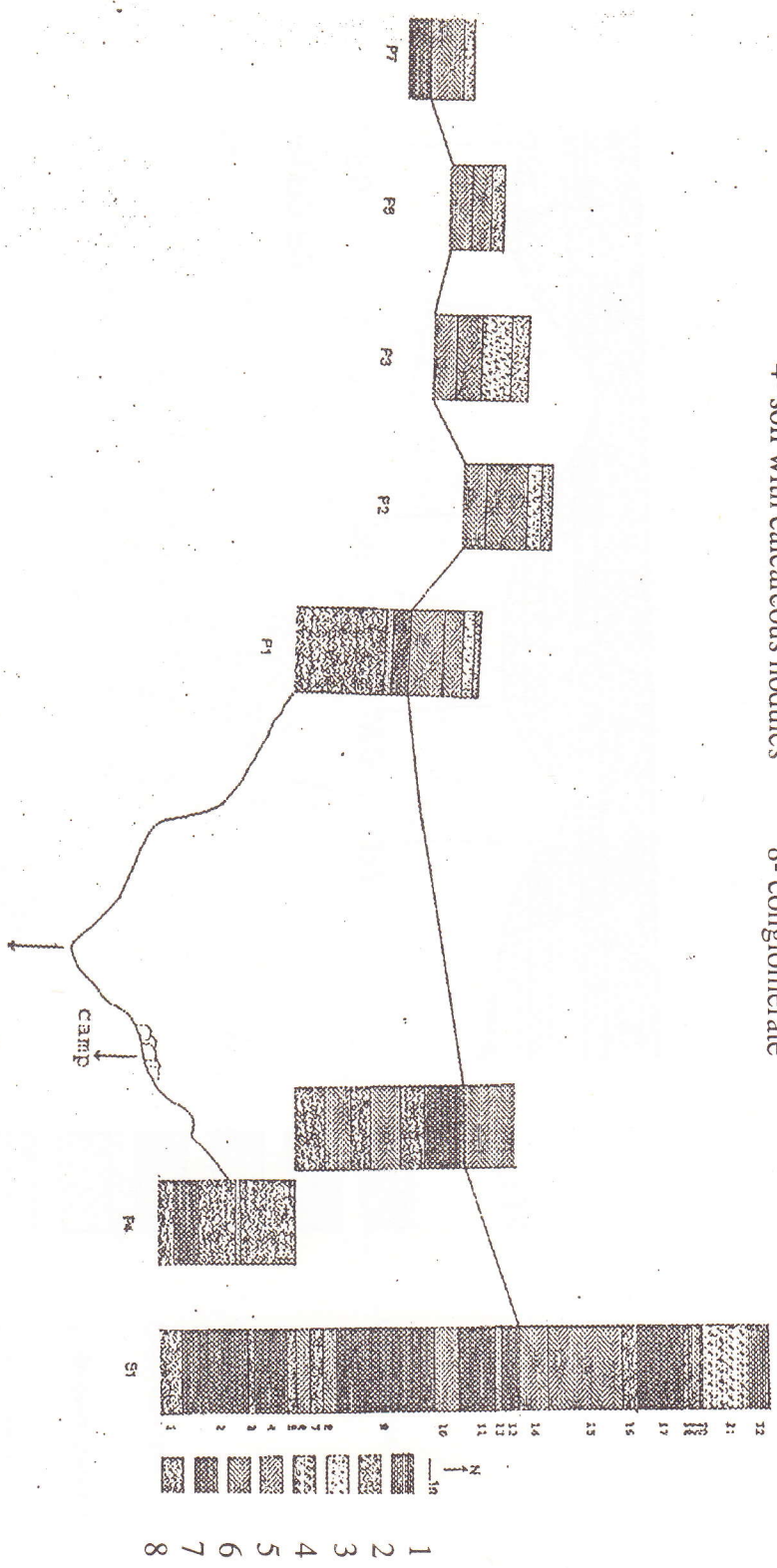


Figure 4: Provisional stratigraphic correlation of the complete stratigraphic sequence (S1) with the test trenches located on the east of the Ain Boucherit stream

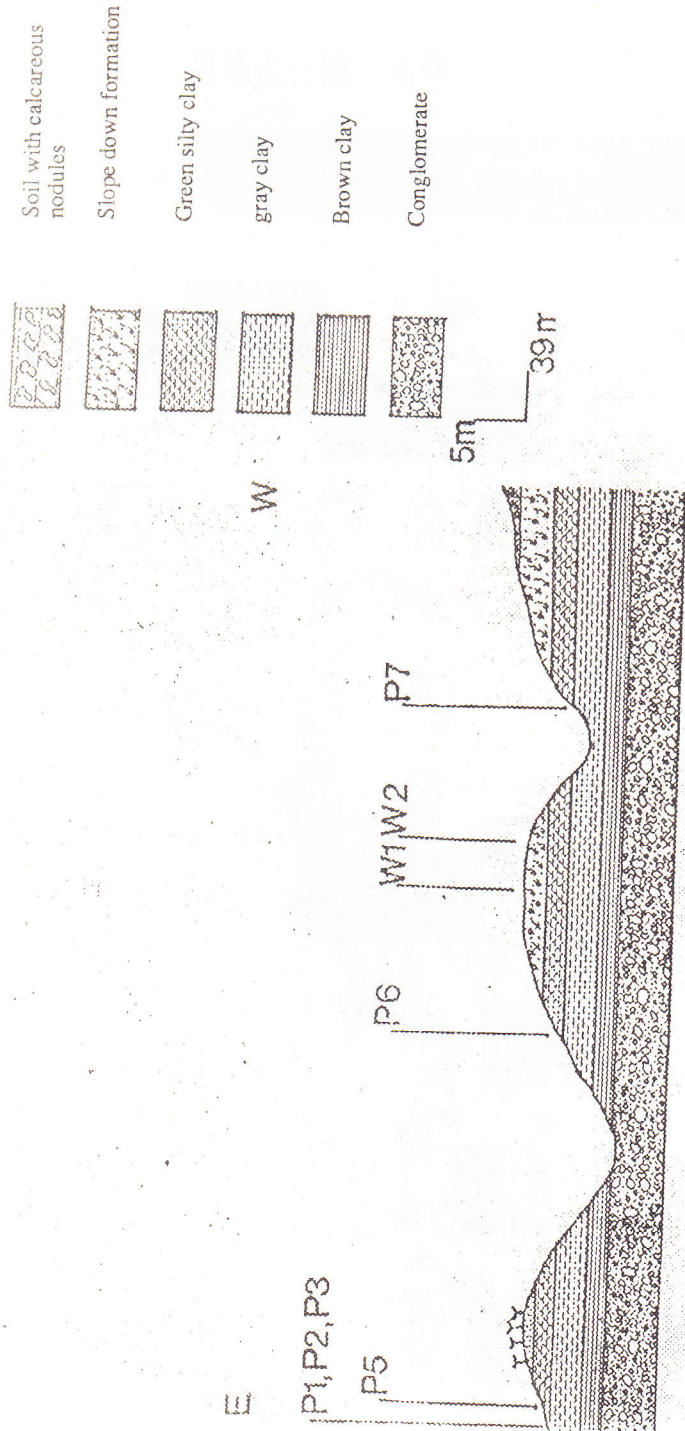


Figure 5 : Delineation of stratified archaeological occurrences with Mode I technology on the east side of the Boucherit stream (Ain Hanech area)

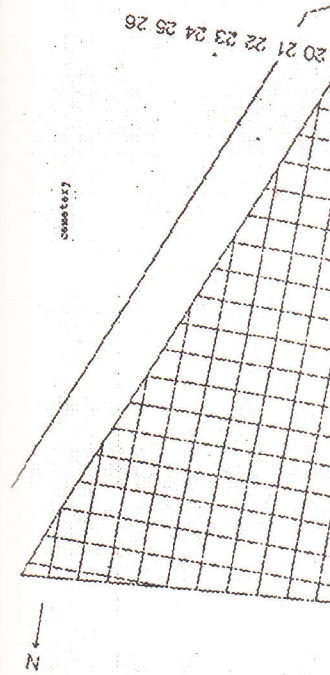




Figure 5 : Delineation of stratified archaeological occurrences with Mode I technology on the east side of the Boucherit stream (Ain Hanech area)

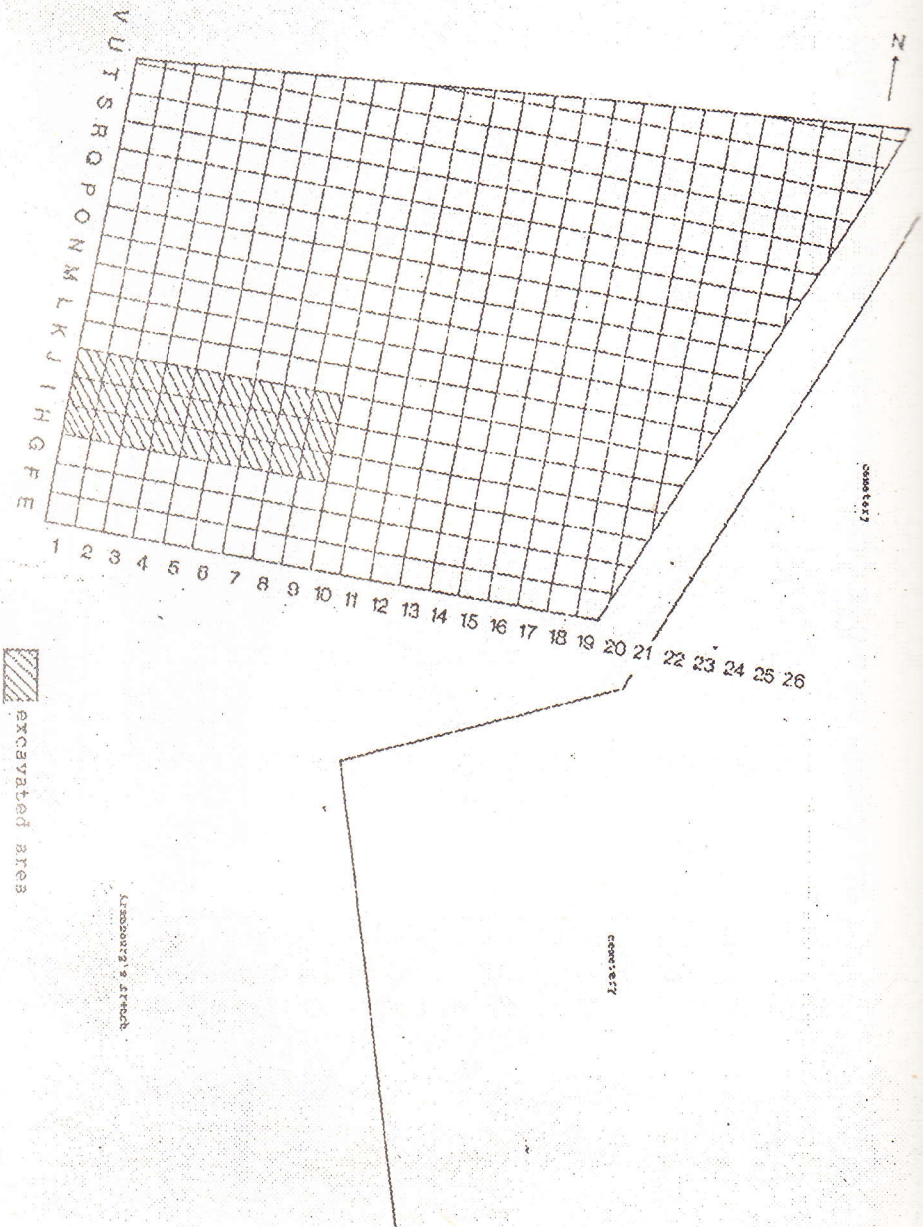


Figure 6 : Location and grid system of the limited test excavation near Arambourg's trench.

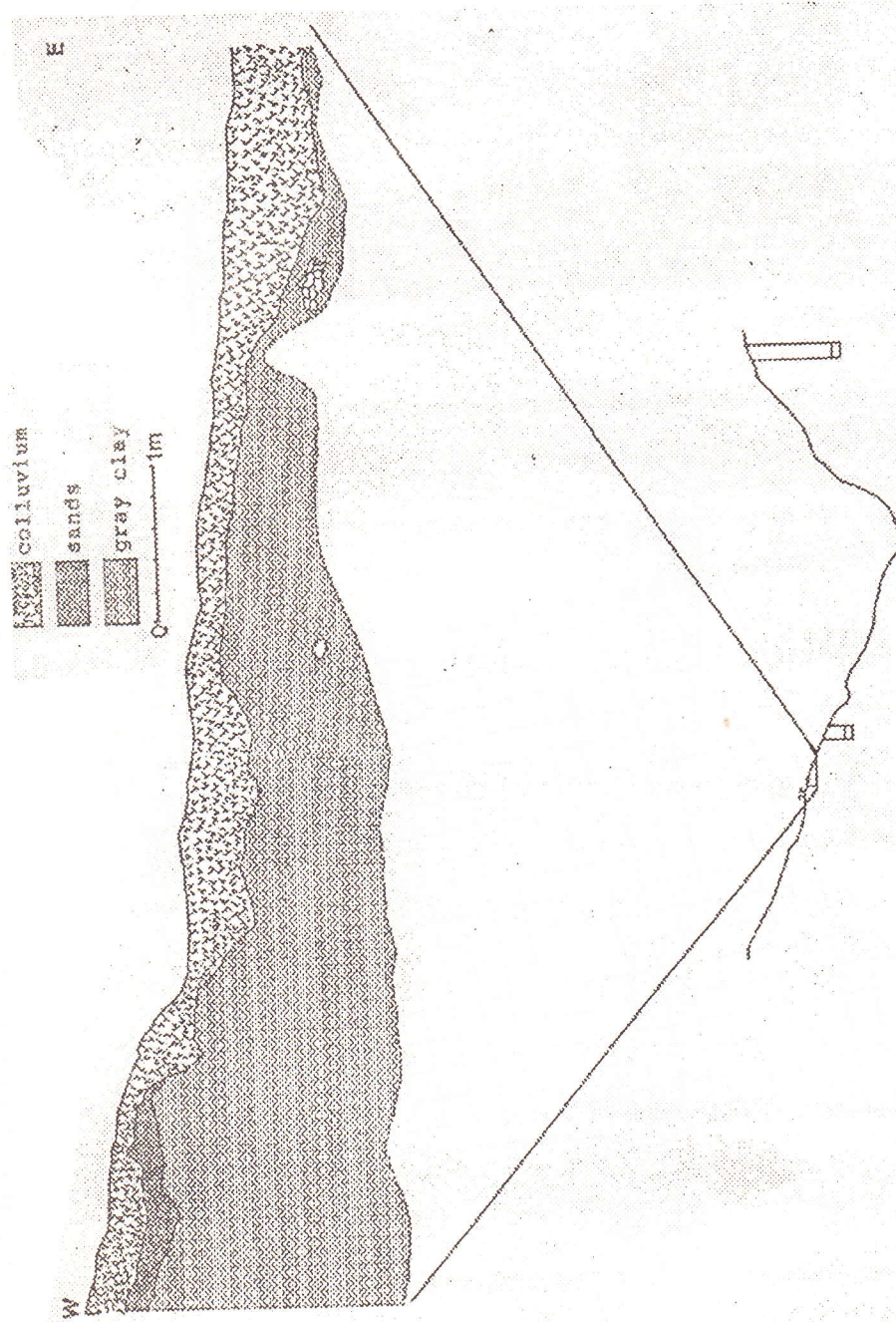


Figure 7 : Stratigraphic section of the excavation at the Ain Hanech site.

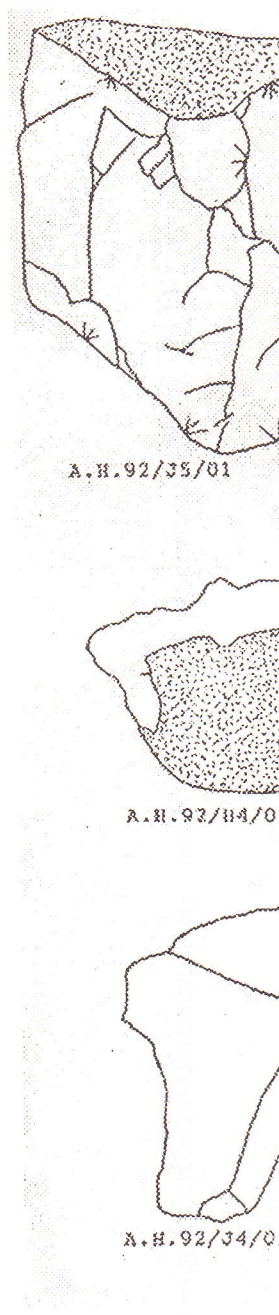


Figure 8 : Some of the artifacts from the excavation (1-2 : colluvium). For flakes dorsal face.

Figure 7 : Stratigraphic section of the excavation at the Ain Hanech site.

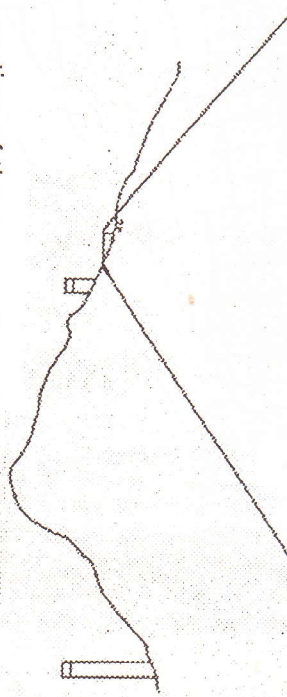
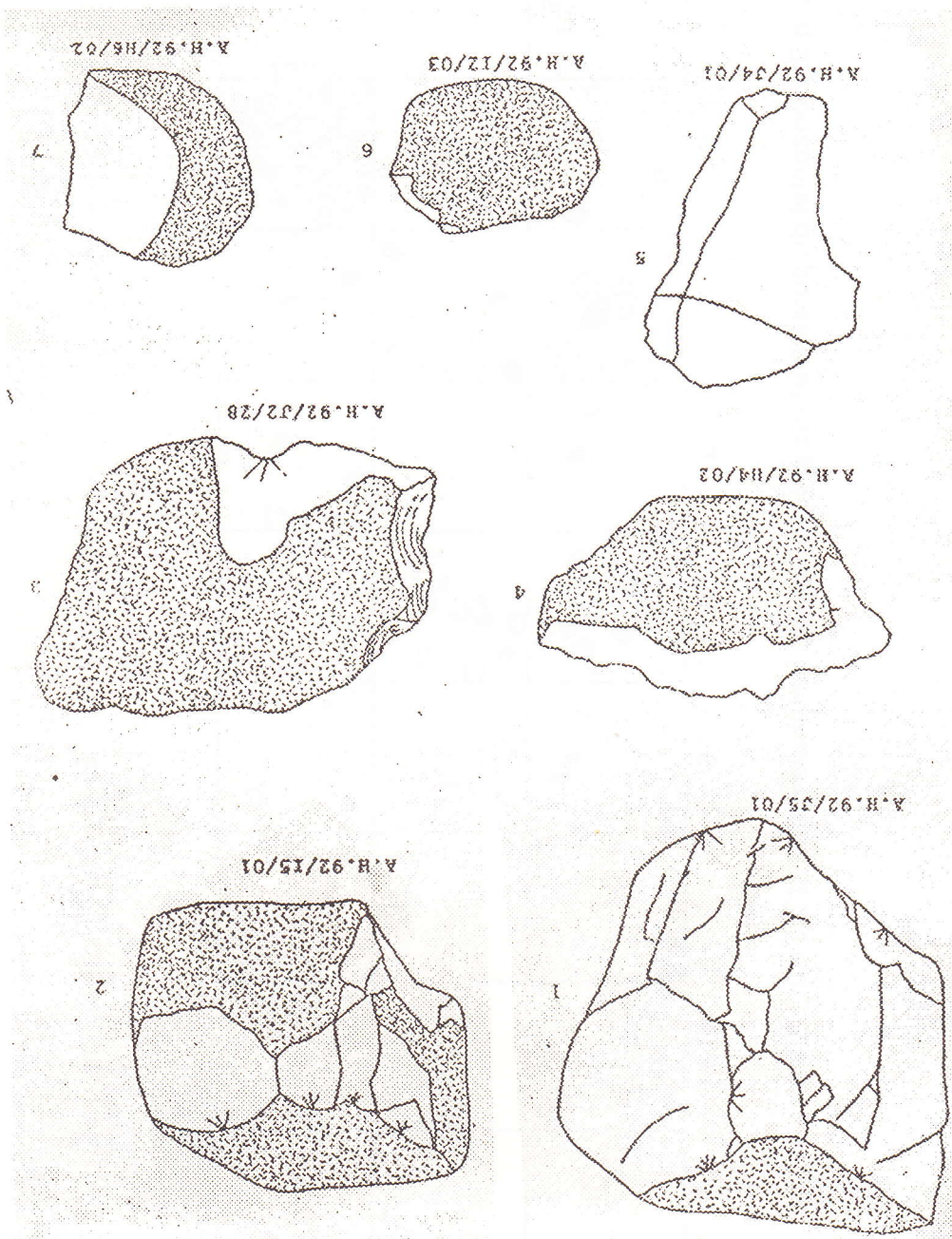


Figure 8 : Some of the stone artifacts recovered at the Ain Hanech test excavation (1-2 : core-tools; 3 : retouched flake; 4-7 : flakes). For flakes dorsal faces are represented. (actual scale).



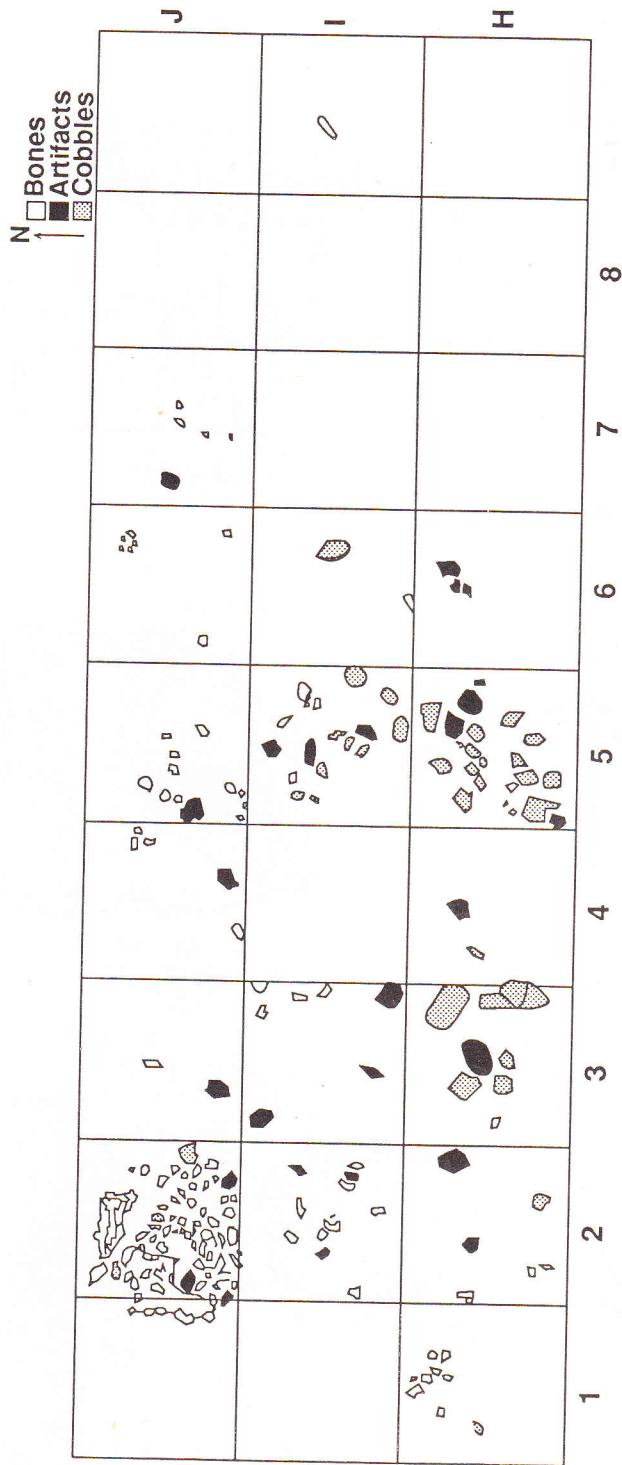


Figure 9: Horizontal dispersion of the archaeological materials at the at the Ain Hanech site.

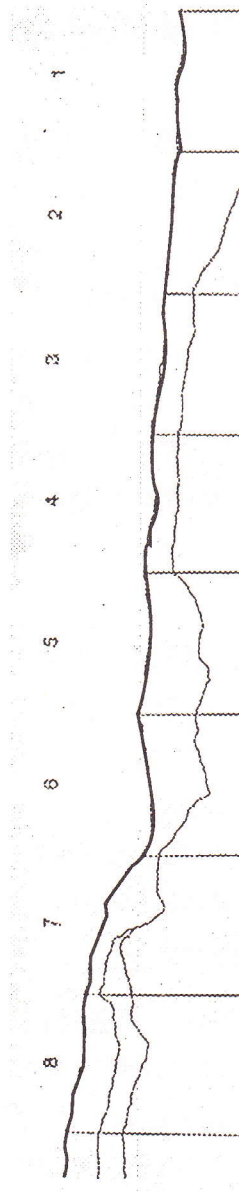


Figure 9: Horizontal dispersion of the archaeological materials at the at the Ain Hanech site.

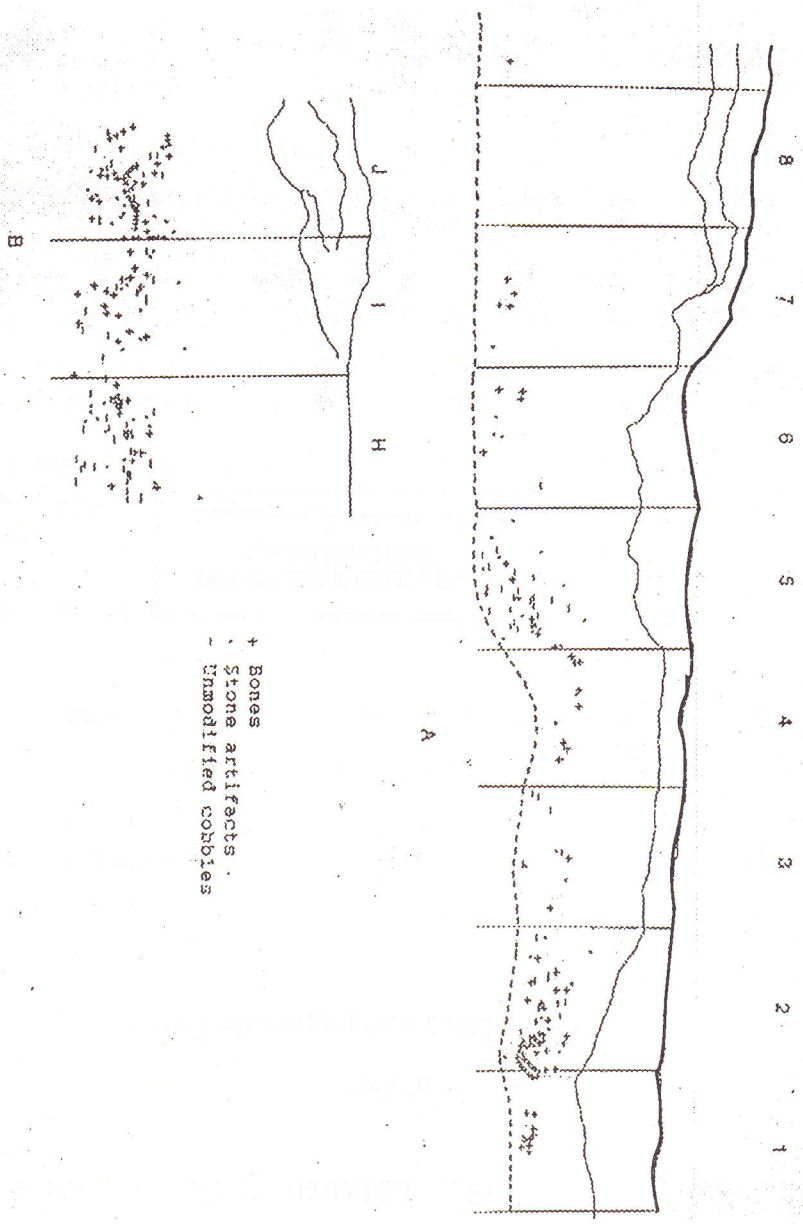


Figure 10: Vertical dispersion of the archaeological materials at the Ain Hanech site.