THE ATERIAN INDUSTRY: ITS PLACE AND SIGNIFICANCE IN THE PALÆOLITHIC WORLD

The Huxley Memorial Lecture for 1946

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I. Introductory

When I decided, after considering the alternatives, that a rather obscure African palæolithic industry, the Aterian, should be my offering on an occasion as important as the Huxley Memorial Lecture, I was not unaware that my audience and readers might regret my choice, regarding it as a somewhat unworthy, even trivial, sacrifice to lay upon so noble an altar. If that prove to be so, the fault rests not with the insignificance of the offering, but with its presentation. Let me, however, indicate why I chose it.

Primarily I did so because it illustrates certain larger issues, generalised, ramified and unagreed, which constantly confront the prehistorian, and which, until nearer an acceptable solution, impede, in my opinion, the progress of prehistory as a science. And, secondly, I did so because I believe these larger issues are unlikely to be resolved until the ground has been first prepared by the monographic re-examination, one by one, of what is known about any specific culture or industry, relating scattered facts, pruning away dead wood, and discarding theories, however attractive, without substantial bases.

The extension of Pleistocene prehistory within the lifetime of my generation, beyond its European nursery-boundaries to the four quarters of the earth, has not, as yet, resulted in the more or less coherent vision of man's infancy we had expected from the elimination, one by one, of the Great Empty Quarters of palæolithic studies. On the contrary, we behold a bewildering multiplicity and geographic complexity of primitive stone cultures, industries and groups, constantly augmented by fresh discoveries, which, in spite of their perennial and sometimes very ingenious arrangement and re-arrangement by our archæological leaders, have so far refused to compose into any ordered general scheme that can honestly be called convincing.

We may be right in supposing that this, to a substantial extent, is due to insufficiency of fossil human remains of the earlier Pleistocene period, so urgently required by the human palæontologist in the development of evolutionary theories; but needed no less by the material prehistorian in order to verify a current assumption that specific stocks of earliest man, *proto-sapiens*, *sapiens* or other, pursued specific ways of producing artifacts, resulting in specific techno-typological assemblages, the interaction or fusion of which down the ages gave rise to that ever-increasing multiplication which we ineffectually try to rationalise.

We may be right in supposing that our perplexities will gradually be, at least partially, composed as soon as the organised international search for them, which we all wish to see instituted, reveals the distributional pattern, horizontal and vertical, of fossil men allied with their artifacts. But we should not be over-optimistic that it will do so. Possibly our perplexities will not diminish but increase, immediately if not ultimately, by the multiplicity of human types revealed; and if the view of the present incoherence of which I complain is not just a personal idiosyncrasy, unshared by others, no enduring advance will be made in our science until we modify or recast, yet again, some of our slowly won basic concepts about the tools and weapons of Pleistocene man.

In this connection, is it conceivable that, when de Mortillet's pioneer scheme of linear lithic succession was, rightly, discarded as provincial, the ensuing reaction against direct typological evolution led us too far in the opposite direction? Are we now slaves or masters of the broad classification of palæoliths into so-called pebble, core, flake and blade *cultures*, rather than techno-typological devices? For instance, is the Clactonian, to take one example, really a generic flake culture, or the integral accompaniment of a core culture, as some of us heretically believe, which, when found in apparent isolation, merely reflects the environmental conditions, and the local need at that remote moment for one sort of artifact rather than the other? The correct answer is surely far-reaching when one considers that, from the Clactonian, current doctrine derives the Tayacian and Mousterian along one evolutionary branch, and the Levalloisian along another?

Are we on sure ground when, as at present, practically any and every substantial morphological change registered in a given industry at a given point in its evolution is attributed to culture-contact, usually assumed to have operated either through the borrowing, or assimilation, of unaccustomed types of implements and the technique of making them; or by the fusion of two presumed distinct lithic traditions which, in some sort of matrimonial alliance, generated a new culture?

Clearly we are not on sure ground. Such theories of the moment, numerous and occasionally persuasive, but against which the rumble of dissent may be already heard, simply mask the fact that we know next to nothing about the origins and spread of the techno-typological entities invoked, or their relationships and reactions to each other, if any.

Until we know more I urge that assumptions which at present tend to be based exclusively, as though it were axiomatic, on the hypothesis of the primary differentiation of certain basic assemblages of stone artifacts which we call cultures, and their diffusion and contact-modifications, might with advantage judiciously comprehend the possibility, not only of linear development, perhaps convergent, and spontaneous inventions by gifted individuals; but the conception also of functional differentiation within a given Stone Age 'culture-complex,' which encouraged the adoption of new artifacts to facilitate the function: and which thus disengaged themselves from the common techno-typological pool or substratum. These appear to us as new integrations of artifacts we rightly regard as 'industries,' but we may be wrong in explaining them as cases of culture-contact metamorphoses.

Let each case in this respect be studied separately, remembering that even in the more accessible chapters of recorded history no theory yet advanced offers a full explanation of the causes governing those relatively sudden cultural surges to higher levels of existence—surges which may, it seems, befall humanity at several geographical points simultaneously without proof of connection.

Admitted that human history proclaims the validity of the biological principle of re-invigoration from the inter-crossing of alien groups, sometimes with brilliant cultural results, the converse seems at times to operate also: and a general application of the principle leads astray in specific cases owing to our insufficient knowledge of the laws underlying it.

If this be true in the accessible history of civilisation, let us beware in our approach to the interpretation of Old Stone Age group behaviour and the results of supposed contacts known to us only through the material characteristics of one or two classes of evolving artifacts, such as bone or stone tools and weapons, the essentially simple nature of which prohibits manufacture in more than a very strictly limited number of ways.

On a small scale these generalised reflections are implicit in the Aterian industry: and though I can, of course, hold out no hope that my examination of what we know of it, which is distressingly limited, will lead to any final and unchallenged conclusions, it may at least help to condense and sift scattered facts about a remarkable and too little heeded industry, evidently of unusual importance in its own world.

Some General Considerations on the Aterian Industry

The Aterian industry, which appears to be centred in North-West Africa, has been described as a Mousterian with the addition of the tanged point. This is an understatement. It habitually includes other artifacts equally unfamiliar or rare in the Mousterian. I can find no record of disagreement with the view of its Mousterian ancestry; but there are many allusions to culture-contact as the cause of its typological elaboration.

The first prerequisite for legitimate hypotheses of culture-contact must be, obviously, the establishment of some sort of time relationship between the contacting industries. This aspect is less popular. Apart from questions of contact, the Aterian position in time—physiographic as well as stratigraphic—is fundamental to our study, since the invention of the tanged point—probably a javelin-head—must have given the inventors, whoever they were, a decided advantage in aggressive action against rival human groups not yet so equipped. And when, as in the Aterian, the tanged point is accompanied by unmistakable arrow-heads of more than one sort, and spear-blades up to 22 cm.—nearly 9 ins.—long, it needs no imagination to visualise not only a new and formidable mechanical force let loose in the African world, able, if its possessors so desired, to impose their territorial or other wishes upon neighbours, as well as to outdo them in hunting prowess; but, for good or evil, a palæolithic group collectively or individually endowed intellectually beyond its contemporaries, being capable of extending the age-old simple contrivance of the sling-stone or bolas[1] into the complex and far more accurate and deadly propulsive force of the bow and arrow.

Setting aside as dubious the purpose of small leaf-shaped flints in the Mousterian, or the sharp split-base bone points of the Middle Aurignacians,[2] and relying on the presence of stem, barbs or wings as the certain criterion of a stone arrow-head,[3] there seem to be four earliest claimants for this revolutionary and generally unfortunate invention, perhaps the most momentous in the palæolithic world since the far older discovery of fire. These claimants are the Gravettians (Upper

[1] Flint cobbles, possibly sling-stones, abounded in the Kharga Upper Acheulian. In Kenya, Leakey claims bolas-stones in the Upper Acheulian.

[2] Their *bâtons de commandement* are too doubtfully arrow-straighteners to be considered here, and in any case would be accessories to bone or wooden points only.

[3] Earlier bone and wooden arrow-heads might be invoked; but evidence is lacking.

Aurignacians), with their single-shouldered (Willendorf) points and double-shouldered (Font-Robert) points; the Upper Solutrians of Eastern and North-Western Europe, with their similar single-shouldered points frequently refined and strengthened by pressure flaking; the creators of the beautiful pressure-flaked arrow-heads, tanged, winged or barbed, of the so-called Upper Solutrian level at Parpalló in South-Eastern Spain; and the African Aterians.

We here have, therefore, in relatively condensed form, material illustrative of those wider prehistoric questions we have outlined. In the first place,

(*a*) Did the stone equipment of the Aterians evolve spontaneously from that of a single older group?

Aterian
|
Levalloiso-Mousterian group

(*b*) Was it the product of polygenic parentage at one, two or more removes?

Aterian
|
Levalloiso-Mousterian group=x

(*c*) Was some influential and more advanced outside contact made at the earliest Aterian level, infusing, into an already evolving local Mousterian, specific additional ideas which collectively denote the Aterian industry?

Aterian
|
Proto-Aterian=x
|
Levalloiso-Mousterian group + or − x

And, in the second place, the Aterian industry, having arisen, and established itself, what evidence exists for its extra-territorial spread, and what perceptible effect did that expansion, if any, appear to have, reciprocally, on the other palæolithic groups within reach?

Though the answers rest with a future prehistoric science, prepared and enabled to co-ordinate and canalise research into specific and fundamental channels such as these, we may perhaps even now by careful scrutiny of available information make a preliminary contribution.

I shall, therefore, attempt to marshal the known facts: these pivot round typology and distribution, and reach their crux in Aterian chronology, stratigraphically relative and physiographically absolute. Not until that is more or less established is it possible to examine Aterian relationships to the African world of its time, and endeavour to disentangle some of the possible strands in its heredity.

A Historical Note

The Aterian industry has been recognised as such since 1919, when Reygasse published the type site of Bir-el-Ater near Tebessa in Tunisia.[4] The following year he gave it the specific name. Many years before that, however, from 1887 onwards, implements which we now recognise as Aterian had been collected in French North-West Africa by Moreau, Pallary and others, and sometimes published.[5] Rejection of its specific and temporal independence of the North African Mousterian persisted until recently;[6] but most prehistorians now accept it as a separate entity, though undoubtedly derived from Mousterian origins. The doubt about it was natural, for the Aterian without its type tools may be hard to distinguish from certain forms of the Mousterian. For the same reason research upon its record is handicapped by an indefinite terminology, such as 'Moustero-Aterian,' frequent in published field reports, which blurs the exact nature of the discovery.

In order to avoid probing into their respective origins and chronological relationship in North Africa, I shall designate the Mousterian of North-West Africa, 'Levalloiso-Mousterian.' In North-East Africa the Levalloisian acquires certain Mousterian-like features in its latest (Upper Levalloisian) phase, and I believe the one to be a simple development from the other. In North-West Africa the distinction and derivation is doubtless similar;[7] but quartzite was so often used that typological details are frequently obscured and a specific label impossible. I will risk the generalisation that a flake culture techno-typologically more Mousterian (when in flint) than Levalloisian is the one which mainly concerns this study.

Known Distribution of the Aterian Industry

The Aterian is found abundantly in French North Africa from the Atlantic to Tunisia. From there eastwards it may be traced through its type tools on an ever decreasing trail into Cyrenaica,[8] Siwa[9] and Kharga Oasis[10] and on into the Nile Valley,[11] from which region no more than a bare handful of its most easily recognised type tool, the tanged point, has yet been found. It has not, to my knowledge, been identified east of the Nile or south of Kharga.

In North-West Africa, however, it extends far to the south in Spanish Morocco;[12] and in the French

[4] Reygasse, 1919–1920, pp. 513–573.
[5] Moreau, 1888, Debruge, 1910, De Morgan, Capitan and Boudy, 1910.
[6] For instance, Ruhlmann, 1936; Wulsin, 1941.
[7] Ruhlmann, 1945a, p. 36.
[8] Petrocchi, 1940, pp. 1–34. [9] Surface.
[10] Caton-Thompson, 1946, p. 58.
[11] Seligman, 1921, p. 128, Figs. 31–33.
[12] Santa-Olalla, 1944, Pl. LIX.

Sahara, where it reaches, for certain, down to latitude 18°N.[13]

Taking into account the abundance of Aterian sites in North-West Africa, and even more, the fact that there lies its area of greatest typological variety, it seems reasonable to deduce that within that vast region, affording the widest range of climatic and environmental stimuli encouraging to progressive ideas, lies the main breeding-ground, with some presumption of Morocco having been the crucial area.

An impression of masterful qualities given by their artifacts is, perhaps, in keeping with Aterian disregard for climatic extremes. In the Middle Atlas they ascended to 2,000 m. above sea-level, to a point now visited seasonally only.[14] At the opposite extreme their sub-tropical distribution has been noted; their penetration, over 2,000 miles across North Africa, to Kharga in the Libyan Desert, where they appear as an intrusive group, proclaims, despite the far-spaced genial stepping-stones, an intrepid spirit, undeterred as they moved eastwards, doubtless stage after stage, by the intensifying and terrifying severity of the desert they must unavoidably have had to cross.

We know nothing of the physical type of Aterian man. His industry, however, follows so closely upon a late Upper Levalloiso-Mousterian phase of circum-Mediterranean range, which has yielded Neanderthal remains, that Neanderthal characters in Aterian man seem possible. *Homo neanderthalensis* himself certainly inhabited the North-West African seaboard; his remains are known from Rabat[15] and Tangier.[16] Here, then, in the midst of Aterian territory are possible ancestors.

Within the known geographical limits of Aterian industry occurs another undated human fossil—Asselar man—from north-east of Timbuctoo, of predominantly negroid characters,[17] with Bushman or Hottentot connection.[18]

II. Aterian Techno-Typology

The substratum of Aterian techno-typology is Levalloiso-Mousterian, based on a developed tortoise-core technique (Fig. 10, Nos 1–3; Fig. 11, Nos. 1–5), yielding a high proportion of plain thin flakes with finely faceted butts, frequently of 'Cupid's-bow' style (Fig. 12, No. 1); and others with varying amounts of retouch, including examples of classic Mousterian 'points.' (Fig. 12, No. 2.)

The strength of this substratum may be measured by an analysis of the cores in six characteristically Aterian *in situ* groups.

	ALGERIA				KHARGA OASIS	
	Djouf-el-Djemel	*Bir-el-Ater*[19]	*Oum-el-Tin*[19]	*Puits de Chaacas*[19]	*Bulaq Pass A. Site*	*Mound spring KO6.E*
Levallois cores: discoids and ovoids ...	71·5%	94·7%	100%	100%	36·3%	37·0%
Levallois cores: triangular	16·5%	—	—	—	58·1%	45·0%

These figures show a tortoise-core technique in excess of that in many Levalloiso-Mousterian groups: they are quoted to correct a mistaken view that a 'blade' element, attributable to so-called 'neanthropic' influence, is strong in the Aterian.

The designation 'blade' in the present context is misleading. It should be used exclusively for the product of blade-cores, not for the narrow or parallel-sided flakes yielded by all tortoise-core industries. For these the term 'flake-blade' seems apt.[20] I know of no true blades in the Aterian, backed or otherwise, earlier than a still conjectural Neo-Aterian stage (see under 'Style δ' later in this section). Flake-blades (such as Fig. 10, Nos. 6, 7) with steep unimarginal partial retouch occur, however, similar to examples in Mousterian assemblages in Europe.[21]

In Kharga the residue of cores is made up partly of random cores, partly of bisected nodules, such as Fig. 11, No. 6, from which short little flake-blades have been detached.

Scrapers are a class to which chronological importance may, I suggest, be attached. True side-scrapers of Mousterian tradition may occur abundantly or not at all: single end-scrapers on short flakes or elongated flake-blades (as Fig. 10, Nos. 9, 10; Fig. 11, Nos. 7–12) are quantitatively variable in inverse ratio to the side-scrapers. Double end-scrapers, such as Fig. 10, No. 14; Fig. 12, No. 13, are rare. Other normal Aterian types of more decidedly Levalloiso-Mousterian tradition will be found in the site inventories in Notes 1, 2 and 3 at the end of this paper.

The characteristically Aterian additions to this substratum include unifaced tanged points, made on flake or flake-blade.[22] They are not a homogeneous

[13] Roffo, 1934.
[14] Ruhlmann, 1932, p. 13.
[15] Marçais, 1934, pp. 579–583; Ruhlmann, 1945b, p. 35–50.
[16] Senyurek, 1940.
[17] Boule and Vallois, 1932, p. 37.
[18] *ibid.*, pp. 84–90; Coon, 1939, pp. 60 f. But see reservations by Weinert, 1939, pp. 233 f.
[19] It is probable that Reygasse did not subdivide the cores at these sites.
[20] Caton-Thompson, 1946, p. 61.
[21] Lalanne and Bouyssonie, 1946, Fig. 29, Nos. 4–6. Ruhlmann, 1936, Fig. 20, No. 33 figures an interesting 'pseudo-lunate' made from a discoidal core
[22] The tang is invariably bifaced, and usually equi-convex in section, as Fig. 12, No. 9, thus disqualifying flakes with mere shoulders or bilateral constriction from the Aterian category.

class of javelin-head, such as Fig. 10, No. 11, but may include stemmed end- or side-scrapers (as Fig. 10, No. 18), or even gravers (as Fig. 10, No. 8). Some students consider these last two to be improvisations from damaged javelin-heads, often reduced in readaptation.

Typologically linking the fully tanged object to the plain bulbar flake, occur intermediate forms such as Fig. 12, Nos. 6, 8, with bulbar reduction by invasive retouch, or the disengagement of embryonic shoulders, latent in the French Mousterian.[23] The former, known as Tabalbalat points in North Africa, Emireh points in Palestine, seem to represent the perpetuation of an ancestral evolutionary type.

From a similar starting point of plain bulbar flake, Aterian enterprise perfected bifacial flake technique,[24] by means of flat percussion flaking (Fig. 13, Nos. 1–4), refined subsequently in the better specimens by pressure retouch (Fig. 13, Nos. 5, 7).

This bifacial flake technique may either take the form of restrained thinning of the ventral tip (as Fig. 12, No. 4), or invade, from the same end, a larger bulbar area (as Fig. 12, No. 5; Fig. 13, No. 9). It may, on the other hand, start from the base (Fig. 12, No. 7), and, through the Tabalbalat technique (Fig. 12, Nos. 6, 8) and further stages of partial retouch, lead to the fully fashioned bifaced spear-head such as Fig. 13, Nos. 1–4, and bifaced javelin-heads, such as Fig. 13, No. 10. Alongside these sophisticated forms, core bifaces of hand-axe type are an important feature, constantly recorded, though frequently misinterpreted as extraneous Lower Palæolithic objects (Fig. 13, No. 12: No. 11, formed on a thin thermoclastic plate, might perhaps be similarly classified rather than with the foliates).

From all this it emerges that a developed Levalloiso-Mousterian tradition, even in the more specifically Aterian artifacts, impregnates the industry. Invasive bulbar retouch at tip or butt was already in vogue in the French Lower Mousterian;[25] hand-axes continued until the final stages of the Upper Mousterian;[26] flake-blades with rough 'backing' begin at one famous site in the Lower Mousterian (2 per cent.), and continue through the Middle Mousterian (5 per cent.), into the Upper (11·5 per cent.).[27] Only the foliate bifacials, and the tanged javelin-points and arrows, seem to be Aterian 'inventions,' or, rather, the extreme logical development of ancestral types. The arrow-heads normally resemble in small size the unifaced javelin-points (Fig. 10, No. 33); but bifaced forms occur also, though exceptionally. Kharga yielded a lozenge-shaped specimen (Fig. 11, No. 14), since repeated in Morocco;[28] and two peculiar Moroccan forms, the '*pointe Marocaine*,' and the '*pointe pseudo-Saharienne*' (Fig. 9, Nos. 1–3) will be referred to again for comparative reasons (see Section VIII).

The variability, however, of the components of Aterian groups complicates any attempt to co-ordinate them into a generalised statement. An example of this occurs in the core percentages quoted as between Algeria and Kharga (Note 2). Thus also the bold, shapely Aterian of the Tebessa alluvial sites appears to lack the splendid bifacial foliates of Kharga, or even the smaller foliates of the Moroccan series, though surface finds of these objects, often believed 'neolithic,'[29] introduce doubt into the reality of this regional omission. Antoine, however, takes it seriously in his careful comparison of the Tunisian sites with the Moroccan Aterian, and interprets the presence of bifacial retouch in the latter as indicative of a late phase.[30] Relative proportions of end-scrapers to *râcloirs* admit another regional difference, carried to its extremes in Kharga where true side-scrapers are virtually lacking; and at 'Ain Metherchem, Tunisia, where, in two Aterian deposits, side-scrapers are overwhelmingly numerous, and end-scrapers rare.[31] The flake-blade element is strong in this group of Tebessa sites, and Reygasse, to rationalise it, regarded it as a latish Aterian influenced by contact with the earliest Capsians.[32] Le Du advances much the same view, with the suggestion that an archaic Mousterian with bifacial technique evolved *via* the Aterian into the Capsian. Oued Djouf, his own well-published site, would, in his opinion, be late in the Aterian stage of this process.[33]

The inventories, as published, but slightly rearranged to give concordance, of four Aterian stations in Algeria, all *in situ*, will give some comparative data in tabulated form (*cf.* Note 1). In Note 2 the range is extended to include *in situ* groups from the extreme eastern limit of known Aterian expansion (Kharga Oasis; the Nile Valley has yielded sporadic surface material only); and the extreme western limit in Atlantic Morocco.

Roffo has recorded surface sites in Southern Algeria in latitude 36°N. and comments that the Aterian

[23] Peyrony, 1934, p. 12, Fig. 9, Nos. 1–3.

[24] In some areas, natural plates of chert of thermoclastic origin were similarly used.

[25] Lalanne and Bouyssonie, 1946, Fig. 6, Nos. 1, 2, 3.

[26] *ibid.*, p. 64.

[27] *ibid.*, p. 62.

[28] Antoine, 1938, Fig. 55, '*Pointe ténuifoliée losangique.*'

[29] A splendid narrow-based specimen from Southern Oran, 25 cm. long, comparing well with our Kharga specimen, Fig. 13, No. 1, has been published as 'enéolithique' (Nougier, 1935, p. 525).

[30] Antoine, 1939, p. 87.

[31] Vaufrey, 1936, p. 20.

[32] Reygasse, 1938, p. 70.

[33] Le Du, 1934*a*, pp. 207, 214–217.

"*se charge souvent de types analogues au paléolithique supérieur—lâmes, grattoirs divers, rares burins, et de formes en* Y."[34] Breuil comments in the same sense,[35] and hints at even greater evolution in the Sahara than to the north of it, though the material, as far as I am aware, is there purely surface. Roffo's surface sites in the M'Zab, though they yielded five *bec de flûte* burins and three angle gravers in undoubted Aterian associations, were significantly devoid of the characteristic Capsian backed blades. These, however, appeared in neighbouring Capsian groups, and emphasized the typological cleavage, as well as exhibiting a marked difference of patina.[36]

The typological evolution of Aterian industry can, as yet, be stratigraphically demonstrated at one site only. This is the two caves of El-Khenzira, Cap Blanc, Morocco.[37] In Grotte No. 1 the basal deposit was sterile; but in Grotte No. 2 a tanged-point industry rested upon the equivalent stratum (Fig. 1). This is Ruhlmann's level A (*Moustérien moyen à tradition Levalloisienne*).[38] The differences between this industry and that of level B (Ruhlmann's *Moustérien supérieur typique*), present in both caves, from which it is separated by a bed of sand, have been summarised in Note 2, and are illustrated in Fig. 10, Nos. 19–27 (level A) and 28–35 (level B). They seem to me to consist in the following —

(*a*) A difference in raw material. In level A, rolled nodules were mainly used. In level B a fine-grained Cretaceous chert.[39]

(*b*) Better workmanship in level B, due perhaps to the choicer material, without much change in the typology. In level A the artifacts were "*souvent fruste*";[40] in B retouch is developed.

Ruhlmann considers that the tanged points show typological evolution, in that the tang becomes positively stemmed by more acute treatment of the shoulders, which results in "*barbelures naissantes.*"[41] This view is presumably based on averages which we are not given; and Antoine[42] has not left it to me to point out that Ruhlmann's illustrations of tanged points from level A, such as Fig. 9, No. 4, show specimens which are already 'neolithic' in the acute angle of the wings and bilateral symmetry; and which in style and size must be accepted as true unifaced barbed and stemmed arrow-heads, not javelin-points.

Bifacial retouch is scarce in both levels, but it exists (Fig. 10, Nos. 26, 32), though in a more primitive form than at Tit-Mellil, which is near enough geographically to be a valid comparison. The absence of end-scrapers on blades, of burins, of fine foliates, would seem to ally both levels A and B at Khenzira to other groups where tanged points and rare and rather amorphous rough bifacial core or flake tools are the only 'Aterian' elements in otherwise Levalloiso-Mousterian assemblages. 'Ain Metherchem is a case in point (see stratigraphy in next section); 'Ain Taya another; while Marchand insists that at numerous small sites along the Algerian littoral tanged points, including many of arrow-head size, commonly occur within a 'classic' Mousterian quartzite industry.[43] At 'Ain Taya a prevalently quartzite industry is described as "*une industrie à facies Moustérien avec outils pedonculés associés à quelques coups-de-poing de petites dimensions*".[44] The tanged implements are relatively scarce, side-scrapers common; *pointes*, thin and with marginal retouch, are commoner than flake-blades.

Antoine's fossil-spring at Tit-Mellil near Casablanca[45], though of dubious stratigraphy, is another Aterian site of the highest typological interest, since it yielded, along with a quantity of Aterian material, two highly specialised types of bifacial arrow-heads. One of these, Antoine's '*pointe marocaine*' (as Fig. 9, No. 1) had previously been noted by him at another Moroccan site[46], but had not been recorded elsewhere as Aterian, owing, probably, to the almost automatic preconception amongst prehistorians that any barbed arrow-head with bifacial retouch must be 'neolithic.'[47] Since then another specimen has been found in the unpublished Aterian of the Dar-es-Soltan cave, Rabat[48] (here reproduced in Fig. 9, No. 1). The single specimen from Tit-Mellil came from Zone A (uppermost level of three, Antoine, 1938, Fig. 48).

The second abnormal Aterian type, named by Antoine, not very comfortably, '*pointe pseudo-saharienne*,' is also bifacial; the strangely set median position of the barbs produces a lozenge-shaped object (Fig. 9, Nos. 2, 3). Four of these were discovered,

[34] Roffo, 1934, p. 5.
[35] Breuil, 1931b, p. 458. He classifies the Aterian with his '*paléolithique moyen*.'
[36] Roffo, 1934, p. 32; 1938, pp. 288 ff. (see also footnote 111).
[37] Ruhlmann, 1936.
[38] Ruhlmann, 1945a, refers to the two levels as Lower and Upper Aterian.
[39] Ruhlmann, 1936, p. 64.
[40] *ibid.*, p. 76.
[41] *ibid.*, p. 70, Fig. 20, Nos. 28–29.
[42] Antoine, 1938, p. 3[illegible] f
[43] Marchand, 1935–6, pp. 3–47.
[44] Piroutet, 1930, pp. 513–517.
[45] Antoine, 1938. The site lies in a hydrographic basin containing still-active springs. The dig was a rapid *sondage* only, far too restricted to be trustworthy physiographically. Consequently I have omitted it, with reluctance, in Section IV.
[46] Antoine, 1934.
[47] One wonders how many 'Saharan' arrow-heads are palæolithic.
Ruhlmann, 1945a, Fig. 13, pp. 74,76.

all in Zone A. The deposit being, by its nature, unstratified, the excavator worked, very properly, on an arbitrary altimetric system. This casts doubts, as he recognised, upon the detail of typological succession. None the less, since all the material collected within Zones A and B (some 1,600 implements and cores in all, apart from waste) is, in my opinion, Aterian,[49] a broad succession may, I think, be accepted, by eliminating as I have done (Note 3), Antoine's too delicate sub-division of Zone A into two parts (A and A^1 in his publication) and using it as one Aterian level overlying B, the other one.

Confidence in this scheme is augmented by Antoine's commendable care in noting the relative proportions of quartzite to flint implements in each descending level. From the information given may be seen the increase of quartzite material from the top down to the basal level C, where, together with an 'archaic' fauna, a massive industry, described as 'Mousterian of Acheulian tradition,' is almost wholly quartzite.

			Percentage of Quartzite Tools
Level	A (uppermost)	Aterian	3·0
,,	B	Aterian	16·0
,,	C	? Mousterian ...	95·0

The analogy with the Grotte du Prince at Grimaldi comes to mind where Couche I[50] (the basal level) yielded prevalently quartzite artifacts and few of flint; Couche 2, 1,500 quartzite to 150 flint; and Couche 3, 122 flint to 68 quartzite.

An industry containing two such mature forms of arrow-heads as those instanced, merits some attention in a classificatory scheme. One might expect it to yield other evolutionary advances from the typical Aterian of Tebessa or Kharga. Not only is this not the case, save for the precocity of these rare arrow-heads, but in such respects as the almost complete lack of end-scrapers on long flake-blades, the absence of burins and fine bifacial foliates, Tit-Mellil is definitely less 'Upper Palæolithic' than the Algerian sites (see Note 3). The range of normal unifacial Aterian tanged points shows no peculiarities: flakes and flake-blades play an equal share in their production; in size, 3 to 4·5 cm. in length is an average;[51] one only may have reached 7 cm., which in Kharga and Wadi Djouf was about the normal. Figured examples leave no doubt that many are unifacial arrow-heads pure and simple, and Antoine calls them such.[52] In a useful analysis he points out that the smallness of some specimens results from reconditioning, but not of all.[53] Retouch throughout is described as Mousterian combined with a proportion of pieces exhibiting a long flat retouch of Solutrian or Neolithic affinities.[54] The longest bifacial foliate is only 7 cm. None is the broad, thin weapon of Kharga, though Kharga produced also thick narrow examples such as these. Triangular cores are absent, and discoidal forms are most numerous after 'polyhedric' or random types. The absence of backed blades is to be noted; but a series of delicately pointed flake-blades with steep marginal retouch recalls French Mousterian specimens of the *couteaux à dos* class.[55]

In order to facilitate comparison with the Tebessa and Kharga inventories I have, in Note 3, based the percentages on a simplification of Antoine's typology.

Antoine, having regard to the Khenzira Moroccan Aterian on one hand, and the Tebessa Aterian on the other, ascribes Tit-Mellil Zone A (the uppermost) to an 'Upper Aterian' period; Khenzira level A (the lowermost) to a 'Lower Aterian' (thus anticipating Ruhlmann's latest view of it[56]); and Khenzira level B to a 'Middle Aterian' (as against Ruhlmann's Upper Aterian). The Tebessa Aterian, noticeably different in size and typological proportions, must also, he thinks, be reckoned as an 'Upper Aterian,'[57] though geographically distinct. The material from Tit-Mellil, Zone B, is treated non-committally. Its increased percentage of quartzite artifacts presumably indicates a different industrial facies.[58] The hand-axe type of core biface in it is normal in the Aterian.[59]

The need, in fact, to subdivide the Aterian is already obvious, and I propose to attempt this, hoping that my French colleagues, in charge of the evidence, will not consider the attempt premature or redundant.

The requirements seem best met by postulating provisionally four Aterian typological styles. Upon these I propose to bestow alphabetic designations rather than chronological labels implied by such words as 'Early,' 'Middle' etc., since Khenzira alone provides us with intra-Aterian stratigraphy.[60]

[49] Ruhlmann, 1945a, p. 46, disagrees: "*Celle-ci* (*i.e.*, the quartzite tools) *réunit . . . les éléments disparates de diverses industries, parmi lesquels également le Moustérien.*"

[50] Cartailhac, 1912, p. 225.

[51] Antoine, 1938, p. 30.

[52] *ibid.*, p. 31.

[53] Antoine, 1938, p. 30.

[54] *ibid.*, p. 15. I have not seen the material. Some of the drawings show good parallel pressure retouch, secondary to flat percussion flake-scars.

[55] *ibid.*, Figs. 76–81. For comparable French series see Lalanne and Bouyssonie, 1946.

[56] *ibid.*, 1938, pp. 83–88, 91; Ruhlmann, 1945a, p. 64.

[57] *ibid.*, 1938, p. 91.

[58] *ibid.*, pp. 56–70, Figs. 87–109.

[59] Such as *ibid.*, Figs. 106–109.

[60] Dar-es-Soltan, referred to in Neuville and Ruhlmann, 1941, p. 105, and Ruhlmann, 1945a, p. 75 f, will provide a second example, and the Mugharet el 'Aliya, Tangier, shortly to be published by the Peabody Museum, a third.

Style α. 'Aterianism' is proclaimed by the tanged points, already of small size, and small core bifaces together with rarer tendencies towards thin proto-foliate forms. Abundance of side-scrapers and rarity of end-scrapers are characteristic, as well as poverty of retouch in general.

	STYLES α and β				STYLE γ			
	Tit-Mellil		*Metherchem*[67]		*Djouf-el-*	*Bir-el-*	*Kharga*[68]	*Kharga*[68]
	B	*A*	*Bed 1*	*Bed 1′*	*Djemel*	*Ater*	*KO6.E*	*Bulaq A*
Side-scrapers	40%	14·6%	9·2%	37·4%	5·6%	1·7%	—	—
End-scrapers	—	2·6%	1·7%	2·2%	11·7%	22·6%	5·0%	9·0%

To Style α I attribute provisionally Khenzira A (Fig. 10, Nos. 19–27), with its disregard for good material and its crude technique; and Tit-Mellil B, with its high percentage of quartzites relative to Tit-Mellil A.[61] 'Ain Metherchem probably should be included here.

Style β. To this style I assign Khenzira B (Fig. 10, Nos. 28–35), on account of its overlying position and of its extended retouch relative to Khenzira A. Tit-Mellil A may be correlated owing to the prevalence of invasive retouch. Antoine in suggesting an Upper Aterian classification for this group was influenced by the presence of the highly evolved *pointe marocaine* and the *pointe pseudo-saharienne*[62] (Fig. 9, Nos. 1–3), as well as a small leaf-shaped unifacial point, the *pointe limacoide*, wholly retouched on the upper face, recalling Proto-Solutrian forms.[63] But wider considerations such as flat invasive retouch and relative prevalence of bifacial flaking rightly weighed with him also. Tit-Mellil A may be slightly more evolved than Khenzira B; but I do not regard one or two 'advanced' types, such as these cited, as necessarily denoting an 'Upper' Aterian position in our conjectural sequence. Bifacial retouch of good quality is also present in Khenzira B[64] (which Antoine reckons as Middle Aterian); while in Khenzira A (Antoine's Lower Aterian) it is already represented by a mature-looking, narrow-based, almost tanged point, 6 cm. long.[65] As for the arrow-tips of Khenzira A, though unifacial, some are flaked completely over the upper face A (Fig. 9, No. 4) and another shows the barbs travelling up to the centre of the weapon, lozenge-fashion as in the *pointe pseudo-saharienne*.[66] I doubt, therefore, if an evolutionary interlude separates Tit-Mellil A from Khenzira B.

More significant perhaps are the distinctions between styles α and β on the one hand, and style γ on the other in the matter of relative proportions of side- to end-scrapers, epitomised in the following percentages:

And in the general technological competence seen in the Tunisian and Kharga Aterian as a whole, witnessed in the shapely cores and regularised retouch on the flakes with special regard for the functional parts. The published material from Morocco shows nothing comparable in this respect with such carefully made cores and flakes as those on Fig. 10, Nos. 1–18 from Tebessa, or Figs. 11–13, from Kharga.

Style γ. This is typified in the Algerian and Kharga sites, the ingredients of which will be seen in Note 2. Fine end-scrapers on long and short flakes and flake-blades (Fig. 10, Nos. 9, 10; Fig. 11, Nos. 7–13) and rare double-ended scrapers (Fig. 10, No. 14; Fig. 13, No. 13) usurp the place of side-scrapers, without dislodging them entirely except in Kharga.[68] Flat retouch encroaches more frequently on the dorsal surface (Fig. 10, No. 12; Fig. 11, Nos. 13, 14), and may extend to the ventral area more completely than mere basal thinning of Tabalbalat type, already present in Khenzira level A. Full bifaced retouch is perfected, and at its best produced very fine foliates, by means of flat percussion flaking (Fig. 13, Nos. 1–8) of rather an erratic type, regularised on occasion by parallel pressure retouch of good quality (Fig. 13, No. 5).

In Kharga the tanged points of the javelin-head class are bold but very little retouched except on the carefully made stems (Fig. 12, Nos. 9–11). The *in situ* groups contained no tanged arrow-heads; but a diamond-shaped tip (Fig. 11, No. 14) is important, since it recalls a bifacial arrow-tip of similar outline from Tit-Mellil, level A, which Antoine regarded as a form transitional towards the *pointe pseudo-saharienne*[69] or Mellilian point. It provides, surely, a possible precursor for the beautiful diamond-shaped flint tips of the Badarian civilisation.

Burins, rare in any case, have so far been recorded from the Tebessa region only.

[61] The stratigraphical order as between Khenzira and Tit-Mellil is unfortunately reversed. At Khenzira the upper level is (correctly) B; at Tit-Mellil it is A. I have not altered this recording lest worse confusion result.

[62] Which I should prefer to name the 'Mellilian' point.

[63] Antoine, 1938, p. 26, Figs. 23–24. Five specimens only, all in level A.

[64] Ruhlmann, 1936, Fig. 20, No. 31.

[65] *ibid.*, Fig. 16, No. 36.

[66] *ibid.*, Fig. 16, No. 30.

[67] The Mousterian *racloirs* alone are quoted. If all types of side-scrapers are included, the percentages are much higher (*cf.* Section III).

[68] The few side-scrapers in Kharga are improvisations, not fixed types.

[69] Antoine, 1938, Fig. 55.

Style δ. A 'Neo-Aterian' consisting of mixed Aterian and microlithic elements, unsatisfactorily documented and in need of controlled excavations, though inherently probable. The more relevant sites are the Abri Alain[70] and El Hank (Brouaux section).[71] Surface sites said to exhibit a true association of small tanged arrow-heads of Aterian style and a Lower Capsian industry have also been recorded.[72] North Africa is rich in small bifaced foliates of unknown date and affiliations, but presumably 'late': it may be provisionally assumed that these represent an Aterian tradition transformed by the passage of time. Consideration of style δ involves problems of post-Aterian survivals and belated reactions on the Capsian and Oranian outside the present scope. They are touched upon in the discussion on Parpalló (Section VIII).

A review of Aterian typology must end with a glance at its possible derivation. We have postulated a North-West African centre of evolution. That view would obviously be strengthened by the presence there of a local Upper Levalloiso-Mousterian culture, exhibiting, like the French Mousterian, trends towards the Tabalbalat technique and bifacial flake retouch, as well as the inclusion of core bifaces of hand-axe type. Such a group remains to be stratigraphically found in North-West Africa, where the very few properly recorded sites display a Levalloiso-Mousterian *facies* singularly devoid of just those features which seem required to lead to the Aterian. This cannot be wholly ascribed to the debasing use of quartzite, for Doumergue's excavations in the Grotte d'Abd-el-Kader in Oran[73] yielded a flint Mousterian assemblage, fulfilling, at one or two removes, the theoretic parental requirements of an advanced Mousterian in the process of shaping Aterian tendencies. Its bold yet delicate retouch, and thin triangular flakes with marginal retouch impinging in some cases on to the dorsal face, were allied with slender flake-blades and side- and end-scrapers, and above all with flakes retouched basally on the dorsal side only, "*pour amincer, plus ou moins, la base, et faciliter ainsi la préhension de l'outil ou l'emmanchement de l'arme.*" Doumergue attributes this group to "*la fin du Moustérien Supérieur.*" In Morocco, Ruhlmann has announced the existence of an Upper Levalloisian which, under belated Acheulian influences assimilated the core biface tradition ("pseudo-bifaces"), and displays moreover a tendency towards the Tabalbalat bulbar technique.[74]

[70] Pallary, 1934.
[71] Gobert and Vaufrey, 1932, pp. 468–475.
[72] Marchand, 1937, pp. 309–313; 1939*a*, pp. 312–317.
[73] Doumergue, 1926, p. 29 ff.
[74] Ruhlmann, 1945*a*, pp. 40 f.

It is clear, therefore, that it would be premature to invoke Mousterian influences from Europe, since further research in North-West Africa seems almost certain to reveal the required succession.

Nor need bifacial flake retouch and the Tabalbalat technique be credited to the Levalloiso-Mousterian of North-West Africa only. They both occur, as abnormalities, in the Upper Levalloisian of Kharga[75] and the Faiyum 34 m. lake;[76] and in both places may safely be ascribed to deposits of the final wet stage of the last pluvial, which, differences of interpretation apart, correlate with a sea-level at, or near, a Monastirian II horizon.[77] This fixed dating in North-East Africa should be, eventually, an important contribution to North-West African correlations. But neither in Faiyum nor Kharga did the makers of these special tools carry their invention further and perfect the stemmed artifact. For in Faiyum the 34 m. lake was succeeded directly by the retrograde epi-Levalloisian I and II industries of the 28 m. and 22 m. lakes;[78] and in Kharga by the also deteriorated Levalloiso-Khargan industry followed by the diminutive Khargan[79] (Fig. 7).

The more generalised conclusions drawn from these observations will be deferred to a final discussion incorporating data of other kinds.

III. Relative Stratigraphy of Some Aterian Sites

The field work and publication of many important North-West African palæolithic sites has been defective and reliance can be placed on relatively few. Thus, shorn of the authority bestowed by Breuil,[80] one may doubt if Boudy's site at Sidi Mansour, Gafsa,[81] recently invoked also by Wulsin,[82] would meet the requirements of modern scientific evidence. The 5 m. section[83] in the Wadi banks yielded, in Breuil's opinion, in descending order :—

Upper Palæolithic (Capsian).
Aterian (Tanged points, 'blades' and end-scrapers, etc.).
Typical Mousterian
Older Mousterian (or Levalloisian).

Vaufrey, however, in a critical field study of the local geology, denies validity to this section, the stratigraphy of which appears to rest with artifacts collected in the stream bed.[84]

[75] Caton-Thompson, 1946, p. 61, Fig. 4, No. 9.
[76] *ibid.*, pp. 78, 84; Fig. 8, No. 6.
[77] *ibid.*, pp. 85–99.
[78] *ibid.*, p. 90 f.
[79] *ibid.*, p. 61, diagram 2.
[80] Breuil, 1931*b*, p. 457.
[81] de Morgan, Capitan and Boudy, 1910, pp. 209–214.
[82] Wulsin, 1941, p. 55.
[83] Quoted as 15 m. by Breuil, 1931*b* p. 457.
[84] Vaufrey, 1936, p. 15 f. and footnotes 5, 6; Vaufrey, 1932, p. 311, and footnote 2.

(*i*) *The Relationship of Aterian to Levalloiso-Mousterian*

(1) *Bérard.* The site lies on the coast 58 km. west of Algiers and was first noted for geological and altimetric reasons by Lamothe.[85] Doumergue and Dalloni later also found artifacts in the red sand horizon.[86] Subsequently Marchand and Aymé demonstrated afresh its archæological importance,[87] and have continued to keep it under observation.[88]

The industrial succession is confined to bed 3, a red argillaceous sand up to 3·5 m. thick (for stratigraphy see Note 5). The implements in this single deposit are stated to be typologically substratified into :—

b. Upper one-quarter of bed 3, and base of bed 4 : Aterian.

a. Lower three-quarters of bed 3 : Mousterian (mainly quartzite).

Though total numbers and other details are unpublished, a few comments may be added.

MOUSTERIAN. Almost wholly quartzite and crude in workmanship.

Discoidal cores (2 only) ; the figured specimen is about 8 cm. in diameter.

Points. Two sorts specified : one sub-triangular, rather thick, 5–7 cm. long, the other made on flake-blades (*lâmes*) 4–5 cm. long, without retouch.

Side-scrapers. Two only are characteristically Mousterian. Other flakes with marginal retouch might be classified as such.

Flake-blades (*lâmes*). Thick, clumsy, no retouch.

Fauna. Patella ferruginea, Lam. and *Helix depressula*, Par.

ATERIAN. Quartzite still used, but flint proportionately greater. Relative percentages not given.

Cores. None recorded.

Points. Smaller and thinner (0·7–0·8 cm.) than the Mousterian.

Tanged points. Eight are characteristic Aterian implements. Those in flint show the advantage of this material over quartzite, and emphasize the danger of seeing 'archaicism' in quartzite industries. Three specimens, 2·5 to 3·5 cm. long, are arrow-heads ; one displays the Aterian tendency to cut the wings high up on the flake.

Side-scrapers. None.

We tentatively assign this Aterian to Style β, chiefly on the grounds that it is certainly not Style γ, and lacks the characters of α as represented at Khenzira.

Marchand considers Bérard to be verified by a site of similar geological character at Novi about 48 km. westwards, where the same succession of Aterian over Levalloiso-Mousterian occurs within a single consolidated dunal deposit.

(2) *Sidi Medjoub* (*Karouba*) *and Station du Moulin* (*Oran*). The pioneer investigator of the Karouba site, which lies on the 18 m. beach about 4 km. north of Mostaganem, was Pallary, who discussed it in papers in 1891[89] and 1911.[90] Doumergue followed in 1922.[91] His study shows the scrupulous care for detail which makes his factual observations permanently reliable. He deals with two separate, but complementary sites—that of Sidi Medjoub, and that of the Station du Moulin about 1,400 m. distant.

Subsequent references to this work disclose the confusion which often confounds North African prehistory. Doumergue himself, Breuil,[92] and Wulsin[93] all instance Karouba as a case of typological and geological stratigraphy—Aterian over Mousterian; and I myself accept it as such. Arambourg[94] and Huzayyin[95] on the other hand, refer to it as Aterian, possibly, though not explicitly, on the assumption that the lower level was also Aterian, but lacked the type tools.

The archæological succession, however (Mousterian at Medjoub, Aterian at Moulin), rests on the evidence of composite stratigraphy between the two sites, one of them overlying the 18 m. (Monastirian I) beach, the other on the 40 m. (Tyrrhenian ?) beach. According to Doumergue, whose geological competence commands respect, the same succession of sedimentary and æolian deposits covers both, and they may be correlated thus :—

KAROUBA SITES

Sidi Medjoub on 18 m. beach ←	1,400 m.	→ Station du Moulin on 40 m. beach
6. Mobile dunes of present régime		Mobile dunes of present régime
5. Recent dunes, concretionary, greyish surface, 1–10 m.		Recent dunes
4*a*. Calcareous crust and/or thin bed of angular quartzite deposition		Calcareous crust and/or angular quartzite deposition *Aterian implements* unrolled, resting on 4 below
4. Yellow æolian sandrock, with rare Helix, 1 m.		Yellow æolian sandrock, 1·50 m.
3*a*. Calcareous crust		
3. Red concretionary sandrock with Helix 0·60–1 m. *Mousterian implements* unrolled. Passes laterally into a wash deposit lightly eroding the surface of 2 below		Angular quartzite fragments from the sand-drowned Eocene cliff behind, 1·50 m.
2. Marine conglomerate with *Pectunculus*, *Pecten*, *Cardium*, etc. 18 m. above sea. 1 m.		Marine conglomerate with *Pectunculus*, etc., 40 m. above sea
		Marls and cobbles
1. Eocene marls and quartzites 16–17 m. visible		Eocene marls and quartzites

[85] Lamothe, 1905, p. 1613 f. 1911, p. 46, Fig. 22.
[86] Doumergue, 1922, p. 199.
[87] Marchand and Aymé, 1935, pp. 333–343.
[88] Marchand, 1935–6, pp. 3–47.
[89] Pallary, 1891, p. 606. I have not seen this paper and rely on Doumergue's reference.
[90] Pallary, 1911, pp. 162–164.
[91] Doumergue, 1922, pp. 183–244.
[92] Breuil, 1931b, p. 457 f.
[93] Wulsin, 1941, p. 58 f.
[94] Arambourg, 1934, p. 33.
[95] Huzayyin, 1941, p. 54.

The Industries. Both series are in quartzite: the Mousterian implements number about 30, the Aterian, 67. The cores, though mainly discoidal in both series, proclaim the industrial differences: the Mousterian specimens are ' rough hewn ' by big flakes struck from alternate faces, producing a coarsely festooned periphery; the Aterian cores display a better controlled marginal flaking and, as nearly always, are thinner.

The Mousterian Series from Sidi Medjoub, stratum 3. Twenty-nine quartzite and two flint fragments. Cores: discoidal, but coarsely flaked. Average size, medium to small. Flakes: ten flake-blades, without retouch, average 5·5 cm. long, are the largest class. A Levallois flake, about 4·8 cm. long, with partial marginal retouch is the most finished artifact. The rest is more or less waste or amorphous flakes without retouch.

The Aterian Series from Moulin, stratum 4*a*. Cores: in addition to the discoidal cores, small discs with a plano-pyramidal cross-section[96] are called subcircular scrapers by the author. Apart from the usual oval or pointed flakes and flake-blades up to 8 cm. long with little or no retouch, the notable pieces are twenty tanged implements, comprising a varied assortment of distinctly rough ' points ' and at least one tanged scraper; an end-scraper on a broad flake; a fine triangular point with broad base, only 3·2 cm. long, with parallel retouch impinging far on to the dorsal face; a pointed bifacial artifact 7·5 cm. long, 1·5 cm. thick, called a '*petit coup-de-poing*' by Doumergue;[97] and an elliptical bifacial core tool, 6·5 cm. long by 2·5 cm. thick; the last two are described by Wulsin as being like " miniature hand-axes, one Chellean, and one Acheulian."[98] They are, of course, normal Aterian hand-axes.

It is difficult to assign this assemblage to a place in the style groups proposed, owing to its quartzite material. Its position upon the earliest dunal deposit overlying the 40 m. beach can do no more than prove a time interval of unknown duration between it and the Mousterian of the adjacent site. This separation of the two industries, contrasted with their direct succession at Bérard, is examined later.

(3) *Bulaq Pass, Kharga Oasis* (Fig. 6). The section through a 7 m. *wadi* terrace provided an interesting sequence, given in Section IV. It may be summarised typologically :—

4. Aterian (style γ) : *in situ*, unrolled, in superficial silt
3. Levalloiso-Khargan : in underlying silt
2. Levalloiso-Khargan : in a fine pebbly sand below
1. Rolled Acheulian and Levalloisian tools in coarse gravels.

The Levalloiso-Khargan industry is a local derivative from the Kharga Upper Levalloisian. It leads to the diminutive ' Khargan ' industry (formerly named Pre-Sebilian). Further details are reserved for the Physiographical Section (IV).

(*ii*) *The Relationship of Aterian to Succeeding Industries: a. Capsian ; b. Oranian*

(1) '*Ain Metherchem, Tunisia* (Fig. 4). Published by Vaufrey,[99] 'Ain Metherchem remains the only dependable example of the Typical Capsian overlying the Aterian. The Capsian, of rather developed type, overlies, in a superficial bed, alluvial deposits of stream and spring origin, containing archæological layers. These are exposed in the two banks, but do not synchronise exactly. The palæoliths from the west bank, layers 1′ and 2′, are described as ' very evolved Mousterian of Aterian age '; whereas those from the east bank, layer 1, are ' Mousterian with Aterian tendencies.' The break between both of these and the Capsian consists of an erosional phase, of no great magnitude, but sufficient geologically to disconnect the Capsian from direct succession: a time interval is proved, and I cannot agree that here is a straight example of Lower Capsian overlying Aterian.[100] There is room for several episodes in between.

The Capsian alone is figured; but I am indebted to Professor Vaufrey for unpublished inventories of the two older groups. That from the east bank, while sharing most types with that from the west, is cruder and the patina reinforces an impression of somewhat greater age. Out of its 571 artifacts, 110 are flat discoidal cores; side-scrapers are prominent, and two tanged points, another with invasive dorsal retouch, a fine end-scraper, and a " pseudo-biface " create, in my opinion, a true Aterian assemblage.

The group in the west bank, numbering 361 artifacts, yielded similar cores, a high percentage of side-scrapers, two Mousterian points " with thinned butts " and a few end-scrapers. Three core bifaces, one of which is reproduced on Fig. 13, No. 12, from a rough pencil sketch provided by Professor Vaufrey's courtesy, measure 10·8, 9·6 and 8·0 cm. in length. Though there happen to be no tanged artifacts or bifacial foliates, the assemblage, like the other, is probably Aterian.[101] Apart from other considerations

[96] Doumergue, 1922, Pl. III, 1*a*, 1*b*.

[97] *ibid.*, 1922, p. 216.

[98] Wulsin, 1941, p. 58.

[99] Vaufrey, 1936, pp. 20–26.

[100] Pericot, 1942, p. 312.

[101] Professor Vaufrey regards them as a belated Mousterian. In the original publication, backed blades are mentioned. I understand that these are not true backed blades but flake-blades with steep marginal retouch; they are inventoried as '*simili-dos*.'

the relative proportions of side- to end-scrapers in both groups suggest an Aterian of Style α (to β ?).

	East Bank	*West Bank*
Side-scrapers, all types, including typical	18·4%	68·9%
Side-scrapers, typical Mousterian	9·2%	37·4%
End-scrapers	1·7%	2·2%

(2) *Khanguet-el-Mouhaad—El Oubira* (*Tebessa*). If Vaufrey's diagnosis of the shell-mound of Mouhaad as Upper Capsian is well founded,[102] the Aterian-Capsian stratigraphy claimed there by Passemard is irrelevant to our present discussion.[103] Passemard stated that the loams of El Oubira, long known to yield Aterian artifacts, pass under the adjacent Capsian site of Mouhaad.

(3) *El-Khenzira, Morocco*[104] (Fig. 1). These two caves provide well documented proof of dissociation

D. Aeolian capping	±50 cm.	Historic.
C. Shell-mound ...	±0·75–1 m.	Oranian.
B. Yellow sand ...	+2 m. ...	Aterian Style β (Ruhlmann's Upper Aterian) in upper part only.
A. Dark cave earth	±1·50 m.	Aterian Style α (Ruhlmann's Lower Aterian) on the surface of stratum A.
Bed-rock.		

The section is important, since the Oranian is ill dated, and correlated at little more than a guess, either with the earlier Capsian,[105] or with the Upper Capsian alone.[106] An attempt to reconcile the two views has recently been made by invoking a regional time-lag in the survival of 'Middle Palæolithic'

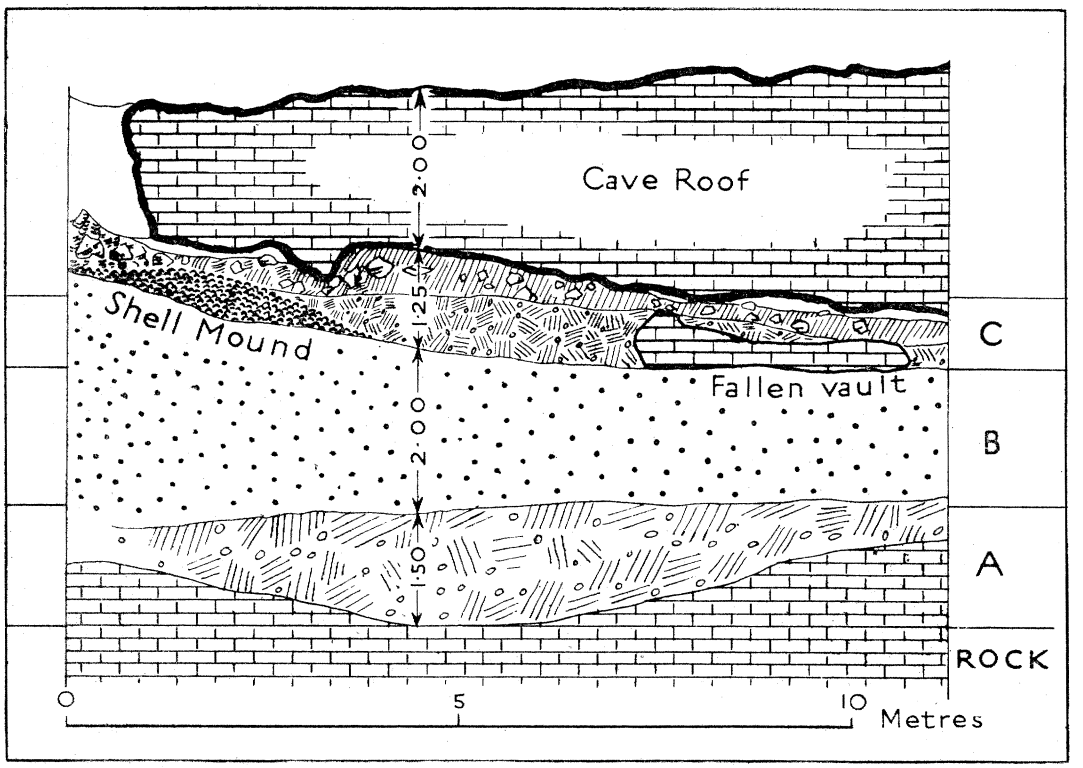

Fig. 1.—El-khenzira, Morocco. Section of Cave II. A (Surface of) Aterian Style α. B (Top of) Aterian Style β. C Oranian with Shell Mound (After Ruhlmann, 1936, Fig. 9.)

of the Oranian and Aterian. Co-ordinating, for summary purposes, the two sets of deposits over 4·50 m. deep, they yielded :—

culture.[107] Khenzira's contribution to these uncertainties consists in Ruhlmann's statements (*a*) that the Oranian shell-mound is "archaic" typo-

[102] Vaufrey, 1938, pp. 10–15, Figs. 3, 4.
[103] Passemard, 1941, p. 116. Mouhaad was first dug by Debruge ; then by Debruge and Pond : in neither case to the advantage of prehistory.
[104] Ruhlmann, 1936 (see also Section II).
[105] Arambourg, 1934, pp. 80 f.
[106] Vaufrey, 1936.
[107] Wulsin, 1941, pp. 80–82, Fig. 33.

logically in comparison with the " type " Oranian ;[108] (*b*) that no industrial or depositional admixture occurs between the top of level B and the base of C ; (*c*) that the break between the two is marked by falls of rock-roof ;[109] (*d*) that the Pleistocene fauna of the Aterian upper level had been replaced by one of more recent complexion.[110]

The separation of the Aterian from the Oranian is here at least proved, though it is less conclusive than it would have been had the Aterian been of Style γ instead of β ; or the " archaicism " of the Oranian been substantiated. None the less, the fall of roof and changing fauna indicate the very considerable passage of time at this place between the two cultures.

In brief, the stratigraphical position of the Aterian at the sites selected for examination, which do not conflict with other known evidence, shows it at Bérard and Novi to succeed without break a Levalloiso-Mousterian ; and at Karouba to be separated therefrom by a time interval. The significance of this becomes apparent in the physiographical section (IV). In Kharga the Aterian of Style γ appears stratigraphically later in the local succession than seems the case in North-West Africa.

In relation to ' blade ' industries, we find that the Aterian at Metherchem and Khenzira underlies the Typical Capsian and Oranian respectively, and is separated from both by a geological time interval. This conclusion is supported by the marked differences in patina, where the Typical Capsian and Aterian strew the same ground.[111] The time-interval between Capsian and Aterian has, presumably, been reduced by Passemard's stratified shelter, the Abri Clariond in Southern Tunisia,[112] where a previously unknown Lower Capsian underlies the Typical variety. Some of the end-scrapers and angle-gravers of this earliest Capsian recall closely similar types in the Tebessa Style γ Aterian (*i.e.*, the more advanced elements in the most ' evolved ' style group) ; but there seems nothing comparable in their respective geological horizons as known at present. No Capsian, Abri Clariond included, has yet been found in a physiographical position denoting the considerable alluvial antiquity of such sections as Bir-el-Ater (Fig. 2) ; Djouf-el-Djemel (Fig. 3) ; and the Kharga sites (Figs. 5, 6), all of Style γ. The lack of fossil mammals in these Aterian γ sites unhappily prevents comparison with the Abri Clariond, where the animals denote a modern African savannah fauna, as they do in other Capsian sites.

On factual evidence, we may conclude, therefore, that the bridge from the later Aterian into the Lower Capsian has not yet been identified. Presumably it exists somewhere, either in the form of a passage, or more probably as a regional overlap of the two. But at present there is no evidence worth quoting that even the most evolved Aterian, our Style γ, reached into the Capsian world, which cannot therefore account for the burins and other supposedly Capsian artifacts in the Aterian. The chronological link, if any, lies in a problematic ' Neo-Aterian ' world, our Style δ (see also Section VIII).

IV. The Physiographical Position of Some Aterian Sites. 1. Alluvial. 2. Raised Beaches and Marine Caves

The evidence drawn upon in the previous section fixes the relative industrial position of the Aterian in a general way only. It is younger than a Levalloiso-Mousterian and older than the Lower Capsian and Oranian in their respective localities. In Kharga alone, the closer integration of the stratigraphical sequence allows of the more precise statement that the Aterian appears, not immediately after the local Upper Levalloiso-Mousterian, but at one remove, coincident with an epi-Levalloisian phase.[113] (Fig 7). This Kharga Aterian is typologically akin to the Tebessa Style γ, and is more ' evolved ' than Styles α and β of Morocco, frequently in quartzite.

Since Sidi Mansour (*cf.* Section III, *init.*) must be ignored as suspect, Bérard and Novi best show that the Aterian of coastal Algeria directly succeeds a Levalloiso-Mousterian which, being in quartzite, is uninformative as to its exact vintage. We may assume it to be ' Upper ' but cannot prove it typologically. We must attempt to narrow the issue by other means.

(*i*) *Some Alluvial Evidence*

Bir-el-Ater, the type station (*cf.* Note 1) is an instance of several similar alluvial sites of the region which have yielded Aterian assemblages *in situ* without any close definition from their explorers of their geological age.

[108] Ruhlmann, 1936, pp. 97f. : *i.e.*, less varied, and lacking the triangles and trapezes and microburins, present at 'Ain Rahmane. But these are surely rare elements in the Oranian, and even 'Ain Rahmane produced five specimens only in a total of 486 implements, of which 72 per cent. were the normal Oranian backed bladelets. A case for " archaicism " at Khenzira, has not, in my opinion, been established. Nor does Ruhlmann, 1945*a*, pp. 79–94, insist on it.

[109] Ruhlmann, 1936, p. 81.

[110] *ibid.*, pp. 30–35 ; also Ruhlmann, 1945*a*, p. 71.

[111] Roffo, 1934, p. 32, in the M'zab. Roffo, 1938, pp. 288–290, in the Oued Djellal, noted the patina of the Typical Capsian to be white ; the Upper Capsian unaltered ; and the Aterian ferruginous brown.

[112] Passemard, 1941, pp. 43–120.

[113] Caton-Thompson, 1946, p. 61, diagram 2.

The Bir-el-Ater section (Fig. 2), unsatisfactorily published[114] and frequently misquoted[115] exposes, thick deposits in the bank of a stream-bed.[116]

4. Surface deposit, merges into 3, but with less gravel	± 1·30 m.	Maximum, diminishing to 2 m.	+
3. Gravel, some fairly coarse ...	± 1·00 m.		
2. Argillaceous sands	± 1·50 m.		
1. Aterian floor, with ash[117] and fragmentary animal bones ...	± 1·00 m.		

The present stream-bed seems to be scouring a pre-Aterian gravel not mentioned in the report.[118] The stratigraphy was determined by Dalloni who pronounced the deposits "certainly Pleistocene,"[119] and Boule considered the fauna "relatively ancient."[120]

Scientific excavations would be invaluable.

Another of Reygasse's Aterian sites south of Tebessa, typologically similar to the last, the 'Puits des Chaacas'[121] (*cf.* Note 1) is interesting because the industry lay in gravel pockets in the sides of a well. The artifacts are highly lustred in the manner of some of the fossil-spring flints in Kharga.

Oued Djouf-el-Djemel[122] (Fig. 3). Only the scantiest information is available about the geographical features of this fine site, dealt with carefully on the archæological side (*cf.* Notes 1, 2).

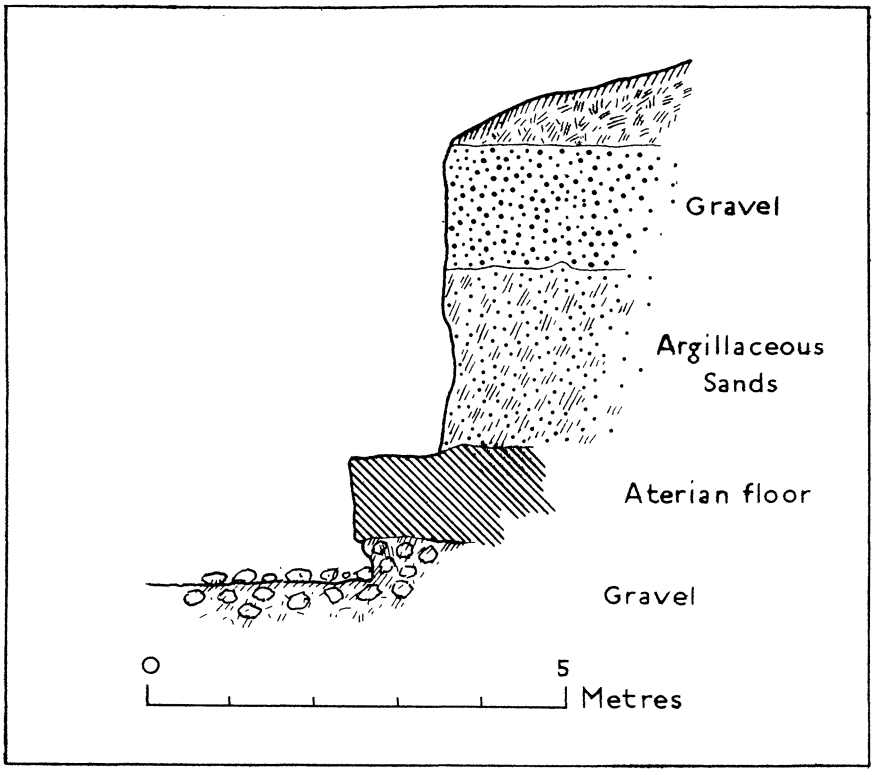

FIG. 2.—BIR-EL-ATER, OUED DJEBBANA, ALGERIA. PROFILE OF ATERIAN STYLE γ DEPOSITS.
(After Reygasse, 1938, No. 12.)

[114] Reygasse, 1919–1920, pp. 551 ff. Sections in Reygasse, 1938, No. 12.

[115] The depth of deposit over the Aterian level has been variously given. (1) Reygasse. 1919–1920, 3·80 m.; (2) Reygasse, 1931, p. 11, 8 m.; (3) Breuil, 1931*b*, p. 457, 7 m.; (4) Wulsin .1941, p. 57, 3 m.

[116] The Oued Djebbana, a drainage line from the Djebel Onk.

[117] More probably the natural carbonisation of plant remains, a common occurrence in Kharga. *Cf.* also Anderson, 1932, p. 855.

[118] I have not personally seen the section.

[119] Reygasse, 1931, p. 11.

The Wadi Djouf has cut a limestone defile in the flanks of a local hill-feature, the Djebel Tazermbount. The Aterian encampment (Style γ : *cf.* Notes 1, 2, and Fig. 10, Nos. 1–18) lies on a terraced limestone platform formed by the stream at about 5 m. above

[120] *ibid*,, p. 11. Boule, 1924, pp. 323–330, remarks that the bones were indeterminable. Some teeth were not true *Equus caballus* as Dalloni had thought; a large ruminant was represented.

[121] Reygasse, 1919–1920, pp. 556 ff.

[122] Le Du, 1933, pp. 42–52; 1934*a*, pp. 201–217.

its present bed. The archæological deposit consists of a limestone wash hardened into a tenacious calcareous crust which encases the unabraded implements. As at Bir-el-Ater, ash is stated to be conspicuous ; a similar explanation may be suggested (*cf.* footnote 117).

The profile of the section has marked resemblances to that of the 7 m. Aterian terrace site in Kharga (Fig. 6).

Kharga Oasis.[124] In Kharga the water-laid deposits at the two main Aterian sites are of different origins. One is sub-artesian ; the other due to direct precipitation.

KO6.E (Fig. 5). At the fossil-spring, KO6*E*., the Aterian floor overlay spring sediments, and in turn was sealed, not by further depositions from below as at the adjacent Levalloisian fossil-spring, but by a bed of æolian sand-rock.[125]

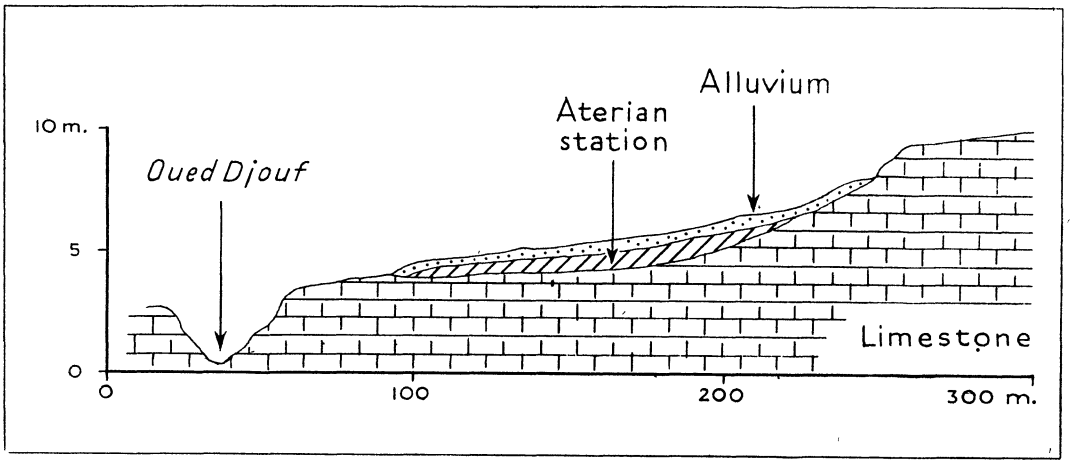

FIG. 3.—DJOUF-EL-DJEMEL, ALGERIA. CROSS-SECTION OF ATERIAN STYLE γ STATION. (After Le Du, 1933.)

'Ain Metherchem (Fig. 4).[123] Vaufrey's stratified Aterian deposits at 'Ain Metherchem (*cf.* Section III), which I have assigned to Style α (to β ?) produce, on examination of its cross-section, a comparable impression of neo-Pleistocene age without the means to define them more closely. The fauna, *Rhinoceros sp.*, *Equus Burchelli*, and *Alcelaphus*, is unhelpful.

In Kharga, owing to acidity, faunal remains have perished. A wild date alone provides biological data.

Bulaq A Site (Fig. 6).[126] This Aterian encampment, on the eastern scarp, proves an advanced stage in the local physiographical sequence. The floor is

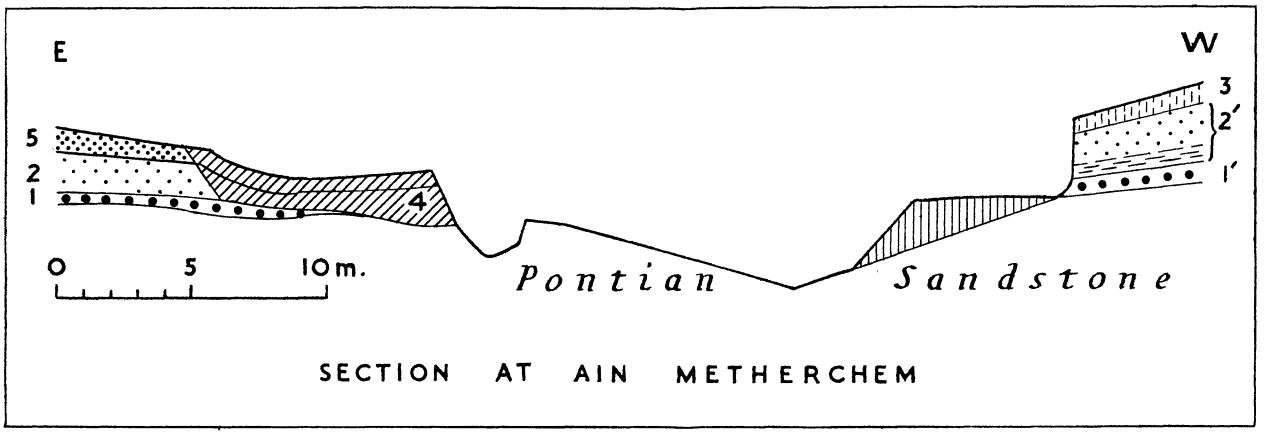

FIG. 4.—'AIN METHERCHEM, TUNISIA. E. BANK, BED 1, ATERIAN, PROBABLY STYLE α. W. BANK, BEDS 1', 2', ATERIAN, PROBABLY STYLE β. BED 4, EARLIER CAPSIAN. (After Vaufrey, 1936, Fig. 3.)

[123] Vaufrey, 1936, pp. 20–26.

[124] Caton-Thompson, 1931 ; Caton-Thompson and Gardner, 1932, pp. 369–406.

[125] Gardner, 1932, pp. 407–412.

[126] Caton-Thompson and Gardner, 1932, pp, 396 f., Fig. 8.

incorporated in silt overlying a 7 m. terrace in a valley of the sub-recent drainage system, itself first defined in the Upper Levalloisian period. The physiographical sequence is the clearest that Aterian field work has yet produced: We interpret it as follows in order of occurrence :—

1. Resorted Upper Sheet gravels (of Acheulian and Acheulio-Levalloisian age) fill the older Pleistocene valley, and rest upon a pre-existing rock-cut terrace of limestone and shale. Rolled Acheulian to Levalloisian artifacts in the gravels (group 1 of inset section).

2. Cutting of resorted Upper Sheet gravels into terraces at 10 and 7 m. above present thalweg (at site A, the 7 m. terrace alone is present). We ascribe this cutting to an erosional phase (8c of graph, Fig. 7) separating the Upper Levalloisian from the Levalloiso-Khargan.

3. Earliest pebbly silt-deposition in a sag in the gravel of the 7 m. terrace. Camp site of Levalloiso-Khargan facies (group 2 of inset section).

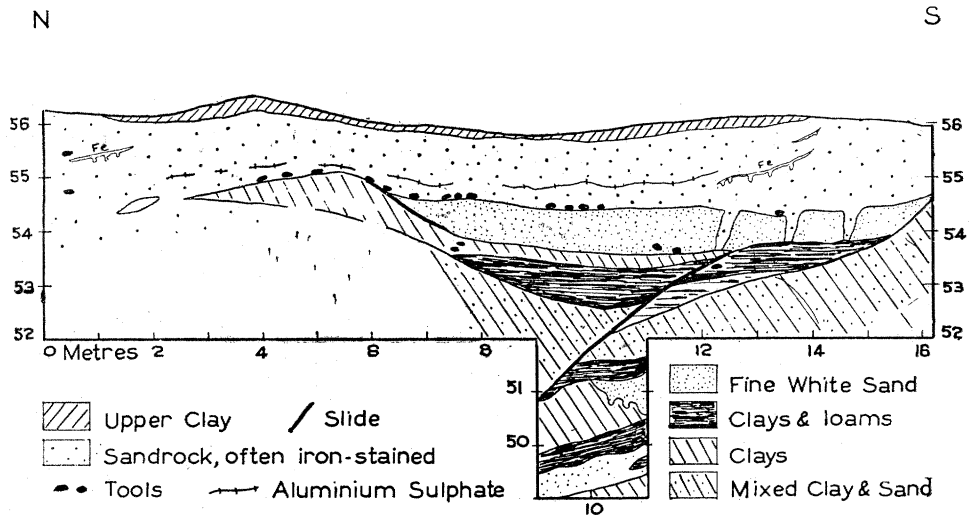

FIG. 5.—KHARGA OASIS. CROSS-SECTION OF MOUND SPRING KO6*E*. WITH ATERIAN STYLE γ *in situ*.

4. Continued silt-deposition with sporadic implements of Levalloiso-Khargan facies (group 3a of inset section).

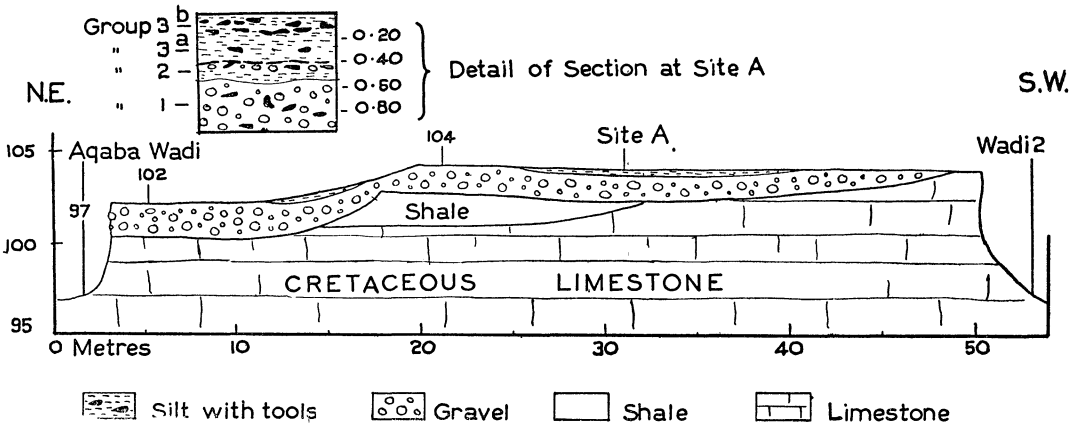

FIG. 6.—KHARGA SCARP, BULAQ PASS. SECTION THROUGH 7 AND 5 M. TERRACES. ATERIAN STYLE γ IN SURFACE SILT AT SITE A.

5. Cutting of 5 m. terrace (102 m. level on section, Fig. 6).

6. Continued silt-deposition on 7 m. terrace: within 20 cm. of the present surface a large Aterian encampment (group 3b of inset section: position "site A" of section, Fig. 6).

An unrolled tanged point (Fig. 12, No. 9) lay on the

5 m. terrace below. The upper silt at least seems likely to be wash from a flanking watershed, and unconnected with stream deposition.[127]

From these two sections emerges the following. The Aterian arrival in Libya witnessed a Pleistocene landscape-modelling which had reached virtually its present form, and was marking time against the progressive decline in moisture (both artesian and pluvial) which culminated eventually in the catastrophe of full desert. At Armant in the Nile Valley on the latitude of Kharga, æolian sand has been noted inter-bedded with Sebilian silt; and it is believed that in Nubia rainfall had failed by Sebilian times.[128] Inasmuch as Lower Sebilians and Levalloiso-Khargans were both immediately post-Upper-Levalloisian in their respective areas, and probably approximately contemporary in their epi-Levalloisian world, the consolidated dune overlying the Aterian floor at mound-spring KO6*E*, is consistent with the external evidence, and in accord with the assumption that, away on the 1,000 ft. Kharga scarp, precipitation still maintained running water, seasonally at any rate.

Given the climatic differences which mark North-East from North-West Africa, the degree of general resemblance shown in the profiles of weathering on Figs. 3 and 6 permits the inference that the Kharga physiographical succession may one day find its companion piece in Tebessa.

Thus the alluvial evidence, such as it is, presents the Aterian of Style γ, both in Tunisia and Kharga, as definitely very late or neo-Pleistocene.

(*ii*) *Some Evidence from Raised Beaches and Marine Caves*

The relation of sea-levels to human activities has been discussed too recently and authoritatively[129] to require attention here beyond relevant fact-finding. Moreover, for French North Africa Wulsin has usefully summarised most of the existing evidence.[130] Indeed, well directed field work is now alone likely to lift the subject beyond its present somewhat conjectural stage. Fortunately the only part of the difficult question which concerns us here is Aterian man's position beside the unstable sea: and it is precisely at this point that most observations fail in necessary detail.

The two well-known Monastirian beaches at ± 18–20 m. and ± 5–10 m. respectively, are widely developed in North-West Africa. The position of a Levalloiso-Mousterian industry in the sea-caves and open stations of Algeria, in deposits overlying the 18–20 m. beach (formerly termed Monastirian I, then, by malacologists—whose biological stride is longer than suits the prehistorian—Tyrrhenian II), has been known for years. Prehistorians, venturing a little ahead of the physiographers, are practically unanimous in correlating this beach, and the transgression

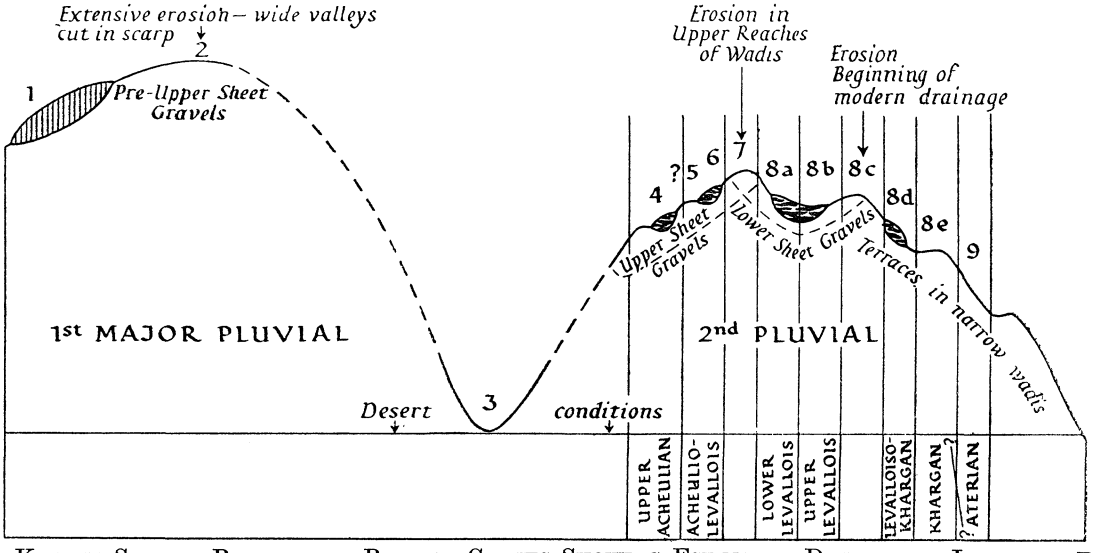

FIG. 7.—KHARGA SCARP. PLEISTOCENE PLUVIAL CURVES SHOWING ESTIMATED DEGREES OF INTENSITY RELATIVE TO EACH OTHER AND TO PRESENT DESERT CONDITIONS. (After Caton-Thompson, 1946, Diag. 2.)

[127] A panoramic view was published in Caton-Thompson and Gardner, 1932, Fig. 8, which shows both terraces and the watershed.

[128] Sandford and Arkell, 1934, pp. 94 f. Also Sandford, 1933, pp. 211–235, for the Southern Libyan Desert.

[129] Blanc, 1936, pp. 129–162; 1937, pp. 621–651; Ball, 1939, pp. 41–67; Huzayyin, 1941, pp. 45–56; Neuville and Ruhlmann, 1941; Breuil, 1942, p. 77; Breuil, Vaulthier and Zbyszewski, 1942, pp. 21–25; Breuil and Mortelmans, 1945, pp. 361–396; Breuil, 1946; Zeuner, 1945, pp. 225–252.

[130] Wulsin, 1941, pp. 39–47.

which led to it, with the Riss-Würm ; and the lower part of the subsequent infilling of caves or open coastal deposits with the early stages of the ensuing regression which, for them, represents the Mediterranean's adjustment to the opening phases of the last glaciation.

Quite recently the archæological record has been amplified from Morocco by the claim that Micoquian bifaces survived, alongside a late Mousterian, into the latter era.[131]

The Lower or Monastirian II shore-line (for which the unhappy name 'Grimaldian' has been proposed[132]) has received less attention, possibly as a result of the prevalent view that it was merely a temporary still-stand in the drop of Monastirian I to submarine levels.[133] Yet for late prehistory it is evidently to be of paramount importance.

The Egyptian Evidence. Egypt's contribution to these questions concerns, not coastal deposits, but Nile terraces under eustatic control. The correlation of the 9 m. terrace (Early Mousterian) with Monastirian I[134] has not been contested, though the view has been expressed recently that the contained industry is Acheulio-Levalloisian—an opinion based on Kharga correspondences[135]—without regard to Morocco, with which, actually, it accords reasonably well.

Similarly, the Nile's accommodation to the Lower Monastirian level has been identified in Lower Egypt with aggradation silts of Upper Levalloisian age.[136] Thus Egypt, unlike Algeria, provides us with fair evidence for the particular industry there contemporary with these respective marine movements. Moreover, the Nile has made an additional major—and so far unique—contribution, by virtually proving the Lower Monastirian level to be a minor transgressive marine 'cycle' on its own, built up from depth, and not just a halt in the fall of Monastirian I—a fact which somewhat affects the view of its physiographical age—usually believed to be last Interglacial like Monastirian I (*cf.* Note 7). More recently, hints of possible complications have arisen from Ball's study of the Nile's Pleistocene flood-plain gradients, supported by the Faiyum lake movements, which led him, indirectly, to suggest three Monastirian high levels, not two.[137] I have elsewhere analysed the logical results of Ball's hypothesis applied to human industries, on the alternative assumptions that Monastirian II is Riss-Würm in correlation value ; or (heretically) Last Glacial.[138] The need for more facts obviates immediate conclusions.

Against this generalised background, where does the Aterian stand ? In Kharga an 'evolved' Aterian which I have termed Style γ is certainly post-Upper Levalloisian, synchronous with abated precipitation, dunal formation, and with the latest recognisable Pleistocene deposition in a sub-recent valley (*cf.* Bulaq A above). In the Nile Valley its relative position is unknown, for true Aterian artifacts are rare. But in as much as the Upper Levalloisian of Kharga corresponds typologically to that of the Nile Valley and Faiyum, and its relative physiographical position in each place seems reasonably co-ordinated,[139] there is justification for regarding the Aterian in Egypt proper also as later than the aggradation silts and the Faiyum 34 m. (or younger Levalloisian) lake ; *i.e.*, post-Monastirian II. Since we know that in Southern Egypt the Upper Levalloisian was succeeded by the Lower and Middle Sebilian,[140] and in Faiyum by the epi-Levalloisian I and II industries (34 m. ; 28 m. ; and 22–24 m. series of falling lakes) ; and in Kharga by the Levalloiso-Khargan which preceded the Aterian (*cf.* Bulaq A above), there seems no option but to regard the Aterian arrival in Libya as invasive ; and I welcome Huzayyin's independent arrival at the same conclusion.[141] In default of full Kharga publication I have, in Note 6, set out the evidence for the chronological relationship of Aterian to Khargan industry.

The Evidence from Pescadian Deposits. That is all Egypt can contribute for the moment ; and it is at once evident that an invasive industry of advanced facies, discovered, like one of its own spent arrowheads, some 2,000 miles from its possible starting-point, throws little light upon the period of its perhaps remote infancy.

For that we must return to North-West Africa. There, no artifacts have as yet been found, rolled or unrolled, in the beach deposits of Monastirian I or II levels.[142] Therefore, while bearing in mind the Egyptian and Moroccan evidence, we must turn to the superimposed subærial deposits on the two beaches.

These *must*, I consider, be kept separate. Monas-

[131] Neuville and Ruhlmann, 1941, pp. 106–120.

[132] Unhappy because 'Grimaldian,' the name long identified with an epi-glacial industry, is totally unrelated in time to the 5–10 m. shore-line.

[133] For example, Huzayyin, 1941, p. 54, footnote 5.

[134] Sandford and Arkell, 1934, p. 124 ; 1939, pp. 59 f.

[135] Caton-Thompson, 1946, pp. 81, 82, 85, 86.

[136] Sandford and Arkell, 1939, pp. 58–60, 96.

[137] Ball, 1939, pp. 56, 193.

[138] Caton-Thompson, 1946, p. 97.

[139] *ibid.*, 1946, Diagrams 2, 3, 4.

[140] Remembering that the full depth of aggrading silt, sterile in the places examined, separates the two.

[141] Huzayyin, 1941, p. 256.

[142] Breuil, 1942*a*, p. 21, reports an unrolled "Languedocian" pebble in the 8 m. beach in Portugal.

tirian I and II are distinct entities,[143] and to refer, as is usual, to the deposits upon both as though they were identical and synchronous (though dunes or wash later than either may cover both), is to invite yet another obscurity into prehistory. This essential distinction could, I suggest, best be enforced by simple designations; and I shall use the term Pescadian for the deposits overlying the Monastirian I shore-line; and the term Berardian for those upon the Lower Monastirian beach (*cf.* Notes 4, 5 and 7).

The Pescadian deposits of Algeria, for the most part unmethodically studied, with brilliant rare exceptions,[144] have never yet produced Aterian implements, and now seem unlikely to do so. Instead, they yield scarce artifacts of generalised Levalloiso-Mousterian type, usually, but not invariably, in quartzite, including a few with good retouch.[145] In Algeria no Micoquian bifaces have yet been recorded from these Pescadian beds.

The Pescadian deposits, which form the lower part of the beds upon the Monastirian I shore-line at Sidi Medjoub, have been noted in another context (*cf.* Section III), and confirm the general position outlined in Note 4. An erosional interlude there separates the Levalloiso-Mousterian campers from the beach,[146] and a substantial interval elapsed before the Aterians camped at the Moulin site alongside, in a position of no altimetric significance.

It is unfortunate that no field work of the calibre of Anderson's at Mazouna[147] has yet been done on the Pleistocene terraces of the coastal valleys. But on the evidence of the shore-line itself, the Pescadian deposits are unmistakably pre-Aterian. Their contained Levalloiso-Mousterian artifacts show no Aterian tendencies. Even the precursor of the Tabalbalat technique has not been recorded amongst them. It is an undistinguished industry, exhibiting, even when in rare flint, little of the good retouch of the Grotte Eboulée in Oran (*cf.* Section II) or even Kifan bel Ghomari in Morocco.[148] It has been called a "developed Mousterian," but I know of no evidence in favour of this opinion, and consider that the Pescadian deposits should be correlated with the Lower Levalloiso-Mousterian period of high precipitation and tufa formation in Kharga (Fig. 7), and in the Nile Valley with the lowering of the Nile's flood-plain in adjustment to a fall of sea-level of at least 30 m.[149] A correlation with Würm I seems irresistible (Note 7).

The Evidence from Berardian Deposits. The Aterian is post-Pescadian, and connected with a totally different and later marine cycle. The Mediterranean, on Egyptian analogies, fell considerably below present sea-level in Lower Levalloiso-Mousterian times, before it reversed the process and regained its second Monastirian maximum of +5–10 m. This gives a very different impression of the time interval between the two levels from that given by the view of a straight drop from the higher to the lower.

The industrial age of the lower North African shore-line is, like the higher one, still unattested by implements *in situ* in it. But the circum-Mediterranean consistency of evidence for Upper Levalloiso-Mousterian artifacts at, or near, the base of the overlying deposits, with Neanderthal man in two cases proved to be their owner[150] and a continued survival of the "archaic" warm fauna of Pescadian beds (see Note 4), indicates that the beach itself (in Egypt altimetrically correlated with Upper Levalloiso-Mousterian aggradation silts[151]) is their near contemporary. The evidence from the Berardian beds of Algeria is not discordant with this view.

Like the Pescadian series they comprise marine-cave infillings and coastal depositions, which are however, predominently sandy and dunal. For nearly a hundred kilometres west of Algiers the Berardian level is intermittently well defined, and has yielded at numerous points Aterian artifacts *in situ* or outweathered. Amongst these Bérard, the type station (see Note 5), is, for stratigraphical reasons already stated at the beginning of Section III, the most important. For overlying the Monastirian II beach, here at about 5·50 m., lies a Levalloiso-Mousterian quartzite industry, occupying the lower part of a red clayey sand. Its aspect, due to the material, may be archaic;[152] but, for the physiographical reasons given, it can be no older than a late

[143] As proved in Egypt. I consider no useful purpose would be served here by pursuing Ball's revival of the theory that the Eastern Mediterranean was an enclosed basin bounded by the Tunisia-Calabria land-bridge during the two periods of low sea-level under discussion here, *i.e.*, the Intra-Monastirian drop, and the Post-Monastirian drop (Ball, 1939, pp. 58–67). Ball seemed unaware of Vaufrey's more specialised reasoning in rejection of the theory (Vaufrey, 1929*a*, 1929*b*). It should, however, be noted that whereas Vaufrey invokes a fall of nearly 400 m. as necessary to establish land contact, Ball's more recent data on submarine topography reduce this figure to 293 m.: he invokes seismic instability and continental uplift to help the process.

[144] In particular Arambourg, 1934.

[145] As at Carrière Anglade (Arambourg and Marchand, 1935, pp. 15–22).

[146] Doumergue, 1922, p. 185.

[147] Anderson, 1932, pp. 847–874.

[148] Campardou, 1917.

[149] Caton-Thompson, 1946, pp. 68, 71, 86 f., Diagram 3.

[150] At Gibraltar and Pontine Italy.

[151] Subject to the possible adjustment to Ball's hypothesis, which would make it one industrial stage later (*cf.* Caton-Thompson, 1946, p. 99).

[152] Environmental occupation may play a part in this. Fishermen are proverbially poor

Upper Levalloiso-Mousterian period. The very important claim that an Aterian industry overlies it, in the top of this same bed (level 3) and the base of level 4 above, requires re-examination, not to verify the statement, but to confirm or deny the geological continuity of the two levels, which affects the time relationship of the contained industries. Yet at Novi, 48 km. westwards, the same observers state that in a very similar section the same industrial stratification has been found.[153]

This association of the Aterian with the consolidated upper dune or sandrock (bed 4), is reaffirmed at another site west of Bérard,[154] where bed 3 was sterile, but the overlying sandrock bed 4 yielded four tanged points and other Aterian types; and a similar situation has been shown at 'Ain Taya.[155]

Natural differences in local depositions account for a variant on this Berardian theme to the north of Bizerta; but the relative Aterian position remains constant, and may be accepted as proved.

Cave deposits of the same general horizon remain to be noted. They have received less attention than the caves of Monastirian I. The most important, Dar-es-Soltan, near Rabat, Morocco, investigated in 1936, is unpublished, and my interpretation, based on perhaps incomplete data, may not accord in detail with that of the excavator.[156] But from preliminary references[157] the cave appears to be due to wave action on the coastal sandrocks of the Monastirian I emergence (Pescadian beds ?), implying a sufficiently long interval for these to have become hardened. At all events, upon the rock-floor at 9 m. rests a shelly beach, 35 cm. thick, overlain by 1·35 m. of sterile deposits. Next follow two Aterian levels, separated, as at Khenzira, from each other by an intervening bed 1·65 m. thick. The sterile bed seems likely to be late Upper Levalloiso-Mousterian in age.

'Ain-el-Turk, Oran,[158] is another instance of a Monastirian II cave (roof at 8 m.). The two or three uninformative quartzite artifacts in the Oran museum inconclusively suggest a Levalloiso-Mousterian rather than an Aterian facies. The bone breccia yielded *Rhinoceros Merckii*, *Bubalis antiquus*, and *Hippopotamus*—'archaic' forms which survived round the Mediterranean into the late Upper Levalloiso-Mousterian, and which Khenzira has additionally proved to have survived as late as Aterian β.

[153] Marchand and Aymé, 1935, pp. 239–242.
[154] Marchand, 1939, pp. 298–363.
[155] Piroutet, 1930, pp. 513–517.
[156] Dr. Ruhlmann.
[157] Breuil, 1942, p. 77; Neuville and Ruhlmann, 1941, p. 105; Ruhlmann, 1945*a*, p. 75 f.
[158] Doumergue, 1934, pp. 309–346. He adopts the view of the physiographical unity of Monastirian I and II.

V. Summary and Discussion of the Aterian in North Africa

The generalised figure of Aterian techno-typology is Levalloiso-Mousterian, without true blade elements, and without evidence of regional contact with Capsian or Oranian industries which are later, but may coincide with an ill defined Neo-Aterian phase. The outstanding features which win the specific Aterian name are bifacial percussion and pressure retouch on large and small spear-heads; the core biface or Aterian hand-axe; the unifacial tanged javelin-head, with occasional bifacial specimens derived from it; and the stemmed and barbed or winged arrow-head, usually unifacial, but bifacial in abnormal cases.

Though Aterian genius perfected these, and united them for the first time within a single knap-sack, the several items, the tangs apart, belong to diverse elements in various aspects of the older Levalloiso-Mousterian culture. But it seems certain that one region only of the three continental areas covered by that culture-complex nourished the roots of Aterianism. That region is neither Europe nor Asia; similarly North-East Africa must be outside the possible field, since its post-Levalloiso-Mousterian history is epi-Levalloisian, the antithesis of Aterianism. The region seems narrowed to west or south of North-East Africa. There is reason therefore to regard North-West Africa as the homeland of Aterian growth, if not of origins; where the greatest variety of types is present, denoting long evolution, and compelling subdivisions, attempted here as a possible systematization for future work. But it is clear that my Style α of Khenzira level A can hardly be the beginning of the Aterian as such. It already contains mature forms, and the arrow-head is well-developed. We cannot, therefore, confidently assume North-West Africa to be the *primary* region of Aterian evolution.

Other possibilities will be examined (*cf.* Section VI). But the claim from Morocco that a Micoquian culture survived there into the Pescadian epoch, alongside a Levalloiso-Mousterian which, in the same region, is believed to exhibit certain 'proto-Aterian' tendencies (*cf.* Section II), obviously predisposes one to regard Morocco as a, or the, crucial area.

This brings us to the problem of how far my proposed Aterian style groups have a chronological value, or may be simply geographic variants reflecting modes of life and access to raw materials on mountain, savannah, desert or sea-shore.

I believe they undoubtedly have a relative time-value; and Khenzira, with its two levels, is the anchorage for the belief. These caves prove a

physical interval, considered "fairly long" by Ruhlmann, between my Styles α and β; a typological development; and a change in taste in raw material. Their absolute age is less sure. Ruhlmann sees in the sterile basal stratum (Fig. 1, A) a normal example of initial cave infilling due to pluvial infiltrations, contemporary with the withdrawal of the high-level Monastirian sea[159]—*i.e.*, Pescadian in our terminology. If that be so, as seems reasonable, the Aterian artifacts on stratum A, are, positionally, perhaps the earliest recorded, and may be absolutely older than others included in the α group. It all depends on the moment of arrival. Khenzira stratum B., with Aterian Style β in the upper part only must also be assigned to a relatively early absolute age by reason of the associated fauna—relict forms usually found in the cave infillings of Pescadian and Berardian age.

Aterian Style γ of Alger-Tunisia and Kharga, on the other hand, seems to be later physiographically as well as typologically. In Kharga we have noted its very late place in the local sequence. In Algeria it may be somewhat earlier: but the general resemblance of its geological position in the alluvia of both regions, quite apart from typology, seems to proclaim it as later than Styles α and β.

Turning to the absolute chronology, it is impossible to evade any longer the crucial question of the age of the Monastirian II shore-line; for its overlying Berardian deposits are consistently the scene of Aterian encampments. Is it interglacial—Riss-Würm; or intra-glacial, Würm I–II?

I have elsewhere analysed the archæological implications of the former view applied to the Egyptian palæolithic sequence.[160] They lead to the unconvincing conclusion that the Upper Levalloiso-Mousterian (or, on Ball's correlation, the early epi-Levalloisian) is Last Interglacial. Unless, therefore, a satisfactory physiographical adjustment, based on ample field data, be proposed to smooth out the inconsistencies, the alternative hypothesis of a Würmian interstade seems archæologically the more plausible probability, but lacks as yet the weighty championship of the other.[161] Yet a choice here and now between these alternatives seems required, since the issue should not weakly be shelved by invoking a time lag, of convenient length to fit the argument, between the beach's emergence and the arrival of the first of successive people who wished to use it. It is against reason to suppose that a well defined beach, as is Monastirian II, remained untenanted, not for several human generations, but for the best part of a physiographical epoch. At Bérard and Novi and at a long list of Berardian sites, the Upper Levalloiso-Mousterians stationed themselves on dunes or other sandy deposits, accumulated directly upon the beach. We may infer they were above the maximum reach of the waves, but not more, for people do not occupy beaches unless they are fishermen. The subsequent Aterian campers on the accumulating dunal deposits may, for the same reason, be assumed to have also been within a stone's throw of their falling sea[162]—in other words to be synchronous, geologically speaking (and that is our only possible time-measurement) with an early phase of Monastirian II regression. A Würm I correlation is out of the question, and I provisionally assume a later interstade (*cf.* Note 7).

In so far as Aterian Style γ has not been identified along the coast, it is possible to suppose, not that Style γ is necessarily an inland variety, but that the shore-line of its falling sea is now below the waves of our rising one.

VI. The Still-Bay Industry

A palæolithic people, formidably armed in comparison with its neighbours; a people who ranged southwards probably to the Niger bend,[163] and pushed eastwards across the width of Africa to the Nile boundary, are people to have adventured beyond, one might suppose, under the same incalculable stimulus, wresting the contracting hunting grounds and watering places from weaker groups, still in thrall to an outmoded Upper Levalloiso-Mousterian tradition, or its deteriorated derivatives.

Knowledge of the late palæolithic sequence in large tracts of Central and West Africa is too defective, however, to justify speculations, which must derive authority from verified distribution and relative chronology still lacking. Nor can it be maintained that the strong elements of 'Aterianism' in the Still-Bay industries of Equatorial and South Africa are due to a transcontinental spread of Aterian peoples or even to "influence" from the marginal zones of their maximum expansion. For despite the close similarity in many respects between the Aterian and Still-Bay,[164]

[159] Ruhlmann, 1945*a*, p. 70. In this publication he inverts the alphabetic succession of deposits given in the 1936 report.

[160] Caton-Thompson, 1946, p. 99.

[161] Zeuner, 1945, pp. 235 f.

[162] Compare the similar situation in South Africa (Section VII).

[163] Actually 100 miles north-east of Timbuctoo, within a relatively short distance of Asselar (*cf.* end of Section I).

[164] Such as the dual retouch (percussion and pressure) on the bifacial spear-heads; the "pseudo-hand-axe"; the Tabalbalat flake technique; and the common substratum of Levallois cores (usually discoid) and flakes. Still-Bay spear-heads, however, frequently display very wide straight butts and an equi-triangular outline, not seen in the Aterian specimens, the butts of which are normally convex.

the most characteristic element in the Aterian repertory, and the one least likely to have been omitted, is the tanged artifact; and this seems not to have been recorded in any Still-Bay group until we reach, baffled, the extreme tip of Cape Colony.

To rationalise this inconsequence is, for the moment, impossible. Obviously crucial data are lacking; but the nature of the problem may be indicated by a selection of still disordered facts awaiting their relative places and significances.[165]

In North-East Africa we noted that Aterian techno-typological tendencies were latent in the Upper Levalloiso-Mousterian. In Egypt, however, they are so infrequent and sporadic as to indicate a marginal region of development. As we travel south, they become accentuated; and in Kenya and Southern Rhodesia have been termed "Proto-Still-Bay" in undefined relationship to the "Early Still-Bay" of Abyssinia and Uganda.

The Anglo-Egyptian Sudan and Somaliland. Surface and outwash artifacts—quartzite in the Sudan, chert in Somaliland—include Tabalbalat points, semi- and fully-bifaced foliates, end-scrapers on flake-blades, associated with the usual basic mixture of Levalloisian cores and plain and retouched flakes from them.[166] Roughly backed flake-blades and probably true blades, which constantly occur in Still-Bay groups, make their appearance. Though no Upper Levalloiso-Mousterian can be isolated in default of stratified series, it surely exists as the local substratum. No Aterian tanged artifacts are on record;[167] we have presumably passed south of the Aterian boundary in the eastern half of Africa, and entered the northern limit of Still-Bay expansion.

The discovery in old deposits of the Blue Nile, some 200 miles south of Khartoum, of a fossil proto-Bushman or Boskopoid skull,[168] is of outstanding importance in view of the known association of the type with the Still-Bay industry in South Africa.

Abyssinia. In a rock shelter above Lake Tana a 12 ft. section shows[169]:—

5.	Late derivative of Magosian.	
4.	Magosian.	
3.	Late Still-Bay ...	Bifaced points; end-scrapers on flake-blades; angle burins; backed blades, etc.
2.	Middle Still-Bay	Bifaced points, mainly straight-based triangular forms; end-scrapers on flake-blades; backed blades. Levalloisian cores.
1.	Early Still-Bay	Bifaced points, both convex-butted and straight-based, triangular; Tabalbalat thinning on unifacial flake; end-scrapers and burins on flake-blades, etc.

It should be noted that the backed blades appear to be struck from tortoise, not blade, cores: the inventory lists none of the latter.

Uganda. In Uganda the Levalloisian is widespread, and is described as "monotonously conservative and unspecialised" until the end of its long history, "when it flourished for a time as the Still Bay."[170] Quartz accounts for the crude appearance. Stratigraphy is defective, but composite rubble sections show:—

3.	Developed Uganda Still-Bay ...	Bifacial points, crude and never acutely triangular, etc.
2.	Early Uganda Still-Bay	Bifacial points and small ovoid to piriform core bifaces (pseudo-hand-axes), etc.
1.	Upper Uganda Levalloisian ...	Disc cores, plain flakes with prepared platforms, etc.

O'Brien regards the Still-Bay as the final development of the Levalloisian, and, like Leakey, assigns it to the end of the Gamblian pluvial.[171] His conclusions about its origin diverge, however, from the theory, upheld notably by Burkitt and Leakey, of Levalloisian and "neanthropic" culture-contact. O'Brien regards the Uganda succession as a case of linear growth from the local Upper Levalloisian, without evidence of "Capsian" or other "blade" contacts.[172] But he suggests that the bifaced tools in the Uganda Still-Bay denote "borrowing" of a biface technique from the Tumbian[173] (see Section VII).

Kenya-Tanganyika. Still-Bay evolution in this area may be epitomised in the sequence[174]:—

3.	Typical Still-Bay	Plus backed tools "borrowed" from the Kenya Aurignacian.

[165] As in the Aterian section, we have selected from the voluminous literature those examples most usefully illustrative here.

[166] Burkitt and Barrington Brown, 1931. Also A. T. Curle material in Univ. Mus. of Arch. and Eth., Cambridge.

[167] Kharga, 700 miles to the north of Khartoum, seems actually to be the most southerly point recorded in eastern North Africa for the Aterian. At a guess, and in view of its western extension towards the Niger, it seems likely that Tibesti may prove to be an important Aterian—Still-Bay area. Teilhard de Chardin, 1940, Fig. 3, has published a definitely tanged semi-circular scraper from French Somaliland, found in hut circles. It may indicate a perpetuation of Aterian tradition.

[168] Smith-Woodward, 1938, pp. 190–5.

[169] Moysey and Leakey, 1943, pp. 196–203.

[170] O'Brien, 1939, p. 170.

[171] O'Brien, 1937, p. 27.

[172] *ibid.*, p. 27.

[173] O'Brien, 1939, p. 64.

[174] Leakey, 1936*a*, pp. 62 f.; also 1931, pp. 78–82.

2. Proto-Still-Bay (formerly Kenya Upper Mousterian)	...	Plus a few backed tools and end-scrapers "borrowed" as above.
1. Simple, pure developed Levalloisian.		

A Levalloisian—Kenya-Aurignacian "hybridisation" is envisaged. We should note that many Kenya Upper Aurignacian blades show a prepared striking platform.[175]

Complications are introduced into the above sequence by uncertainties about an unpublished "Pseudo-Still-Bay" industry, regarded as "a branch derivative of the Levalloisian influenced by the Acheulian," and assigned to the end of the Kamasian pluvial.[176] The illustrated specimens[177] depict a group which, a disclaimer to the contrary notwithstanding, looks strangely suggestive of the Kenya Proto-Still-Bay, if not of a typical Still-Bay. The inclusion in it of small thin hand-axes is important to the present study; and in view of the claimed antiquity detailed information is awaited eagerly.

It is relevant here to note that in Tanganyika a fossil human skull associated with a pure Levalloisian culture is non-*Homo-sapiens* in character.[178]

South of the Equator, the Rhodesias continue the known Still-Bay area, with or without known ancestry.

Northern Rhodesia. Mumbwa Cave.[179] The 9 ft. deposits yielded :—

4. Recent		
3. Upper Cave Earth	...	Rhodesian Wilton
2. Lower Cave Earth	...	Rhodesian Still-Bay
1. Red Cave Earth over decomposed rock	...	Sterile

The Still-Bay, small and perhaps of latish facies, is chiefly in quartz. The main types are bifacial foliates; unifaced Levalloisian flakes; discoidal cores; various scrapers, including end-scrapers; burins; core bifaces (pseudo-hand-axes); a few backed blades and bladelets. Careful publication imparts information about the last. "The faceted flakes (68 per cent.) are of two main forms—either broad and sub-triangular, or long and blade-like. These were struck from different types of cores. The former from the oval or sub-triangular tortoise core, and the latter from a flattish long core having usually one faceted platform—the flakes being struck down one long side only. The unfaceted flakes, nearly all long and blade-like, were derived from formless cores with unfaceted platforms—one or two platforms being found on each core."[180] Though not identical in detail, the Aterian flake-blade core (see Fig. 11, No. 6) falls into the same general class. It already occurs in early Levalloisian industries.

Southern Rhodesia. Bambata Cave.[181] Results have benefited from independent excavations in 1929 and 1939. Sufficient for present purposes is a simplified section, showing the main divergencies in the findings of the two excavators. The term 'Bambata industry' is by common consent now re-named Rhodesian Still-Bay.

Armstrong (1929)	*Strata* (*Total* ±19 *ft.*)	*Jones* (1939)
4. Wilton		3. Wilton
3. Upper Bambata, Middle ,, , Lower ,,		
2. Typical Mousterian intercalated with Lower Bambata (or 'neanthropic') contemporary occupation.	Upper Cave Earth	2. Rhodesian Still-Bay. Unstratified: little lithic evolution save for Still-Bay foliate points.
1. Acheulian	Lower Cave Earth	1. Proto-Still-Bay (developed Levalloisian).

The 'Acheulian' hand-axes and cleavers of Stellenbosch type[182] were accepted as such by Breuil.[183] Cumulative Still-Bay and Aterian evidence favours Jones, however, in his ascription of these bifaces to the Proto-Still-Bay,[184] supported as they are by the associated flake industry (with burins), directly ancestral in type to the Still-Bay of the Upper Cave Earth. The hazards of excavation favoured Jones, moreover, but not Armstrong, with similar "pseudo-hand-axes" in the Upper Cave Earth also. No discredit attaches to a pioneer identification since seen to be erroneous, and dangerously restricted in area.

Armstrong's pure Mousterian level, based typologically upon the 'point,' and absence of 'blade and burin' elements, is hardly at variance with Jones's preference for a Still-Bay label. But a radical difference of interpretation is disclosed over Armstrong's claimed Lower Bambata intercalations, which, to him, denoted the arrival of 'neanthropic' immigrants from the north, introducing Capsian technique into the Rhodesian Mousterian world. A classic example of supposed culture-contact follows: and it is suggested that "the newcomers absorbed the best elements of the older Mousterian industry,

[175] Leakey, 1931, p. 102, Fig. 33.
[176] Leakey, 1936*a*, pp. 52–54. 63 f.; also comments by O'Brien, 1939, pp. 180, 183, 204.
[177] *ibid.*, Fig. 6.
[178] Weinert, 1939: Leakey, 1936*b*, p. 1082; Leakey, 1945, p. 54.
[179] Desmond Clark, 1942.
[180] *ibid.*, p. 183.
[181] Armstrong, 1931, pp. 239–276; Neville Jones (undated paper; work done in 1939).
[182] Armstrong, 1931, p. 254.
[183] *ibid.*, p. 256.
[184] The fact that they are made on heavy flakes is immaterial.

notably the point . . . which they developed ultimately into a long slender point, almost Solutrean in technique."[185]

To Neville Jones the intercalation, absent in his own section, was probably due to an irregularity of deposition (a view originally proposed by Braunholtz); and he interprets the sequence of industries as a direct development from the Proto-Still-Bay, undisturbed by "neanthropic" contacts, until the Wilton microliths announce a radical cultural change. He expresses the opinion "that the more we learn of the development of our Middle Stone Age industries, the more we have reason to believe that they developed locally in South Africa from the moment they began to emerge from the Early Stone Age until they began to give way to the Later Stone Age. It is really not necessary to suspect the cultural contact of another race in order to account for cultural advancement . . ."[186]

Little in the Bambata cave assemblage, which is normal Still-Bay, requires special comment, except the rather numerous burins (26) in the Lower Cave Earth, alongside the core bifaces (18),[187] and some steeply edge-trimmed flake-blades which are designated "backed blades": this on our definition they are not.[188] Undoubted backed bladelets occur, however, (level unspecified[189]) as we have noted in Abyssinia, Kenya-Tanganyika, and Northern Rhodesia.

South Africa. The importance of the Middle Stone Age culture-complex in the Union, including the Still-Bay, is out of all proportion to the brief notice needed for our present purpose. The Still-Bay industry itself seems there to reach its zenith of development.[190]

Natal. A bifaced spear-head over 16 cm. long is on record,[191] a size comparable to our Aterian, Fig. 13, No. 1, though its outline is nearer our Fig. 13, No. 3, with the same rather large flat percussion flaking regularised by pressure. This Natal Still-Bay lies on wind-eroded, consolidated red earth, beneath dunes, recalling many North African Aterian sites. It shows an advanced Levalloisian technique and includes ovoid cores, unifacial points with faceted platforms and some dorsal retouch, side-scrapers, and the shapely bifaced flake spear-heads in a wide range of size. The acutely triangular bifaced points of Rhodesia and Equatorial Africa are here replaced by bases tapering to a convex butt, as in the Aterian. Core bifaces of Stellenbosch type appear at the Tugela Mouth "in apparent association with bifaced points and flakes of Levallois character";[192] and Cramb's conclusion, despite opposition, that they form an integrated group is, in my view, fully justified.[193] Backed blades are mentioned; one is described as made from a Levallois core, and the figures suggest that others may also be so made.[194]

Zululand. From Ingwavuma,[195] comes a preliminary announcement of fossil man in cave deposits containing the Pietersburg variation of the Middle Stone Age, nearly related to the Still-Bay in age and style. It is mentioned here because "backed blades," said to be similar to those which characterise the Still-Bay culture of the Cape, were made on flake-blades of Levalloisian core origin. The skull is said on a first study to be neither negro nor Bushman: perhaps a Boskopoid variant will be its eventual designation.

Cape Colony. The artifacts from the Cape Flats (Hardy collection)[196] display a wide variety of outline in the bifaced spear-heads, in which double end-pointed forms are as frequent as convex-butted. No exaggeratedly triangular wide-based points are represented, and the majority are slender foliates made on flakes of flake-core origin. Symmetrical plain flakes with carefully faceted platforms show very evolved Levalloisian technique: others are unfaceted. Reduction and retouch of the bulbar area are also noticeable. The "backed blades," including lunates, are important, since their Levalloisian core origin is firmly established by careful techno-typological observations. Sub-trapezoids and forms resembling Chatelperron and Audi types occur under this heading. The special type of core connected with this output is described as a "formless" core,[197] a term used also by Desmond Clark in Northern Rhodesia (*cf.* Northern Rhodesia above). We have noted that the Aterians of Style γ made these cores, and that they are long pre-Aterian. Their significance in all cases is that they yield "blades," *i.e.*, flake-blades in a purely Levalloisian matrix. Apart from these, the cores are normal discoids (some double-ended) and ovoid to triangular forms.

But for us the outstanding contribution of the

[185] *ibid.*, p. 259.
[186] Neville Jones, 1939, p. 27.
[187] *ibid.*, p. 17.
[188] Armstrong, 1931, Fig. 12, No. 1.
[189] *ibid.*, Fig 13 15–17.
[190] Goodwin and van Riet Lowe, 1929, pp. 119–145.
[191] From Natal. Malan, 1944, p. 402 and Fig. 5. The length is quoted as 14·4 cm.; but the drawing measures +16 cm. (broken).
[192] Malan, 1944, p. 403.
[193] *ibid.*, p. 403.
[194] *ibid.*, Fig. 3, No. 2.
[195] Cooke, Malan and Wells, 1945.
[196] Malan and Goodwin, 1938.
[197] Malan and Goodwin, 1938, p. 8, Fig. A.

Cape Flats are the tanged points from Noordhoek,[198] which, when flaked extensively on the ventral surface of the stem, as in the specimen reproduced in Fig. 8,

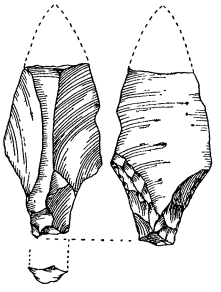

FIG. 8.—NOORDHOEK, CAPE OF GOOD HOPE. STILL-BAY TANGED POINT. (After Malan and Goodwin, 1938, Fig. D.3. Scale ½.)

are undistinguishable, as Goodwin noted,[199] from the narrower Aterian forms, such as Fig. 12, Nos. 9, 11. He believes the two may be "safely connected." Adopting Burkitt's widely held theory of a "hybridisation" of basic Levalloisian and "neanthropic" elements[200] he concludes "The Cape Middle Stone Age . . . is the mingling of a variety of themes. The general Middle Palæolithic is represented by a Levalloisian, Aterian and perhaps by the bifaced pressure technique discussed above.[201] The Neanthropic element is seen in the backing of blades and the parallel flaking on the crescents."

The physical type of the makers of the Cape Flats Still-Bay is well known through the famous Skildegat cave nearby : it is primitive or proto-Bushman,[202] and lay in the lower of two Still-Bay horizons. A report of Stellenbosch hand-axes in the level below, if true, suggests a Proto-Still-Bay substratum.

By the fortunate conjunction of alert prehistorians and good sections, the geochronological position of the South African Still-Bay is as closely fixed as the Aterian in North Africa and by the same means—relationship to sea-level. Within this spacious measurement of time they are nearly contemporary.

In North Africa we have assigned the earlier known phases of Aterian industry to a period long enough after the emergence of the Monastirian II beach to allow for the accumulation of a dunal deposit upon it, occupied *pari passu* first by Upper Levalloiso-Mousterian fishermen, then by Aterians. Both were thus post-Monastirian II ; but if our view of their choice of level is valid, the sea had not yet appreciably receded. With this finding may be compared the evidence from Cape Colony.

There the Monastirian II level (the 20 ft. emergence of South African prehistorians ; extreme limits 15–25 ft.)[203] has received systematic attention. At Mossel Bay a maximum height of 21 ft. (6·10 m.) has been established on good exposures.[204] On the evidence of a rolled "pseudo-hand-axe" in the beach of Middle Stone Age type (Mossel Bay variation)[205] and from other closely reasoned data, it is concluded "we may take it as proved that the Mossel Bay industry is, at least in part, contemporaneous with or older than the raised beach exposed at Mossel Bay[206] . . . Goodwin has already pointed out that the Middle Stone Age sites near the coast are all situated above the raised beach level, and it should be further noted that they are generally situated *immediately* above that level but never below. The recent contour survey of the Cape Peninsula has shown that the Noordhoek lagoon or vlei, which would seem to be a remnant of the raised beach, is situated just below the 25 ft. contour. This becomes important when we realise that on the seaward shore of the vlei and at the 20 ft. level is an extensive Still-Bay site."[207]

Aterian and Still-Bay are therefore fairly closely contemporary, with implications of a somewhat greater antiquity for the Still-Bay, which is interestingly contradicted by the typology of the respective industries, since the Still-Bay is decidedly more 'evolved.'

The absolute age of this Monastirian II beach, so closely connected with both, must remain open until physiographers decide if a Riss-Würm synchronism is really obligatory. Meanwhile in South as in North Africa it seems impossible to adjust the archæological facts to that conception.

VII. DISCUSSION OF THE ATERIAN AND STILL-BAY RELATIONSHIP AND ORIGIN

Were it not that Aterian and Still-Bay industries differ so markedly over those most important weapons, the tanged javelin-point and tanged arrow-head, the

[198] *ibid.*, pp. 16, 23, and Fig. D.
[199] *ibid.*, p. 25.
[200] Burkitt, 1928, pp. 86, 170.
[201] Derived from the wood technique in vogue in the Lower Palæolithic.
[202] Details in Keith, 1931, pp. 126-142 ; also Goodwin and van Riet, Lowe 1929, pp. 125 f.
[203] Goodwin and Malan, 1935, p. 133 ; see also Zeuner, 1945, pp. 241 f.
[204] *ibid.*, pp. 134–137.
[205] Considered to be partly contemporary with the Still-Bay industry of which it is a variant, due to choice of material.
[206] *ibid.*, p. 137.
[207] *ibid.*, p. 138. Breuil, 1945, p. 362, alludes to the Noordhoek gap and hand-axes from it, which he ascribes to the Fauresmith industry or "very near it." Perhaps a proto-Still-Bay or Mossel-Bay attribution may prove correct.

remarkable resemblances in most other respects of their stone equipment and manner of making it would possibly justify their amalgamation within a single cultural designation.

Apart from this radical difference, their requirements in life (in so far as stone artifacts in isolation proclaim them) differed little from each other, despite the vast geographic range and extremes of topography and climate covered between them, and certainly not more than is noticeable in regional differences within the same industry. Both based their lithic technique strictly on the Levalloiso-Mousterian model; both retained the ancient core biface or hand-axe[208] as a necessity whatever the environment; both developed, along precisely the same lines of partial thinning at base and tip of tortoise-core flakes, the fully bifaced spear-head, treated, by both groups, to a mixture of flat percussion and pressure flaking. Both utilised flake-blades from flake, not blade cores, the steep marginal treatment of which resulted in a pseudo-backed-blade, rare in the Aterian, fairly common in the Still-Bay. Both used burins, but the Aterians so rarely that this indicates an occupational divergence rather than similarity.

Another divergence was the "typical Mousterian" side scraper, and a whole range of more makeshift pattern, which was an early Aterian major requirement, apparently less needed by the Still-Bay groups, though in this respect fairly marked regional differences need watching.[209]

More differences than we are aware of might be disclosed by quantitative analyses of different types of artifacts for which the data do not exist. Meanwhile the more obvious divergences of Still-Bay from Aterian, apart from the radical one of the tanged artifacts, consist in the presence of microlithic bladelets and lunates in the Still-Bay, absent in the true Aterian of Styles α to γ; and in the increased formality and more invasive pressure retouch on the parti- or fully bifaced foliates of the Still-Bay group. The consistently high level of this retouch on the spear-heads from Gorgora [210] to take one example, is unknown to me in any Aterian assemblage made in the same material.[211] Nor did the Aterians favour the wide-based, sharply triangular form of this weapon

Whether the microlithic backed blades in the Still-Bay are derived, like some at least of the larger ones, from a particular sort of Levallois core, requires attention, to satisfy those who, like the present writer, doubt if contact with "neanthropic blade and burin" people is a satisfactory postulate.

In sum, the resemblances between the two industries are very close. Yet they are not identical, but appear rather as twin derivatives of Upper Levalloiso-Mousterian parentage, which grew to dominate, more or less simultaneously in time, but in mutual exclusion, virtually the entire African continent.

The Aterians, based in North-West Africa long enough to develop there three or four styles, ranged south to the Sahara's equatorial limits, and east to the Nile, but seem to have stopped short of the Nubian-Sudanese region. They were thus (taking into account late Pleistocene climatic evidence) predominantly desert and sub-desert dwellers, whose temperament or mode of life enabled them to adapt themselves also to the rigours of the Atlas flanks and high plateaux, as well as to the Atlantic and Mediterranean seaboards.

The Still-Bay people, no less adaptable climatically, monopolised the eastern half of Africa from the sub-desert zone to the Cape, with all that that implies of aridity, grass-lands, tropical forests and highlands, lakes, and Red Sea and Indian Ocean seaboards.

In view of this eclectic distribution it seems out of the question to presume unsuitable environment as the deterrent to the use of the tanged missile in Still-Bay groups; or to rationalise by these means its extraordinary appearance in the Cape Peninsula over 4,000 miles from its nearest Aterian representative in Kharga Oasis.

It would be unwise to envisage either culture-group, given its geographical range, as homogeneous in the physical sense, though the immense distance which separates the Boskopoid-Bushman of the Sudan from his brethren in South Africa is there to remind us of the magnitude of that question (*cf.* Section VI).

Africa has already revealed herself as the Upper Pleistocene home of a very remarkable physical diversity of man, *sapiens* and *non sapiens*, distributed, on the evidence of his plethora of artifacts, in densities of tropical population unparalleled elsewhere in prehistory. Thus, assuming a Proto-Bushman or Bush-Boskopoid race to be the dominant one of Aterian or Still-Bay times, and the brain behind the cultural achievements of the Still-Bay, and conceivably of the Aterian also, it would seem inevitable, given the distribution of his artifacts, that he imposed his formidable lithic culture, in peace or war, upon many at least of his contemporaries. The question is inseparably linked with the equally problematic

[208] The 'pseudo' should be dropped. These core bifaces are hand-axes.

[209] At Mumbwa (Clark, 1942, p. 181) scrapers are the commonest group of implements; at the Cape Flats (Malan and Goodwin, 1938, p. 18) side scrapers are very rare, end scrapers few

[210] Moysey and Leakey, 1943, Pls. 33, 34, 35.

[211] Assuming this to be fine-grained rock. The required information is lacking in the Gorgora report.

significance of the pan-African distribution of earliest African cave art—the bow-and-arrow hunting scenes —which follows, as Leakey has noted,[212] that of the Still-Bay industry (as well as the Wilton), and, I might add, of the Aterian.[213] A mounting list of caves yielding Still-Bay implements in deposits containing particles of pigment should not be ignored.

The western half of Africa from the Niger south is still virtually unexplored ; but if either industry is eventually found there, it seems more likely to be the Aterian.

If this, then, is an approximately accurate presentment of the Aterian—Still-Bay factors, it is evident that we face a very intricate problem of cultural ancestry, complicated further by uncertainty as to whether they shared one in common. To clear the approach, an inevitable over-simplification of the component parts of the question seems required :

1. On the one hand, the relation of both industries to the African Levalloiso-Mousterian culture, the features of which were perpetuated so pervasively in Aterian and Still-Bay, must be taken into account.

2. On the other hand, thought must equally be given to those added, extraordinary elements in both, which seem outside the normal Levalloiso-Mousterian culture-orbit : the Solutrian-like flaking ; the core bifaces ; the tangs (in the Aterian) and the blade-backing (in the Still-Bay).

1. With the Levalloiso-Mousterian represented in Africa north of the Union as a distinct culture in time and place, with a geologically defined 'Upper' horizon in North Africa, claimed also in East Africa,[214] the techno-typological elements derived from it in the Aterian and Still-Bay are perfectly intelligible.

We have, however, given evidence that Aterian derivation from an Upper Levalloiso-Mousterian must have been a purely regional affair, suspected to have happened in North-West Africa (*cf.* Section V). Certain is it that not all Upper Levalloiso-Mousterian groups, in fullness of time, developed "Aterianism," but some were deflected in other evolutionary directions (*e.g.*, towards 'epi-Levalloisianism' in Egypt), whereas in Europe they gave way, on the orthodox view, to Aurignacian inroads.

Since Still-Bay distribution prohibits North-West Africa as its evolutionary home, and the regional Upper Levalloiso-Mousterian there cannot, in any case, be envisaged as schizophrenic, it seems necessary to postulate some other, unknown, region of parallel Levalloiso-Mousterian development towards the Proto-Still-Bay : and we cannot fail to think wonderingly of the Kinangop Plateau "Pseudo-Still-Bay" of Kenya[215] (*cf.* Section VI).

2. Unfortunately, few details are available of the Moroccan Upper Levalloiso-Mousterian : we must rely on the bare statement that a Levalloisian, considered Upper, ascribed to the last Inter-pluvial (equated with the Riss-Würm), and contemporary with a developed Acheulian, contains "pseudo bifaces," and flakes with "*enlèvements basilaires.*"[216] The same author claims evidence of a Mousterian (derived from the Upper Levalloisian) and a parallel Micoquian, in the last Pluvial (=Last Glacial) : they provide a suitable techno-typological background for the Aterian, supplemented by the additional evidence from Egypt that fully bifaced flakes and Tabalbalat bulbar treatment were not unknown in the Upper Levalloiso-Mousterian. The tanged flake, therefore, whether javelin-point or arrow-head, remains together with the hand-axe, the only item in Aterian equipment for which a precursor did not exist in the preceding period. Shouldered flakes are, of course, recorded in the European Mousterian, and in the Nile Valley an undated series has been published as 'Late or Post-Mousterian.'[217] These are not Aterian, nor tanged ; but they surely indicate an early (or provincial ?) conception of the advantages of hafting by some such contrivance, which was perfected by an inventive Aterian in connection with that major invention, the bow—the inspiration surely of a single creative genius ?

One cannot but feel, however, that, given the richness and precocity of African prehistory, all this is a thread-bare rendering of the Aterian and Still-Bay background.

Many of us believe with Lowe[218] and others that Africa is the homeland of the core (or flake) biface, derived from a primæval pebble culture. Its inextinguishable vitality there is shown by its persis-

[212] Leakey, 1936*a*, p. 140.

[213] Aterian artifacts have not been recorded from Owenat and the Gilf Kebir, but their appearance in Kharga, east of that massif and plateau, virtually establishes their presence there. Aterian invasion of Kharga, known to have passed through Siwa and Dakhla, probably followed the more southerly Kufra-Gilf route also.

[214] Publication of the details is required.

[215] Leakey, who disclaims its connection with the much later true Proto-Still-Bay, derives it (1936*a*, p. 75) from a lateral offshoot of the Early Levalloisian. On his other graph (1936*a*, facing p. 136) it is shown as the direct descendant of the Sangoan.

[216] Ruhlmann, 1945*a*, p. 40 f. The parallel existence of two cultures, if substantiated, is interesting. Kharga has stratigraphically proved an Acheulio-Levalloisian (*i.e.*, Faure-smith in Abyssinia, Kenya and South Africa ?) between the Upper Acheulian and the lower of two pure Levalloisian levels (*cf.* Caton-Thompson, 1946, p. 59 f and Diagram I.).

[217] Sandford and Arkell, 1934, pp. 116–118, Pl. XXXVIII.

[218] Van Riet Lowe, 1945.

tence in East Africa into the later 'Tumbian' phases (late Gamblian on Leakey's determination);[219] and its reappearance in Egyptian Neolithic,[220] Predynastic,[221] and Old Kingdom[222] times, for use, apparently, as an agricultural tool in the two former, and for quarry work in the latter.[223] The evolved Acheulian form of hand-axe may be so thin in section as to simulate a foliate; and, in surface association with Aterian spear-heads, helped, in North-West Africa, to create the illusion of the S'baikian industry. In Egypt fully bifaced, long, flat, narrow fragments, of 'Tumbian' appearance though not recorded *in situ*, are possibly Acheulian.[224] A very thin, semi-bifaced dagger *in situ* in the Acheulio-Levalloisian of Kharga continued this early biface tradition, alongside the orthodox hand-axes.[225] The flattened thinness of cross-section in many flake or core hand-axes in the Abyssinian, Kenyan, and South African Fauresmith is notable.[226]

This ingrained older African biface tradition, reacting selectively for inexplicable reasons on two regional Levalloiso-Mousterian groups, may have given them respectively an impetus towards eventual Aterian and Still-Bay development. If so, hypothesis (b) of Section I must be conceded.

There is, however, I think, another possibility—one charged with dangers and chronological pitfalls, requiring an act of faith to support, certain to be widely opposed; but irresistible in the magnitude of the relatively simple solution it offers for many palæolithic problems, Aterian and older.

This is the possibility that Central Equatorial Africa was the shaping ground, and the control centre, of Africa's later palæolithic destinies.

It is too soon to perceive the eventual shape, age, sequence and distributional significance which prehistorians will give to that disreputable and amorphous Congo culture, the Tumbian.[227] But whatever it is decided to call it, or to include in it, the outlines begin to emerge from O'Brien's study in Uganda[228]; Leakey and Owen's in Kenya[229]; and Breuil and van Riet Lowe's recent classification of Cabu's material from the terraces of the Kasai River.[230]

That Menghin's 'Tumbian' represents, however confusedly, a developing cultural entity of great potential importance, seems incontestable. It supplies, by recent accounts, and indeed as Colette insisted long ago,[231] an evolutionary series receding into distant pre-'Tumbian' horizons of Lower Palæolithic antiquity.[232] Techno-typologically it seems formed of just such a combination of flake and bifaced elements as is required (unless its lower and middle horizons are more belated than seems credible) to rationalise those same persistent elements in the Aterian and Still-Bay industries—namely the Levalloisian technique, the core-biface technique, and the flake and core foliates.

Breuil's preliminary classification of Cabu's Congo collection discloses a growth based on the first stage, the Kalinian (or Congo Fauresmith ?), which in the second horizon (Djokocian) had already reached a development evoking a 'proto-Still-Bay.'[233] The Lupembian, derived from the last, is assigned to the Middle Stone Age: the forms remain essentially Djokocian, though some foliates diminish to arrowhead size.[234] And backed blades and bladelets of Chatelperron form appear, some apparently of flake-core origin,[235] together with the possibility of true arrow-heads, which, in the final or Tshitolian group, become undoubted and various, and include one specimen with "*une curieuse saveur atérienne.*"[236] A final-Middle-Stone-Age position is suggested for this.[237]

A far greater Pleistocene age for these various 'Tumbian' phases begins to be envisaged than was at one time supposed; and personally I have no doubt at all, given the lay-out of Stone-Age Africa and the biological background in general, that it will be fully substantiated.[238]

The completely unverified bearing of all this upon the origins of Aterian and Still-Bay is self-evident, and will rest ultimately upon an agreed geological sequence dating in which sea levels will, one hopes, be prominent. Both Aterian and Still-Bay, for their part, have

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[219] Leakey, 1945, p. 14.

[220] Caton-Thompson and Gardner, 1934, p. 21, under 'celtiforms.' Pls. XLV, XLVI, 3, 5.

[221] Myers and Huzayyin, 1937, p. 212 f. Pl. LXIV.

[222] Caton-Thompson and Gardner, 1934, p. 129, Pl. LXVII

[223] General review by Coghlan, 1943, pp. 27—56.

[224] Seligman, 1921, p. 122, Fig. 4.

[225] Caton-Thompson, 1946, p. 61, Fig. 2, No. 6.

[226] Desmond Clark, 1945, p. 23; Leakey, 1931, Fig. 9; Goodwin, 1929, p. 72.

[227] Disreputable because condemned by the leading South African prehistorians led by Breuil (1944) and van Riet Lowe (1946), supported by Cabu (1944), and independently by Delcroix and Vaufrey (1939). Of the latter, see criticism by Shaw, 1944, pp. 56 f.

[228] O'Brien, 1937, 1939.

[229] Leakey and Owen, 1945.

[230] Breuil and van Riet Lowe, 1944.

[231] Colette, 1929.

[232] Bequært, 1938: van Riet Lowe, 1946.

[233] Breuil and van Riet Lowe, 1944, p. 150.

[234] *ibid.*, p. 157.

[235] *ibid.*, pp. 151, 157.

[236] *ibid.*, p. 153. I am reliably informed that this is of true Aterian technique.

[237] *ibid.*, p. 166.

[238] Shaw, 1944, pp. 51–61, gives a critical review of the evidence to date.

provided their *terminus ad quem*. Their heterogeneous parts, drawn, as is commonly believed, from diverse "hybridising" sources, appear as apparently integral ingredients of the various horizons postulated for the Congo earlier 'Tumbian'; and Lowe has pronounced "there are unmistakable affinities between the Djokocian and the Still-Bay of South Africa on one hand, and the Djokocian and the Aterian of North Africa on the other."[239]

In other words, if the crucial geochronological test be passed, it may eventually be possible to discern ripples of 'Tumbian' dispersion from a mighty Congo reservoir, lapping against and revitalising a pre-existent population in North-West Africa, with a resultant Aterian industry, owing its arrow-heads and foliate spear-heads at least to Central Africa: and a similar, but perhaps at the start rather earlier, movement from the Equatorial reservoir east and south-eastwards, with a resultant Still-Bay industry. It is, at the moment, the only hypothesis which seems to cover both the distributional divergence and cultural resemblances of Aterian and Still-Bay industries.

At all events we may have here the control centre of a whole group of major prehistoric problems noted in our opening pages. The most fundamental of these concerns the relationship, within this apparently homogeneous 'Tumbian' culture, of the three basic techno-typological elements which compose it—the core biface; the tortoise core and flake; and the backed blade; with bifacial flake retouch at a masterly level cementing the first two.[240]

It is not, therefore, a 'pure' culture at any postulated level of development; and has, inevitably, been designated 'hybrid.'[241] I doubt if any lithic assemblage is techno-typologically 'pure,' unless it be one of primæval pebbles hurled by sub-hominids at each other in Equatorial forests. The unsuspectedly wide range of artifacts and ways of making them in any single culture-group is now being increasingly realised through the more scientifically complete excavations and publications of the past twenty years. These have already transformed our view of prehistory only less than the next twenty will retransform it. Few, if any, individual artifacts, however specialised in type and technique, can now be safely 'dated' to the culture-horizon formerly regarded as specifically its own. Supposedly 'late' forms appear, sporadically, in earlier and earlier contexts, and we can no longer 'place' a group of artifacts by the light of the most advanced type in it.

It is the first appearance of a type which is the significant thing; and the significance may not, I suggest, invariably be 'culture-contact' (though that must have become increasingly frequent down the palæolithic ages, and we have not hesitated to invoke it here), so much as man's experimental and unpredictable nature,[242] tempered by his environmental needs.

VIII. The Aterian-Solutrian Question at Parpalló

The Aterians, we remarked in the Introduction, were one of four palæolithic claimants to the revolutionary invention of the bow and arrow, the others being the Gravettians, the Solutrians of East and North-West Europe, and the mysterious creators of the beautiful pressure-flaked arrow-heads of 'neolithic' aspect in South-Eastern Spain.

The problem of priority is implicitly charged with wider questions of African-European interconnections, which have baffled prehistory since the Capsian was dispossessed of its formerly attributed antiquity.

We have, in our Aterian examination, concluded that Morocco was probably the main centre of evolution for that industry; but that sequences of so-called 'Tumbian' culture in the Congo area, in which various sorts of arrow-heads appear to have started early, seem likely, if chronologically verified, to be the primary point of departure.

The Aterian falls into three fairly well defined stages. The two earlier ones were old enough to have witnessed a survival of the relict 'archaic warm fauna' constantly associated round the Mediterranean with the Late Upper Levalloiso-Mousterian culture of Neanderthal man, established upon a beach at about 5–10 m. above present datum. For this beach, since its individuality in terms of marine cycles has been established in Egypt, I have retained the disputed name of Monastirian II. Aterians of one or other of the two older styles adopted the Levalloiso-Mousterian practice of camping among sand dunes formed on this beach, and in North-West Africa their artifacts directly overlie in one or two places those of the older industry (which probably lingered on in areas unaffected by Aterian development, until replaced by

[239] Breuil and van Riet Lowe, 1944, p. 171; though Malan, 1943, p. 85, refers to important differences.

[240] Such as the picks and spear-heads, up to 31 cm. long Leakey and Owen, 1945, Fig. 18.)

[241] Leakey and Owen, 1945, p. 15 f. The Proto-Tumbian (Sangoan) is regarded "with no doubt whatsoever" as a "hybrid culture deriving part of its elements from a degenerate stage of the hand-axe culture, and part from the Levalloisian culture." That represents, doubtless, the consensus of opinion. Personally I prefer to suspend judgment until the earlier stages and geological sequences are adequately known.

[242] Garrod, 1946.

Aurignacian culture), with no geological suggestion of a prolonged interval. For long stretches of the Algerian coast, Aterian artifacts lie at this same constant level in fossil dunes.

The age of the sea which formed the Monastirian II beach is unagreed. For archæological reasons, and supported by Middle Stone Age evidence from Mossel Bay, Cape Colony, I have suggested a Würm I–II interstade for the attention of physiographers. The age of the dunal or other deposits, formed on it after the sea had begun to withdraw in accordance with the theory of glacial eustasy, and which I have named Berardian, is, however, the crucial thing here. I suggest, again supported by the Cape Flats coastal prehistory, that Würm II, in a broad sense, is a reasonably assured estimate to cover both the beach's first campers and their Aterian successors, whose exact altimetric relation to a falling sea affects their position in respect of the Würm II regressive maximum, and may precede it in one or both cases (*cf.* Note 7).

The publication in 1942 of *Parpalló*,[243] threw a challenge to academic prehistory which, in any survey of the Aterian, it would be cowardly to ignore entirely. Though the moment is still unripe for definite conclusions, which, in any case, must equally encompass the artistic problem not attempted here, the shape of probable events begins already, in my opinion, to emerge, and it may not be premature to try here to trace an outline, admittedly as conjectural in places as the reconstruction of a partly obliterated cave painting of comparable age.

The Parpalló sequence was as follows :—[244]

Levels VI-IX	Magdalenian IV to I	Contents irrelevant here.
Level V ...	Solutrio-Gravettian	Gravettian industry with 5 Solutrian winged and tanged arrow-heads as before.
Level IV ...	Upper Solutrian ...	26 foliates (12 coarse) : 46 tanged and winged arrow-heads.
Level III ...	Middle Solutrian ...	52 foliates (20% coarse) unifacial and bifacial; two unifaced tanged points.
Level II ...	Lower Solutrian ...	6 unifaced foliates.
Level I ...	Gravettian ...	Contents irrelevant here.

Pericot, in his admirably thorough analysis of the complex factors presented by the sequence of deposits and their amazing contents, isolated two fundamental problems which concern North African prehistory :[245]

1. The relationship of the Parpalló Solutrian to the Aterian.

2. The relationship of the Parpalló blade industries to the Capsian.

And he left them largely suspended for lack of a fixed chronology in North Africa. This I have tried to supply ; and it now rests with European Upper Palæolithic specialists to consider the correlation value of these findings. To be recklessly precise, I propose an early Würm II age for the Aterian of Styles α and β. Style γ is uncorrelated ; but, by typological measurement and physiographical position in the Kharga sequence, is rather later. The Lower and Typical Capsian on existing evidence is, in the main, somewhat later still.

I shall, therefore, in discussion here, feel justified in assuming that the problem of interrelationship between Parpalló and Africa, if any, is not one of delayed cultural effect (comparable to the frequently and rashly invoked Faiyum—Merimdian influence in Spain of a later date), but a more or less contemporary affair.

Taking Pericot's two problems in turn it will be convenient to sub-divide the first into two considerations : (*a*) the question whether the resemblances between the Parpalló Solutrian (three levels) and the Aterian (three stylistic horizons), are close enough to warrant the inference that one is due in some way to the other ; and if so, (*b*) from which end was the " influence " derived, and what chronological relationship may be suggested. The second problem, the Capsian connection, is outside our already over-extended scope, and a summary outline of the position, actual, and possible, must suffice.

Problem 1 (*a*). The controlled bifacial retouch and perfection of symmetry in the Parpalló arrow-heads are far above the competence of known Aterian groups.[246] Aterian arrow-heads are seldom bifaced except for the tang, and normally exhibit plain flake surfaces without retouch (as Fig. 10, No. 13).

None the less, even in the older styles, specimens with invasive retouch over the upper side were made (Fig. 10, No. 33 ; Fig. 9, No. 4) ; and coarse bifaced individuals already occur.[247] Such similarities as exist between Parpalló and North Africa lie more in form than execution. Pericot rightly noted Antoine's curious bifaced Aterian arrow-heads from Morocco, the *pointe marocaine* (Fig. 9, No. 1), and the *pointe pseudo-saharienne* (Fig. 9, Nos. 2, 3, discussed in Section II) ; but placed them in a suspense account

[243] Pericot y Garcia, 1942.

[244] I have drawn on Childe's excellent summary (1944, pp. 29-35) for this analysis of the layer contents but not otherwise.

[245] Pericot, 1942, pp. 316ff.

[246] I refuse to use surface material, Saharan or other, supposed to be Aterian, and limit myself to still restricted *in situ* groups.

[247] Ruhlmann, 1936, Fig. 16, no. 36.

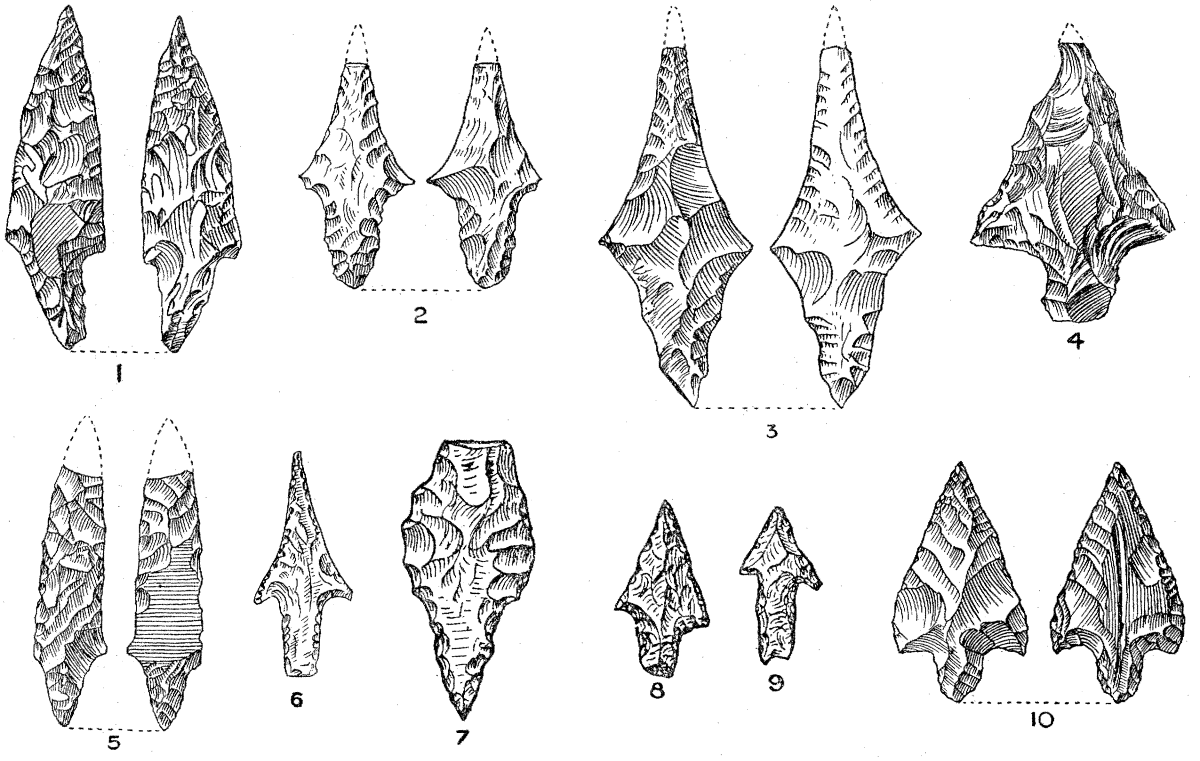


FIG. 9.—NOS. 1–4. MOROCCAN ATERIAN ARROW-HEADS. NOS. 5–10. PARPALLÓ ARROW-HEADS, LEVEL IV. SCALE 1 : 1.

awaiting verification.[248] This they have now fully received,[249] and doubt only remains as to the Aterian horizon to which they belong—Ruhlmann's Upper Aterian (of two) ; or the Style β (of three) proposed here (*cf.* Section II).

In Fig. 9, Nos. 1–4, these Moroccan arrow-heads have been redrawn[250] to the same scale as their Spanish parallels. Given the peculiarity of outline, with the unusual median position of the barbs, it seems to me evident that one is a derivation from, or copy of, the other. Chance cannot have thrown up independently, at about the same palæolithic moment, in contiguous areas, these unusual forms.

(*b*) Granted the interconnection, which is the inventor ? A case may be made for both. It is possible to envisage the rude Aterian technique, in these and other arrow-heads, as a barbarous copy, by a tortoise-core and flake-using people, of refined European models, made by a blade-using people, derived and locally elaborated from the Solutrian.

On the other hand, it is equally possible to envisage the Spanish Gravettians assimilating an African invention of great importance, and transcending the original. But if so, why abandon it so speedily ? The bifaced arrow-head appears at Parpalló as an alien intruder of short duration : a tentative approach in level III ; a flood in level IV ; a sudden reduction and disappearance in level V. It suggests not Gravettian assimilation so much as Aterian invasion ; and that view might be advocated were it not for the unresolved problem of the different technical levels. In spite of this unexplained fact, which may, at any moment, be cleared up by the discovery of an early Aterian of fine quality (the search is barely begun yet), it seems to me almost certain that, given the respective backgrounds, or '*synthèses culturelles*,' the inspiration was African, not European. We have noted (Section V) that Khenzira level A—the oldest Aterian we can be sure of—already contained mature unifaced arrow-heads (Fig. 9, No. 4) ; there are earlier levels somewhere, in Central Africa if not in Morocco.

The still obscure Aterian-Djokocian relationship needs to be borne in mind ; and in this connection it is worth noting that the type of arrow found in

[248] Pericot, 1942, p. 317.

[249] Ruhlmann, 1945*b*, pp. 75f.

[250] By Mr. C. O. Waterhouse, to whom I am also indebted for Figs. 8 and 10.

Parpalló level IV[251] is a common, though unreliably 'dated,' African form.[252]

No comment is needed on the Parpalló foliates as distinct from the arrow-heads, with this exception: that whereas the fine retouch of the Parpalló arrow-heads distinguishes most of them from most of the Aterian of comparable forms, the foliates, many of which at Parpalló are coarse, seem technically more nearly on a level. The Kharga specimens (Fig. 13, Nos. 5, 7), the best yet known as to flaking, are witnesses. These foliates are, however, Style γ.

It may be noted without comprehension of the significance, if any, that the Parpalló foliates appear, blossom, diminish and vanish one stage ahead of the arrow-heads.

The Aterian origin of the bifaced element in South-East Spain, if admitted, inevitably enforces reconsideration of the whole Solutrian question. It is really overtaxing the probabilities, as Pericot recognised,[253] to suppose that Parpalló was the meeting-place of two convergent, unrelated spreads of biface industries from north and south, which miraculously reached, at precisely the same moment, the Gravettian world established there and elsewhere. Reject that as fantastic and what logically remains? The elimination of the Solutrian culture, not only from Southern Spain,[254] but from Catalonia, Franco-Cantabria and beyond; leaving the Hungarian Solutrians, whoever they were, masters in a much diminished eastern field.

In other words, I suggest that a current of Aterianism swept into, and pervaded for a relatively short time, the well consolidated Gravettian world of the Iberian Peninsula and thence into Western Europe, neither undermining nor eliminating the established blade culture, but superadding to it, by some obscure selective process, its own most serviceable, and incidentally most warlike, elements.

In broad outline the Parpalló-Aterian chronological relationship might be as follows:—

North Africa.	*Parpalló*[255]
4. Neo-Aterian ? style δ = Typical Capsian, Lower Capsian	v. Solutrio-Gravettian (El Mekta contact).
3. Aterian style γ	iv. Upper Solutrian.
2. Aterian style β	iii. Middle Solutrian.
1. Aterian style α	ii. Lower Solutrian.
	i. Gravettian.
0. Later Upper Levalloiso-Mousterian	?

Problem 2. Pericot has noted the striking resemblance of a geometrically engraved slab in Parpalló V to a design from El Mekta of Typical Capsian age.[256] That and the micro-burins in the same level proclaim a continued contact at that later moment between the two regions, after the biface tradition had waned.[257] We found no cause to suppose that even the earlier Capsian originated as early as Aterian Style γ (*cf.* Section III, end); and though it seems unlikely that a bridge or overlap did not, in reality exist somewhere with a belated Aterian, no Capsian contacts yet identified are in a chronological position to account for the supposed 'blade-culture' elements in Aterian Style γ equipment—the single and double end-scrapers and rare transverse angle-gravers. Unless, therefore, the predominantly tortoise core and flake technique of Aterian industry, set out at the beginning of Section II, evolved these forms itself, which I envisage as quite likely, it seems necessary to look to Gravettian ideas from Spain[258] which *are* chronologically possible and which are, indeed, implied as soon as Aterian intercourse with that quarter is acknowledged.

In other words, the cultural pendulum swung to and fro, delivering and receiving contributions from both worlds. And with the Aterians and Gravettians in close touch and their contemporaneity well defined, the problem of the origin of Capsian industry should before long yield to renewed examination. The issues lie with:

(*a*). *A stream of Asiatic 'blade' origin, passing across North Africa.* The apparently complete absence of sufficiently related material between Palestine and Tunisia has forced illusory suppositions of a Sebilian *point d'appui*, under misapprehension of the

[251] Pericot, 1942, Fig. 23, no. 3.

[252] I begin seriously, though dimly, to envisage the Egyptian Neolithic of Faiyum-Merimde as probably due to the same culturally precocious stream of Equatorial stimuli as had, I suggest, affected North-West Africa somewhat earlier; and the 'Solutrian' element in it, long ago urged by Petrie, and refuted by me, to be derived from that source, along with the beginnings of pottery (and perhaps the ground axe), late palæolithic in origin farther south as Leakey first claimed (1931, pp.103f.).

[253] Pericot, 1942, p. 347.

[254] Gobert and Vaufrey, 1932, pp. 488f, mention sites in Almeria summarily published by Siret, where foliates and bifaced arrow-heads are associated with a blade industry presumably Gravettian.

[255] If the views propounded here are acceptable, the designation 'Solutrian' must be replaced by 'Aterio-Gravettian' for levels II to V.

[256] Pericot, 1942, pp. 330f., Fig. 650.

[257] At Parpalló the micro-burin starts in level IV (one specimen): level V, seven specimens: level VI (Magdalenian I), temporary disappearance. In the Aterian, styles α to γ, none; in Passemard's Lower Capsian, none; in the Typical Capsian, abundant.

[258] But belonging doubtless to the main block of Gravettian industry in Western or Eastern Europe.

distribution of that purely local epi-Levalloisian flake, not blade, industry. It is a Nubian and Southern Egyptian industry of limited Nilotic range.[259].

(*b*). *An East African secondary centre of Aurignacian culture, derived from Asia via Arabia; with a tertiary movement thence to North-West Africa.* The significance of the Kenya Aurignacian is problematic. It may be suspected to be derived from a tortoise-core and not a blade-core origin. The faceted butts of some of its blades have been noted in Section VI. Similarly the supposed 'neanthropic' blade element in the Still-Bay of Northern Rhodesia, Natal, Zululand, the Cape Peninsula and probably Abyssinia, attest on occasions a Levalloisian technology which may be more prevalent than has been realised. The Capsian appears to be as true a blade-core industry as the Gravettian. The possibility, therefore, that it and the Kenya Aurignacian are unrelated is not negligible. For the latter I am inclined provisionally to invoke linear development from a tortoise-core substratum;[260] the resemblances to the Capsian would therefore be fortuitous and due to convergent evolution. The Sebilian is there to prove the manufacture of backed artifacts and trapezes from miniature double-ended Levalloisian cores, which themselves have a very respectable antiquity in the Lower Levalloisian if not before.[261]

(*c*). *A Neo-Aterian origin.* The evidence for an Aterian Style δ stage (Section II) is too ill established to form a basis for serious discussion. If it exists as a chronological and typological entity one might guess at its connection with the formation of the Oranian industry rather than the Capsian. The typological and distributional differences between Oranian and Capsian have been demonstrated.[262] The technological differences require equal definition, to establish or demolish a suspicion that the Oranian is based on a Levallois-core tradition, the Capsian on a blade-core tradition. The little double-ended pebble-cores of the Oranian have been rightly likened to the Sebilian[263] (of Levallois origin); the thick backing of its microliths[264] is, in my opinion, another indication leading to the same conclusion;[265] and a number of its blades show faceted platforms.[266] Moreover, Oranian distribution covers the Aterian province in Morocco and Algeria much less incompletely than the Capsian.

(*d*). *A Gravettian origin from Spain.* In Garrod's careful review[267] she concluded that, though the Gravettian had clear affinities with the Capsian, and might be contemporary with it, an African origin must be ruled out.[268] The reasons were: 1. The presence of micro-burins and lunates in the Lower Capsian, absent in the Gravette—Font-Robert stages of Europe. 2. The too belated appearance of Capsian influences in the Iberian Peninsula. 3. The strength of Gravette—Font-Robert industry in Central and Eastern Europe, pointing to a Eurasiatic origin. 4. The absence in Spain and Little Africa of the female figurines constantly associated with the Gravettian of Central Europe. She suggests that the Capsian-Gravettian similarity is better explained by a common derivation from the Chatelperronian, along circuitous geographical routes.

The possibility of reversing the movement geographically, and deriving the Capsian from Spain, has now been opened up by the removal of objection 1. since the micro-burin appears in Parpalló level IV, 2. is undermined by the Parpalló chronology. 3. The validity of this assumption remains unimpaired. 4. Remains unanswered, from whichever direction it is argued; but if real, might be explained on religious grounds. In view of the close resemblances of many decorative motifs on Parpalló slabs to Capsian ostrich-egg scribblings,[269] and the unmistakably 'Aurignacian' affinities of Clergeau's splendid bovine fragment from south of Biskra, painted in red on ostrich egg shell[270] it now seems difficult to deny a close artistic connection.

Though the inland enclave to which Lower Capsian distribution is allegedly confined, provides an additional minor (though perhaps transitory) objection to hypothesis (*d*.), there is, on the whole, much to favour it given the established El Mekta contact with Parpalló V. And I see no reason to cling to the view that the micro-burin by-product technique is necessarily African in origin until the comparative chronology proclaims it as such. The Romanelli and

[259] Caton-Thompson, 1946, p. 112.

[260] Professor Garrod has called my attention to Haller's relevant evidence from the Abri Abou-Halka, Syria, 1946.

[261] Caton-Thompson, 1946, Fig, 3, no. 4; Fig. 7, no. 3; Fig. 8, no. 8.

[262] Gobert and Vaufrey, 1932, pp. 449-490; Vaufrey, 1933, pp. 457-483.

[263] Gobert and Vaufrey, 1932, p. 483.

[264] *ibid.*, p. 466.

[265] Caton-Thompson, 1946, p. 118.

[266] Gobert and Vaufrey, 1932, p. 479.

[267] Garrod, 1938, pp. 1-26.

[268] *ibid.*, p. 21. Gobert and Vaufrey likewise recognise the typological resemblances, but rejected a connection (1932, pp. 487-489).

[269] Thus Pericot, 1942, Fig. 208; Le Du, 1934b, Fig. IV. There are others demanding study and chronological comparisons. Many are Magdalenian on one side, Upper Capsian on the other.

[270] Breuil and Clergeau, 1931, pp. 53-64.

Parpalló micro-burins are certainly as old as anything Africa has yet produced ; at Romanelli their context may be older still.[271]

I suggest, therefore, for the future to decide, that whereas the Oranian may be an autochthonous African microlithic industry, derived, like the Sebilian and other epi-Levalloisian regional groups and perhaps also like the Kenya Aurignacian, from a Levallois-core tradition, the Capsian may be a colonial expression of the European Gravettian blade industry from Spain, ultimately, therefore, of Eur-asiatic origin.

My attempted study of Aterian industry and its contemporary Upper Palæolithic world of Africa and Europe has, therefore, thrown into relief the many problems outlined in the prefatory remarks which confront, haunt and stimulate the prehistorian.

[271] Blanc, 1939*b*, pp. 115–131.

Note 1

Type cited in publication	*Djouf-el-Djemel*[1]	*Bir-el-Ater*[2]	*Puits des Chaacas*[3]	*Oum-el-Tine*[4]
Discoidal cores or discs	72 = 62·6%[5]	90 = 94·7%	25 = 100%	58 = 100%
Ovoid tortoise cores	11 = 9·5%	—	—	—
Triangular tortoise cores	19 = 16·5%	—	—	—
Lamellar and other cores	13 = 11·3%	5 = 5·2%	—	—
Points (*Pointes à main*)	161 = 32·5%	150 = 26·7%	24 = 20·6%	34 = 14·4%
Tanged Aterian implements[6]	134 = 27·0%	231 = 41·1%	29 = 25%	100 = 42·5%
Side scrapers (*racloirs*)	28 = 5·6%	10 = 1·7%	7 = 6%	16 = 6·6%
End scrapers on flakes or blades	58 = 11·7%	127 = 22·6%	—	24 = 10·2%
Double end scraper	1 = ·20%	—	—	—
Retouched blades	42 = 8·4%	12 = 2·1%	29 = 25%	19 = 8%
Plain blades, no retouch	58 = 11·7%	20 = 3·5%	—	39 = 16·5%
Notched blades	10 = 2%	3 = ·5%	11 = 9·4%	—
Borers	1 = ·20%	—	3 = 2·5%	—
'Saws' (*scies*)	—	8 = 1·4%	5 = 4·3%	—
Burins, angle[7]	2 = ·40%	—	2 = 1·7%	—
Bifacial retouch[8]	—	—	4 = 3·4%	—
Totals	610	656	141	293

[1] *Le Du*, 1934*a*, pp. 201–217.
[2] Reygasse, 1919-1920, pp. 551 ff.
[3] *ibid.*, - .
[4] *ibid.*, - .
[5] Core percentages are based on core totals ; the rest on implement totals, cores excepted.
[6] Include end scrapers with tangs.
[7] A fine angle graver, 9·3 cm. long, is made on a tanged point, included in the pedunculated class.
[8] Not mentioned by Reygasse, and published by Le Du, 1934*a*, Pl. XI, pp. 215-216.

NOTE 2.

Types or Style	*French Morocco. El Khenzira*[9] *(Ruhlmann)*	*Algeria. Oued Djouf*[10] *(Le Du)*	*Kharga Oasis, Floor and Scarp.* KO6*E*[11] *(Caton-Thompson)*	*Bulaq Pass, Sites A & B*[12] *(Caton-Thompson)*
Material	*Level B*—Fine grained flint *Level A*—Cobbles of opaque mediocre flint Some quartzite used	Flint or chert; no other information —	Fine Eocene tabular, 70·7% Cobbles from gravels 29·2% Very rare quartzite	Fine Eocene tabular only
Cores	*Level B*—None mentioned but flakes indicate Levallois and blade cores *Level A*—Discoidal and blade cores	Triangular Lev., 16·5% Discoidal or ovoid, 72·1% Lamellar-flake, etc., 11·3%	Triangular Lev., 45% Discoidal or ovoid, 37% Lamellar-flake, etc., 9% Mostly thin and flat Av. length triangular, 7·1 cm.	Triangular Lev., 58·1% Discoidal or ovoid, 36·3% Lamellar-flake, etc., 5·45% Symmetric. Av. length of triangular, 8·05 cm
Flake lengths	*Level B*—Variable *Level A*—Small, up to 5 cm. Largest, 7 cm.	Majority 7 to 9 cm. Largest, 12 cm.	Average about 7·2 cm.	Average about 7 cm.
Retouch	*Level B*—Flat, elongated and invasive *Level A*—Restricted, quantitatively and qualitatively	Very flat	Flat	Flat
Tanged implements ...	*Level B*—Less abundant *Level A*—More abundant and more varied	27% of all implements Length, all over 4·5 cm. Mostly 7·8 cm.; maximum 11·3 cm. Some scraper-ended	13% of all implements Length, average 7·7 cm. Three with scraper ends	7·1% of all implements Length, average 8·3 cm. None scraper-ended
Tabalbalat points ...	*Level B*—One only ? *Level A*—Several, but not classified in this way	None published or noted in Constantine Museum	3% of all implements Length, average ±6·2 cm.	2·85% of all implements Length,average +7 cm.
End scrapers on flake-blades	*Level B*—Not mentioned or figured *Level A*—Not mentioned or figured	11·7% of all implements The longest noted 11·6 cm. Fine scraper retouch	3% of all implements Average length, 7·2 cm. Fine scraper retouch	9·25% of all implements Average length, 7·35 cm. Fine scraper retouch
Side scrapers(*racloirs*)...	*Level B*—Traditional types, thin and thick flakes *Level A*—Frequent. Wide variety, 5 to 7 cm. long	5·6% of all implements but are thin flakes with marginal retouch, not true Mousterian '*racloirs*'	None Some end scrapers with scraper sides	None Some end scrapers with scraper sides
Narrow flake-blades ...	*Level B*—Poor, maximum length, 6 cm. *Level A*—Lengths, 5·6 to 7–8 cm.	Numerous, 20·1% of all implements	8% of all implements Length, average 8·5 cm.	7·85% of all implements Length, average 8·75 cm.
Bifacial foliates ...	*Level B*—One narrow leaf-shape, 5·2 cm. long *Level A*—One rather thick, 6 cm. long	None	13% of all implements Length, average 8·9 cm. good flat retouch	One only, 7·3 cm. long good flat retouch
Other bifacial types ...	*Level B*—One triangular short point, 4·1 cm. long, one lanceolate implement of hand-axe type, 4·4 cm. long	None	1% of all implements Two thin ovals Average length, 10·5 cm.	One lozenge shaped arrow-tip, 5·2 cm. long. One tanged point, +7·3 cm. long.
Burins	None	Two angle: one on narrow tanged point	None	None

[9] Ruhlmann, 1936. This important study lends itself badly to analysis by failure to give numerical information for Levels A and B (Aterian), though Level C (Oranian) supplies it.

[10] Le Du, 1934*a*, pp. 201–217.

[11] *Cf.* Section IV.

[12] *Cf.* Section IV.

Note 3

Aterian Industry of Tit-Mellil

Type	Upper Level A, % based on 1263 artifacts.	Level B, % based on 334 artifacts.
Discoidal cores and discs[14] ...	37·85	53·85
Polyhedric and random cores ...	47·0	41·0
Lamellar-flake cores	7·00	2·56
Various cores	8·10	2·55
Points (Typical Mousterian) ...	8·08	13·55
Points (various subdivided types)	14·12	2·37
Points (Tabalbalat type)[15] ...	·83	·33
Tanged Aterian points	5·76	2·03
Tanged Aterian bifacial points ...	·18	—
Tanged Aterian scrapers ...	·65	·67
Bifacial arrow-head, '*Pointe Marocaine*' type	·09	—
Bifacial arrow-head, '*Pseudo-Saharian*' type	·37	—
Side scrapers	14·59	40·0
End and side scrapers on short oval flakes	2·32	8·13
End scrapers on flake-blades ...	·27	—
Retouched flake-blades	3·15	4·06
Plain flake-blades	7·71	4·74
Notched flake-blades	·46	1·01
Borers	2·78	3·72
Foliate bifacials	1·95	·33
Bifacial core tools or partial retouch, various	1·70	3·05

Note 4

Pescadian Deposits

The name "Pescadian," here proposed, is taken from two caves at Pointe Pescade, one of which may claim priority of discovery and publication in Algerian prehistory.[16] Its deposits are more or less representative of those generally overlying the Monastirian I beach in North-West Africa. The name maintains the tradition established by Depéret when he bestowed the term 'Monastirian' upon the beach itself, from Monastir in Tunisia. Whether in caves or in the open[17] these Pescadian deposits may be summed up as strata predominantly of red breccia, red clays, or red argillaceous sands, often overlying conglomerates and beach cobbles. They are constantly associated with a mammalian fauna which includes "archaic" forms of the great herbivorae in combination with an incoming "replacement" fauna of holarctic type, well exemplified in the cave at Guyotville (Sintes).[18]

Cave of Pointe Pescade II[19]

4. Wash deposit of red (clay) mud, with mammalian bones, 5-6 m.
3. Rolled schist fragments, 25 cm.
2. Red earth with angular schist fragments, 50 cm.
1. Marine sands with *Patella* etc. at 19·0 m. above present sea.

The mammals in 4 (derived) include *Rhinoceros Merckii*; possibly *Elephas antiquus* (certain elsewhere); *Hippopotamus*; *Bubalis antiquus*; *Taurotragus oryx* (*Antelope canna*), to mention the more "archaic" and climatically significant creatures.

At another cave in the locality a Levalloiso-Mousterian industry occurs in stratum 2. Arambourg interprets the physiography of Pescadian deposits as follows:—

1. Marine deposits formed by a sea at about 15-18 m.
2. Marine regression to − 0 m. Infiltration of red clays, due to the high precipitation and tropical climate, which filled the lower levels of caves, and deposited red earths on the outer slopes. The fauna indicates moisture and heat. Mousterian man occupied certain caves.
3. Stabilisation of a coast-line probably below present sea-level, and the formation of dunes (now sandrocks) which may be dated to the end of the 'Middle Palæolithic.'

Note 5

Berardian Deposits

(*a*) *Bérard.*—The proposed name commemorates Lamothe's work at Bérard,[20] which gives it an early place in the history of eustatic observations. Bérard provides a representative section through this lowest "*cordon littoral*" and shows:—

4. Upper consolidated dune (sandrock) of variable thickness, with land shells (*Helix depressula*).
3. Red argillaceous sands, up to 3·50 m. thick, with artifacts.
2. Hardened marine deposit with *Pectunculus* at about 5 to 5·50 m. above sea level.
1. Basal consolidated dune, down to present sea level.

Upper Levalloiso-Mousterian implements occur in the lower three-quarters of bed 3; Aterian implements in the top part and at the base of bed 4.[21] It may be suggested here that the Aterians camped on the then unconsolidated dune (4), in process of accumulation, and that some of their implements worked down into 3 (*cf.* also Section V). This would accord with the evidence at a site west of Bérard referred to as the Station du Rocher Plat[22] which showed:—

4. Upper dunes of variable thickness but not great.
3. Red argillaceous sands.
2. Marine level with three *Pectunculus* beds.
1. Basal dune, 3-8 m. thick.

Bed 3 was sterile, but 4 yielded tanged points and other Aterian artifacts. Oranian implements lay on the dune surface.

[14] Percentages of cores, based, as elsewhere, on core totals only. Percentages of flakes are based on the whole assemblage, quartzite or flint, in each level, but the least informative classes are omitted.

[15] Not recorded specifically as such, and possibly more numerous.

[16] Bourjot, 1868.

[17] The continuity of these red beds has been observed in the Bougie region (Arambourg, 1934).

[18] Pomel, 1894; Arambourg, 1932,*a*; 1935.

[19] Arambourg, 1932*a*.

[20] Lamothe, 1905, 1911.

[21] Marchand and Aymé, 1935, pp. 333-343. Geological observations by Doumergue, 1922, pp. 196-198, are still valuable, particularly the footnote 3 on p. 198.

[22] Marchand, 1939*b*.

Note 6

Aterians and Khargans

In Section IV, Fig. 6, is set out the Aterian position on the 7 m. terrace in a wadi of the Eastern scarp, Kharga Oasis. Aterian Style γ overlies Levalloiso-Khargan[23] at the base of the same bed of æolian silt capping the terrace. No great time interval separates them ; but they are not, here at any rate, contemporary. The Khargan industry[24] is derived from the Levalloiso-Khargan ; but it, on the other hand, has been found only on the surface, where it occurs in big self-contained assemblages. A favourite place was on (or lightly buried in) the silts of solution basins with enclosed drainage, formed on eroded sheets of old tufas. The Aterians also haunted some of these pans, which vary in size. The following is an example : Pan B, Bulaq Pass, a smooth silty depression about 30 m. in diameter surrounded by jagged masses of weathered tufa. The section showed ± 1 m. of silt, gritty with tufa particles, passing down into whitish calcareous powder, in turn underlain by tufacious rubble over breccia. At about 60-80 cm. from the surface, a dark line indicated vegetation. Tools were confined to the top 0·20 cm. and the present surface.

At Bulaq Pass some of these basins form an ascending series up the scarp undercliffs at increasing altitudes. Eight were trenched. The interest of the result lies in the curious relationship of the Aterian artifacts to the Khargan.

Site A.—Altitude R.L. 104 m. Aterian tools 112.[25] Khargan tools 5.[26]

Pan B.—Altitude R.L. 180 m. Aterian tools 111. Khargan tools 2.

Pan C.—Altitude R.L. 252 m. Aterian tools 50. Khargan tools 1.

Pans D and E.—Altitude R.L. 292-297 m. Aterian tools 25. Khargan tools 55.

Pans F, G and H.—Altitude R.L. 328-348 m. Aterian tools 0. Khargan tools 467.

To express my doubt about the exact chronology, but to indicate my opinion as to the general, but perhaps overlapping, synchronism, I have in the Kharga graph, Fig. 7, drawn a diagonal line between the two industries Aterian/Khargan.

[23] Caton-Thompson, 1946, Fig. 5, Nos. 1-9.

[24] *ibid.*, Fig. 5, Nos. 10-18.

[25] 78 *in situ*, 34 weathered to surface, mostly unpatinated.

[26] True surface patina.

Note 7

Monastirian geochronological correlation.[27]

The scheme I advocate may be summarised.

Monastirian I. Shore-line at ± 18–20 m. End of Riss-Würm Interglacial. Nile's 9 m. terrace. Faiyum earlier 34 m. lake. Egyptian Acheulio-Levalloisian culture.

Intra-Monastirian oscillation. Fall of sea level to — 30 m. at least. Würm I. Nile bed erosion. Subaerial deposits (Pescadian beds) formed on emerged Monastirian I beach, and in lower infillings of its marine caves. Egyptian and North African Lower Levalloiso-Mousterian culture.

Monastirian II. Rise of sea level to ± 5—10 m. Würm I–II Intra-glacial. Nile aggradation silts. Faiyum later 34 m. lake. Egyptian and North African Upper Levalloiso-Mousterian culture.

Post-Monastirian major regression. Fall of sea level to — 100 m. at least, reflecting Würm II and maximum of European cold. Nile bed major erosion. Descending Faiyum lakes at 28 and 24 m., and subsequent erosion. Subaerial deposits (Berardian beds) forming on emerged Monastirian II beach, and in lower infillings of its marine caves. Egyptian epi-Levalloisian industries. Elsewhere round Mediterranean late Upper Levalloisian or Mousterian industries, succeeded in Algeria by the Aterian, and by blade industries, irregularly, elsewhere.

[27] Compare with Kharga graph, Fig. 7.

References

ANDERSON, R. V. ... ... 1932 "Pleistocene Mazouna Stage in Western Algeria, containing Artifacts," *Bull. Geol. Soc. of America*, Vol. XLIII.

ANTOINE, M. ... ... 1934 "Un gisement atérien en place dans les alluvions de l'oued Goréa, près de Casablanca," *Bull. Soc. de Préhist. du Maroc*, Vol. VIII, Nos. 1–2.

——— ... ... 1938 "Notes de Préhistoire Marocaine. Un cône de résurgence du paléolithique moyen à Tit-Mellil près Casablanca," *Bull. Soc. de Préhist. du Maroc*, Vol. XIV, Nos. 1–4.

ARAMBOURG, C. ... ... 1932*a* "Note préliminaire sur une nouvelle grotte à ossements des environs d'Alger," *Bull. Soc. d'Hist. Nat. de l'Afrique du Nord*, Vol. XXIII.

——— ... ... 1932*b* "Revision des ours fossiles de l'Afrique du Nord," *Ann. du Mus. de Marseille*, Vol. XXV, No. 2.

——— ... ... 1934 "Les Grottes Paléolithiques des Beni-Segoual," *Arch. Inst. Paléont. Hum.. mém.* 13.

——— ... ... 1935 "La Grotte de la Carrière Anglade à Guyotville," *Bull. Soc. d'Hist. Nat. de l'Afrique du Nord*, Vol. XXVI.

ARMSTRONG, A. L. ... ... 1931 "Excavations in Bambata Cave," *J.R.A.I.*, Vol. LXI.

BALL, J. ... ... 1939 *Contributions to the Geography of Egypt.* Cairo (Survey and Mines Dept.)

BEQUAERT, M. ... ... 1938 "Les fouilles de Jean Colette à Kalina," *Ann. du Musée du Congo Belge*, Vol. I. fasc. 2.

BLANC, A. C. ... ... 1936 "La stratigraphie de la plaine cotière de la Bassa Versilia (Italie) et la transgression flandrienne en Méditerranée," *Rev. de Géog. Physique*, Vol. IX.

——— ... ... 1937 "Low Levels of the Mediterranean Sea during the Pleistocene Glaciation," *Quart. Journ. Geol. Soc.*, Vol. XCIII.

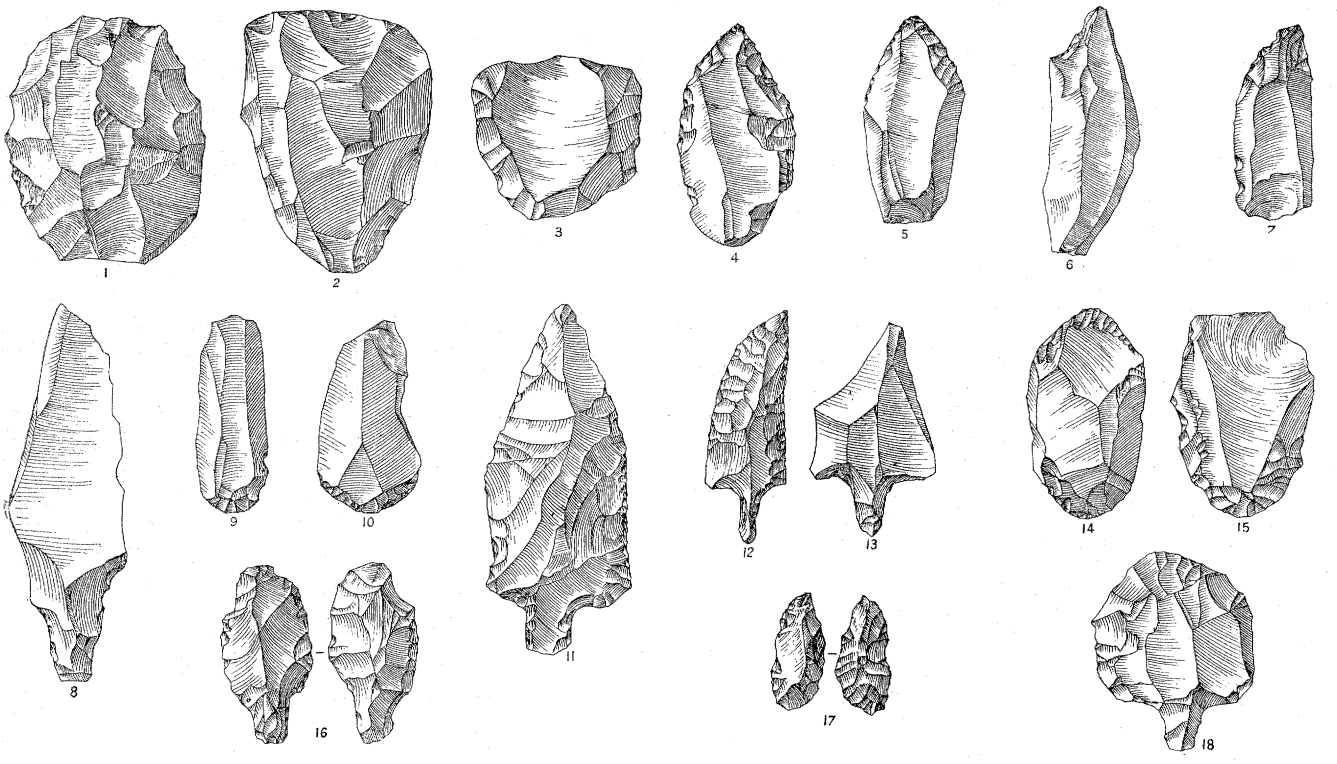
——— ... ... 1939*a* "L'homme fossile du Mont Circé," *L'Anthropologie*, Vol. XLIX.

		References
BLANC, A. C.	1939*b*	"Les microburins dans les niveaux à faune glaciaire de la grotte Romanelli en terre d'Otrante," *Bull. Soc. Préhist. Française*, Vol. XXXVI.
BOULE, M.	1924	Review of Reygasse, 1922, in "Mouvement Scientifique." *L'Anthropologie*, Vol. XXXIV.
BOULE, M. and VALLOIS, H.	1932	"L'Homme fossile d'Asselar," *Arch. Inst. Paléont. Hum., mém.* 9.
BOURJOT, DR.	1868	"Découverte d'une grotte à la Pointe Pescade (près d'Alger)", *Bull. de la Soc. de Climatologie d'Alger.*
BREUIL, H.	1942	"Pleistocene Raised Beaches on the West Coast of Morocco," *Nature*, Vol. CXLIX.
———	1946	*The Discovery of the Antiquity of Man : Some of the Evidence.* Huxley Memorial Lecture for 1941, Roy. Anthrop. Inst.
BREUIL, H. and CLERGEAU	1931*a*	"Oeuf d'autruche gravé et peint, et d'autres trouvailles paléolithiques du territoire des Ouled Djellal (Sahara septentrional)," *L'Anthropologie*, Vol. XLI.
BREUIL, H., and FROBENIUS, L. ...	1931*b*	*Afrique.* Paris (Cahiers d'Art.)
BREUIL, H. and LOWE, C. VAN RIET ...	1944	"Le Paléolithique au Congo Belge d'après les recherches du Docteur Cabu," *Trans. Roy. Soc. S. Africa*, Vol. XXX.
BREUIL, H. and MORTELMANS, G. ...	1945	"The Old Palæolithic Age in Relation to Quaternary Sea-levels along the Southern Coast of Africa," *S. Afr. Journ. Science*, Vol. XLI.
BREUIL, H. VAULTHIER, M. and ZBYSZEWSKI, G.	1942*a*	"Les plages anciennes portugaises et leurs industries paléolithiques," *Bull. Soc. Préhist. Française*, Vol. XXXIX.
———	1942*b*	Reprint of 1942*a* in *Proc. Prehist. Soc.*, Vol. VIII.
BURKITT, M. C.	1928	*South Africa's Past in Stone and Paint.* C.U.P.
BURKITT, M. C. and BARRINGTON-BROWN, C.	1931	"Stone Implements from British Somaliland," *Man*, 164.
CAMPARDOU, Lt.	1917	"La grotte de Kifan bel Ghomari," *Bull. Soc. de Géog. et d'Arch. d'Oran.* Vol. XXXVII.
CARTAILHAC, E.	1912	*Les Grottes de Grimaldi*, Vol. II, fasc. 2.
CATON-THOMPSON, G.	1931	"Royal Anthropological Institute Prehistoric Research Expedition to Kharga Oasis," *Man*, 91.
———	1946	"The Levalloisian Industries of Egypt," *Proc. Prehist. Soc.*, Vol. XII.
CATON-THOMPSON, G. and GARDNER, E.W.	1932	"The Prehistoric Geography of Kharga Oasis," *Geog. Journ.*, Vol. LXXX, No. 5.
———	1934	*The Desert Fayum* (London).
CHARDIN, TEILHARD DE	1940	"Les Industries lithiques de Somalie française," *L'Anthropologie*, Vol. XLIX.
CHILDE, V. G.	1944	"The Cave of Parpalló and the Upper Palæolithic Age in South-East Spain," *Antiquity*, Vol. XVIII.
CLARK, J. DESMOND	1942	"Further Excavations (1939) at the Mumbwa Caves, Northern Rhodesia," *Trans. Roy. Soc. S. Africa*, Vol. XXIX, pt. 3.
———	1945	"A Kenya Fauresmith Factory and Home Site at Gondar, Northern Abyssinia," *Trans. Roy. Soc. S. Africa*, Vol. XXXI, pt. 1.
COGHLAN, H. H....	1943	"The Evolution of the Axe from Prehistoric to Roman Times," *J.R.A.I.*, Vol. LXXIII.
COLETTE, M. J.	1929	"Le préhistorique dans le Bas-Congo," *Bull. Soc. Roy. Belge d'Anth. et de Préhist.* (*Séance du* 25 *Février* 1929).
COOKE, H. B. S., MALAN, B. D. and WELLS, L. H.	1945	"Fossil Man in the Lebombo Mountains, South Africa," *Man*, 3.
COON, C. S.	1939	*The Races of Europe.* New York. (Macmillan.)
DEBRUGE, M. A.	1910	"Le préhistoriqne dans les environs de Tebessa". *Rec. de Not. et Mém. de la Soc. Arch. de Constantine.*
DELCROIX, R. and VAUFREY, R. ...	1939	"Le Toumbien de Guinée française," *L'Anthropologie*, Vol. XLIX.
DOUMERGUE, F.	1922	"Descriptions de deux stations préhistoriques à quartzites taillés des environs de Karouba, et considérations sur leurs relations stratigraphiques avec la plage émergée du niveau de 18 mètres," *Bull. Soc. de Géog. et d'Arch. d'Oran*, Vol. XLII.
———	1926	"Grotte Eboulée du Camp d'Abd-el-Kader," *Bull. Soc. de Géog. et d'Arch. d'Oran*, Vol. XLVI.
———	1934	"Grotte et Brèche Ossifères de Saint Roch sur Mer," *Bull. Soc. de Géog. et d'Arch. d'Oran*, Vol. LV.
DU, R. LE	1933	"La station préhistorique de l'Oued Djouf-el-Djemel," *Bull. mens. Soc. Arch. de Constantine*, No. 59.
———	1934*a*	"Station Atérienne de l'Oued Djouf-el-Djemel," *Rec. de Not. et Mém. de la Soc. Arch. de Constantine*, Vol. LXII, fasc. 2.
———	1934*b*	"Une Station Capsienne : L'escargotière d'Ain Bahir," *Rec. de Not. et Mém. de la Soc. Arch. de Constantine*, Vol. LXII, fasc. 2.

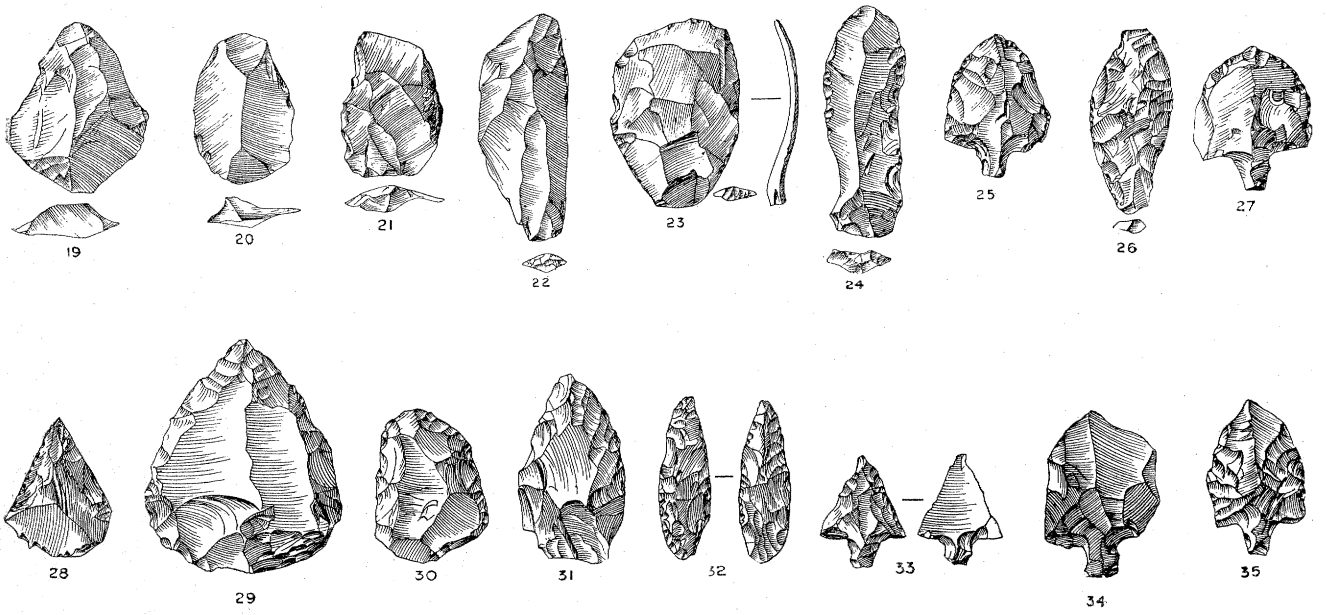
References

Gardner, E. W.	1932	"Some Problems of the Pleistocene Hydrography of Kharga Oasis, Egypt," *Geol. Mag.*, Vol. LXIX, No. 819.
Garrod, D. A. E.	1938	"The Upper Palæolithic in the light of recent discovery," *Proc. Prehist. Soc.*, Vol. IV.
———	1946	*Environment, Tools and Man.* C.U.P.
Gobert, E. G. and Vaufrey, R. ...	1932	"Deux gisements extrêmes d'Ibéromaurusien," *L'Anthropologie*, Vol. XLII, Nos. 5–6.
Goodwin, A. J. H. and Lowe, C. van Riet	1929	"The Stone Age Cultures of South Africa," *Ann. S. Afr. Mus.*, Vol. XXVII.
Goodwin, A. J. H. and Malan, B. D. ...	1935	"Archæology of the Cape St. Blaize Cave and Raised Beach, Mossel Bay," *Ann. S. Afr. Mus.*, Vol. XXIV.
Haller, J.	1946	"L'Abri de Abou-Halka (Tripoli)," *Bull. du Musée de Beyrouth*, Vol. VI.
Huzayyin, S. A.	1941	The Place of Egypt in Prehistory, *Mém. de L'Inst. d'Egypte*, Vol. XLIII.
Jones, Neville	n.d.	"Bambata Cave : A Re-orientation," *Occ. Pap. Nat. Mus. S. Rhodesia*, No. 9.
Keith, Sir A.	1931	*New Discoveries relating to the Antiquity of Man.* London.
Lalanne, J. G. and Bouyssonie, J. ...	1946	"Le gisement paléolithique de Laussel," *L'Anthropologie*, Vol. L, Nos. 1–2.
Lamothe, R. de	1905	"Les anciennes lignes de rivage du Sahel d'Alger," *Compte Rendu Acad. Sciences*, Vol. CXL.
———	1911	"Les anciennes lignes de rivage du Sahel d'Alger et d'une partie de la côte algerienne", *Mem. Soc. géol. de France.* Vol. V.
Leakey, L. S. B.	1931	*The Stone Age Cultures of Kenya Colony.* C.U.P.
———	1936*a*	*Stone Age Africa.* C.U.P.
———	1936*b*	"A new fossil skull from Eyasie, East Africa," *Nature*, Vol. CXXXVIII
Leakey, L. S. B. and Archdeacon Owen	1945	"A contribution to the study of the Tumbian Culture in East Africa," *Coryndon Mem. Mus., Occ. Pap.*, No. 1.
Lowe, C. van Riet	1945	"The Evolution of the Levallois Technique in South Africa," *Man*, 37.
———	1946	"Some Observations on the Tumbian Culture," *Man*, 3.
Malan, B. D.	1943	"Some problems of the Stone Age in South Africa," *S. Afr. Journ. Science*, Vol. XXXIX.
———	1944	"Bifaced Middle Stone Age points from Natal," *S. Afr. Journ. Science*, Vol. XLI.
Malan, B. D. and Goodwin, H. J. ...	1938	"The Middle Stone Age of the Cape Peninsula (Hardy Collection)," *Bureau of Archæology, Arch. Series*, No. III.
Marçais, J.	1934	"Decouverte de restes humains fossiles dans les grès quaternaires de Rabat, Morocco," *L'Anthropologie*, Vol. XLIV.
Marchand, H.	1932	"Une importante station préhistorique du littoral Est-Algérois," *Bull. Soc. Préhist. Française*, Vol. XXIX, No. 6.
———	1935	"Les industries lithiques de la Grotte de la Carrière Anglade à Guyotville," *Bull. Soc. d'Hist. Nat. de l'Afrique du Nord*, Vol. XXVI.
———	1935–6	"Les industries préhistoriques littorales de la province d'Alger," *Rec. des Not. et Mém. de la Soc. Arch. de Constantine*, Vol. LXIII.
———	1937	"Instruments pédonculés atériformes dans le Capsien Inférieur," *Bull. Soc. d'Hist. Nat. l'Afrique du Nord*, Vol. XXVIII.
———	1939*a*	"Stations préhistoriques nouvelles de la région des Ouled Djellal, l'Inter-Atéro-Capsien. *Bull. Soc. Préhist. Française*, Vol. XXXVI, No. 6.
———	1939*b*	"La station préhistorique du Rocher Plat," *Bull. Soc. d'Hist. Nat. de l'Afrique du Nord*, Vol. XXX.
Marchand, H. and Aymé, M.	1935	"Recherches stratigraphiques sur l'Atérien," *Bull. Soc. d'Hist. Nat. de l'Afrique du Nord*, Vol. XXVI.
Moreau, F.	1888	*Notices sur les silex taillés receuillis en Tunisie.* Paris.
Morgan, J. de; Capitan, R. and Boudy, P.	1910	"Etudes sur les stations préhistoriques du Sud Tunisien," *Rev. de l'Ecole d'Anth.*, Vol. XX.
Mortelmans, G. and Breuil, H. ...	1945	"Les plages soulevéees à industries lithiques de la région de Keurbooms River District de Knysa, Province du Cap," *S. Afr Journ. Science*, Vol. XLI.
Moysey, F. and Leakey, L.S.B. ...	1943	"Excavation and industries of a rock-shelter at Gorgora, Lake Tana, Ethiopia," *Journ. E. Afr. and Ug. Nat. Hist. Soc.*, Vol. XVII, Nos. 3 and 4.
Myers, O. H. and Huzayyin, S. A. ...	1937	*Cemeteries of Armant, I.* O.U.P.
Neuville, R. and Ruhlmann, A. ...	1941	*La Place du Paléolithique Ancien dans le Quaternaire Marocain.* Casablanca.

		References
NOUGIER, L.	1935	"Grand couteau de silex énéolithique du Sud-Oranais," *Bull. Soc. Préhist. Française*, Vol. XXXII.
O'BRIEN, T. P.	1937	"La préhistoire dans l'Ouganda," *Bull. Soc. Préhist. Française*, Vol. XXXIV, No. 10.
———	1939	*The Prehistory of Uganda Protectorate.* C.U.P.
PALLARY, P.	1891	*Etat du Préhistorique dans le Département d'Oran.*
———	1911	"Sur la présence d'une industrie paléolithique dans une plage soulevée algérienne," *Bull. de la Soc. Préhist. française*, Vol. VIII.
———	1934	"L'abri Alain près d'Oran," *Arch. Inst. Paléont. Hum., Mém.* 12.
PASSEMARD, E.	1941	"Le Capsien de la Table Ouest dit Abri Clariond à Moularès (Sud Tunisie)," *Préhistoire*, Vol. VIII.
PERICOT GARCIA, L.	1942	*La Cueva del Parpalló (Gandia).* Madrid.
PETROCCHI, C.	1940	"Ricerche Preistoriche in Cirenaica", *Africa Italiana*, Vol. VII, Nos. 1–2.
PEYRONY, D.	1934	"La Ferrassie," *Préhistoire*, Vol. III.
PIROUTET, M.	1930	"La station préhistorique d'Ain Taya," *Bull. Soc. Préhist. Francaise*, Vol. XXVII, No. 11.
POMEL, A....	1894	"Sur une nouvelle grotte ossifère découverte à la Pointe Pescade à l'ouest d'Alger", *Compte Rendu Acad. Sciences*, Vol. CXIX.
REYGASSE, M.	1919–20	"Etudes de Palethnologie Maghrébine (Nouvelle série)," *Rec. de Not. et Mém. de la Soc. Arch. de Constantine*, Vol. LII.
———	1921–22	"Etudes de Palethnologie Maghrébine (Deuxième série)," *Rec. de Not. et Mém. de la Soc. Arch. de Constantine*, Vol. LIII.
———	1931	*Histoire et Historiens de l'Algérie.* Paris.
———	1938	"Notes sur la distribution géographique et la morphologie de diverses stations préhistoriques de Tebessa," *Bull. Soc. de Préhist.. et d'Arch. de Tebessa.*
ROFFO, P.	1934	*Les Civilisations Paléolithiques du M'Zab.*
———	1938	"La station Capsienne de Oued el Hamara (Sud des Oueled Djellal)," *Bull. Soc. Préhist. Francaise*, Vol. XXXV, No. 6.
RUHLMANN, A.	1932	"Note sur l'Aguelman de Sidi Ali," *Bull. Soc. Préhist. Française*, Vol. XXIX, No. 12.
———	1936	"Les Grottes préhistoriques d'El Khenzira," *Publication du Service des Antiquités du Maroc*, fasc. 2. Rabat.
———	1945*a*	*Le Paléolithique Marocaine*, fasc. 7. Rabat.
———	1945*b*	"L'homme fossile de Rabat," *Hespéris.*
SANDFORD, K. S.	1933	"The Geology and Geomorphology of the Southern Libyan Desert," *Geog. Journ.*, Vol. LXXXII.
SANDFORD, K. S. and ARKELL, A. J. ...	1933	"Paleolithic man and the Nile valley in Nubia and Upper Egypt," *Oriental Inst. Publications*, Vol. XVII.
———	1934	"Paleolithic man and the Nile valley in Upper and Middle Egypt," *Oriental Inst. Publications*, Vol. XVIII.
———	1939	"Paleolithic man and the Nile valley in Lower Egypt." *Oriental Inst. Publications*, Vol. XLVI.
SANTA-OLALLA, J. M.	1944	*El Sahara Español Anteislamico.* Madrid.
SELIGMAN, C. G.	1921	"The Older Palæolithic Age in Egypt," *J.R.A.I.*, Vol. LI.
SENYÜREK, M. S....	1940	"Fossil Man in Tangier," *Peabody Mus. Amer. Arch. and Ethn.* Vol. XVI, 3.
SHAW, C. T.	1943	"Archæology in the Gold Coast," *African Studies*, Sept., 1943.
———	1944	"Report on Excavations carried out in the Cave known as Bosumpra at Abetifi," *Proc. Prehist. Soc.*, Vol. X.
SMITH-WOODWARD, A.	1938	"A Fossil Skull of an Ancestral Bushman from the Anglo-Egyptian Sudan," *Antiquity*, Vol. XII.
VAUFREY, R.	1929*a*	"Les Élephants nains des îles méditerranéens et la question des isthmes pléistocènes," *Arch. Inst. Paléont. Hum.*, Mém. 6.
———	1929*b*	"La question des isthmes méditerranéens pléistocènes," *Rev. de Géog. Physique*, Vol II, fasc. 1.
———	1932	"Les plissements Acheuléo-Moustériens des alluvions de Gafsa," *Rev. de Géog. Physique*, Vol. V, fasc. 3.
———	1933	"Notes sur le Capsien," *L'Anthropologie*, Vol. XLIII, Nos. 5–6.
———	1936	"Stratigraphie Capsienne," *Swiatowit*, Vol. XVI, 1934–35.
———	1938	"Le Capsien des environs de Tebessa," *Rec. Soc. de Préhist. de Tebessa*, Vol. I,
WULSIN, F. R.	1941	"Prehistoric Archæology of North-West Africa," *Peabody Mus. Amer. Arch. and Eth.*, Vol. XIX, 1.
WEINERT, P.	1939	*L'Homme Préhistorique.* Paris (Payot).
ZEUNER, F.	1945	*The Pleistocene Period.* London.

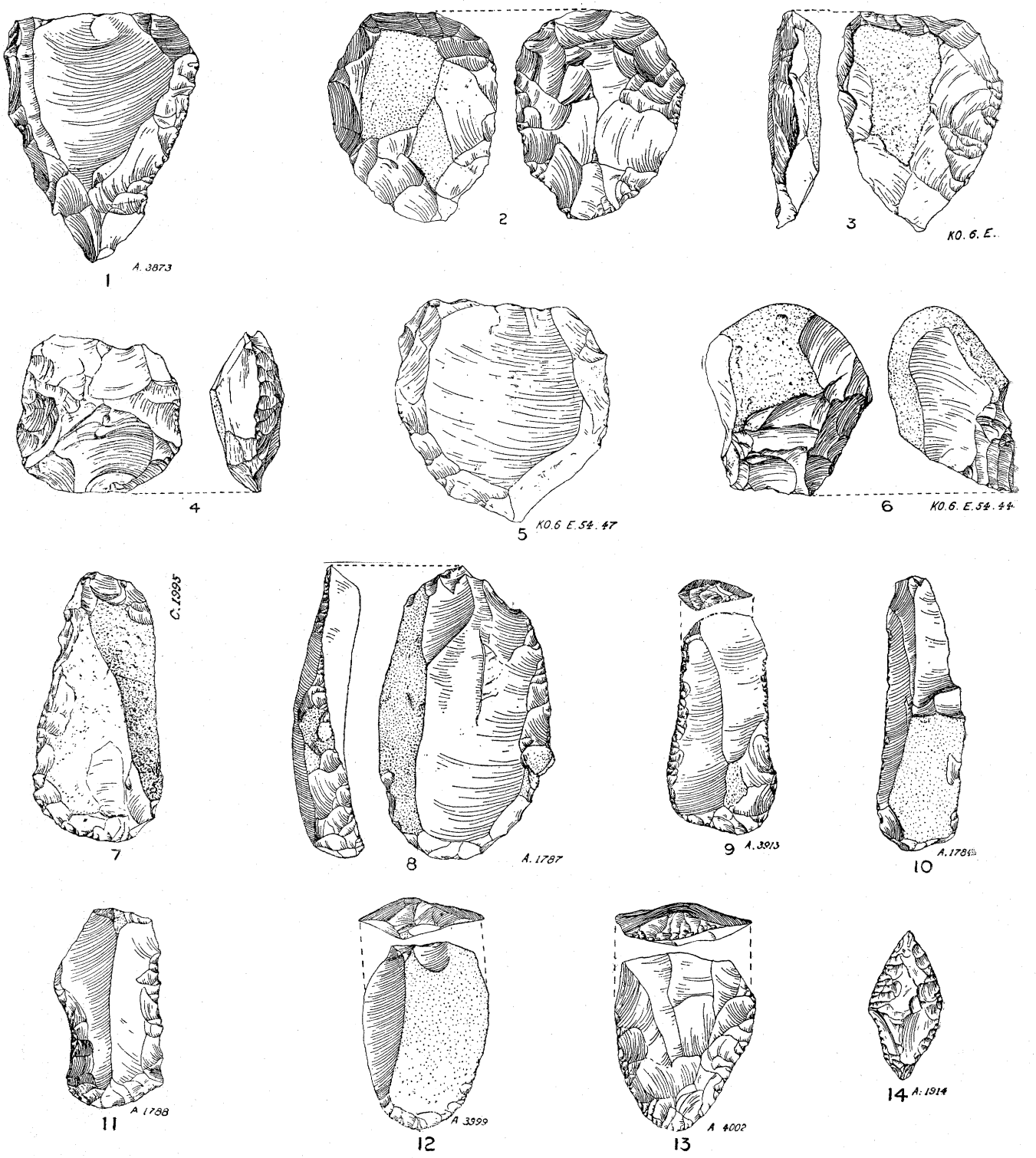


Djouf-El-Djemel, Tunisia. Aterian Style γ (after Le Du). Scale ½ Natural Size.



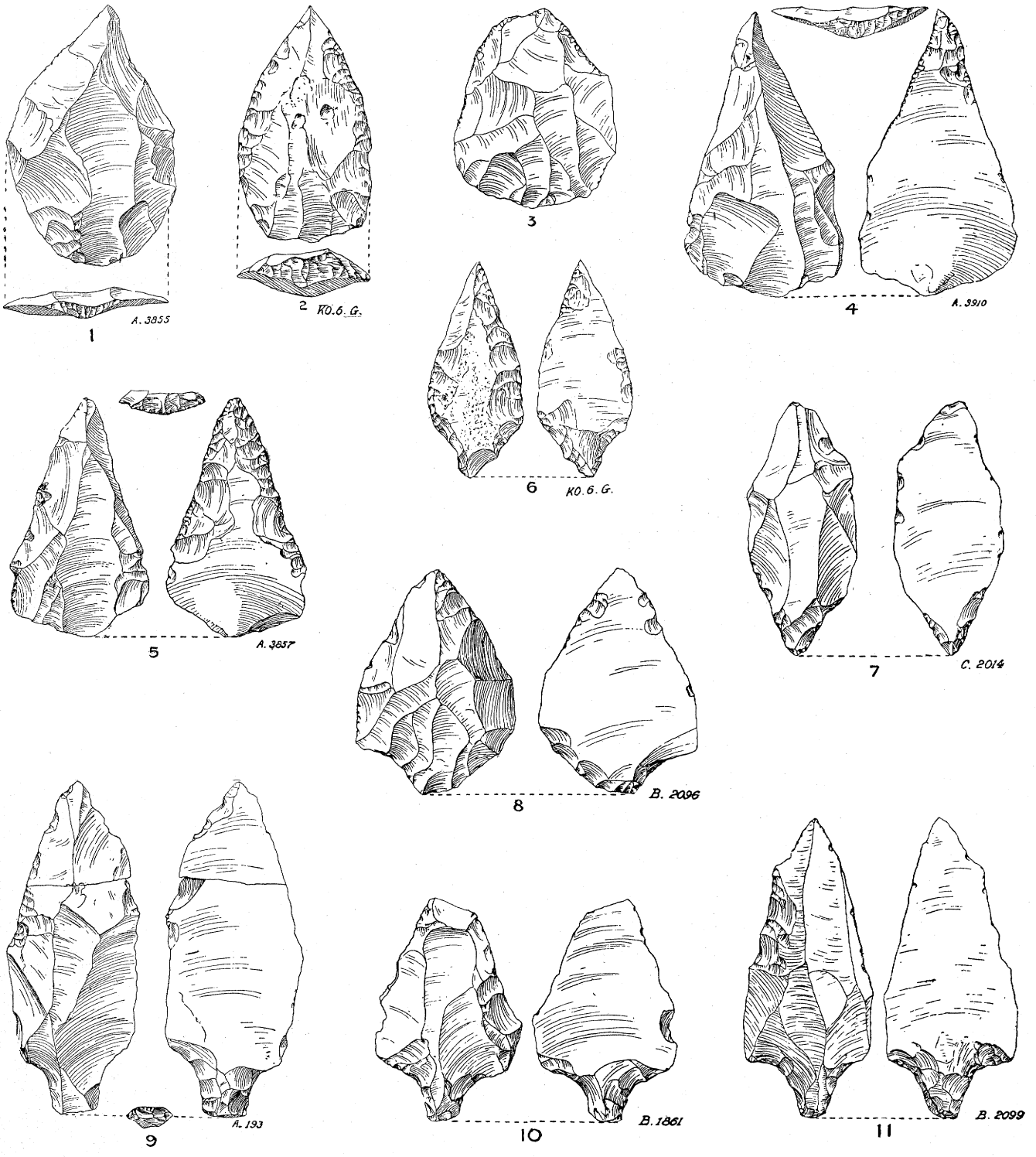
El-Khenzira, Morocco. Nos. 19–27. Level A. Aterian Style α. Nos. 28–35. Level B. Aterian Style β (after Ruhlmann). Scale ⅖ Natural Size.

Fig. 10



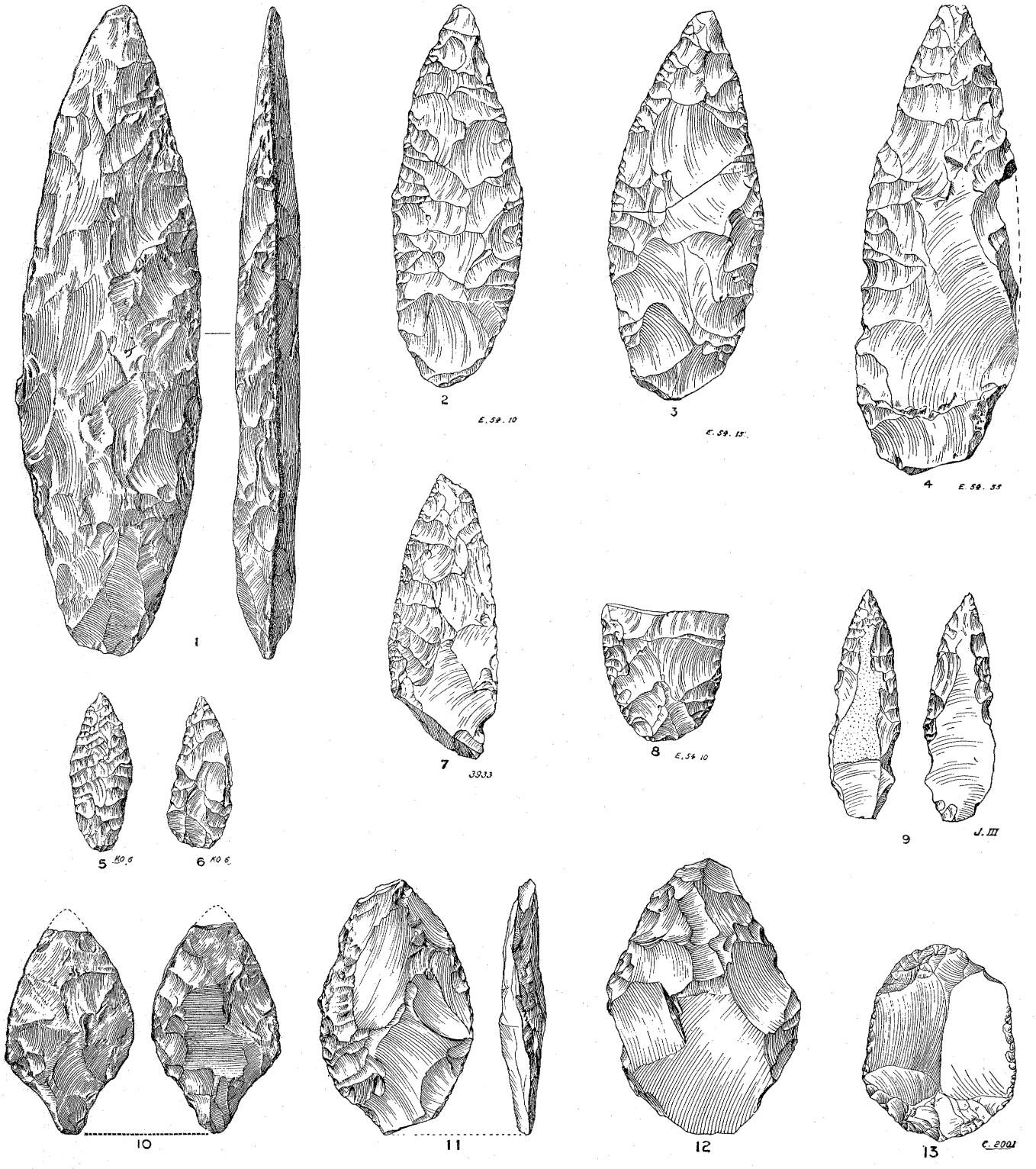
Kharga Oasis. Aterian Style γ. Nos. 1–6. Cores. Nos. 7–13. End Scrapers. No. 14. Biffaced Arrow-Tip
Scale ½ Natural Size.

FIG. 11



KHARGA OASIS. ATERIAN STYLE γ. PLAIN AND RETOUCHED FLAKES LEADING TO TABALBALAT AND FULLY TANGED POINTS. SCALE ½ NATURAL SIZE.

FIG. 12



Kharga Oasis. Aterian Style γ. Nos. 1–9. Biface and Semi-Biface Foliate Points. No. 10. Tanged Biface Point. No. 13. Double End Scraper. No. 11. Foliate Handaxe. No. 12. Aterian Handaxe from 'Ain Metherchem, Tunisia (by Courtesy of Prof. Vaufrey). Scale ½ Natural Size.

Fig. 13