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Pleistocene Stratigraphy and Prehistory in Egypt

Although considerable work has been done on coastal stratigraphy of the northern Egyptian coast, on the Pleistocene deposits of the Nile Valley, on fossil soils and on the industries of selected areas, numerous difficulties of correlation remain. In order to facilitate future field investigation and avoid unnecessary problems of circum-Mediterranean comparison, it will be attempted to present the available data as objectively and critically as possible. Very little of the stratigraphy is relatively certain so that it would be better to speak of chronologies or correlations as " probable ", " possible " or " reasonable " as the case may be. Above all the weak points and gaps in our knowledge will be emphasized wherever possible. The discussion will be directed along the following lines:

1. The marine Quaternary of the northern Egyptian coast.
2. The Pleistocene Deposits of the Nile Valley.
3. The Palaeolithic Industries.

1. The Marine Quaternary of the Northern Egyptian Coast.

The marine Quaternary of the Mediterranean littoral of Egypt has been summarized in K. W. Butzer (1958, p. 36-38). Fluviatile terraces, almost certainly reflecting deposition near the mouth of the Nile during marine transgressions, occur near the Nile Delta between approximately Wadi Natrun, Cairo and Wadi Tumilat. These terraces were recorded by Sandford and Arkell at levels of 15, 46, 61-70, 80-98, 110-120 and 218-233 m.

Although marine deposits almost certainly exist on the northern shore of the Sinai Peninsula, no work has yet been done there. On the western margins of the Delta, the situation is rather different. High Pleistocene shorelines have been traced from Abuqir (east of Alexandria) to the Gulf of Sollum at the Libyan border. The field work involved has been in progress for some 70 years. The most comprehensive study has been that of Shukri, Philip and Said (1956). Very fruitful has been the theoretical work of F. E. Zeuner (1950, p. 233 and in later references) on the basis of the topographic maps. An extended critical evaluation of the existing work has been recently made (Butzer, 1960), so that these remarks can be confined to the more reliable information available.

This section of the Mediterranean littoral is characterized by a sequence of fossil offshore bars and lagoons, these being most numerous south of Arabs' Gulf (long. 29° - 30° E.).

a) *Problems of the Old Strandlines Alexandria-Alamein.*

After Fourtau had recognized the marine nature of these deposits in 1893, Blanckenhorn very succinctly described them as consolidated offshore bars with intervening lagoons in 1901. The sediments were later generally considered as fossil coastal dunes. It is to the credit of ZEUNER (1950) and SHUKRI, PHILIP and SAID (1956) that the marine origin was finally demonstrated and accepted. Zeuner indicated that a sequence of similar ridges and depressions occupied the coasts to some 40 km. inland and went further to set up a sequence of bars and lagoons corresponding to some 10 stages of the Pleistocene Mediterranean. No field mapping of any kind was apparently carried out. In this connection SHUKRI, PHILIP & SAID (1956) bring a welcome selection of new facts. It is indeed disturbing that Shukri, Philip & Said also employ the available cartographic material to set up a sequence of precise sea-levels as logical and detailed as that of Zeuner, but with considerable differences on matters of bar identification and above all on the associated sea-levels determined.

The two successions of supposed Mediterranean sea-level corresponding to the twelve odd barrier bars in question are the following:

	ZEUNER (1950)		SHUKRI, PHILIP & SAID (1956)	
—.	Harbour Island Bar	0 m.	Harbour Island Bar	0 m.
1.	not recognized		Coastal Bar	10 m.
2.	Abusir Bar	5-10 m.	Abusir Bar	25 m.
3*a*.	Gebel Maryut Bar	15-20 m.	Gebel Maryut Bar	35 m.
3*b*.	Sanakra - Habbub Bar	35 m.	not recognized	
4.	Ruweisat Bar	58 m.	Khashm el Eish Bar	60 m.
	Gebel Bein Gabir Bar	80 m.		
5.	Alam el Halfa Bar	80-100 m.	Alam el Khadim Bar	80 m.
6.	El Mikheirta Bar	85 m.	El Mikheirta Bar	85 m.
7.	Raqabit el Halif Bar	90 m.	Raqabit el Halif Bar	90 m.
8.	Alam Shaltut Bar	103 m.	Alam Shaltut Bar	110 m.

The approximate location of the various bars and the corresponding lagoons is given in Fig. 1. The topography can generally be easily followed in the 1 : 100,000 series of the Survey of Egypt.

The weaknesses of the above sequences are discussed in detail in BUTZER (1960), so that the arguments need not be repeated here. Former sea-level responsible for a fossil offshore bar and lagoon can only be safely determined as the altitude of the transition from aquatic-lagoonal to terrestrial facies in the lagoon floor. Neither authors employ this criterion effectively but rather attempt to apply methods of approximation, in lieu of detailed field studies. Consequently none of the values given by ZEUNER (1950) and SHUKRI, PHILIP and SAID (1956) for at least the six oldest shorelines can be considered free from a possible error of ±20 m. (BUTZER, 1960). This is no attempt to minimize previous work but rather a critical appraisal of present knowledge of this vital Mediterranean sequence.

For the purpose of this survey, however, a limited interpretation of the

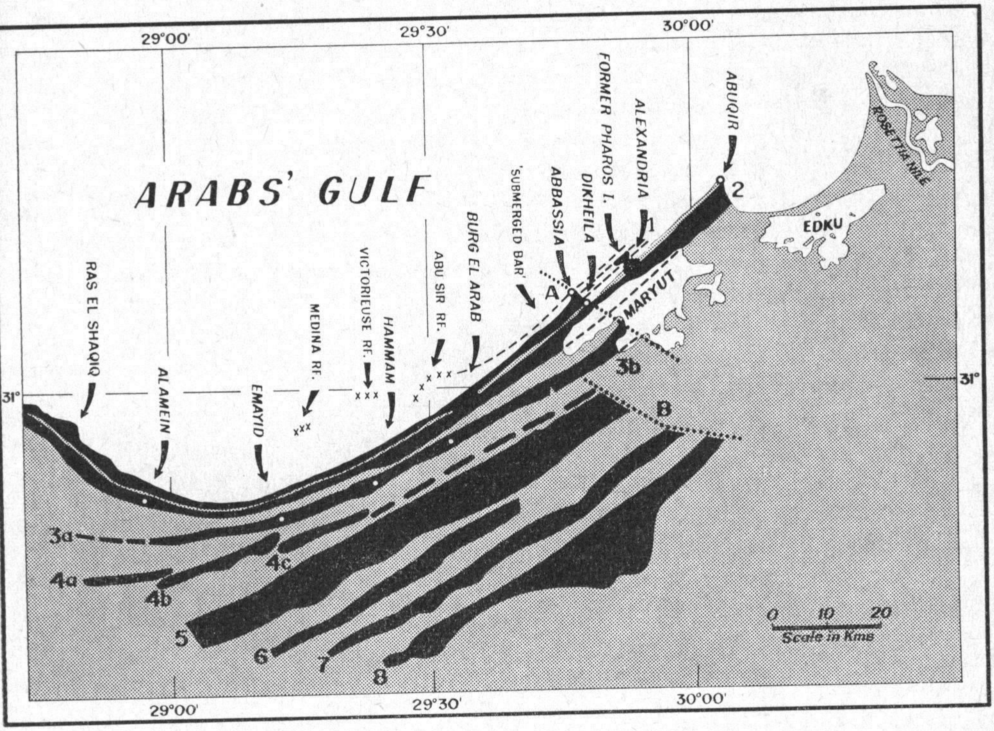

FIG. 1. *Outline Map of the Pleistocene Bars and Lagoons of Arabs' Gulf.* The seaward margin of the solid dark bands represents the crest line of the offshore bar, the landward margin the axis of the respective lagoon floor. 1. Coastal Bar. 2. Abusir Bar. 3. Gebel Maryut Bar. 3*a*. Sanakra & Habbub Bar. 4*a*. Ruweisat Bar. 4*b*. Gebel Bein Gabir Bar. 4*c*. Khashm el Eish Bar. 5. Alam el Halfa Bar. 6. El Mikheirta Bar. 7. Raqabit el Halif Bar. 8. Alam Shaltut Bar. The dotted lines A and B indicate probable fault lines in the Maryut area (from the *Journal of Geology*).

present field evidence will be attempted outlining some of the more significant contributions this area offers to circum-Mediterranean stratigraphy. Beginning with the oldest and highest bars, respective sea-levels can only be grossly approximated, those of bars 4 to 8 lying somewhere between 50 and 120 m. Altimetrically, these bars seem to lie in the range of the Lower Pleistocene eustatic levels. The fauna and foraminifera support this suggestion strongly. BLANCKENHORN (1901) already described terrestrial *Helix* limestones in the lagoon of the Alam el Halfa bar as Lower Pleistocene on account of the curious extinct fossil *H. quadridentata* Blank. Blanckenhorn also mentions *Strombus coronatus* (probably *S. bubonius* Lmk.) from the bar 4c, a distinctly Senegalese form. The examination of the foraminifera (SHUKRI, PHILIP & SAID, 1956), which contain Indo-Pacific elements such as *Operculinoides venosa* and many extinct forms, bears this date out. The Milazzian position suggested by SHUKRI, PHILIP & SAID for bar 5 (and 4?) and the Sicilian for bars 6 to 8 — on the basis of considerable faunistic evidence -- at least seems reasonable. One should hesitate to offer any opinion at all on the Gebel Maryut bar(s) other than to mention that some Atlantic as well as Indo-Pacific foraminifera occur (SHUKRI, PHILIP & SAID, 1956), whereas Blanckenhorn reported only modern mollusca such as *Glycimeris* and *Cardium edule*. The alternating facies behind the bar in the quarry at el Hamman (Said, Philip & Shukri) indicate one period of sea-level fluctuating between about +3.5 and +8.5 m., considering that the top of the local quarry is at about 9 m. m.s.l. The major responsible sea-level must have been appreciably higher however. Summarizing:

The sequence of shorelines of Arabs' Gulf, representing offshore bars and lagoons, provides evidence in favour of at least eight transgressions above modern m.s.l. in the course of the Pleistocene. The altimetric values provided so far are insufficient, but on the basis of the fauna and foraminifera (particularly due to SHUKRI, PHILIP & SAID, 1956) the five oldest, major transgressions, achieving altitudes in the very approximate range of 50-120 m., can reasonably be considered as Lower Pleistocene.

b) *The Upper Pleistocene Deposits Alexandria-Alamein.*

On the basis of field work carried out between el Alamein and Ras el Shaqiq it seems locally possible to assess the highest m.s.l. responsible for the older of the two youngest bars at +10 m. (cf. BUTZER, 1959). The railroad from Alexandria to Mersa Matruh runs on the Abusir lagoon surface (2) at 8-11 m. between a point 7 km. NW and 2 km. SE of El Alamein Station. A little seaward lies the corresponding bar at 10-14 m. The lagoon surface is littered with marine shells of *Arca, Lucina, Donax* etc. which are sharply delimited to below the 9 m. or 10 m. contours. They do not occur at higher levels, suggesting an upper limit of the marine facies at about this level. Higher up silts, clay and marls with *Helix* occur. The foraminifera examined from the same bar further east (SHUKRI, PHILIP & SAID, 1956; BLANCKENHORN) are largely extinct species of Mediterranean character, however. Blanckenhorn further lists *Strombus bubonius*. This would suggest a Tyrrhenian age faunistically, more specifically classical Tyrrhenian II (Eutyrrhénien) on altimetric grounds.

On the same 18 km. stretch from Alamein to Ras el Shaqiq the Coastal Bar, of white oolitic limestone, fluctuates between 2 and 9 m, the landward lagoon between sea-level and 4 m. The bar contains the same foraminifera as the Abusir (SHUKRI, PHILIP & SAID, 1956) but it was not possible to obtain a closer estimate of corresponding m.s.l, as the lagoon has been reflooded and reformed morphologically at the height of the post-Tyrrhenian, i.e. Flandrian Transgression. For details of this the reader is referred to BUTZER (1958, p. 37-38). A notch was cut into the seaward flank of bar (1) at 4 m. m.s.l. and corresponding tidal inlets and landward terraces in the reflooded lagoon testify to the renewed transgression. The surface shells of this lagoon floor include numerous *Glycimeris* (*Pectunculus*) as well as *Arca noae, Cypraea, Lucina leucoma* and *Conus* (fragmentary). Among these were found several pieces of *Strombus bubonius,* one of which was strongly rolled. This extinct species of the characteristic Tyrrhenian fauna may be derived from the Tyrrhenian II bar slope, at the foot of which it was found, or, which is more unlikely, it may belong to the later deposits of the Tyrrhenian III lagoon. Following the 4 m. Flandrian maximum a drop of sea-level by two meters led to the formation of a second notch at 1.8 m. with corresponding tidal inlets and lagoon floor with a 1-2 m. landward terrace rising to the 4 m. stage lagoon surface (BUTZER, 1957, 1958). Strong alluviation has covered the marine fauna of this youngest stage, and only *Helix* can be found in the colluvial red earth accumulated.

Further east the Coastal Bar is disconformably covered by aeolian, calcareous sand, achieving a maximum elevation of some 13 m. A part of this sand is consolidated and seems to be fossil, possibly dating from the post-Tyrrhenian III regression. Another part is Recént, for example the dunes immediately west of el Dikheila. About Abusir town the lagoon floor disappears entirely, the surface of the Coastal and Abusir Bars being almost even because of the later deposition of aeolian sand.

Summarizing:

a) A local m.s.l. of 10 m. has been determined at el Alamein (Abusir Bar) with a corresponding Tyrrhenian fauna both here and nearer to Alexandria. This transgression can be safely designated as Tyrrhenian II (Eutyrrhénien).

b) A Tyrrhenian III (Oujien, Néotyrrhênien?) transgression of presumably 2-4 m. is also recorded (Coastal Bar), although it is no longer possible to determine the related sea-level accurately.

The Coastal Bar and the related former lagoonal surface continue NE with a sharp drop in elevation near el Dikheila, as a submerged ridge and trough, reemerging as the former Pharos Island, now part of the peninsula of metropolitan Alexandria. A little seaward lies a chain of reefs and islands extending from Alexandria to the center of Arabs' Gulf. This represents another fossil bar ("Submerged Bar"), indicating a post-Tyrrhenian III sea-level several meters below that of the present.

Concluding, the following sequence can be recognized in the Arabs' Gulf area of northern Égypt for the Upper Pleistocene and Holocene:

a) A maximal transgression to little more than +10 m., characterized by *Strombus bubonius,* leaves little doubt of its identification with the typical Tyrrhenian (II or Eutyrrhénien) and the maximum of the Riss/Würm interglacial.

b) After a temporary regression of unknown but undoubtedly limited dimensions, a renewed transgression of +2 m. to 4 m., with derived *Strombus* (?), seems contemporary with the late Tyrrhenian (III or Ouljien).

c) This last transgression was followed by a gradual regression interrupted by repeated shoreline development [at c. — 10 m., — 13 to — 14 m., — 45 m., etc.) below modern sea-level. This major regression to at least — 45 (evidence from the Nile Delta shelf suggests — 90 m. (PFANNENSTIEL, 1956)] leaves little doubt as to its identity with the last Würm glaciation.

d) In Postglacial times successive transgressions to +4 m and +1.8 m. modified the marine deposits of the late Tyrrhenian transgression.

Previous authors have not clearly identified the " Harbour Island Bar ", which is either identical with the Coast or Submerged Bar —neither of which indicate a former sea-level of ±0m (BUTZER, 1960). The designation "Harbour Island Bar " should be abandoned.

2. THE PLEISTOCENE DEPOSITS OF THE NILE VALLEY.

a) *Introduction and Related Problems.*

The areal denudation and erosion of the Cretaceous and Eocene marine beds covering the greater part of Egypt west of the Red Sea Hills began at latest during the Oligocene, when large gravel spreads were deposited in the Libyan Desert between the latitude of Minya and the Fayum. These cobble gravels, predominantly hornstein, were derived from the limestone beds and the Nubian Sandstone and possibly deposited by a predecessor of the modern Nile. Certain is that at the close of the Lower Pliocene (Pontic) the Nile Valley already existed in its present position north of Aswan and with more or less similar areal dimensions. During the Upper Pliocene a marine transgression in the form of a gulf flooded the Nile Valley and deposited brack and freshwater sediments in Upper Egypt to north of Aswan. This implies that the river must have gone over to linear erosion at latest during the Upper Miocene period, and have completed the incision of the present valley to a depth of 200 m. to 600 m. in the limestone plateau during the Lower Pliocene. Similarly the location and fundamental geomorphological character of the present desert valleys is due to vertical erosion during the Miocene and Pliocene. Subsequent erosion and deposition have only remodelled them. At the close of the Pliocene the Nile began the removal of the Plaisancian filling, a tendency only periodically interrupted in favour of renewed deposition during the Quaternary. Once the Nile had shifted back upon its ancient bed, fairly immediately in Upper Egypt and during the Middle Pleistocene in Middle Egypt, lateral erosion accounted for most earlier gravel deposits within a fairly short time. In Upper Egypt north of Gebelein Nile deposits are only preserved in deeply idented bays in the Lower Tertiary beds, while in Middle Egypt the former Nile beds can be traced with considerable certainty upon the limestone of the Western Desert. Unfortunately the widespread clayey facies of the Mokattam stage, subjected to severe erosion by water, has not been too favourable for the preservation of the Pleistocene deposits either. The greater part of this area is covered by undifferentiated Nile gravels. All in all the Nile terraces cannot be compared in development or preservation with those of any larger river in temperate latitudes.

In view of the absence of fossils in the non-marine Pliocene, the Plio-Pleistocene limit was implicitly accepted by Sandford as the changeover from subaqueous to fluviatil deposits. This transition is recorded in four main exposures in Upper Egypt. The upper levels of these earliest Pleistocene deposits are now at 42, 41 and 54 m. above alluvium. Lastly, the Abbassiya beds near Cairo expose some 15 m. of crossbedded, estuarine feldspar-bearing sands overlying a very coarse conglomerate resting on Pliocene clays and sands. Disconformably above the estuarine sands are two implementiferous gravel beds separated by Nilotic sands and overlain by silts.

The English geologists K. S. Sandford and W. J. Arkell, to whom the greatest part of our knowledge of the Nile Valley Pleistocene is due, basically considered the entire succession of terraces of both Nile and its tributaries as the result of eustatic changes of Mediterranean sea-level. It is not feasible that glacial eustasy should be appreciable so far upstream, something implicit from Sandford's work which postulates a continuous Pleistocene pluvial phase. Neither can aggradation or degradation proceed so fast upstream as to keep pace with the fairly rapid fluctuations of Mediterranean sea-level. An interplay of essentially independent eustatic and local climatic factors (both in Egypt and East Africa) must be allowed for.

On the basis of the writer's reinvestigation of the Nile Valley gravels in 1958 (BUTZER, 1959) there seems to be reason for separating two classes of deposits in Egypt. In southern Middle Egypt there is an 80 km. gap between Mallawi and Beni Adi where no differentiated fluviatile gravels can be recognized. North of Mallawi a varied succession of deposits can be traced to the Delta with fair continuity, south of Beni Adi a series of intercalated Nile and wadi gravels of a less continuous nature can be followed southward to Nubia. The gravels of northern Egypt are essentially interpluvial deposits, aggraded in response to a rising base-level (eustatic transgressions of the Mediterranean Sea). Those of southern Egypt are pluvial gravels due to climatic alluviation of the local drainage channels as well as the exotic Nile. The basis of distinction is the following:

a) In none of the areas studied on the west bank from Mallawi to the Delta could any wadi deposits be found that had been aggraded simultaneously with Nile gravels. On the east bank (Mallawi to Maghagha) the occasional sequences of wadi terraces cannot be correlated with the local Nile gravels. The wadi gravels of the Eastern Desert between Maghagha and Cairo have not been visited by the writer, and a reinvestigation of them is rather necessary.

b) South of Beni Adi and Asyut local and Nile gravels are contemporaneous and at times almost inextricably intercalated.

c) The Nile gravels of northern Egypt in the post-Lower Pleistocene sections showed (1) a lack of wadi rubble admixture indicating no local water transport; (2) finer gravels occurring in mixed sandy-pebbly beds consisting of flint gravels and coarser sands derived from Upper Egypt—not from local bedrock (redeposited older Nile gravels from further upstream?); and (3) red earth (a terra-rossa type soil) developed in situ on unweathered gravels. On the other hand the gravels of southern Egypt showed (1) complex mingling of local and extraneous materials with every sign that local and exotic aggradation were simultaneous; (2) irregular beds of pure sands and coarse but rolled gravels; and (3) complex soil profiles inevitably consisting of two fossil soils: the lower part of a terra fusca-type or a xerorendzina with a younger red (terra-rossa type) soil later developed on top.

b) *The Eustatically Aggraded Gravels of Northern Egypt.*

The highest Nile gravels appearing as surface features achieve a maximum at 233 m. above alluvium west of Cairo. Southwards there are patches in 116, 120, 143 and 198 m. at scattered localities to the latitude of the Fayum.

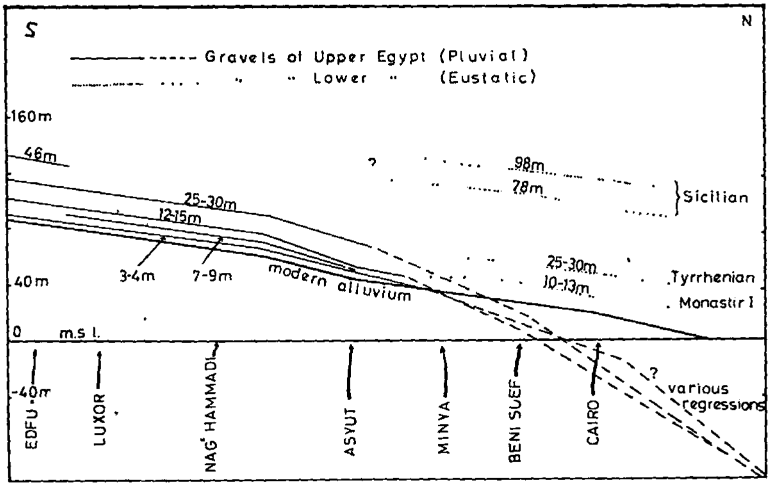

FIG. 2. *Vertical Profile of the Nile Valley deposits* (terraces and gravels refer to text). Strong vertical exaggeration.

A first general feature are the gravels to +98 m. alluvium reappearing continuously from the delta to Mallawi. They are separated from the marine-lagoonal deposits south of the Maryut area by a bare 100 km. and it may prove possible to establish some correlation with the oldest Sicilian (Alam Shaltut) bar at a similar elevation. There is little doubt that these fluviatile gravels are due to eustatic aggradiation.

The second general stage with gravels to +78 m. occurs in the same general area. Interestingly C. Arambourg identified the Villafranchian mastodont *Anancus osiris* in these gravels at Gizah. It seems likely — but not proven — that there is again a connection with one of the Sicilian strandlines near Alexandria. Like that of the +98 m. gravels the associated local climate of the +78 m. stage was at least as moist as today.

Contrary to earlier workers we incline to be skeptical of a 46 m. stage in northern Egypt.

Regarding gradational stages this summarizes our knowledge of the Lower

Pleistocene. Subsequently renewed aggradation was responsible for gravels at +24 — 30 m. between the Delta and Maghagha.

The scanty industries published by Sandford & Arkell from these gravels can be broadly classified as Lower to Middle Acheul, and a correlation may one day be possible with the Tyrrhenian I strandline west of the Maryut.

The case of the 10-13 m. gravels is similar. They occur in the same general area and are reflected by the oldest Fayum lake level. A Tyrrhenian II age seems probable, but no industries have yet been found in situ. Again the weakness of the stratigraphy is a lack of direct correlation between the marine and the fluviatile facies in the western Delta area.

The so-called 8 m. " fine gravels " of the lower Nile are better termed silts. They occur from south of the Fayum entrance to the Delta — where they drop off rapidly in elevation from +8 m. at Cairo to +4 m. some 50 km. further north. The Middle Palaeolithic Fayum level of +28 m. belongs to this period. Their industries are very similar to those at the base of the Sebilian Silts in Upper Egypt. This continuity of aggradation upstream into the central Sudan, and the steep gradient in the Delta area, suggest aggradation due to a major change of hydrography in Ethiopia. Conspicuously the modern percentage of Blue Nile heavy minerals is attained only with this influx of silts. It seems that the base-level was falling at the time of deposition north of Cairo.

Subsequently, in Epi-Levallois time the Nile floods in all Egypt reached progressively lower levels, the Fayum lake receded, and the Nile reverted to vertical incision in its lower course. The suballuvial gravels of northern Egypt suggest a means of correlation to the last great eustatic regression of the Mediterranean. Judging by submerged coastal dunes in northwestern Egypt (to at least — 43 m.) and the submarine topography of the shelf in front of the Nile Delta (with submarine canyons to over — 90 m.) there was at least one recent major regression.

Sandford and Fourtau have identified at least three buried channels of the Nile, testimony of vertical incision to depths well below the present Nile bed reaching upstream into Upper Egypt, something that can only be understood as a response to marine regressions below modern sea-level. The " lower buried channel " is filled with sand and gravel which have been tapped to more than — 100 m., and cannot be older than Villafranchian on the basis of the mineralogy (Eastern Desert or Nubian origin). The next (middle) buried channel, known to a depth of — 30 m. m.s.l. in the Delta, rests unevenly upon the " lower buried channel " and is filled with hornblende sands and silts of igneous and metamorphic provenance, undoubtedly of Pleistocene age. Lastly, the " upper buried channel " filled with sands and silts very rich in Ethiopian mica flakes and hornblende crystals, is known to a depth of — 30 m. in the southern Delta and is probably considerably deeper further north. This last degradation phase belongs to the Upper Pleistocene as the mineralogy is " modern ", and most probably followed the aggradation of the 8 m. Middle Palaeolithic silts. The stratigraphy here is however obscure. Possibly the " middle buried channel " postdates the 10-13 m. gravels as Early Würm, the " upper buried channel " postdating the 8 m. silts as Late Würm. The series is capped by Recent Nile silts.

The surfaces of the Nile gravels of Northern Egypt have been invariably weathered to red earths, resembling an aberrant terra rossa on highly calcareous sandy gravels. Two profiles are described in detail here.

A. Exposures in 78 m. gravels upon limestone at Tuna el Gebel, west of Mallawi at 90 m. m.s.l., escarpment facing E., annual precipitation average 4 mm., mean annual temperature 21° C., no vegetation.

0-40 cm. Light yellow-brown scree.

160 cm. Flint and hornstein gravels (up to 15 cm. major axis) with quartz sand bound by a calcareous and gypseous cement. The finer material is weathered brick red due to a veneer of iron compounds on the carbonate and gypsum aggregate, not however effecting the quartz grains. Where finer materials dominate, flecks of white calcareous gypsum precipitate in columnar shape to 2-3 cm. long occur within the clayey sands, giving a mottled appearance. (B) - horizon.

5+ m. Limestone of the Lower Mokattam series marked with numerous 3-4 m. long vertical clefts suggesting an embryonal karstification.

As a basis of comparison a similar sandy soil from the Mediterranean littoral of Upper Pleistocene or Recent date developing from oolitic limestone, under steppe, vegetation, was also analyzed. The results gave:

		SiO_2 (%)	Fe_2O_3 (%)	Al_2O_3 (%)
Soil at El Alamein	I.	33.3	1.59	5.6
	II.	33.7	1.63	5.8
Soil at Tuna el Gebel	I.	51.3	1.10	2.2
	II.	50.9	0.97	2.2

The Lower Pleistocene red earth apparently developed under a moister climate in order to account for the very large SiO_2 content, which presupposes greater amounts of humic acid at the time of formation and implicitly more vegetation then the dry steppe belt of the Mediterranean coast. Similarly the sesquioxides appear to have been leached to a greater extent. For the initiation of the karstic phenomena perennial water infiltration will have undoubtedly been provided for by the Nile before the deposition of the gravels. These clefts are filled with cemented sand and gravel, to a good part stratified. The rubefaction with iron compounds has penetrated in most to the base. Where this has not been the case a hard gray conglomerate (C-horizon) stands in contrast to the compact but soft, decalcified zone of rubefaction. Little or no gypsum occurs in the conglomerate. The weathering must represent a long period, having penetrated through gravels originally at the very least 2 m. thick to the base of some 3 m. deep clefts, there superficially discolouring the limestone.

B. Exposure on the Nile-Fayum divide near Gerzeh in 25-30 m. and 10-13 m. Nile gravels at 40 m. m.s.l., facing S. Annual precipitation 8 mm., temperature 21° C., no vegetation.

4 cm. Light brown, slightly clayey, fine sand with small pebbles which also lie free on the surface (pavement).

3 cm. Soft, calcareous gypsum crust, often cementing pebbles.

40 cm. Coarse quartz sand, weathered reddish in upper 15 cm., lower 25 cm. unweathered yellow: (B)-and C-horizons of Tyrrhenian II.

Disconformity.

60+ cm. Finer, brick red sand with small and moderate sized gravel. Iron compounds mainly confined to calcareous and gypsum crystals. (B)-horizon of Tyrrhenian I gravels.

The sequence here can be described as 1) deposition of the 26 m. Rus (Tyrrhenian I) gravels, 2) intense weathering and decalcification, 3) erosion of surface, 4) fluviatile deposition of coarse sands, 5) moderate rubefaction of sands, 6) reversal of weathering process to gypsum deposition under surface by capillary action. The significance of the last exposure is that there were different periods of red soil development, of differing intensity and separated by longer stages of limited chemical weathering. It is also important that red earth development followed upon eustatic aggradation.

c) *The climatically aggraded gravels of Upper Egypt.*

Over wide areas, particularly in Upper Egypt, the local deposits of wadis emptying into the Nile Valley are better developed or preserved than corresponding Nile gravels. Their morphology and stratigraphy provide considerable auxiliary information on the Pleistocene evolution of the Nile Valley. In general a striking contrast can be noted in the topography and relief of the Upper Cretaceous and Lower Tertiary limestone plateau on both sides of the valley. With exception of the limestone massif deflecting the Nile in the great bend of Qena, the wadis of the Western Desert are shallow channels reaching only a few kilometers back onto the relatively level plateau. The Thebaid and the Eastern Desert on the other hand are deeply dissected by tributaries cutting deep gorges or eroding small pediments in the limestone beds. That this contrast reflects local distribution of the episodic rainfall can be shown by present day vegetation and other traces of waterflow in the wadi channels.

The Lower Pleistocene gravels of southern Egypt can be dismissed very briefly. The oldest deposits consist of 95 m. gravels in the Luxor area, 75 and 100 m. rock platforms in Nubia and the northern Sudan. The stratigraphy of these obscure features and of the 45 m. gravels south of the barrier at Gebelein is quite vague — we only know that this all antedates the Abbeville-to-Lower Acheul 30 m. gravels, and postdates the Pliocene. Throughout this period there was variable aggradation (and local transport of Red Sea Hills material towards the river) alternating with erosion and removal of the Pliocene filling.

The said 30 m. gravels occur south of Beni Adi - Asyut well into the Sudan, and consist of both Nile and wadi facies. The industries are relatively more frequent but still scant (Abbeville to Lower Acheul). The soil developments recorded are more complex than those of northern Egypt. The following profile tells much about the sequence of climate.

C. Exposure in Nile gravels at el Izziya, west of Asyut at 65 m. m.s.l., facing NE. Precipitation 4 mm., temperature 22° C., no vegetation.

45 cm. Flint and quartz gravel with dark brown red clayey sand in crevices. On slopes these gravels attain 130 cm. showing further differentiation into light reddish brown material over dark brown red. Overlying modern scree is unweathered. (B) horizon of younger soil.

8 cm. Dark red brown clayey sand with small spots of calcareous gypsum concentrate. (B) horizon of younger soil.

120+ cm. Calcareous horizon forming a net-like structure recalling as a cavernous calcareous marl, the hollows of which are filled with light-brown, earthy sand. This sand is cemented in the lime throughout the remainder of the complex. Ca-horizon of older soil — C-horizon of younger soil.

The brown soil embedded in a cavernous calcareous marl occurs at the base of all pluvial gravel profiles and is the calcium horizon of a former, semiarid brown soil of burozem type, later subjected to rubefaction under somewhat differing climatic conditions. Thus the fossil brown soil, now represented only by its own Ca-horizon, is preserved as the unweathered C-horizon of a subsequently developed red earth. In its turn the later is now also a palaeosol.

Since the brown soil development is not recorded in northern Egypt (it can not be contemporary with the arid climate accompanying eustatic aggradation in the north) the only explanation possible is that the lower Nile was flowing at a lower level than to-day, i.e. was degrading to a lower base-level during a regression. The point cannot be proven as yet but seems likely. In any case aggradation in the south and north were not contemporary. On the basis of the industries the 30 m. gravels in the south are somewhat older than the altimetric equivalents on the lower Nile.

The absolute stratigraphy of the younger 12-15 m. (evolved Middle Acheulian), 7-9 m. (Acheulio-Levallois), 3-4 (Late Lower Levallois) and 1-2 m. (Epi-Levallois II or Middle Sebilian) gravels of Upper Egypt is a little more clear. Representative fossil soil profiles are published in Butzer (1959) and show the same sequence of brown and red soils—excepting in the two last stages. This would indicate that the 3-4 and 1-2 m. gravels postdate the 10-13 (Tyrrhenian II) aggradation of the lower Nile. They are separated by the Sebilian silts which in their turn can be correlated to lower Egypt as slightly younger than the local 8 m. silts. This suggests alluviation in the south corresponding to vertical incision in the Delta area—during the Würm regression.

d) *The Significance of the Soil Profiles and Conclusions.*

The eustatically controlled Nile terraces of Middle and Lower Egypt each bear traces of reddish weathering, the development of sandy red earths ("terra rossa") from generally calcareous sand. The climate must have been considerably moister since a 4 mm. mean annual rainfall will never suffice for the chemical reaction inherent in this process. From the high SiO_2 content of the 78 m. terrace the humic acid present must have been considerably greater than that of the modern sandy red earth of the Mediterranean coast with 100 mm. rainfall. This red earth development must have occurred after the eustatic aggradation locally and before the deposition of the next pluvial gravels upstream, either during the later interglacial periods or the very early glacial phases. It may be suggested that "terra rossa" was characteristic in Egypt during late interglacial periods. The thin, relatively loose gypsum crusts found almost everywhere in the country may be Recent or, rather, Recent to Upper Pleistocene in age.

Pluvial gravel deposition upstream was apparently immediately followed by the development of brown earths with massive calcareous horizons. Related semiarid burozems in middle latitude develop with mean temperatures 5° C. or more lower than in present-day Egypt and with a precipitation of 250-350 mm., the well-known lime horizon develops to close beneath the surface thanks to the absence of a high water-table. It may be justifiable to suggest a considerably moister and perhaps somewhat cooler climate for the development of the Egyptian counterparts, probably during the glacial phases. Possibly the gradual replacement of the carbonates by more soluble gypsum in the younger terraces suggests progressively weaker pluvials in the course of the Middle and Upper Pleistocene.

Thirdly it was indicated that a red earth development followed the calcareous brownish soil formation in the 25-30, the 12-15, and the 7-9 m. deposits. One may assume they were separated by an arid phase with little soil formation, as the rubefaction of the eustatic gravels succeeded upon a period without chemical weathering and a time of no local wadi activity. That there was not only one but rather several phases of rubefaction seems obvious from the two dinstict periods of red earth development illustrated at Gerzeh. A terra rossa developing from limestone could not be expected to keep such a distinct, almost horizontal demarcation between fossil and developing soil. But in the Nile Valley case a sandy red earth was formed in a homogeneous sandy sediment, so that the border between the red and brown soils can be expected to remain as striking as it is. Possibly the decalcification of the upper soil horizon led to further carbonate precipitation in the older brown soil preserved below. Red earths are very stable and it is therefore not surprising that subsequent climates have not reversed the red soil profiles of Egypt.

The typical climatic, morphological, and pedological sequence can be summarized as:

1. Deposition of sand to great depth by wadis and Nile and final aggradation with fluviatile gravels upstream. Moist.
2. Brown soil development with massive Ca-horizons. Moist, cooler?
3. Cessation of chemical weathering and soil development. Eustatic aggradation downstream. Dry.
4. Red earth formation with decalcification. Moist.

The last phase has only in an incipient way succeeded upon the last two Upper Pleistocene sedimentary phases.

The evolution of the present Nile Valley below Gebelein can be tentatively summed up as follows These suggestions are of a preliminary character and should be taken as a possible directive for future lines of research, not as finished results.

Miocene to Lower Pliocene. Cutting of present Nile valley and tributaries to at least 125 m. below m.s.l. probably in response to a very pronounced marine regression. Tributaries could apparently not keep apace with rapid incision of main valley.

Upper Pliocene. (Plaisancian). Deposition of marine and freshwater beds in gulf flooding Nile valley to over 180 m. m.s.l.

Pleistocene, Calabrian. Return to fluviatile conditions. Various gravels between 115 and 230 m. in Lower Egypt, probably eustatic. Large scale erosion in Red Sea Hills and transport of masses of gravels to Nile.

Sicilian. Nile course to +98 m. on surface of Western Desert north of Mallawi in response to Mediterranean sea-level of 103 m.

Shorter period of vertical incision in lower Nile.

Nile course to +78 m. on Western Desert from Mallawi to the sea in response to m.s.l. of +80-85 m.

Post-Sicilian, Pre-Mindel. Long period of intermittant vertical incision in entire valley. During part of this time longer phase of rubefaction of calcareous sands (" red earth ") with some precipitation.

Mindel (?). (" Abbevillian to Lower Acheulian "). Climatic aggradation on upper Nile and tributaries with gravels deposited to 25-30 m., gradually falling off towards the north.

Brown soil formation with strong calcareous precipitation below surface (precipitation and cooler).

Tyrrhenian I. (" Lower to early Middle Acheulian "). Vertical incision upstream, eustatic aggradation and redeposition of older material by Nile downstream following a course in 25-30 m. on Western Desert north of Minya, bed rising towards north in response to sea-level of +35 m. Locally dry.

Longer period of red earth development (considerable precipitation).

Riss (" Middle and evolved Acheulian ", pre-Micoquian). Climatic aggradation of Nile and wadis in Upper Egypt to 15 m., apparently falling off rapidly north of Sohag to 8 m. at Mallawi. Vertical incision downstream.

Brown soil formation with calcareous horizon (precipitation and cooler).

Vertical incision upstream.

Red earth formation (?).

(" Acheulio-Levalloisian "). Renewed aggradation of Nile and wadis in Upper Egypt to 9 m., falling off towards north. Vertical erosion downstream?

Period of brown earth formation with discontinuous calcareous horizon (precipitation and cooler).

Tyrrhenian II (Monastirian). Aggradation of Lower Nile to 10-13 m. rising towards north in response to sea-level of +10-15 m. Beds are merely redeposited older materials from further upstream showing no traces of local wadi activity. Local aridity.

Moderate period of red earth development (precipitation).

Würm. (" Late Lower Levallois "). Aggradation of 4 m. torrential gravels in Upper Egyptian wadis.

Moderate period of brown soil formation with precipitation of calcareous gypsum (some precipitation and cooler).

(" Upper Levallois to Epi-Levallois I "). Inauguration of modern hydrographical regime with surge of exceptionally high, silt-bearing annual floods. Sea-level low or falling. Vertical erosion of wadis. Very short phase of slight reddish weathering with some moisture. Epi-Levallois I phase with little local wadi activity.

(" Epi-Levallois II "). Short period of wadi aggradation and wadi activity. Incision of Nile begins.

(" Epi-Levallois III "). Vertical incision of Nile with gradual cessation of all wadi activity. Some tendency to formation of arid light brown soil (slightly moister, cooler?). Ultimately intense local aridity with greater aeolian activity.

Holocene. Resumption of silt deposition. Neolithic and early Islamic period locally moist, later Dynastic period drier with greater aeolian activity.

3. The Palaeolithic Industries.

Although the old Stone Age industries of Egypt were considered as comparatively well-known some fifteen years ago, a lack of subsequent prehistoric investigation has been unfortunate. We know little definite about the oldest culture found in situ so far, namely that of Abassiya. With exception of this and Vignard's "Sebilian " no prehistorian has yet worked in the Nile gravels proper, such knowledge as we possess being derived from incidental collections by Pleistocene geologists. Yet without a clear picture of the Palaeolithic stratigraphy of the Nile deposits, Miss Caton-Thompson's valuable work in the Kharga and the Fayum remains without a safe link to sequences elsewhere. Lastly the absence of stone implements from the offshore bar and lagoon shorelines is anything but helpful in understanding the prehistory of Egypt.

a) *Abassiya, the Kharga, the Fayum and Kom Ombo.*

The *Abassiya* beds of the east bank in the Cairo area contain the oldest culture so far found in situ in Egypt. The geology of the site is complex (see above) and the tools were found in sand and gravel beds disconformably overlying fluviatile deposits of Villafranchian (?) age. The top of the series is 32 m. above alluvium, making the whole sequence of Tyrrhenian or earlier date. In fact however the range of industries found in the upper 10 m. is so great that one must suppose that the various implementiferous beds do not form a conformable series. The major weakness of the site lies in the painfully inadequate publications by the discoverer, P. Bovier Lapierre, and the lack of systematic prehistoric work at the site since.

The oldest industry was originally classified as pre-Chellian. These implements include circular pebbles reduced to zigzag cutting edge on one side by alternate chipping, a technique recalling a pebble culture (cf. Sandford and Arkell, 1939; Huzayyin, 1941; Butzer, 1958). C. B. M. McBurney informed the writer that these primitive tools seem to occur together with the better known crude triangular hand axes. These massive, coarse trihedral artifacts with zigzag edge and untouched butt would describe the association as of Abbevillian type, although of course no true Abbevillian is known from Africa. Interestingly Bovier Lapierre spoke of a large, extinct mammalian fauna — the elements of which were never specified nor published. Faunal remains in the Egyptian Pleistocene are so rare that this act of omission is particularly distressing.

From — 5 to - - 2 m. Bovier Lapierre found Lower Acheulian (" Chelleo-Acheulian "), from — 2 m. to the surface, Middle Acheulian bifacial implements Near or upon the surface there are Micoquian-type artifacts.

The *Kharga Oasis* was subject to systematic work by Misses G. Caton-Thompson and E. W. Gardner, and has received quite adequate publication (Caton-Thompson, 1952). The industries offer a fairly complete range from Upper Acheulian over the Levalloisian to the Neolithic. Of great value is the painstaking geology presented with the material. The interpretation of the geomorphologic processes is however open to some controversy, the major aspects of which are discussed in Butzer (1958, p. 71-74). The stages described by the British archaeologists, with associated industries, are as follows:

i. Plateau tufa deposits. Sterile.

ii. Gravel deposition on plain with incision of great V-shaped valleys into plateau edge. Sterile.

iii. Breccia accumulation in the plateau wadis. Sterile.

iv. Tufa, gravel and silt accumulation in the wadis, gravel fans on plain. Two stages: Upper Acheulian bifaces and flakes, some with faceted striking platforms; Acheulio-Levalloisian flakes with faceted butts, less carefully worked bifaces, discoid cores.

v. Gravel deposition on plain, excavation of wadi fill on plateau edge.

vi. Gravel deposition on plain, tufa, gravel and silt accumulation in the plateau wadis. Lower and Upper Levalloisian flakes with smooth or faceted bases, discoid and occasionally triangular cores.

vii. Gravel deposition on plain, excavation of wadi fill on plateau edge.

viii. Gravel, silt and tufa accumulation in plateau wadis. Levalloisian flakes with small retouched broken flakes (" Levalloiso-Khargan ").

ix. Minor terraces representing limited aggradation in some of the plateau wadis. Late Palaeolithic industries: " Khargan " (numerous small retouched broken flakes, shapeless flakes truncated at base and retouched there, etc.), Aterian (cores, points of bifacial leaves) and Epi-Levalloisian (smaller, blade-like pieces with short faceted platforms and subgeometric forms). The Khargan-Aterian seems to precede the Epi-Levalloisian (or Sebilian).

The Pleistocene lake levels of the *Fayum Depression* were also the subject of intense investigation (lastly by CATON-THOMPSON, GARDNER and HUZAYYIN, 1937). The industries correspond quite closely with those of the Nile Valley proper and will be discussed more closely there. The oldest 40-44 m. lake corresponds to the 10-13 m. Nile gravels of northern Egypt and would then presumably be Tyrrhenian II. No industries were found associated with the beaches but an Upper Acheulian biface has been suggested as a possible correlative. The lake levels, industries and corresponding Nile deposits (details in BUTZER, 1958, p. 68-71) are as follows:

40-44 m. (m.s.l.) lake		13 m. gravels
34 m. (m.s.l.) lake	Upper Levalloisian	8 m. silts
28 m. (m.s.l.) lake	Epi-Levallois I	?
22.5 m. (m.s.l.) lake	Epi-Levallois II	Suballuvial gravels
Desiccation of lake		Deep vertical incision

The molluscan fauna of the 22.5-34 m. lakes contained decidedly northern elements, and quite possibly reflect a cooler climate.

The last of the better known Palaeolithic sites in the area under discussion is *Sebil-Kom Ombo* in Upper Egypt. The site is fully analogous in character to the Fayum beaches, the implements having been found around the successive shorelines of a gradually draining lake behind Gebel Silsila. Although the publication of the materials (by VIGNARD, 1923) is widely considered as inadequate, the stratigraphy is as sound as that of the Fayum after reinvestigation by SANDFORD & ARKELL (1933). The earlier industries are fully comparable with the Fayum Epi-Levallois I and II — which we know are anterior to the Late Pleistocene incision of the Nile. There are then no grounds whatsoever for considering the Lower and Middle " Sebilian " as recent industries, or even as contemporaries of the North African Capsian.

The Epi-Levallois I or Lower Sebilian is essentially still a Levalloisian industry (after CATON-THOMPSON, 1946). Its characteristic is the gradual appearance of a number of innovations such as faceted striking platforms, sometimes on both sides of the flakes. The flakes tend to be a little smaller than the Egyptian Levalloisian and are often truncated at the base, across the percussion bulb. Flake points are very common. Alongside of these are any variety of typical Levalloisian flakes and cores.

The Epi-Levallois II or Middle Sebilian has evolved into a Late Palaeolithic industry of more characteristic assemblage. Although Levalloisian-type cores remain, such flakes have been fully replaced by sub-geometric forms. The implements are again somewhat reduced in size with sharp retouching on one or more edges, often from both sides. Blade-like flakes are common, truncated flakes characteristic.

The Upper Sebilian is no longer considered as an Epi-Levalloisian by Miss CATON-THOMPSON, although the term is sometimes used for sake of convenience. This industry is sub-microlithic in character, cores are very small and flakes are widely truncated and retouched. Geometric forms — triangles, trapezes and crescents — are characteristic and blade-like pieces most abundant. Arrowheads occur, and as in the case of the Middle Sebilian, also mortars and pestles. These levels both have kitchen middens. Into just what period the Upper Sebilian persisted we have no way of telling. It probably was replaced by the beginning of the Holocene.

Of great interest regarding the Kom Ombo sites is the fauna (GAILLARD, 1934, p. 3-58). Along with the bubal, isabella gazelle, wild ass and the spotted hyaena, Gaillard identified the following extinct forms: *Bos brachyceros* Owen, *Bos primigenius* Boj, *Bubalus vignardi* Gaill., *Equus caballus* L., *Hippopotamus anphibius* L., var. *major* Owen. SANDFORD (1934, p. 86) adds crocodile, a tortoise, ostrich and *Homo* sp. Dr. DERRY examined the human skulls and described them as " akin to the Predynastic race ", although no closer publication of them has ever been made. All these remains were found in the Sebilian Silts and so correspond to the Epi-Levallois I.

b) *The Nile Valley Deposits.*

The oldest industry among the " unclassified " Nile Valley sites is an Abbevillian at es Sibaiya Station (SANDFORD and ARKELL, 1933, p, 27-28, plate figures 1-9). This consists of primitive hand axes with coarse zigzag edges due to primary flaking alternating sides on three edges. The butt is often untouched. The varied and interesting assemblage was found in the 30 m. pluvial gravels of Upper Egypt. The appearance is however more advanced than that of the oldest levels at Abassiya. Elsewhere in the Asyut area the 30 m. pluvial gravels contain Lower Acheulian type bifaces with skillful primary flaking with occasional earlier forms characterized by triangular-shaped or large untouched butts. The stratigraphy of the unpublished, immense Lower Acheulian hand axes found by BOVIER LAPIERRE in the Eastern Desert of Middle Egypt is unknown. The material is now in the Cairo Museum.

The 25-30 m. eustatic gravels of northern Egypt seem to contain a majority of straight-edges, finely retouched Acheulian hand axes, as in the upper Abassiya beds. Although the 10-13 m. gravels of northern Egypt are sterile (unless the Upper Acheulian biface of the Fayum be considered), the older, 12-15 m. pluvial gravels of Upper Egypt contain an evolved, but definitely pre-Micoquian form of Acheul (cf. BUTZER, 1959).

The area west of Luxor is known for plentiful finds of Middle Palaeolithic character, although the Acheulio-Levalloisian of the 9 m. gravels there is rather scanty (cf. CATON-THOMPSON, 1946). The 4 m. pluvial gravels of Upper Egypt contain abundant Levalloisian flakes and cores, whereas the less omni-present 1.5-2 m. gravels contain an Epi-Levallois II industry west of Luxor (BUTZER, 1959).

The overall impression that the industries of the various deposits are known in a broad way is misleading, however. With the exception of Mis Caton-

Thompson's work none of the prehistoric research involved meets modern standards. Particularly in the case of the Nile Valley gravels " cultures " are often identified on the basis of vague characteristics suggested by isolated bifaces. In other words then, this outline makes no pretences about our knowledge of the Egyptian Palaeolithic. We know something to be sure, broad outlines are apparent, but there is a bitter lack of systematic, statistical analyses of sites.

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ILLUSTRATIONS

LOWER PALAEOLITHIC

1, 2. *Pebble artefacts from lower Abbassiya beds* (1/2 size) (from Huzayyin (1941) Nos. 1-2, Pl. VI), Early Abbevillian.

3. *Trihedral implement from lower Abbassiya beds* (1/2) (Huzzayyin No. 2, Pl. VII) Early Abbevillian.

4. *Triangular hand axe from lower Abbassiya beds* (3/4) (Sandford & Arkell - UCOIP 46, 1939, No. 2) Early Abbevillian.

5, 7. *Primitive hand axe from 30m gravels of Upper Egypt, es Sibaiya* (3/4) (UCOIP 17, No. 1, 3) Abbevillian - Lower Acheulian.

6. *Primitive core* (?) (ditto No. 5) Abbevillian - Lower Acheulian.

8. *Biface* (ditto No. 7) Abbevillian - Lower Acheulian.

9. *Biface from upper Abbassiya beds* (UCOIP 46, No. 3) Middle Acheulian.

10. *Biface from surface of 39m gravels of Upper Egypt, Esna* (UCOIP 17, No. 10) Middle Acheulian.

11. *Disk, 15m gravels of Upper Egypt, el Kab* (UCOIP 17, No. 18) Middle Acheulian.

12. *Small biface* (ditto No. 19) Middle Acheulian.

13. *Biface, 9m gravels of Upper Egypt, Armant* (ditto No. 21) Acheulio-Levalloisian.

14. *Biface, 9m gravels near Armant (Thebaid)* (UCOIP 17, No. 21) Acheulio-Levalloisian.

MIDDLE PALAEOLITHIC

15. *Core, surface of 9m gravels, west of Sohag* (UCOIP 18, No. 29) Late Lower Levalloisian.

16, 18. *Flakes, 3-4m wadi gravels of Upper Egypt, near Nagadà (Thebaid)* (ditto No. 34, 33) Levalloisian.

17, 19. *Flake and shouldered point, 3-4m wadi gravels of Upper Egypt, Wadi Qena at el Haita* (ditto No. 35, 47) Levalloisian.

20. *Core, desert surface west of Nag Hammadi* (ditto No. 38) Levalloisian.

LATE PALAEOLITHIC

21, 22, 23. *Double-ended core, flake, and blade-like flake from +24m beach deposits of Fayum lake, near Philadelphia* (1/2 size) (Huzayyin No. 4-6, Pl. XI) Epi-Levallois I.

24, 25. *Blade-like truncated flake, double-ended core. Surface finds from Kharga Oasis* (1/) (Huzayyin No. 6, 1, Pl. XII) Khargan.

26, 27, 28, 29, 30. *Flakes, often with steep trimming or truncation at base. Level I at Kom Ombo* (1/2) (Huzayyin No. 8-12, Pl. XII) Epi-Lavallois I.

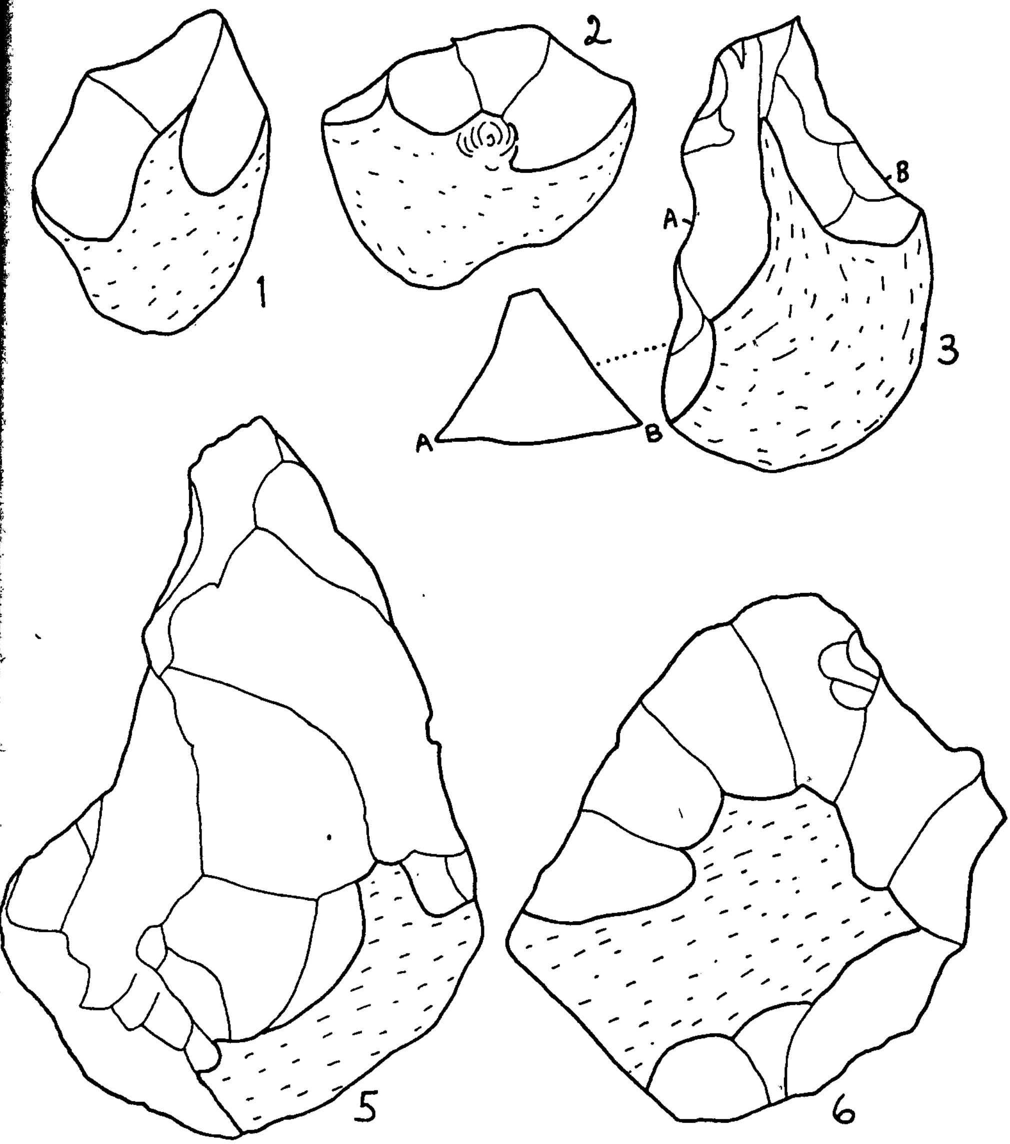
31, 32, 33, 34, 35. *Small discoidal core, truncated flakes or blade-like flakes, and a large backed lunate. Level II at Kom Ombo* (1/2) (Huzayyin No. 13-18, Pl. XII) Epi-Levallois II.

36. *Blade-like flake with short, faceted platform. 2m gravels of Wadiyein Thebaid* (3/4) (Butzer, 1959, Ill. 1b).

37-49. *Microlithic core, various truncated flake fragments, lunates, and two micro-burins. Level III, Kom Ombo* (1/2) (Huzayyin No. 19-32, Pl. XII) Epi Levallois III or Upper Sebilian.

MICROLITHIC (Final Paleolithic)

50, 51. *Microliths from surface at Helwan* (1/2) (Huzayyin No. 40, 44, Pl. XII) Helwan microlithic - Upper Natufian.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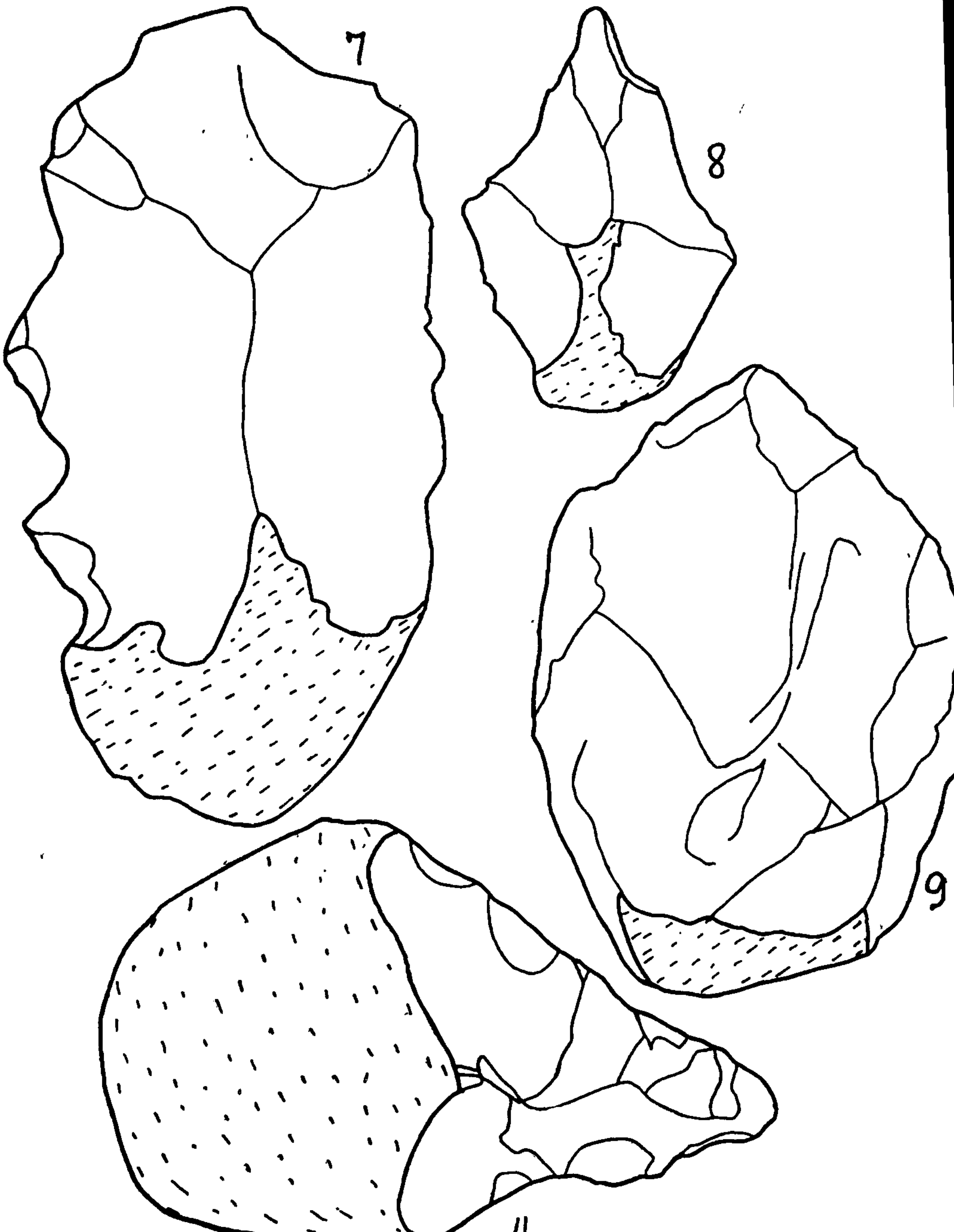
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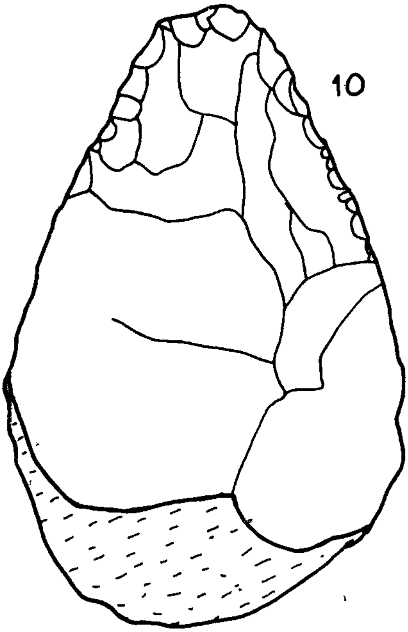

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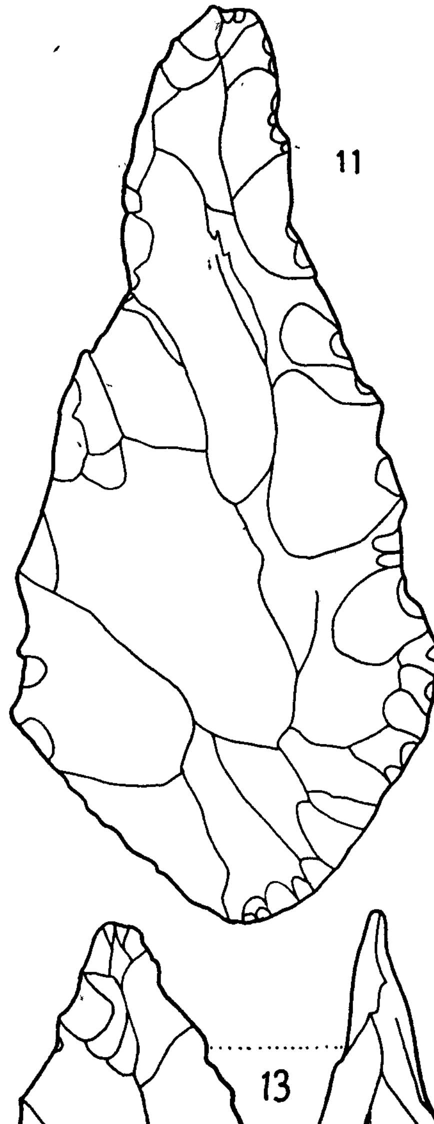

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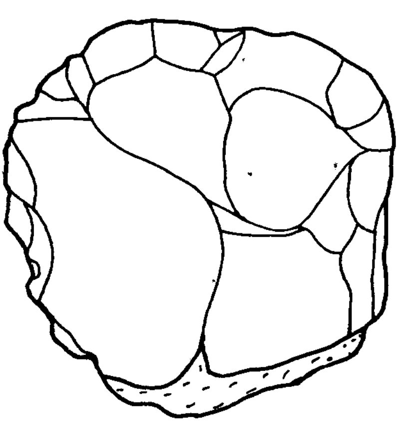

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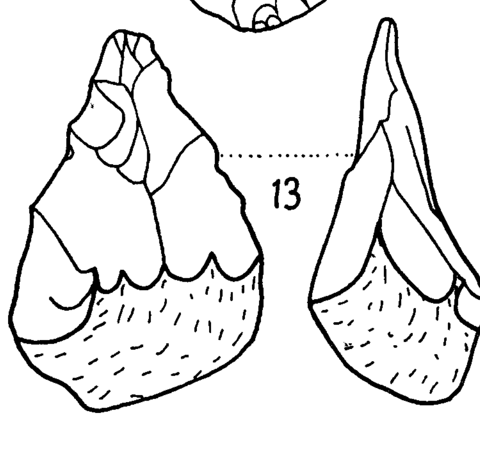

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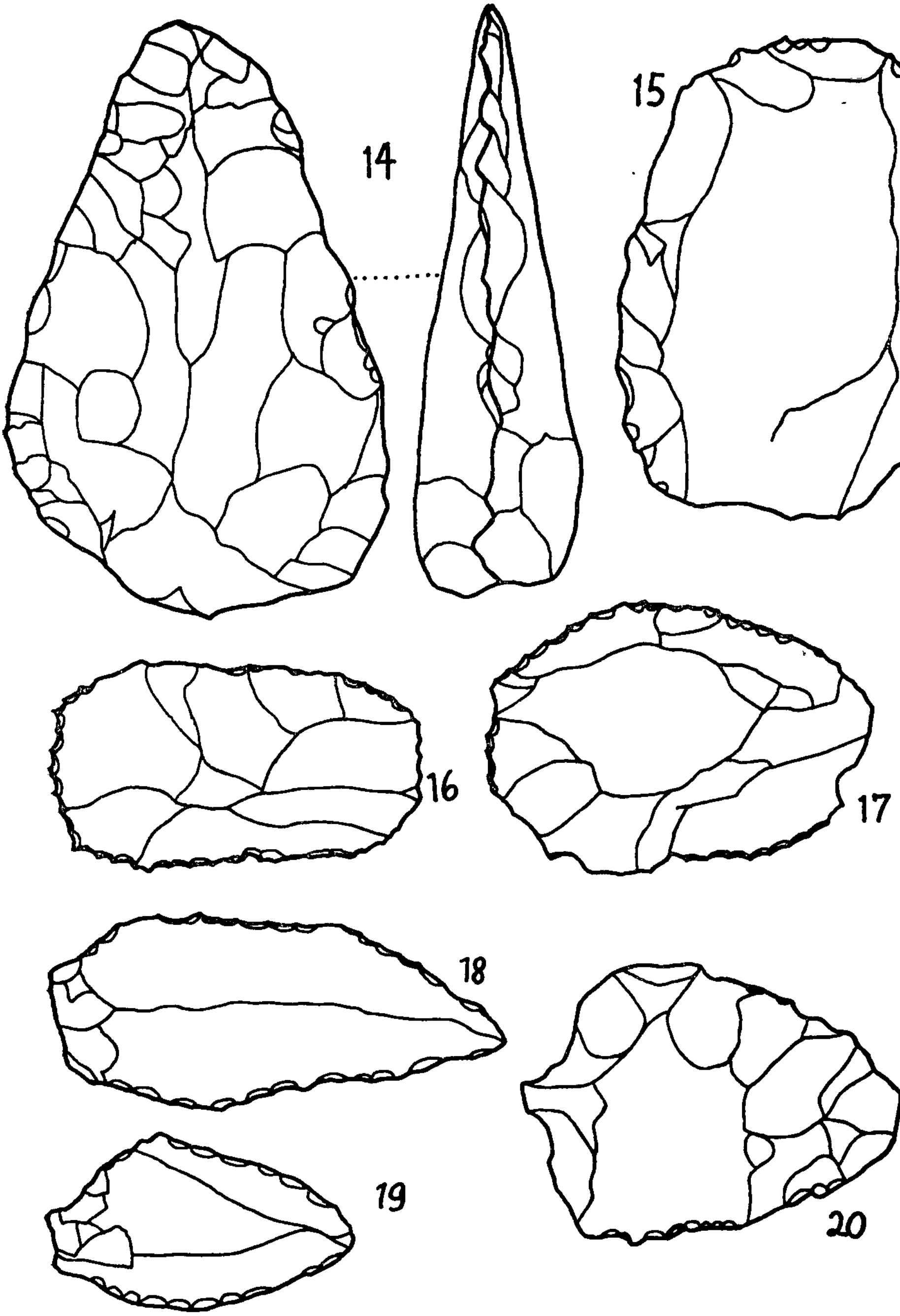
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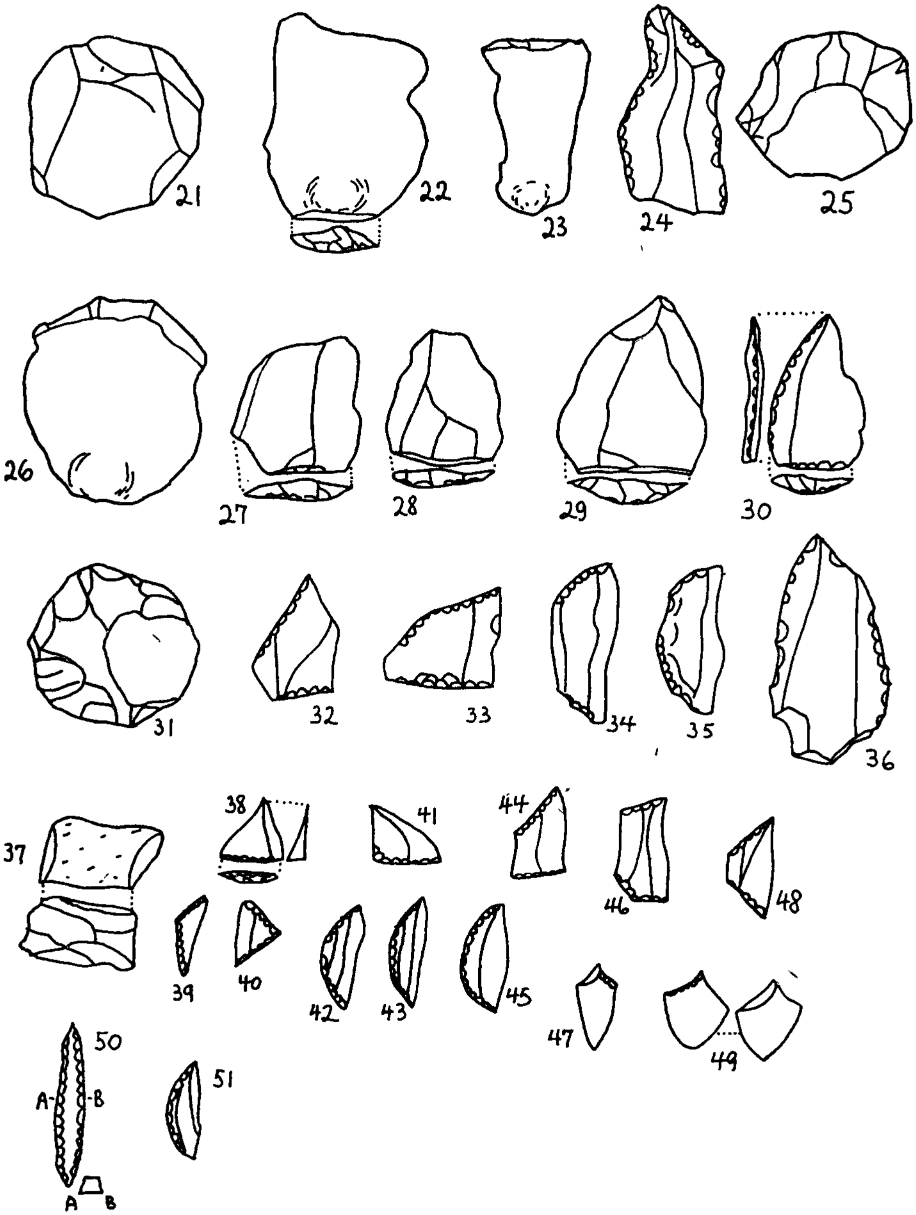
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