LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
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The Early Neolithic, Qarunian burial from the Northern Fayum Desert (Egypt)

Investigations of prehistoric sites in the Fayum were carried there for quite a long time (Caton-Thompson and Gardner 1929; 1934; Caton-Thompson *et al.* 1937; Puglisi 1967; Wenke 1984; Mussi *et al.* 1984; Casini 1984). During the season of 1968 - 1969 a team of American, Egyptian and Polish investigators operating within the framework of the Combined Prehistoric Expedition conducted extensive research in the area of Northern Fayum Desert. In the area between Qasr El-Sagha and Kom Aushim eight sites were explored. The oldest of them are of Early Neolithic age, previously described as Terminal Palaeolithic, and are dated back to Early Holo-

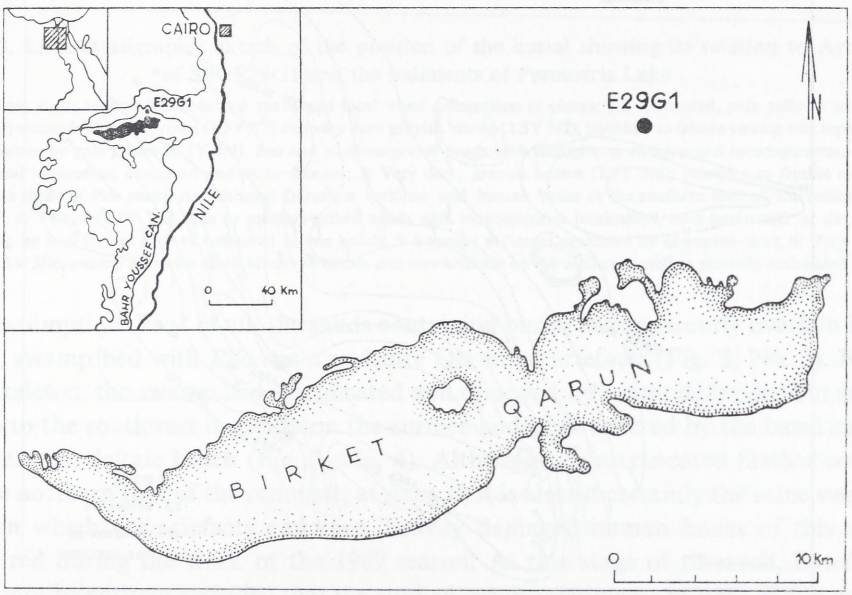

FIG. 1. Map showing the location of Site E29G1 in the Fayum Depression

cene, while the most recent are of Middle Kingdom age (Said *et al.* 1972; Wendorf and Schild 1975; 1976). The change in terminology from "Terminal Palaeolithic" to "Early Neolithic" was prompted by recent work in the Western Desert which has resulted in the recovery of bones identified as probably domestic cattle associated with sites similar to those in the Fayum (Wendorf *et al.* 1984), and by the presence of cattle in one of the Qarunian sites in the Fayum (E29H1B; Gautier 1976).

The burial dealt with here was saved much later from imminent destruction by a petroleum geologist and is now in the Geological Museum in Cairo. The locality which yielded the skeleton is close to one of the oldest sites known in the Northern Fayum Desert. The site is labelled E29G1 and is also known under the name of Z-1 in the publications of Caton-Thompson and Gardner (Fig. 1).

Age and litho-stratigraphic placement of the skeleton

The skeleton was found embedded in cemented, pale yellow to yellow, mottled sands with ferruginous stains of glay character and inconspicuous lamination, perhaps representing an early beach face. It was found 130 m to 135 m and 30° towards east from the center of an elevated lacustrine remnant at Area F of Site E29G1, some 18 m to SE from a surface Qarunian concentration designed as Area C of the same site (Fig. 2).

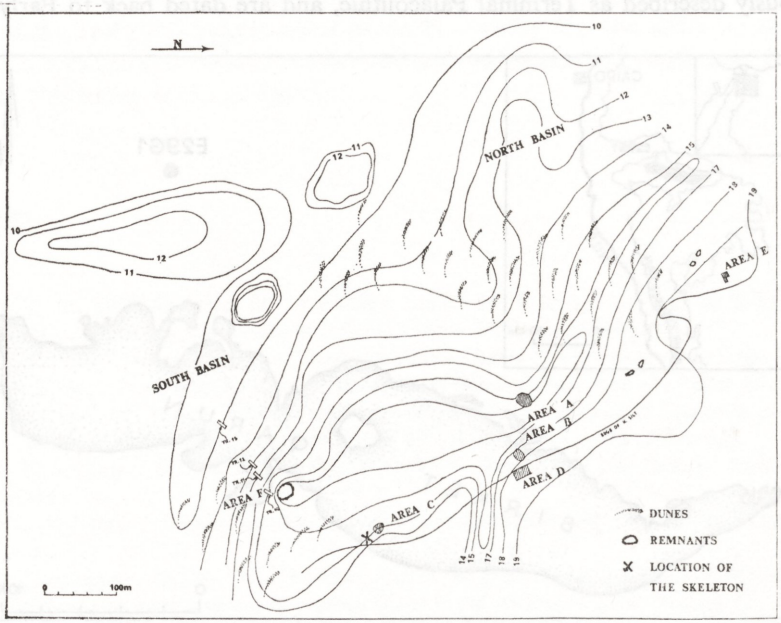

FIG. 2. Topographic map of Site E29G1

Except for surface geological work and necessary measurements no additional trenching or boring was done at the site of find. On the other hand, extensive litho--stratigraphic investigations accompanied by expended trenching of the area were conducted by the Combined Prehistoric Expedition in the 1969 season (Wendorf and Schild 1976). This work resulted in an adequate understanding of the dynamics and chronology of the lacustrine formations at site E29G1. It is this work which permits a relatively good chronological and cultural placement of the skeleton.

It is certain that the skeleton occured in the lacustrine sands of Premoeris Lake at an elevation of *ca* 17 m above sea level (Fig. 3). There are several reasons for

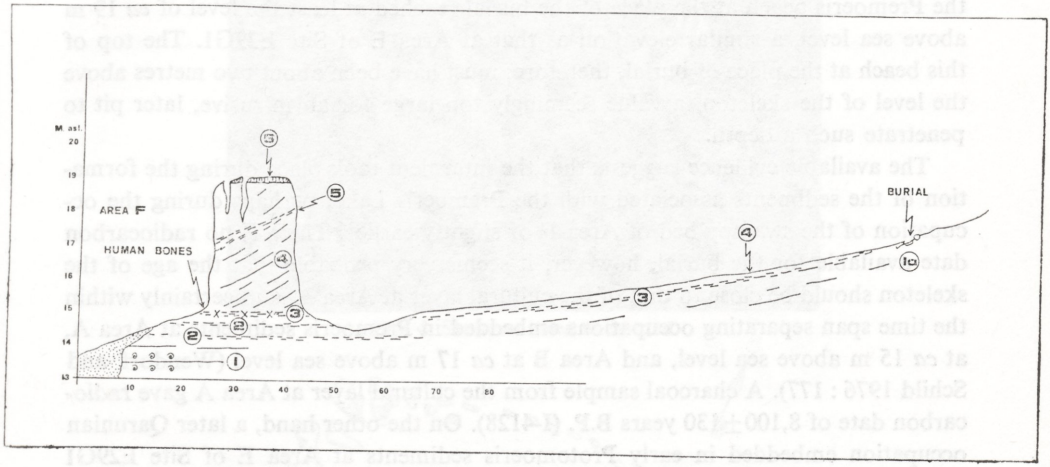

FIG. 3. Litho-stratigraphic sketch of the position of the burial showing its relation to Area F of Site E29G1 and the sediments of Premoeris Lake

1: Shallow water sands with lacustrine snails and local water truncations at places; *1a*: Cemented, pale yellow, mottled beach (?) sands; *2*: Grayish brown (2.5Y5/2) and very dark grayish brown (2.5Y 3/2), powdery to friable swamp silts separated and overlain by pale yellow (2.5Y 8/4), fine and medium-grined sands with ferruginous staining and inconspicuous, semi-horizontal lamination, cemented and carbonaceous; *3*: Very dark, grayish brown (2.5Y 3/2), powdery to friable swamp silts with shells of *Pila ovata*, rare chipped Qarunian artifacts and human bones at the southern foot of the remnant in Area F; *4*: Yellow (2.5Y 7/6), fine to medium-grined sands with inconspicuous lamination, semi-horizontal at the base, grinding up into foreset beds of cemented deltaic beach; *5*: Swampy sediment separated by cemented sand; *6*: Very dark gray (2.5Y 3/0), swamp silts with small blocky structure and rare artifacts on the surface as well as partially embedded in it.

this assumption. First of all, the sands containing burial are apparently overlain by a dark, swamp bed with *Pila ovata* and rare Qarunian artefacts (Fig. 3, No. 3). Near the skeleton, the swamp bed is truncated and removed by recent deflation, but some 10 m to the southwest it occurs on the surface and/or is covered by the basal sands of the next, deltaic beach (Fig. 3, No. 4). Although again truncated farther south, at the northern foot of the remnant, at Area F, it is almost certainly the same swamp bed in which the artefacts and rare, heavily damaged human bones of this area occurred during the work of the 1969 season. At this stage of research, however, it cannot be entirely excluded that the studied swamp sediments at Area F and south of the skeleton belong to different subhorizons forming a series of alternating swamp

silts and sands, similar to those at Areas A and B of the same site (Wendorf and Schild 1976 : 177). In any case, the sediments have to be associated with the Premoeris Lake.

When found, the burial at Site E29G1 had no upper seal which would have helped chronological placement of the find. Theoretically, this situation does not, however, exclude a remote possibility that the burial pit had been sunk from a later surface, perhaps that of the Protomoeris Lake (?). Although theoretically possible, such a situation seems to be highly unlikely. First of all, there were no other than local sediments observed in the pit, and as indicated by the lithology of the remnant, the Premoeris beach at the place of the burial reached at least the level of *ca* 19 m above sea level, a similar elevation as that at Area E of Site E29G1. The top of this beach at the place of burial, therefore, must have been about two metres above the level of the skeleton, a value seemingly too large for an intrusive, later pit to penetrate such a depth.

The available evidence suggests that the interment took place during the formation of the sediments associated with the Premoeris Lake, perhaps during the occupation of the swampy bed of Area F or slightly earlier. There is no radiocarbon date available for the burial, however, it seems very probable that the age of the skeleton should be close to that of the cultural layer at Area A, and certainly within the time span separating occupations embedded in Premoeris sediments at Area A, at *ca* 15 m above sea level, and Area B at *ca* 17 m above sea level (Wendorf and Schild 1976 : 177). A charcoal sample from the cultural layer at Area A gave radiocarbon date of 8,100±130 years B.P. (I-4128). On the other hand, a later Qarunian occupation embedded in early Protomoeris sediments at Area E of Site E29G1 gave a radiocarbon date, on burnt shells, of 7,140±120 years B.P. (I-4129). In short, it is almost certain that the burial at Site E29G1, in the northern Fayum, is associated with the early Qarunian occupation and dates around 8,000 B.P.

Archaeology

The skeleton was lying on its left side in a flexed position with its head to the east, facing south. The left hand was placed under the head, the right one apparently covered the face. Lower extremities were flexed so much that the knee almost touched the albows (Fig. 4 and 5). Till now, not many Terminal Palaeolithic and Early Neolithic burials from Northeastern Africa have been recorded. Moreover, all hitherto discovered burials were found rather far from the Fayum depression. Flexed position is highly typical for the Northeastern African Terminal Palaeolithic and Neolithic burials; however, positioning of skeletons with respect to geographical directions varies. The style of the burial dealt with here is exactly similar to the majority of burials at Terminal Palaeolithic cemetery of Jebel Sahaba in Sudanese Nubia (Wendorf 1968) related to the Qadan industry. Similarly, though with a higher number of exceptions than those at Jebel Sahaba, the deceased were

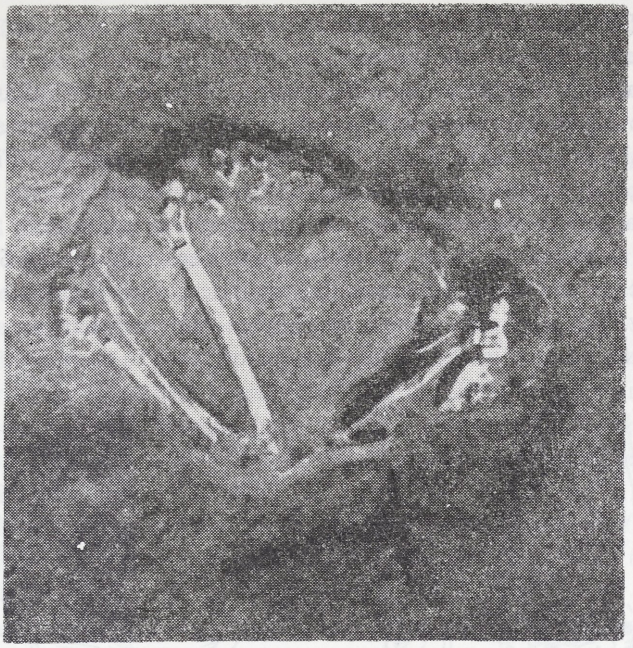

FIG. 4. Skeleton when excavated

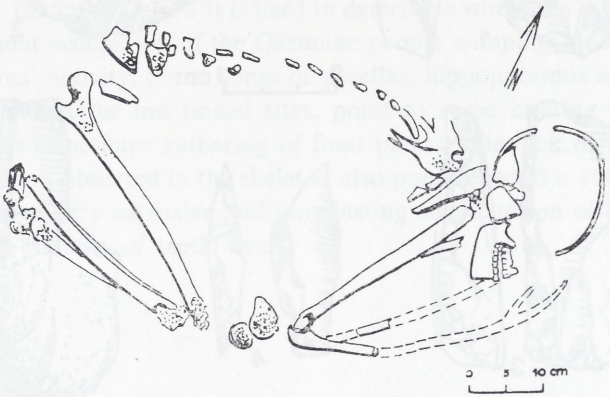

FIG. 5. Position of skeleton

buried at approximately the same time on the western bank of the Nile, opposite Jebel Sahaba (Armelagos 1965). A child's skeleton from the Neolithic settlement (site El Ghorab – E-79-4) of Egyptian Western Desert was equally strongly flexed, but placed on its right side with the head pointing west (Kobusiewicz 1984). Nearby, in the vicinity of Jebel Nabta, a double burial of probably Terminal Neolithic origin was excavated in which both individuals were lying on their right sides with their heads directed to the west, facing south, and the hands close to their faces. The legs of one of the skeletons were strongly flexed, while the other one's legs looked as if

pulled back (Wendorf and Schild 1980).

No artifacts were found in the immediate vicinity of the skeleton at the Fayum. To the northwest of the burial ,at a distance of about 18 m, a flint assemblage was found on the surface. It was labelled as Area C of site E29G1. Areas A, B and D of the same site are 220 m to the north-northwest of the burial (*cf.* Fig. 2).

The foregoing stratigraphic data indicate that the burial at site E29G1 should be dated to a period of lake Premoeris aggradation, or to an early period of lake Protomoeris aggradation, most probably at the beginning of the 6th millennium B.C. That means that the burial should be attributed to the population of the Qarunian industry. Traces of these people are known from at least four sites located at nowadays deserted area of the Fayum depression lying to the north of the modern

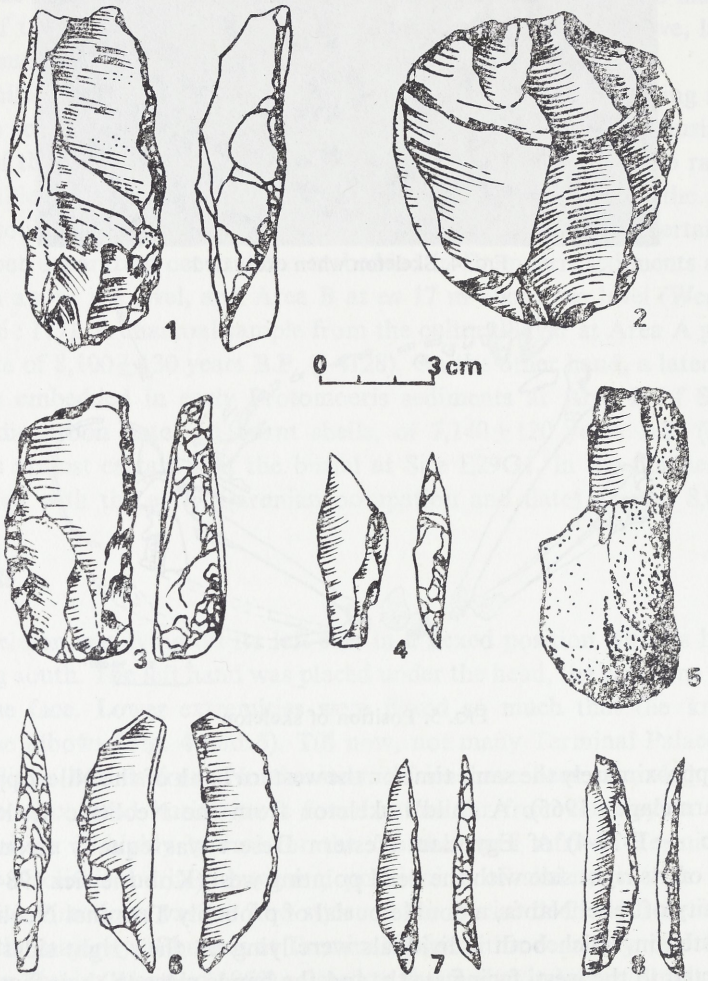

FIG. 6. Stone artifacts of Qarunian industry

Lake Qarun. These are as follows: E29H1, E29G1, E29G3 and Bahr El-Malek 4. People of Qarunian industry placed their campsites close to the water edge along beaches of the fossil lake. The sites are usually formed by small artifact concentrations of a diameter ranging from 20 to 50 m. One of the sites comprises several separate concentrations of archaeological material. Qarunian stone assemblages are typologically quite consistent. Oligocene flint from a nearby Gebel Qatrani mountain ridge was used almost exclusively for tool manufacture. The blade technology was common. The blades were struck from single platform cores. For the retouched tools, the most characteristic is a high frequency of backed blades, bladelets and microblades; somewhat lower indices one obtains for retouched blades and flakes, notches and denticulates. Typical end-scrapers and burins are lacking (Fig. 6). From the inventories assembled at sites E29G3 and E29G1 (from which the burial dealt with here originates), simple bone points and harpoons made of modified catfish jaws are also known. Site E29H1 also yielded some grinding stones and grinders.

Location of camp sites at lake shores and enormous quantities of fish remains found there allow us to state that the major subsistence activity of the Qarunian population was a large scale fishing.

The lake was practically an inexhaustible source of fish. In those times its diameter varied from 80 km to 60 km. The lake was several times larger than the modern remnant of it – the Lake Qarun. It is hard to determine whether a large scale fishing was the permanent occupation of the Qarunian people camping along lake shores, or only a seasonal activity. Some bones of gazellas, hippopotamus and wild cattle, infrequently found at the mentioned sites, point to some hunting while grinding implements indicate perhaps gathering of food plants. The lack of special pattern of the teeth attrition observed in the skeleton also points toward a rather diversified diet; however, even very extensive and long lasting consumption of fish is not able to cause special pattern of teeth wear.

The skull

State of preservation

Bone tissue is well preserved with practicaly intact compacta. The right half of the skull vault (the skull was lying on its left side) bears traces of long lasting exposure to erosion caused by sand particles – it is of yellow-white colour, polished with occasional shallow pits in places where compacta has been partly removed by attrition. No single bone has been preserved intact. The largest fragments are halves of parietal bones, on the average fragments are several centimeters in diameter. Most breaks were freshly caused by excavation and transport, so the skull has been quite easily reconstructed. Preserved fragments are: an almost complete frontal bone, complete both parietal bones, upper part of the lower nuchal line, squamous

and mastoid parts of both temporal bones, large fragment of left zygomatic bone, fragments of alveolar arches of the maxilla and almost complete mandible (only the right condylar and small part of the middle of the corpus are lacking). Summing up: the vault is practically complete and the existing fragments of facial skeleton, fortunately enough of rims of orbits and nasal aperture to give an impression of their size and shape and allow basic measurements to be taken. All fragments fitted well enough to allow a reliable reconstruction of the vault and face.

Craniometry

All measurments were taken and indices calculated according to the standard technique (Martin and Saller 1957).

Table 1

Craniometric data

Diameters							
g-op	178	eu-eu	129	co-co	106?	ft-ft	96
zy-zy	132	au-au	120?	ast-ast	105	mf-ek	40
mf-mf	26?	h.of orb.	32?	nas. br	26	n-ns	43?
n-pr	62	n-gn	110	ba-b	125?	mst-mst	96
po-v	105	n-b	111	b-L	106	L-i	63
g-i	170	n-i	165				
Arches							
n-b	122	b-L	122	L-i	68	au-au	310
n-i	315	skull circumference through g and op					500?
Indices							
breadth-lenght			72.5	upper facial			47.0
nasal			60.5	orbital			80.0
fronto-parietal			74.4	fronto-zygomatic			72.7
total face			83.3	height^{x}-lenght			59.0
				height^{x}-breadth			81.4
				x - auricular height			
Diameters of the mandible							
total lenght			114	go-go	110?	go-gn	98
max. ramus breadth			44	gn-id	35?		
min. ramus breadth			37	condylar height			64
coronoid height			58				
Cranial capacity							
Lee-Pearson's formula for female					948 ccm		
Manouvrier's formula for female					1,048 ccm		
facial angle n-pr to Frankfort plane					83°		

The above craniometric data may be qualitatively interpreted as follows (Table 1): The skull is small, braincase long, broad forehead, broad face, intermediately high orbits, very broad nose and mesognatic face. Visual examination of the skull corroborates this formal description based on values of measurments and indices.

Cranioscopy

The vault of the skull is small, gracile in the norma verticalis (Fig. 7), its shape is brisoides with marked postorbital construction and well visible zygomatic arches provided they were preserved), in the norma occipitalis the skull has a definitely

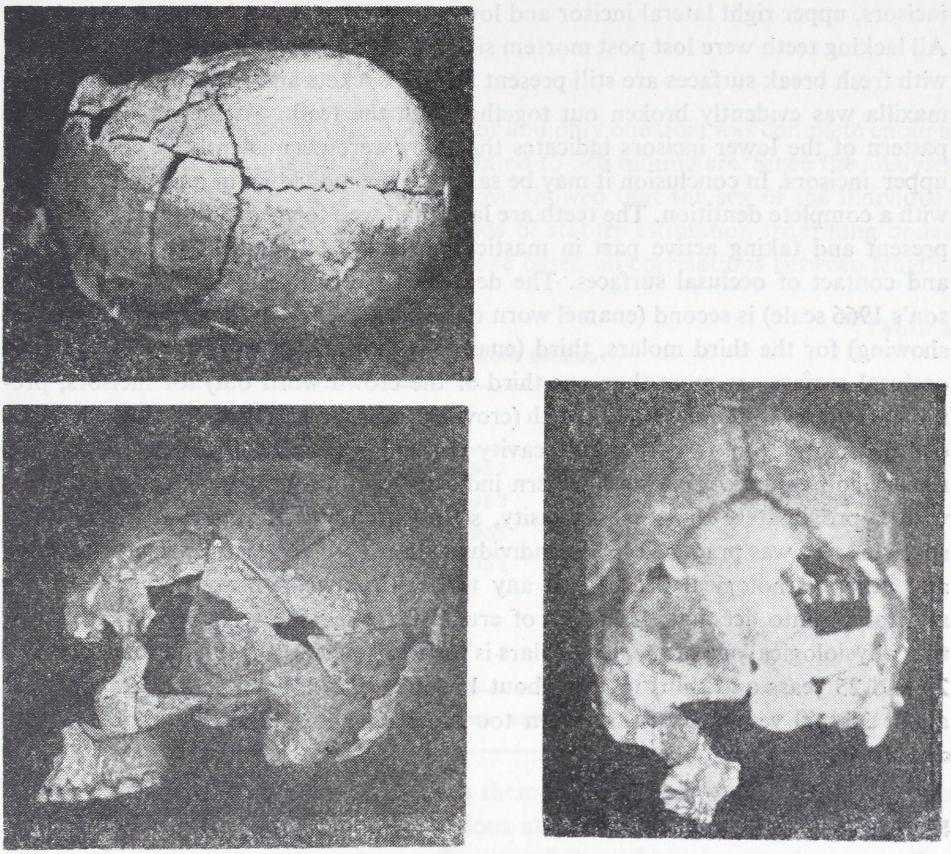

FIG. 7. Skull of Site E29G1

pentagonoid shape, in the norma lateralis the most important features are low, long sloping forehead and relatively short but broad parietal bones. Their combination results in location of the vertex in the posterior part of the vault and lack of any vertical flattening. Both temporal and nuchal lines are very slightly marked, and despite the sloping forehead, brow ridges are weak and glabella markedly stands

out from the frontal bone. The face, as may be inferred from the preserved fragments, is broad, with medium size (relatively to the whole face) orbits and broad nose, apparent prognathism and marked alveolar prognathism, large jaws and teeth. No particularities such as additional sutures, deformations, scars, openings, asymmetry, etc., were observed. General impression is that of a small delicate head and face with rather large jaws and low forehead.

Dentition

Almost complete dentition is preserved. The only exception are upper central incisors, upper right lateral incisor and lower right central and both lateral incisors. All lacking teeth were lost post mortem since in case of lower incisors parts of roots with fresh break surfaces are still present in their sockets and the central part of the maxilla was evidently broken out together with the teeth. Furthermore, the wear pattern of the lower incisors indicates that they were permanently in contact with upper incisors. In conclusion it may be said that the individual in question had died with a complete dentition. The teeth are large and well formed, all four third molars present and taking active part in mastication, this being indicated by their wear and contact of occlusal surfaces. The degree of teeth wear (according to Gustafson's 1966 scale) is second (enamel worn on all the occlusal surface, islets of dentine showing) for the third molars, third (enamel completely worn out from the whole occlusal surface, or more than one third of the crown worn out) for incisors, premolars and second molars and fourth (crown almost completely worn out, secondary dentine filling up most of the pulp cavity showing on the occlusal surface) for first molars and canines. The wear pattern indicates that all groups of teeth were used with approximately the same intensity, so no pronounced and long lasting food specialisation was practiced by the individual. There are no traces of dental caries or any other pathological process on any tooth. Comparing wear of various teeth and taking into account their ages of eruption (Miles 1963) it may be concluded that physiological age of the first molars is about 30 years, of second molars between 20 and 25 years and third molars about 15 years giving thus age of the individual about 35 - 40 years. Teeth are worn too much to allow useful odontometric observations.

Sex

Female. Estimated on grounds of generally gracile morphology, slightly marked muscular attachements, sharpness of upper rims of orbits. Mastoid processes are rather large in comparison to modern female ones, there are also present retromarginal processes on zygomatic bones that, formally treated, are indicators of male sex. However, since these are very remote results of maleness occuring via larger mechanical demands put upon certain anatomical features in usually stronger males,

it cannot be excluded that with dolichocephalic and mesognatic cranial morphology mechanical stresses put upon anatomical features in question even in a "weak" female were large enough for giving them a male form.

Age

About 40 years (35 - 45 years). Established on the basis of teeth (wear and involutionary changes in roots) and suture obliteration: all sutures completely obliterated endocranially, ectocranially partial obliteration of the sagittal and lambdoid suture.

Estimation of stature

The state of bones preservation was poor and only one tibia was complete enough for measuring its total length which amounted to 346 milimeters. Since the analysis of the skull of the skeleton presented above showed that the sex of the individual was most probably female, several methods of stature estimation from long bones of females were applied. All the methods are based on correlations between lengths

Table 2

Stature estimations according to various authors

Author/s		Sample	Stature cm
Trotter and Gleser	1952	whites	162.0
Trotter and Gleser	1952	blacks	157.4
Depertuis and Hadden	1951	whites	162.8
Depertuis and Hadden	1951	blacks	159.6
Telkkä	1950	whites	160.0
Pearson	1899	whites	156.2
Rollet	1899	whites	159.5
average of the above seven estimates			159.6

of bones and stature, differences between them are not great resulting mainly from differences between samples used by various authors for construction of standards and method of taking measurments. Stature of the subject in question according to various methods indicates Table 2.

It may be concluded that the stature of the female from the Fayum was about 160 cms, *i.e.*, above the average for the majority of modern females from various populations (those averages oscillate around 155 cm in the 19th century, and only in the 20th century have risen above 160 cms). However, it is well within the normal range of variation for various populations. Hence the female was of quite normal

stature, probably slightly above average for a population to which she belonged since the change in stature between prehistoric times and 19th century was not a significant one.

Comparison with other populations

It must be emphasized that any comparison of a single specimen to populations gives approximate and often dubious results as to its affiliation to any of the populations. It is due to the fact that in human populations individual variability within one population is usually greater than variability between averages for various populations. It may then happen, and very frequently it actually does, that an individual originating from a given population is most similar to average characteristics of some other human group. The only thing possible is to compare an individual with several sets of averages characterizing various populations and conclude that the individual in question is most similar to an average member of such and such population. This statement is mainly of descriptive value and, though suggestive, does not provide sound basis for concluding upon its actual origin.

The female skull from site E29G1 has been compared by means of the standard Penrose method with summary data for prehistoric North African skeletal remains (Chamla 1978) and two sets of data pertaining to modern Negroes (Górny 1957) and Australian aborigines (Milicer 1955). M. C. Chamla (1978) has collected all known to date information upon skeletal materials covering the period from Epipalaeolithic to Protohistoric times excavated in the North Africa. Material has been divided into groups with respect to its territorial origin (eastern and western groups) and cultural affinity (Capsian, Iberomaurusian, Capsian-Neolithic). From among these groups those territorially closer (eastern) were taken for comparisons with the skull in question. Negro and Australian materials are collections of skulls stored in the Institute of Anthropology of the Polish Academy of Sciences in Wrocław and originate from Uganda and the entire territory of Australia. In comparisons was also included the largest and territorially and chronologically closest, well

Table 3

Distance computed for Fayum skull and other female skull series
(Penrose method)

Skull series	1	2	3	4	5	6	7	8
1. Fayum E29G1	-	0.84	0.86	0.88	2.23	2.89	1.01	1.27
2. Wadi Halfa	0.52	-	1.64	1.53	0.89	1.00	1.04	0.64
3. Negro, Uganda	0.71	0.75	-	0.33	2.34	3.83	0.33	0.75
4. Australian aborigines	0.88	1.18	0.20	-	1.93	3.16	0.40	0.89
5. Capsian	1.43	0.78	0.71	1.07	-	0.37	1.24	0.73
6. Iberomaurusian	1.24	0.47	1.06	1.42	0.21	-	2.38	1.55
7. Neolithic	1.01	0.78	0.18	0.40	0.45	0.75	-	0.22
8. Tunisia protohistoric	1.20	0.34	0.34	0.81	0.32	0.49	0.16	-

studied series of data upon Wadi Halfa "Mesolithic" people (Greene and Armelagos 1972).

The Penrose distances computed for 10 diameters usually employed in analysis of the braincase, face, nose and orbits are as follows: above the main diagonal are given $C_H^2=\frac{\sum z^2}{n}$ distances below diagonal $C_p^2=\frac{\sum z^2}{n}-\left(\frac{\sum z}{n}\right)^2$ distances (z – differences between compared values expressed in standard deviation units, n – number of characters compared – Table 3).

It may be seen that the skull in question shows the closest affinity to Wadi Halfa, modern Negroes and Australian aborigines being quite different from Epipalaeolithic materials of Northern Africa usually labelled as "Mechta type" and "proto-mediterranean type". In analysis of an Early Neolithic mandible from Nabta Playa in Egypt (Henneberg et al. 1980) we have found the same affinity to modern Negroes. Comparing 5 metric characters of female mandible from E29G1 site with the same characteristics of the Nabta mandible by means of the Penrose method we find a similarity between the two specimens, $C_H^2=0.76$, $C_p^2=0.30$, standarized on standard deviation for North Africa given by Chamla (1978).

Since during the present analysis Penrose distances between series used for comparison were obtained, it is interesting to analyse briefly affinities between them. The simplest way is to use a symmetric diagram as proposed by J. Czekanowski, *i.e.* grouping the series together on the basis of the smallest distances between them (Table 4).

Table 4

Symmetric diagram grouping female skull series on the basis of the smallest distances between them
(Czekanowski method)

Skull series	4	3	7	8	2	5	6
4. Australian aborigines	+	+	+	–			
3. Negro, Uganda	+	+	+	–			
7. Neolithic	+	+	+	+			
8. Tunisia protohistoric	–	–	+	+	–		
2. Wadi Halfa				–	+	–	–
5. Capsian					–	+	+
6. Iberomaurusian					–	+	+

+ denotes the closest relationship (smallest distance).
– denotes second closest relationship (next to smallest distance).

Since there are some methodological controversies concerning the validity of the Penrose method for comparisons between group means, and because in the above analysis data on female skulls were only used, it seems advisable to revise the analysis between the same groups taking into account the data for male skulls and

submitting them to the statistically flawless method of D^2 distances of Mahalonobis computation. Here are D^2-s for males of our groups and Czekanowski's diagram ordered in the same way as for females (Table 5 and 6).

Results obtained with both methods with respect to both sexes are in mutual agreement.

Conclusions

Summing up the above discussion we may conclude that the burial found at site E29G1 of the Northern Fayum Desert should be related to fishermen of Qarunian industry living on the shores of an Early Holocene lake about 8,000 years ago.

Table 5

Distances computed for male skull series by method of Mahalonobis D^2 distances

Skull series	2	3	4	5	6	7	8
2. Wadi Halfa	-	19.2	24.6	30.1	30.8	22.3	21.5
3. Negro, Uganda		-	7.6	37.0	40.2	8.9	9.9
4. Australian aborigines			-	32.4	35.7	14.4	13.7
5. Capsian				-	0.4	14.9	11.7
6. Iberomaurusian					-	16.9	14.3
7. Neolithic						-	1.7
8. Tunisia protohistoric							-

Table 6

Symmetric diagram grouping male skull series on the basis of the smallest distances between them
(Czekanowski method)

Skull series	4	3	7	8	2	5	6
4. Australian aborigines	+	+	–	+			
3. Negro, Uganda	+	+	+	+			
7. Neolithic	–	+	+	+			
8. Tunisia protohistoric	+	+	+	+		+	–
2. Wadi Halfa		–					
5. Capsian			–	+		+	+
6. Iberomaurusian				–		+	+

\+ denotes the closest relationship.
– denotes second closest relationship.

The woman buried there was in general more modern than the "Mechta" classic materials (Iberomaurusian and Capsian of the present analysis). The "Mechta" people were not morphologically similar to Neolithic and later people, who in turn are similar between themselves up to modern times despite their territorial dispersal. It seems that this fact is not due as much to the common origin of these

human groups as to the more or less uniform course of human evolution during the Late Pleistocene and Holocene. This evolution is characterized by main trends of gracilization, dental reduction and brachycephalization due to gradual development of cultural adaptive mechanisms (Henneberg 1983) and it is evident in the affinities analysed here: robustly built types stick together being opposed to more gracile ones with Wadi Halfa occupying an intermediate position. The female skull from E29G1 site seems to occupy equally intermediate position: it is already gracile but still posseses large teeth and heavy jaws and shape of its braincase is dolichocephalic. Slanting forehead is also a link with earlier populations. Summing up, there is no logical possibility of establishing purely populational, not to mention "racial", affinity of the studied skull, but it may be stated that it is in general more modern than "Mechta" classic materials and if its similarity to some modern people should be established, then it could be described as resembling modern negroids. This is by no means equivalent to stating that the skull in question belongs to the Negro. The main reason for this statement is that during Terminal Palaeolithic/Neolithic times there were no modern Negroes anywhere in Africa since they simply had not evolved yet. Similarity between the jaw of the studied specimen and the jaw from Nabta Playa, as well as relation of the skull to Wadi Halfa female skulls point toward a continuity of population along the Nile and in the Western Desert, but still more material is required to support the idea that some 10 - 5 thousand years B.C. this continuity of peopling of the Nile Valley and its surroundings reached down to the very springs of the river in subsaharan Africa.

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