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The morphological differentiation of anatomically modern man in Africa, with special regard to recent finds from East Africa

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With 4 figures in the text

Summary: The aim of the present study, apart from a critical review of the hominid finds and main lines of differentiation of anatomically modern man in Africa, is especially the discussion of recent finds, absolute datings as well as re-assessments. There are a number of essential aspects concerning the hypotheses and theories about the geographical and chronological dispersion of early African populations. In this context, special importance is due to the more recent human skeletal finds from Eastern and Southern Africa. They suggest, among other things, a much earlier presence of the Negrid combination of characteristics in these parts of the continent.

Zusammenfassung: Ziel der vorliegenden Arbeit ist neben einem kritischen Überblick über die Hominidenfunde und die Hauptlinien der Differenzierung des anatomisch modernen Menschen in Afrika, besonders die Diskussion neuerer Funde, absoluter Datierungen sowie Neubearbeitungen. Es ergeben sich eine Reihe wesentlicher Aspekte in bezug auf die Hypothesen über die geographische und chronologische Verbreitung der frühen afrikanischen Bevölkerungen. Besondere Bedeutung kommt in diesem Zusammenhang den neueren Funden aus Ostafrika, aber auch aus Südafrika zu. Sie legen u. a. ein wesentlich früheres Vorkommen der negriden Merkmalskombination in diesen Gebieten nahe.

Although the East African highlands probably cannot be regarded as the centre of differentiation of modern man in Africa, this part of the continent does represent an important region which was inhabited by Europid, Negrid and Khoisanid populations in prehistoric times. Some hominid finds in East Africa, including fairly recent discoveries, from the Final and Post-Pleistocene have given rise lately to considerable discussion as they may lead to a modification of traditional theories. Interpretations concerning morphological differentiation make it necessary to give particular consideration to the numerous migrations and infiltrations from the whole continent to East Africa. Therefore, a general review is required of the main patterns of morphological differentiation manifested by African fossil and subfossil hominids.

Origin and expansion of African populations

There ist some disagreement on biological classification, especially of sub-Saharan populations. Special importance is due to HIERNAUX's comprehensive multivariate analysis (1968 a) based on data for 101 population samples. In his distance analysis he included anthropometrical, serological as well as dactylos-

copic characteristics, but the kind and number of variables varied according to the available anthropological data. The results of his analyses showed no groupings of similar populations along the lines of traditional classifications. Apart from the different number of variables in individual samples, the question arises whether the reason for such a result lies in the inclusion of various kinds of characteristics which probably follow divers gradients and reflect differentiations of varying age. Moreover, this result may be due also to the very stringent principle of classification, according to which populations within a group have to be more similar to one another than to any sample outside the group (SCHWIDETZKY 1974 b).

Consequently, a new statistical analysis of HIERNAUX's data – using only the anthropometrical characters – was undertaken by SCHWIDETZKY (1969). She found the data falling into a number of superpopulation groups which correlate with v. EICKSTEDT's categories (1934), such as Nilotids, Ethiopids, Sudanids and other divisons. Furthermore, ALEKSEEV's (1974) analysis of a number of African cranial series, using the taxonomic distance, yielded results essentially in agreement with SCHWIDETZKY's (1974 b).

In a recent study (BRÄUER 1977), the craniometrical relationships of African populations were analysed by PENROSE's size and shape components. San (Bushmen), Khoikhoi (Hottentots) as well as Negrid populations could be separated fairly distinctly, even when different groups of variables were used.

The fact that very little is known about the history of the dispersal and mixture of modern heterogeneous populations presents considerable difficulties for biological, especially taxonomic analysis. During the last millennia differentiation may have taken place which can hardly be reconstructed, and in which microevolutionary processes as well as hybridizations were involved. The problems which arise in classifying modern populations are easily overshadowed by those entailed in tracing, however roughly, the evolution of anatomically modern man.

Human skeletal remains which are important for the history of African populations are rare. To a large extent, this is due to climatic conditions which are, in many parts, extremely adverse to the preservation of skeletal remains. Hence, there is often no agreement among specialists concerning the significance of human remains in morphological differentiation. The main difficulties probably arise, on the one hand, from the wide variability of morphological characteristics and, on the other hand, from the search for affinities between individual prehistoric finds and samples of recent populations.

The emergence of the major indigenous African morphotypes – the Khoisanoid, the Negroid and the Mediterranean – can be documented from the end of the Pleistocene. Some older finds are often regarded as evidence of the antiquity and wide distribution of the large Khoisan stock, though they represent rather an archaeomorphic type of anatomically modern man (*Homo sapiens sapiens*). Among the oldest was the cranium discovered by T. F. DREYER near Florisbad (Orange Free State) in 1932; a recent radio-carbon dating (PROTSCH 1974 a) of wood

and collagen samples gave an age of about 39,000 years B. P. This high age, which had already been assumed on the basis of earlier radio-carbon datings (e. g. Barendsen, Deevey & Gralenski 1957), has been doubted by Coon (1962), as he presumes that the San (Bushmen) developed in Northern Africa before they were driven by invading Europid populations across the Sahara (Singa) down to Southern Africa. In his opinion, the Khoisanids moved to the south no earlier than the end of the Pleistocene, pushed by populations linked with the Mouillian and Capsian cultures of Northern Africa. The Florisbad hominid was robust and had a large cranium with a wide, receding frontal bone, relatively heavy brow ridges, short orthognathic face, but without distinct paedomorphic characteristics, although Drennan (1937 a) and Wells (1947) did recognize the relatively small face.

Probably to the same group are attributed the hominids from Cape Flats near Cape Town, where in 1929 three skeletons were discovered at a depth of 1 m. One of the crania was partly described by Drennan (1929) and Keith (1931). On the basis of associated artifacts, the skeletons were assigned to the Late Middle Stone Age (Goodwin 1929).

The hominids from Border Cave, Ingwawuma District (Natal), discovered in 1941/42 and 1974, probably are among the oldest representatives of anatomically modern man like Omo I, II and Kanjera. Although an absolute date of about 60,000 B. P. (Border Cave 3) and a preliminary date of 89,000 B. P. were obtained by the amino acid method (Protsch 1975), radio-carbon dates of charcoal gave an age of about 48,000 B.P. (Beaumont & Vogel 1972). The associated industries belong to the "advanced" Pietersburg/Epi-Pietersburg, i. e. the final Middle Stone Age. The adult fragmentary skull consists mainly of the frontal bone and parts of the two parietalia, one temporal and the occipital bone, and has no paedomorphic features (Tobias 1959). The brow ridges are heavy but less marked than those of Florisbad, and there seem to be affinities with Springbok Flats. De Villiers (1973) undertook a revision of the skeletal remains.

In 1974, C. Powell and P. B. Beaumont discovered at the same site another isolated adult mandible, in an intact Middle Stone Age layer, which is dated to about 80—100,000 B. P. (Beaumont, Butzer, De Villiers & Vogel 1976). De Villiers (1976 a) describes this new mandible (Border Cave 4) and compares it with recent and fossil material. The metrical and non-metrical characteristics fall within the range of *Homo sapiens*. If it is confirmed that the mandible is affiliated to the MSA layer, the presence of *Homo sapiens* in South Africa would have been still earlier.

In 1924, a fossil skull belonging to an adult man was found at Singa (Sudan). Its chronological position could be determined indirectly. The radio-carbon date of approximately 17,000 B. P. was based on a crocodile tooth which was found together with animal bones and artifacts in deposits of another locality, Abu Hugar, upstream from Singa. It is assumed that these layers are contemporary with those from Singa (Oakley & Campbell 1967).

Fig. 1. Sites of fossil and subfossil *Homo sapiens*.

Woodward (1938) and Wells (1951), who first studied the fossil, concluded on the strength of the cranial vault and certain paedomorphic features, that it was an ancestral Bushman of great antiquity. Cole (1964) mentions more recent works which have shown that these alleged affinities seem to be rather coincidental. These doubts are underlined by a recent study by Brothwell (1974) who compared the Singa skull with series of modern populations and Pleistocene finds in Africa by means of multivariate statistics. He concluded that the Singa skull is very hard to relate to the other finds. There are affinities also with African Neandertaloids (*Homo sapiens rhodesiensis*); morphologically, it seems most likely that it resulted from hybridization between heterogeneous populations from North-East Africa during late Pleistocene times.

Another find in East Africa presents difficulties as to its morphological affinities. In 1959, the greater part of a fossilized calvaria and the right ramus of the mandible were discovered, still partly enclosed in undisturbed Late Pleistocene lacustrine deposits, near Kabua water-hole on the west side of Lake Turkana (Kenya). According to WHITWORTH (1966), who has studied the cranial remains, there are some affinities with Neandertaloid crania. But the receding frontal bone and the low vault could be the result of his reconstruction. For this reason PHENICE (1972) modified WHITWORTH's reconstruction. First, he altered the size of the orbit. In the original line drawing reconstruction, the natural orbital height would have been about 50 mm. The second change consisted in placing the drawing in the Frankfurt Plane. Moreover, the brow ridge development is rather weak, and the occipital curvature probably bears no similarities to that of African Neandertaloids. Although the morphology appears to be uncertain, it would seem more appropriate to include Kabua I within the range of modern *Homo sapiens* (RIGHTMIRE 1974).

An early differentiation of *Homo sapiens* in Africa is the so-called "Boskop-type", named after a village in S. W. Transvaal where the first fossil of this type was found in 1913. It is generally regarded as an antecedent of the paedomorphic San (Bushman), though the chronological extension of the so-called Boskop type is not adequately established. The presence of this type is generally restricted to the period from the end of the Middle Stone Age (MSA) to the beginning of the Later Stone Age, about 34,000 B. P. (BEAUMONT & VOGEL 1972). GALLOWAY (1959), on the other hand, sees in the Iron Age skeletons from the Northern Transvaal sites K2 and Mapungubwe on south bank of Limpopo, the following characteristics as well: long and relatively low skulls with paedomorphic features, such as tubera parietalia and pentagonoid neurocranial shape. However, the Khoisanid/Boskopoid affinities are at present disputed on the basis of multivariate analyses (RIGHTMIRE 1970).

Though the existence of a "Boskop race" is not uncontested, and a replacement of this term, for instance by Proto-Bushman (WELLS 1952), in respect of the paedomorphic characteristics, has been proposed and often used (OAKLEY, COLE), or the Boskop term restricted to the giganto-paedomorphic type (TOBIAS 1959), some fossils from South Africa are known which are regarded as variants of such a type. For instance, in 1929 a well-preserved human skeleton was found together with Stillbay industries at Fish Hoek (Skildergat Cave) near Cape Town (WELLS 1959). Based on a radio-carbon date on associated faunal material, PROTSCH (1974 b, 1975) obtained an age of 35,630 ± 2,500 years B. P., making this find probably the earliest one to date with distinct Khoisanid characteristics. The skeletal remains from Tsitsikama (South Africa) are likely also to belong to the same giganto-paedomorphic group (DART 1923; GEAR 1926), though their chronological position has not been confirmed by absolute dating.

Paedomorphic characteristics are evident also among the well-preserved remains of more than 18 individuals discovered in 1930–32 in lower layers of

Matjes River Cave (South Africa), and which are sometimes described as Boskopoid or Proto-Bushmanoid. For a long time the dating proved a problem. On the strength of the artifacts which belong to the Smithfield Culture (Louw 1960), and of the associated fauna, the layers have been dated to the early Later Stone Age (Mason 1962). Recent absolute datings (Protsch & Oberholzer 1975) elicited an age of 10,120 ± 200 years B. P. for layer D and 9,230 ± 160 years for layer C. Based on the finds from Matjes River Cave, which contained individuals of "normal" and small stature, Clark (1970) agrees with Louw (1960) that these are the earliest representatives of the small Khoisanids or San (Bushmen). According to Clark, there is little doubt that at that time San (Bushmen) and Khoikhoi (Hottentots) became differentiated in the southern parts of the continent, both evolving from the same gene pool during a long period of isolation, the Upper Pleistocene. Tobias (1972) assumes that "from a basically Khoisan-like genome, proto-negriform Africans split into two major branches, Khoisans and Negroes. The separation must have begun a long time ago".

On the basis of recent absolute datings (Protsch 1975), the southern parts of central Africa also have entered the discussion as a possible centre of origin of the San (Bushmen), as there has been a series of hominid finds at Mumbwa Cave (Zambia), some of which are said to have stronger affinities with the Boskop type, and others with Bushmen (Jones 1940; Wells 1957). While Stratum V (19,780 ± 130 B. P.) produced only fragments of a parietal bone and an occipital bone, together with postcranial remains, Stratum IV (18,000 ± 350 B. P.) yielded the remains of several individuals, among them a well preserved cranium which could be described as San (Bushman) (see Protsch 1977).

As already mentioned, it is often impossible to make a reliable diagnosis, especially as far as Negrid characteristics are concerned, since a wide apertura piriformis and prognathism are not restricted to Negroid but are found also among Khoisanoid and earlier European populations (Schwidetzky 1970).

Further characteristics of Khoisanoids are, inter alia: strong bossing in the frontal, parietal and occipital regions, a pentagonoid cranial shape, angled zygomatic bones, extremely flat nasal root and a vertical forehead. The problems which arise from using typological methods, based mainly on modern characteristics, are demonstrated by the analysis of the probably Late Pleistocene hominid from Tuinplaas (Springbok Flats, Transvaal, 1929). This find was often ascribed to the Boskop or, more generally, to the Proto-Bushman-type. Toerien & Hughes (1955), however, described the characteristics of this fossil hominid as a mixture of Negrid- and San traits. On the other hand, Europid features are evident in the Tuinplaas skull and it may be compared with the brachycranial type from Elmenteita F1 (see p. 281). Consequently, Cole (1954) begs the question, whether the Europid populations from Kenya mixed during that period with Bushman-like hunters and settled in the same region. In her opinion, the Wilton C population, linked with the shell mounds on the shores of Lake Victoria, had been Khoisanoid. After all, the Tuinplaas hominid is regarded also as being represent-

ative of the non-paedomorphic or archeomorphic type (Tobias 1959). The latter diagnosis is certainly the more probable one.

The skeletal remains from cave deposits at Klasies River Mouth (South Africa), which were excavated by a team from the University of Chicago in 1968 (Singer & Smith 1969), would appear to be more accurately dated. Judging by the cultural remains, the layer belongs to the late Middle Stone Age. A carbon-14 dating of overlying layers ascribed to the Final Middle Stone Age gave an age of 38,000 B. P. (Klein 1974). The numerous, quite fragmentary skeletal remains are being studied by Singer et al. (in prep.), so that there are still no firm ideas as to the morphological affinities of this MSA population.

Though Negroid populations are today predominant in Africa, the problems concerning their origin and expansion are far from being clarified because of the scarcity of material. The main Negroid characteristics to be diagnosed on the skeleton are: alveolar prognathism, though stronger among populations from West Africa than those from East Africa; the ramus or ascending branch of the mandible is wide and low with a deeper incisura mandibularis than that of the Khoisanoids, the chin is weakly developed, the skull is generally dolichocranial and ovoid and the forehead region is smoothly and evenly curved in all directions, the orbita is predominantly high, the interorbital breadth is great and the apertura piriformis is very broad; the occipital bone is flat among the South and West Bantu; more curved among the East Bantu and, for the most part, has a high occipital index. Typical of the postcranial skeleton are the relatively long upper limbs and especially the forearms as well as the relatively short trunk and long lower limbs. The pelvis is absolutely smaller than that of Europids (see De Villiers 1968).

West and Equatorial Africa are generally considered to be the centre of origin of the Negrids (Coon 1962; Clark 1970; Hiernaux 1968 b). However, because of adverse preservation conditions, there are only very few fossils of Pleistocene age. Hence, all that is known of the Negrids is based on recent material.

In 1965, a grave was discovered in a cave at Iwo Eleru not far from Benin in the Nigerian rain forest. The excavation yielded the first fragments of a Negroid skeleton which has been dated to the Late Pleistocene. The radio-carbon dating gave an age of 9250 ± 200 B. C. The find has been studied by Brothwell & Shaw (1971). The fragmentary remains of the skeleton could not be reconstructed, although this was in part possible with the skull. The stature of this male skeleton was estimated to be about 165 cm. The authors concluded that the population from Iwo Eleru can be identified as West African Proto-Negroid; they represent a separate Proto-Negroid group, probably without any affiliation to early or modern East African relatives. However, only further material will resolve this question. Until recently finds have led one to assume that Negroid populations did not invade East Africa until the beginning of the Iron Age and did not move to Southern Africa until even later. However, new skeletal remains,

absolute datings, and revisions have cast some doubt on the matter over the last few years.

For instance, COON (1971) described the mandible fragment from Kangatotha (Kenya), which has been dated by radio-carbon tests to about 4,800 B. P., as being Negrid. GRAMLY & RIGHTMIRE (1973) obtained a similar diagnosis on the neurocranial fragments from Lukenya Hill, which have been dated by radio-carbon tests to 17,800 B. P. These East African finds and the resulting aspects will be discussed in detail on p. 284.

Contrary to the existing hypotheses (TOBIAS 1972) is the result of a morphological study and dating of the infant mandible from Bushman Rock Shelter, Origstad (Transvaal, 1969). On the basis of various radio-carbon dates of the strata, the mandible is assumed to have an age of about 29,500 B. P. According to the microanalytical measurements, it is probable that the mandible belongs to the layers which, judging by the cultural remains, are characteristic of the transition from Middle Stone Age to Later Stone Age (ELOFF 1969).

A morphological analysis, and a comparison with fossil and recent material, have been undertaken by PROTSCH & DE VILLIERS (1974). The results showed that the strongest affinities are with the South African Negrids, while there are no similarities to the characteristics of the San mandible, as described by WELLS (1931).

Although this evidence on one infant jaw cannot prove the presence of Negroid populations at this early time, there are other recent indications that in South Africa Negroid influences may date back much further than was until recently supposed. The new material refers to the skeletal remains excavated by D. W. PHILLIPSON at Kalemba (East Zambia) in 1971. Altogether, remains of 5 individuals from various well-stratified deposits were found. Of special interest are the individuals 2—4, a young woman (Kalemba 2) and two children, attributed to a horizon dated by radio-carbon tests to 8,000—7,000 B. P. (PHILLIPSON 1976). According to DE VILLIERS's analysis (1976 b) of the adult skull, there are general affinities with the southern African Bantu female cranium, but there are also some Khoisanid characteristics, though the Negrid affinities are predominant.

Kalemba 4 (7—8 years) also shows Negrid affinities (curvature of the cranial vault bones, size of the incisors). Individual 5 originates from an horizon dated to 5,000—4,500 B. P. The cranial remains of what was probably an adult male are too fragmentary to show affinities with population groups. The intact mandible shows a number of Khoisanid features (small size, broad ramus, low incisura mandibularis), whereas the measurements fall within the overlapping ranges obtained for both San and South African Negrid mandibles.

It is far from satisfactory that the more recent material is very fragmentary and yields limited information. To confirm such a high age for Negrids, further finds are necessary, especially from Southern Africa, where the finds are generally more recent than 2,000 years (Inyanga, Bambata Cave, Kalomo, Isamu Pati a. o.) (DE VILLIERS 1970, 1972).

Of some importance to the history of Negrid populations in this context are the numerous skeletal remains found at Ishango, Lake Edward (Zaire), in 1935 (Ishango 1) and 1950 (Ishango 2–8), which can probably be dated to the 7th millennium B. C. The jaws in particular show strong Negrid features. Contrary to the general robustness, the long bones reveal the slenderness of West African populations (Twiesselmann 1958). Lwanga-Lunyiigo (1976) regards these early hominids as evidence of the fact that Negroid populations settled in the interlacustrine region in East Africa long before the beginning of the Iron Age. Recent radio-carbon dates (Sutton 1972) show that iron-working in the region of the large lakes started as early as in Western Africa.

We now turn to the situation in Northern Africa, where the Sahara served as a contact point for influences from North and South, particularly in the last few millennia B. C. The hominid material known from the Sahara demonstrates that distinct morphological patterns cannot be differentiated regionally, but it is obvious that groups with different characteristics were resident in the Sahara in post-Pleistocene times.

Chamla (1968) gives a morphological classification of the finds from the Sahara, dated mostly between about 5,400 and 1,300 B. C. There are three groups to be distinguished:

1. those showing typical features of the classic west African Negrids (e. g. Ibalaghen, Tin Lalou and Asselar, 4,400 B. C.);
2. those of more robust build with a number of archaic characteristics, but indicating affinities with the Sudanids (e. g. Tamaya Mellet, El Guettara and Tamanrasset);
3. a tall, slender non-Negroid form with long heads and high faces (El Guettara No. 1).

A catalogue of the mainly Neolithic skeletal remains from the Sahara and West Africa is given by Mauny (1961). Only the skeleton of the old man from Asselar (Mali) is to be dealt with here in more detail. The skull is dolichocranial with marked alveolar prognathism, though there are also some non-Negroid features, such as a large face and a gnathic index of only 97 per cent (Wendorf 1968). The postcranial skeleton, however, has typical Negroid proportions: a relatively long forearm in relation to the arm and long slender bones; the stature was estimated to be about 170 cm.

The skeletal remains of 17 burials from Khartoum (Sudan), dated to the 5th millennium B. C. (Arkell 1949), are reckoned to be Negroid (Derry 1949) rather than Europid, though there is no agreement on the classification. The only satisfactorily reconstructed skull of this series is long and narrow with a large rugged face. Subnasal prognathism, the flat and wide apertura piriformis, as well as the wide and low ramus of the mandible underline the Negroid affinities. According to Clark (1970), these skeletons from Khartoum, which he judges to be Sudanid, serve as evidence for the hypothesis that Negroids settled in the upper Nile region

quite early. This is indeed in accordance with the fact that there are Negroid similarities within the predynastic populations of Egypt (e. g. Badari).

In 1965, remains of 60 individuals were found at Jebel Sahaba in the Sudan, but there is no agreement as to their morphological affinities. These strongly prognathic people are assigned, on the one hand, to the Sudanids and, on the other, to the robust populations of the Maghreb, known as the "Mechta-Afalou-race" (Wendorf 1968).

Interesting results can be expected also from further studies of 36 hominid finds from Wadi Halfa (Sudan), including 16 intact skulls. Greene & Armelagos (1972) established affinities with the series from Jebel Sahaba. As far as can be judged by the results so far, both population samples from Sudan show Negrid characteristics. Should this be confirmed by the studies still in progress, then there would be some evidence for the assumption that Negrid or Negroid populations settled in Northern Africa as early as 8,000—12,000 years ago.

At this point, another site from the northern Sudan should be mentioned. In 1959 some fossil animal and human skeletal remains, dated by Coppens (1972) to the Late Pleistocene, were found at Soleb. The associated artifacts reveal a Late Levallois technique (De Heinzelin 1972). The human skeletal remains are very fragmentary: eight small cranial fragments, 2 larger jaw fragments and the symphysis region of an infant mandible. According to Sausse (1975), the material is too fragmentary to draw general conclusion from it, but she believes it shows some Negrid characteristics.

Obviously, the skeletal material known to date cannot shed enough light on the problem of the origin of the two African major races, the Negroids and the Khoisanoids. More field work and especially more Pleistocene finds are needed. However, on the basis of existing material it can be assumed in all probability that Khoisanoid populations were present primarily in Southern Africa and in parts of East Africa, where the small San (Bushmen) and large Khoikhoi (Hottentots) later attained genetic distinction.

The Negrid combination of characteristics certainly evolved in the forested and savanna regions of western Africa, where they are likely to have become further differentiated by microevolutionary processes (Clark 1970). Fig. 2 illustrates Brothwell's hypothetical distribution of the African major stocks at 9,000 B. C. This distribution, however, must be modified in the light of recent finds. With regard to the common origin of these two major groups the existing affinities can be proved less definitively by means of palaeoanthropological than by serological evidence, e. g. the high frequencies of the Rh-complex cDe, Henshaw and Js (Tobias 1972). According to present knowledge (Tobias 1974), San, Khoikhoi and Negrid populations belong to the same "major gene constellation", though morphological and genetical specializations point to a long period of differentiation during relative isolation which, according to Tobias (1974), may have started 10,000 or 15,000 years ago or probably even earlier. The analysis of monogenic serological systems, moreover showed convincingly that the Bantu-

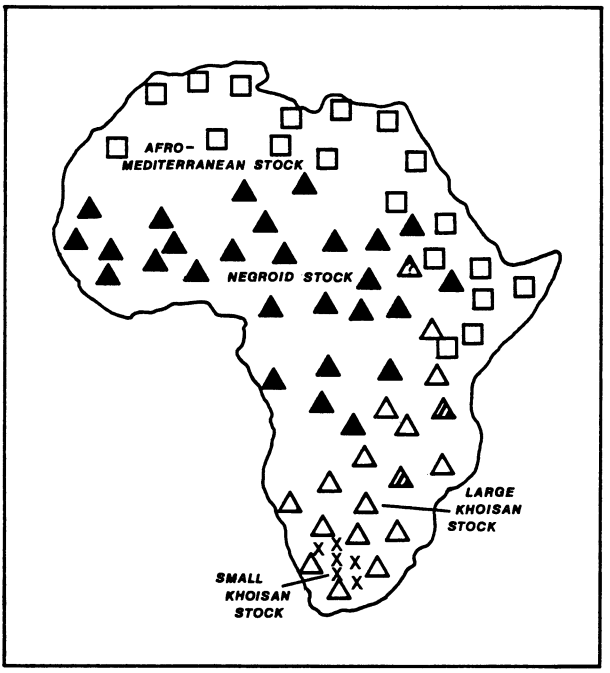

Fig. 2. Possible distribution of the major African stocks about 9,000 B. C. (after BROTHWELL, modified).

speaking people from Southern Africa have considerable genetical affinities with the populations from West and central Africa ("the sub-Saharan African Genotype") (TOBIAS 1971, 1974).

Considerable problems are presented by the genesis of the Pygmies. Small-sized variants side by side with normal-sized populations are found in several regions of the world (e. g. Andamanese Negritos).

Dwarfing mutants not correlated with pathology are likely to provide the genetical basis (FISCHER 1950, 1954; GUSINDE 1943). Also certainly correlated with a retardation of growth are pygmid morphological characteristics, such as the large skull in relation to stature, and other paedomorphic features of the frontal bone and the face.

Furthermore, adaptive selection, hybridization, geographical as well as ecological isolation, and lack of protein have contributed greatly to the characteristics of the Pygmies (CLARK 1970). According to SCHWIDETZKY (1962), there may have been social banishment of abnormal small-sized individuals from normal-sized populations, whereas TOBIAS (1961) suggested cultural or social selection against tallness among the San. However, the relations of African

pygmies to the major races remain obscure; there is some evidence of a distant relationship to the Khoikhoi (Hottentots) (Coon 1962), as well as to the Negroids (e. g. flat chin).

Toerien's analysis (1961) showed "that hybridization between Bantu and San (Bushmen) can produce individuals that will pass as Central African Pygmies. This fact indicates that the latter are more probably the product of a cross between a basic dwarf stock and the Negrid than the dwarf stock itself."

Fossil finds which might shed light on the origin of the African Pygmies are lacking, and the earliest archaeological remains from the tropical forest region are surprisingly late (Clark 1970).

There is a third African major race: the Mediterranean. The populations living on the shores of the Mediterranean Sea and in parts of East Africa are classified as Mediterranean or Afro-Mediterranean because of their relatively homogeneous Europid characteristics. Due to various admixtures with neighbouring Negrid populations in prehistoric and historic times, the present populations of East Africa in particular are more or less heterogeneous in appearance, especially with regard to soft-tissue morphology.

Mediterranid characteristics are also to be found among the extremely tall and slender Nilotids who live in the swamp regions of the upper White Nile.

The Nilotids include in the northern part of their homeland the tribes of the Dinka, the Nuer and strongly Mediterranid Shilluk; further down and in northern Uganda the Acholi, the Lango and Alur and, finally, in East Uganda and West Kenya the Luo with strong Negrid characteristics (Cole 1965).

The Mediterranean character is clearly dominant among the Ethiopids, who include the large populations of the Amhara, the Galla and the Somali. Their skeletal features are predominantly Europid; the nose is generally narrow and prominent. However, there are also Negrid admixtures of varying degrees among the individual tribes. The Negrid character is strongest among the Sidamos in South West Ethiopia, and at its weakest among the Somali (Cole 1965).

Farther to the South there are tall tribes (e. g. the Masai) who are more strongly Europid in their appearance than the Nilotids; they are often called "Nilo-Hamites". The explanation of the occurrence of these Europid characteristics down to Kenya and Tanzania allows various hypotheses. On the very basis of the geographical distribution it can be assumed that there were migrations from North Africa along the upper Nile to East Africa; this is indeed supported by numerous types of artifacts and human skeletal remains.

The number of sites in Algeria and Morocco belonging to the Ibero-Maurusian culture is relatively large. Especially well-known is the mesolithic cemetry of Afalou-bou-Rhummel on the Algerian coast, where in 1928–30 remains of more than 40 adults and a number of children were excavated (Arambourg 1929; Arambourg et al. 1934; Vallois 1952). Likewise linked with the Ibero-Maurusian culture is the important skeletal series of more than 280 individuals found in the

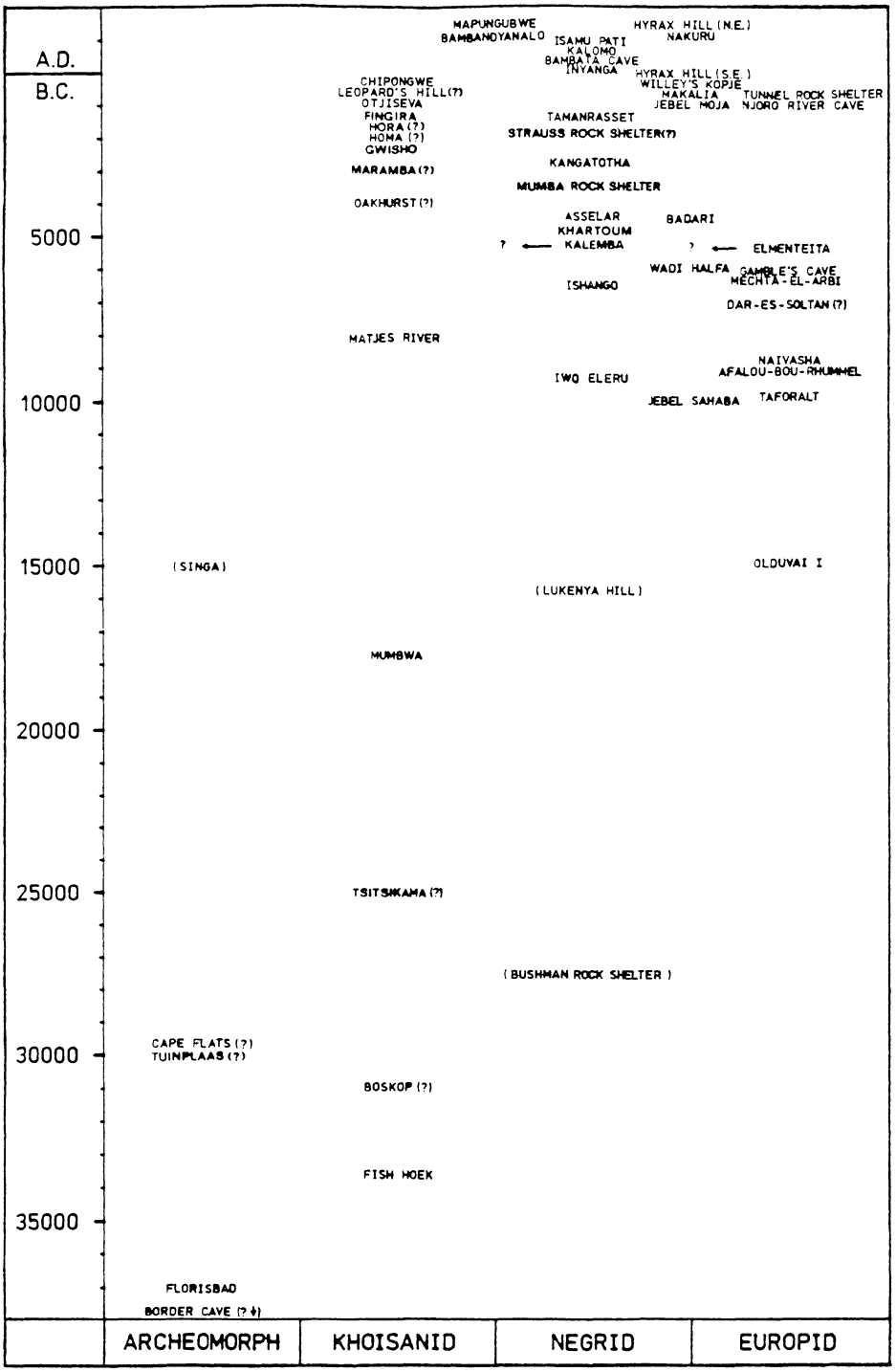

Fig. 3. The morphological differentiation of modern man in Africa.

Taforalt cave (Morocco) in 1951–1953 (FEREMBACH 1962). A late Pleistocene layer of this site has been dated to about 10,000–12,000 B. P. (ROCHE 1959).

In Maghreb, however, there are also numerous settlements of the North African Capsian, which are linked with huge shell mounds. The most important site of this type is Mechta-el-Arbi, southwest of Constantine (Algeria), where in 1907–1927 remains of more than 30 individuals were found in a huge shell mound (ARAMBOURG et al. 1934). As an indication of the dating, the absolute age of another shell mound associated with the same culture (Upper Capsian) may be of interest; it has been dated at about 8,400 ± 400 B. P., the beginning of the Holocene (IVANOVA 1972). The skeletons from Dar-es-Soltan near Rabat (Morocco) also are ascribed to the Mechta type (VALLOIS 1951; FEREMBACH 1976).

The morphological affinities of all of these samples are generally Europid, though there appears to have been differentiation into two morphotypes. One is represented by tall, robust individuals with large, long and high crania, broad faces with low, rectangular sloping orbitae and heavy rugged jaws with strong chins (BRIGGS 1955; FEREMBACH 1962). The other type comprises individuals with small faces and less rugged "leptodolichomorphic" characteristics. Although both combinations of characteristics do not generally occur separately, relating to the sites, there is some evidence of a tendency (SCHWIDETZKY 1970) for the more robust type to be more numerous in Ibero-Maurusian sites, while the leptodolichomorphic form is more frequent in those of the Capsian, as shown by the East African men of the Kenya Capsian.

The modern populations, too, can be understood on the basis of this polarity of types. The Berber populations from the Maghreb and North West Africa tend to be more robust and broad-faced than the Arabian populations and other groups from the East.

The present Egyptians are closer to the pole of the small leptodolichomorphic Mediterranean populations (SCHWIDETZKY 1970), as evidenced by the populations of Egypt since predynastic times, and have yielded some larger series. However, Egypt had been infiltrated by groups of various populations, especially in historical times. The increase of Negrid influence is due primarily to the Arabic slave-trade. Nevertheless, Negrid influences in ancient Egypt seem to have been much smaller than in Nubia (STROUHAL 1975). The present southern Nubians are tall and lightly built, but the skin colour is darker; they are probably the product of hybridization between Europid Egyptians and Negroids.

The fossil documents from Kenya are dealt with in detail below. The possibility of an European or Arabian thrust may help to explain the marked Europid features of the present Ethiopians as well as certain East African tribes; however, the Ethiopian regions and the hills near the Red Sea which could document such a movement to the South are unknown to both archaeology and palaeoanthropology. However, before a southward penetration of an early Mediterranean stock can be suggested, we must be certain that these East African fossils are sufficiently distinct from the present population of East Africa and the Upper

Nile to preclude their being ancestral to any of them, especially to the Nilotids (Clark 1970).

Human skeletal remains and morphological differentiation in East Africa

With regard to morphological differentiation, East Africa represents a heterogeneous region. Here, the three major racial elements are found in numerous hybridisized forms and show variable regions of expansion in prehistoric times. Hence, a meaningful interpretation of East African Late Pleistocene and Holocene hominid finds can often be made only in connection with finds from other areas of the continent.

Until some years ago, it was generally presumed that the earliest remains found in East Africa relevant to the differentiation of modern races have Europid appearance, perhaps with the exception of an early presence of Negroid groups in the Sudan at that time (Early Khartoum, Jebel Sahaba, Wadi Halfa). These early "Europids", who produced blade tools by the Capsian technique, are first represented by a find from Olduvai, where in 1913 in sediments of the Naisiusiu Bed (Olduvai Bed V), H. Reck discovered the remains of a well-preserved male skeleton, Olduvai Hominid I. Since then, a number of absolute datings have been carried out (Leakey, Protsch & Berger 1968; Protsch 1974 c). It was possible to date not only the faunal material from the upper and middle unit of the Naisiusiu Bed, but also the hominid itself; radio-carbon dates gave an age of about 16,920 ± 920 B. P.

A morphologically similar hominid was found in 1940 by M. D. Leakey in the deposits of a terrace of Lake Naivasha near Naivasha Railway Rock Shelter. The site had been attributed by Leakey (1953) to the Upper Kenya Capsian. A recent absolute dating (Protsch 1975, 1976) gave an age of 10,850 ± 330 B. P., which is a little higher than hitherto assumed (Oakley & Campbell 1967). The skeletal remains of what was probably a woman of advanced age are poorly preserved. The skull, incomplete especially in the facial region, is very long and narrow (LBI: 64.5) (Leakey 1935, 1942).

This group embraces also the skeletal remains from Gamble's Cave II, excavated in 1927–29. Here, remains of five individuals were found, among them 3 crania which are relatively well preserved. Based on the associated tool industries, the layers were ascribed by Leakey (1931) to the "Upper Kenya Capsian C". A radio-carbon dating yielded an age of 8,210 ± 260 B. P. (Protsch 1975).

A short description of the essential characteristics of the two preserved skulls from Gamble's Cave No. 4 and 5 is set out below (see Leakey 1935).

The two skeletons belong most likely to male individuals who died at an age of about 25 years (No. 4) and 20 years (No. 5). No. 4 has weakly developed brow ridges and a prominent occipital region. The face is wide and of medium height without subnasal prognathism. The nose is long and fairly wide, and the cranial index is 71 per cent. The skull of individual No. 5 (cranial index = 73) is comparatively low; the forehead is well developed, as is the chin; the face is

high and orthognathic, like that of No. 4; the nose also is very high. The occipital region is not prominent. Altogether, these early finds suggest a tall, slender dolichocranial population with very high orthognathic faces, high and narrow noses, and prominent chins; a combination of characteristics showing mainly Europid features.

More recent are the skeletons found at Bromhead's Site on the south bank of the Makalia River. The chronological position, which had been uncertain for a long time, was established by a recent radio-carbon dating as 7,410 ± 160 B. P. (PROTSCH 1965).

Altogether, remains of about 30 individuals were found, including children. Some skulls are fairly well preserved and show distinct variability which has led to the recognition of two types.

a) The type represented by the skull Elmenteita A. Its special features: ultra-dolichocrany, high face, narrow nose. This form includes also the skeletons Elmenteita B ♂ and D ♀.
b) The brachycranial type of Elmenteita F1 with lower face and parietal bossing, bearing some affinities with the San (Bushmen), has been compared to the "Proto-Hottentots" from Mapungubwe and to the archaeomorphic type from Tuinplaas.

Interesting in this context is the work of BRIGGS (1955) who summarizes the whole material of north African Mesolithic and Neolithic times. His classification of it into 4 morphological types is described below (according to WENDORF 1968). Affinities with the East African skeletons from Elmenteita were assumed.

Type A: Hyperdolichocranial with heavy supraorbital ridge, low wide face, fairly high orbita, wide nose and prognathic middle face (early East Mediterranean population).

Type B: Not as dolichocranial as Type A, with narrow supraorbital ridge, high orbita, high narrow face, narrow nose and medium prognathism (originated in the Middle East).

Type C: Sub-brachycranial with short, wide and flat vault, low orbita, heavy brow ridge and low nose. Type C is contemporary with B.

Type D: Dolichocranial with low vault, robust appearance, heavy brow ridge. This is the so-called Mechta-Afalou-type.

In his comparative tables, BRIGGS (1955) includes also data on the Elmenteita skulls and suggests paralleling them with those from northern Africa. On this basis, his type A is compared with Elmenteita A, type B with Elmenteita D and type C with Elmenteita F1.

To what extent the variability among the Elmenteita skulls has its origin in East Africa itself, or whether the various characteristics have direct genetical relations to the North African spectrum, is an open question, though hybridization and differentiation in Eastern Africa seems to be more likely, especially as the Elmenteitan industries may also have developed directly from the Upper Kenya Capsian.

A continuous presence of Mediterranid populations in East Africa has been assumed on the evidence of more recent sites in Kenya. One of the earliest of this group is probably Njoro River Cave, excavated by the LEAKEYS in 1938. The rock shelter, which had been dated by radio-carbon testing to 950 B. C., was used as a crematorium. Although remains of numerous partly deformed individuals were found, only a few crania could be reconstructed satisfactorily. In some skulls, LEAKEY & LEAKEY (1950) found distinct affinities with those from Elmenteita. According to the cranial indices, two variants (ultra-dolichocranial and brachycranial) can be differentiated, which, however, show also many common characteristics such as similar occipital and nasal indices.

Further "Europid", or Ethiopid, skeletal remains were found in cairns whose age could not so far be determined absolutely. The graves belong to the Gumban variants described by LEAKEY. The earliest group, which can be dated to probably the beginning of the 1st millennium A. D., includes sites such as Hyrax Hill, Willey's Kopje and Makalia burial site. At Hyrax Hill, 18 burials were found, all of which are very fragmentary. Of the three individuals exhumed at Willey's Kopje, only one skull is intact. In general, these finds differ from those found at Elmenteita in having a lower face, a more prominent nose and more robust mandibles. Not far from Bromhead's Site, two skeletons were recovered from cairns near the Makalia River, but only one is well preserved.

The burials at Nakuru and Hyrax Hill (N. E.) are assigned to the younger Gumban B variant of the Stone Bowl industry. These Iron Age cultures may be dated to the second millennium A. D. In 1926, remains of 10 individuals were found in a large burial mound at Nakuru, but only one individual was well preserved; the others had been broken by stones. The skull is long and narrow (LBI: 69), the forehead prominent, the face long and wide and the chin well developed. Burials of this type are known also from Tanzania near Ngorongoro Crater (LEAKEY 1966). In spite of the mostly very fragmentary finds it was supposed for a long time, because of various Europid characteristics, that Mediterranid populations had occupied East Africa from the Late Pleistocene to the Iron Age.

In the light of this situation regarding the finds, COLE (1964) did not see any reason for the assumption that the inhabitants of Kenya, before the arrival of the Bantu, had been Negrids who evolved farther west and north-west. It seemed more probable that, before the arrival of Negrid groups, parts of the East African area had been inhabited by Hamitic pastoral tribes who, coming from Ethiopia at about the second millennium B. C., invaded the area of modern Kenya and Northern Tanzania (SUTTON 1971). In Uganda, for example, there is little doubt about the presence of Ethiopid populations during the early part of the second millennium A. D. Remains of their settlements confirm the existence of these tall populations. A number of recent finds, however, shed doubt on this traditional point of view and suggest an earlier presence of Negrid populations in East Africa.

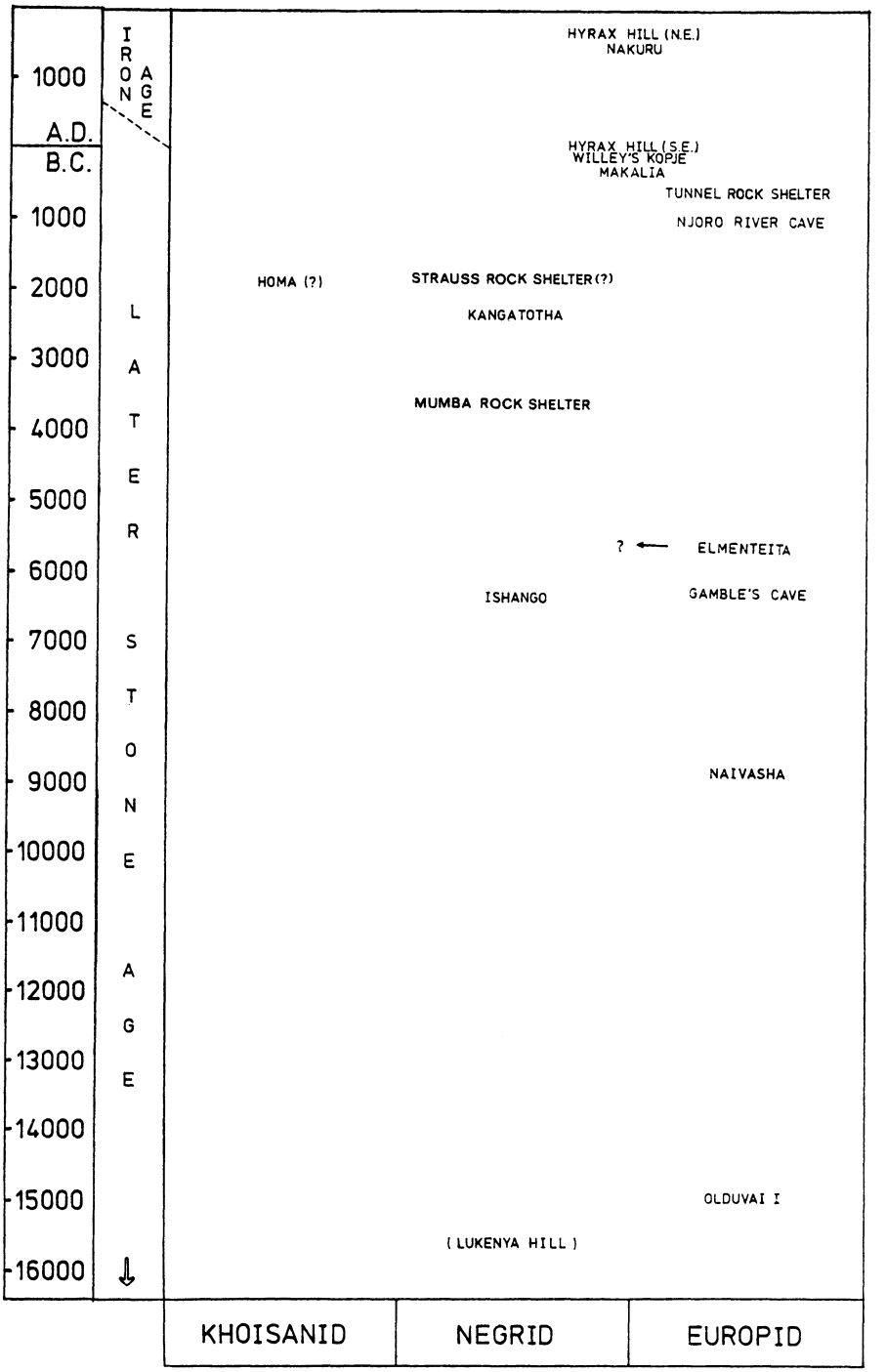

Fig. 4. The morphological differentiation of modern man in East Africa.

Firstly, there is the heavily mineralized fragment of a mandible (right corpus) with 3 permanent molars, found in 1965 near Kangatotha west of Lake Turkana (Kenya). The site has been classified as "Makalian Epi-pleistocene". A radiocarbon dating of associated fauna (shells) gave an age of 4,800 ± 100 B. P. (2835 B. C.). Coon (1971) has subjected the mandibular fragment to a morphological and odontological analysis. He compares it with the jaw fragments from Ishango (cf. p. 274) and concludes that there are striking resemblances, especially in the molars, between Kangatotha and Ishango. Moreover, comparisons with South African Bantu and other groups lead him to the conclusion that the individual from Kangatotha was in all probability Negrid, which means that Negrid people occupied this region before the arrival of modern Bantu-speaking tribes.

The second more recent find is a left neurocranial fragment (two thirds of the frontal bone and nearly all of the left parietal bone), discovered during systematic excavations not far from Nairobi in 1971. The three fragments from Lukenya Hill (Kenya) were found at a depth of 140 cm below LSA artifacts. The radiocarbon dating, based on the collagen of two associated faunal samples, gave an age of 17,670 B. P. and 17,700 B. P. Microanalytical measurements of the nitrogen and fluorine content established the contemporaneity of the cranium and animal bone samples. Gramly & Rightmire (1973) conducted the morphological study of the hominid. The frontal bone is relatively low and receding and the frontal angle shows strong affinities with South African Bantu. The arcus superciliares are marked and the nasal root is relatively flat. Although no conclusion can be drawn from important parts of the facial skeleton, the authors come to the opinion, that Lukenya Hill shows affinities with Negrid populations. According to Gramly & Rightmire (1973), it is still an open question, whether Negroid populations were already present in East Africa during Later Stone Age times.

Particularly interesting may be the skeletal remains found by J. D. Clark near Lake Besaka, east of Addis Abeba (Ethiopia) in 1974. The remains of 6 individuals were associated with Phase B of the Ethiopian Later Stone Age industry. The estimated age is 5,000–7,000 B. P. (Oakley, Campbell & Molleson 1977). In a preliminary analysis of the material, McCown (1975) recognized Negroid features.

Of late, a number of revisions have yielded some indications concerning the ancient "Mediterranean group" in East Africa. For instance, Howells (unpubl. manuscript) found Negrid affinities with skulls A and B from Elmenteita, and Rightmire (1975) obtained similar results with other early "Mediterranean" representatives of the Rift Valley.

Applying discriminant analysis, Rightmire compares crania from Elmenteita, Willey's Kopje, Makalia, Nakuru and others with series of East and South African Negrids, ancient Egyptians, San and Khoikhoi. His results – tentatively interpreted – indicate that some of the so-called East African Mediterraneans have stronger affinities with various groups of African Negrids. This applies in particular to Elmenteita A and D, Willey's Kopje III and Nakuru IX. Various

other finds revealed no distinct affinities; occasionally, there were also affinities with the Mediterranean Egyptians. In order to support his results, RIGHTMIRE quotes recent linguistic studies which suggest an early diffusion of the Nilotid language in East Africa. RIGHTMIRE's assumption, however, that the populations from Willey's Kopje, Nakuru and probably also Bromhead's Site may have been Nilotid Negrids, certainly requires further study and comparisons with a larger number of comparative samples, as well as an analysis of non-metric characteristics.

Although, according to the latest finds, the presence of Negrid populations during the Later Stone Age is quite possible, this does not exclude the simultaneous existence of Ethiopid, or Mediterranid, populations. With regard to RIGTHMIRE's results, it should be mentioned also that the numerous multivariate comparisons conducted by BRÄUER (1976 a) in the course of the analysis of KOHL-LARSEN's material from Northern Tanzania generally showed that the various representatives of the Mediterranean group indicated no Negrid affinities; in almost all cases, great distances were obtained from all the series compared. Only Gamble's Cave reveals certain affinities with Europid skeletal material.

The results emerging from the study of the hominids from Mumba and Strauss Rock Shelter are of particular significance. The two shelters were excavated by KOHL-LARSEN during his East African expeditions in 1934—1939 (KOHL-LARSEN 1943). However, it was not possible to conduct the anthropological studies until recently (BRÄUER 1976 a, 1978 a, b). The most important excavation was that of the Mumba shelter situated in the Eshigesh Hills at the north-eastern end of Lake Eyasi. The main excavation in 1938 reached a depth of 9.40 m. The artifacts, more than 100,000 of them, which have already been the subject of an unpublished dissertation (ROLLER 1955), are presently being reassessed.

While artifacts were present in practically all of the 6 beds (with exception of the sterile sand layer IV), the hominid finds were restricted to Bed III, belonging to the Later Stone Age. The fairly rough stratigraphic dating of the hominid layer, which altogether yielded remains of 18 individuals, has meanwhile been established with considerable certainty by two radio-carbon datings; firstly, a dating based on charcoal found with skeleton No. IX gave an age of 3,670 B. C. (4,860 ± 100 B. P.) (UCLA-1913). The absolute age of the associated skeleton was later determined at 3,700 B. C. (4,890 ± 70 B. P.) (Fra-1).

While only a few fragments of the skull of individual No. IX exist, hominid No. X, which lay about 60 cm deeper, but still near the base of Bed III, is relatively well preserved and must have been at least of about the same age or older. Hominid X, moreover, is the only individual in the shelter showing signs of advanced mineralization.

The human skeletons were submitted to both a morphological-descriptive and a multivariate analysis. The results showed distinct affinities with the Negrid morphology. Hominid X has no paedomorphic features. The cranium is long and ovoid. Glabella and arcus superciliares are moderately developed, the nasal root

is not flat, but the nasal bones form a relatively small angle. The nose in all probability, is hyperchamaerrhine. Furthermore, the specimen shows distinct alveolar prognathism and the morphology of the mandible also supports the supposed affinities.

The analysis of the finds of more recent horizons shows strong affinities both with one another and with Mumba X. On the whole, then, the skeletons from Mumba Rock Shelter seem to indicate the existence of Negroid populations over a long period in the Later Stone Age.

The second shelter excavated by KOHL-LARSEN in Tanzania is the Strauss Rock Shelter, situated southeast of Lake Eyasi. The excavation team struck the rock-base at a depth of 2.20 m. In addition to numerous artifacts belonging to the Wilton cultures, remains of three human skeletons were found in different depths. The morphological and multivariate analyses (BRÄUER 1976 a, 1979) show predominantly Negroid affinities here as well. Strauss II in particular reveals striking affinities with the Teita and with recent populations of the Eyasi territory. In the case of the most deeply situated skeleton, the multivariate comparisons produced no distinct association. Affinities exist with representatives of the probably Negroid populations of Bambandyanalo, as well as with Negrid representatives of an Iron Age series from Northern Tanzania (Masai?) (BRÄUER 1976 b). The crania from Strauss Rock Shelter are long and ovoid, the nose is chamaerrhine to hyperchamaerrhine. The morphognostic analysis does not indicate Khoisanid characteristics.

Altogether, the more recent finds permit with a high degree of probability the conclusion that populations with Mediterranid as well as Negrid characteristics were present in East Africa during the Later Stone Age.

Traces of early Khoisanid populations, though sparse, also exist in East Africa. For instance, LEAKEY (1935) found San (Bushman) characteristics on a skull (Homa 4) which was found together with a "typical Kenya Wilton industry" and huge shell mounds on the north-eastern side of Lake Victoria. Consequently, it was supposed for a long time (MURDOCK 1959; COLE 1964) that the east African Wilton Cultures were made by San-like people. It should also be mentioned here that two other individuals, found in the same shell mounds as Homa 4, were not regarded by LEAKEY as being related to a Bushman population. So far it has not been possible to confirm the hypothesis of a wide diffusion of Khoisanid populations in East Africa and it seems rather unlikely, even if there have been numerous Khoisanid finds of the Later Stone Age in southern Africa, for example, in Zambia: Maramba (CLARK 1950), Chipongwe (CLARK & TOERIEN 1955), Gwisho (GABEL 1963), Leopard's Hill (WELLS 1950); in Malawi: Fingira (SANDELOWSKY & ROBINSON 1968), Hora (WELLS 1957); in the Republic of S. Africa: Oakhurst (DRENNAN 1937 b) and in Namibia: Otjiseva (DE VILLIERS 1972). There is hardly any doubt that the San (Bushmen) were once spread over a much larger territory before the rise of the Negroid populations. According to the presently available finds, however, it is most likely that East Africa as well as parts of

South-East Africa were already inhabited by Khoisanoid, Negroid and Ethiopid-Mediterranid populations during the LSA. For instance, WELLS (1957) found similarities between the crania from Hora and the skeletons from Nakuru and Ngorongoro (see TOBIAS 1972). Skeletons which are similar both to the Khoikhoi (Hottentots) and to the finds from Elmenteita come from the South African Iron Age sites K2 at Bambandyanalo (1,050 A. D.) and Mapungubwe (1,450 A. D.). Most of the 74 skeletons from Bambandyanalo and the eleven from Mapungubwe, studied by GALLOWAY (1959), are said to belong to normal-sized Khoisanids who show also distinct morphological similarities to the Boskop "type" (cf. p. 270).

However, based on a recent multiple discriminant analysis, RIGHTMIRE (1970) obtains other affinities for the skulls from K2. His results place them within the range of modern Negrid populations and in his opinion, "Proto-Hottentots" and similar terms seem to be unjustified.

Finds of similar age were discovered by DREYER and MEIRING in a number of graves at the Orange River near Kakamas in 1937. The large-headed, non-paedomorphic group, which is distinctly different from the San (Bushman) type, has not been studied in detail; however, the combination of characteristics was described as "Kakamas type". They have long, narrow and high crania with high faces and large mandibles. According to RIGHTMIRE (1970), these skeletons do not allow of a uniform diagnosis with regard to "Hottentots", but rather refer to a group mixed with Negrids. TOBIAS (1959), too, mentions that the Kakamas individuals absorbed many Bush-Boskop features and so they represent a more heterogeneous group. These subfossil skeletons fall almost wholly within the range of modern races. Hence, it seems appropriate not to introduce new typological terms in morphological diagnosis, but to interpret these recent representatives within a classification based on the categories of modern races (see JENKINS & TOBIAS 1971).

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