

# THE KATANGA SKULL

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My learned and experienced colleague, Dr Matthew Young, has kindly prepared for me the following report : Grafton Elliot Smith.

## GENERAL FEATURES

The human skull which is part of a skeleton discovered in 1918 in some old native workings during operations by a mining company « l'Union Minière du Haut-Katanga » in the mine of Kambove (Katanga) in the Belgian Congo is undoubtedly of negroid type but it presents certain features that are not so emphasised as they usually are in negroes and are to some extent suggestive of admixture. Unfortunately, the skull only is available; the remaining parts of the skeleton were not preserved <sup>(1)</sup>.

The skull is quite complete with the lower jaw. The bone is in good condition with a smooth surface and shows no evidence of erosion anywhere except in the occipital condyles. The surface of the skull and the mandible is for the most part greenish in colour from staining with malachite (copper carbonate) but the weight, resonance, sensation to the tongue and radiographic appearance (Fig. 1) clearly indicate that the bone is not mineralised or fossilised to any appreciable extent. So far as can be judged from the condition of the specimen, it must be considered of comparatively recent date.

On general inspection, as may be seen in the large scale photographs of the skull illustrating its appearance from the four principal aspects or normae, facial, lateral, vertical and occipital (Figs. 2 to 5), the specimen is of moderate length, very narrow with a notable post-orbital constriction and relatively high with a well-arched vault. There is a slight suggestion of keeling at the sagittal suture and slight flattening at the obelion. The forehead is fairly rounded and shows the median eminence characteristic of the negroid type though there are also distinct indications of frontal eminences. The superciliary ridges are fairly prominent. The temporal ridges are strongly developed,

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<sup>(1)</sup> Thanks to the courtesy of Mr E. Sengier, managing director of the « Union Minière du Haut-Katanga », this skull is now preserved in the anthropological collection of this Museum. It is registered under n° 10395.



FIGURE 1. — Radiograph of the lateral aspect of the skull.

which is alleged to be a negroid feature, and appear to be more convergent than usual. There is a definite bulging or protuberance over the inferior frontal region of the brain in the temporal fossa and a clearly indicated sylvian depression or furrow.

The face is decidedly long, absolutely and relatively; the nasal bridge is excessively flat; the nasal aperture relatively wide but not characteristically so; there is a moderate degree of prognathism, the orbits are large, quadrangular and relatively high with the transverse axis rather inclined. The lower jaw is of robust type though the body is relatively narrow and almost « pointed » anteriorly; the ramus is relatively large with well developed muscular impressions. The molar teeth are all present. The lower central incisors are absent and have apparently been extracted at an early age.

The detailed measurements of the principal characters of the skull including the mandible are given in Table I. In commenting on the measurements of the principal characters, reference will be made to particular features of the skull, which are illustrated in the photographs.

#### **Age.**

As the basilar suture is closed and the third molar teeth are fully erupted the skull is apparently that of an adult. The calvarial sutures show a considerable degree of complexity but bear no evidence of obliteration either externally or internally. Their completely « open » condition would suggest that the probable age of the individual at death was under 30 years.

#### **Sex.**

The size of the skull (the cubic capacity is only 1150 cc.) and its general lightness and relatively small processes, particularly the mastoid, suggest that the skull is that of a female but the rather pronounced superciliary ridges with relatively thick upper orbital margins, the strongly developed temporal ridges, the well indicated muscular attachments in the occipital region and the robust type of mandible with prominent muscular markings tend to convey the impression that the skull is male although towards the lower limit of male range as regards size. Recognisable superciliary ridges appear to be present occasionally in the female negro skulls collected from the Teita hills though this is not a general feature of the negro female.

#### **Teeth.**

The molar teeth are of average size and show only a slight to moderate degree of wear of the occlusal surfaces, although rather « marked » considering the probable age of the individual at death. The bicuspid and the canines on the other hand show an extensive degree of attrition. The incisors, central and lateral in the upper jaw and lateral in the lower jaw, have fallen out after death



FIGURE 2. — Norma frontalis of the skull oriented in the Frankfort plane.

but the lower central incisors have been removed, having been either drawn or knocked out at an early age, as only sufficient space intervenes between the empty alveoli for the lateral incisors to accommodate the width of one incisor; the alveolar margin in this region is now full and rounded. The radiograph of this part of the alveolar region (Fig. 6) shows no remnant of the roots of the incisors but merely bony trabeculae. There is no evidence of caries in any of the teeth that are present in the maxilla but the second left lower molar shows a carious cavity on its mesial surface and the first and second right lower molars show cavities on the approximal surfaces. There is also definite evidence that an abscess has been present at the root of the first right lower molar. The second right lower bicuspid is only represented by a partially absorbed root, the crown having disappeared presumably as a result of caries. The radiographs of the molar regions of the jaws show the presence of two supernumerary molars, that on the upper left side being merely represented by a crown (Fig. 7) which is partly disclosed to the eye through a small aperture in the tuberosity. The presence of a rather diminutive lower fourth molar with a definite pulp cavity on the right side is clearly indicated in the radiograph (Fig. 8) though not visible on superficial examination of the specimen. There is no evidence of a corresponding tooth on the left side.

### ANOMALIES OR PECULIAR FEATURES

A feature which arrests attention at once is the relatively large size of the infraorbital foramina which open downward into deeply hollowed out canine fossae. A suture extending from the foramen to the orbital margin persists on each side. The fissures and foramina in the orbit including the naso-lachrymal canal are also unusually large in size. The anterior condyloid foramina are also definitely larger than is commonly seen. The right and left jugular foramina are not of unusual size and are about equal in extent. The anterior part of the right foramen is cut off by a bony ridge. The occipital condyles appear to be of average size, the surface of the right is almost completely eroded or broken off and the left shows some erosion at its posterior end but the part that remains intact is somewhat irregular and faceted in appearance. The left styloid process is broken off but the right persists and appears to be exceptionally long. The bony palate is exceptionally high with a rather irregularly ridged surface.

The nasal bones are of average size but unusually flat; the lower margin of the nasal aperture is fairly well-defined though not sharp; there is no evidence of a simian groove.

No anterior nasal spine is present and there is no indication that any bone has been broken off in this region.

No bony ossicles are present in any of the cranial sutures unless at the pterion where a small epipteric bone is present on each side.

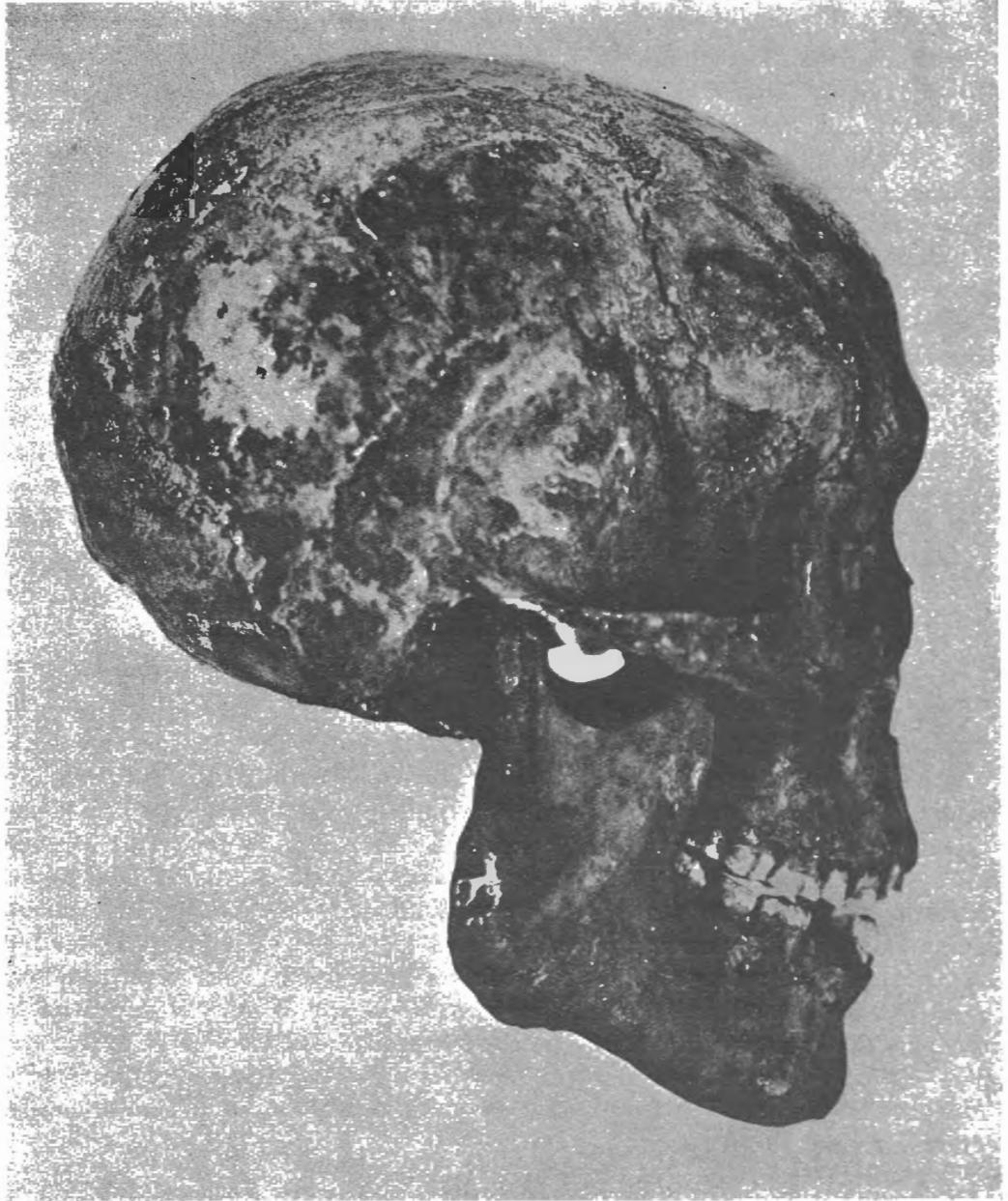


FIGURE 3. — Norma lateralis of the skull

### AFFINITIES WITH NEGRO GROUPS

While it seems inadvisable and indeed rather venturesome to go further than to state that the skull is that of a negro, probably of the male sex, an attempt has been made to identify the group or tribe with which it is most

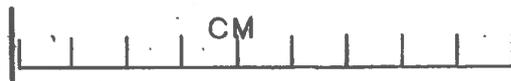


FIGURE 4. — Norma verticalis of the skull.

closely related or presents the closest affinities by comparing the detailed measurements of the specimen and its contour tracings from the different aspects with the measurements and tracings of various groups of negro skulls from Central and East Africa which have been published, including amongst other the Congo (Batetela tribe), the Gaboon, the Angoni, the Somali, the Kaffir, the Cameroon and the Teita series. It has also been compared with the Dinka skulls and with other small groups of negro skulls in the museum



FIGURE 5. — Norma occipitalis of the skull.

of the Royal College of Surgeons. In its measurements and general proportions it seems to resemble most closely the female Teita skulls which have been collected and sent to England by Leakey and are described in detail by Kitson in *Biometrika* Vol. 23. The tracings (drawn with the Klaatsch contour tracer) in the sagittal vertical, the horizontal (glabellar level), and transverse vertical (through the porion and vertex) planes with the skull oriented in the Frankfort plane have been superimposed on the corresponding tracings of the average

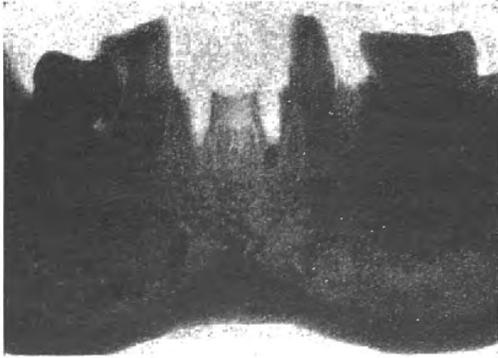


FIGURE 6. — Radiograph of mandible showing that central incisors have been removed at an early age.



FIGURE 7. — Radiograph of the left upper molar region showing presence of crown of supernumerary (4th.) molar.

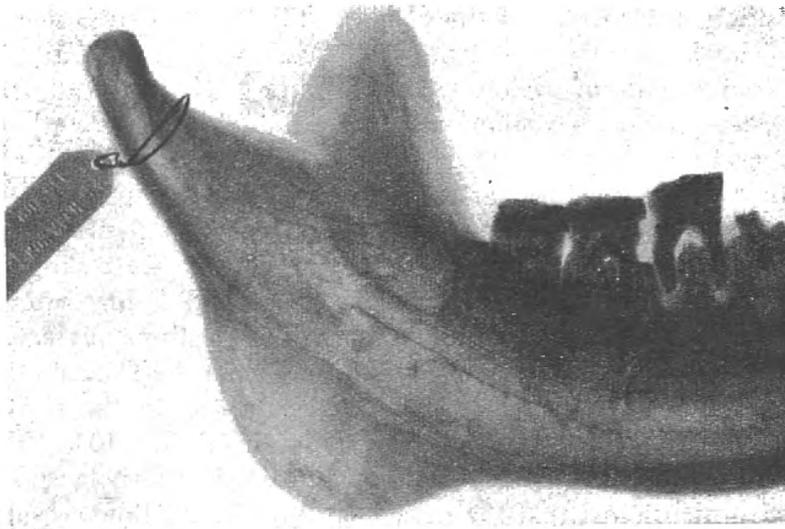


FIGURE 8. — Radiograph of the right side of mandible showing presence of supernumerary (4th.) molar.

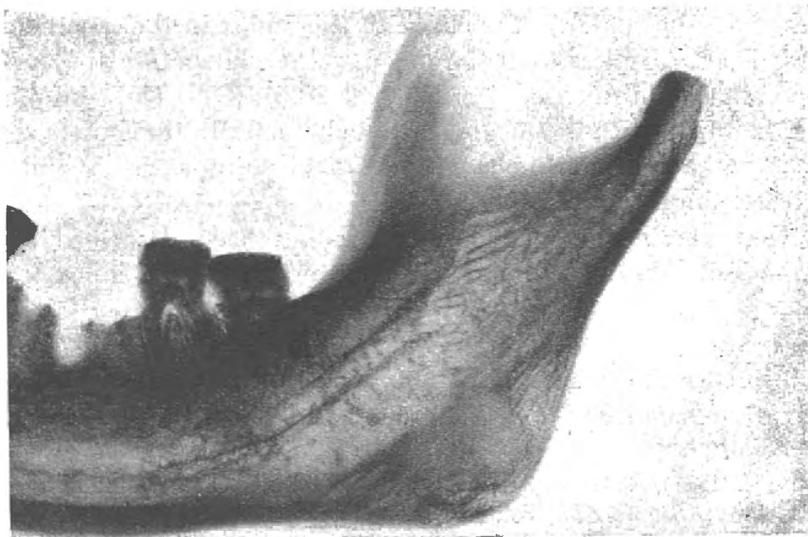


FIGURE 9. — Radiograph of the molar region of the left side of the mandible.

Teita female skull which are based on the contours of 49 specimens. Though the skull is probably that of a male it has been superimposed on the female contour tracings because of its relatively closer agreement in general dimensions with the average of the female series than with the male, and because the male and female of a type as a rule resemble one another in general form. The superimpositions of the tracings in the different planes of the Katanga skull on the mean Teita female skull are given in figures 10, 11 and 12. Figure 10 shows how closely the sagittal contour tracings correspond. The cranial parts of the contour tracings are almost coincident in their whole extent. The only feature in which the Katanga specimen deviates from the average Teita is in the facial region where the relatively greater length of the alveolar portion of the face and the greater depth of the palate in the Katanga specimen are clearly illustrated. The horizontal contour (Fig. 11) shows the extreme narrowness of the skull (the maximum parietal width is only 121 mm.) and the strongly developed post-orbital constriction which is a notable feature of the specimen, while the transverse vertical contour through the apex (Fig. 12) shows the relative narrowness of the specimen as compared with the average Teita skull; it is of much the same height. Though in cranial size and general proportions, the skull appears to differ but slightly from the average Teita skull, individual skulls can be selected from the Teita female series and a few even from the male series which seem to be almost identical with it in these characters.

A feature in which the Katanga skull differs from the Teita skull and many other negro skulls is its long face which is largely due to the relatively long alveolar portion (PH). This is well illustrated in figure 10. Most negroes show a relatively short and usually relatively projecting alveolar process.

It has been mentioned that the nasal bones in the specimen are excessively flat. This is shown by the value of the simotic index ( $100 \times SS/SC$ ) which is only 19.5 as compared with the approximate mean values of 25 and 29 given for the corresponding index in the female Congo and Gaboon negroes <sup>(1)</sup> (which are lower than in the male). The value of this index in the specimen is in fact so low that it is actually less than the mean value shown for the male though not for the female chimpanzee ( $\sigma$  21.4,  $\text{♀}$  18.5) <sup>(2)</sup>. The simotic subtense (1.5 mm.) is identical with the mean for that character in the female chimpanzee; the slight divergence from the average female chimpanzee is thus due to a slightly shorter simotic chord.

Excessive flattening of the nasal bones has been described as a special feature of the Teita skulls <sup>(3)</sup>; in which the average simotic index for the male

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<sup>(1)</sup> BENNINGTON, R. CREWDSON (1911-1912), A study of the Negro Skull with Special reference to the Congo and Gaboon Crania. (*Biometrika*, vol. VIII, p. 292.)

<sup>(2)</sup> RYLEY, K. V. and BELL, J. (1913), A study of the Nasal Bridge in the Anthropoid Apes and its Relationship to the Nasal Bridge in Man. (*Biometrika*, vol. IX, p. 391.)

<sup>(3)</sup> KITSON, E. (1931), A study of the Negro Skull with Special References to the Crania from Kenya Colony. (*Biometrika*, vol. XXIII, p. 271.)

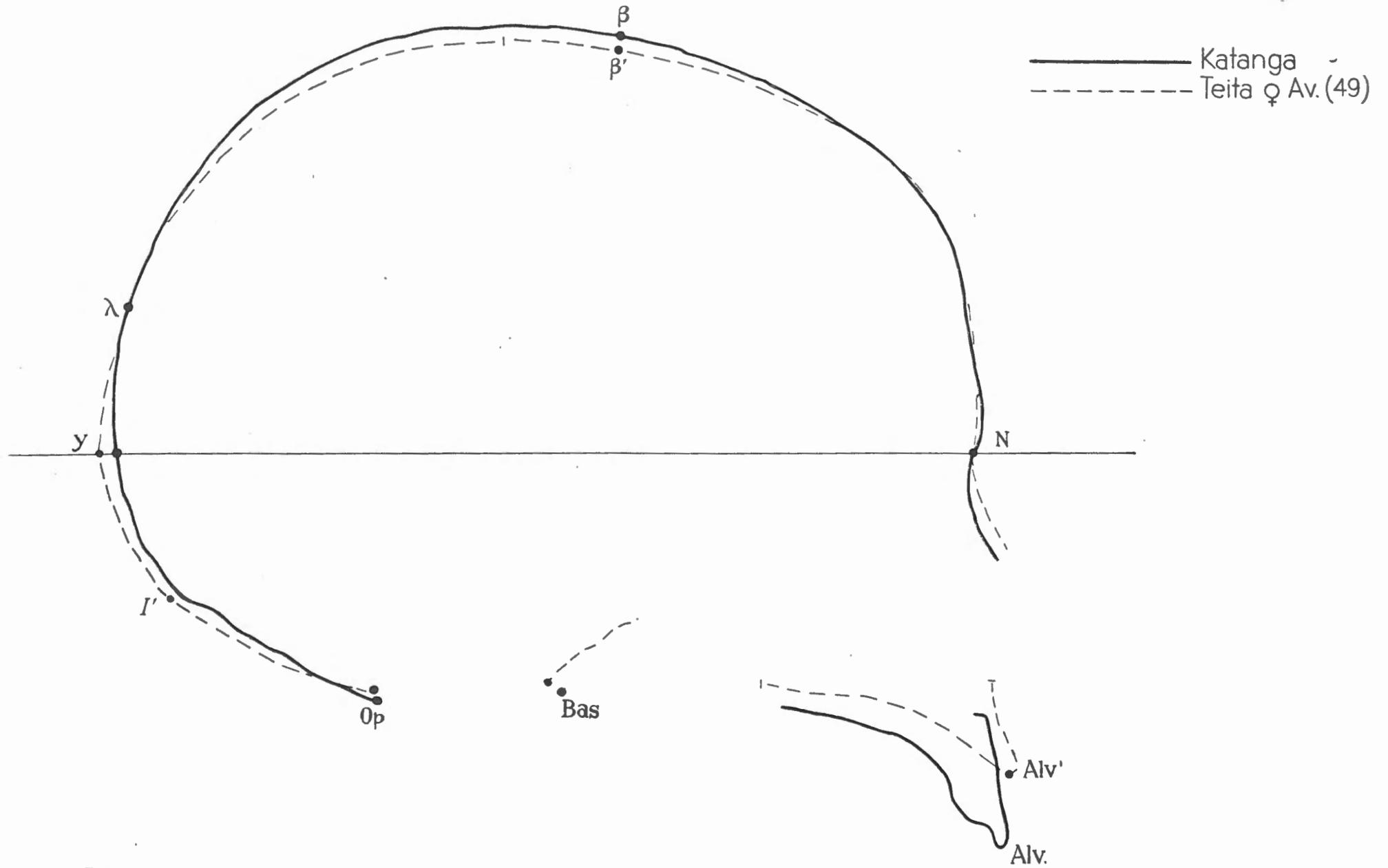


FIGURE 10. — Median sagittal contour tracing of the Katanga skull superimposed on the mean sagittal contour of the Teita female skull (based on 49 specimens).

is 22.4 (39) and for the female 18.6 (49). It has been suggested, though it is considered extremely unlikely, that in the Teita skull the excessive flattening may be due to artificial deformation.

The dacryal index (100 DS/DC) is higher than that in the Congo negro but approximates to that in the Gaboon and Teita negroes.

#### Nasal index.

In the specimen the nasal index is 52.0; in the Teita group it is on the average 55.2 for the male and 57.5 for the female. In most other negroes, except those from Galla and Somaliland where the average index is 52.2, it is as high if not higher than the Teita value; e. g. Gaboon 56.5, Congo 55.2, Angonis 58.0, Kaffirs 56.3, Northern negroes 56.5. The nose while thus relatively broad is not so platyrrhine as that shown in the average negro in Central and East Africa and this feature in the specimen suggests some racial admixture.

#### Prognathism.

This feature may be measured by the alveolar profile angle, P, the nasal angle N, and less precisely by the alveolar or gnathic index 100 GL/LB.

In the specimen the alveolar profile angle (P) is 83°0 the nasal angle (N) 63°5 and the alveolar index 96°4. In the male Teita the average alveolar angle P is 83°2 but the nasal angle is 69°2; the respective values are approximately the same in the female. The values for the alveolar or gnathic index are 98°7 for ♂ and 98°2 for ♀.

In the Congo negro (Batetela tribe) the average gnathic index is 98°2 for the ♂ and 100°6 for the ♀; in the Gaboon negro (1864) the values are 100°2 for the male and 102°7 for the female.

Judged by these values, the specimen would appear to be less prognathic than the majority of negroes. The lack of emphasis in this feature in the specimen is obviously associated with the relatively long alveolar portion of the face and the fact that this process does not project or shelve forward in the manner shown in many negro skulls.

Attention may be directed to other indices besides the gnathic and the nasal in Table I which serve to differentiate the Katanga skull and negro skulls generally from the European type.

1. The acroplatic index, 100 (B — H') LL, is — 7.7 i. e. definitely negative. In the negro this ratio is as a rule either zero or actually negative, it is not only positive but fairly high in the European.

2. The basio-bregmatic height (H') is 134.5 mm., i. e. relatively high. This dimension is greater in the negro skull as a rule than in the European. The exaggerated height of the negro skull is associated with the portion of the skull between the basion and the auricular axis; the auricular height is about

————— Katanga  
----- Teita ♀ Av. (49)

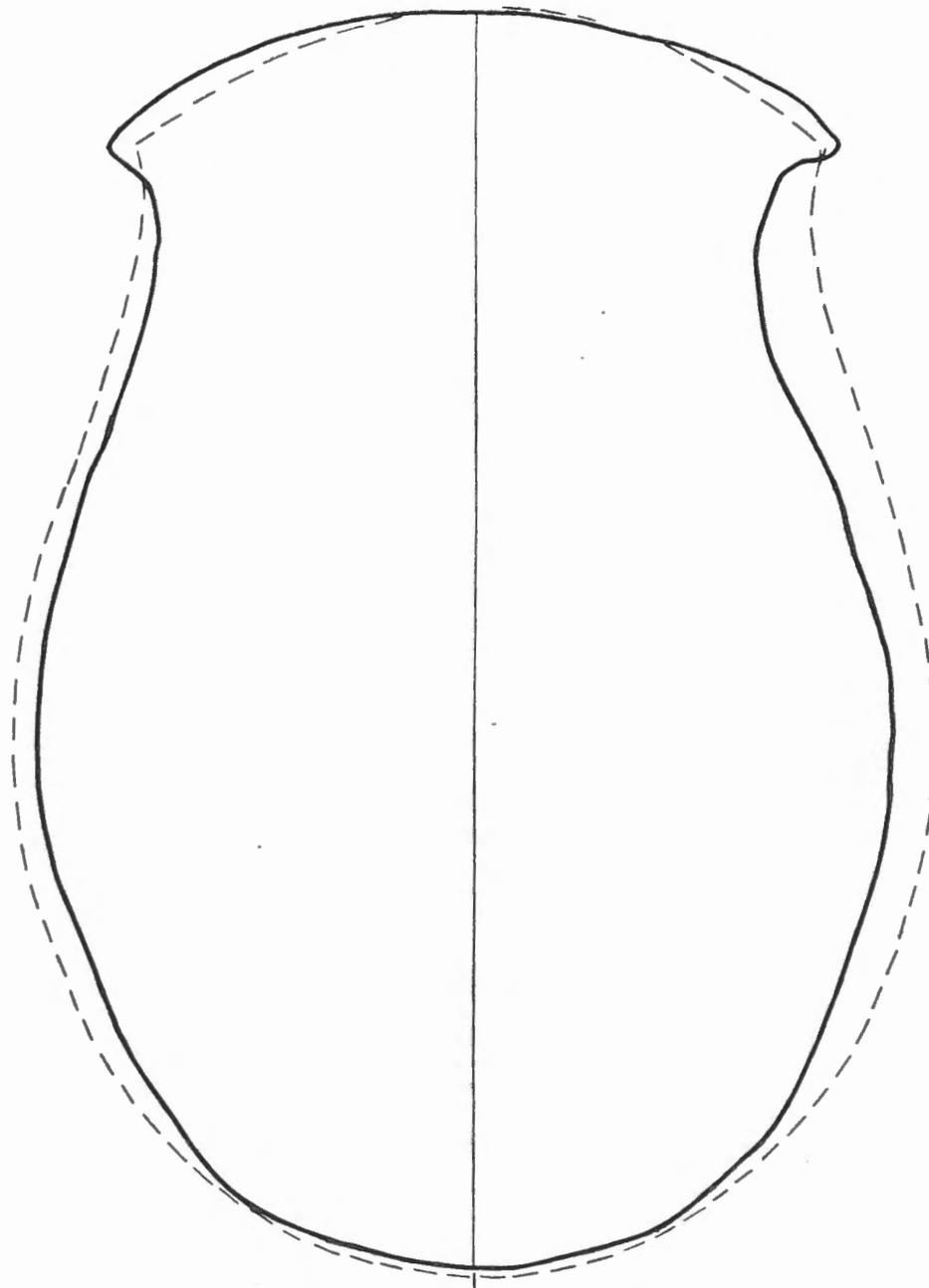


FIGURE 11. — Horizontal contour tracing at the level of the Glabella of the Katanga skull oriented in the Frankfort plane superimposed on the mean contour tracing of the Teita female skull (based on 49 specimens).

the same. There is a relative reduction of the basal part of the European skull as compared with the negro. This is well brought out by taking the index formed of the ratio of auricular to total height ( $100 \text{ OH}/\text{H}'$ ). In the Katanga specimen this ratio is 81.4, in the Gaboon it is 84, in the European (English) it is 88.

3. In the Katanga specimen, as in other negro skulls, the occipital region is ill-developed as compared with the European. The occipital index, the ratio of the radius of curvature of the occipital arc to the chord from lambda to opisthion is 66.2 i. e. relatively high (in the Congo negro it is 68.8 and in the Gaboon negro [1864] it is 68.3) as compared with the European (English) value of 58.5. A high occipital index means an ill-developed occiput.

4. The upper facial index ( $100 \text{ G}'\text{H}/\text{GB}$ ) in the Katanga specimen is 81.4. This is unusually high for a negro, e. g. the corresponding values in the Congo negro are 66 for the ♂ and 64 for the ♀. Europeans, as a rule, have a relatively longer upper face than negroes, the upper facial index being in the English Whitechapel series 76.5 for the ♂ and 77.9 for the ♀. The Katanga specimen in this feature is clearly an exception to the negroid type; this divergence, as has been mentioned, is largely due to the relatively long alveolar portion of its face (PH).

In an effort to determine more precisely, if possible, the negro group to which the specimen was most closely akin, a table was prepared showing (1) a list of the measurements of the principal cranial and facial characters of the Katanga skull; (2) in parallel series with these the mean measurements of the corresponding characters in the principal negro groups for which measurements are available. Among these tabulated for males were the Congo (<sup>1</sup>) (Batetela) the Gaboon, the Angoni, the Teita, the Tanganyika Territory, the Galla and Somali; the Cameroon, the Kaffir and Egyptian (<sup>1</sup>) series; for females, the Congo (<sup>1</sup>), the Gaboon, the Teita, the Tanganyika Territory (Reid) and the Egyptian groups (<sup>1</sup>) are available. The regions in which these types are found in relation to Katanga are shown in the sketch of the map of Africa (Fig. 13). The measurements of the several characters in the Katanga skull were subtracted from the mean values of the corresponding characters in the different groups and the difference in each case was divided by the standard deviation of the character for the longest negro series of skulls available (the Gaboon 1864); the male standard deviations being used for the male series and the female standard deviations for the female series. The ratios that were found showed by their sign, in what direction, excess or defect, for the individual characters in the

(<sup>1</sup>) These mean values are taken from the memoirs on the Negro Skull in *Biometrika* already given as references.

list each type deviated from the corresponding values in the Katanga skull and by their magnitude a measure of the extent of the deviation. Only in those instances in which the value of the ratio was numerically equal to or in excess of 2 can the particular dimension be said to differ to a degree that may be considered individualistic or characteristic. A rapid survey of the table, which is not given because of its large size, showed that the number of instances in which the ratio attains the level 2 for any type is very small, a fact which seems to justify the conclusion that the Katanga skull can be said to differ characteristically in very few characters from any of the negro groups. In its general dimensions it undoubtedly shows a closer approximation to the female groups than to the male and to the East African than to the West African series. Of the groups with which comparison is made, the skull seems to deviate least from the female Teita group, though in length of face and facial proportions, represented by the facial index, it shows considerable divergence from this type as well as from the others.

Comparing the skull with the smaller groups of negro skulls of recognised tribes from Central Africa which are exhibited in the Museum of the Royal College of Surgeons, London in an effort to find a type that is similar in its general features and at the same time shows the relatively long alveolar portion of the face which is a feature of the Katanga specimen, it was found that while the skull in its general form presented features reminiscent of the Dinka skull the face of this type has generally a relatively short alveolar portion, although occasional individual skulls of the series are relatively long in this respect. The Royal College of Surgeons Museum, London possesses a fairly representative number of Dinka skulls (fully 30 presented by C. G. Seligman, F. R. S.). The Dinkas are a race of negroes living near Bor on the White Nile to the south of Khartoum. They belong to the tall, long-headed group termed « nilotic ».

The cranium of one Nuba skull in the Museum is in its general features not unlike the Katanga specimen and the mandible which accompanies it presents an appearance in its anterior alveolar region identical with that in the Katanga specimen resulting from the removal of the central incisors in early life. The custom of removing the central, or the central and lateral incisors of upper, lower, or upper and lower jaws in early life usually soon after the permanent incisors are fully erupted is a common practice amongst many tribes in Central and East Africa.

The skulls of identifiable tribes amongst those represented by a few specimens in the Royal College Surgeons Museum, London that appear to resemble the specimen from Katanga most closely and at the same time have a relatively long alveolar part of the face (PH) are those of two Nuba females taken from graves near Kurun in South Kordofan. One of these skulls has the mandible associated with it and in this lower jaw both central and one of the lateral incisors have apparently

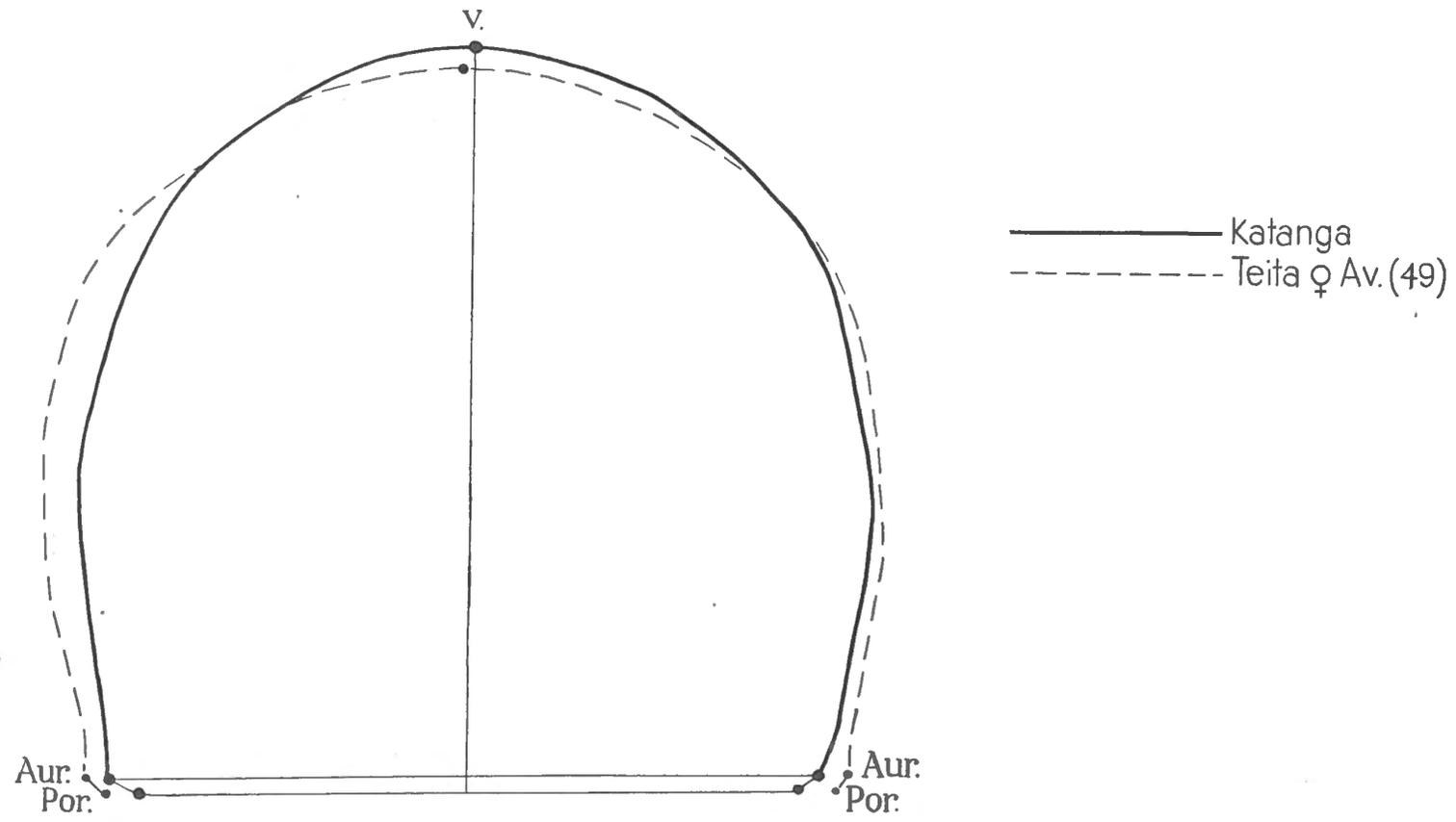


FIGURE 12. — Transverse vertical contour tracing of the Katanga skull superimposed on the mean contour of the Teita female skull (based on 49 specimens).

been removed in early life. To show how closely the Katanga specimen resembles one at least of these Nuba female skulls, that with the mandible (and labelled N° 17.0852), a few of the corresponding measurements are tabulated (Table II). The Nuba specimen is relatively wider in its cranial region, relatively shorter in the face and relatively wider in its palate, but it has an alveolar process (PH) of an equal length and in many other characters is almost identical.

The relatively small size of the skull may suggest the possibility that it is



FIGURE 13. — Sketch map of Africa to show place of origin of the series of negro skulls which have been compared with the Katanga specimen. Adapted from *Biometrika*, vol. 23, p. 274.

that of a pygmy, tribes of which are found in various parts of Central Africa including the Belgian Congo. Unfortunately, it is not possible to be certain that it is not one of these small negroes as none of the long bones of the skeleton is available for estimation of the stature. Many of the pygmy skulls described as coming from Egypt, however, are relatively broad-headed. In two Akka skulls, from Central Africa <sup>(1)</sup>, one male and one female, the cranial

<sup>(1)</sup> SMITH, H. DOROTHY (1911-1912), A study of Pygmy Crania based on skulls found in Egypt. (*Biometrika*, vol. VIII, p. 262.)

indices are 74.4 and 77.9 respectively. In the six Akkas particulars of which are given by Elliot Smith <sup>(1)</sup> the cephalic indices are 76.5, 77.7, 78.0, 78.7, 79.1 and 79.1. If we deduct 2 units from these values to make them comparable with the cranial indices, the corresponding cranial indices would be 74.5, 75.7, 76.0, 76.7, 77.1 and 77.1, which would suggest that in general the pygmy of this type is mesaticephalic. In Flower's two Akkas described in the J. R. A. I., Vol. XVIII, 1888, and measurements of which are cited by H. Dorothy Smith in *Biometrika*, the capacity of the male is given as 1102 cc., which is much the same as that of the Katanga skull, and that of the female as 1072 cc.; the gnathic index in the male is 108.8 and in the female 104.3 so that they are definitely prognathous unlike the Katanga; the nasal index in the male is 63.4 and in the female 55.3, so both are definitely platyrrhine unlike the Katanga; the orbital index in both the male and female is 82.9 which is almost identical with the index in the Katanga specimen. Such records as are available for the Akka pygmies thus do not suggest that the Katanga skull should fall into this category.

The principal measurements of the Katanga mandible are tabulated (Table I, p. 24) and its general characters and any peculiarity of feature are briefly described (p. 2) but since the evidence furnished by Morant (unpublished, but in the press) clearly proves that the characters of the modern mandible at least are of comparatively little value in differentiating one racial type from another a detailed study of the bone will not be included.

The abnormally high, and relatively narrow, palate of the Katanga specimen is undoubtedly an individual feature which although alleged to be prevalent in modern European skulls and to be becoming gradually more common must indeed be a comparatively rare occurrence in the negro, in which type the palate is usually well-developed and broad. The exceptionally long alveolar portion of the face (PH) to which reference has been made may be but a more or less necessary concomitant of the unusually high palate. Its comparative rarity in negro skulls tends to support this view.

It seems not only of interest but relevant to mention that a similar type of unusually long face, not due to elongation of the nasal region but mainly to excessive development of the alveolar region, also accompanied by an exceptionally high palate but no very definite evidence of prognathism, are features of at least one of the male skulls found in the ancient lacustrine deposits (probably of Magdalenian date or rather later according to the discoverer) at Nakuru in the Rift valley in Kenya Colony, East Africa by Dr. L. S. B. Leakey <sup>(2)</sup>. This skull is definitely larger (1450 cc.) than the Katanga specimen but it is of the same relatively narrow form, the cephalic index being under 70. The relative width

<sup>(1)</sup> SMITH, G. ELLIOT (1905), Notes on African Pygmies. (*Lancet*, Aug. 12, 1905.)

<sup>(2)</sup> LEAKEY, L. S. B., Stone age Man in Kenya Colony. *Nature*, vol. 120, p. 85, 1927.

of the nose is much the same as in the Katanga specimen, the respective nasal indices being 51 and 52.

A male skull found at the Elmenteita I site (Kenya) is very similar in size and proportions to the Nakuru specimen and has the same relatively elongated face. The nose is relatively narrower, however, and the palatal vault is only of moderate height. One of the male skulls found at Gamble's cave in East Africa by Leakey though also larger than the Katanga skull is of much the same type, showing a cephalic index of 69 and a relatively long face, mainly sub-nasal. The skull found in 1914 by Dr. Reck further south at Oldoway <sup>(1)</sup> in the same valley in German East Africa (now Tanganyika Territory) is very similar to the skull from Gamble's cave. Its cephalic index is under 69 and the face, especially the sub-nasal region is exceptionally long. These skulls are not skulls of pure negroes but are usually considered to be negroids or Hamites. Sir Arthur Keith looks on the Oldoway type to which he assigns Elmenteitan man and Gamble's cave man as a proto-Hamite <sup>(2)</sup>.

To sum up : the skull is that of a negro of recent date, probably later at least than the 12th. century A. D. While it presents some characters which suggest that it is male, its small size, and certain other features suggest that it may be female. It is one of those specimens not infrequently found in collections of negro skulls which cannot be sexed easily or with certainty from the skull alone; the characters of the pelvic part of the skeleton which was, as mentioned, found but not preserved would have established the sex definitely. The existence of two supernumerary molars and the unusually large size of the foramina, especially the infraorbital, are noteworthy peculiarities.

In its general features the skull is more nearly allied to the East African than to the West African type of negro. Its similarity to the skull of the female Teita negro from the Teita hills in Kenya and the resemblance to some skulls from the southern part of the Sudan have been emphasised.

It is not improbable from the circumstances in which the skeleton was found that it may have been the remains of a slave and may easily have been a captured member of a tribe located at some distance from Katanga, even possibly as far distant as the Teita hills in Kenya or the Nuba hills in the south of the Sudan.

One item of evidence not connected with the skull which has an important bearing in establishing the fact that the skull is of comparatively recent origin,

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<sup>(1)</sup> MOLLISON, TH. and GIESLER, W. (1929), Untersuchungen über den Oldoway Fund. (*Verhandl. Gesell. für physisch. Anthropol.*, vol. 111, p. 50, quoted from KEITH's, *New Discoveries relating to the Antiquity of Man*, p. 159.)

<sup>(2)</sup> KEITH, SIR ARTHUR, *New Discoveries relating to the Antiquity of Man*, p. 169, 1931. Williams and Norgate, London.

at least of no great antiquity, i. e. within the last five or six hundred years, is the fact that the leash of dried fibres forming the core of the wire bracelet which encircled the forearm bones of the skeleton when it was excavated is still well-preserved and intact and that their vegetable nature and origin can easily be recognised by identification of the cellular structure under the microscope. Bracelets or bangles of the type described with a covering of bronze wire dating from the 9th. to the 12th. century A. D. have been found in Northern Rhodesia; on the other hand similar bracelets are worn in Central Africa at the present day. It may be mentioned that chemical analysis of the wire shows it is composed of 99.5 per cent of copper with traces of zinc and iron but no tin <sup>(1)</sup>.

TABLE 1.

## Measurements of Principal Characters of the Katanga Skull.

CHARACTER.	SYMBOL.	MEASUREMENT.
Cubic capacity... ..	C	1150.0 cc
Glabello-occipital length ... ..	L	176.0 mm
Ophryo-occipital length... ..	F	174.0
Maximum parietal breadth... ..	B	121.0
Minimum frontal breadth ... ..	B'	94.0
Basio-bregmatic height... ..	H'	134.5
Auricular height ... ..	OH	109.5
Basi-nasal length ... ..	LB	98.0
Transverse arc... ..	Q'	293.0
Sagittal arc ... ..	S	356.0
Frontal arc... ..	S <sub>1</sub>	126.0
Parietal arc ... ..	S <sub>2</sub>	125.0
Occipital arc ... ..	S <sub>3</sub>	105.0
Frontal chord ... ..	S <sub>1</sub> '	111.0
Parietal chord... ..	S <sub>2</sub> '	112.5
Occipital chord... ..	S <sub>3</sub> '	92.0
Horizontal circumference ... ..	U	483.0
Facial height ... ..	GH	128.0
Upper facial height... ..	G'H	76.5
Alveolar height... ..	PH	27.5
Bimalar facial width ... ..	GB	94.0
Bizygomatic breadth ... ..	J	122.0
Facial depth ... ..	GL	94.5

<sup>(1)</sup> Analysis made by Prof' H. Van de Walle (Brussels' University).

TABLE 1 (continued).

CHARACTER.	SYMBOL.	MEASUREMENT.
Nasal height (R) ... .. .	NHR	49.0
Nasal height (L) ... .. .	NHL	49.0
Nasal height (Mid)... .. .	NH'	49.0
Nasal breadth... .. .	NB	25.5
Dachryal chord ... .. .	DC	20.9
Dachryal subtense ... .. .	DS	9.1
Dachryal arc ... .. .	DA	30.0
Simotic chord ... .. .	SC	7.7
Simotic subtense ... .. .	SS	1.5
Orbital width (R) ... .. .	O <sub>1</sub> R	42.0
Orbital width (L) ... .. .	O <sub>1</sub> L	41.0
Orbital width (dachryal) ... .. .	O <sub>1</sub> 'R	40.0
Orbital height (R) ... .. .	O <sub>2</sub> R	35.0
Orbital height (L) ... .. .	O <sub>2</sub> L	34.0
Inner biorbital breadth... .. .	EOW	105.5
Palatal length (1) ... .. .	G <sub>1</sub>	51.0
Palatal length (2) ... .. .	G <sub>1</sub> '	46.0
Palatal width ... .. .	G <sub>2</sub>	34.5
Palatal height ... .. .	EH	17.8
Length of foramen magnum ... .. .	fml	36.5
Breadth of foramen magnum ... .. .	fmb	27.5
Cephalic index (1)... .. .	100 B/L	68.8
Cephalic index (2)... .. .	100 B/F	69.5
Altitudinal index ... .. .	100 H'/L	76.4
Height-breadth index ... .. .	100 B/H'	90.0
Acroplatic index ... .. .	100 (B—H') LL	—7.7
Height-auricular height index ... .. .	100 OH/H'	81.4
Upper facial index (1) ... .. .	100 G'H/GB	81.4
Upper facial index (2) ... .. .	100 G'H/J	62.7
Gnathic index ... .. .	100 GL/LB	96.4
Nasal index (R) ... .. .	100 NB/NHR	52.0
Nasal index (L) ... .. .	100 NB/NHL	52.0
Nasal index (I) ... .. .	100 NB/NH'	52.0
Dachryal index... .. .	100 DS/DC	43.5
Simotic index ... .. .	100 SS/SC	19.5
Orbital index (R) ... .. .	100 O <sub>2</sub> R/O <sub>1</sub> R	83.3
Orbital index (L) ... .. .	100 O <sub>2</sub> L/O <sub>1</sub> L	82.9

TABLE 1 (continued).

CHARACTER.	SYMBOL.	MEASUREMENT.
Orbital index (dachryal) ... ..	100 $O_2R/O_1'R$	87.5
Palatal index ... ..	100 $G_2/G_1$	64.7
Palatal height index ... ..	100 $EH/G_2$	51.6
Foraminal index ... ..	100 $fmb/fml$	75.3
Profile angle ... ..	< P	83°0
Nasial angle ... ..	< N	63°5
Alveolar angle... ..	< A	70°0
Basilar angle ... ..	< B	46°5
Basio-nasal horizontal angle ... ..	< $\theta_1$	33°5
Basio-alveolar horizontal angle... ..	< $\theta_2$	13°0
Occipital index... ..	$100 \frac{S_3}{S_3'} \sqrt{\frac{S_3}{24(S_3 - S_3')}}}$	66.2
<b>Mandible.</b>		
Bicondylar width ... ..	$w_1$	110.0 ?
Bigonial width... ..	$g_o g_o$	92.5
Bicoronal width ... ..	$c_r c_r$	86.0
Intermental width ... ..	zz	44.0
Condylar length ... ..	$c_p l$	19.0 (rt.)
Mandibular length... ..	ml	111.0
Mandibular body length ... ..	$c_p l$	85.0
Least rameal width... ..	rb'	37.5
Molar-premolar length... ..	$m_2 p_1$	28.5
Symphysial depth ... ..	$h_1$	33.0
Mandibular body depth ... ..	$m_2 h$	31.0
Coronial height... ..	$c_r h$	72.0
Rameal length... ..	rl	67.5
Mandibular angle ... ..	< M	116°0
Rameal angle ... ..	< R	72°0
Symphysial angle ... ..	< C'	68°0
Mandibular length-coronial height index ... ..	100 $c_r h/ml$	64.9
Mandibular length-bicoronal width index ... ..	100 $c_r c_r/ml$	77.5
Body length-bigonial width index ... ..	100 $g_o g_o/c_p l$	108.8
Bicoronal-bigonial index ... ..	100 $g_o g_o/c_r c_r$	107.6
Rameal length-width index... ..	100 $rb'/rl$	55.6

TABLE 2.

Comparison of Principal Cranial and Facial Measurements  
of the Katanga Skull and a Female Nuba Skull.  
(N<sup>o</sup> 17.0852 Royal College of Surgeons Museum).

Cranial Characters.	Katanga skull.	Nuba ♀ (17.0852)	Cranial Characters.	Katanga skull.	Nuba ♀ (17.0852)
C	1150.0 cc	—	NB	25.5 mm	27.0 mm
L	176.0 mm	177.0 mm	PH	27.5	27.0
B	121.0	126.0	O <sub>1</sub> R	42.0	40.0
B'	94.0	94.0	O <sub>2</sub> R	35.0	32.0
H'	134.5	134.5	G <sub>1</sub>	51.0	—
Q'	293.0	296.0	G <sub>1</sub> '	46.0	45.0
U	483.0	492.0	G <sub>2</sub>	34.5	40.0
S	356.0	363.0	100 B/L	68.8	71.2
GH	128.0	116.0	100 H'/L	76.1	76.0
G'H	76.5	69.0	100 G'H/GB	81.4	70.8
GB	94.0	97.5	100 G'H/J	62.7	56.6
J	122.0	122.0 ?	100 GL/LB	96.4	101.1
LB	98.0	94.0	100 NB/NHR	52.0	58.1
GL	94.5	95.0	100 O <sub>2</sub> R <sub>1</sub> O/R	83.3	80.0
NHR	49.0	46.5	100 G <sub>2</sub> /G' <sub>1</sub>	75.0	88.9

Mandibular Characters.	Katanga skull.	Nuba ♀ (17.0852)	Mandibular Characters.	Katanga skull.	Nuba ♀ (17.0852)
W <sub>1</sub>	110.0 ?	107.0 ?	g.g.	92.5 ?	89.0 ?
W <sub>2</sub>	98.0	93.0	zz	44.5	46.5
C <sub>r</sub> C <sub>r</sub>	86.0	89.0	rb'	37.5	32.0