

The African Pygmies

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The student of human races recognizes various sources of differences in racial phenotypes. These include (1) heredity, (2) environment in the widest sense, involving climate and food (3), mutations. The limits of environmental effects on racial characters are but little known; and the effects produced by persistent lack of certain food elements, minerals or vitamins are still obscure, although a few remarkable effects on animals are already known.

It is well recognized that all races are mixed, in the sense of being heterozygous for many genes, and that gene frequencies vary from population to population. The study of race crossing is therefore one of the methods by which the origin of racial differences can be determined, and it is now recognized that various races or populations of man and various species of animals and plants have arisen from the crossing of previous forms. The analysis of racial crosses is complicated by the fact that racial characters appear to be based entirely on multiple genes (Gates 1956), while the abnormalities which occur in all races and which constitute the basis of medical genetics, almost without exception are based on single mutations (Gates 1946). Moreover, while these single mutations can generally be classified as dominant, recessive or sex-linked, although dominance is generally incomplete; yet it appears that the multiple factors, which may frequently be multiple alleles, are simply cumulative in their effects, so that the conception of dominance has to be discarded in relation to them.

The blood groups form a third group of genes, standing in many respects between the other two. Like the pathological mutations they show dominance, but like the genes which control physical racial characters they are generally in multiple series. They are of great value in the study of racial crosses, as they furnish contributory evidence of the make-up of the hybrid race. Their value is equally great as an indication of the relationships between races on the same continent. There is evidence that the primary races of man (White, Black, Yellow) differ greatly in certain fundamental blood group genes, and it now appears that these genes rarely undergo mutations.

Material

In a study of African races, made in 1955 with the aid of a grant from the Wenner-Gren Foundation for Anthropological Research, a visit was made to a group of Pygmies at Bundibugyo in Western Uganda. They inhabit a tongue of the Ituri forest

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in the foothills of the Ruwenzori range extending from the Belgian Congo, and they apparently agree entirely with the *Efé* Pygmies. Their location is 43 miles West of Fort Portal over a road of spectacular beauty winding through the low mountain levels. The road is so narrow that there is no room to pass at the innumerable turns and hairpin bends, which are often at sheer precipices, so all motor traffic must go westward in the morning and eastward in the afternoon, to avoid the necessity of passing which would be dangerous and in many places impossible. Further west is the Semliki River, which flows from Lake Edward northwards to Lake Albert.

Measurements were obtained of six adult Pygmies in this colony, as shown in Table I. They include the chief and his two wives. There were many children, and this group of nineteen were living together in two simple grass and banana leaf shelters on the edge of a clearing in the forest. They had bows and arrows for sale, but had apparently given up hunting. The chief and another Pygmy wore shirts and were very sophisticated.

Additional observations on the individuals in Table I are as follows. 1. Chief Ulangama, ears medium size, offset; nostrils broad, hair woolly, moustache and small beard (Fig. 1). 2. Kamarampaka, head shaved, heavy brow ridges, projecting zygoma, nostrils broad, pointed jaw, very marked occipital "bun" (Fig. 2). 3. Zaremba, very broad nostrils, lips slightly thick, hair woolly. 4. Amabingingo, hair black, peppercorn to woolly (Figs. 3, 4). Sister of Amabingingo, full Pygmy nose, lips markedly thick, hair woolly (Fig. 5). 6. Torbo, wife of the chief; near black, tufted hair, in short ringlets, nostrils broad, lips slightly thick, chin pointed, ears small. Note tattoo marks on cheeks by nose (Figs. 6, 7). Fig. 8 is a photograph of Kizabangi, a boy two years old, to show the hair, which was brick-red in colour and in ringlets like Fig. 7 but much longer. I was informed that this was natural; that it would be cut off later, when it would then become black and woolly. But there is reason to believe that the red colour at least is the result of a protein-deficiency disease common in Uganda and other tropical countries and known as Kwashiorkor. A younger brother had the same long ringlets of red hair.

From Table I it will further be noted that the females have shorter and relatively broader heads than the males, the ears are small, generally with a small lobe or none, the skin colour is rather uniformly a light mahogany, the nose is generally very depressed at the base and in shape the characteristic button nose of the Pygmy, the stature being about 4 1/2 feet. The hair is most frequently woolly like the Negro, but may be peppercorn, at least in part, or tufted (Gates 1957). All had full temples and the head in top view showed little departure from ovoid form. No clear differences were observed from the Bambuti or *Efé* Pygmies as described by Schebesta (1938), Gusinde (1942) and others. No. 2 had heavy brow ridges and a very marked occipital "bun" supposed to be common in the Bantu.

The recording of skin colour has long been a matter of much difficulty, as the artificial colour charts previously in use do not correspond with the natural shades. The Gates (1949) colour chart was constructed as follows: A series of 8 colours, each one representing accurately the skin colour of an individual of mixed Negro-white

descent, were painted on canvas by a portrait painter. A firm skilled in colour reproduction then duplicated these colours on paper by a process involving the mixing of inks. Scientifically exact results were obtained by using a spectrophotometer to determine the correct wave lengths in every part of the spectrum for each of these colours.²

This set of colours has been used in recording the skin colours in many families of Negro-White descent in which segregation for skin colour was taking place. The results led to a hypothesis of three very unequal factors (genes) for skin colour (Gates 1953). It is of great interest that these colours are frequently exactly duplicated in the study of the skin colour of very different races. Thus in Table I the skin colour of six Pygmies was found to be nearly uniform and to correspond in all to No. 3 of the chart, but somewhat less red. Skin colour of Pygmies has been recorded in a variety of terms by different observers, but "light mahogany red" appears to be a suitable descriptive term in the large majority of cases.

General body skin colour is more uniform, and hence more easily determined, than the face, which is frequently more or less variegated, with high-lights and darker depressed areas, especially in those of mixed descent.

The necessity of accurate reproduction of skin colours for various purposes has led to the reproduction of Figs. A, B, C, D and in colour. They were taken by my wife in Kodachrome, using a Zeiss Contaflex Camera. Fig. A shows a group of ten Pygmies, adults and children in the camp at Bundibugyo. Two of these children have red hair, which will be referred to shortly. In Fig. B the group consists of Mrs. Ruggles Gates holding a Pygmy baby, and the mother, with the framework of a new shelter in the background. Fig. C is reproduced in colour to show on a larger scale the red hair in long ringlets of one child in contrast to the normal black hair of the other. Occasional cases of red hair in Pygmies have been referred to by earlier travellers and investigators. For example Johnston (1902 p. 530) refers to a peculiar "tendency on the part of the head-hair to be reddish", and Trilles (1932) cites a young Pygmy woman who had a brick-red skin and reddish brown hair. Schebesta also saw a reddish tinge of the hair in Aká. This condition is now recognized as pathological. Occurring in the natives of tropical countries, it is a symptom of a disease known as kwashiorkor, and is believed to be a result of deficiency of protein in the diet. The brickred hair colour is the most characteristic symptom. In Uganda and the Congo region bananas, which are a staple food, are known to be deficient in protein. However, although the disease has been much investigated, there is still much to learn about this condition.

The Baamba

I wish now to contrast with the pure Bambuti Pygmies a tribe known as Baamba, Bwamba, Amba or Wambas, living in the region of Fort Portal and also at Bundi-

² Copies of this coloured plate, which is the frontispiece to a book (1949), can be obtained from the author by payment of the postage only.



Fig. 1 - Pygmy Chief at Bundibugyo. Age 62 years.



Fig. 2 - Kamarampaka, age 65, head shaven.

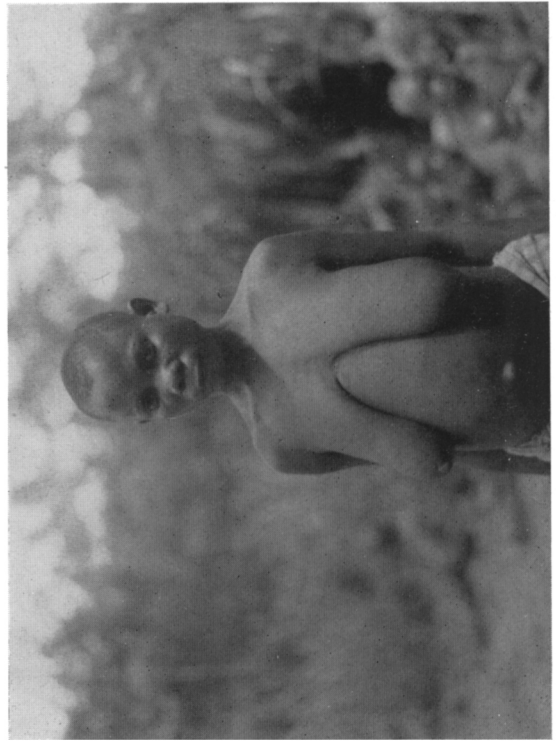


Fig. 3 - Amabingo, age 29 years.

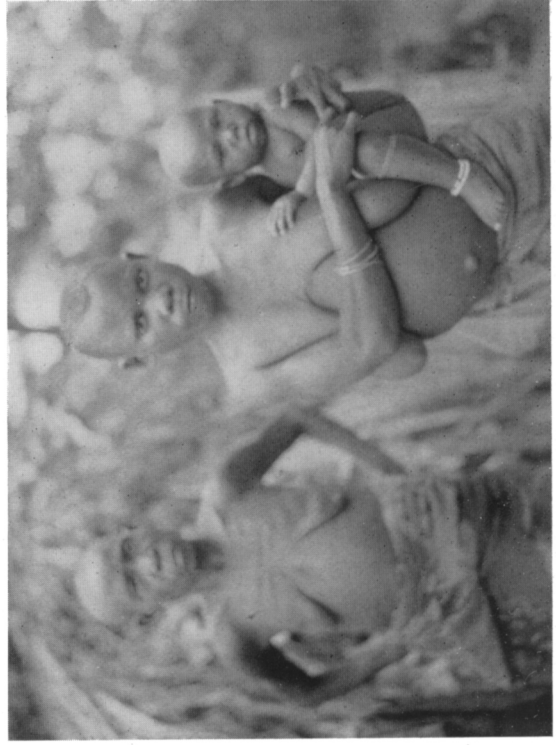


Fig. 4 - Amabingo, her mother and child.

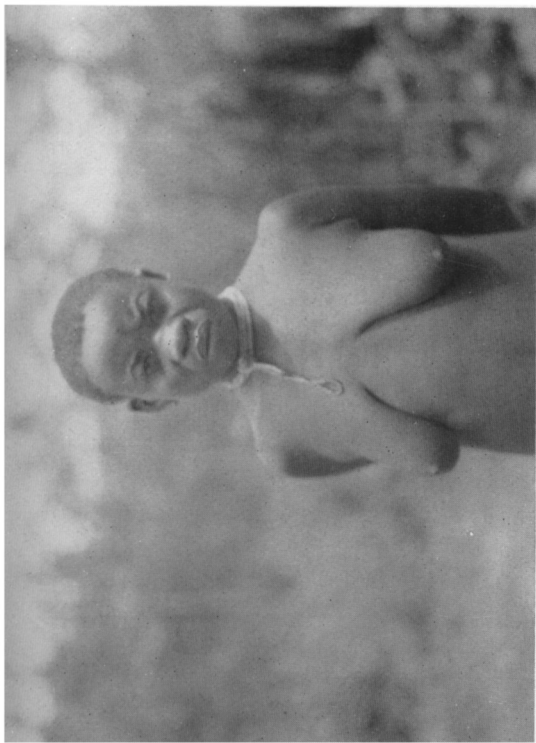


Fig. 5 - Sister of Amabinggo, age 35 years.

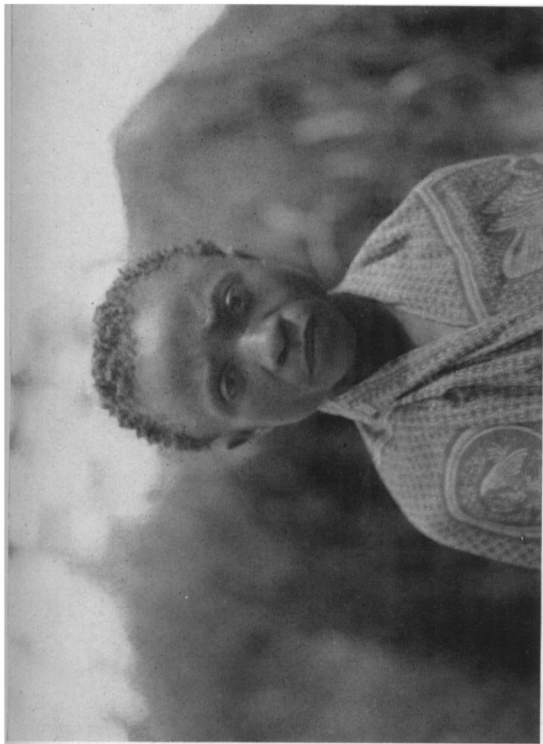


Fig. 6 - Torbo, a wife of Chief, in front view.

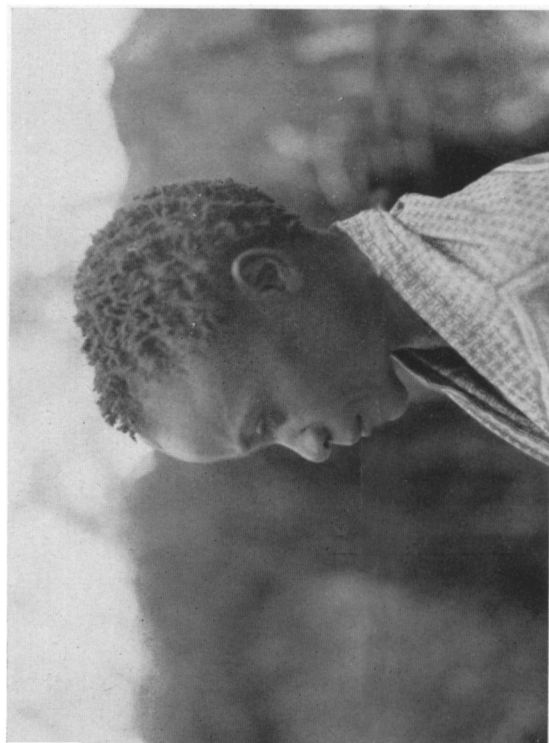


Fig. 7 - Same in side view. Hair tufted in short ringlets.



Fig. 8 - Kizabangi, male child 2 years old. Hair in long ringlets, result of kwashiorkor.

Table I - Pygmies at Bundibugyo, Western Uganda

Age	L	B	C.I.	Ears		Lobe	Eyes	Skin	Height	Nose	Brow ridges
				L	B						
1. ♂ 62	193.	140	72.5	61	32.3	lobe	4 ³	3 less red ⁴	c. 4'8"	v. depressed	Projecting laterally
2. ♂ 65	190	147	77.4	59.7	35.1	small	4	4	4'6"	depressed	heavy
Means	191.5	143.5	74.95	60.35	33.2 ⁵	—	—	—	4'7" = 137 cm.	—	—
3. ♀ 32	176	135	76.7	56.2	30.1	none	2	3 less red	—	fully depressed	none
4. ♀ 29	177	136	76.8	53.2	30.1	none	—	3 less red	4'6½"	¾ depressed	slight
5. ♀ 35	176	141	80.1	58.4	32.0	v. slight	3	3 less red	c. 4'6"	depressed	none
6. ♀ 40	174	143	82.2	49.3	29.6	small	3	3 less red	4'4½"	depressed	slight
Means	175.7	138.7	78.94	54.3	30.5	—	—	—	4'6" = 135 cm.	—	—

³ Using Martin's Augenfarbentafel.

⁴ Using the Gates skin colour chart.

⁵ Johnston (1902) measured the ears of 6 males, the mean size being 56.8 x 32.3 mm. His means for head dimensions were L = 186.6, B = 146.8, C.I. 78.7, bizygomatic breadth 134.5.

Table II - Bwamba at Bundibugyo and Fort Portal

Age	L	B	C.I.	Ears		Lobe	Eyes	Skin	Height	Nose	Brow ridges
				L	B						
1. ♂ 48	184	146	79.3	55	33.4	small	3	2 less red	5'1"	depressed	none
2. ♂ 35	184	145	78.8	56.2	32.8	small	1	1	5'6¼"	¾ depressed	slight
3. ♂ 32	189	142	75.1	54.3	33.7	v. small	2	2	5'6½"	½ depressed	—
4. ♂ 46	197	145	73.6	71.1	41.4	lobe	2	2	5'4¼"	¾ depressed	none
5. ♂ 38	185	142	76.6	61	35.0	lobe	3	2	5'2½"	½ depressed	small
6. ♂ —	182	147	80.8	63	34.5	none	2	2	—	¾ depressed	none
7. ♂ old	182	149	81.9	69.5	42.4	lobe	3	3	4'10"	½ depressed	none
Means	186.1	145.1	78.01	61.4	36.2	—	—	—	5'3" = 157.5 cm	—	—

bugyo, where there is also a large Bantu population. Generally they are six inches to a foot taller than the Pygmies, and with very different features; they seem to have been derived from crosses of Efé Pygmies with a tall race of people. Their hybrid origin is emphasized by the wide variation in some at Bundibugyo, although there is a type, especially in the Fort Portal area, with remarkably uniform features. Observations on the Baamba are recorded in Table II. Only males were studied.

Additional observations on these men were as follows: 1 Mbay, head shaven, wrinkled brows, temples full, nostrils broad, lips thick, alveolar prognathism, ears small (Fig. 9). 2 Fremon, hair black, woolly, slight brow ridges, scaphoid, lips very thick, skin black, chin broad, nose pygmoid, ears small; very negroid (Fig. 10). 3. Batigai, hair black, woolly; slightly scaphoid, projecting occiput, lips thick, skin dark, nose less pygmoid, ear small, with very small lobe. The wrinkled brows are very characteristic of the Baamba (Fig. 11). 4. Babugorli, hair near black, woolly, retreating at the sides of the forehead, temples slightly depressed, nostrils broad, chin broad, lips \pm thick, *ears large* with a lobe, moustache and small beard. Note the scarified breast pattern (Fig. 12). 5. Kazaki, hair \pm peppercorn, temples \pm depressed, forehead bulged, zygoma prominent, lips \pm thick, ears medium, with lobe (Fig. 13). 6. He swept the walks at the Fort Portal Hotel; short stature with higher C.I., ears medium, lobe attached to cheek, lips thin, no brow ridges, no "bun", scaphoid, nostrils intermediate, zygoma prominent, brows wrinkled, small moustache (Fig. 14). 7. Old man who brought wood to the Hotel, hair woolly, greying, ears large, with big lobe, no brow ridges, eyebrows black; scaphoid, lips not thick, zygoma prominent, no "bun", chin rather pointed, nostrils rather broad, wrinkled brows (Figs. 15, 16).

The great advance which has taken place in the civilization of the Baamba may be judged from the account of a missionary (Lloyd 1899). He found the "Bamba" on the west side of the Mountains of the Moon (Ruwendzori). They were wild and ignorant, practically nude, with the nose pierced. The women wore heavy iron neck rings; the men and some of the women sharpened their teeth to points. The Baamba warriors carried spears⁶.

The relationship of the Baambas to the Pygmies seems evident, but they differ markedly in many respects and cannot be classed in the same race. The great variety of facial features (cf. Figs. 9 to 16) shows their hybrid origin. Their greater height, about a foot taller than the Pygmies (the statures not overlapping in these short series) indicates that one of the parent races was Pygmy. The thick lips especially show Negro ancestry. Thus we may conclude that the Baambas are a hybrid race⁷ resulting from crosses between Pygmies and Bantu. The great variability still present indicates that their origin is relatively recent. No. 2 (Fig. 10) might represent a back-cross to the Bantu, but he has a Pygmy nose combined with Negro lips and shows the extreme condition of both these racial features. He may therefore be a recom-

⁶ Winter (1956) has recently published a social study of the modern Bwamba.

⁷ Gayre (1954) suggests the term "racial-breeds" for races of hybrid origin, in which he includes the East Baltic, Alpine, Dinaric and Armenoid sub-races.

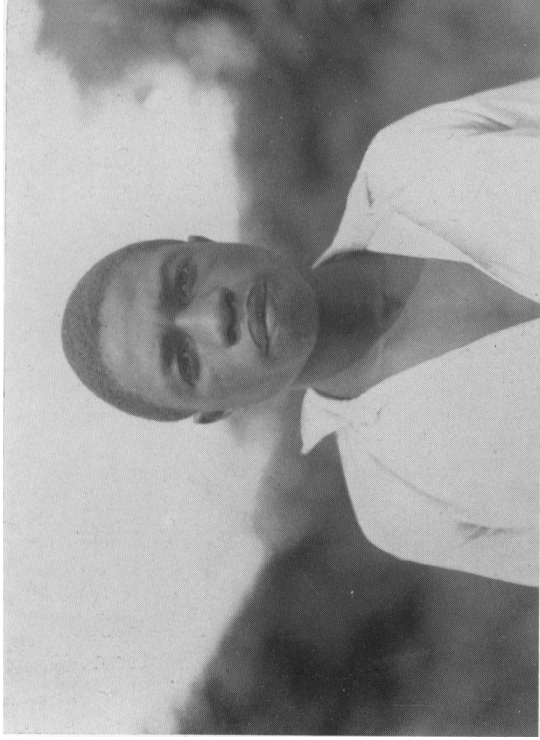


Fig. 10 - Fremon, 35 years old. Scaphoid skull, everted lips, hair woolly.

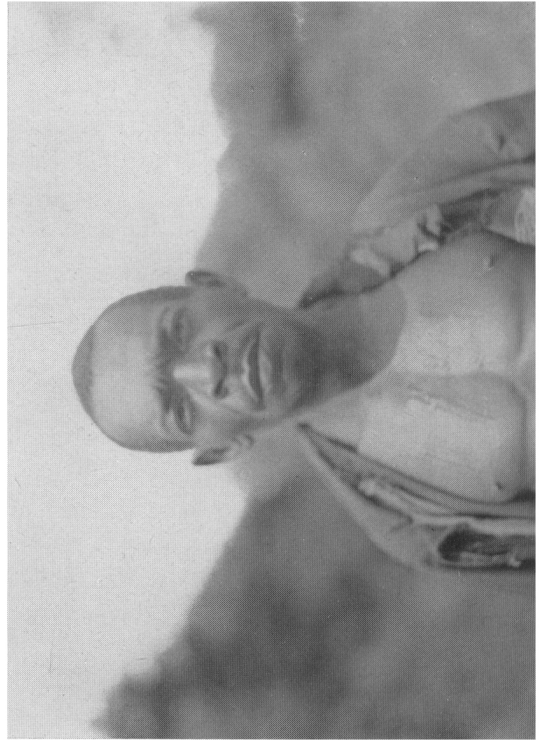


Fig. 12 - Babugorli, ca. 46 years old, breast scarified in a pattern.



Fig. 9 - Mbay, 48 years old.

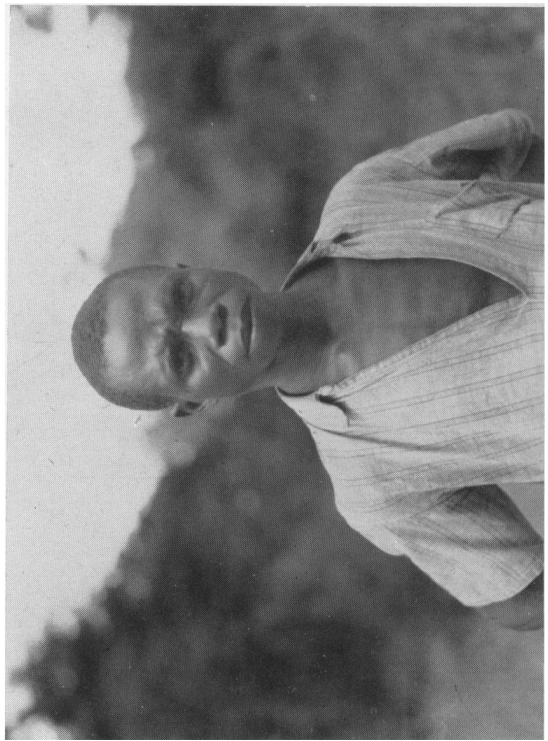


Fig. 11 - Batigai.

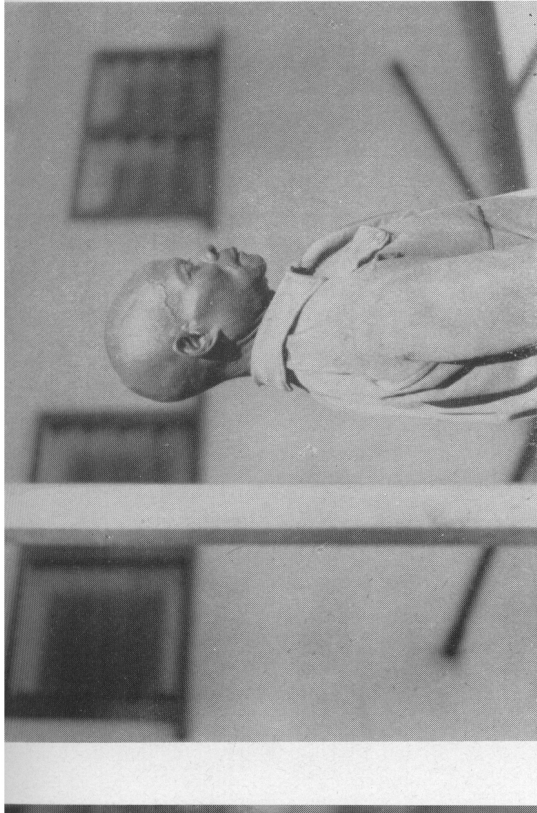


Fig. 14 - Bwamba at Fort Portal, head shaven.

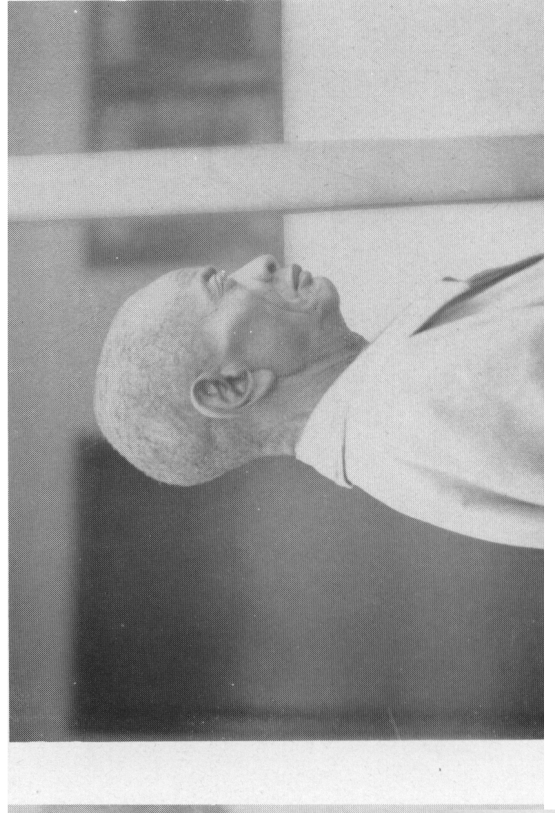


Fig. 16 - Same in side view.

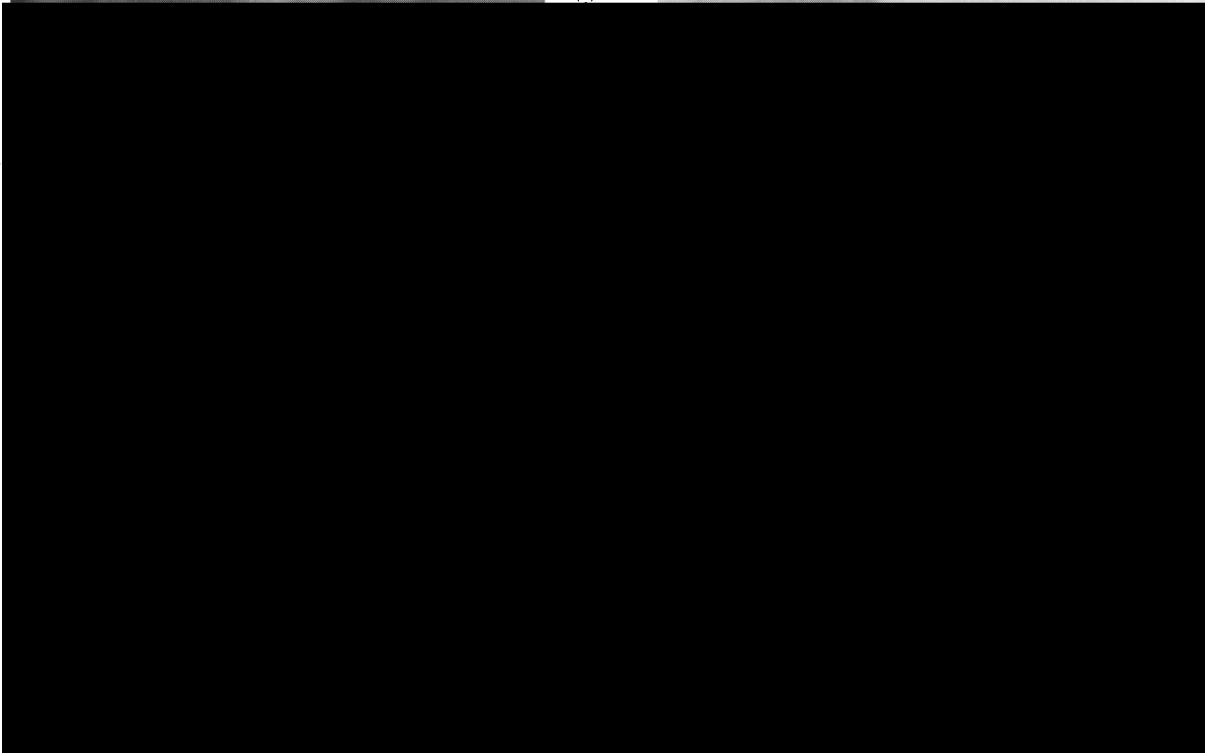


Fig. 15 - Bwamba at Fort Portal, old man, front view.

bination of Pygmy and Bantu characters. This is not unlikely when we remember that each racial character appears to be based on a small number of genes. Notwithstanding this wide variability, there appears to be in the population a more stabilized type represented by Figs. 9 and 14-16. The alert features and wrinkled brows appear to be particularly characteristic of this inner group.

The Baambas⁸ differ clearly from the Pygmies as follows: (1) taller, 157.5 cm ♂ : 137 cm ♀. (2) large ears in some, with a large lobe. This feature cannot come from the Negro race, and perhaps derives from a Europoid source. Czechanowski (1922) states that the Babira Negroes in this region (Irumu) have big ears.

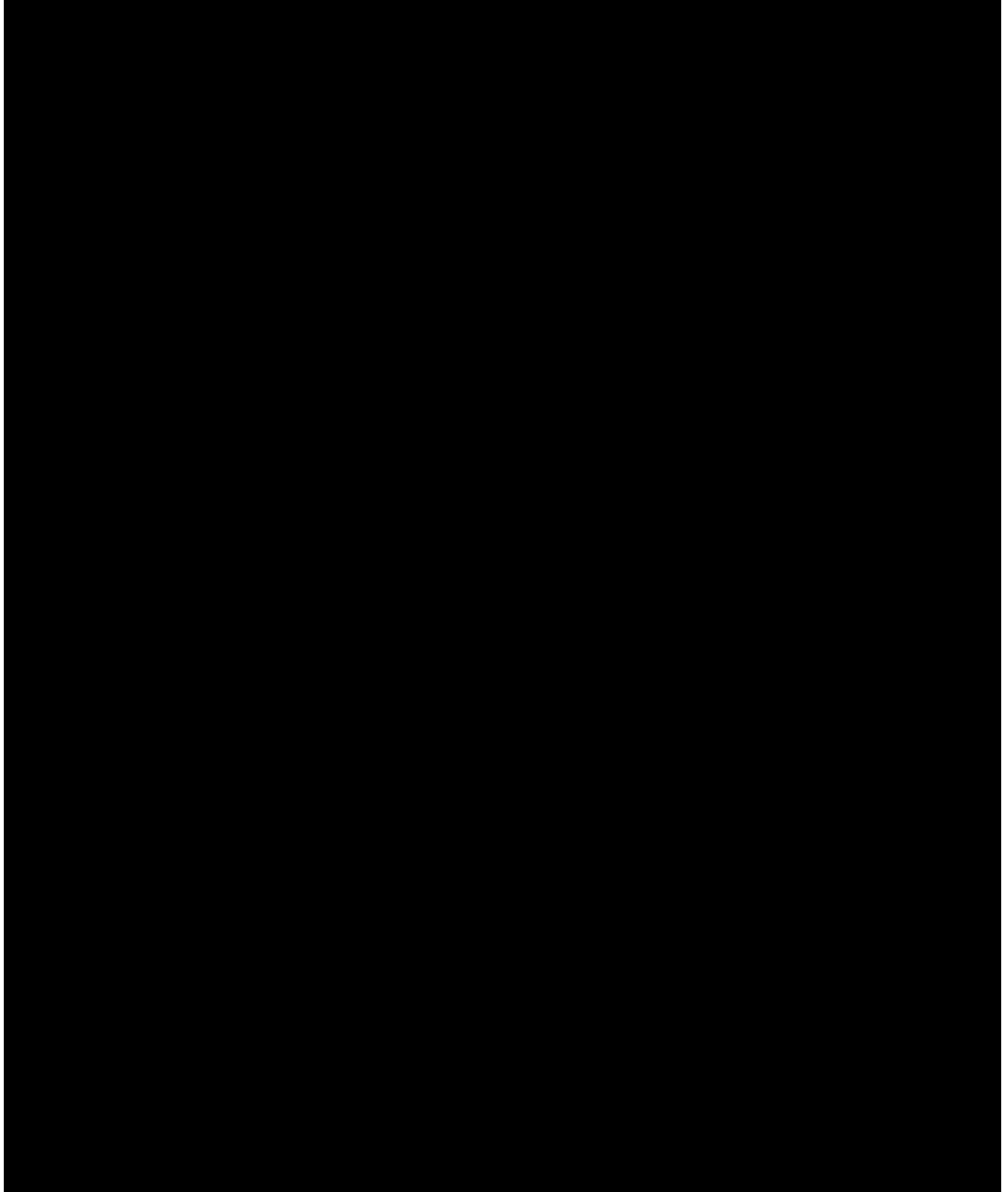
(3) The higher C.I. would not be expected from a cross with Bantu, unless two dolicho- or mesocephals can produce a brachycephal. In two of the women the C.I. is over 80. (4) The Baambas have darker eyes and (5) darker skin. Their skin colour frequently fits *exactly* No. 2 of the Gates colour chart, i.e., they are a shade darker in reddish colour than the Pygmies. (6) The more or less thickened lips in nearly all is evidently a direct derivative from the Bantu. (7) There is more alveolar prognathism, another Bantu character. (8) Some heads show more or less marked scaphocephaly, the source of which is not evident. (9) The hair is more woolly than the Pygmies, again indicating Bantu ancestry. (10) The wrinkled brows and distracted look of the Baambas is too strikingly in contrast with the open features of the Pygmies to be overlooked. The Baamba head-shape in top view is ovoidal like that of the Pygmies.

Czechanowski (1922) found the Baamba extending from the Semliki river eastwards to Long. 30° E. (i.e., Fort Portal), with some Pygmy colonies in the same area. He visited 47 huts in six villages of Baamba between Fort Portal and Beni. They had no cattle, but goats, fowls, dogs and a few sheep. On the basis of language, Stuhlmann (1894) regarded them as a mixture of Bakodjo and Babira Forest Bantu. Johnston (1902) placed them between the eastern and western Bantu. Czechanowski says they regard themselves as autochthonous, formerly occupying a wider area and being displaced later by the incoming Bambuba and Bakondjo Negroes. He thinks they were formerly further south, and was at first inclined to unite them with the Babira Negroes. Their origin as Pygmy mixtures with Bantu seems too clear to be doubted, and as already mentioned, they appear to be of relatively recent origin.

Relations of racial types

In addition to the Pygmies, anthropometric measurements have been made of many neighboring peoples in Central Africa. The work of Czechanowski (1922) was most extensive, but Oschinsky (1951) has recently measured many tribes, chiefly in Uganda, and derived indices for head, trunk and limb measurements, comparing also the work of previous authors in adjacent areas. He uses the terms Bantomorph (Bantu)

⁸ It should be pointed out that the prefix Ba with which all these tribal names as well as the Bantu themselves begin, is simply the method of plural formation in Bantu languages, the corresponding singular being generally Ma.



Hamitomorph (North East African peoples and tribes of mainly Hamite descent, such as the Bahima of Uganda and the Batutsi of Ruanda-Urundi), Nilotomorphs (the tall, stork-like people of the Nile in the Sudan, and such Uganda tribes as the Lur, Madi and Acholi), Nilohamitomorphs (Nilotes with more Hamite ancestry, such as the Teso in Uganda and the Masai in Kenya), and the Bambutomorphs including the Pygmies and pygmoids). In height for instance, the Batutsi means of different authors range from 180.1 to 172 cm., the Baganda ca. 166.7, the Baamba (Czechanowski) 159.4, Batwa 159.7, Babinga 155, Aka Pygmies 142.9, Ituri Pygmies (Gusinde) 144 cm. The cephalic indices are consistent with these great differences in stature, the tall Nilotes having a C.I. 70.6 - 72.8, the Bantu 73.7 to ca. 77, the Pygmies and pygmoids ca. 77 - 79. The dwarfs thus approach closely to brachycephaly.

The Bambuti or Efé Pygmies are roughly surrounded by a zone of pygmoids⁹ extending east and south to Lake Kivu and far to the west. The Baamba are one of these. It is a curious fact that although the Congo Pygmies, and especially those of the Ituri forest, are now well known through the work of Schebesta and Gusinde, yet evidence of the West African Pygmies was brought to Europe some 250 years earlier, although relatively little is now known of these Western Pygmies. In Purchas *His Pilgrimes* (1625) is included the remarkable adventures of Andrew Battell, who described a little people "no bigger than Boyes of twelve years old" on the River Ogoue (Ogooué) in the modern French Gabon. Dapper (1686) described similar dwarfs in Lovango (modern Loango) in southern Gabon. Hamy (1879) refers to these and other records of West African Pygmies. He introduced the term Negrilles for the Pygmies, in contrast to the Negritos of southeast Asia. DuChaillu (1867) encountered the Obongo dwarfs in the Gabon country south of Cape Lopez and inland. The height of six women ranged from 4 feet 4 $\frac{1}{4}$ inches to 5 feet $\frac{1}{4}$ inches and one man was 4 ft. 6 in. tall. There was much early discussion of the brachycephaly of the Pygmies in contrast with the dolichocephaly of the Negro¹⁰.

⁹ Fischer (1954) objects to the use of this term on the ground that the -oid ending is also used in another anthropological sense. This objection can be overcome by not using a capital.

¹⁰ As evidence of the former existence of Pygmies on the Ivory Coast, Jacquier (1935) says the Guéré natives speak of wild people of low stature in the forest, who live like chimpanzees, feeding on fruits, making inarticulate cries like monkeys and raiding villages at night when pressed by hunger. They were called Mohin-Goués (= like chimpanzees). Strikingly small stone axes have been found, which are attributed to dwarf people. Roubaud (1935) adds that in 1912 a young native of Abidjan, on the coast, told him that in the great forest of the Ivory Coast were little men with a light skin, living in trees like monkeys. One of them was captured by the native's grandfather and taken to a village on the coast. But he was savage and refused to eat, so he was set free.

Schnell (1948) cites traditions of Pygmies, especially in the west of the Ivory Coast. Portuguese navigators in the 16th century reported, on the coast of Sierra Leone, Negroes with hairy bodies, which others found to be real Pygmies. In 1902 they were called Béré, the tallest being scarcely 150 cm. high. These were identified with the Bellé of present Liberia. Chevalier in 1909 reported Béré pygmoids in a state of semi-slavery in the Nzo region. In 1924 Tauxier saw pygmoids in Gagou and Gouru regions having a mean height of 155 cm., weight 42 Kg., the shortest female being 133 cm. An old man, 165 cm. high, had a very big head, hairy body, lips everted and broad nose, the photo showing Pygmy ancestry, as also in another of mixed descent. There is thus clear evidence of métissée remnants of Pygmies in the Ivory Coast and adjacent parts of Liberia.

Vallois (1940), in an important modern study, classifies the Pygmies (Negrillos) into three groups: (1) the (Eastern) Bambuti in the Ituri basin, (2) the (Central) Batwa in the basin of the Belgian Congo, (3) the (Western) Babinga in French Equatorial Africa and the Cameroons. Still further west, in Spanish Guinea, Castillo-Fiel (1948, 1949) gives an account of the Bayales, a pigmy tribe isolated on an island in the Rio Campo in the former German Cameroons. Their mean stature was 146 cm, the women much shorter than the men. The height of the latter ranged from 137.5 to 163.1 cm, thus clearly showing segregation in crosses with Negroes. Still further north the Bagielli in the Cameroons form another group. Vallois shows that all these groups are taller than the Bambuti, many individuals being over 150 cm. (pygmoids). He curiously concludes that their greater height is not due to crossing with forest Negroes, on the grounds that their other characters remain essentially the same, but some form of selection could account for the absence of, for example, the thick Negro lips. The measurements in Table III are taken from Vallois (1940).

Table III

	Height ♂	Means (cm)	Height ♀	Means	C.I. ♂	C.I. ♀
Bagielli	140-148	—	—	—	—	—
Babongo	144-170	154.1	133-156	145.2	79.1	77.4
Babinga	139-172	149-157	134-164	144-154	77.6-82.2	77.9-81.7
Batwa	142-157	152.2	128-151.5	143.7	78.1	77.7
Bambuti	125-157	142.9	118-151	135.4	79.6	79.6

Schkopp (1903) briefly described dwarfs in the Cameroons, along a stretch of 300 km of coast south of the River Sanaga. They were called Bako (literally "short men"), reached a height of 150 cm and were in association with the Bakoko Negroes. Their distinctive features are described as a round, relatively large head, low projecting forehead; small, deep-set eyes, thin lips, bad teeth and large, offstanding ears. Their food and hunting habits evidently resembled those of other Pygmies. But they also collected native rubber and exchanged it with the Negroes. Their numbers were estimated at not over 2000 and their language was said to be different from any of the Negro dialects.

Vallois (1935), in a general consideration of the significance of pygmies, cites the various records of Neolithic and Bronze age dwarf burials in Austria and other parts of Europe. These apparently remained as individuals or families but never multiplied to produce a race.

Trilles (1932) arrived in Gabon in 1892 as a missionary. Mixing of the Akoa Pygmies with the Mpongwe Negroes had already taken place. He afterwards made measurements in 53 villages and found that the Akoa with darker skin were taller (♂ 136-152 cm., ♀ 130-142 cm.), those with lighter (yellowish) skin shorter (♂ 125-130 cm., ♀ 90.5-131 cm.). Their number was estimated at 20,000, living as usual in close relations with the forest Negroes. He ascribes to the Pygmies a repulsive natural odour, which he compares with the odour of certain Aroid flowers which attract carrion flies. He says it is stronger under emotion, and that a Pygmy who passes leaves this "scent" in the air. This is confirmed by earlier observations of Johnston in his great work (1902), who says, "even when forced to keep themselves clean (they *never* wash naturally) they exhale from their skins a most offensive odour". Vallois (1935) also says the Pygmies "exhalant une odeur extrêmement forte". My wife and I noticed nothing of this sort in the Pygmies of Bundibugyo, but these had served an American "movie" concern. Trilles states that the Pygmies have the calcaneum projecting backward as in the Negro, the foot being broad and short.

Häuser (1953) concludes that the Babinga arrived in the Likouala district North of the Congo only about the middle of the nineteenth century, most of them coming from the Belgian Congo, conducted by the Bondjo Negroes, on whom they already depended in the symbiotic or vassalage relationship the Pygmies always have with their forest Negro neighbours. The Akoa (Bekwi) are southwest of the Babinga but north of the Congo.

Lalouel (1949) made a study of the demography of the Babinga on the lower Oubangui, a tributary of the Congo in Gabon, and the Likouala, a smaller tributary nearby. He maps the Pygmy camps on these two rivers and the area between them. Vallois (1940) estimated the number of Pygmies in the Cameroons to be nearly 7000. Lalouel studied the Baká and Bayaká on the lower Oubangui, finding about 6500. He estimated the Western Pygmies to number in all nearly 20,000. Lalouel (1950) made a metrical study of the Babinga on the Likouala. Defining the Pygmies as less than 150 cm. in height, he found that more than half of those measured were 150-155 cm. tall. He and Vallois both affirm that the Pygmies are not dwarfs, apparently meaning that they are not single-mutational dwarfs, such as occur in all races. This will be discussed later in connection with the origin of the Pygmies.

Lalouel finds in 565 male Baká and Bayaká a range in height of 131-169 cm. and in 475 females a range of 131-163 cm. The Bondjo and other Negroes in this area have heights which fall into two groups with means at 168 and 164 cm. respectively. It seems clear that the Pygmies at least with height of 160 cm. or more are descended from crosses with Negroes, or back-crosses. They are by no means merely "reduced models" of their Negro neighbours. They have, for example, characteristically hairy bodies while Negroes are relatively hairless. Lalouel's head measurements of 130 male Baká and Bayaká give a mean C.I. of 79.2, and of 70 females 78.8. The Babinga skin colour varies, but is lighter than that of the Negroes and, in confirmation of the observations of other authors, the face is generally lighter than the body. Some of the shorter Babinga are very dark. The Mongolian spot was found in about

two-thirds of 110 births in the Hospital. Vallois (1940) distinguished two types of ears in Babinga: (1) primitive, having a horizontal upper border of the helix and no lobe, (2) with lobe frequently free and rarely absent. The Pygmies in general speak the language of their Negro neighbours, but Lalouel considers the question of a separate Pygmy language by no means settled. The social relations between Pygmy and Negro are compared to those between a Roman family and its "clients", no Babinga being entirely free from any Negro.

Boclaert (1949) has described the Batswa (Chwa) in the Western group. They are regarded by him as a separate race of pure blood numbering over 50,000 in the province of Coquilhatville in Belgian Congo. In a demographic study of the Batwa and their Negro symbionts, the Nkundo, he finds that they multiply much faster and need no protection against the latter. The Batwa birthrate is 11.4%, the Nkundo 3%. In the Batswa population 50.6% are non-adult, in the Nkundo only 23.4%.

Early observations of Pygmies

The early contacts of Battell, DuChaillu and others with Pygmies in West Africa have already been mentioned. The first modern contact with eastern Pygmies was that of Schweinfurth (1873), who travelled the Nile regions in 1863-66 and again in 1868-71. He traversed the land of the Zande (Azande) = Niam Niam, who were then regarded as cannibals with tails. The Monbuttos, east of the Zande, were also cannibals. He exchanged one of his dogs with the King of the Monbuttoo for two Pygmies. One of them died in Nubia 18 months later from overeating. Schweinfurth saw "several hundred" Akka warriors. Three of them ranged from 4 ft. 1 in. to 4 ft. 10 in. in height. They are described as having dull brown skin, a large head and broad skull, prognathous. The Akka, he says, are "distinguished from all other nations of Central Africa by the huge size of the ear". This may be the source of the big ears in same Bwamba (p. 10), but the Aka whose photographs I have seen have small ears like other Pygmies. The Akka are described as showing continual changes of expression, and as fond of antics, like the Bushmen. These Akka had poultry and lived in a condition of symbiosis with the Monbuttoo Negroes¹¹. Hutereau (1909),

¹¹ My statement (Gates 1946, p. 1321) that the Aká are dwarfs of normal proportions in contrast to the Efé, was based on that of Rischbieth and Barrington (1912), who state that the Aká are ateleiotic dwarfs, which appears to be borne out by their group photograph (plate 0). Some are shorter than the Efé, and these may perhaps be ateleiotic. Their height is given as 3 feet 6 inches to four feet. The monograph of Rischbieth and Barrington on human dwarfs is the most extensive on record. It includes descriptions and photographs of many types of dwarfs. Unfortunately this monograph is the source of the erroneous conception that ateleiotic (miniature) dwarfs are "normal" whereas all achondroplastic dwarfs are pathological. After describing the Aká as ethnic ateleiotic dwarfs these authors say, "These dwarfs are shown here in contrast to those whose dwarf growth is due to disease", including in the latter category all achondroplastic dwarfs as well as those resulting from rickets, myxoedema and cretinism. Further on, achondroplasia is classed as "dwarf growth of pathological origin". It is now clear that the Efé Pygmies are ethnic dwarfs of achondroplastic type. Whether some Akás are ateleiotic dwarfs remains to be determined.

in an early study of the Batúa of the Uele (Welle) river, found them and the neighboring Azande in a primitive condition. The bands of the Batúa were in a state of hostilities; they took no prisoners but cut off the heads of captives and carried them around. The Azande, who lived north of the Uele on the southern border of Sudan, were cannibals, their photographs indicating some Pygmy mixture. South of the Azande were the Mangbetu (Monbutto) Negroes extending from the Uele south to the high Ituri West of Lake Albert. They were in the country of the Aká Pygmies. The areas of the Eastern Pygmy and Negro tribes on the upper Congo, the Uele, Ubangi, Aruwini and Ituri river are mapped by Hutereau (1922).

Van den Brock (1940) recognizes the Aká, Efé and Basúa as separate groups of Bambuti (Eastern Twiden) occupying different geographic areas. The Aká (formerly Akka) are the most northerly, extending to the country of the Azande (Sandeh). In this region they were seen by Schweinfurth in 1871. They were probably the Pygmies known to the Pharaohs. What differences, if any, exist between these groups can only be elucidated by further study. Some Aká deform their heads, a custom adopted from their Negro neighbors, the Mambettu. Further south, around Lake Kivu, between Lakes Edward and Tanganyika, are the Batwa, or Twa; Casati (1891) says that the Pygmies call themselves Efé and are called Akka by the Mambettu (Mangbetu) and Tiki-Tiki by the Sandeh. Their skin is described as reddish brown, thickly covered with hairs. The Tiki-Tiki were taller, darker and less hairy, the height 4 ft. to 4 ft. 9 in. His statement that the Akka and Tiki-Tiki were generally at war as has been confirmed by Hutereau (1909).

Stanley was evidently a keen, though untrained, observer. In his later volume, *In Darkest Africa* (1897) he describes further contacts with Pygmies. He refers (p. 131) to a tribe of dwarfs (the Bambuti) thickly scattered north of the Ituri River and extending eastward to the Semliki river, which flows from Lake Edward to Lake Albert. A young woman of about 17 years was 33 in. high. "Her figure was that of a miniature coloured lady and her face was very prepossessing. Her complexion was that of a quadroon, like yellow ivory, the eyes "absurdly large"¹², full and protruding.

The "Queen" of the Pygmies was captured (p. 247) and measured 4 ft. 4 in. in height, the height of the tribe ranging from 3 ft. to 4 ft. 6 in. On p. 636 Stanley describes two "species" of Pigmy, the Batwa with "longish heads and long narrow faces, reddish, small eyes set close together, which gives them a somewhat ferrety, sour, anxious, and querulous look". This appears to describe the type of countenance I have cited in the Bwambas (Figs. 9, 14-16), but in the latter the eyes are not close together, and of course the stature is greater. On the other hand, Stanley's Wambutti have "round faces, gazelle-like eyes set far apart, open foreheads, which give one an impression of undisguised frankness, and are of a rich yellow, ivory complexion".

There have been many attempts to classify types within the Efé or Bambuti Pygmies, but for the most part without success. Burrows (1899) refers similarly to "Black"

¹² Gusinde (1955) also refers to the protruding eyeballs and a restless flicker in the eyes, as well as the pure white sclera.

and "Red" Pygmy tribes which do not mix, on the watershed of the Aruwimi and Welle rivers.

Accounts of first contact with unknown native peoples are often revealing. Stanley (1878) describes his remarkable journey across tropical Africa from Zanzibar through Tanganyika and Uganda and finally down the Congo, which he called the Livingstone. He fought his way with a native party down the Arawime into the Congo, taking part in 32 battles with savages and cannibals in canoes. His first encounter with a Watwa (Batwa) Pygmy (Vol. 2, p. 172) was in the forest. His height was 4 ft. 6 ½ in., chest 30 in., waist 24 in. His head was "large", with a fringe of whiskers, his complexion "light chocolate". He was "exceedingly bow-legged and thin-shanked". Stanley believed the Aruwimi (also Aruwine), which flows into the Congo, to be the same as the Welle of Schweinfurth, which empties further down.

Lloyd (1899), coming from Toro in western Uganda, crossed the Semliki in a dugout, and began a journey to the Congo to see if the Pygmies existed and could be evangelized. After six days marching through the forest they saw their first Pygmy, who ran along branches in the trees. These Pygmies were of powerful build, their chests covered with black, curly hair, most of the men having thick, black beards. The chief spoke the Toro language. A few Arabs were in the forest getting slaves. They also got ivory, honey and meat in exchange for rice, maize, sweet potatoes and yams. Lloyd saw groups of Pygmy huts in the dense jungle, and a few clay pots for cooking. The women were smaller than the men and had a lighter skin.

Hind (1897) described the Pygmies as the only real hunters in the Congo Basin. Their poisoned arrows were so deadly that a man will die in three to ten minutes from a scratch. "An elephant in one of our stations, which was scratched on the haunch by a poisoned spear, fell dead before going a hundred yards". If this is not an exaggeration, this poison was more deadly than some. In later recorded instances an animal may be pursued long distances after being struck with a poisoned arrow.

These Pygmies, like the Bushmen, could shoot three or four arrows "so rapidly that the last is discharged before the first reaches its mark". These dwarfs would occasionally attack a caravan in the forest, and a whole party of Arab slave-traders could be killed without ever seeing their attackers.

Quatrefages (1895), who wrote an extensive account of Pygmy lore, pointed out that the ancient Egyptians knew them under the name Akka. This name was carved by the side of a sculpture of a dwarf on a monument of the old Empire. He believes that they formerly extended much further north into the sudd region of the Nile, being later driven south and west. Quatrefages refers to Akkas taken via Khartoum to Italy. Two of these were described by Mantegazza and Zannetti (1875). They were taken by Count Miniscalchi (Senator) to his estate on Lake Garda to study their language, and much was written about them. They continued to grow, as shown by measurements taken later, but remained Pygmy size. They became acclimated in two or three years, spoke Arabic and learned to read and write in Italian. Giglioli (1880), who measured their height at an interval of two years, records

them as male and female,¹³ but Owen (1874), in his brief account writes of “deux garçons” 12-14 years old, with dark chocolate brown skin and ear lobe “peu développé”.

The Pygmy nose is chamaerhine and, in the extreme, almost triangular, sloping outwards from a narrow base to a broad overhanging tip. It is his most characteristic feature, extremely primitive, and is never seen in the Bushmen.

Other Pygmies brought to Europe were studied by von Luschan (1906). Six Pygmies, four male and two female, were taken to Berlin from the Ituri forest northwest of the Ruwenzori Mountains, where Stuhlmann had obtained two females in 1893, and in the area where Sir Harry Johnston discovered the okapi. Some of von Luschan's measurements are given in Table IV. The arm span was notably greater than the height in both males and females.¹⁴ The head dimensions are essentially in accord with the more extensive measurements of Schebesta, Gusinde and others. The corresponding head length for various Bantu tribes ranges (means) from 196.8 (Batutsi) to 187.2 (Bakonjo), and for head width from 142.9 (Batutsi) to 147.0 (Bakonjo). The Pygmy head is thus notably large in relation to the stature, and not much smaller in absolute dimensions, the ranges of Negro and Pygmy overlapping. Further discussion of the nature of the Pygmy dwarfing will be taken up later.

In an extensive study of palm and finger prints, Fleischhacker (1951) compares the Pygmies with other races. M. Weninger (1953) finds that the African and Asiatic dwarfs are at opposite poles of the variation series. The finger-prints of the Bambuti and Bushmen are very similar but their palm patterns show less similarity. The Aeta and Semang Negritos differ much less from the Malay races than the Pygmies differ from the Negro. Geipel (1953) has shown, from a study of Chinese-Negro mixtures in South America, that the palm print patterns are intermediate between those of the Chinese and the Negro, sometimes nearer one, sometimes nearer the other.

Schebesta (1938-50) concludes that the Aká, Basúa and Efé all have the same four racial types in different proportions. His types I and II are pure Pygmy. III and IV are described as Negroid or Europid, intermediate forms being regarded as rare. I and II are said to differ in skin colour, body hair, nose form, mouth, and especially in body-proportions. He regards these as original race types which became mixed. They appear rather to be genetic elements in an interbreeding population.

Gusinde (1955), in a recent general account of the African Pygmies, adopts for them the name Twiden suggested by Gusinde (1945) and also used by Schumacher (1949). The root *twa* is a diminutive, and some Bantu roots are said to be derived from Sumerian. The tribal names Batwa, Batua, Basua, Bakwa, Batkwa, Bakka, Akka, are shown to be etymologically the same. Primitive peoples' own tribal names for themselves generally mean in their own language “the men” or the people, while, as Jeffreys (1953) shows, the name applied to them by others frequently means “the

¹³ In May, 1876, their heights were respectively 134.5 and 120.5, in May, 1878, 141.0 and 133.0.

¹⁴ On the other hand, the absolute arm length (Ochinsky 1954) is 63-65 in Pygmies and 75-80 in Bantu.

Table IV - Measurements of six Pygmies (von Luschan)

	Height	Arm Span	Head		C. I.	N. I.
			L	B		
1. ♂	136.5	138	186	148	79.6	114.3
2. ♂	133.5	142	179	139	77.6	109.5
3. ♂	142.5	156.5	190	146	76.8	131.9
4. ¹⁵ ♂	125.0	129.1	—	—	—	—
Means	137.5	145.5	185	144.3	78.0	118.6
5. ♀	128.1	132.0	181	138	76.2	123.5
6. ♀	132.5	136.5	176	136	77.3	102.8
Means	130.3	134.3	178.5	137	76.7	113.1

foreigners". Thus Philistine, Fulani, Nupe, Fang, Galla, Welsh and Walloon are all said to have this meaning. Batwa, in its various forms, is applied to many tribes, and he suggests that it simply means foreigner. But there is much conjecture about these terms.

Gusinde suggests that the term Negrillo for the Pygmies should be discarded, as the Negro and Pygmy races are not on the same level either racially or culturally. His classification of the Pygmies or Twiden is similar to that of Vallois (1940) but now more extended. The three main areas of Twiden occupation are: 1. The Bambuti in the Ituri River area, divided into Efé, Basúa and Aká. 2. The Great Lakes region, extending north and south, west of Lakes Albert, Edward, Kivu and Bangweolo, including the Twa in Ruanda-Urundi. 3. The Western Twides in French Equatorial Africa, Gabun, Cameroons and Spanish Guinea. The tribes here include Bagielli, Babongo, Babinga, Akoa, Bachwa, Bayele, Baká and Bayaká. The Pygmies or Twi are thus scattered in the whole vast area from the Great Rift Valley westwards to the Gulf of Guinea and from 6° N. lat. to 5° S. lat., not including the Bangweolo group. There are indications that they formerly extended further north, and perhaps much farther west. Gusinde estimates the total Twi population at 168,500, including 32,000 Bambuti, 25,500 Babinga, nearly 100,000 Bachwa and 10,000 Twa. Tribes of stature over 150 cm. are generally classed as pygmoids, the Bambuti being shorter than all the rest.

¹⁵ No. 4 was evidently immature and is not included in the means.

Gusinde finds that remarkable changes have occurred in the manner of life of the Pygmies, especially those in the Lake region. In Ruanda the Hutu Negroes burned the forest in their primitive agriculture, thus forcing the Twa higher up in the mountains. The first Batutsi Hamites entered Ruanda and Urundi about seventy years ago, displacing the Bahutu to the low mountain levels and so forcing the Twa pygmoids still higher up the mountain slopes. Some remained primitive hunters, but others finally settled in villages in the open plains near Lake Kivu created by the process of deforestation. These became potters and some adopted farming. On Lake Bangweolo the Twa have become fishermen. Negro and Pygmy women may sometimes be found working together in the fields. These are remarkable instances of relatively sudden change of occupation forced on them by the encroachment of other tribes.

Schumacher (1950) has made a full study of the Batwa of Kivu, which he called Twiden. Gusinde concludes that the Batwa are the products of prehistoric race mixture, but Schumacher regards them as a pure race in which there has been no racial mixture for a thousand years. They occupy the open forest from Ruanda to Lake Victoria at an altitude of 1000 to 3000 m. The conditions are very different from the low, dark and humid Ituri forest. Schumacher suggests that ultra-violet mutations may account for the differences between the Batwa and the Bambuti, but it is more likely that racial crossing was involved. The Batwa live in symbiotic relations with the agricultural Negro population and oppose the entry of the Batutsi Hamites, who appeared a dozen generations ago.

The relations of Pygmies to ancient Egypt are also discussed (Schumacher Vol. 3, 1949). The Batwa God Imana = Amon (Egypt) and Amana (Babylon). Cultural diffusion from these early civilizations would seem to have reached Central Africa. The Pygmies were strong dancers, and in ancient Egypt they became "danseurs des dieux". In Pharaoh times they exploited this ability and became official representatives of the mysteries of fecundity. The desert Bushmen farther south are perhaps even better known (at least in modern times) for their dancing propensities. Vassall (1956) finds that the Egyptian god Phtah represents, not a dwarf but a human fetus, the god Bes being an achondroplastic dwarf like Pygmies.

The Twa are pygmoides, taller than the Bambuti. Gusinde (1955) gives their mean height as 152.9 cm. for males and 144.2 cm. for females. They are 8.9 cm. taller than the eastern Twiden (Bambuti). They show no steatopygy but have a large head (C.I. 76.6 for males, 75.5 for females). They have either "button" or "funnel" noses and many Twa show Negro or Nilotic characters resulting from crossing which took place long ago. Gusinde believes that the Twi formerly extended westward to the Ivory Coast and Liberia (see footnote, p. 169). He suggests that remnants of the Pygmies may still remain in this area. The eastern and western Twi are regarded as distinct sub-races, the southern Twi being mixed variants of the eastern Twi. Gusinde suggests that the Pygmies although aborigines of the tropical forests, originally lived in open, sunny country, and were forced into the dark, damp forests as a refuge area by Negroes, who moved into the forests several centuries ago.

The latter became the forest Negroes and were pressed further by Hamites from the east.

As further evidence that the Pygmies formerly lived much farther to the northeast, Sir Harry Johnston (1902) may be cited (p. 59). "The native inhabitants of West Elgon are a wild-looking and a savage race, among which some stunted individuals recall irresistibly the facial features of the Pygmies of the Congo Forest, whom they closely resemble in their low stature".

Stuhlmann (1894) says that the Bambuba were a tribe coming from the West to the Semliki four generations ago, about the end of the eighteenth century, the Bakonjo coming up from the south more recently. Westermann (1942) gives a general map of migration routes to and in Africa. He points out that until recently all African peoples were nomadic. This resulted from their primitive methods of agriculture and forest burning. In the absence of reserves, a short series of dry years might force a migration, which in turn involved aggression on neighboring tribes, with further movements and local wars. Only in such terms can the constant shifting of early populations in Africa be understood. Even as late as the nineteenth century, native wars produced colossal destruction, large areas being rendered desert and whole tribes exterminated or reduced to slavery. The Pygmies safe in the tropical forest were largely preserved from this fate.

Relations of Pygmies and Negroes

The social relations between Pygmies and Negroes have been described at length by Schebesta (1938) and Gusinde (1942, 1948). This relationship is in some respects unique. The condition known as commensalism between two different animal species is known among Arthropods and fishes as well as other animal groups. In man there have been various cases of one race more or less socially dependent upon another. Slavery, which frequently involved the dependence of one race upon another, is older than history and could be regarded as a symbiotic form of relationship. But the form of symbiosis between Pygmies and Negroes throughout Central Africa is not known elsewhere. Yet it varies greatly from one group to another. It may be a mass action in which all the Pygmies of a group hunt in the forest and exchange their surplus meat with the Chief of a Negro village, who supplies them with bananas and other agricultural products and sometimes utensils. Or individual Pygmies may make their exchanges with particular Negroes. If not satisfied with this arrangement they might take up relations with another, or they may even peddle their offering until they find a more favourable buyer. But generally the Pygmy is somewhat dependent on his more wily overlord. Friction shows itself when a Pygmy shoots a poisoned arrow into his Negro master, but occasionally they will work for their overlords (the Wanandi) in the banana plantations. Johnston (1902) says that the Pygmies were more intelligent and quicker at divining his thoughts than the forest Negroes. In the

opinion of Barns (1922), the Pygmies produce with their simple pan pipes (and a small drum), the most melodious music in all Africa.

The banana is native to Malaya, whence it was introduced into India. The origin of the seedless form, which requires the attention of man for its propagation, must have involved crosses between two species and the production of a triploid form. Triploidy is accompanied by seed sterility, which therefore developed quickly and not by slow selection, (See Simmonds and Shepherd 1955). Burkill (1953) suggests that the cultivated banana came from India to Africa via the Sabaean lane of Southern Arabia, but there is no evidence as to when it reached Africa. The earliest Portuguese explorers in the 16th century found the banana grown in Negro West Africa apparently just as it is today. The Pygmy-Negro symbiosis could scarcely have existed without it, so there was probably a pre-banana period in which the Pygmies lived independent lives in the forest or, as Johnston (1902) suggests, in open country before they took refuge in the forest. Of course, in addition to meat from deer, elephant and okapi,¹⁶ they supplement their diet with a variety of roots and bulbs as well as small animals collected in the forest. This would be adequate for an independent existence before the symbiosis with Negroes began. If the Pygmies lived at first in open country and entered the forest as a refuge, as Gusinde also believes, the symbiosis would probably have begun at that time. The forest Negroes also probably sought the forest at first as a refuge. The bananas and other fruits of Negro cultivation would then be of the nature of luxuries for the Pygmies, enriching their lives with the products of a race which lived at a higher level of culture.

Kwashiorkor, already mentioned (p. 3) in Pygmies, is a pantropical and subtropical disease discovered in 1929 by Dr. Cicely D. Williams (1953), who showed that it is distinct from pellagra. Trowell (1954) has been a leading investigator of this disease (see Trowell and Davies 1952, Trowell, Davies and Dean 1954, and Brock 1956). It affects native children from 6 months to 4 years old and was frequently fatal. The symptoms include retarded growth, frequently dyspigmentation of hair and skin, slight oedema of feet and hands, liver necrosis and fibrosis, peeling of skin. Researches indicate that it results from lack of particular amino-acids which have not yet been identified. In native children it is associated with weaning, the mother's diet having a deficiency of protein, the weaned child being given carbohydrate foods such as bananas and cassava. Red hair occurs also in other wasting tropical diseases, and some West Africans normally have red hair.

Schebesta constantly and rightly combats the view that the Pygmies are a product of degeneration. Their biology and ecology contradict any such idea. The Bushmen,

¹⁶ The okapi (probably more correctly okwapi or kwapi, the native name) has probably always been an important article of Pygmy diet. Gatti (1937) found the okapi in no present danger of extinction. They were especially abundant in parts of the forest where no Pygmies go. He estimated that the Pygmies killed 1000 okwapi a year for food, using spears, nets and pits. The striped part of the forelegs only is used for skin belts, yet nearly all Pygmies have such a belt.

on the contrary, appear to be the result, in part, of evolutionary degeneration. Schebesta concludes that the forest Negroes are a contact product of Bambuti and Negro, not an old Negro form nor the stem from which the Bambuti arose. Nevertheless, the Pygmies stand nearest to the Negro race in a general sense. He finds no steatopygia but strong lordosis in pure Pygmies.

Mixture of races

In the Ituri forest the Bakumu and Babira are the forest Negroes in closest contact with the Bambuti. The Bapakome are a mixed pygmoid people near the Beni river, as are the Baamba or Wahumu in northwest Ruwenzori. The Babira also are strongly pygmyized. In the northeast of the Ituri region the Babali, Bandaka, Banyari, Babudu and Balika tribes are less intensely mixed with the Pygmies, and the mixing was later than with the Babira and Lese Negroes. The Sudan-speaking Mangbetu are regarded as the last to enter the Ituri forest, their culture underlying that of the Aka, Badika and Basa. Schebesta estimates the total Pygmy population of Central Africa at 100,000, some 35,000 of these being Bambuti in an area of 100,000 square kilometers. A clan may number from 5 to 50 families, the average in a horde being about 60, which would have about 180 sq. km. of forest in which to hunt. In many places in the forest the Pygmies are much more numerous than the Negroes.

Intermarriage between the two races is entirely one-sided. A Negro may take a Pygmy wife, who lives in the Negro village. Her children become "Negroes". In this way considerable Pygmy blood has been absorbed into the forest Negroes. On the other hand, the Pygmy race remains relatively pure because a Negro woman never marries a Pygmy man. Unofficial miscegenation must account for the Negro characters which can sometimes be seen in the Pygmies. Schebesta (1938) states that in certain places 20-35 % of the Negroes had Pygmy wives.

Gusinde (1942) made a study of hybrids between the Pygmies and the Balese and Babira Bantu. These two tribes of Bantu scarcely differ from each other in measurements or in blood groups (see Table VI pag. 29). The hybrids with Pygmies are fertile and their condition of life in the Negro village is better than that of the nomadic Pygmies. The F_1 phenotype is intermediate. Of Bambuti X Balese 8 ♂ and 4 ♀ were described and measured, and of the back-cross of F_1 to Balese, 8 ♂ and 6 ♀. Bambuti X Babira and the back-cross to Babira numbered 3 ♂ and 1 ♀. The back-crosses showed a much greater range of variation than the F_1 , as might be expected. Some of the Bantu probably already carried certain Pygmy genes from earlier crossing. Gusinde says that all the Pygmy characters are recessive in crosses, but this is a first impression rather than an accurate reading of the results. From a study of Negro X Chinese, I have concluded (Gates 1956) that all human racial characters are based on multiple genes which are cumulative in effect, and generally without dominance. Some of the results of Gusinde's measurements are shown in Table V.

It will be seen that the C.I. of these Pygmies differs very little from that of the Lese and Bira Negroes who are themselves doubtless much pygmyized¹⁷. Other records of C.I. make the Pygmies as high as 79.54 (Czechanowski) and the Hamiticized Baganda

Table V - Comparison of hybrids with parent races (Gusinde)

	Negro		Bambutu		F ₁	
	♂	♀	♂	♀	♂	♀
Height	158.6	148.0	144.8	137.2	148.1	142.7
Headform	generally elliptic		generally oval		oval	
Lanugo	none		much		muchless	
L	189.5	180.6	184.6	178.2	185	178.8
B	146.1	138	141.2	135.9	143.9	140
C.I.	77.12	76.44	76.47	76.30	77.82	77.95
N.I.	90.20	91.98	105.19	103.44	102.41	97.55

Table Va - Bambutu X Balese, F₁ ♂ and ♀ (Gusinde)

	Age	Height	C.I.	N.I.		Age	Height	C.I.	N.I.
1. ♂	28	1479	73.16	91.49	9. ♀	20	1365	77.71	82.61
2. ♂	26	1572	78.53	95.45	10. ♀	30	1460	77.35	95.12
3. ♂	22	1555	76.12	102.04	11. ♀	20	1432	77.22	109.76
4. ♂	24	1480	79.14	—	12. ♀	22	1453	80.33	105.00
5. ♂	25	1410	78.26	117.65	Means		1427.5	78.15	98.12
6. ♂	45	1496	79.23	93.33					
7. ♂	24	1417	77.96	114.29					
8. ♂	30	1438	80.68	97.67					
Means		1480.9	77.88	101.70					

¹⁷ Johnston (1902) figures (Fig. 275, p. 519) a "pygmy" woman of Lese stock.

as low as 73.45. The head form of the Negro in vertical view is stated to be generally elliptic, in the Bambuti generally oval, while the F_1 is always oval. The absence of lanugo in the Negro contrasts strongly with the hairiness of the Pygmies, and here again the F_1 is intermediate in amount, as also in skin colour¹⁸.

The 29 F_1 were "ungefähr das soeben bezeichnete Dunkelbraun der Neger", but one F_1 ♂ and one back-cross ♀ were „helle Gelb mit sehr blasser Brauntönung der Bambuti". The lighter F_1 ♂ is presumably due to the Negro father being heterozygous for the dark skin-colour factor. The back-cross, as expected, is "gegenüber der F_1 - Gruppe dunkler und neigt mehr to den Negern hin". Certain mixed individuals were darker than the Negroes, probably from recombination of the multiple genes for skin colour.

Comparing Tables V and Va, the average height of F_1 males is little more than that of the Bambuti, but the range - 1410 to 1572 mm in only eight individuals - is far beyond the 150 cm limit of the dwarfs, reaching nearly to the Negro means, while others nearly reach the Bambuti mean. This can only be accounted for if some Lese fathers are heterozygous for genes affecting height. In the four F_1 females the range is considerably less, but still 9.5 cm. The range of C.I. in the F_1 males is again

Table Vb - (Bambuti X Balese) X Balese (Gusinde)

	Age	Height	C.I.	N.I.		Age	Height	C.I.	N.I.
13. ♂	26	1429	77.91	102.44	21. ♀	28	1464	73.12	100
14. ♂	50	1430	80.11	97.56	22. ♀	26	1399	72.58	97.56
15. ♂	30	1493	76.63	102.17	23. ♀	50	1435	75.96	88.64
16. ♂	26	1630	74.74	104.88	24. ♀	28	1354	80.23	102.63
17. ♂	24	1568	76.60	85.71	25. ♀	26	1420	77.89	116.22
18. ♂	22	1441	81.81	102.27	26. ♀	24	1492	76.09	80.00
19. ♂	26	1476	80.54	107.14					
20. ♂	28	1683	75.00	102.08					
Means		1518.75	77.92	100.53	Means		1427.3	75.98	97.51

¹⁸ In the Kalahari in 1955 I heard stories of natives in Northern Angola, some with hairy chests, others with hairy legs. These individuals were attributed by the natives to Negro women raped by gorillas, but they probably represent remnants of Pygmy stock in this region.

much more than in the females, but in N.I. the range of the four females is slightly more than in the eight males. These results are naturally understood on the basis of multiple genes.

When the backcrosses to the Negro (Table V b) are compared with the F₁ (Table V a) there are no appreciable differences in the means, except in the height of the males. This again indicates heterozygosity in the Lese parents.

In Table V c the range of variation of the backcross is compared with that of the F₁. As would be expected, the range in height is much greater, both in males

Table V c - Ranges of variation in F₁ and backcrosses

		Height	C.I.	N.I.			Height	C.I.	N.I.
F ₁	♂	162	7.52	26.16	♀	95	3.11	27.15	
backcross	♂	254	7.7	21.43	♀	138	7.55	36.22	

and females than in the F₁, although the numbers involved are the same in males and only slightly greater in females. As regards the C.I. and N.I., the range of the backcross is again greater in the females, but for some reason it is smaller in the males.

Table V d - Comparison of heights

		Bambutu	Balese	Mean	F ₁ means	backcross
383	♂	1449.5	1585.6	1517.5	1480.9	1518.75
263	♀	1382.1	1479.6	1430.9	1427.5	1427.3

In comparing the heights of the parent races (Table V d), the mean for males is 1517.5 mm, which is considerably more than 1480.9, the mean height for the eight F₁ males. This might be attributed to dominance of the dwarfing gene or genes, but is probably because some of the Balese fathers were already heterozygous for height genes.

A more detailed genetical study of families from Pygmies X Bantu is necessary to determine the inheritance of many characters. At the Germiston gold mine near Johannesburg I recognized a single "Pygmy" among the miners, all the rest of whom were Bantu. His features were unmistakably Pygmy but his height was intermediate. It turned out that his mother was a Pygmy, his father Bechuana, but I was unable to study him further. That genes for low stature are widespread is shown,

for instance, by Fig. 324 in Johnston (1902), which shows two tall and one short male Toro in Uganda, or by the typical achondroplastic dwarf in Nyasaland (Plate SS in Rischbiet and Barrington (1912). No study has been made of the inheritance of the excessive tallness of the Nilotes in crosses, which would be of great interest. Johnston measured six male Bahima with a mean height of 184.7 cm. and 30 male Kavirondo, average 181.3 cm. This is even taller than some of the pure Nilotes (from Oschinsky 1954, Nuer 180.6-185, Dinka 178.6-180.2, Shilluk 181.1). Johnston classed the Kavirondo (on Lake Victoria) as Nilotes. In how far Hamite and Nilote genes are here involved is not clear. The excessive height of the Nilotes cannot be a result of heterosis because of its stability. It would seem to be rather the result of tall Hamites meeting a race having different genes for tallness, the taller mixtures among their descendants later undergoing a period of selection (probably by choice) to produce the tallest race of man, geographically near to the shortest race.

It is worth mentioning here that Johnston (1902) speaks (p. 511) of a prognathous type west of the Semliki river with short legs, a beard and dirty-yellowish brown skin. One photograph (Fig. 269) shows a strongly retreating glabella (as in the Australian Aborigines) and large ear. These two characters are unique and not found among the Efé Pygmies of this area.

Barns (1922) refers to a "half caste Pygmy-Arab" who was not more than 4 ft. 2 in. in height, with a small beard, his round head surmounted by a turban. If he was full grown, as the beard indicates, then the dwarfing gene or genes would appear in his case (i.e., in the Semite cross) to be fully dominant. But this single case is scarcely sufficiently well documented to be accepted as an exception to the rule of intermediacy. Barns states (p. 162) that Pygmies extend east as far as Mount Elgon, Lakes Eyassi and Rudolf. Whether these are true Pygmies of ancient origin or modern dwarf mutations will be considered later.

Skin colour inheritance

Reference has already been made (p. 3) to my three-gene hypothesis of skin colour inheritance in Negro X White race. On the basis of many studies, the analysis led to the assumption of three genes R, S and T having respective values in melanin production of 6, 2 and 1. In this series the mahogany and black skins in the Negro were regarded as variants of one gene R producing a very large amount of pigment. As already pointed out, the Pygmy skin colour corresponds with No. 3 (Mahogany) of the Gates chart, (but slightly less red), the Bwambas correspond with No. 2 of the chart, indicating somewhat deeper pigmentation, while unpublished observations of Hottentots in South Africa show that they fit, generally quite exactly, No. 4 of the scale. The scale is therefore applicable not only to the Negro race (No. 1, or full black) but also to the African (hybrid) Bwamba (No. 2), the Pygmies (No. 3) and the Hottentots (No. 4-6), assuming as before that 4, 5 and 6 represent differences in tone rather than in amount of melanin. The chart is therefore applicable to four different

African races. Since the mahogany skin colour of the Pygmies is clearly distinct from the black of the Negro, it becomes necessary to separate R into two independent genes. Thus we have the series Q, R, S, T with respective values of approximately 3, 3, 2, 1, their absences being q, r, s, t. The Negro race will then have four genes for skin colour. The hybrid Bwambas will also have four but will be heterozygous for Q and R. The Pygmies will have three, RST, assigning Q as the black gene of the Negro. The Hot-tentot will then be homozygous for S and T (that is, SSTT) but will not have Q or R.

It is a striking fact that my colour chart, originally constructed only for Negro-White crosses, is thus directly applicable without change (except in recognizing four instead of three genes) to three other African races. Of course, mahogany might have been separated from black in the first place, but recognition of the mahogany skin colour of the Pygmy race necessitates this separation.

These relationships suggest that the intense black of the African Negro has resulted from a mutation in his ancestry from mahogany to black, i.e., a race which was RRSSTT became QQRRSSTT through mutation and subsequent selection by climatic conditions. The ancestral type would already have woolly hair, small ears and a flat nose. In this mahogany-skinned type would have occurred the main dwarf mutation producing the Pygmy type. On this hypothesis the Pygmy race will be older than the Negro, but both would be derived from a common ancestor.

Probably the hairy condition of the Pygmy would also have been present in his pre-Negro ancestor; the Negro race having subsequently experienced a mutational loss of body hair. The Pygmy race has in the meantime suffered an extreme broadening and flattening of the nose, probably an adaptation to the moist tropical climate, while the nasal adaptation of the Negro has taken a somewhat different but similar form.

As is well known, melanism occurs in many animals besides man. Melanic or black varieties are found locally in many species of mammals; and many species of moths have developed melanic varieties in connection with industrialization, but this condition is unknown in butterflies. The work of Ford (1955) in this connection is well known. Many of these melanic varieties are simple dominant mutations. Kettlewell (1957) shows how many melanic varieties have spread in industrial areas owing to the protection from birds afforded by their dark colour. Thus in the species *Tethea* or the first melanic was taken near Hamburg about 1907, and by 1917 over 90% of this species were melanic; but in England this mutation has never occurred. In *Tethea duplaris*, however, the dark form reaches over 90% in industrial areas. More apposite to human melanism is the condition in *Lymantria monacha*, in which the darkest individuals have three melanic genes, all dominant, one being sex-linked. In *Aglaia tau* there are two melanic forms, the genes being allelomorphs and semidominant (Ford 1955). *Etropis luridata* is another moth having several melanic forms. In *Biston betularia* there are two melanic forms, *carbonaria* and *insularia*. Both are dominant, but the genes are at different loci, not alleles. There is evidence that melanism has been appearing in Lepidoptera for some thousands of years, but has only been enabled to spread where industry has produced dark surfaces on which the moths can rest in safety.

These facts appear illuminating in relation to the more extreme forms of adapta-

tional melanism in man, a black skin being an advantage in a tropical climate. The conception that only two or three melanic mutations have occurred in the evolution of the present human races fits in with present knowledge of the genetics of skin colour. Negative mutations involving loss of melanic pigmentation probably produced the skin colour of the white race in Europe or North Africa. The blue eyes and fair hair found in certain of its sections are probably further independent mutations in the same direction of depigmentation. Just as melanic mutations have never occurred in some species of Lepidoptera, so mutations to light hair and blue eyes have not occurred in the Mongolian race. As pointed out elsewhere (Gates 1956), the pale yellow skin of the Mongol appears to result simply from very dilute melanin.

In this connection it is of interest that the male mountain or Lake Kivu gorilla (*G. Beringeri*) is stated by Barns (1922) to have a breast of "bare grey skin" although its whole body is covered with long black hair. However, the rest of the body skin appears to be pigmented.

The Hamites

A few words may be inserted here regarding the Hamitic peoples, who have played an important part in Central Africa in the last two or three millenia. Coming apparently from the Horn of Africa or Abyssinia, they differ conspicuously from the Negro race in (1) generally taller stature, (2) high, narrow nose, (3) thin lips; but they agree with the Negro in having an intense black skin, and also in their relative hairlessness. That they also differ greatly from the Negro in temperament is clear to anyone who has come in contact with them. The head hair shows marked differences which have not yet been sufficiently investigated. Sir H.H. Johnston, in his Introduction to Barns (1922) says, "In Western Uganda, in Toro, Ankole, Ruanda, Karagwe and Burundi, they (the Hamites) still remain as a distinct and sovereign caste. The hair is tightly crinkled but (when allowed to grow) is long and abundant, and the facial features are not those of the Negro but of the handsome Galla, Somali, and Ancient Egyptian". The hair of the "Fuzzy Wuzzy" should be compared with that of the Melanesians.

A study of the Plates in Schebesta (1938) shows that the Pygmies generally have woolly hair like the Negro, but there are exceptions. A two-year-old baby (Fig. 1) has typical *tufted* hair, (see Gates 1957) also a boy (Fig. 8) and Figs. 54-57. Some heads are semi-tufted, not so smooth as the Negro. Some others (in Figs. 27, 37, 39, 47, 63) have peppercorn hair. This appearance may be a result of cutting the hair short, or while it is growing out after being shaved. Some other variations in Pygmy hair may be the result of crossing, as Figs. 75, 76 with thick lips and \pm tufted hair.

The various amounts of Hamite contribution to different Bantu tribes have still to be evaluated, but it is clear that they have been large in some cases and small in others. The blood groups, when fully recorded, will perhaps serve as the best index of this intermixture. Hamite-Pygmy crosses, when they occur, could be studied with much advantage.

Table VI - ABO blood groups

	N	p	q	r	
Pygmies	1013	25.7	20.6	52.1	Julien, in Boyd (1939)
Efé	1032	22.7	21.9	55.4	Jadin 1935
Aka	100	30.5	20.2	52.0	Gusinde 1936
Baamba	113	18.1	12.8	69.1	Ikin et al. 1952
Babira	273	16.1	11.8	72.9	Jadin 1935
Balese	507	19.4	10.9	69.7	Jadin 1935
Negroes, Liberia	567	15.2	—	69.6	from Boyd 1939
Negroes, Sierra Leone	635	16.3	15.7	68.9	from Boyd 1939
Negroes, South Africa	5000	13.8	11.6	73.8	Elsdon-Dew 1936
Bantu, Transvaal	880	15.3	11.8	72.9	Pijper in Elsdon-Dew 1936

Table VII

	Amba ¹⁹	Hima ²⁰	Iraqw	Tswa	Batutsi	Bahutu	Kikuyu
O	46.9	66.7	59.1	36.4	66.1	48.3	68.8
A ₁	23.9	9.4	8.6	42.4	11.8	20.2	20.2
A ₂	5.3	5.1	4.3	—	10.2	7.5	6.6
B	20.5	15.4	22.6	15.2	9.4	21.3	13.4
A ₁ B	2.7	0.8	3.2	6.1	1.6	2.2	—
A ₂ B	0.1	2.6	2.2	—	0.8	0.4	—
N	113	117	93	33			124

¹⁹ Ikin et al. 1952.

²⁰ Elsdon-Dew (1936) obtained 81.3% O.

Blood groups and sickling

Extensive serological tests have now been made of the Bambuti, various pygmoids and the related peoples. These are summarized in Tables VI to X. From Table VI it will be seen that the Efé and Aká are very similar in their blood groups, while the Baramba pygmoids are much higher in O and lower in A and B. The Babira and Balese forest Negroes are very similar to each other, and differ but little from the Pygmies, probably due to earlier miscegenation with the latter. The Bantu from West and South Africa show remarkably small differences.

From later work (Table VII) embodying the A_1 and A_2 subgroups, A_1 has over four times the frequency of A_2 in the Baamba, but only twice the frequency in Bahima, Iraqw and Kikuyu. The Tutsi and Hutu are very different from both and from each other in this respect, the Batutsi (Watussi) being (like the Bahima²¹) tall Hamitomorpha and the Bahutu of Bantu type. The Batswa have an even higher proportion of A_1 . The Tutsi and Hutu also differ widely in B, while the Hamitic Bahima and the Batswa agree and are markedly lower than the Amba and the Iraqw, a tribe in the mountains of Tanganyika.

In Table VIII the MNS groups are compared. The Tutsi and Hutu are again markedly different, the Amba very low in MS. The Henshaw blood group, which is almost confined to Africans and is linked with the MNS groups (Allison, Ikin and Mourant 1952), is uniquely high (11.8 %) in the Iraqw. The related Hunter (Hu) is much lower than in West Africa.

The Rh blood groups (Table IX) show several significant features. The D (R_0) chromosome, so characteristic of Africa, is very high in the pygmoid Batswa and the Luo of Kenya. The Amba, with 61.6 %, are the same as the Kikuyu. The Hamitic Bahima are naturally lowest of all in R_0 ²².

Blitstein and Moureau (1948) found 3.25 % r (Rh-) in 400 Bantu, and Jadin (1949), in similar tests of 500 Bambuti Pygmies, found 3 %. The Pygmies thus resemble the Bantu in this respect. The much higher frequency (12.9 %) in the Amba with still higher values in the Hamitic Hima and Iraqw, point clearly to some Hamitic ancestry in the Amba. cDE (R_2) is high in the Tswa, and Du in the Iraqw.

Taking the evidence from all the blood groups, we may conclude that the Baamba were derived from crosses between the Pygmies and a Bantu tribe which already had

²¹ The Bahima aristocracy are Hamites, and Johnston (1902) suggests that they entered Uganda from the northeast some 2000-3000 years ago, remaining for several centuries east of the Victoria Nile, the Acholi being a remnant left behind when they moved further west.

²² Glass and Li (1953) have developed formulae for estimating the rate of gene flow between populations, based on the R_0 gene, but many highly hypothetical factors are involved. Herbert Zwiauer (in M. Weninger 1956) discusses random drift in the Pygmy population, which is in clans practicing exogamy. Gusinde thinks the exogamy is founded on totemism. A clan has generally about 60 persons and may be in reproductive relations with 2-19 but rarely more than nine clans, the whole Ituri population numbering 32-35000. The number of married pairs from which each clan stems varies from 4 to 28. There is thus much inbreeding and the marriage possibilities are limited.

Table VIII

	Amba ²³	Hima ²⁴	Iraqw ²⁴	Kikuyu	Tutsi	Hutu
MS	6.7	13.4	24.1	21	M 40.1	28
Ms	40.2	35.7	43.6	38	MN 40.9	46.4
NS	7.1	7.1	3.3	8	N 18.9	25.5
Ns	46.1	43.8	29.0	33		
Henshaw		3.4 ²⁴	11.8			
Hunter		2.6	2.15			

Table IX

	Amba	Hima	Iraqw	Tswa ²⁵	Tswa ²⁶	Luo	Tutsi
CDe (R ₁)	6.5	6.8	11.3	—	6.2	—	8.3
CD ^{ue}	—	—	1.6	—	—	—	—
cDe (R ₂)	6.5	9.4	7.	18	19.5	—	5.7
cDe (R ₀)	61.6	33.9	47.1	82	63.8	81.7	52.7
cD ^{ue}	9.4	22	12.1	—	—	4.7	10.2
Cde (R')	3	—	—	—	—	4.7	—
cde (r)	12.9	27.8	20.9	1	10.5	4.2	21.6
cdE (R'')	—	—	—	—	—	4.7	—

²³ Ikin et al. 1952. ²³ Allison et al. 1954

²⁴ The 33 Tswa had 3.03% Henshaw and the same of Hunter.

²⁵ Allison et al. 1954 (N = 33).

²⁶ Hubinont & Snoeck 1949 (N = 94).

a considerable infiltration of Hamite ancestry. This would mean that their origin has been very late and comparatively recent. Their highly variable character indicates the same thing.

Both the Bambuti and the Baamba live in a very malarious country, the latter having as neighbours the Bakonjo living on higher slopes of the Ruwenzori mountains. The Baamba are in two groups, the Babwizi speaking a Congo dialect and the Babulibuli who came in later from the east, both being regarded as now fused into one (Lehmann and Raper (1956)). There has been much recent discussion of the relation of sickle cell anaemia to malaria. Lehmann and Raper (1949) found in the Baamba a frequency of 39-45 % with sickle cells, the highest in Africa. This condition is inherited as a simple dominant. The gene is largely confined to the Negro race. Edington and Lehmann (1955) examined 200 in the Gold Coast, finding 19 % with sickle cells, two of whom were homozygous for the S haemoglobin gene. Elsewhere in Africa the rate is higher. Roberts and Lehmann (1955) found no case of sickle blood cells among 739 Nilotes in the Southern Sudan, but they have been found in Nilotes further south where there is some Bantu mixture. Crystallization of the S haemoglobin produces the sickle-shape of the red cells. Some eight other types of haemoglobin are now known, their genes all apparently alleles of S.

Other frequencies of sickle cells in Africa, shown in Table X, are taken from Mourant (1954). The Baamba are by far the highest yet known. They are well above the Pygmies

Table X - Frequency of sickling (from Mourant)

	N	%	
Amba	220	39	Pygmy X Hamitic Bantu
Amba	140	45	Pygmy X Hamitic Bantu
Efé	456	25.9	Pygmies
Azande	100	18	Nilotic
Toro	120	12.5	Bantu
Hutu	395	11.9	Hamitic Bantu
Hutu	403	5.2	Hamitic Bantu
Hutu	135	2.96	Hamitic Bantu
Twa	141	2.8	pygmoid
Twa	33	0	pygmoid
Hima	166	2.4	Hamite

who are clearly one of their ancestral races. It does not necessarily follow that the Pygmies are the original source of the sickling gene, as Singer (1953) suggests. But as there is some evidence of a balanced polymorphism of this gene, heterozygotes having a considerable advantage in relation to malarial infection, this possibility cannot be denied either. The absence of sickling in the Sudanese Nilotes (as compared with Nilotic tribes further south in Uganda) and its very low frequency in Central African Hamites may both be a result of the relative absence of malaria among these peoples. Shapiro and Vandepitte (1954) find an association between sickling and the Rh.

Lehmann and Raper (1949) made an extensive survey of sickling in Uganda. They found very few cases (0.2-3.9 %) in Hamites (Bahima 2.4 %) and a very uniform figure (ca. 25 %) in seven Nilote tribes. Among nine Bantu-speaking tribes the sickling frequency ranges widely, from 2 % in the Bairu and 8 % in the Bahutu to ca. 30 % in the Basoga and Bagishu. The last two tribes are closely related and are most remote from Hamite influence, while the Bairu are helots of the Bahima. Thus clearly, the more Hamitic ancestry in the Bantu the less sickling. Probably the aristocratic Hamites have less sickling because they live in less malarious areas.

Sickle cells were found in 31 % of a Veddid jungle tribe in Southern India, by Lehmann and Cutbush (1952), while no cases were found among the surrounding peoples. Various interpretations have been placed on this discovery by different investigators. Singer (1953) produces evidence that there were large numbers of African Negroes in India in earlier centuries. For instance, in A.D. 1437 large numbers of African slaves were introduced into Western India. In 1696 there were 20,000 Negroes in Pondicherry. This is, as he suggests, a possible source for the Veddid sickle cells, rather than a separate centre of their origin; but the R_0 (cDe) in the Veddids was as low as in Europeans, whereas Negro ancestry should make it high. When travelling on the Malabar coast of India in 1938, I was much struck with the Negroid appearance (for example, of nose and lips) in some of the inhabitants. It seemed that these characteristics could only stem from Africa. Two cases of sickling have recently been found in Java, the significance of which it is not at present possible to assess. Incidentally 1500 Bushmen in Southwest Africa showed no case of sickling.

Full testing with all the Rh sera as well as examination for sickling and for the various forms of haemoglobin should now throw considerable further light on the origin and relationships of the Pygmies.

Another blood group antigen, V, of the Rh series, has recently been found to be high in Negroes and rare in whites (De Natale et al. 1955). Of 150 West Africans, 40 % were V +, 26.8 % of New York Negroes were V +, but only 2 in 407 (0.49 %) of Londoners. Examination of the Pygmies for all the new antigens, as well as further testing for sickle cells and the haemoglobins, may throw fresh light on their origin and relationships. The Lutheran, Kell and Duffy antigens all approach 100 % in both the Bushmen and the South African Bantu.

Pygmy skulls and skeletons

Very few Pygmy skulls or skeletons are in museums, because buried bodies soon disintegrate in the damp tropical Congo forests, the Pygmies dislike disturbance of their burials, and the Belgian Government has banned their excavation. Two nearly complete Pygmy skeletons, a male and a female were sent via Emin Pasha to the British Museum and were fully described by Flower (1889). From a careful study and comparison with Bushmen and Andamanese he concluded that "there is nothing in the characters or proportions of these little people resembling those of dwarfs of other races", a conclusion which is in agreement with most of the recent studies. He also concluded, "that they belong in all their essential characteristics to the black or Negroid branch of the human species there can be no doubt".

Shrubsall (1901 and in Johnston 1902, pp. 559-565) described the Bambuti male skull sent to the British Museum by Sir Harry Johnston²⁷. Shrubsall emphasized the higher C.I., microseme orbits, long and very narrow palate, broad nose and small mastoids. In all these respects it agreed with the Akka skulls sent from adjacent territory by Emin Pasha and described by Sir William Flower. Shrubsall described the skull as "small and slight", (as the photos of the same living individual also show) L = 178, B = 141, C.I. 79.2. Full measurements and indices of the skeleton are given. The Monbottu compared with the Asande or Bari were found to have shorter stature, smaller cranial capacity, a broader skull, higher prognathism, and more megaseme orbits, which "might suggest some intermixture with the dwarf races of the forest zone constituting the Welle-Nile watershed", i.e. with the Akka.

Van den Broek (1938) fully described a female Pygmy skeleton which was brought to Holland by Dr. P. Julien (1935) who studied the Pygmy blood groups²⁸. The skull was very small, L = 167, B = 122, height (ear to bregma) 103.5, C.I. 73.1. The sacrum in this skeleton was extraordinarily small and gracile, length 97 mm, width at top 87 mm. On the other hand, the pelvic girdle can be as large as in some Negroes.

Matiegka and Maly (1938) made a full study of four Pygmy (Bambuti) skeletons (2 ♂ 2 ♀) from the Ituri, which are in the Congo Belge Museum at Terveuren near Brussels. They were obtained in an expedition from the Museum in 1934-5. I had the privilege of examining these skeletons at the Museum in 1956 through the kindness of the Director, Dr. F. M. Olbrechts, and of Mr. Maurice Baquaert, Departement of Archeology. My measurements of the skulls are given in Table XI. Some of them, especially in the nasal region, were not taken by the previous authors. After making the measurements, I came to the paper of Matiegka and Maly and found certain discrepancies in length and breadth measurements of the skulls. On rechecking, I made only one slight change. My bizygomatic measurements are nearly all smaller than theirs, the reason being that I place the calipers at the top of the suture in the

²⁷ This individual alive is shown in Johnston (1902), Figs. 287 and 310.

²⁸ It is now in the Anatomical Institute of Prof. Huizinga at Utrecht.

Table XI - Pygmy Skulls

	L	B	C.I.	bifront.	bizyg.	Inter orb.	Nasals			Nas. apert.		Remarks
							L	top	butt.	Ht.	Br.	
No. 207 ♂	169	135	79.88	97	118	23.1	21.3	13.1	18.4	24.0	26.1	From Irumu ²⁹
No. 212 ♂	174	133	76.44	104	125	25.4	21.3	7.4	17.2	19.0	24.9	From Irumu ²⁹
No. 1901 8.9.1 ♂	177	140	79.09	104	119 ³¹	23.4	17.4	9.2	16.7	28.7	26	Bambutu, Sir H. Johnston ³⁰
No. 1887 12.1.105 ♂	168	122	72.61	97	114	19.9	17.8	6.0	13.7	21.2	23.7	Akka, Emin Pasha ³⁰
No. 20520 ♂?	171 ³²	122	73.7	96	c.112	21.9	16.3	9.2	16.1	25.5	23	Babongo (Moyen Congo) ³²
Means	171.8	130.4	76.34	99.6	117.6	22.7	18.8	8.98	16.4	23.7	24.7	
No. 208 ♀	172	127	73.26	100	118	23.3	17.2	9.2	14.6	22.1	24.2	From Irumu ²⁹
No. 213 ♀	162	129	79.63	102	117	24.2	19.4	9.1	16.2	21.0	24.3	From Irumu ²⁹
No. 1887 12.1.106 ♀	162	126	77.78	95	107	19.3	12.7	7.2	12.5	23.	19.8	Akka from Emin Pasha ³⁰
No. 18449 ♀	166 ³²	130	78.3	99	104	19.3	21	10.5	11.4	23.2	21.9	Babinga ³²
Means	166.6	129.6	77.9	98.2	111.8	21.8	17.6	9.	13.7	22.3	22.5	
No. 18492	171	138	80.7	95	113	23	—					Toerien (1954)
	158 ³⁵	130	82.3	96	107	22.8	19.9	7.7	14.3	23	20.1	Child ³²

²⁹ In the Royal Congo Belge Museum, Terveuren, Brussels.

³⁰ In the natural History Museum, South Kensington.

³¹ Shruballs' measurements of this skull were L 178, B 141, C.I. 79.2 bizyg. 125. My slightly smaller measurements could be accounted for by shrinkage of the skull in the last 56 years.

³² In Musée de l'Homme, Paris.

³³ This skull has a full occipital "bun", regarded as a Negro feature, but shows no guttering. It is pentagonoid, the nasals well arched up and projecting outward below rather like a European nose. Height ca. 137 cm, age ca. 25

³⁴ This skull, probably male, has a full bun, small mastoids; it is ellipsoid and scaphoid, the nose again Euroid.

³⁵ Slightly pentagonoid, bun, nasals nearly flat but above frontal branch of maxilla, not projecting outwards below; slight guttering in base of nasal aperture.

zygomatic arch as a fixed point, whereas the measurement is generally taken at the point of greatest breadth of the skull. My measurement also has a certain advantage because the zygomatic arch is frequently broken just behind this suture where the skull is generally widest. I also measure the minimum bifrontal width at the suture, which gives a fixed landmark.

I was afterwards able to examine three Pygmy skeletons in the British Museum (Natural History) through the kindness of the Director, Sir Gavin de Beer, Dr. Kenneth P. Oakley in charge of Anthropology, and with the aid of Miss R. Powers. These were the male Bambuti skull sent to the British Museum (Natural History) by Sir Harry Johnston and examined by Shruballs (1901), and the two skeletons (male and female) sent by Emin Pasha and studied by Sir William Flower (1889). My measurements of these four male and three female skulls are brought together in Table XI together with a female Babinga and a probably male Babongo skull examined in the Musée de l'Homme, Paris, through the kindness of Professor H. V. Vallois. Other observations on these skulls are given below.

Morphological characters of Pygmy skulls

No. 207 ♂. Skull ovoid to beloid in top view, low and rounded; very small brow ridges, slight occipital "bun",³⁶ (Wormian bones), temples depressed, no parietal bosses, small mastoids. Zygomatic arches short and high. Nasal bones wide, \pm arched above the frontal branch of the maxilla. Mandible shallow, 18.5 mm high at the symphysis, genial ossicles small. Bone absorption was so extreme that there were no teeth nor even alveoli in either jaw, the maxillary surface being level with the palate.

No. 212 ♂. Skull pentagonoid, low and rounded, small brow ridges, temples depressed, small mastoids. Zygomatic arches short, and wide from the skull. Nasals flat, narrow above, broad below, \pm in plane of maxillary branch but bent outwards. No guttering,³⁷ slight prognathism, glabella vertical. Mandible shallow, only 22 mm at the symphysis, no teeth or alveoli.

No. 1901. 8.9.1 ♂. Skull \pm pentagonoid, \pm scaphoid, Wormian bones, temples very depressed, mastoids very small, no brow ridges but a marked frontal depression or groove,³⁸ glabella slightly bulged. Nasals arched above the maxillary branch, guttering of nasal aperture, alveolar prognathism. Teeth little worn. Skull shape approaches that of the Bushmen.

No. 1887. 12.1.105 ♂. Skull (Aká) \pm pentagonoid, smaller than the last and most dolichocephalic; mastoids small. Nasals narrow above, nearly flat, bending outward below. No. 208. ♀. Skull ovoid, near pentagonoid, low and rounded, small brow ridges, frontal and parietal bosses, temples depressed, very small mastoids. Zygomatic arch high. Nasals flat, narrowest at top, widest at base, giving a trian-

³⁶ Regarded as a feature of the Negro race.

³⁷ Guttering at the base of the nasal aperture is regarded as a Negro skull character.

³⁸ Frequently seen in Hottentot-Bushman skulls.

gular form, nearly in plane of maxillary branch; strong alveolar prognathism, nasal aperture nearly round, little guttering. Malars prominent, orbits low and broad, squarish. Mandible shallow, teeth worn flat, genial ossicles very small.

No. 213. ♀. Skull ovoid-pentagonoid, low and rounded, sutures not simple, slight brow ridges, mastoids very small. Zygomatic arch short. Nasals nearly flat, widening at extreme top, above plane of maxillary branch, no guttering. Orbits less low, squarish. Mandible extremely shallow, 14.7 mm at symphysis, alveoli absorbed but M_3 unworn. This skull is markedly younger than 208, the wisdom tooth being newly cut, yet the alveoli of the jaw were absorbed. No. 1887. 12.1.106. Akka skull, ovoid, very scaphoid, glabella vertical, no brow ridges, slight transverse depression in frontal, temples depressed, mastoids medium small. Nasals small, \pm arched over maxillary branch. No guttering, alveolar prognathism. Teeth worn flat.

Considering these seven skulls, there are no significant differences between the five Bambuti and the two Aká. The male Babongo and the female Babinga skull fall in with the series. They are all generally ovoid but some are more or less markedly pentagonoid, a feature of the Bushman skull. The brow ridges are quite small or absent, the temples generally depressed, mastoids small or very small. The zygomatic arch is generally short. The nasal bones may be wide or narrow at the top, they are generally flat but may be \pm arched up over the frontal branch of the maxilla. Guttering of the nasal aperture was present in one. The mandible is shallow, and a unique feature is the way in which the alveoli were absorbed in skulls 207, 208 and 213. In the last, a female skull, the mandibular alveoli were absorbed although a wisdom tooth (M_3) had only recently been cut. In No. 207 all the alveoli of both jaws are absorbed, the surface of the maxilla being level with the palate. Such a condition is hardly compatible with life, but was antemortem, this man having apparently no teeth since the age of 15. Schebesta (1952) found abundant caries, with frequent loss of all teeth before old age. The teeth may be overcrowded or insufficient to fill the jaw. Périer and Adé (1953) made a study of the severe maxillo-dentary conditions in seven Pygmy skulls. They suggest as cause constitutional endocrine deficiencies.

Dental studies of Pygmy teeth and jaws are much needed. Purulent inflammation of the teeth appears to be frequent. This and the jaw bone absorption probably has some relation to the diet. Sauter and Adé (1953) have pointed out certain pithecoïd anatomical features of the Pygmy skull.

Twisselmann (1942) made a careful study of four skulls of western Pygmies (two female Babongo from Gabon, one adolescent Babinga male from the Congo, and one man from Baturi, SE Cameroons). The cranial bones were thicker, especially in the posterior region, than in the French, and the sex differences were marked, the head being as large as in the tall races. The basion-bregma height was 124 mm in females, less than in males and the same as in female Bushmen. One skull was ellipsoidal in top view, the other three pentagonoid. Brow ridges were marked only in the male skull. Two show occipital protuberance. All exhibit alveolar prognathism, but less than in the Negro. The nose is regarded as the lowest among races, but broad.

The mandibles show great resorption and tooth loss. Many other anatomical details are given. He finds the range of C. I. in the eight known skulls 68.8-84.5, the capacity of the female skulls 1268 cc, male 1428 cc. The Pygmy skull is slightly smaller in all dimensions than the Negro, but not in proportion to the decrease in size of other bones. He concludes that the Ituri skull is narrower, a little longer and clearly lower than the western Pygmy. His comparative measurements show that the Pygmy and Negro skull widely overlap, but some Negro heads are larger. The smaller capacity of the Pygmy skull is partly accounted for by the thicker skull bones. Twiesselmann finds the C.I. of the Negro 77 and of western Pygmies 77.8, Ituri 75.9. He curiously denies that the greater resemblance of the western Pygmy to the Negro can arise from intercrossing.

Toerien (1954) has carefully described the skeleton of a female Pygmy who died in a mental institution at Makerere, Uganda. He finds in it a number of paedomorphic features which are shared with the Bushmen. The skull is euryptenonoid, with prominent parietal bosses. The C.I. is 80.7, placing it among the brachycephalic, shortheaded Pygmies. In a number of features the skull differs from that of the Bush and resembles the Negro. The innominate bones are very narrow and show resemblances to the Australopithecines.

The Singa skull described by Smith-Woodward (1938) from the Sudan is generally regarded as an ancestral Bushman, but may also have ancestral relations to the Pygmies. It is brachycephalic and extremely pentagonoid with prominent supraorbital ridges and a depression above them. The nasal bones are curved forwards unlike the Bushmen. The male Aka skull in the British Museum is also \pm pentagonoid, and the nasals although nearly flat, bend outward below.

For comparison, measurements of certain other African skulls are given in Table XII. The Asande skeleton from N E Congo (Uele district) is evidently a Pygmy-Negro mixture, especially in the nasals and the long bones. The skull was ovoid, low and rounded, with no brow ridges but a transverse depression, the temples depressed, zygomatic arch short, mastoids small, nasals \pm arched over the maxillary branch, slight guttering of base of nasal aperture. The skeleton is that of a short, small individual, femur ca. 33.5 cm, same length as Pygmy and even more slender. There is no humerus, but the forearm is much longer than in the Pygmy: Ulna 28 cm. (Pygmy 21 cm), radius 27 cm (Pygmy 19.5 cm). In No. 36, a supposed Negro female from the same area, the length of femur was 35.2 cm, tibia 31.7 cm, another " Negro " femur being 41.7 cm.

A collection of nine remarkably small Egyptian crania from the 3rd Dynasty were described by Smith (1911). From the descriptions and photographs it seems that these were not Pygmies but infantile dwarfs with a small skull and small pelvis. However, Toerien (1954) regards them as true Pygmies. The very small male skull is pentagonoid with small mastoids.

As regards the post-cranial skeleton, Matiegka and Maly (1938) have made many measurements of bones and pointed out certain anatomical features in No. 207 and No. 208 (see Table XI). The clavicle shows less torsion than in other races, its length

Table XII - Other Skulls

	L	B	C.I.	bifront.	byzyg.	Inter orb.	Nasals			Nas. apert.		
							L	top	bot.	Ht.	Br.	
No. 35 ♀	156	121	77.56	100	114	24.	20.4	12.3	12.9	19.8	23.5 ³⁹	Asande, N.E. Congo
No. 39 ♀	171	128	74.85	99	120	20	16.8	8.8	12.2	28.2	22.8 ³⁹	Negro, not typical, Uele, Congo
No. 36 ♀	172	128	74.42	95	c. 110	21.9	16.2	8.0	15.3	22.4	23.0 ³⁹	N.E. Congo
No. 23-299 ♀	172	135	78.49	103	118	25.1	23.2	—	—	19.3	24.1 ⁴⁰	West Africa
No. 1923.6.43 ♀	177	141	79.66	105	135	26	—	11.4	13.2	—	25.1 ⁴⁰	Hottentot
No. 1949.12.7.11 ♂	179	133	74.30	109	131	22.2	17.1	—	—	29.8	28.3 ⁴⁰	Basuto
♂?	192	142	73.96	111	141	30.3	25	—	—	32	25.5 ⁴⁰	Zulu

³⁹ In the Royal Congo Beige Museum, Terveuren, Belgium.

⁴⁰ In the Natural History Museum, South Kensington, London.

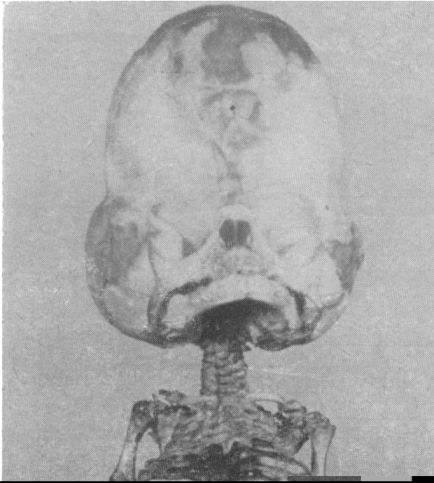


Fig. 17 - Photograph of a specimen in the Museum of Pathology, St. Bartholomew's Hospital, London, dated 1831-1851. It shows the skeleton of a seven months fetus with achondroplasia and hydrocephalus. For description see text.

Fig. 18 - X-ray photograph of an achondroplastic fetus, showing the very immature limb bones. From specimen No. A30.14. 32196 in the Museum of Pathology, St. Bartholomew's Hospital.

108-127 mm. The sternum measured 90.8 mm long, scapula height 107-121, breadth 84-96 mm. Sacrum length 95-105, breadth at top 84-93 mm, at bottom 45-53 mm. Viewing the unarticulated bones, they are nearly all both shorter and more slender than the corresponding bones of the Negro. For instance, in No. 207 the scapula, clavicle, femur and innominate bone are all smaller in all dimensions than in the Negro. Width of the innominate bone is 121 mm in Pygmy 207, 134.3 mm in a Negro, the diameter of the acetabulum being respectively 41.4 and 48.0. However, in one case this bone approximated in size to that of the Negro, but its acetabulum was smaller, to fit the smaller head of the Pygmy femur.

Measurements of long bones are not sufficient to draw final anatomical conclusions, but as already pointed out (p. 25) the Pygmy has short legs, relatively long arms, generally a relatively large head and we may add, frequently a relatively broad pelvis.

Fig. 17 is a unique specimen in the Department of Pathology of St. Bartholomew's Hospital, London. This skeleton of a 7 months fetus combines typical achondroplasia with hydrocephalus. It is dated between 1831 and 1851. The very short, thick limb bones are clearly shown in the photograph kindly provided by Dr. W.J. Hanbury. The specimen is accompanied by the following description. "The vertebral column is natural; the ribs are thickened and unnaturally short. Both the upper and lower extremities are somewhat stunted". Arms $3\frac{1}{4}$ inches, shoulder to finger-tips. Lower limbs, from the head of the femur to the heel, show a similar measurement ($3\frac{1}{4}$ in.). Spine $4\frac{1}{2}$ in. long. Diaphyses of all long bones of limbs are well ossified, thickened and heavy, but only some $\frac{2}{3}$ normal length of a 7 month fetus. Some, such as femora and fibulae, unnaturally curved, as well as thickened. Epiphyses shrunken in preparation so their original condition cannot be determined. Clavicle alone is natural in length and thickness. Condition of limb bones probably "due to a slight degree of achondroplasia". This specimen thus represents one of the many forms of achondroplastic mutation, different in many respects from that of the Pygmy. An X-ray photograph of a younger achondroplastic fetus from the same Museum, for which I am indebted to Dr. Hanbury (Fig. 18), shows the large head and the very immature condition of the skeleton.

Nature of the Pygmy dwarfing

The nature of human dwarfing has been much discussed (M. Weninger 1954). Many forms of dwarfing are now known (Gates 1946, pp. 1320-32) and need not be discussed here. A general rule, though apparently not without exceptions, is that achondroplastic dwarfing is a simple dominant in man, while miniature, ateleiotic or liliputian dwarfing is a simple recessive. Such dwarfs probably occur in all human races, but with more frequency in some than in others. Stannus (1914) described a male Bantu achondroplastic dwarf in Nyasaland, aged 25 years. His parents were normal, so he was probably a mutation. Photographs show him to be normal except that his lower legs were bowed outwards. The upper arm was very short compared

with the forearm.⁴¹ His measurements were, height 118.2 cm, span 113.3 cm, head $L = 201$, $B = 158$ (C.I. 78.6). Four other cases were cited, showing that the condition is not very uncommon in Nyasaland. The head is large, and the pelvis probably full size. Another member of the Yao tribe, 35 years old, height 142 cm, is shown with a normal male, height 185 cm. In addition is an ateleiotic dwarf 125 cm high.

Here is evidence that achondroplastic dwarfing at least is not uncommon in the Yao tribe of Bantu. There is ample evidence that it occurs in other Africans. Longmore (1952) describes an achondroplastic dwarf in NE Transvaal. He was only 3 ft. 2 in. (969 mm) high and weighed 50 pounds at the age of 67 years. There were five dwarfs of this type, with relatively big heads, in three generations of a family, the inheritance a simple dominant. Although a much more extreme type of dwarf than ordinary achondroplastics, the photograph shows essentially this type, i.e., with stout body and short limbs. Thus we have a form of dwarfing which combines the two main types but is dominant in inheritance.

While we speak of achondroplastic dwarfing as dominant, these individuals are all presumably heterozygous and the homozygous condition *might* be more extreme. When the heterozygote is crossed with the race from which it sprang we have the phenomenon of "dominance", i. e., the same short stature reappears. However, in crosses of Pygmies (who are homozygous for the dwarfing gene) with Negroes, the F_1 is intermediate, as already pointed out in this paper. This may be because the Pygmies have not sprung from the Negroes, but from another race as already concluded (p. 26). But it is equally likely that the Pygmies, being homozygous for the dwarfing gene,⁴² are for this reason shorter than the single-gene heterozygotes in crosses.

Since this was written, an account of achondroplasia in Northern Ireland has appeared (Stevenson 1957). In this population 39 cases were found, a frequency of 28 per million. Three forms of achondroplasia were recognized. 1. A severe and generally fatal form, appearing as a dominant mutation or a phenocopy. 2. With no impaired vitality. Mated to a normal partner, their children are either normal or affected, showing that the dwarf parent was heterozygous for a dominant mutation. 3. Certain cases indistinguishable from 2. are probably recessive in inheritance. This confirms the condition postulated in Africans.

Thus we reach the conclusion that the Pygmies have arisen through inbreeding of individuals heterozygous for a simple dwarf mutation. The parent tall race is perhaps now extinct. It would have mahogany skin colour and hairy body.

The Hanhart (1925) type of dwarfing accompanied by adiposity and genital dystrophy is an independent form of inherited dwarfism now well known.

⁴¹ It will be remembered that the first Pygmy Stanley encountered (p. 15) was bow-legged.

⁴² The suggestion of Goldschmidt (1956) that the term gene should be dropped as meaningless and misleading is like throwing out the baby with the bath-water. It was pointed out many years ago (Gates 1915), even before the term gene was invented, that a factor mutation represents a *difference*, which is stable in later generations. Whether this is based on a biochemical difference in a molecule at one locus of a chromosome or on some newer concept, the concept itself must last as long as Mendelian heredity.

Dwarfs of achondroplastic type have been recorded in other African races, for example, Johnston (1902). Like the melanic moths, such dwarf mutations have probably been occurring in the ancestors of the Pygmies for thousands of years. An isolated group of such dwarfs could multiply rapidly in isolation. They would have at first the same customs and utensils as the race from which they sprang.

Schebesta (1952) considers that the Bushmen were derived from Bambuti X another race and later adapted to dry steppe conditions. He also (1931) argues for a common origin of Bush and Pygmy on a linguistic basis which is not convincing. Dart (1937), in an analysis of the physical characters of the Bush, supports their relation to the Pygmies as well as their derivation from Boskop ancestry. The question is too involved to discuss here, but it will be taken up elsewhere. It may be pointed out that the Bush and Pygmy races differ markedly in many characters, such as skin colour, head shape, hair form and body build, to mention a few. Common ancestry, if it exists, must go back a long way, and the nature of the dwarfing appears to be totally different in the two races.

No attempt will be made here to consider the many types of human dwarf races now known, but reference may be made to a few of the less known or recently investigated dwarf races. The Abbé Rochon (1791) gives convincing evidence of the former existence of a dwarf race called Quimos living on a plateau in the interior of Madagascar, some three or four days journey from Fort Dauphin in the southeast of the island. The only one seen was a slave woman described as 3 ft. 7 in. high, with very long arms, hair short and woolly, features more European than Madagasy, and with nipples but no breasts. The Governor in 1768 reported them living in the interior at 22° S. Lat. I have found no later reference to these Madagascar dwarfs, but I am perhaps more inclined to credit their existence, having seen many years ago, on exhibit, a group of "Hovas" with black skin who were certainly semi-dwarfs. Their bodily conformation was wholly unlike that of the Pygmies. I think this term, by the way, should be confined to the Bambuti and their allies, not made equivalent to dwarfs.

Gusinde (1957) gives a preliminary account of a dwarf race he studied in NE New Guinea, on a plateau in the Schrader Mountains near Madang. He finds three racial varieties with separate languages and regards them as the first inhabitants of the island who were forced up from the valleys by warlike invaders (Kanakas). He measured 260 adults, average height below 150 cm. His description sounds remarkably like that of the Bambuti, but presumably one may regard them as of independent origin. They have relatively large, broad heads, long arms and short legs; dark skin very hairy, with full beards, nose large and bulbous; ears oval, generally with no lobe. These people raised taro, manioc, yams, bananas and tobacco in simple gardens. Bijlmer (1923) made an early study of short people in the mountains of New Guinea, but found "great diversity" of stature, and the picture he gave led to the view that their condition might be the result of several cumulative genes for height.

Van den Brock (1923) described the skeleton of a male "Pygmy" from SW Dutch New Guinea. The skeleton of this mountain Papuan, besides being short, shows mor-

phological differences in nearly every respect from the lowland people, but many of the differences are ascribed to environment.

As another example of a dwarf race we may mention dwarf Indians (Ayamanes) living on the Rio Tocuyo in Venezuela, as described by Fleury - Cuello (1953). Their stature is under 150 cm, their proportions are normal, and of course they have Indian characters, but the nature of the dwarfing cannot be analyzed without further evidence. Gusinde (1955 a, b, 1956) has recently studied this tribe under the name Yupa. He concludes that they are not mutational dwarfs, but their small stature is produced by their miserable conditions of life. The average height of 23 men was 153.77 cm and of 14 women 141.78 cm. The Maraca Indians on the West side of the Sierra de Perija are similar. Both tribes show some very small but normal individuals, and many with more or less crippled structure accompanied by low mentality.

Mention may be made of former records of Neolithic dwarf skeletons in parts of Europe (Kollmann 1895). They were associated with tall skeletons and never multiplied sufficiently to form a race. Kollmann (1902) later suggested that dwarf man was ancestral to tall races, being derived therefrom by mutation. So early was the conception of mutation applied to man, but in the reverse direction. We now consider dwarf types as derived from tall. Rischbieth and Barrington (1912) find evidence of a dwarf race in Europe in Roman times, disappearing as late as the 10th century.

Kirchhoff, Lehmann and Schaefer (1954) describe four pedigrees of "primordial" dwarfs, the dwarfing recessive in three but dominant in one. The deficiency in height began to show in measurements at one or two years of age. The trunk was short but relatively long. It will be remembered that this type of dwarf is generally recessive in inheritance. Kirchhoff and Schaefer (1954) describe another family of pituitary dwarfs. Rudder and Kipper (1950) record yet another kind of hereditary dwarfing (primordial or miniature dwarfs) in which the parents were below medium height and an additive effect of several cumulative factors is indicated. However, most of the facts can be explained by a single gene in a short family producing more dwarfing in the homozygous than in the heterozygous condition. These cases illustrate the great variety of dwarf types (mutations) which exist.

A study of the various types of chondrodystrophy by Grebe and Weisswange (1943) shows what a great variety of more or less *pathological* forms of hereditary dwarfing are found in medical practice, each inherited in its own family and distinguishable by X-ray examination and study of the epiphyses. There is reason to suppose that the number of kinds of racial dwarfing is equally great. Grebe (1957) estimates that there are probably over 100 different monomeric genes for pathological dwarfing in man.

Fischer (1950) recognizes three kinds of racial human dwarfs: (a) produced by unfavourable food and other environmental factors inhibiting growth, this condition not being inherited. He cites as an example the mountain strain in the New Hebrides. (b) A long period of selection by nutritive, climatic and other conditions gradually reducing the stature. His examples are the Veddas, Lapps and pygmoids, but we have seen that the pygmoids of the Congo are the result of crossing between Pygmies

and forest Negro strains. (c) Through mutation in growth-controlling genes which are then selected or isolated. The Bambuti certainly belong here, and Fischer thinks probably the Bushmen as well. Marked dwarfing of animals to produce a dwarf strain, can occur under unfavourable conditions. A well authenticated instance is that of the Sable Island ponies (Gates 1923, p. 36) produced in about 150 years from horses which ran wild.

From the beginning of genetics it has been assumed that spontaneous mutations occur in all or many directions without reference to environmental factors. Then swarms of mutations were produced by X-rays, and later by chemical substances. More recently certain cases (e.g. in bacteria) indicated a possible directive effect. Now comes an established case of directed mutation in maize (Brink 1957). The R locus conditions aleurone and plant colour, and the mutation $R \rightarrow R'$ (reduction of pigment) occurs regularly in plants heterozygous for stippled aleurone. This at any rate makes more plausible the suggestion that dwarf faunas may be produced by some environmental factor. Kutassy (1930) described a dwarf fauna in the Middle Miocene of Hungary. He also cites Sarasin's account of an area in Southern New Caledonia where there are pools and swamps and much iron in the soil. The dwarf fauna here included snails, crayfish and fishes. An area in the Seiser Alps (South Tyrol) also has a volcanic soil of iron-bearing tufa and a dwarf fauna.

Staffe (1936, 1947) has advanced the argument a step further. He points out that chondrodystrophy is the most common developmental anomaly (mutation) in domestic animals, resulting from derangements in the endocrines which retard cartilage development and ossification of bones. Achondroplasia is cited in cattle, dogs, pigs, horses, sheep, goats, fowls, taking many different forms. In 1938, Staffe saw in the Kupe Mountains of Kamerun about 50 Balundu Pygmy plantation workers with their wives and children, some mixed with Negro. About half of them showed exophthalmos. The stature of the males was 144-153 cm, females 138-150 cm. The whole population was estimated at 20,000-25,000. He regarded their body characters as nearly all arising from chondrodystrophy, parallel to some of the dwarf domestic animals. He regards the Pygmy as a mutation. Incidentally he cites historical evidence that at the beginning of the 16th century, between Lakes Albert and Edward, the Birakuma and their advance guard, the Lengola, were driven away by the Pygmies.

In the Kamerun, Staffe cites, in addition to dwarf cattle, goats and fowls, dwarf elephant, hippopotamus, antelope, pigeon, bittern, grebe. These accumulations of dwarfs in particular areas seem to require some special explanation. Staffe cites the photo sensitization of cattle in South Africa by porphyrin compounds being produced by the action of bacteria in the rumen, breaking down chlorophyll, the haemato-porphyrin being resorbed into liver and gall and capillaries, thus sensitizing the skin. Iron also accumulates in porphyrin diseases, and the South African soils contain abundant iron. It is suggested that the germ cells might also be sensitized by excess porphyrins in the body. The same argument is applied to dwarfing, with the suggestion that derangement of iron metabolism might produce distortion of hereditary endocrines at different stages of development.

Jeffreys (1951) has discussed the problem of dwarf men and animals from a similar point of view. He describes a Pygmy strain from the British Cameroons. He adds to the list of dwarf wild animals in West Africa the buffalo, crocodile, dormouse, leopard, goose and chimpanzee. Some of these dwarf varieties are regarded as distinct species.

These examples of dwarf faunas are sufficiently striking. Whether they are in any sense the result of directed mutations remains for the future to determine. Another important study of dwarfing has since come to my attention. Vaufrey (1929) wrote a monograph on the fossil dwarf elephants on islands in the Mediterranean. They are all varieties of the Pleistocene *Elephas antiquus*. The three dwarf forms all occur in Malta and in Sicily, with which it was formerly connected. They are believed to be of Würmian age, when the elephant had already disappeared from western Europe. The same forms, *mnaiadiensis*, *melitensis* and *Falconeri* were also found in Sardinia, Crete and Cyprus. They were progressively smaller in size, the length of the cubitus bone being respectively 84, 65 and 36 mm. They appear very near the end of the Pleistocene, and Vaufrey insists, on good grounds, not only that unfavourable conditions produced these island dwarfs, which do not appear on the continent, but that they were produced independently on each island, not by any restrictive action of the island, but by what we would call directed mutations. Moreover, as the three forms are distinct from each other on each island, we must assume that they were produced by three successive mutations making them progressively smaller. They do not merge into each other. There were also two dwarf forms of the mammoth, *E. primigenius*. Vaufrey finds also three dwarf races of Hippopotamus; (1) *H. Pentlandi*, which is smaller than the hippopotamus of Madagascar, (2) *H. melitensis* of Malta and Crete, (3) *H. minutus* of Cyprus, which is as small as the Liberian dwarf species. These must have originated in the same manner as the dwarf elephants.

We have seen that there are many forms of hereditary chondrodystrophy which are similar to achondroplastic dwarfing, and which arise from time to time as a mutation. So we may conclude that the Pygmies have arisen as some form of achondroplastic mutation, such being not uncommon in Negro races today. The exact nature of the genetic change involved can only be determined by further morphological and physiological research with the Pygmies, and by fuller comparison with other racial dwarfs.

Adé (1954) has studied the problem and concludes that the Pygmy dwarfism results from an alteration in the endocrine mechanism. He believes that two changes are involved, (a) deficiency of the adeno-hypophysial growth hormone, and (b) hyperoestrinization. A drawback to this view is that the Pygmy dwarfing is inherited as a unit, and there is no evidence that it breaks up in crosses. Adé (1953) also points out as features of hypopituitary dwarfing parallel to those of the Pygmy, (1) preponderance of head and trunk to the limbs, (2) a tendency to brachycephaly, (3) narrow face and flat nose, (4) micromelia affecting especially the proximal segment of the limbs, (5) similar curvatures and axial torsions, (6) pelvis small and narrow, (7)

certain dental anomalies. Adé attributes various other (endocrine) peculiarities to the Pygmy, and thinks that his endochondral deficiency is less than that of achondroplastic dwarfs. But we have seen that these mutations occur in various degrees, some pathological, others not. Any final verdict regarding the exact nature of the dwarf mutation awaits further knowledge of Pygmy physiology.

Fischer (1954) points out various parallelisms between the racial characters of the Pygmies and those of some dwarf domestic animals. He finds that the Bambuti as well as the Negritos and Bushmen have all arisen through mutations which produced a number of racial characters besides the dwarfing. But he cites the Vedda of Ceylon and the dwarf races in the mountains of New Hebrides as cases of environmental modification. We will not enter further into the various types of dwarf human races in this paper, and their relationships. We have confined our attention mainly to the nature and origin of the Central and West African Pygmies. The dwarf race recently studied by Gusinde (1957) in New Guinea appears to be remarkably like the African Bambuti. If this is so, the question arises whether they are a parallel mutation or whether possibly both races stem from a common origin.

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Summary

This paper expresses new views regarding the origin and relationships of the African Pygmies, based on a study of a small colony at Bundibugyo in Western Uganda which apparently differ in no respect from the Efé Pygmies. Compared with them are the Bwamba, a tribe examined at Bundibugyo and Fort Portal who are found to be pygmoids, of relatively recent hybrid origin from crosses between the Pygmies and forest Negroes. Their intermediate stature and great variability confirm the hybrid origin.

Citation of early literature shows that the Pygmies formerly occupied a much wider area, including the Cameroons, Sierra Leone and probably Liberia in West Africa, where they first came to the attention of Europeans in the 16th Century. The Eastern Pygmies first came to be known about 1870 by expeditions up the Nile into the Azande country where they found the Monbuttu Negroes and the Akka Pygmies. The ancient Egyptians knew the Akka.

The Bambuti Pygmies are now recognized as having three branches, Efé, Basúa and Aká of similar dwarf stature, the differences between them being of minor character. The upper limit for Pygmy stature is generally regarded as 150 cm. Surrounding the Ituri forest Pygmies are many pygmoid tribes of taller stature, produced by miscegenation with the forest Negroes. Groups extend east to the Semliki River and south as far as Lake Kivu and even Lake Bangweolo. The adjacent Negro (Bantu) tribes in these eastern areas show various degrees of hamitization.

Accounts are given of early as well as later European contacts with Pygmy tribes, and of certain groups taken to Europe.

The extensive observations of Schebesta and Gusinde have made the Bambuti Pygmies best known. For these people Gusinde adopts the name Twiden, which may be shortened to Twi. He shows that some of the eastern Pygmies and pygmoids have recently undergone great changes in their manner of life.

The unique symbiotic relations between Pygmies and their Negro overlords are well known. They hunt in the forest for okapi, elephants and other animals, supplying meat to the Negroes, who give them bananas in return. When the banana was introduced to Africa from India is unknown, but there must have been an earlier period when the Pygmies fed themselves, and perhaps lived in open territory northeast of where they now extend. The Singa fossil skull gives possible evidence of such former extension.

The pantropical disease Kwashiorkor, is seen in the Pygmies, the brick-red hair being a symptom. It apparently results from protein deficiency, and especially from a diet of bananas at the time of weaning. The Pygmy teeth and jaws are probably the most pathological to be found in any human race.

Racial mixture with the Negroes is considered. Forest Negroes frequently take

a Pygmy wife, whose children become "Negroes". The Pygmies thus remain pure except for occasional unofficial mixing. The F_1 hybrids are intermediate in stature and probably in other characters. They backcross to the Negro and are thus absorbed into that race. A small number of genes, without dominance, for each racial character-difference is probably involved. The Balese and Babira Negroes are much pygmyized.

Study of skin colour in Pygmies, Baambas, Hottentots and Negroes shows that the Gates chart of skin colours is applicable to these races. The Pygmies correspond with No. 3 (mahogany) of the chart, the Baambas (Pygmy X Negro) with No. 2 (dark mahogany), the Hottentot-Bush with No. 4 (yellow), and the Negro with No. 1 (black). Thus the gene R, under which was formerly included both black and mahogany, is divided into two – Q representing the black of the Negro, and R representing the mahogany of the Pygmy. S (yellow) and T (brunet) skin are present in the Bush-Hottentot. The full black Negro is then QQRRSSTT, the Pygmy RRSSTT and the Bush-Hottentot SSTT. The colour chart, derived only from Negro-White crosses is thus directly applicable to the other African races.

Certain evolutionary relationships of the Pygmies, Negroes and Bushmen now seem clear. The Pygmies are of ancient origin, with mahogany skin and hairy body. The Negroes have since acquired a black skin by the Q mutation, and their bodies have become hairless by one or more loss mutations. The common ancestor of Pygmy and Negro would be a tall race with the mahogany skin and hairy body of the Pygmies. This race may now be extinct. The Bush, with fallow yellow skin, must have lost the ancestral mahogany gene in addition to their other transformations.

The Pygmy dwarfing is apparently the result of a single gene mutation of essentially achondroplastic type, as suggested in 1946. This kind of mutation is not very uncommon in Negro-tribes (various cases are cited) and has probably been occurring like melanism in moths, for thousands of years. Interbreeding of such heterozygous dwarfs would quickly establish a tribe more or less homozygous for the dwarf gene. The Pygmies are then the oldest living race in Africa with the exception of the Bushmen.

The blood groups and sickling of the Pygmies are considered in relation to other African races.

Measurements show that the Pygmy skull is frequently little smaller than that of the Negro, their ranges apparently overlapping, although some Pygmy skulls are very small in dimensions. The cephalic index is higher than that of the Negro in accordance with the small stature, and frequently approaches closely to brachycephaly or overlaps it in the female. In morphology the Pygmy head is ovoid, but skulls are frequently more or less markedly pentagonoid. This suggests a common Boskopoid origin of Pygmies and Bushmen. The Pygmy nose is very primitive and characteristic. Various other morphological features of the skull are considered. The Pygmy teeth and jaws are the worst in any human race, the alveoli being sometimes eroded away completely. This may have a nutritional basis.

The armspan in the living Pygmy exceeds the stature, but the proximal segment of both limbs is relatively very short. The bones of the skeleton are generally smaller in all dimensions than in the tall races, but the head is relatively large, and the same is frequently true of the pelvic girdle. Thus we have a form of achondroplastic dwarfing of mutational origin. Many kinds of dwarfing occur in man, some normal, some pathological. The Pygmy type is one of these but "normal".

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RIASSUNTO

In questo articolo si espongono nuovi punti di vista in riguardo all'origine ed ai rapporti di affinità dei Pigmei Africani basati sullo studio di una piccola colonia di Bundibugyo nell'Uganda occidentale, la quale, sotto ogni aspetto, non sembra differire dagli *Efé* Pigmei. Paragonati a questi sono i *Bwamba*, una tribù che venne studiata a Bundibugyo e a Fort Portal e che appartiene alla razza dei Pigmoidi di origine ibrida per incroci relativamente recenti fra Pigmei e i Negri della foresta. La loro statura intermedia e la gran varietà di tipi conferma la loro origine ibrida.

Dalle osservazioni dei precedenti studiosi dell'argomento risulta che anticamente i Pigmei occupavano uno spazio più esteso che comprendeva il Cameroun, la Sierra Leone e probabilmente anche la Liberia nell'Africa Occidentale, dove essi attirarono per la prima volta l'attenzione degli Europei nel 16° secolo. I Pigmei orientali furono invece per la prima volta conosciuti verso il 1870 dalle spedizioni che si spinsero fino al Nilo ed al paese delle Azande dove incontrarono i Negri *Monbuttu* e i Pigmei *Akka*. Gli antichi Egiziani conoscevano gli *Akka*.

Oggigiorno è ammesso che i Pigmei *Bambutu* si dividono in tre rami, *Efé*, *Basúa* e *Aká* aventi tutti una statura nana e caratteri differenziali di minore importanza. Generalmente si considera che la massima statura dei Pigmei sia di circa cm. 150. Circostanti ai Pigmei *Ituri* della foresta vivono altre tribù di statura superiore che sono il prodotto di incroci coi Negri della foresta. Alcuni gruppi si estendono ad oriente sino al fiume *Semliki* e a sud oltre il lago *Kivu* sino al Lago *Bangweolo*. Le tribù vicine dei Negri (*Bantu*) in queste regioni orientali mostrano vari gradi di hamitizzazione.

Nel presente articolo si riferiscono i più antichi e i più recenti contatti fra Europei e tribù di Pigmei compresi alcuni gruppi portati in Europa.

Le estese osservazioni di *Schebesta* e *Gusinde* hanno reso più noti degli altri i Pigmei *Bambutu* che *Gusinde* chiama anche *Twiden* o, più

semplicemente, *Twi*. Egli dimostra che alcuni fra i Pigmei orientali hanno cambiato profondamente negli ultimi tempi la loro maniera di vivere.

L'unica relazione simbiotica fra i Pigmei e i loro padroni Negri è ben conosciuta. Essi cacciano nelle foreste gli *okapi*, elefanti ed altri animali procurando carne per i Negri che, in ricambio, danno loro banane. Quando la banana fu introdotta in Africa dall'India precisamente non si sa; ma vi deve essere stata un'epoca precedente nella quale i Pigmei si procuravano il cibo da soli e forse vivevano in paesi aperti a nord-est di quelli dove attualmente si trovano. Il cranio fossile dei *Singa* appoggia questa supposizione.

La malattia pantropicale cosiddetta *Kwashiorkor* è evidente nei Pigmei; i capelli rosso-mattone ne sono un sintomo. Essa è dovuta probabilmente alla deficienza di proteine e specialmente alla dieta di banane nell'epoca del divezzamento. In nessuna razza umana si trovano mascelle e denti così patologici come nella razza dei Pigmei.

Si considerano anche nel presente studio gli incroci con i Negri. Spesso la moglie di un Negro della foresta è della razza dei Pigmei, e i figli diventano Negri: così la razza dei Pigmei rimane pura salvo occasionali mescolanze.

Gli F1 ibridi stanno nel mezzo fra le due razze per quanto riguarda la statura e probabilmente per altri caratteri. Essi incrociano coi Negri e così sono assorbiti in questa razza. Probabilmente un piccolo numero di geni non dominanti, è responsabile per i caratteri razziali differenziati. I Negri *Balese* e *Babira* son i più pigmeizzati.

Studi sul colore della pelle nei Pigmei, *Baambas*, *Ottentotti* e Negri, dimostrarono che la carta di « Gates » cui colori della pelle è applicabile a queste razze. I Pigmei rientrano nel N. 3 (color mogano) della carta Gates; i *Baambas* (Pigmeo Negro) nel N. 2 (color mogano scuro); gli *Ottentotti-Bush* nel N. 4 (giallo), e i Negri nel N. 1 (nero). Così il gene R entro il quale precedentemente si facevano rientrare il nero e il mogano è diviso in due, Q rappre-

senta il nero del Negro, R rappresenta il mogano del Pigmeo. S (giallo) e T (brunetto) sono presenti nei Bush-Ottentotti. Il Negro puro è allora QQRSSSTT, il Pigmeo RRSSTT e il Bush-Ottentotto SSTT. La Carta del Colore derivata solo dagli incroci Negro-Bianco, è quindi direttamente applicabile alle altre razze africane.

Appaiono ora più chiare certe affinità dovute all'evoluzione fra Pigmei, Negri e Bush. I Pigmei sono di origine antica con pelle color mogano e corpo peloso. I Negri sono poi diventati di pelle nera per la mutazione del Q e i loro corpi hanno perduto il pelo per una o più mutazioni di perdita. I comuni antenati delle due razze Pigmei e Negri devono essere stati una razza di alta statura con la pelle color mogano e il corpo peloso dei Pigmei. Questa razza può considerarsi oggi estinta. I Bush dalla pelle giallastra devono aver perduto il gene color mogano degli antenati, in aggiunta alle altre loro trasformazioni.

I Pigmei diventarono nani evidentemente in conseguenza della mutazione di un singolo gene di tipo essenzialmente acondroplastico; questa ipotesi fu già suggerita nel 1946. Questa specie di mutazione non è molto rara nelle tribù dei Negri (se ne citano vari esempi); essa si è svolta probabilmente attraverso migliaia di anni, con un processo simile a quello chiamato « melanismo » nelle falene. Generazioni di incroci di questi nani eterozigoti dovrebbero rapidamente costituire una tribù più o meno omozigota per il gene nano. I Pigmei sono quindi la più vecchia razza vivente nell'Africa, fatta eccezione dei Bushmen.

I gruppi sanguigni e il sickling dei Pigmei

sono studiati in confronto a quelli di altre razze africane.

Dal punto di vista di dimensioni del cranio, quello dei Pigmei è generalmente un po' più piccolo di quello del Negro, coi grafici che apparentemente si sovrappongono, sebbene alcuni crani di Pigmei siano di dimensioni estremamente piccole.

L'indice cefalico è più alto di quello del Negro in armonia con la sua bassa statura, e spesso molto si avvicina a quello dei brachicefali e si sovrappone nelle femmine. Dal punto di vista morfologico la testa del Pigmeo è ovoidale, ma il cranio è spesso più o meno marcatamente pentagonale. Questa osservazione suggerisce l'esistenza di una comune origine Boskopoide dei Pigmei e dei Bushmen.

Il naso dei Pigmei è molto primitivo e caratteristico. Vari altri caratteri morfologici del cranio sono presi in considerazione. In nessuna razza umana esistono mascelle e denti peggiori di quelli che si ritrovano nei Pigmei, che presentano spesso gli alveoli quasi completamente distrutti. Una spiegazione può forse trovarsi nel tipo di nutrizione.

La distanza fra l'estremità delle braccia aperte supera nel Pigmeo vivente la sua statura, ma il segmento superiore di entrambe le membra è relativamente molto corto. Le ossa dello scheletro sono generalmente più piccole in tutte le dimensioni di quelle di razze più alte, ma la testa è proporzionalmente grande, e così pure spesso la circonferenza del bacino. Concludendo, abbiamo qui una forma di rimpiccolimento acondroplastico di origine mutazionale. Molti tipi di rimpiccolimento si osservano nell'uomo alcuni normali, altri patologici. Il Pigmeo rappresenta uno di questi tipi, ma « normale ».

RÉSUMÉ

Cet article exprime des opinions nouvelles concernant l'origine et la parenté des Pygmées africains, s'appuyant sur l'étude d'une petite colonie à Bundibugyo en Ouganda occidental, une tribu qui semble ne point se distinguer des Pygmées Efé. Avec eux, on compare les Bwamba, tribu observée à Bundibugyo et à Fort Portal et démontrée d'être des pygmoïdes d'origine hybride assez récente, résultant du croisement entre Pygmées et Nègres forestiers. Leur taille moyenne et grande variabilité confirment leur origine hybride.

Citations d'ancienne littérature établissent que les Pygmées occupaient autrefois une région beaucoup plus étendue, y inclus le Cameroun, la Sierra Léone et probablement le Libéria en Afrique occidentale où ils furent remarqués par des Européens pour la première fois au XVI^{ème} siècle. Les Pygmées orientaux furent connus d'abord vers 1870, résultant des expéditions en amont du Nil au pays Azande où l'on découvrit des Nègres Monbuttu et des Pygmées Akka. Les anciens Egyptiens connaissaient les Akka.

Dès à présent il est reconnu que les Pygmées Bambuti se constituent de trois branches: les Efé, les Basoua et les Aká, tous de stature naine pareille, leurs différences étant d'ordre secondaire. L'extrême hauteur de la stature naine est généralement considéré d'être 150 cm. Aux entourages des Pygmées de la Forêt Itouri habitent plusieurs tribus pygmoïdes de plus haute stature, produites de mélanges avec les Nègres forestiers. Ces groupes se répandent vers jusqu'à la rivière Semliki, vers le sud jusqu'au Lac Kivu et même au Lac Bangwéolo. Les tribus nègres, (Bantous) leur voisins dans les régions orientales, manifestent divers degrés de hamitisation.

Contacts entre Européens et tribus pygmées sont relatés, autant de date ancienne que plus récente, ainsi que l'histoire de groupes nains emportés en Europe.

Dû aux vastes observations de Schebesta et Gusinde, les Pygmées Bambuti sont les mieux

connus. Gusinde a adopté le nom de « Twinden », abrégé « Twi », pour ces peuplades, et il montre que certains d'entre les Pygmées et pygmoïdes orientaux ont récemment subi de grands changements dans leur mode de vie.

Les singulières relations symbiotiques entre Pygmées et leurs maîtres Nègres sont bien connues. Ils chassent des okapi, des éléphants et d'autres animaux dans la forêt et remettent la viande aux nègres qui leur donnent des bananes en échange. On ne sait pas quando la banane fut introduite de l'Inde en Afrique, mais il semble que dans une période du passé les Pygmées ont dû s'alimenter et peut-être même vivre dans des contrées ouvertes au nord-est de leurs habitations actuelles. Possiblement, le crâne fossile de Singa témoigne d'une pareille étendue ancienne.

Les Pygmées ont la maladie pantropicque kwashiorkor, dont la chevelure rougebrique est un des symptômes; elle est peut-être causée par l'insuffisance de protéïdes ou plus particulièrement par un régime de bananes pendant le sevrage. Les dents et les mâchoires des Pygmées semblent être parmi les plus pathologiques de toutes les races humaines.

Le mélange avec la race nègre est discuté. Les Nègres forestiers prennent souvent des femmes pygmées, leurs enfants devenant des « Nègres ». Ainsi les Pygmées restent purs sauf pour des croisements officiels d'occasion. Les hybrides FI sont intermédiaires, autant par la taille que par d'autres caractéristiques. Ils se croisent avec les Nègres et sont ainsi absorbés par cette race. Un petit nombre de gènes pour chaque trait caractéristique racial et sans dominance, est probablement affecté. Parmi les Nègres Balèse et Babira le nanisme est répandu.

L'étude de la couleur de la peau des Pygmées, des Baambas, des Hottentots et des Nègres prouve que le tableau de Gates classant les couleurs de la peau est applicable à ces races. La couleur des Pygmées correspond au no.3 (acajou) du tableau, celle des Baambas (Nègres-pygmes X) au no. 2 (acajou foncé), celle des Boushman-Hottentots au no. 4 (jaune), et celle des Nègres au no. 1 (noir). Ainsi le gène R qui

réunissait autrefois noir et acajou, est divisé en deux, Q représentant le noir du Nègre et R représentant l'acajou du Pygmée. Les couleurs de peau S (jaune) et T (brunet) se trouvent parmi les Boush-Hottentots. Le Nègre d'un noir total est donc QRRSSTT, le Pygmée RRSSTT et le Boush-Hottentot SSTT. Ce tableau de couleurs, basé uniquement sur des mélanges blancs-nègres, est donc directement applicable aux autres races africaines.

Certaines parentés d'évolution entre Pygmées, Nègres et Boushmen paraissent claires maintenant. Les Pygmées sont d'origine ancienne à peau acajou et à corps velu. Les Nègres ont entretemps acquis la peau noire par mutation Q, et leurs corps a perdu le poil par une ou plusieurs mutations de perte. L'ancêtre commun des Pygmées et des Nègres était peut-être une race de haute taille à la peau acajou et au corps poilu des Pygmées. A présent, cette race aura disparu. Les Boush avec leur peau d'un jaune vague ont sans doute perdu leurs gènes acajou ancestraux ensemble avec ceux qui causaient leurs autres transformations.

Le nanisme des Pygmées est apparemment le résultat d'une mutation unique des gènes d'un type essentiellement achondroplastique, selon proposition faite en 1946. Cette espèce de mutation n'est pas très rare parmi tribus nègres (plusieurs cas sont cités) et elle s'est vraisemblablement produite, pareille au mélanisme des mites, pendant des millénaires. Le croisement entre de pareils nains hétérozygotes établira vite une tribu plus ou moins homozygote pour les gènes nains. Les Pygmées sont donc la race vivante la plus ancienne de l'Afrique, exception faite des Bushmen.

Les groupes sanguins et les sicklima des Pygmées par rapport aux autres races africaines sont discutés.

Mensurations crâniennes établissent que les crânes des Pygmées ne sont souvent que peu plus petits que ceux des Nègres, leurs dimensions se chevauchant à ce qu'il semble. Cependant, quelques crânes pygmées sont très petits. Leur indice céphalique est supérieur à celui des Nègres conformément avec leur petite taille; souvent il est tout juste brachycéphale ou les dimensions se chevauchent dans les têtes féminines. Morphologiquement, la tête pygmée est ovoïde, mais les crânes sont souvent pentagonaux d'une façon plus ou moins marquée. Ceci suggère une origine boskopoïde commune des Boushmen. Le nez des Pygmées est très primitif et très caractéristique. Plusieurs autres traits morphologiques du crâne sont considérés. Les dents et les mâchoires des Pygmées sont les plus mauvaises de toutes les races humaines, les alvéoles étant parfois complètement rongées. C'est peut-être une résultat de l'alimentation.

L'empan des bras du Pygmée vivant surpasse sa stature, mais le segment proximal des deux membres est relativement très court. D'une façon générale, les os du squelette sont dans toutes leurs dimensions plus petits que ceux des races à haute taille, mais par rapport, la tête est grande; il en est souvent le même pour le périmètre pelvien. Donc, nous avons ici une forme de nanisme achondroplastique d'origine mutationnelle. Maintes espèces de nanisme existent parmi les hommes, quelques unes normales, d'autres pathologiques. Le type Pygmée en est un, mais « normal ».

ZUSAMMENFASSUNG

Dieser Artikel bringt neue Ansichten hinsichtlich der Abstammung und Zugehörigkeit der afrikanischen Pygmäen, basiert auf der Erforschung einer kleinen Kolonie im westlichen Uganda, der Bundibugyo, die sich scheinbar in keiner Weise von den Efé Pygmäen unterscheiden. Mit ihnen werden die Bwamba verglichen, ein in Bundibugyo und Fort Portal studierter Stamm, als pygmoid und von verhältnismässig neuer hybrider Abstammung erwiesen, und zwar als Folge der Kreuzung zwischen Pygmäen und Waldnegern.

Hinweise aus älterer Literatur gestatten den Schluss, dass die Pygmäen einst ein viel grösseres Gebiet bewohnten, einschliesslich Kameruns, Sierra Leones und wahrscheinlich Liberias in Westafrika, wo Europäer sie erstmalig im 16. Jahrhundert bemerkten. Die östlichen Pygmäen wurden erst um 1870 bekannt, als Folge von Expeditionen den Nil hinauf in das Azande Land, wo man Monbuttu Neger und Akka Pygmäen antraf. Die alten Aegypter kannten die Akka.

Es ist nun erwiesen, dass die Bambuti Pygmäen sich in drei Gruppen einteilen: die Efé, die Basua und die Aká, alle von gleicher Zwergstatur und nur durch geringfügige Merkmale von einander unterschieden. 150 cm. gelten allgemein als äusserste Länge für die Zwergstatur. Im Kreis um die Ituri Waldpygmäen leben viele pygmoide Stämme von höherer Statur, hervorgegangen aus Mischehen mit Waldnegern. Solche Gruppen reichen östlich bis zum Semliki-Fluss, südlich bis zum Kivo- und sogar bis zum Bangweolo-See. Die ihnen in östlichen Regionen benachbarten Negerstämme (Bantu) offenbaren verschiedene Grade der Hamitisation.

Zwischen Europäern und Zwergstämmen werden berichtet, auch Erzählungen von Pygmäen, die man nach Europa brachte.

Dank der umfassenden Forschungen von Schebesta und Gusinde sind die Bambuti-Pygmäen am bekanntesten geworden. Für diese benutzte Gusinde den Namen « Twiden », ab-

gekürzt « Twi ». Er zeigt, dass in der Lebensweise der östlichen Zwergvölker und Pygmoiden neuerdings grosse Veränderungen vorgegangen sind.

Das einzigartige symbiotische Verhältnis zwischen den Pygmäen und ihren Neger-Beherrschern ist gut bekannt. Sie jagen im Walde nach Okapi, Elefanten und anderen Tieren und versorgen die Neger mit Fleisch, wofür diese ihnen Bananen geben. Wann die Banane von Indien nach Afrika verpflanzt wurde, ist unbekannt, doch muss es eine Zeit gegeben haben, wo die Pygmäen sich in offenem Gelände ernährten und vielleicht dort lebten, und zwar nordöstlich der Regionen, bis wohin sie jetzt reichen. Der fossile Singa-Schädel ist möglicherweise Zeugnis einer solchen einstmaligen Ausdehnung.

Unter Pygmäen gibt es die pantropische Krankheit Kwashiorkor, wovon ziegelrotes Haar eins der Symptome ist. Scheinbar ist dies die Folge eines Proteinmangels und insbesondere der der Bananendiät zur Zeit der Entwöhnung. Die Zähne und Kiefern der Pygmäen sind wohl die krankhaftesten irgend einer Menschenrasse.

Die Vermischung mit Negern wird erörtert. Waldneger nehmen häufig Pygmäenfrauen, und ihre Kinder werden dann « Neger ». Die Pygmäen bleiben dieser Art ungemischt, abgesehen von gelegentlicher inoffizieller Mischung. Die F1 Hybriden sind mittelgross und auch in anderen Merkmalen ein Zwischending. Sie mischen sich zurück unter die Neger und werden dieser Art von der Rasse absorbiert. Nur eine geringe Zahl der Gene, ohne Dominanz für jedes Rassenmerkmal, ist wahrscheinlich betroffen. Die Balese- und Babira-Neger sind sehr zwergt.

Das Studium der Hautfarbe in Pygmäen, Baambas, Hottentotten und Negern zeigt, dass die Gates-Hautfarbentabelle auf diese Rassen angewendet werden kann. Die Pygmäen stimmen mit No. 3 der Tabelle (Mahagoni) überein, die Baambas (Pygmäen-X-Neger) mit No. 2, (dunkel-Mahagoni), die Busch-Hottentotten mit No. 4 (gelb) und die Neger mit No. 1 (schwarz). Derart werden die Gene R, die

früher sowohl schwarz als Mahagoni umfassten, nun in zwei geteilt - Q für das Schwarz der Neger, R für das Mahagoni der Pygmäen. S (gelbe) und T (brünette Haut finden sich unter den Busch-Hottentotten. Der völlig schwarze Neger ist also QRRSSTT, der Pygmäe RRSSTT und der Busch-Hottentott SSTT. Die Farbentafel, die nur auf Neger-Weisse Kreuzungen gegründet ist, kann somit direkt auf andere afrikanische Rassen angewendet werden.

Gewisse Evolutions- Zugehörigkeiten der Pygmäen, Neger und Buschmänner scheinen nun klar. Die Pygmäen sind alter (archaischer?) Herkunft, mit mahagonifarbenener Haut und behaartem Körper. Die Neger haben seither durch Q-Mutation die schwarze Hautfarbe erworben, und ihr Körper ist durch eine oder mehrere Verlust-Mutationen haarlos geworden. Der gemeinsame Vorfahr der Pygmäen und Neger könnte eine hochgewachsene Rasse mit der mahagonifarbenen Haut und dem behaarten Körper der Pygmäen gewesen sein. Diese Rasse mag nun ausgestorben sein. Die Buschmänner mit ihrer gelblicher Hautfarbe müssen zusammen mit denen ihrer anderen Verwandlungen auch die Mahagoni-Gene der Vorfahren verloren haben.

Die Verzweigung der Pygmäen ist anscheinend die Folge einer einzigen Gene-Mutation, vornehmlich vom achondroplastischen Typus, worauf im Jahre 1946 hingewiesen wurde. Diese Art Mutation ist unter Negerstämmen nicht sehr ungewöhnlich (verschiedene Fälle werden aufgezählt), und hat sich wahrscheinlich, wie Melanismus in Motten, durch Jahrtausende ereignet. Kreuzungen solcher heterozygoter Zwerge würde schnell einen für die Zwerg-Gene mehr oder weniger homozygoten Stamm erzeugen. Die Pygmäen wären also, mit Aus-

nahme der Buschmänner, die älteste lebende afrikanische Rasse.

Die Blutgruppen und Sichelneigungen der Pygmäen in ihrer Beziehung zu anderen afrikanischen Rassen werden erörtert.

Messungen ergeben, dass der Pygmäenschädel oft nur wenig kleiner ist als der des Negers, das sich die Masse also scheinbar teilweise decken, doch sind einige Pygmäenschädel immerhin sehr klein. Ihr Kopfindex ist höher als der der Neger, übereinstimmend mit ihrer niedrigen Statur, und oft grenzt er nah an Brachycephalie, oder die Dimensionen überschneiden sich in weiblichen Köpfen. Morphologisch ist der Pygmäenköpfe eiförmig, doch sind die Schädel häufig mehr oder weniger deutlich pentagonoid. Dies lässt auf einem gemeinsamen boskopoiden Ursprung der Pygmäen und der Buschmänner schliessen. Die Pygmäennase ist sehr primitiv und charakteristisch. Verschiedene andere morphologische Besonderheiten des Schädels werden behandelt. Die Pygmäenzähne und -Kiefern sind die schlechtesten irgendeiner Menschenrasse, mit gelegentlich völlig weggefaulten Zahnhöhlen. Dies mag durch die Ernährung bewirkt werden.

Die Armspanne lebender Pygmäen überschreitet ihre Statur, doch ist das Proximalsegment beider Gliedmassen relativ sehr kurz. Die Knochen des Skellets sind durchweg in allen Ausmassen kleiner als einer hochgewachsenen Rasse, doch der Kopf ist im Verhältnis gross; das Gleiche gilt oft für den Beckenumfang. Derart haben wir hier eine Form achondroplastischer mutationsmässigen Ursprungs. Viele Arten der Verzweigung kommen unter Menschen vor, manche normal andere pathologisch. Der Typus der Pygmäen ist eine dieser Arten - jedoch « normal ».