Affinities of Philippine Populations: An Anthropological Study Based on Human Skull Data

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THE OBJECT OF this paper is to present new data on the affinities of the populations which inhabit the Philippine archipelago. The conclusions are based on a multivariate analysis of skull measurements interpreted against the background of the knowledge and insights of the literature.

The material includes 344 skulls. Two hundred and nineteen were collected by Schadenberg in 1890, described by Koeze (1904), and later studied by de Wilde and Snijders in 1957. The remaining 125 were measured by the author during a visit to the Philippines in 1980 (Table 1).

Schadenber	₹G	Uytterschaut			
GROUP	NUMBER OF SKULLS	GROUP	NUMBER OI SKULLS		
VISAYA	21	BANTON ISLAND	6		
ILOKANO	13	BUTUANO	5		
TAGBANUA	14	IBALOI	99		
IGOROT	13	CALATAGAN	8		
BALUGA	8	IFUGAO	3		
TAGALOG	62	PALAWAN	1		
CAVE-SKULLS SAMAR	9	MASBATE	1		
CAVE-SKULLS CALAMIANES	13	ILIJAN	1		
NEGRITO	55	ORIGIN UNKNOWN	1		
MANGIAN	2				
QUIANGAN	2				
ginan	3				
TINGUIAN	1				
CAVE-SKULLS MARINDUQUE	2				
ORIGIN UNKNOWN	1				
	219		125		

TABLE 1.	Provenances	OF TH	e Philippine	Skull	Material	According	то	Етниіс	Group	OR
			F	ind-Pl	ACE					

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Fig. 1. The Philippine archipelago (after de Wilde and Snijders 1957).

According to Koeze (1904), Evangelista (1980), and Peralta (1980), the skulls are derived from different places and belong to different ethnic groups, as represented in Table 1. Figure 1 shows the situation of these different find-places and ethnic groups on the Philippine Islands map.

On the basis of this sample of skulls, the hypothesis of a distinction between three



Fig. 2. Dendrogram for the male individuals (n = 94).

CLUSTER	(3)	(1)	(2)	(4)	n
TAGALOG	1	15	2	2	20
IBALOI	19	25	5	0	49
NEGRITO	2	5	12	6	25
	22	45	19	8	94

TABLE 2. Assignment of Each Male Individual (n = 94) to One of the Four Clusters Shown in Figure 2

main population groups (Negrito, Proto-Malay, and Deutero-Malay) in the Philippines will be examined. This hypothesis is based mainly on data from old literature, and according to it the following groups are considered as Proto-Malay: Igorot (including Tinguian, Ifugao, Quiangan, and Ibaloi), Manubo, Mangian, Ginan, and Tagbanua. Descended from the Deutero-Malay are the Tagalog, Visaya, and Ilokano.

Apart from examining any distinction between the three main groups, smaller comparisons, for instance between Negrito, Baluga, and Butuano (North Mindanao), will be considered. The different Igorot populations will also be compared with each other and with Chinese and Japanese.

AFFINITIES BETWEEN PHILIPPINE POPULATIONS: RESULTS AND DISCUSSION

For multivariate analysis the cluster program CLUSTAN 1C written by David Wishart (1978) was used. Although cluster analysis was first applied to all of the completely-scoring male (n = 129) and female (n = 116) skulls, only the skulls belonging to the three larger groups, i.e., the Tagalog (n = 62), Ibaloi (n = 99), and Negrito (n = 55) were used in the final cluster analysis. The number of skulls belonging to the smaller groups appeared to be too small to allow a meaningful interpretation of results.

In the dendrogram for male individuals (Fig. 2) four highest-order clusters can be distinguished. The assignment of individuals from the three main populations to these clusters is summarized in Table 2.

The dendrogram for females is represented in Figure 3. From this, five clusters can be distinguished at the same highest level. The assignment of individuals to these clusters is summarized in Table 3.

From both the male and the female dendrograms one can distinguish a well-defined Negrito cluster, a well-defined Ibaloi cluster, and one cluster consisting of both Tagalog and Ibaloi. Tables 2 and 3 thus suggest that one cluster in each sample is an overlapcluster.

Table 4 shows the D_c values (D_c is an unbiased estimator of the discriminatory value Δ) between Tagalog and Ibaloi, Tagalog and Negrito, and Ibaloi and Negrito, based on five variables. The group differences have been evaluated by using Hotelling's T². The three groups were found to be significantly different from each other (significance level $\alpha = 0.1$). For results see Table 5.



Fig. 3. Dendrogram for the female individuals (n = 79).

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CLUSTER	(4)	(2)	(5)	(1)	(3)	n
TAGALOG	4	11	2	3	4	24
IBALOI	28	11	0	1	1	41
NEGRITO	0	1	10	3	0	14
	32	23	12	7	5	79

TABLE 3. Assignment of Each Female Individual (n = 79) to One of the Five Clusters Shown in Figure 3

TABLE 4. D_c Values Between Tagalog-Ibaloi, Tagalog-Negrito, and Ibaloi-Negrito

D _C VALUE	MALES	FEMALES
TAGALOG-IBALOI	1.3	1.3
TAGALOG-NEGRITO	1.9	2.2
IBALOI-NEGRITO	2.4	3.4

TABLE 5. HOTELLING'S T² VALUES BETWEEN TAGALOG, IBALOI, AND NEGRITO. MALES AND FEMALES WERE TREATED SEPARATELY.

	OBSERVED VALUE	$\alpha = .01$
TAG-IB O	28.9	17.8
ç	32.3	17.8
TAG-NEG O	32.4	19.6
Ç	47.2	20.7
IB-NEG O	106.3	17.4
ç	123.6	18.5

In all instances it is evident that the difference between the Negrito and the other groups is much larger than the difference between the Tagalog and Ibaloi.

It is also interesting to note that according to the Mahalanobis distances the Tagalog, who belong to the Deutero-Malay, resemble the Negrito more than do the Ibaloi, who are considered to belong to the Proto-Malay. This is not in line with expectations. According to the older literature the Philippines were first inhabited by Negritos. Many years later the first wave of Proto-Malays arrived and later still a second wave brought in the Deutero-Malays. Considering this information more resemblance was expected between Negrito and Ibaloi than between Negrito and Tagalog.

Hotelling's T² test was also used for the assignment of the smaller groups to one of the three large groups. Two variable combinations were chosen, the first based on glabello-occipital length, orbit height left, orbit breadth left, nasal breadth, and biauricular breadth. The second was based on glabello-occipital length, maximum cranial breadth, nasal height, and nasal breadth. By applying Hotelling's T² test to the results of both variable combinations it was possible to assign the Visaya and Samar groups plus the Ilokano and Igorot to one of the three large groups (Table 6). Those populations each contained both male and female individuals. Visaya, Samar, and the Igorot were assigned to the

	(и)	FIRST VARIABLE COMBINATION (1, 15, 16, 18, 9)	second variable combination (1, 5, 14, 18)	ASSIGNED TO
VISAYAS	O* (8)(6)	Т	T or I	T
	Q (7)	_	-	
SAMAR	° (4)	T or N	Т	Т
	Q (1)	T or I or N	T or I or N	
ILOKANO	° (4)	T or N	T or N	N
	Q (7)(8)	N	N	
BUTUANO	O' (2)	T or I or N	T or I or N	? (T or I)
	Q (1)	T or I	T or I	χ , γ
TAGBANUA	ී (6)	T or I	T or I	? (T or I)
	Q (4)	T or I	T or I	X P
CALAMIANES	O* (3)	T or I or N	I	?
	Q (4)(5)	T or N	T or N	
IGOROT	° (2)	T or I	T or I or N	Т
	Q (10)(9)	Т	Т	
BALUGA	ଙ(1)	T or I or N	T or I or N	? (T or N)
	Q (3)	T or N	T or N	· · ·

TABLE 6.	Assignment	of Some	Smaller	Groups	to On	e of	THE	Three	Large	Groups
		(Ta	galog, Ib	aloi, or	Negrito)				

T = Tagalog; I = Ibaloi; N = Negrito.

1 = glabello-occipital length; 5 = maximum cranial breadth; 9 = biauricular breadth; 14 = nasal height; 15 = orbit height left; 16 = orbit breadth left; 18 = nasal breadth.

	(N)	First variable combination (1, 15, 16, 18, 9)	second variable combination (1, 5, 14, 18)	Resemblance
BANTON O'O'	(2)	$2 \times T$	$1 \times T$ and $1 \times I$	T
MASBATE O	(1)	Т	Т	Т
ILIJAN O'	(1)	Т	Т	Т
ORIGIN UNKNOWN O	(1)	Т	N	?
PALAWAN O'	(1)	N	I	?
GINAN O'O'	(2)	2 × I	2 × I	I
IFUGAO O	(1)	N	Ι	?
QUIANGAN O	(1)	I	Ι	1
calatagan Q	(1)	Ι	Т	?
mangian QQ	(2)	2 × T	2 × T	Т
tinguian Q	(1)	Т	N	?

TABLE 7. RESEMBLANCES BETWEEN THE SMALLEST GROUPS (1 OR 2 INDIVIDUALS) AND THE 3 LARGE GROUPS, BASED ON POSTERIOR PROBABILITIES

Tagalog, and the Ilokano were assigned to the Negrito. Concerning the Butuano and Tagbanua it can only be stated that they do not resemble the Negrito, and the Baluga do not resemble the Ibaloi.

Moreover, resemblances between the smaller groups, which contain only one or two individuals, and the three large groups were investigated. These individuals were not used in the further analysis. The resemblances are based on posterior probabilities, as summarized in Table 7. The few individuals who belong to Banton, Masbate, Ilijan, and the Mangian seem to resemble the Tagalog, while the Ginan and Quiangan resemble the Ibaloi.

AFFINITIES OF PHILIPPINE POPULATIONS WITH NEIGHBORING AND OTHER POPULATIONS: RESULTS AND DISCUSSION

Table 8 lists 11 Pacific and East Asiatic groups, with the numbers of male and female individuals that were used for a comparison with the three major groups of Philippine skulls. These data were kindly sent to me by Professor W. W. Howells.

In order to make a plot of the D_c^2 distances between the total of 14 groups, the metric scaling option of the program KYST was used. The plot gives a graphic approximation of the mutual relationships between the 14 populations.

Using four different variable combinations for males and females separately, eight plots were obtained, each giving nearly the same picture. Only the positions of Atayal, Mokapu, and Guam differed in some instances. Figure 4 shows one of the plots. The Tagalog group is closely associated with the South Japanese, the Ibaloi closest to Hainan. Except for the Negrito, the Philippine groups are in general closest to the South Japanese, the North Japanese, the Ainu, and Hainan. This is in accordance with the literature which claims that the Philippine populations are mainly Southeast Asian in origin. The Philippine populations are more closely associated with the Japanese and Chinese than with any other East Asiatic or Pacific populations.

It was concluded that, as far as the skull is concerned, a Mongoloid phenotype predominates in the Philippines. Andamanese, Tasmanian, and Atayal are not situated close to Negrito, and Tasmanians especially are clearly different from them. So in the present analysis the "rather rugged skulls of the Tasmanians" (Howells 1973) do not cluster with the Negrito, in contrast to the classification of Tasmanians as Negrito by other writers.

The distribution of the 14 groups in Figure 4 is remarkably comparable with the geographical distribution of the pertinent countries (Fig. 5). Guglielmino-Matessi, Gluckman, and Cavalli-Sforza (1979) have found that morphological similarities of skulls may reflect environmental similarities. According to Albrecht (1980), the major differences in

TABLE 8. ENUMERATION OF THE Eleven Pacific and East Asiatic Groups With Numbers of Male and Female Individuals				
	NO	NQ		
Tasmania	45	42		
Tolai	55	55		
Mokapu	51	49		
Andaman	26	28		
Ainu	48	38		
North Japan	55	32		
South Japan	50	41		
Hainan	45	38		
Atayal	29	18		
Guam	30	27		
Moriori	57	53		



Fig. 4. Plot of D_{e}^{2} values between the Philippine groups (Tagalog, Ibaloi, and Negrito) and 11 East Asiatic and Pacific populations.

skull morphology among modern human populations represent the interplay of size, climate, and geographic factors upon the genetic and evolutionary background of racial differentiation.

AFFINITIES WITH AFRICAN AND AUSTRALIAN POPULATIONS

In addition to the plot represented in Figure 4, another plot of D_c^2 distances was made with the same 14 groups plus four new ones: Dogon, Teita, Bushmen, and South Australians (data also from Howells). Again, four variable combinations were used, males were treated separately from females, and I made use of the scaling-program KYST. The eight plots derived each produced a similar picture, and one of them is shown in Figure 6.

The Dogon from Mali, the Teita from Kenya, and the Bushmen from South Africa were added for comparison with the Negrito skulls. However, in Figure 6 it can be seen that these Negroid and Khoisanid populations lie far from the Negrito.

The Ibaloi display closer affinities with South Australians than do the Tagalog and the



Fig. 5. Geographic spread of the 11 East Asiatic and Pacific groups and the three Philippine groups used in Fig. 4.

Negrito. This finding seems to be in accordance with the hypothesis suggested by early scholars that Proto-Malays show more Australoid traits than Deutero-Malays.

When compared to the representatives of three of the five Oceanic populations analyzed by Pietrusewsky (1970), the Philippine populations are not seen to be closely associated. According to my results, they lie closer to Japanese and Chinese than to any of the Oceanic groups. According to the cluster analysis of Pietrusewsky (1974), the Philippine Manobo cluster with Tai and Chinese, and the Mokapu Hawaiian and Guam populations form a separate cluster. There is also a more removed cluster which contains New Guinea and Fiji. This is more or less in accordance with the present results: the Tagalog and Ibaloi are closely associated with Chinese, the Mokapu Hawaiians are close to Guam, and all five populations are clearly distinct from the Tolai of New Britain. In Figure 4 it is also clear that the Ainu associate closely with the population of North Japan. This close rela-



Fig. 6. Plot of D_c^2 values between Philippine, East Asiatic, Pacific, African, and Australian populations.

tionship between Ainu and Japanese was also reported by Bowles (1977) and Howells (1979), and strengthened by gene frequency data (from protein and blood group loci) published by Omoto (1975) and Nei (1978). The Ainu are thus closer to Japanese and Chinese than to other populations.

CONCLUSIONS

The traditional division of Philippine populations into three main groups, i.e., Negrito, Proto-Malay, and Deutero-Malay, as suggested by early scholars, is here revised. Cluster analytical procedures were applied to the skulls belonging to three large groups: Tagalog (Deutero-Malay), Ibaloi (Proto-Malay), and Negrito. It was concluded that these three groups are significantly different from each other. However, the Mahalanobis distances between Negrito and the two others are much larger than between the Tagalog and the Ibaloi. In addition, the Tagalog resemble the Negrito more than do the Ibaloi.

The Philippine skulls were also compared with skulls from 11 East Asiatic and Pacific populations: Tasmanians, Tolai, Mokapu Hawaiian, Andamanese, North Japanese, South

Japanese, Hainanese, Atayal, Guamanian, and Moriori. From this comparison it was concluded that the Philippine populations, except for the Negrito, are closest to the Japanese, Ainu, and Hainanese. This is in accordance with the literature, namely, that the Philippine populations are mainly Southeast Asian in origin. The Philippine populations are more closely associated with the Japanese and the Chinese populations than with any of the other East Asiatic and Pacific populations. As far as the skull is concerned, a Mongoloid phenotype predominates in the Philippines. The Negrito group is isolated from these Mongoloid populations, as well as from the other East Asiatic and Pacific populations. Neither the Andamanese, Tasmanians, nor the Atayal are situated close to the Negrito and this holds in particular for the Tasmanians, who appear instead to be associated with the Tolai.

From the comparison of the Philippine skulls with the skulls of some African and Australian populations, it was concluded that the Negrito are also isolated morphologically from Negroid, Khoisanoid, and Australoid populations, even more so than from Mongoloid. The Ibaloi are closer to the South Australians than are the Tagalog or Negrito. This is in accordance with the hypothesis that Proto-Malay show more Australoid traits than do Deutero-Malay.

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