Facial Flatness and Cheekbone Morphology in Arctic Mongoloids

A CASE OF MORPHOLOGICAL TAXONOMY

BY L. OSCHINSKY

RÉSUMÉ

Le type du mogoloïd de l'arctique se distingue par ce que l'on peut appeler la "trinité" de l'aplatissement facial. Cette caractéristique, à laquelle se joint d'autres traits bien définis, apparaît avec une constance marquée dans une grande partie de la région circompolaire, c'est-à-dire, du Groënland à la rivière Yenesei en Sibérie. Se basant sur la distribution continue de ces facteurs, il semble bien qu'il faille englober les mongoloïds de l'arctique en un seul groupe taxinomique.

Cet assemblage de traits, lequel change de plus en plus rapidement à mesure qu'on s'éloigne du groupe mongoloïd, se retrouve aussi parmi les fossiles de Chou-kou-tien, de même que parmi les plus anciens spécimens d'esquimaux préhistoriques.

La répartition continue de cette "trinité" dans l'espace et dans le temps lui donne donc une grande valeur diagnostique pour la phylogénétique et l'anthropogéographie des mongoloïds.

The history of Eskimo physical anthropological studies includes many interesting methodological varieties and theoretical divergences. In the main there have been two schools of thought in Eskimo researches which have offered explanations of the origin, antiquity and affinities of the Eskimos.

One group represented by Boas (1888), Shapiro (1934), Rink (1887), and Birket-Smith (1930) holds that the Eskimos originated in North America south of the Arctic area and moved north. In other words, they are Indians who shifted their environment from a boreal forest or temperate area to the Arctic area.

The other group represented by Hooton (1918), Hrdlicka (1930, 1944, 1945), Mathiassen (1927, 1930), Jenness (1925, 1933, 1941) and Collins (1951, 1954) believes that the Eskimos or Proto-Eskimos originated in Siberia and then moved East to Alaska, Canada and Greenland.

The considerable literature in ethnology, archaeology and linguistics on these subjects will not be reviewed here. It is mentioned to show how physical anthropological research in the history and evolution of subspecific biological groupings such as races and subraces can contribute to general anthropological problems in historical reconstruction.

It is agreed that there is a distinctive Eskimo culture which has a considerable antiquity, it is found in an Arctic habitat, it has a distinctive language which is surprisingly homogeneous considering its extension over a six thousand mile area, and physical anthropologists have maintained that there is such a thing as an Eskimo physical or racial type.

Some of the questions that shall concern us here are first, is this true, second, do the Eskimo belong to a wider group which might be termed Arctic Mongoloids, third, is there a very big difference between Indians and Eskimos and Siberians, fourth, is there any justification for the term Mongoloid, and its application to the aboriginal inhabitants of the New World south of the Arctic area, and fifth, what is the evidence for the antiquity for these groups?

The next series of questions which must be asked are methodological, namely on what sort of evidence can we decide if there is such a thing as Eskimos in the biological sense? Will the distribution of the various blood groups, or the somatometric data of the anthropometrist or the study of non-metrical morphological characters tell us the answers? Will skeletons tell us more than studies on the living and will heads and skulls tell us more than bodies and post-cranial skeletons?

Since the concept of race has been under fire from various corners we also feel constrained to ask is there such a thing as race or sub-race? It might be simpler to answer this last question first.

All biologists believe that there is such a thing as the species and since it is the species which evolves it is a necessary concept in evolutionary thinking. Although there are many opinions on what a species is or isn't, some idea of it is maintained in biology.

All botanists and zoologists more or less agree that there is such a thing as a subspecies and, beyond that, geographical races and local races.

This last concept is rejected by some physical anthropologists as either unreal or unimportant. However, the majority of biologists are of the opinion that there are such things as subspecies and geographical races. There are, however, no valid reasons that a study of human variations on the subspecific level is not valuable, if our interest be in racial origins and related questions.

Human variations on the subspecific level have been interpreted in the past in two ways. They can be understood as vestiges of the evolutionary process in the larger (supra-specific) sense or they can be interpreted as immediate adaptations to the various environments in which they are found.

Without undestanding these two assumptions the literature on subspecific or racial differences is unintelligible.

In the 19th century it was fashionable to see a phylogenetic sequence in the various contemporary racial groups. Australoids and Negroids were placed at the bottom of the biological hierarchy, Mongoloids were above these and at the top was usually placed the bust of some curly-headed decapitated Athenian, representing the summit of Homo sapiens.

Nowadays the interest in racial studies is more to understand how the various racial features such as skin colour, hair form, prognathism, etc. are adaptations to a given environment and also how racial characteristics change in relatively short time (microevolution).

Since the above-mentioned features are polygenitic, their mode of inheritance is not known. Certain researchers have claimed that the study of monogenitic serological factors are more important because their mode of inheritance is known and their gene frequency changes can be precisely computed. The changes in gene frequency observable in time and space are referred to by these students as microevolution.

The assumptions involved in the above are first, that the ultimate biological subspecific reality is gene frequency and, second, that knowing the mode of inheritance of a feature somehow makes it taxonomically relevant or reliable.

It is evident in biological science that the data of gross anatomy are no more valid than the data of histology or electron-microscopy. Reality is manifest on many levels and these levels are usually instrumentally determined.

In the study of racial differences what we see in the phenotypes are the interactions of the genetic potential with the environment. We deduce the gene or genes from their effects i.e., phenotypes. By stating that the genotype is the ultimate reality we simply beg the question by referring it to a different level of biological reality.

To say that race is the study of gene frequency is as irrelevant as to say race is protoplasm or race is nitrogen, etc. Also to denote as evolution the change in gene frequency within a multiple allelic monogenetic system such as the ABO blood groups is incorrect. Evolutionary change usually involves modifications and specialization of organs in a species which take place gradually over a given period of time.

These changes are irreversible in the narrow sense of the term, as horses' hoofs and seals' flippers, all developing from the original pentadactyl condition. The primate hand has preserved the primitive pentadactyl arrangement and developed prehensility. In all of these examples it is evident that the evolutionary change has been in a given direction in response to a way of life. This is not so in the case of the multiple allelic monogenitic characters which can frequently vary in their mathematic frequency as a pendulum rather than in a definite irreversible trend. Unless some of the allels are lost by genetic drift or new ones arise by mutation, it is pretentious to refer to the frequency shifts as microevolution unless we are to refer to all biological changes as evolutionary.

These are some of the problems which confront subspecific biological studies.

In dealing with the history of a racial group (or any other subspecific category) which characters will be most reliable in tracing the historical biological affinities (phylogeny) of the group? Part of the problem in tracing subspecific relationships is the constant overlap of characteristics within the species. This is unavoidable and to be expected since we are dealing with a single species. If the differences were all that large they would be supra-specific and the problems would thereby be different and simplified. It is in the interpretation of the significance of similarity and difference that certain pitfalls are to be avoided.

The first pitfall is to assume that any subspecific similarity is automatically an indication of immediate genetic relationship. The second pitfall is to place too much weight on single characters which are supposedly unique to the subgroup. And the third pitfall is to assume that high frequency of a character automatically makes it diagnostic of a subgroup.

Physical anthropologists have given very little attention to the taxonomic theory underlying the choice of characters indicating phylogenetic relationships. This has resulted in a great deal of confusion. The metrical and morphological anthropologists have been severely criticized by the serologists and geneticists for not paying attention to the mode of inheritance of traits among other things.

As has already been indicated above, the writer feels that this is irrelevant to the science of subspecific or racial variation. In the study of the mode of inheritance of monogenetic factors in human populations the main concern is the phenomenon that results between two of three generations. This is in itself interesting but does it really shed light upon the more relevant factors which are indicated by the *mode of variation* (absence of overlap etc.)?

When an attempt is made to search for the phylogenetic relationships of existing geographical races the investigator is given leads in this regard by observations of similarities and differences, frequencies, and absences and presences of certain

TABLE 1

ESKIMO BLOOD GROUPS (after Laughlin 1950)

Group	Investigator	No.	O	A	B	AB	p	q	r
Aleutian Eskimos	Laughlin								
West (Attu-Atka)	1948	42	45.24	50.0	2.38	2.38	.303	.018	.673
East (Nikolski-Unalaska)	1949	54	44.44	46.3	7.41	1.85	.286	.054	.666
Interisland (most mixed)		48	58.33	37.5	2.08	2.08	.215	.013	.764
Total		144	49.31	44.44	4.17	2.08	.266	.029	.702
Alaskan Eskimos	Levine								
Nome Pure	1944	254	43.31	42.52	11.81	2.36	.268	.084	.659
Nome Mixed		68	44.12	42.65	11.76	1.47	.267	.083	.664
Greenland, East Angmassalik region (said to be) Pure	Fabricius-Hansen 1939	569	23.9	56.2	11.2	8.7	.406	.106	.489
Polar Eskimos (North Greenland) Thule	Heinbecker and Pauli 1927	57	70.1	15.8	5.3	8.8	.090	.031	.837
Labrador and Baffin Land	Sewall	143	55.6	44.4	0	0	.253	0	.752
Labrador and Baffin Land	1939	56	46.5	53.5	0	0	.318	0	.682

biological phenomena in time and space. Phylogeny involves trends in time involving many generations rather than a concern with a frequency change between two generations. One does not attempt to explain all evolution on the basis of embryological evidence neglecting and rejecting the evidence of comparative anatomy and palaeontology.

When we review past work in the area of Eskimo physical anthropology, including metrical data and serological data, we notice certain inconsistencies. For example the cranial indices of the south Alaskan and Siberian Eskimos are mesocephalic to brachycephalic in contrast to the eastern Eskimos, who are dolicho to hyper dolichocephalic; there are also significant differences in head height. Certain of the western groups are low-headed and many of the eastern groups are high-headed (Laughlin 1950).

Hrdlicka (1944, 1945) felt these features were of great taxonomical importance and on that basis rejected the idea that the Aleuts and Koniags are Eskimoids. On the basis of metrical data Hrdlicka pointed out that the Pre-Aleuts and the Pre-Koniags were more closely related to the Sioux and the Algonquians than to the Eskimos. This shows how far afield conclusions can go which are based upon chance overlap between populations that are widely separated geographically.

The blood group data also present certain perplexities. In ABO, Rh and Mns frequency distribution Chown (Chown and Lewis 1961) has pointed out that certain western Eskimos and the Polynesians show a remarkable overlapping although the metrical evidence here is quite different.

The Polar Eskimos, the Labrador Eskimos and the Alaskan Eskimos show quite different ABO distributions which are probably caused by genetic drift (see Table 1).

In two ABO series of Alaskan Eskimos, one denoted as mixed and the other as pure, done by Levine (see Table 1), the ABO distributions are almost identical which means that blood groups do not always indicate that hybridization has taken place or that the concept of what is mixed and what is pure is not clear in the mind of the observer.

TABLE 2 — Blood Group Gene or Antigen Frequencies Dealing with the Three Great Subdivisions of Man and the North American Indians and Eskimos.

(After Chown and Lewis, 1958)	Caucasoid	Negroid	Mongoloid	Indian	Eskimo
ABO SYSTEM					
Frequency of 'A'[1]	20-30%	10-20%	15-40%	0-60%	7-40%
Ratio $'A'_2 / 'A'_1$	1:10-3:10	About 4:10	0	0	0
Frequency of B	5-20%	5-25%	10-30%	0	0-10%
MN SYSTEM					
Frequency of N	30-50%	40-60%	35-50%	10-20%	10-20%
Frequency of MS	20-30(25)[2]	7-25(10)	5-30(5)	15-35	6-20
Frequency of Ms	30-40(30)	30-50(40)	35-55(50)	35-70	55-60
Frequency of NS	5-10(6)	3-12(7)	2-20(4)	0-7	0 ?
Frequency of Ns	30-40(39)	20-60(43)	20-40(36)	4-23	20-40
Frequency of He	0	2-12(7)	0 ?	0 ?	0 ?
P SYSTEM					
Frequency of 'P'+	About 75%	About 90%	About 50%	About 80%	About 50%
Rh SYSTEM					
Frequency of r (cde)	40%	25%	0	0	0
Frequency of R_0 (cDe)	10%	40-80%	10%	? 1%	? 1%
Frequency of D^u[3]	Low	High	Absent	Absent	Absent
Frequency of C^w	About 2%	0	0	0	0
Frequency of 'V'+	Rare	Common	?	?	?
DUFFY SYSTEM					
Common phenotype	Fy(a+b+)	Fy(a—b—)	Fy(a+b—)	Fy(a+b—)	Fy(a+b—)

Arctic
Mongoloid
Crania

a-1. Upper Cave Chou-Kou-Tien. 103.

a-2. Eskimo, Baffin Island.

b-1. Upper Cave Chou-Kou-Tien. 101.

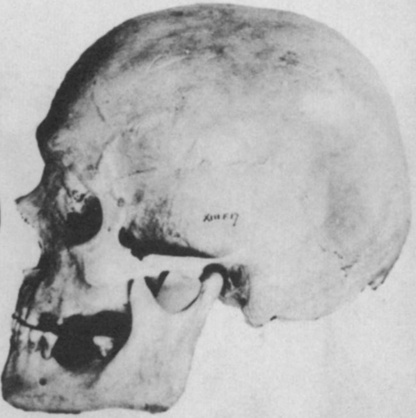
b-2. Cro-Magnon.

b-3. Prehistoric Iroquois.

a-1. Upper Cave Chou-Kou-Tien. 103.

a-2. Eskimo, Baffin Island.

b-1. Upper Cave Chou-Kou-Tien.

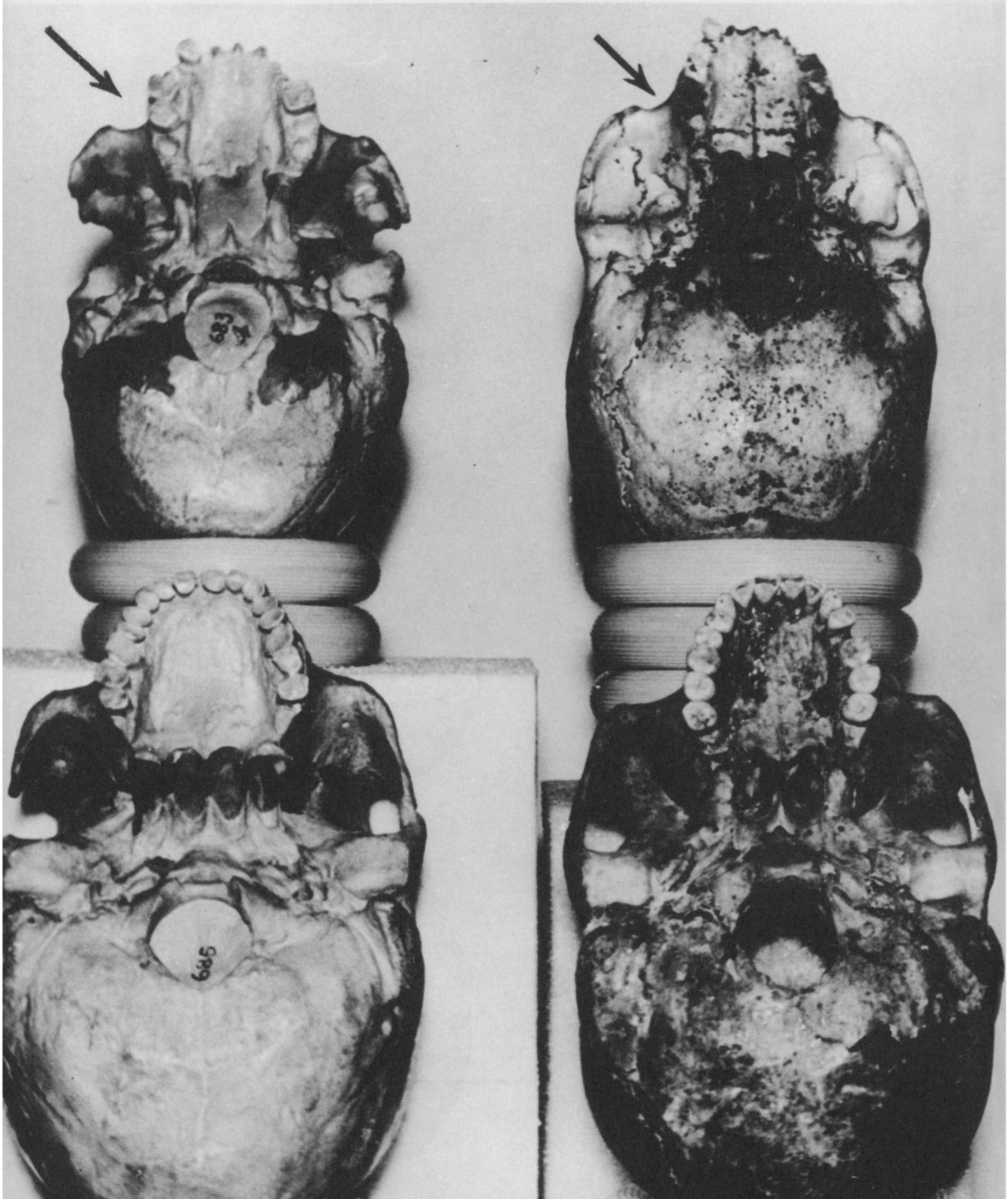


b-2. Cro-Magnon.

b-3. Prehistoric Iroquois.

Upper Cave Chou-Kien Skull 103 ♀ Eskimo, Baffin Island.

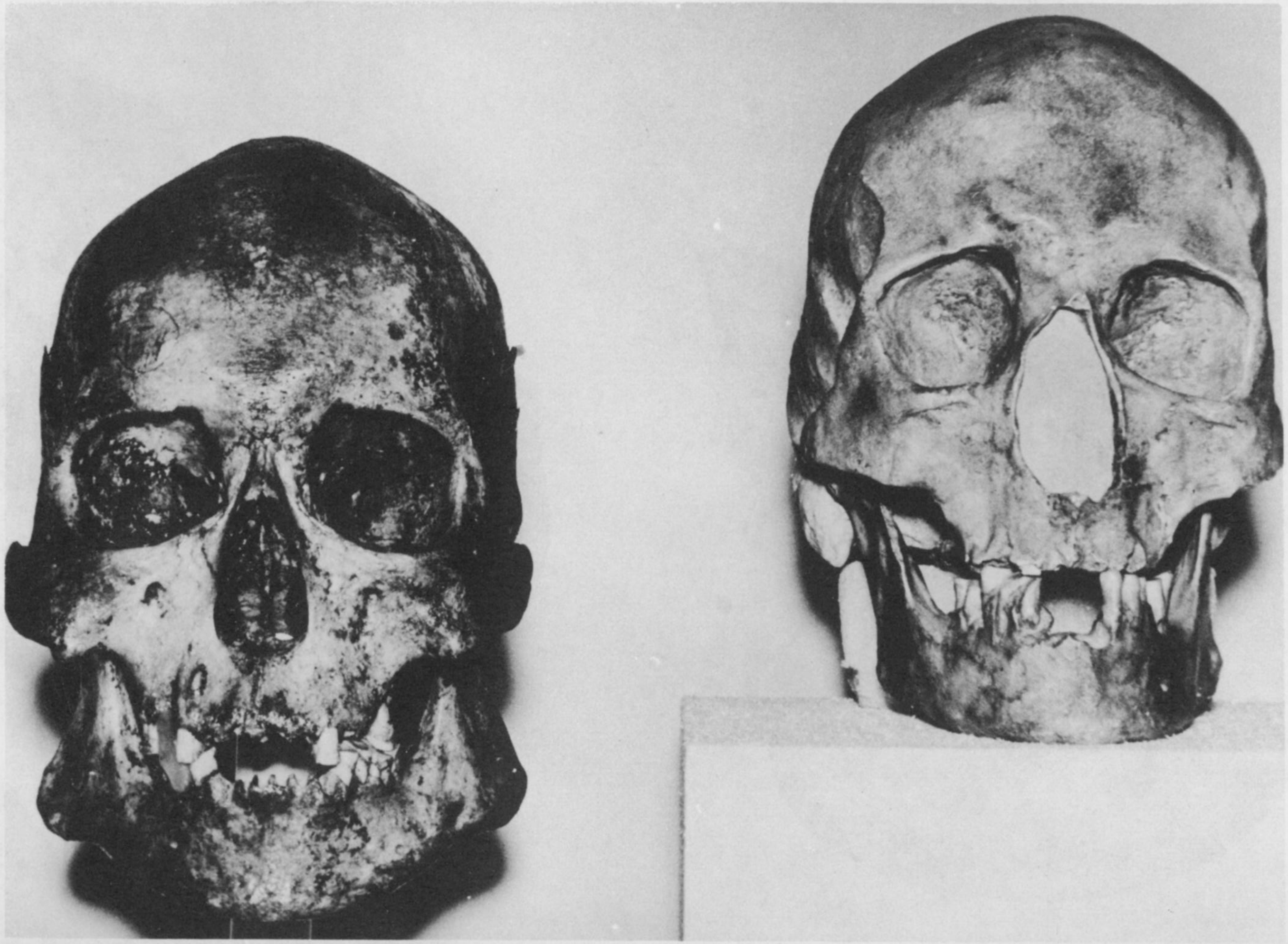
Arrow indicates infra-maxilarry fossa typical of arctic Mongoloids.

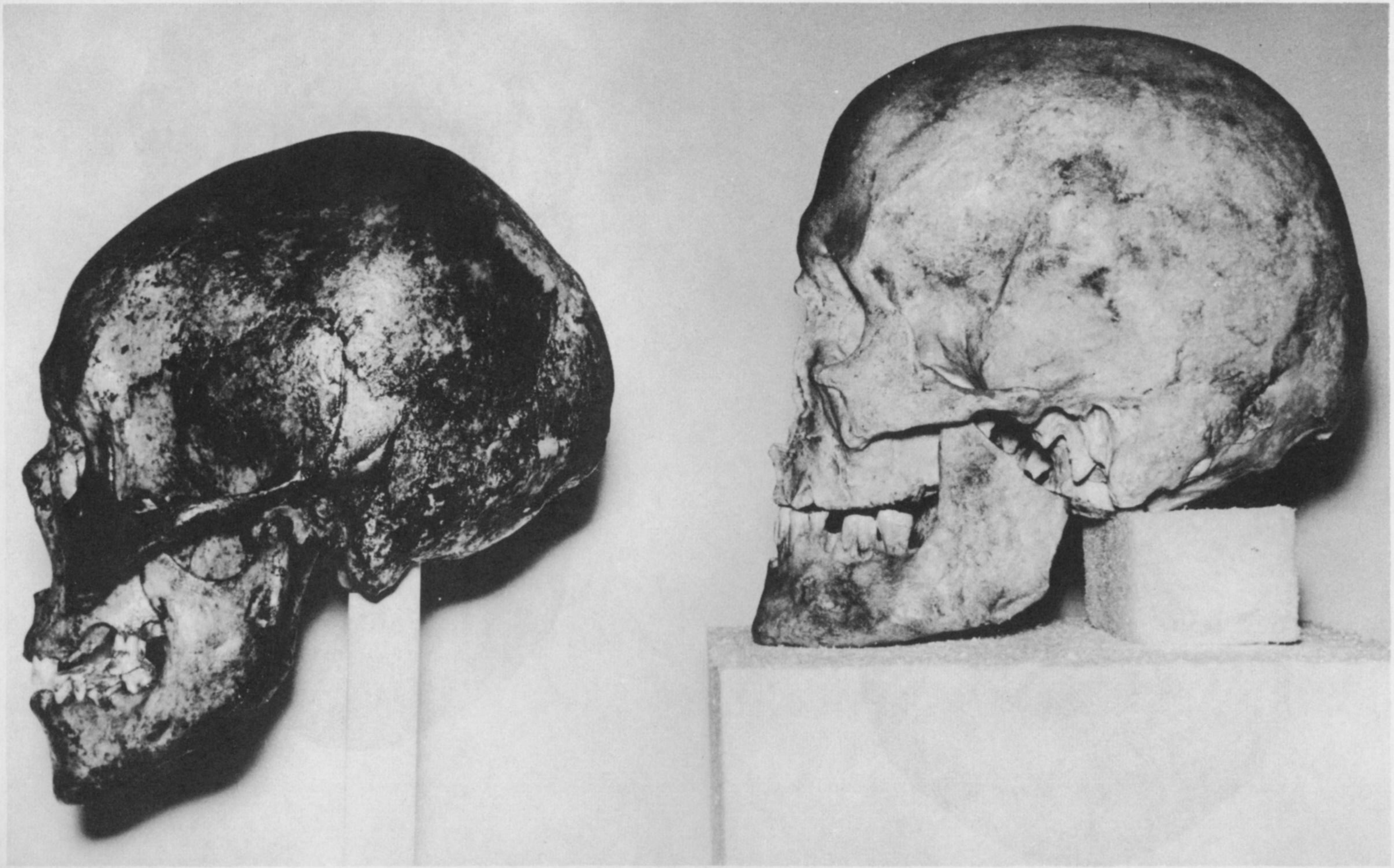


Upper Cave Chou-Kou-Tien
Skull 101 ♂

Assiniboine Indian...
Manitoba.

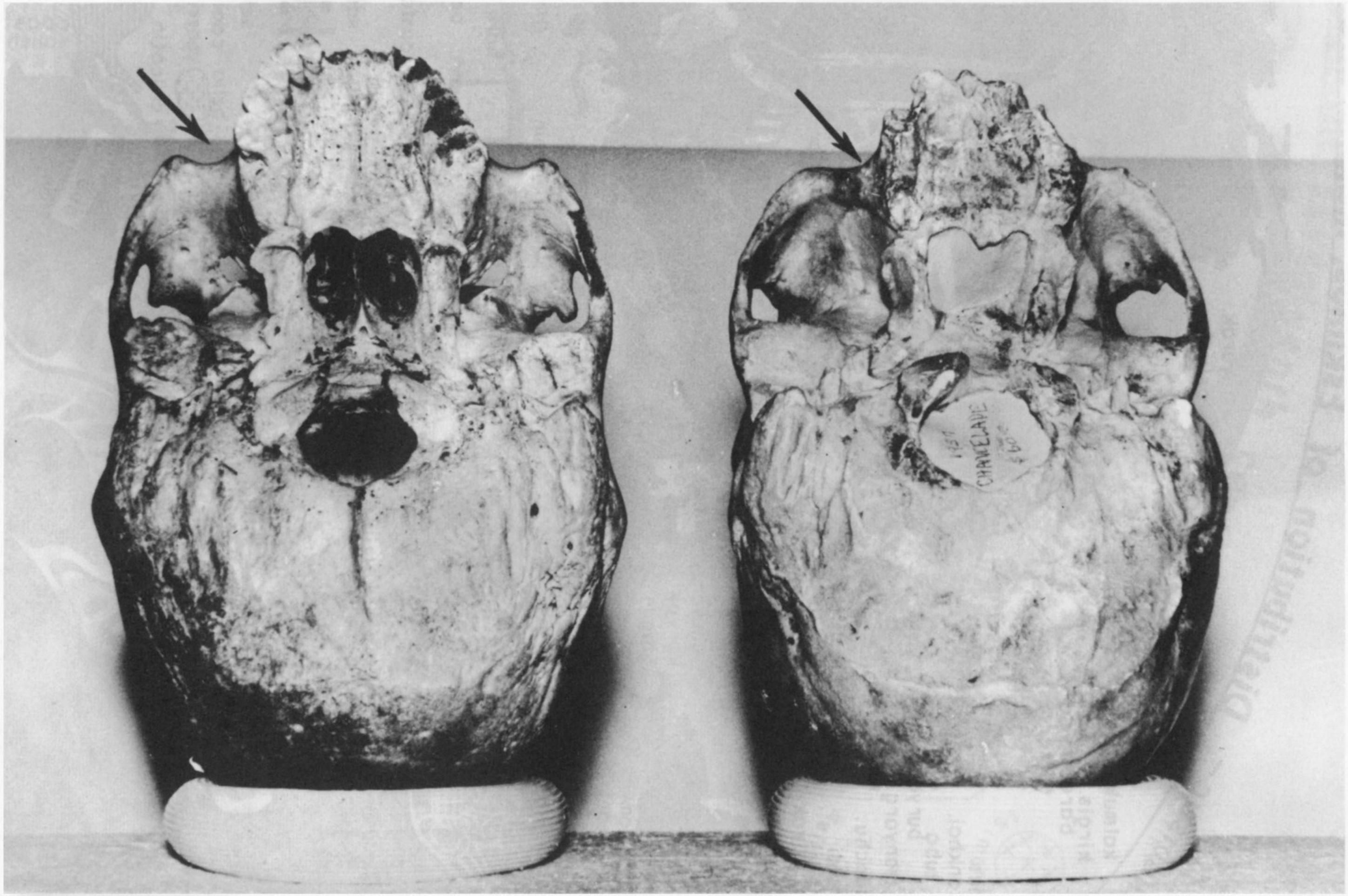
Mac Kenzie Eskimo. Chancelade.





Mac Kenzie Eskimo.

Chancelade.



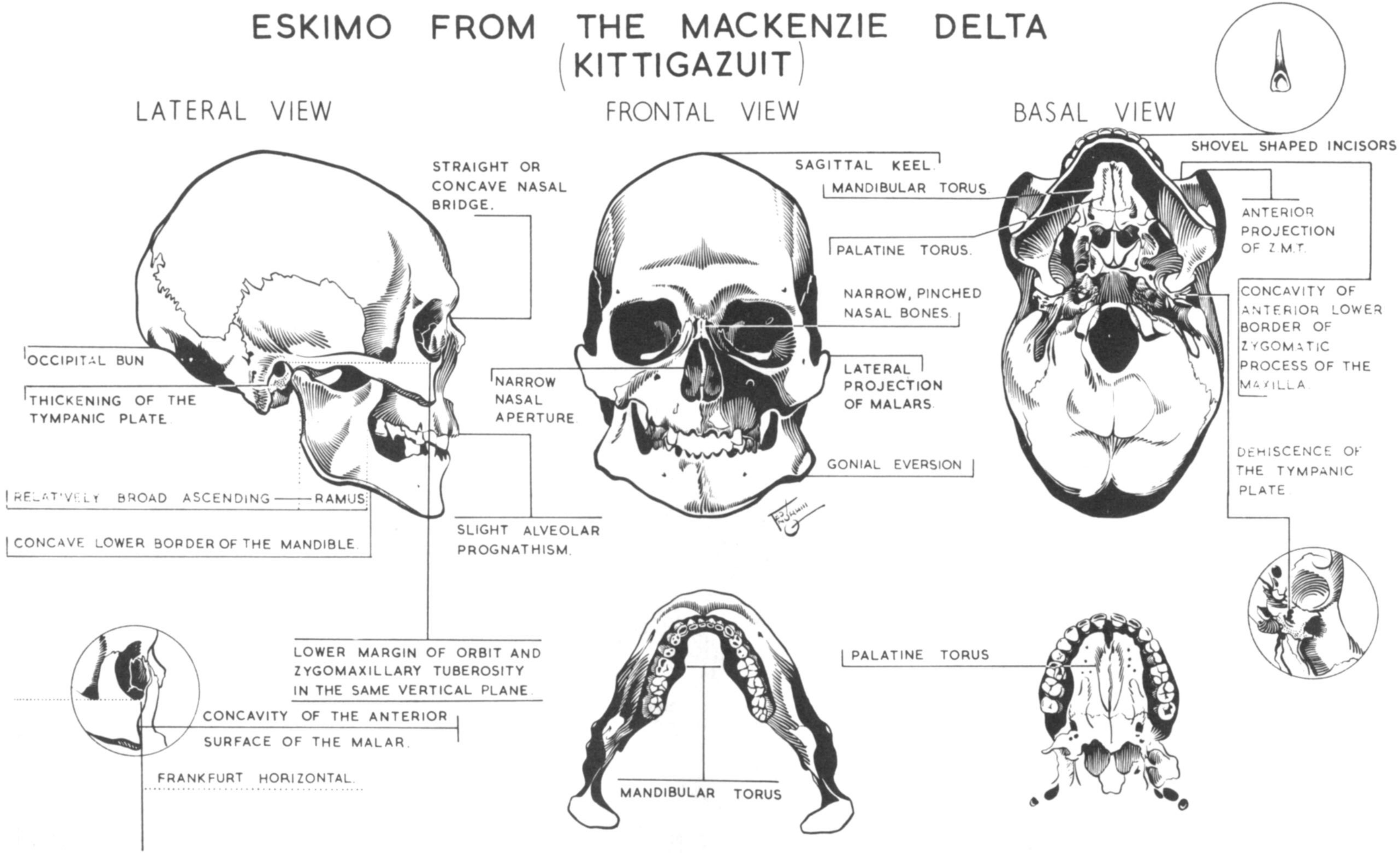
Mac Kenzie Eskimo. Chancelade.

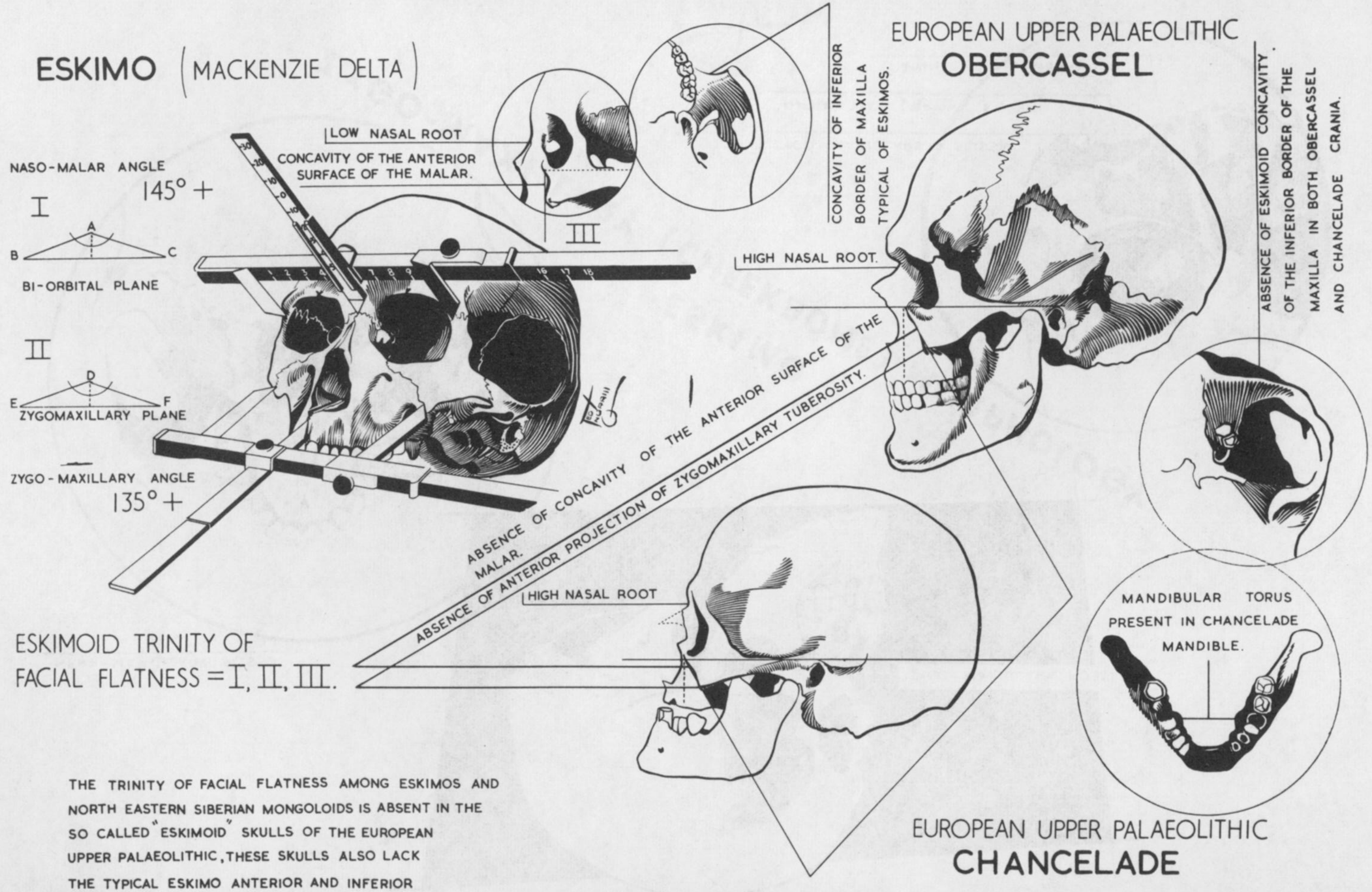
Present. Infra-Maxillary Fossa. Absent.

LINGUISTIC— Distribution of Eskimos, Indians and Sibe

erians in the seventeenth century….

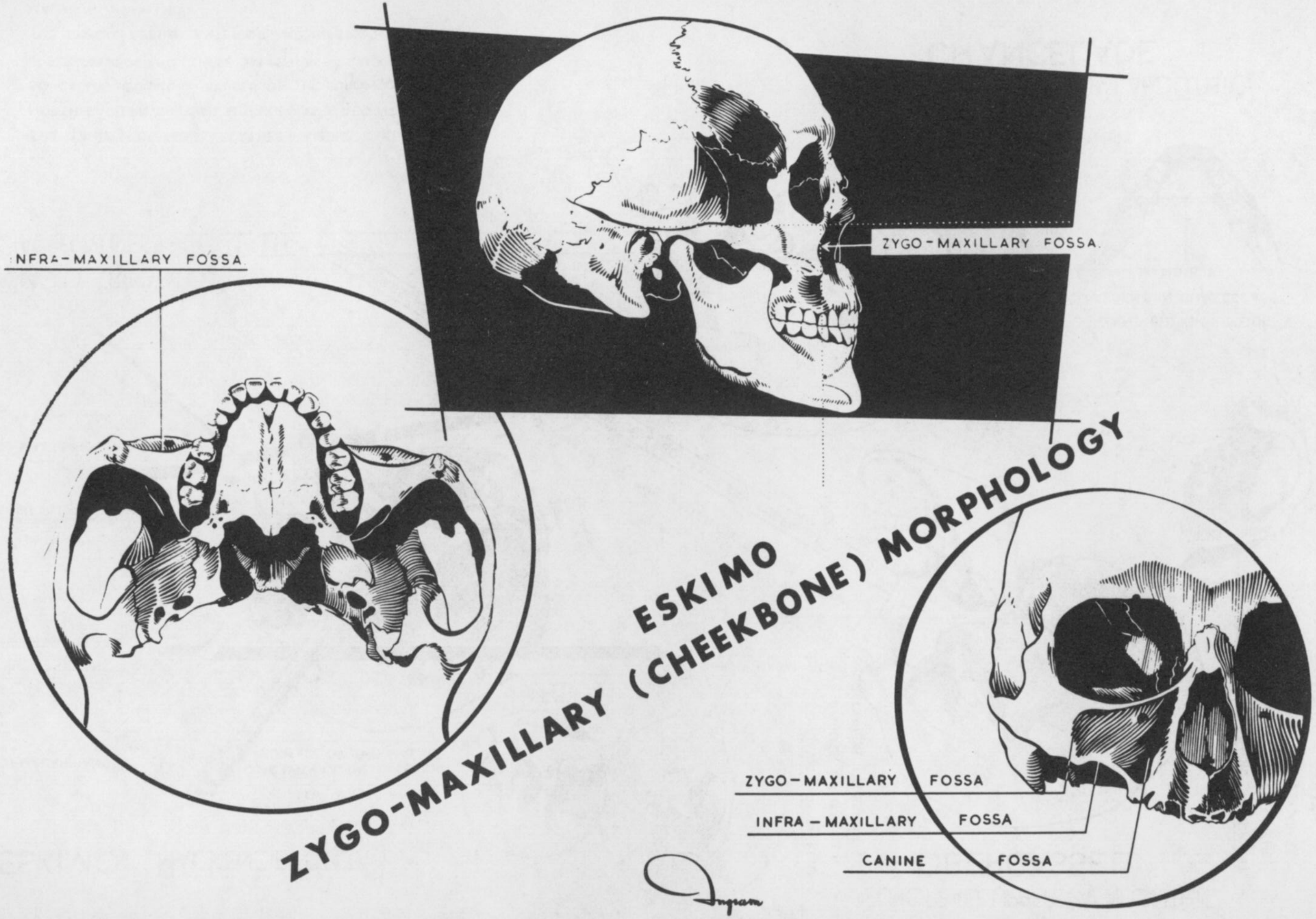
ESKIMO FROM THE MACKENZIE DELTA
(KITTIGAZUIT)



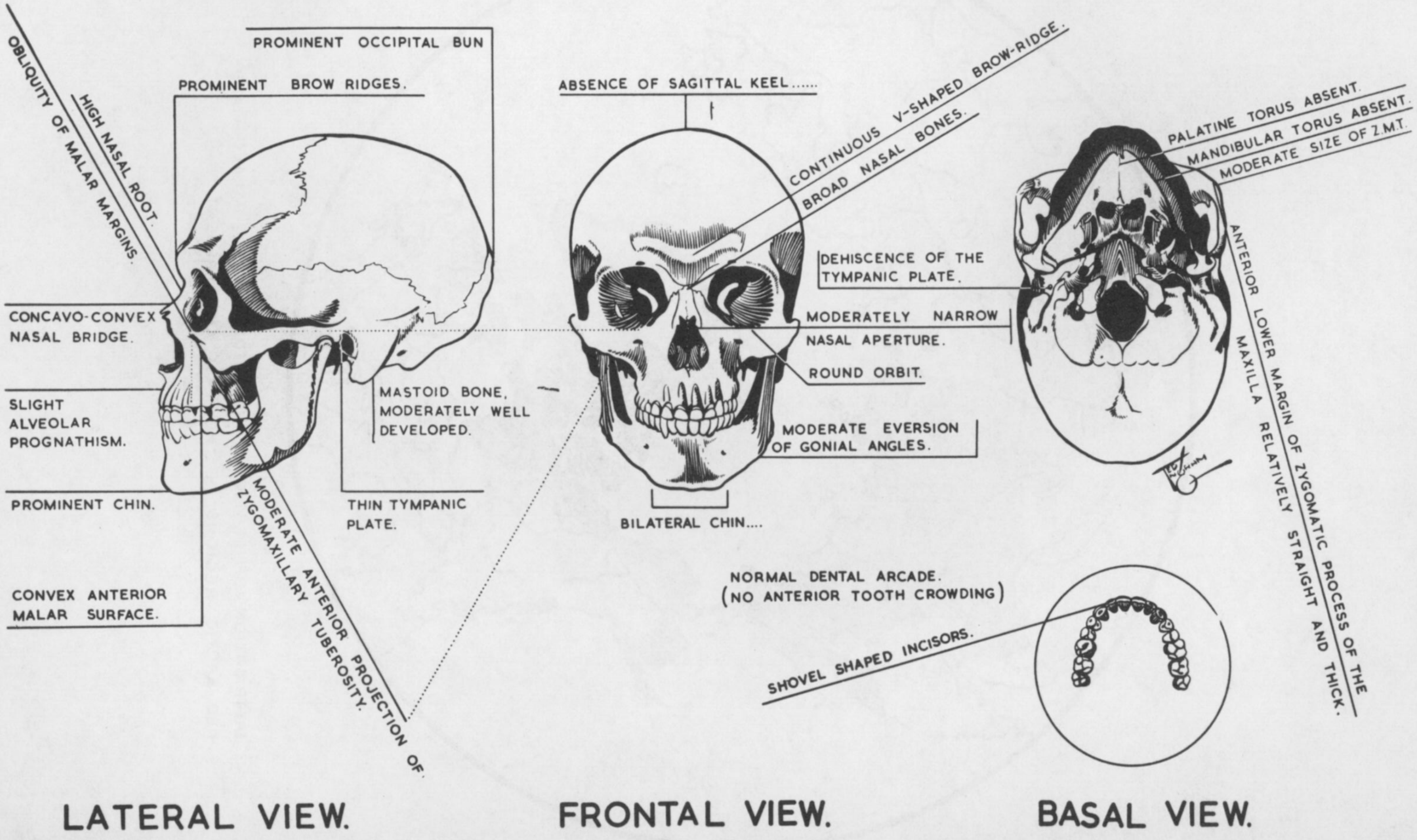


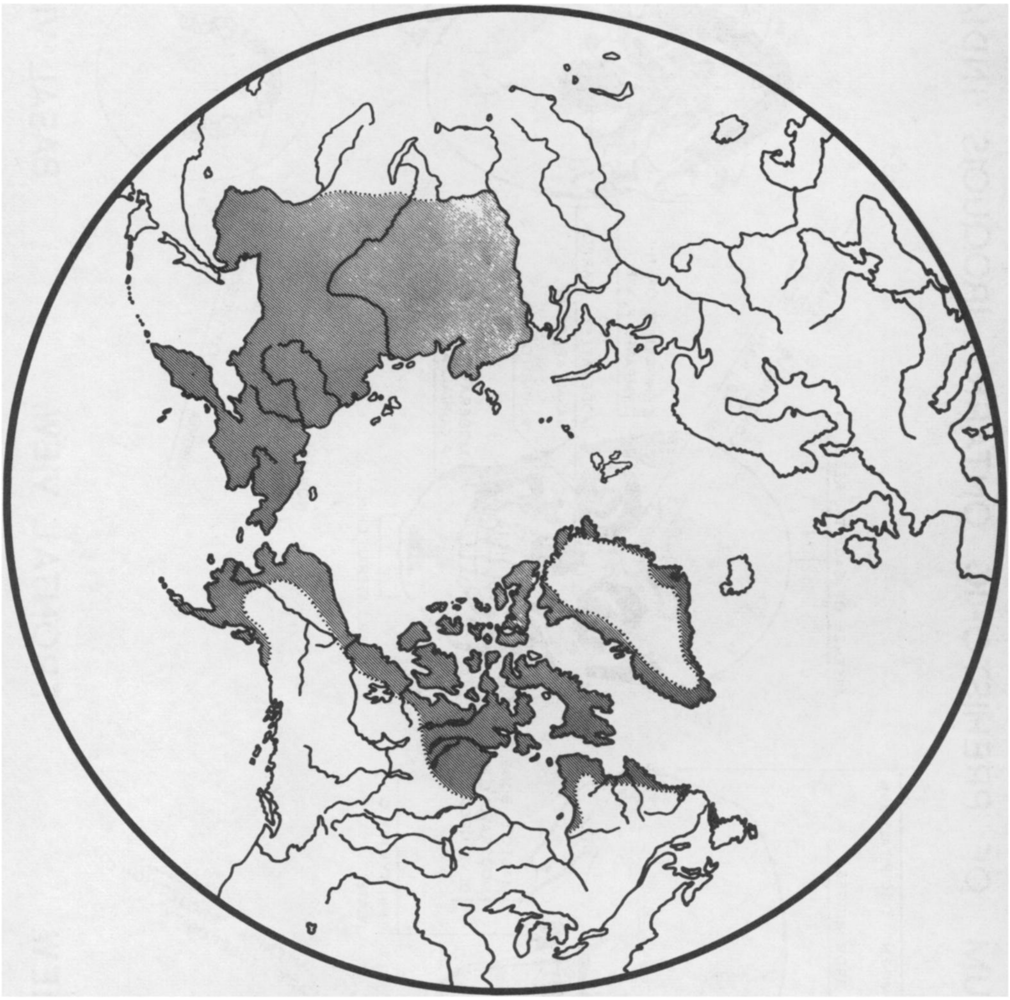
THE TRINITY OF FACIAL FLATNESS AMONG ESKIMOS AND NORTH EASTERN SIBERIAN MONGOLOIDS IS ABSENT IN THE SO CALLED "ESKIMOID" SKULLS OF THE EUROPEAN UPPER PALAEOLITHIC, THESE SKULLS ALSO LACK THE TYPICAL ESKIMO ANTERIOR AND INFERIOR MALAR CONCAVITIES.

ESKIMO ZYGO-MAXILLARY (CHEEKBONE) MORPHOLOGY

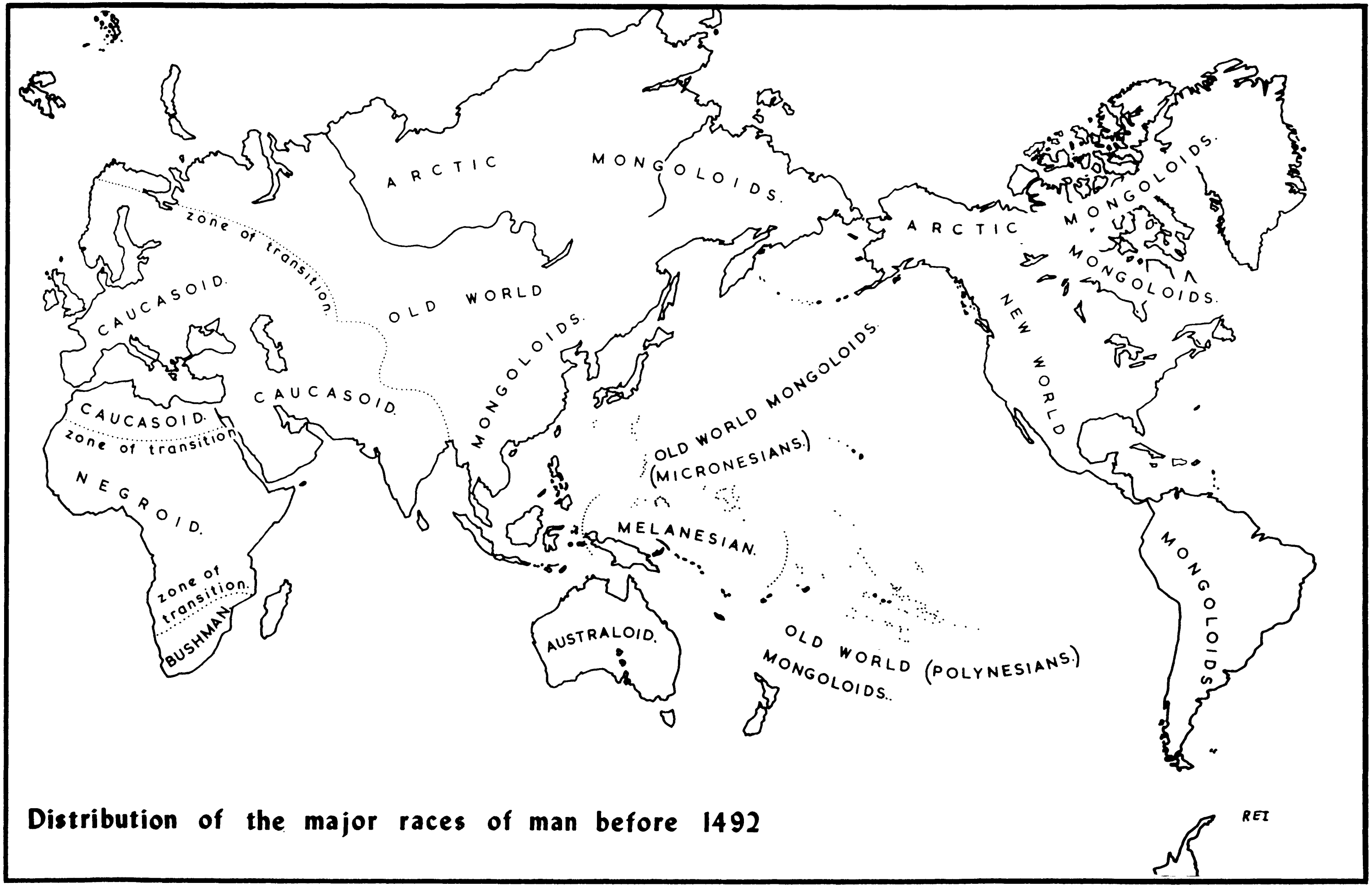


CRANIUM OF PREHISTORIC ONTARIO IROQUOIS INDIAN.





DISTRIBUTION OF ARCTIC MONGOLOIDS IN THE PALAEO — AND NEO ARCTIC REGIONS IN THE PAST AND PRESENT.



Distribution of the major races of man before 1492

PREHISTORIC ESKIMO ARCHAEOLOGICAL SITES CONTAINING SKELETAL REMAINS.

1. UELEN SIBERIA, OLD BERING SEA CULTURE.
2. GAMBELL ST. LAWRENCE IS., OLD BERING SEA CULTURE.
3. KUKULIK ST. LAWRENCE IS., OLD BERING SEA CULTURE.
4. PUNUK ISLAND, PUNUK.
5. CAPE KRUSENSTERN, IPIUTAK AND BIRNIRK.
6. BATTLE ROCK, WESTERN THULE CULTURE.
7. POINT HOPE, IPIUTAK CULTURE.
8. POINT BARROW, BIRNIRK CULTURE.
9. SOMERSET ISLAND, THULE CULTURE.
10. ALARNERK, THULE, DORSET CULTURES.
11. NAUJAN, THULE CULTURE.
12. ARCTIC BAY, THULE CULTURE.

KELL SYSTEM					
Frequency of K	5%	0.2-5%	0	0	0
LUTHERAN SYSTEM					
Frequency of Lu^a	4%	0.0-4%	0	0	0
LEWIS SYSTEM					
Frequency of 'Le' (a+)	22%	23%	10-15%	0	0
Frequency of 'Le' (a—b—)	5%	25%	?	0 ?	0 ?
KIDD SYSTEM					
Frequency of Jk^a	50%	75%	30%	35-75%	?
DIEGO SYSTEM					
Frequency of 'Di' (a+)	0	0	5-10%	0-40%(10)	0 ?
SECRETOR SYSTEM					
Frequency of Sec	50%	50%	100%	100%	?

[1] A letter in quotes indicates a phenotype; a letter not in quotes a gene.

[2] Figure in brakets indicates most frequent frequency about which the others cluster.

[3] D^u is not an exact quantity; its apparent frequency depends on the sera used and the method.

NOTE: Antigens reported in Causasoids only:

'C^w', 'C^x', 'C^u', 'c^v', 'E^w', 'E^u' all of the Rh System. Only 'C^w' has an appreciable frequency.

Negroids only: 'He', 'Hu', 'S^u' all of the MN System.

Mongoloids only: 'Di^a'. The systematic position of 'Di^a' is not clear.

Table 2 by Chown and Lewis (1958) shows clearly the problems of overlapping in blood group frequencies between racial groups. For instance, the frequencies of 'A' are not dramatically different in all the races of mankind; in the frequency of N, Indians and Eskimos show an identical frequency; in the frequency of MS, Caucasoids, Negroids, Asiatic Mongoloids and Indians are very similar; in the frequency of NS, Caucasoids, Negroids, Asiatic Mongoloids and Eskimos are similar; in the P system, Negroids and Indians have similar frequencies; in the Duffy system, the Mongoloids, Indians and Eskimos are identical; in the Kidd system, Asiatic Mongoloids and Indians are somewhat similar; in the Diego system, Asiatic Mongoloids vary from 5% to 10%, Indians from 0 to 40%, and it seems to be absents among Eskimos. The frequency of Diego (a+) seems to be limited to Mongoloids but all Mongoloids do not have it and its distribution is geographically distributed in an irregular manner.

As is evident from the irregular permutations and combinations of the various systems in relation to the racial groups it would be impossible to reconstruct the racial groups on the basis of the frequencies of the various systems.

Caucasoid, Negroid, Mongoloid, Indian, and Eskimo are morphological categories, not serological.

As Chown and Lewis (1960) themselves say: "From this Table it appears that the Indian and Eskimo pattern is closer to the Mongoloid than to the other great divisions but that each has an individuality that sets it somewhat apart. It is not a sharply focused picture, not a close-pointed survey, yet it is surprisingly clearly defined considering how few points out of the theoretical thousands have been used in the delineation. The picture is bound to become sharper in time as other genes such as those for the hoemoglobins and the blood protein fractions are studied in population genetics and still other, simply-inherited genes come to light."

Chown and Lewis (1961) in a later paper express some doubt on the special validity of monogenetic serological factors. This is most welcome after the overstatements of Boyd (1950), Spuhler (1951) and others in this area.

Chown and Lewis state their case as follows: "Evidence is beginning to accumulate that some blood group genes are subject to selection. All this raises the question of how much we can rely upon gene frequencies of unilocular, Mendelian traits such as the blood group antigens in anthropologic studies."

"Such frequencies are reliable over the short haul, but how short or how long is 'short'? They also give evidence of large geographic similarities without saying what those similarities mean. It is an error to use them to the exclusion of, or to insist upon their superiority over, other anthropologic evidence. It has been held that the evidential value of anthropometric characters must be heavily discounted because they may be altered by the environment. Environment alters blood group gene frequencies, and it is the frequencies we make use of in anthropology."

They have some interesting ideas on the relationships between the Eskimos and Polynesians to which we have already alluded above. "For all but the Lewis and secretor systems these turned out to be more similar to those of present-day Polynesians than to those of any other ethnic group for whom comparable data are available."

There is no doubt on the morphological basis that the Polynesians are partially Mongoloid but there is very little evidence that they are especially closely related to Eskimos.

With reference to cheekbone morphology, mandibular morphology, facial flatness, palatine and mandibular tori, nasal morphology, thickness of the tympanic plate, hair texture, stature, weight, odontology, etc., the Polynesians are at the opposite end of the range of morphological variation of the Mongoloids.

The morphological and metrical data in Tables 3, 4 and 5 show a much more consistent variation as would be expected since race is a morphological concept. It is particularly noticeable in Table 5 that these features are stable over periods as great as 20,000 years as well as large areas of space, e.g., from Angmagassalik, Greenland to northern end of Baikal.

Collins (1954), Laughlin (1956), Jørgensen (1956), and the writer (1960) have maintained that such morphological fea-

TABLE 3 — MALAR BONE, VERTICALITY

Legend:	(a)	Frequency distribution by grades.
	(b)	Combinations of last three categories.
	(c)	Figures given in percentage form.
	V	Verticality.
	O	Complete absence of verticality.
	***	Vertical.
	**	Less vertical.
	*	Much less vertical.

			(a)				(b)		(c)	
Series	Sex	n	O	*	**	***	O	V	O	V
MONGOLS	▲	69	1	14	21	33	1	68	1	99
	●	50	4	10	15	21	4	46	8	92
	Totals	119	5	24	36	54	5	114	4	96
KONIAGS	▲	34	0	0	5	29	0	34	0	100
	●	36	1	0	5	30	1	35	3	97
	Totals	70	1	0	10	59	1	69	1	99
BURIATS	▲	13	0	0	4	9	0	13	0	100
	●	10	0	1	5	4	0	10	0	100
	Totals	23	0	1	9	13	0	23	0	100

CHUKCHEES	▲	12	0	0	0	12	0	12	0	100
	●	7	0	0	0	7	0	7	0	100
Totals		19	0	0	0	19	0	19	0	100
GREENLAND ESKIMOS	▲	5	0	0	0	5	0	5		
	●	5	0	0	0	5	0	5		
Totals		10	0	0	0	10	0	10		
SIBERIAN ESKIMOS	▲	2	0	0	0	2	0	2		
	●	3	0	0	0	3	0	3		
Totals		5	0	0	0	5	0	5		
ALEUTS	▲	7	0	0	7	0	0	0		
PUNUK	▲	5	0	0	1	4	0	5		
ANGARA NEOLITHIC (SIBERIA)	▲	1	0	0	0	1	0	1		
BIRNIRK	—	34	0	0	0	34	0	34	0	100
(OLD) ST. LAWRENCE ISLAND ESKIMO	—	6	0	0	0	6	0	6		
MEDIEVAL ENGLISH	▲	15	13	2	0	0	13	2	87	13
	●	15	14	1	0	0	14	1	93	7
Totals		30	27	3	0	0	27	3	90	10
17th CENTURY ENGLISH	▲	18	11	4	2	1	11	7	61	39
	●	15	12	2	1	0	12	3	80	20
Totals		33	23	6	3	1	23	10	70	30

tures as mandibular torus and palatine torus, pinched narrow nasal bones, etc., are distinctive of Arctic Mongoloids in that they show a very high frequency and a minimum of overlap with other groups.

Hooton (1918), Debetz (1960), Laughlin (1956), and Jørgensen (1956) pointed out that Scandinavian Nordics such as Medieval Islanders and Greenland Vikings and the Lapps have a high frequency of some of these traits as well. This has led Debetz to suggest the possibilities that these traits may in some way or other be determined by the Arctic environment.

TABLE 4

COMPARISON OF THE NEOLITHIC SKULLS OF CIS-BAYKALIA WITH THE ANCIENT AND PRESENT-DAY CRANIOLOGICAL SERIES OF SIBERIA (Facial angles) (Males) (after Levin 1950 and Debet 1959).

Skull series	Naso-malar angle	Zygo-maxillary angle
Afanasyevo population	136.1(8)	126.2(25)
Andronovo population	139.2(18)	128.1(18)
Cis-Baykal Neolithic Isakovo-Serovo stage	145.3(15)	138.5(13)
Cis-Baykal Eneolithic Glazkovo stage	144.8(30)	137.9(28)
Cis-Baykal Neolithic and Eneolithic, summarized.	145.7(56)	138.0(49)
Reindeer Tungus	149.1(28)	141.6(28)
Negidals	148.6(16)	142.3(16)
Yukagirs	148.7(18)	137.0(17)
Baykal type, summarized	148.7(62)	140.5(61)
Trans-Baykal Buryats	145.5(45)	140.9(42)
Mongols	146.4(80)	138.4(76)
Tuvins	146.6(44)	141.3(42)
Central-Asiatic type, summarized	146.2(169)	139.8(160)
Southeastern Eskimos	146.2(89)	135.6(84)
Coastal Chukchi	147.8(28)	137.4(27)
Arctic type, summarized	146.6(117)	136.0(111)
Ipiutak	146.6(33)	135.8(31)
Tigara	146.5(113)	133.9(108)
Yukaghirs	148.7(18)	137.0(17)
Tungus	149.1(28)	141.6(28)

Aleuts	145.5(30)	138.1(28)
Kwakiutl	143.0(27)	131.3(27)
Arikara	140.1(33)	126.8(33)
Georgians	138.0(28)	125.6(27)

TABLE 5 — FACIAL ANGLES OF VARIOUS PREHISTORIC ESKIMOS, INDIANS AND UPPER PALAEOLITHIC HOMO SAPIENS †

Skull series	Naso-malar angle	Zygo-maxillary angle
Upper Cave Choukoutien 101 ▲	143	130 (measured from cast)
Upper Cave Choukoutien 103 ●	150	139 (measured from cast)
K-1, Early Ipiutak* ▲		
K-3, Middle Ipiutak* ▲	147	155
K-2, Birnirk* ▲	147	136
K-4, Birnirk* ●	149	136
BR-1, Western Thule* ●	149	134
BR-2, Western Thule* ▲	148	138
Arctic Bay Thule ▲	151	142
Dorset ▲	147	145
Donaldson ▲	143	134
Kant ▲	133	125
El Risco ▲	141	132

† Facial angles calculated by E. Arima.

* These skulls were found in Alaska in 1960 by the Brown University Field Party. The author wishes to express his gratitude to Dr. J.L. Giddings for permission to study these specimens which are now in the collections at the Haffenreffer Museum of the American Indian, Bristol, Rhode Island.

TABLE 6 — FACIAL ANGLES OF UPPER PALEOLITHIC AND AND NEOLITHIC HOMO SAPIENS FROM CHINA

(after Wu Xin-Zhi 1961; Yen Yin, Liu Chang-Zhi, Gu Yu-mm 1960; Ju-Kang Woo 1959)

Skull series	Naso-malar angle	Zygo-maxillary angle
Liukang Upper Paleolithic ▲	143	138
Upper Cave Choukoutien 101* ▲	135*	128* (measured from cast)
Upper Cave Choukoutien 102 ●	130	125 (measured from cast)
Upper Cave Choukoutien 103* ●	148*	131* (measured from cast)
Bao Ji Neolithic ▲	144(12)	137(12)
Bao Ji Neolithic ●	143(9)	139(6)

* These values differ from those of the author (see Table 5).

Except for this embarrassing overlap with Scandinavian Nordics the morphological data are distributed consistently among the Arctic Mongoloids, i.e. Eskimos, Northeastern Siberian Mongoloids.

These traits are in general absent among most New World Mongoloids excepting those living on the Eskimo frontier, e.g. Northern Athabaskans, Northwest Coast Indians, etc. (Oschinsky and East).

In the Old World, however, the peoples of South Siberia and East Asia still have a high frequency of these traits but not as high as among the Arctic Mongoloids, e.g., Buriats, Mongols, Japanese, Chinese, etc. In the New World the distributions change dramatically; the Algonquians, the Iroquois, the Plains and all Indians south of them show a sudden drop in the frequency of these features (Oschinsky and East).

Is this above morphological evidence really indicative of the morphological and taxonomical unity of the Arctic Mongoloids?

It is certainly evident that the geographical distribution of these features is more consistent than that of the blood group or anthropometry and craniometry, and since these features are relatively stable polygenetic features we can understand their consistent variation, except for the overlap with the Scandinavians. They fulfil all the requirements of subspecific taxonomy as the author understands them, namely, they have a high frequency in the various populations in question, they are not found in high frequency outside these populations except for the Scandanavians. They are distributed without interruption in a geographical continuum.

At this point we might ask the question: are there no other morphological features which are as consistently or more consistently distributed (in the geographical and numerical sense) than the above-mentioned ones?

Debetz and Levin (1946, 1947, 1949, 1950, 1959, 1960) in a number of publications, have pointed out that Arctic Mongoloids have the flattest faces as indicated by naso-malar, and zygomaxillary facial angles. These show a very consistent distribution geographically except that the zigo-maxillary angle is sometimes affected by prognathism giving them a lower reading than would be expected on the basis of the cheekbone morphology. This led the writer to investigate the cheekbone morphology of the Arctic and other kinds of Mongoloids to see if this showed any interesting variations to the above-mentioned facial angles and other morphological characters.

The author found that among Eskimos and Chukchee the zygo-maxillary tuberosity projects in such an extreme manner that two distinct fossae are created in two distinct areas on the zygomatic process of the maxilla.

Also, when a perpendicular is erected to the vertical surface of the zygo-maxillary junction at the tuberosity, it crosses the Franckfort horizontal at right angle. This situation is present in over 95% of the 3,000 Eskimo and Arctic Mongoloid crania examined by the writer.

In non-Arctic Mongoloids the zygo-maxillary tuberosity projects forward but in a lesser degree so that the two above-mentioned fossae are usually absent. When the cheekbone is viewed in the norma lateralis the lower margin of the orbit and the tuberosity are in an oblique plane with reference to the Frankfort horizontal. In the Greenland Vikings this plane is extremely oblique as is typical of Caucasoids.

An important general feature of the Mongoloid zygomaxillary complex is that the zygomatic process of the maxilla is considerably long relative to the length of the zygomatic arch. This is most apparent when viewed in the norma basalis and is the cause of the relative lack of obliquity of the zygomatic arch in Mongoloids.

When the skulls of non-Arctic Mongoloids are viewed in the norma basalis the zygo-maxillary junction appears as a 90 degree angle rather than the beaklike formation present in the Arctic Mongoloids.

It is interesting to note that this intermediate zygo-maxillary protrusion is an ancient Homo sapiens character and is found in almost all of the specimens of Homo sapiens fossilis ("Cro-magnon man"). Specimen 101 from the Upper Cave of Chou-kou-tien shows this condition which is practically identical with the Cro-magnon types of France and Germany, as well as the Mesolithic individuals from North Africa (Afalou-bou-rummel) (see plates 1-6).

The only specimen to show the extreme Arctic Mongoloid zygo-maxillary tuberosity projection from the upper Paleolithic is specimen No. 103 from the Upper Cave of Chou-kou-tien which Weidenreich (1939) quite correctly designated as Eskimoid but not precisely for this reason.

It seems that although all the specimens of upper Paleolithic Homo sapiens from Asia, Africa, and Europe resemble each other in enough features to be considered one subspecies, e.g. continuous brow ridges, rectangular orbits, large mastoid processes, prominent chins, similar cheekbone morphology, they also begin to foreshadow modern racial populations. The specimens at Chou-kou-tien are ancestral Mongoloids; the Mesolithic skulls from Elmenteita in Kenya are the ancestral Negroids and the Wajak skulls from Java are the ancestral Australoids. The descendants of these various groups have preserved some of the chief diagnostic features of their upper Paleolithic ancestors but in different combinations and intensities.

This seems to indicate that the modern races have had a polyphyletic origin dating from the upper Paleolithic. The ancestral Mongoloids have intensified the upper Paleolithic type of cheekbone and transmitted it to their descendants among whom it has become a fundamental racial character (see plates 1-6).

The zygo-maxillary tuberosity projection among Negroids and Caucasoids has undergone considerable reduction. Although the Mongoloids are as varied as any other group in nature some degree of zygo-maxillary tuberosity projection is always present. It is hard to understand why Mongoloids have maintained and intensified the upper Paleolithic cheekbone morphology while the other subgroups of Homo sapiens have lost it.

It is probably isolation which has preserved this feature as a part of the distinctive phylogenetic mosaic, which comprises the Mongoloids.

To sum up, the Arctic Mongoloids, e.g. Eskimos, Chukchee, Tungus, etc., are characterized by the "trinity" of famial flatness, i.e., large naso-malar and zygo-maxillary angles, and verticality of the malar (caused by pronounced anterior projection of the zygo-maxillary tuberosity) (see figure 2, 3, 4).

The geographical distribution of these traits is the circumpolar area from Greenland to the Yenesei River in Siberia (see map, figure 6). In conjunction with these features there is a high frequency of narrow, pinched nasal bones, thicknening of the tympanic plate, palatine and mandibular tori. It is this situation of high frequency in an uninterrupted geographical continuum which defines the Arctic Mongoloids as a taxonomic morphological entity.

Metrical data and blood group data may indicate interbreeding and relationship in more limited areas but are not useful in higher taxonomic categories and phylogenetic reconstruction because of the phenomona of interracial overlapping and genetic drift.

Certain morphological features as the sagittal keel and gonial eversion are guilty of interracial overlapping and for that reason are less useful. Although Eskimos have a high frequency of sagittal keel and gonial eversion these traits turn up in too many other groups, e.g. Melanesians, Iroquois, etc., to be diagnostic of Eskimos or Arctic Mongoloids (Oschinsky and East).

As we proceed south of the Arctic in the Old and the New World the Arctic morphological complex changes rapidly (more rapidly in the New World than in the Old World).

The Iroquois, the Algonquians and all Indians south of them show an incidence of malar verticality of less than 10% whereas the Buriats and Mongols of Urga show it in about 40% to 50%. The other traits such as the two tori and the thickening of the tympanic plate also decrease at roughly the same rates (Oschinsky and East).

When we investigate the frequency of these traits phylogenetically we notice that many of these features are present in the Upper Cave Chou-kou-tien specimens, the Siberian Neolithic, and the earliest prehistoric Eskimo specimens in the Old and New Worlds. It is interesting that facial flatness, as measured by the two angles (Debetz 1959) and the morphology of the zygomaxillary tuberosity, is so consistent in its distribution and frequency in time and space (Oschinsky and East). It is, therefore, of great diagnostic value in Mongoloid phylogeny and anthropogeography.

As new finds are made in Siberia, China, and the Arctic New World these characteristics will be of great usefulness in unravelling Mongoloid history.

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