Micronesica Supp. 2: 363–372, 1990

Micronesia to Macromongolia: Micro-Polynesian Craniometrics And the Mongoloid Population Complex

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Abstract—Using previous cranial evidence, this paper considers the Micronesian and the Polynesian populations in terms of their position within the diversity of East Asian populations and meaning for the history of the so-called Mongoloid peoples.

Introduction

The Mongoloids of the world are a major, multiplex component of the problem of the emergence of moderns generally. The constituent populations are more varied than those of the sub-saharan Africans or the "Caucasoids;" yet it is rather persuasive that all (Asiatic Mongoloids, Pacific Islanders, American Indians) have some kind of a common base.

We may study the subdivisions from this point of view of interconnections: Micronesians versus Polynesians versus Indonesians, Philippine Islanders, Taiwan aboriginals and so on. What is the communality? By different approaches they all seem to differ considerably. Traditional blood systems have not been informative, but immunoglobulins, HLA and possibly mtDNA may be very revealing, as well as dermatoglyphics. All these methodologies are rather arduous.

Craniometrics continue to be helpful, as Pietrusewsky has shown, especially in his recent findings with respect to Polynesians and Vietnamese. Here I consider some results from my own data. This paper, as prepared and circulated for the 1987 Conference, was the forerunner of a fuller and more intensive presentation of all these data, in a report which has now been published (Howells 1989). In that report the cranial populations are described and the methods and measurements covered in detail.

The conference paper was based on selected, mainly Asiatic, series of crania, and only 35 measurements were entered for analysis instead of the fuller complement of 57. Thus it is not a duplicate of the monograph. The latter, however, contains basic statistical tables covering so much similar information that most of the original tables of this paper have been dispensed with, their contents condensed—accurately I hope—into verbal form alone. Anyone wishing copies of the tables may apply to me.

Populations

The series used, in most cases approaching 50 specimens of each sex, are these (including, for comparison, Australo-Melanesians and Europeans):

Guam, Marianas

Polynesia: Mokapu, Oahu, Hawaii; Easter Island; Moriori, Chatham Islands

East Asia: North Japan (Hokkaido): South Japan (Kyushu); Anyang (Shang Dynasty); South China (Hainan Island); Philippines (general); Atayals (Taiwan). Also Ainu (Hokkaido); Buriat (Siberia).

Americas: Arikara (South Dakota); Santa Cruz Island (California); Peru (Yauyos District); Eskimo (Inugsuk culture, Greenland).

Australo-Melanesia: South Australia (Murray River); Tasmania (general); Tolai (New Britain).

Europe: Norse (medieval Norway); Zalavar (medieval Hungary); Berg (Austrian mountain village).

Shape Description

By a process described in the 1989 monograph, all measurements, and means thereof, were rendered into a size-free form, denoted C-scores, as follows. A grand mean for each measurement and a pooled standard deviation were computed for each of the 35 measurements. These figures were used to put all individuals measurements in standard form (deviation scores divided by standard deviation); thus the mean of all becomes zero and the standard deviation 1.0. Each individual's measurements were then recentered: a mean of his standardized scores (PENSIZE) was subtracted from his scores, so that for him or her the individual mean becomes zero. The resulting C-scores are, so to speak, all indexed relative to one another, so that their plus or minus values reflect shape in various parts of the skull. The following descriptions of the several populations and areas are appraisals from inspection of all these mean C-scores, not shown.

The mean PENSIZE figures show that Polynesians, Guamanians, Eskimos, Buriats and Ainus are large-skulled, while such fringe Mongoloids as Filipinos and Atayals are small.

In shape judged from C-scores, the central Mongoloids—Japanese and Chinese—are not distinguished in the vault, though this is relatively high; it is broad below, across the sphenoid angles. The nose is relatively high in the vertical sense, but markedly flat across the interorbital space, and the face is also flat and narrow across the upper orbital rim. The subnasal region is likewise flattish; the malar is short from front to back, and angled.

Polynesians are high-skulled, and prominent at nasion, as well as in the middle and at the sides; but the subnasal surface is not protruding, and the face and skull become narrow below, contrasting with Japanese and Chinese; Polynesians agree with these, however, in the flatness across the nose and upper orbital margin. (Easter Islanders are markedly long and narrow in the skull, agreeing in other measures as well; it seems clear that this is a special development within the Polynesian pattern, however.)

Guamanians agree with all in traits of the upper face and nose, but differ clearly from Polynesians in the pronounced lower maxillary breadth, and in breadth of malars and of skull base generally. Development of supraorbitals is less than Polynesians; in general, Guamanians appear to have no particular relation to these, mainly sharing features found

in Japanese and Chinese. Nor do they give evidence of relationship in configuration to those offshore Mongoloids, the Filipinos and Atayals.

Ainus have their own traits, but many are those of Mongoloid, especially the important ones of flatness across the upper orbital margin and the interorbital and nasal spaces. In many figures they depart clearly from Europeans and Australians, further evidence against two popular hypotheses of Ainu affiliations.

American Indians depart from other Mongoloids in their own ways. They are not strikingly uniform, at least in the meager representation here, which is hardly surprising. They differ mainly in showing a distinctly greater prominence of the nasal root and of the interorbital space generally, though not reaching European figures. Indians are also marked by a strong development of zygomatic, auricular (basal) and minimum cranial breadths. The first two of these excesses are shared by Eskimos and Buriats but, among other "Mongoloids," only by Guamanians.

Principal Components

A further examination of these patterns consists of a principal components analysis of the same data (the means of the C-scores). This has the effect of converting the measurements to new scales (called principal components or factors), in which the first few factors express the most important aspects of shape, and in which the correlation among measurements is removed so that the same information is not repeated from one factor to another. Thus different patterns of shape may be suggested by different components, with the first being the most important. In addition, these should be factors of shape only, size having been expressed by PENSIZE and thus removed beforehand.

Also shown are the product moment correlations of each group's mean C-scores with the factor loadings, to show the registration of groups on factors. These are given in Table 1, before the factor patterns in Table 2. Both are shown for the first three, the most important, factors only.

Factor 1 is an Australoid versus Mongoloid distinction, with Europeans siding with Mongoloids. Continental Asiatics are the most extreme, accompanied by Atayals, Filipinos and Guamanians. In Table 2 (from which all loadings smaller than 0.40 are omitted for easier inspection), this most important factor shows Australoids to be marked by a projection of the muzzle (SSR, BPL, PRR, AVR), a lowness of face (WMH, NLH), and a face narrow below (ZMB) but broad above (OBB, FMB). Mongoloids are the opposite: retracted lower face, especially subnasally, as in the earlier description from C-scores, American Indians tend to go with Mongoloids on this factor. The separation of Polynesians, especially Easter Island, is interesting.

Factor 2 opposes Europeans (somewhat associated with American Indians and Australoids) to Polynesians with Guamanians, also Mongoloids generally, including Eskimos and Ainus, but not Atayals or Filipinos. In this contrast, Europeans exhibit a broad, elevated interorbital region and swept-back sides of the face (cf. EKR), as do Australians but not Melanesians, and as do Indians except for Arikara. The Mongoloid pattern is a low, narrow interorbital region with forwardly-placed sides of the face; Eskimos in particular are famous for these traits.

Factor 3 highlights American Indians (the Peruvians stray in this and other charac-

TABLE 1

CORRELATIONS BETWEEN C-SCORE MEANS AND FACTOR LOADINGS

	Factor 1		*Factor 2*		*Factor 3*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*
Guam, Marianas	-0.31	-0.58	-0.72	-0.58	0.09	-0.07
Mokapu, Hawaii	0.08	0.02	-0.83	-0.86	0.01	0.08
Easter I	0.51	0.52	-0.61	-0.60	-0.41	-0.34
Moriori, Chatham	0.22	0.10	-0.60	-0.64	0.45	0.49
North Japan	-0.56	-0.68	-0.42	-0.25	-0.22	-0.09
South Japan	-0.47	-0.57	-0.47	-0.40	-0.53	-0.46
Anyang, Shang Dyn	-0.62	.	-0.44	.	-0.34	.
Hainan Chinese	-0.82	-0.68	-0.16	-0.27	-0.27	-0.43
Ainu	-0.13	-0.38	-0.28	-0.29	-0.11	-0.04
Atayal, Taiwan	-0.74	-0.55	0.12	0.24	-0.42	-0.55
Philippines	-0.70	.	0.02	.	-0.25	.
Buriat, Siberia	-0.68	-0.77	-0.50	-0.42	0.33	0.29
Eskimo, Greenland	0.16	0.09	-0.84	-0.86	0.00	-0.01
Arikara	-0.30	-0.49	-0.37	-0.30	0.70	0.68
Santa Cruz I	-0.31	-0.18	0.20	0.27	0.73	0.55
Peru, Yauyos	-0.66	-0.67	0.41	0.51	0.26	0.13
S Australia	0.77	0.80	0.29	0.26	0.20	0.24
Tasmania	0.65	0.70	0.41	0.36	0.14	0.20
Tolai, New Britain	0.84	0.81	0.02	-0.15	0.00	0.01
Norse	-0.26	-0.14	0.48	0.47	0.01	0.03
Zalavar	-0.30	-0.39	0.57	0.61	-0.08	0.02
Berg, Austria	-0.61	-0.55	0.42	0.57	0.19	0.23

ters) plus Buriats, versus the central Mongoloids; it is a intra-Mongoloid differentiation, even intra-Polynesian. The Indian side of the distinction lies in upper facial and zygomatic breadth (ZYB, AUB, FMB, OBB) but also lowness of the vault (VRR, PAS) and flatness of the frontal (FRS). These are well-recognized Indian traits; it might seem strange that the central Mongoloids should feature the opposing pattern, as they do.

Further factors will not be shown, although patterns are evident on a diminishing scale. Factor 4 is a European factor, opposing these to most Mongoloids but not to Polyne-

TABLE 2

FACTOR PATTERN

		Factor 1		Factor 2		Factor 3	
		Male	*Female*	*Male*	*Female*	*Male*	*Female*
Glab-occip length	(GOL)	0.73	0.78				
Max cranial breadth	(XCB)	-0.77	-0.82				
Vertex radius	(VRR)			-0.49	-0.53	-0.60	-0.56
Bas-nasion length	(BNL)	0.48		-0.66	-0.67		
Bas-prosth length	(BPL)	0.89	0.86				
Nasion radius	(NAR)	0.52	0.45	-0.62	-0.66		
Prosthion radius	(PRR)	0.87	0.81				
Max frontal breadth	(XFB)	-0.78	-0.82				
Bizygomatic breadth	(ZYB)		-0.55	-0.45		0.74	0.59
Biauricular breadth	(AUB)	-0.70	-0.79			0.55	0.48
Min cranial breadth	(WCB)	-0.80	-0.75				
Nasal height	(NLH)	-0.63	-0.72	-0.58	-0.46		
Orbit height	(OBH)	-0.46	-0.52				
Orbit breadth	(OBB)	0.51				0.61	0.65
Palate breadth	(MAB)						
Bimaxillary breadth	(ZMB)	-0.46	-0.66				
Zygomaxill subtense	(SSS)	0.50	0.50	0.40	0.48		
Bifrontal breadth	(FMB)	0.49	0.57	0.41		0.51	0.50
Nasio-front subtense	(NAS)		0.40	0.73	0.80		
Interorbital breadth	(DKB)			0.71	0.72		
Naso-dacryal subtense	(NDS)			0.71	0.81		
Simotic chord	(WNB)			0.91	0.88		
Simotic subtense	(SIS)			0.84	0.87		
Infer malar length	(IML)	0.73	0.75				
Malar subtense	(MLS)	-0.44					-0.53
Cheek height	(WMH)	-0.64	-0.75	-0.52	-0.51		
Glabella projection	(GLS)	0.69	0.75				
Frontal subtense	(FRS)					-0.67	-0.65
Parietal chord	(PAC)		0.45			-0.70	-0.63
Breg-lambda fraction	(PAF)			0.47		-0.65	-0.69
Occipital subtense	(OCS)			0.58	0.70		
Dacryon radius	(DKR)			-0.86	-0.91		
Subspinale radius	(SSR)	0.91	0.87				
Ectoconchion radius	(EKR)			-0.90	-0.94		
M1 alveolus radius	(AVR)	0.85	0.77				

sians. This rises from a narrowness and shortness of the maxillary region, relative to some prominence of the upper nasal region; this last is not a character of Polynesians who instead have an overall prominence of the upper face. Further factors make successively less sharp distinctions, and tend to distinguish among populations of the same region, after distinguishing between regions in the earlier factors.

Clusterings

Finally, consider the degrees of likeness among the populations themselves. The diagrams (Figures 1 and 2) give clusterings for the male and female populations separately, from a Nature's Groups algorithm (Jones 1964) progressively pairing series or groups by least distance.

Such dendrograms are not very stable, varying in structure with different sets of groups involved and different sets of measurements or functions entered. Here, the main fact of interest is, on the one hand, the gathering of Asiatic samples all in one main branch (including Guamanians and the Ainu), and the placing of Polynesians and American Indians on two other branches separate from the Asiatics. (Other such clusterings in Howells, 1989, tend to associate Americans with Europeans somewhat, but to draw Polynesians closer to Asiatics, and certainly not to Australoids.)

For what it is worth, the male "Mongoloid" samples group the Japanese and Shang Dynasty Chinese in opposition to the fringe or offshore people, of which Guamanians appear here to make as good a member as any other; so do the Hainan Chinese. This suggests a picture of an older and a newer stratum, according somewhat with Turner's Sundadonts and Sinodonts; however, the American Indians do not conform to such a picture. Buriats would seem to form a quite separate western or Siberian wing.

Discussion

Conclusions may be vitiated by the nature and limitations of the data, which sacrifice breadth for depth, and depend on sizeable series in which all cases can be measured fully, series which are not easily found. Thus, while it appears that Eskimos (Greenland) are considerably less like American Indians than averred by Szathmary & Ossenberg (1978), it has to be acknowledged that the Indian series here is small and less strategically distributed than one could wish.

The analyses described above seem to point to certain loose conclusions and to further problems.

1. Crania in these terms do seem to reflect fairly long-term genetic connections. Questions as to adaptive changes may be posed. In the case of Polynesians, time as controlled by archaeology becomes important; these populations clearly have some common morphology from before 2000 years ago. Does this include size, a definite Polynesian trait? It also seems clear that local differentiation has been significant, especially in the case of Easter Island. Morphology here can hardly be ascribed to non-Polynesian genetic strains. Is adaptation to environment involved? This would be hard to test. In general, genetic drift is a more likely explanation of Polynesian differentiation, since its effect on Polynesian blood polymorphisms is persuasive (Howells 1973).

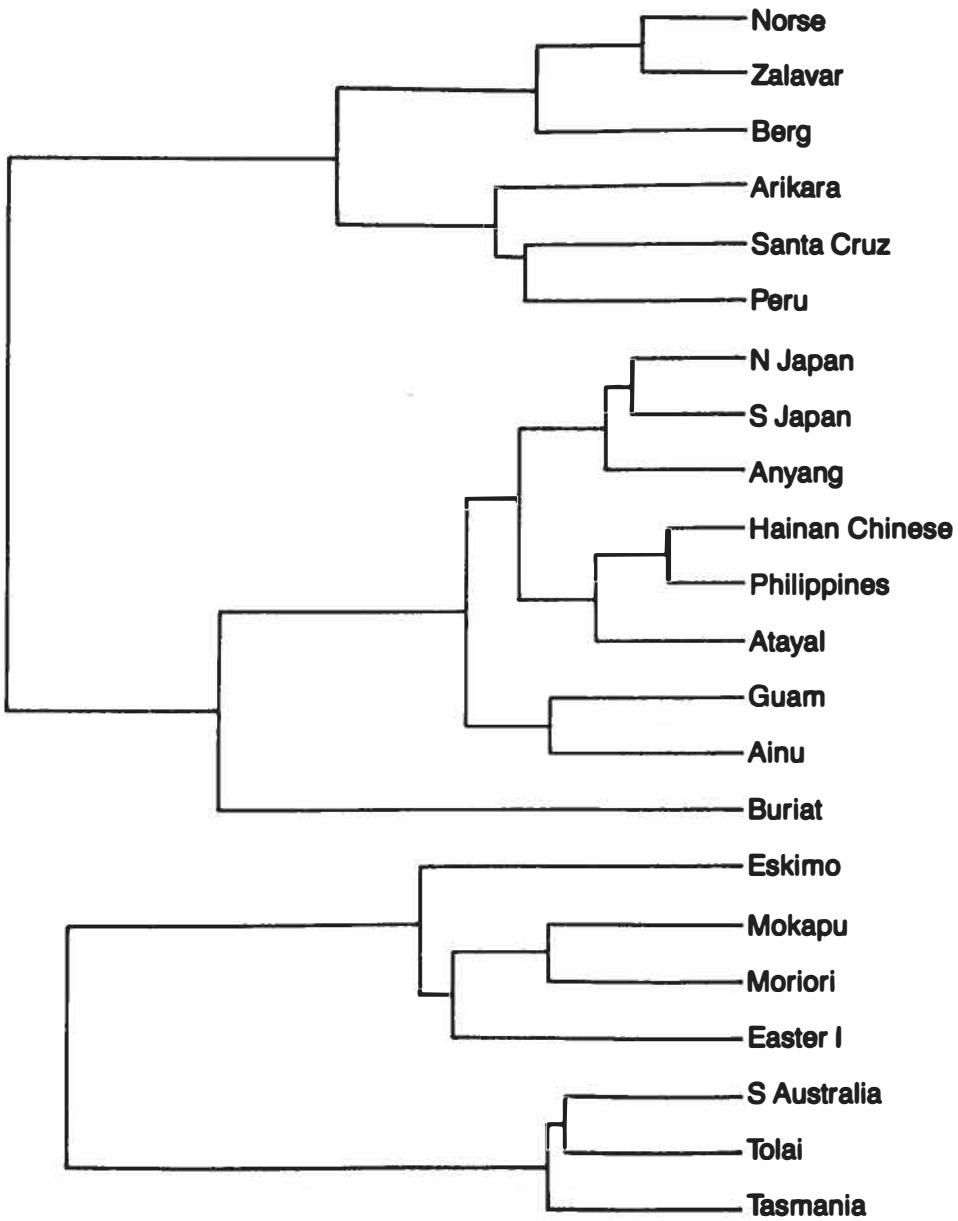

Figure 1. Clustering analysis (Nature's Groups) of 22 male series, using distances based on means of C-scores. (The final joining of branches is too distant to be shown.)

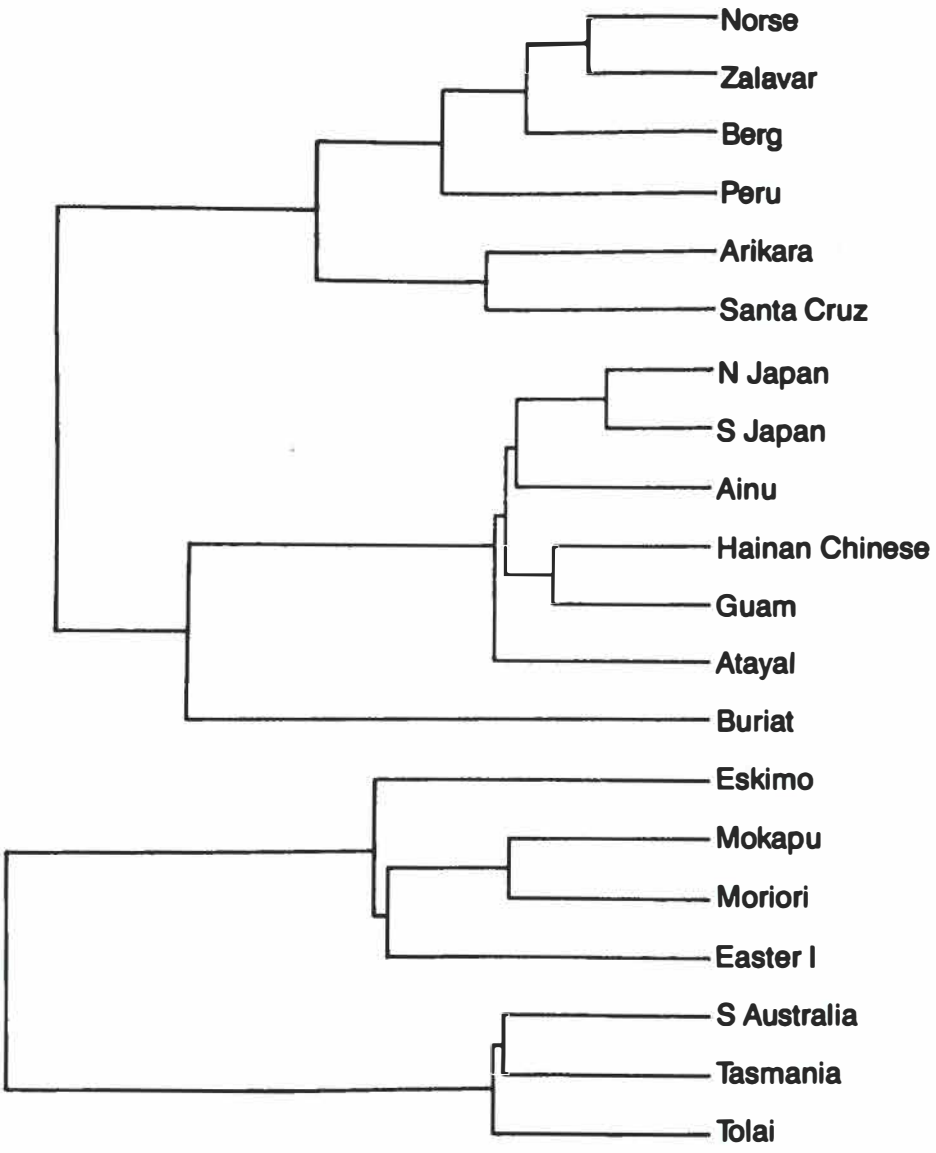

Figure 2. As in figure 1, clustering of 20 female series.

2. Ruling kinds of differentiation are suggested in the factor analysis, such as dental development in Australoids. It has also been hypothesized that the tendency to facial flatness in Mongoloids is an adaptation to protect the eyes and nasal chamber against dry cold. This is, however, inferential and lacking experimental support in spite of the fact that this flatness is so strongly associated with north Asiatic peoples.

3. Groupings generally are informative. However one conceptualizes Mongoloids,

there is obviously wide cranial divergence among them; at the same time, as noted above, those of Asia (included here) are a general group, with Polynesians and American Indians set off in different directions.

Convergence of Indians on Europeans should not suggest derivation from that direction; Christy Turner would answer here. The remote linking in the dendrograms of Polynesians with Australoids (and Eskimos) is not supported in fuller studies (Howells 1989). As to the old hypothesis of getting Polynesians from America, the opposition in the figures between the two kinds of population is strong, except for the Moriori and Arikara. One has not heard that derivation proposed.

Finally, the strongest opposition in the analyses is that between Mongoloids and Australoids. In one theory of *Homo sapiens* development (Wolpoff & Thorne 1984) these two branches arose in the Far East from similar general *Homo erectus* ancestors, diverging gradually in more recent times; that is, the two share a special original ancestry. As far as these data go, the idea finds little support.

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