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journal or publication title	アジア・太平洋地域の中の日本人
volume	4
page range	79-93
year	1992-12-25
その他のタイトル	頭蓋形態小変異に基づく北方モンゴロイドの分化
URL	http://doi.org/10.15055/00003278

**Differentiation of the Northern Mongoloid:
The Evidence of Cranial Nonmetric Traits**

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ABSTRACT

The Mongoloid populations in Siberia, East Asia and North America were investigated in terms of nonmetric cranial traits to elucidate their differentiation and migration. The result of the analysis confirmed that there were three different types of Mongoloids in Siberia as mentioned by Debets (1951). The Arctic populations have peculiar characteristics and the Neolithic Baikal are more similar to the Evenki and Amur than to the inland Mongoloids consisting of the Buryat and Mongolian, who clustered with Kazach. It seems that the inland Mongoloids came later from China to central Siberia where the Neolithic Baikalian had once inhabited. The Japanese are similar to the inland Mongoloids, whereas none of the Siberian Mongoloids have affinities with either the Neolithic Jomon or the Hokkaido Ainu.

Introduction

The Mongoloid populations today inhabit the Asian continent, the Pacific islands and North and South Americas. The various Mongoloid peoples were formerly distributed throughout vast areas of Siberia and the Far East, and then some of their descendants dispersed into the Americas via Beringia. As for the differentiation of Siberian Mongoloids, a number of craniological and somatological reports have been published by Soviet anthropologists (e. g., Debets, 1951; Levin, 1963; Alekseev, 1979). Recently, the dental morphology and nonmetric cranial traits of Siberians were investigated and hypotheses on Mongoloid dispersal were proposed (Rychikov and Movsesyan, 1972; Ossenberg, 1986; Turner, 1985, 1987, 1989, 1990; Ishida, 1990).

In 1988-1989, the first author had the opportunity to investigate the cranial nonmetric traits of the Siberian Mongoloids and other groups in collection in the Soviet Union. The aim of the present study was to clarify the differentiation of the Northern Mongoloids and relationships between them and Asian populations through the analyses of cranial nonmetric data.

Materials and Methods

The materials examined in the Soviet Union consisted of the following 14 groups: the Aleut, Asiatic Eskimo, Ekven (the Iron age), Chukchi, Yukagir, Yakut, Evenki (including Even), Buryat, Neolithic Baikal, Mongolian, Tagar (the Iron age, southern Siberia), Kazach, Amur (Ulch + Nanay + Negidal + Oroch) and Sakhalin Ainu. Those cranial collections are housed in the Institute of Ethnography-Leningrad Branch; the Museum of Anthropology of Moscow State University; and the Institute of History, Philology and Philosophy, Novosibirsk. The cranial samples of the Neolithic Baikal examined consisted of collections from both the east and west coasts of Lake Baikal. The Tagar culture thrived from the 7th to the 3rd century B. C. in southern Siberia and their crania show European characteristics in many respects (Kozintsev, 1977). The nonmetric cranial data of the Sakhalin Ainu were taken from collections at Kyoto University and from the Institute of Ethnography-Leningrad branch (Ishida and Kida, 1991). The nonmetric data of the Hokkaido Ainu collection, which is stored in the University of Tokyo, were collected by the first author.

Twenty-three traits were examined for presence or absence following the criteria of Dodo (1974, 1986a) in order to calculate biological distances. We had selected 15 of those traits as having high interobserver consistency (Ishida and Dodo, 1990a). In addition, the transverse zygomatic suture vestige proved to have a high interobserver consistency as a result of recalculation of the phi coefficient based on the Hokkaido Ainu data ($\phi = 0.89$). Therefore, 16 traits were employed for comparisons between the Siberian Mongoloids and neighbouring ethnic populations to decrease the influence of interobserver errors. The samples for comparison consisted of the Japanese, Mongolian, Alaskan Eskimo, Canadian Eskimo, Aleut (Dodo and Ishida, 1987), Aeneolithic Doigahama Yayoi (Dodo and Ishida, 1988), Neolithic Jomon and protohistoric Kofun (Dodo and Ishida, 1990), all the data of which were gathered by the second author.

The distance estimates using the mean measure of divergence (MMD) and its standard deviation were calculated based on pooled-sex and skull incidences (Sjøvold, 1973). Clustering and principal coordinate analyses were applied to the distance matrices of the MMDs (Sneath and Sokal, 1973).

Results

Skull-incidences of nonmetric traits in 15 cranial samples from Siberia and the Far East are given in Table 1.

Table 1. Skull-incidences of cranial nonmetric traits of several population samples from Siberia and the Far East.

Traits	Aleut		Asia Eskimo		Ekven		Chukchi	
	n	p	n	p	n	p	n	p
1. Metopism	63	0.032	133	0.053	111	0.027	45	0.044
2. Supraorbital nerve groove	59	0.237	130	0.231	109	0.138	43	0.140
3. Supraorbital foramen	63	0.714	133	0.602	108	0.648	45	0.778
4. Ossicle at the lambda	62	0.145	132	0.053	109	0.055	45	0.089
5. Biasterionic suture trace	59	0.068	131	0.168	105	0.162	45	0.022
6. Asterionic bone	58	0.121	131	0.168	102	0.118	45	0.133
7. Occipitomastoid wormians	51	0.078	110	0.164	92	0.217	38	0.263
8. Parietal notch bone	57	0.123	132	0.227	101	0.317	44	0.205
9. Condylar canal patent	55	0.927	124	0.944	91	0.901	43	0.837
10. Precondylar tubercle	58	0.052	118	0.068	99	0.003*	37	0.054
11. Paracondylar process	53	0.005*	71	0.042	72	0.027	24	0.083
12. Hypoglossal canal bridging	58	0.379	126	0.325	98	0.327	44	0.295
13. Foramen of Huschke	59	0.610	132	0.523	103	0.466	44	0.545
14. Foramen ovale incomplete	60	0.067	121	0.099	101	0.059	42	0.071
15. Foramen of Vesalius	62	0.210	128	0.313	99	0.303	40	0.275
16. Pterygo-spinous foramen	61	0.049	128	0.008	102	0.088	42	0.048
17. Medial palatine canal	59	0.034	119	0.002*	100	0.030	38	0.026
18. Transverse zygomatic suture	39	0.179	101	0.030	85	0.094	32	0.094
19. Clinoid bridging	59	0.305	131	0.229	84	0.202	44	0.159
20. Mylohyoid bridging	29	0.483	38	0.237	88	0.159	16	0.438
21. Mandibular torus	30	0.900	38	0.474	91	0.791	16	0.375
22. Jugular foramen bridging	56	0.107	127	0.236	87	0.103	43	0.209
23. Sagittal groove left	58	0.259	132	0.182	109	0.257	44	0.205

* The proportion $p=0$ is replaced by $p=1/4N$ (Bartlett's adjustment).

1) Ishida and Kida (1991)

Table 1. (Continued)

Yukagir		Yakut		Evenki		Buryat		Baikal		Mongol	
n	p	n	p	n	p	n	p	n	p	n	p
30	0.008*	60	0.033	45	0.006*	140	0.043	61	0.004*	108	0.037
28	0.214	59	0.271	44	0.068	138	0.290	49	0.122	107	0.346
30	0.633	60	0.717	44	0.614	139	0.705	58	0.655	108	0.583
30	0.133	58	0.086	44	0.136	137	0.139	51	0.078	107	0.065
29	0.069	59	0.169	45	0.111	137	0.182	50	0.120	106	0.170
28	0.107	58	0.052	45	0.088	133	0.120	46	0.217	105	0.133
22	0.273	56	0.125	41	0.195	122	0.131	40	0.175	102	0.147
29	0.448	58	0.207	45	0.222	128	0.133	45	0.200	103	0.252
27	0.778	58	0.776	44	0.909	135	0.852	34	0.971	106	0.736
26	0.077	59	0.136	43	0.116	138	0.174	50	0.100	106	0.142
25	0.010*	59	0.085	41	0.073	129	0.054	25	0.080	98	0.020
27	0.074	59	0.254	44	0.182	138	0.217	52	0.308	107	0.187
30	0.333	57	0.544	44	0.614	140	0.593	55	0.309	107	0.542
29	0.034	59	0.034	45	0.067	138	0.036	42	0.048	106	0.057
29	0.172	58	0.534	45	0.267	137	0.474	37	0.324	107	0.421
29	0.009*	58	0.017	45	0.044	138	0.029	47	0.021	108	0.037
29	0.009*	58	0.069	45	0.006*	131	0.061	47	0.021	100	0.040
22	0.227	57	0.088	41	0.244	120	0.108	40	0.250	80	0.125
28	0.214	59	0.068	44	0.006*	138	0.116	36	0.056	105	0.095
12	0.021*	54	0.074	24	0.042	117	0.145	40	0.050	-	-
12	0.500	52	0.981	24	0.375	112	0.259	48	0.396	-	-
27	0.074	58	0.121	44	0.068	137	0.146	40	0.175	106	0.094
29	0.207	59	0.237	44	0.182	139	0.209	53	0.189	107	0.187

Table 1. (Continued)

Tagar		Kazach		Amur ¹⁾		Sakhalin Ainu ¹⁾		Hokkaido Ainu	
n	p	n	p	n	p	n	p	n	p
147	0.034	120	0.033	132	0.002*	92	0.003*	150	0.020
143	0.343	120	0.308	127	0.157	79	0.190	144	0.097
146	0.568	120	0.600	131	0.725	92	0.435	145	0.283
143	0.175	114	0.126	124	0.048	91	0.011	146	0.002*
132	0.091	120	0.075	129	0.109	92	0.141	150	0.087
129	0.202	120	0.183	125	0.192	92	0.141	144	0.125
113	0.088	110	0.127	107	0.150	90	0.244	142	0.197
130	0.200	119	0.168	127	0.118	92	0.348	141	0.220
120	0.800	118	0.754	127	0.764	86	0.837	143	0.937
119	0.042	120	0.150	128	0.039	84	0.071	143	0.112
111	0.002*	119	0.008	115	0.043	73	0.041	108	0.093
121	0.322	120	0.308	130	0.215	90	0.322	146	0.377
136	0.353	118	0.398	127	0.299	92	0.337	141	0.305
129	0.023	120	0.017	130	0.031	92	0.109	139	0.094
123	0.577	120	0.517	125	0.280	92	0.413	138	0.428
132	0.053	120	0.050	131	0.046	92	0.022	142	0.063
133	0.038	119	0.050	119	0.034	88	0.045	119	0.202
104	0.010	112	0.080	107	0.159	66	0.242	97	0.289
111	0.207	119	0.109	127	0.039	88	0.114	131	0.092
81	0.099	117	0.103	92	0.076	71	0.099	95	0.200
93	0.785	113	0.469	89	0.427	68	0.265	92	0.478
116	0.190	120	0.158	127	0.181	91	0.132	142	0.099
140	0.164	116	0.207	126	0.190	90	0.111	149	0.221

Supraorbital foramen

More than 50 percent of the individuals of each Siberian Mongoloid population have the supraorbital foramen, whereas the incidence is quite low in the Hokkaido Ainu (0.283). The occurrences of supraorbital foramen in the Kazach and Tagar are as frequent (0.600 and 0.568, respectively) as in other Mongoloids.

Transverse zygomatic suture vestige

The Neolithic Jomon and Ainu have the highest incidences (0.242-0.456) of transverse zygomatic suture vestige of all the populations examined, while the incidences range between 0.1 and 0.25 in the Eastern Asian and Siberian populations. In the Arctic Mongoloids, other than the Aleut, the frequencies of this trait are under 10 percent, with the Tagar and Kazach having the lowest incidences (0.01 to 0.008).

MMDs based on the 23 nonmetric cranial traits, data of which are listed in Table 1, were computed for the Siberian Mongoloid and Ainu populations. The mandibular data of the Smithsonian series of Mongolian examined by Dodo (Dodo and Ishida, 1987) were used in the calculations due to the absence of mandible in the Soviet series. The MMD matrix is shown in Table 2. The Neolithic Baikal are more similar to the Evenki and Amur than to the Buryat and Mongolian. Clustering and principal coordinate analyses showed that the Ainu cluster is isolated from the others and that the Siberian populations are divided into three clusters: the Arctic Mongoloids (Asiatic Eskimo, Chukchi, Ekven), northeastern Siberians (Amur, Evenki, Neolithic Baikal, Yukagir) and inland Mongoloids (Mongolian, Buryat, Kazach) (Figs. 1 and 2). The Aleut, Yakut and Tagar did not clearly cluster.

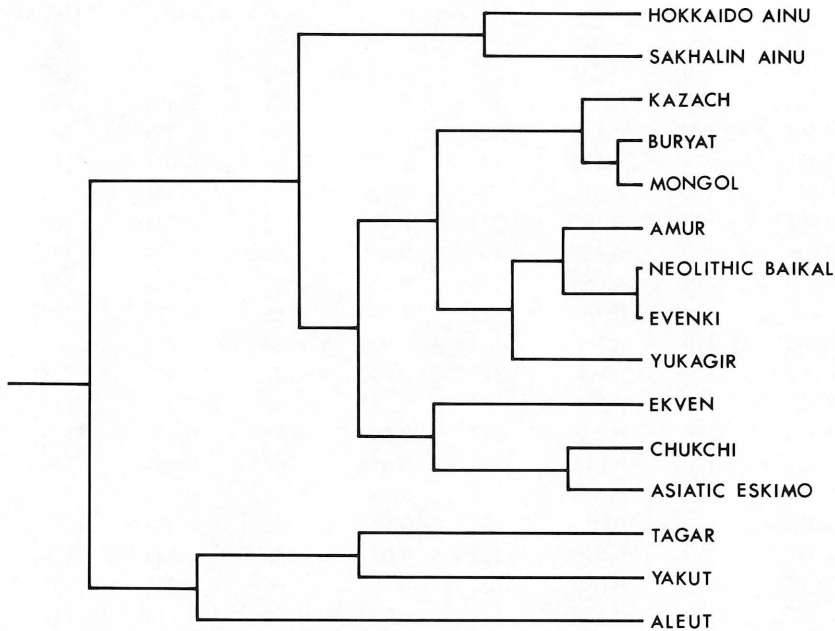


Fig. 1 Cluster analysis (group average method) of 15 cranial samples from Siberia and the Far East based on the MMD's computed from the 23 cranial nonmetric traits

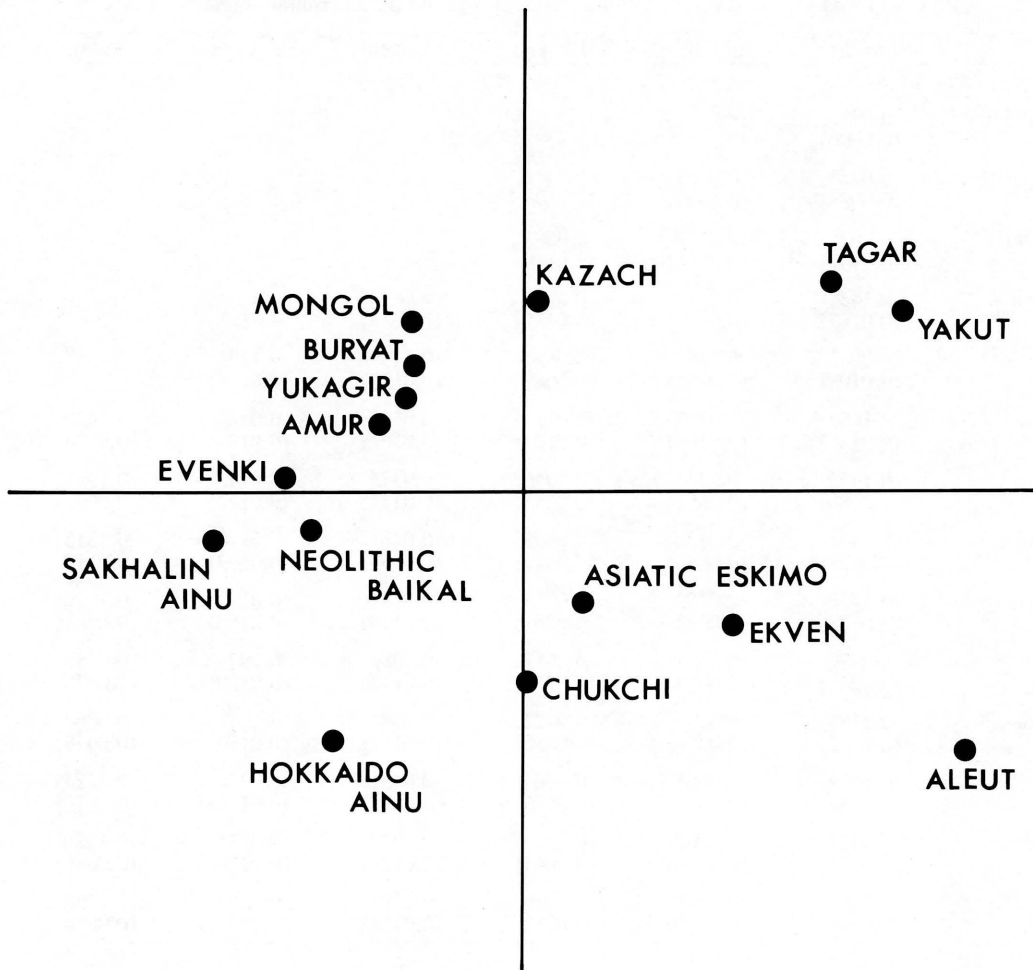


Fig. 2 Principal coordinate analysis of 15 cranial samples from Siberia and the Far East based on the MMDs computed from the 23 cranial nonmetric traits

Table 2. Matrix of the MMDs and their standard deviations based on 23 cranial nonmetric traits.

	Aleut	Asia Eskimo	Ekven	Chukchi	Yukagir	Yakut
Aleut						
Asia Eskimo	0.0787 (0.0090)					
Ekven	0.0457 (0.0088)	0.0403 (0.0062)				
Chukchi	0.0625 (0.0147)	0.0160 (0.0122)	0.0501 (0.0119)			
Yukagir	0.1435 (0.0183)	0.0732 (0.0158)	0.0497 (0.0155)	0.0693 (0.0215)		
Yakut	0.0945 (0.0108)	0.1264 (0.0082)	0.0624 (0.0082)	0.1499 (0.0138)	0.1225 (0.0175)	
Evenki	0.1655 (0.0132)	0.0795 (0.0106)	0.0813 (0.0104)	0.0587 (0.0162)	0.0248 (0.0199)	0.1325 (0.0124)
Buryat	0.1435 (0.0080)	0.0444 (0.0054)	0.1046 (0.0053)	0.0375 (0.0111)	0.0745 (0.0147)	0.1302 (0.0073)
Neolithic Baikal	0.1432 (0.0125)	0.0426 (0.0099)	0.0603 (0.0099)	0.0481 (0.0155)	0.0270 (0.0192)	0.1315 (0.0119)
Mongol	0.1438 (0.0088)	0.0452 (0.0062)	0.0752 (0.0061)	0.0531 (0.0119)	0.0242 (0.0156)	0.1027 (0.0081)
Tagar	0.0971 (0.0082)	0.0681 (0.0057)	0.0557 (0.0055)	0.1082 (0.0113)	0.0978 (0.0150)	0.0610 (0.0075)
Kazach	0.1185 (0.0082)	0.0506 (0.0056)	0.0722 (0.0056)	0.0506 (0.0113)	0.0512 (0.0150)	0.0864 (0.0076)
Amur	0.1472 (0.0082)	0.0686 (0.0056)	0.0664 (0.0055)	0.0451 (0.0113)	0.0330 (0.0150)	0.1224 (0.0076)
Sakhalin Ainu	0.1978 (0.0092)	0.0603 (0.0066)	0.0852 (0.0065)	0.0677 (0.0123)	0.0375 (0.0160)	0.1824 (0.0086)
Hokkaido Ainu	0.1709 (0.0080)	0.1085 (0.0055)	0.0969 (0.0053)	0.1001 (0.0111)	0.1240 (0.0148)	0.1732 (0.0074)

NOTE : The figures in parentheses are standard deviations.

In order to compare the Siberian populations with neighbouring ethnic peoples, MMDs and their standard deviations were calculated based on the 16 nonmetric cranial traits. The results are given in Table 3. As for the Aleut and Mongolian, the respective nonmetric data investigated by Dodo and Ishida were pooled to get sufficient sample size, while the populations of small sample size were not used for this comparison. The Neolithic Baikal are closest to the protohistoric Kofun, Alaskan Eskimo and Amur, and their MMDs are insignificant at the 0.05 level. All the MMDs between the Buryat, Mongolian and Kazach are also insignificant at the 0.05 level. In the clustering and principal coordinate analyses (Figs. 3 and 4), the Neolithic Jomon and Hokkaido Ainu form an isolated cluster. The other three Japanese groups and the three inland Mongoloid populations form two close clusters that are near each other, whereas the prehistoric Tagar are rather distant from the inland Mongoloids. The Arctic populations in Asia and North America are loosely lumped with each other. The Neolithic Baikal and Amur are situated intermediately between the Arctic and inland Asian-Japanese populations, while the Sakhalin Ainu are positioned intermediately between the Jomon-Hokkaido Ainu cluster and the others.

Table 2. (Continued)

Evenki	Buryat	Baikal	Mongol	Tagar	Kazach	Amur	Sakh. Ainu
0.0426 (0.0096)							
0.0000 (0.0141)	0.0408 (0.0091)						
0.0339 (0.0104)	0.0052 (0.0052)	0.0414 (0.0098)					
0.1561 (0.0098)	0.0961 (0.0047)	0.1060 (0.0093)	0.0725 (0.0055)				
0.0674 (0.0098)	0.0191 (0.0047)	0.0396 (0.0094)	0.0071 (0.0055)	0.0239 (0.0049)			
0.0304 (0.0098)	0.0503 (0.0047)	0.0041 (0.0093)	0.0352 (0.0055)	0.0911 (0.0049)	0.0317 (0.0050)		
0.0464 (0.0108)	0.0631 (0.0057)	0.0157 (0.0103)	0.0279 (0.0065)	0.1296 (0.0059)	0.0547 (0.0060)	0.0434 (0.0059)	
0.0920 (0.0096)	0.1159 (0.0045)	0.0499 (0.0091)	0.0938 (0.0053)	0.1621 (0.0047)	0.0962 (0.0048)	0.0935 (0.0047)	0.0342 (0.0058)

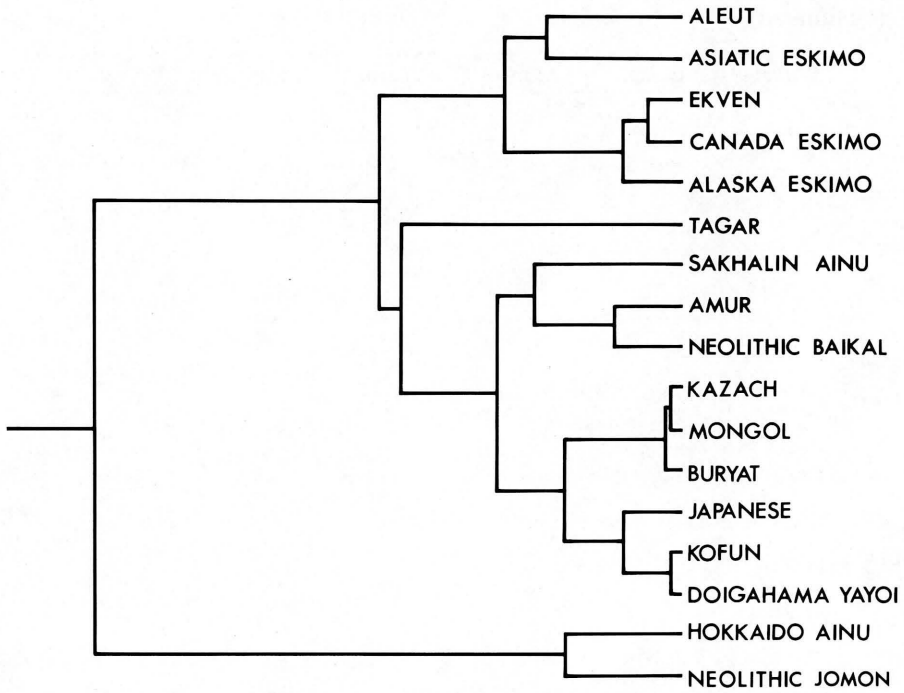


Fig. 3 Cluster analysis (group average method) based on the MMD matrix computed from the 16 cranial nonmetric traits.

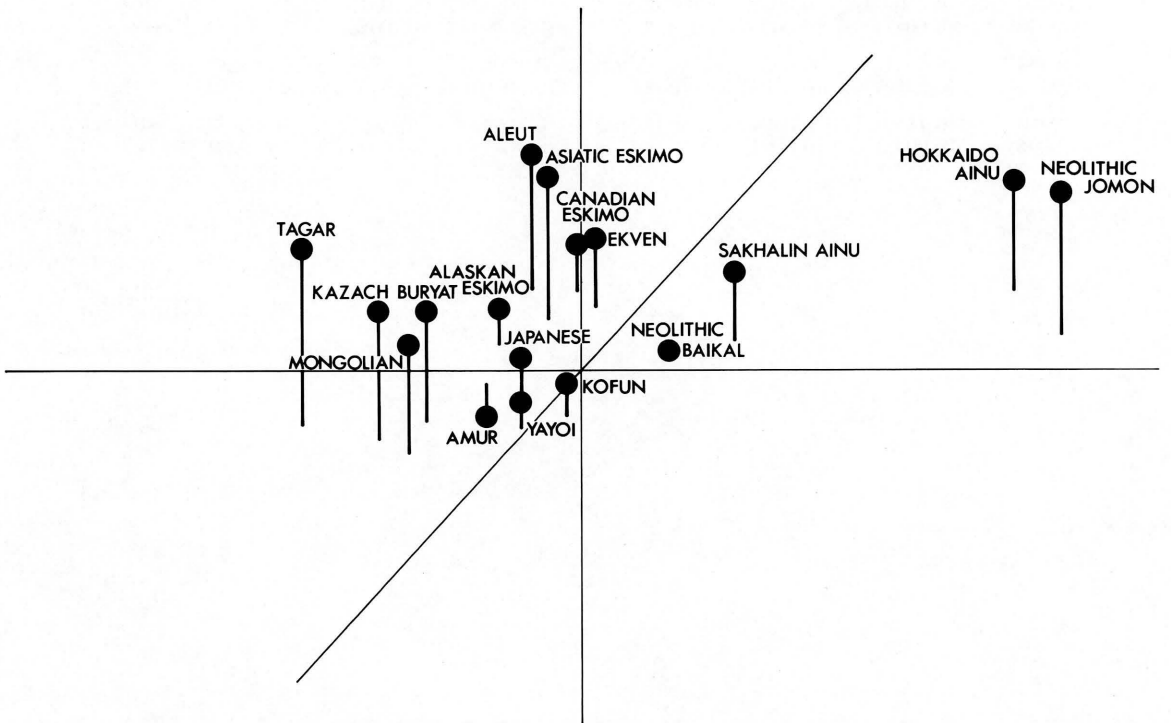


Fig. 4 Three-dimensional representation of principal coordinate analysis based on the MMD matrix computed from the 16 cranial nonmetric traits.

Table 3. Matrix of the MMDs and their standard deviations based on the 16 nonmetric variants.

	Jomon	Doigahama	Kofun	Japanese	Alaska Eskimo
Neolithic Jomon					
Doigahama Yayoi	0.1317 (0.017)				
Kofun	0.1017 (0.015)	0.0033 (0.0099)			
Japanese	0.1318 (0.013)	0.0163 (0.0077)	0.0153 (0.0062)		
Alaska Eskimo	0.2168 (0.0129)	0.0644 (0.0076)	0.0424 (0.0062)	0.0673 (0.0039)	
Canada Eskimo	0.2472 (0.0136)	0.1274 (0.0084)	0.0909 (0.0070)	0.1111 (0.0048)	0.0138 (0.0047)
Aleut	0.2660 (0.0131)	0.1403 (0.0079)	0.1340 (0.0064)	0.1562 (0.0042)	0.0475 (0.0041)
Asia Eskimo	0.2145 (0.0142)	0.1040 (0.0091)	0.0907 (0.0078)	0.0875 (0.0056)	0.0414 (0.0056)
Ekven	0.1993 (0.0145)	0.0779 (0.0094)	0.0678 (0.0079)	0.0736 (0.0057)	0.0178 (0.0056)
Buryat	0.1720 (0.0135)	0.0439 (0.0083)	0.0218 (0.0068)	0.0389 (0.0047)	0.0332 (0.0046)
Neolithic Baikal	0.1192 (0.0189)	0.0341 (0.0141)	0.0045 (0.0127)	0.0545 (0.0105)	0.0174 (0.0104)
Mongol	0.1638 (0.0126)	0.0247 (0.0073)	0.0170 (0.0056)	0.0207 (0.0037)	0.0597 (0.0037)
Tagar	0.2626 (0.0138)	0.0992 (0.0086)	0.0746 (0.0071)	0.0746 (0.0049)	0.0714 (0.0049)
Kazach	0.1928 (0.0137)	0.0458 (0.0086)	0.0280 (0.0071)	0.0391 (0.0050)	0.0499 (0.0049)
Amur	0.2245 (0.0137)	0.0494 (0.0085)	0.0297 (0.0071)	0.0648 (0.0049)	0.0429 (0.0048)
Sakhalin Ainu	0.1126 (0.0147)	0.0599 (0.0098)	0.0407 (0.0084)	0.0462 (0.0062)	0.0642 (0.0061)
Hokkaido Ainu	0.0307 (0.0136)	0.1262 (0.0084)	0.0887 (0.0070)	0.1120 (0.0062)	0.1390 (0.0047)

NOTE : The figures in parentheses are standard deviations.

Table 3. (Continued)

Canada Eskimo	Aleut	Asia Eskimo	Ekven	Buryat	Baikal
0.0587 (0.0050)					
0.0568 (0.0065)	0.0355 (0.0059)				
0.0088 (0.0065)	0.0496 (0.0059)	0.0252 (0.0073)			
0.0868 (0.0054)	0.0749 (0.0048)	0.0524 (0.0063)	0.0699 (0.0064)		
0.0536 (0.0113)	0.1014 (0.0107)	0.0580 (0.0120)	0.0403 (0.0122)	0.0373 (0.0111)	
0.1127 (0.0045)	0.1162 (0.0039)	0.0786 (0.0052)	0.0829 (0.0053)	0.0050 (0.0043)	0.0553 (0.0101)
0.0892 (0.0057)	0.1103 (0.0051)	0.0635 (0.0066)	0.0630 (0.0066)	0.0429 (0.0056)	0.1180 (0.0114)
0.0865 (0.0057)	0.0985 (0.0052)	0.0684 (0.0066)	0.0687 (0.0067)	0.0040 (0.0056)	0.0632 (0.0115)
0.0690 (0.0057)	0.1067 (0.0051)	0.0898 (0.0065)	0.0485 (0.0066)	0.0428 (0.0056)	0.0181 (0.0114)
0.0805 (0.0070)	0.1191 (0.0064)	0.0652 (0.0078)	0.0400 (0.0079)	0.0712 (0.0069)	0.0233 (0.0127)
0.1409 (0.0055)	0.1844 (0.0049)	0.1369 (0.0064)	0.1085 (0.0064)	0.1301 (0.0054)	0.0743 (0.0112)

Table 3. (Continued)

Mongol	Tagar	Kazach	Amur	Sakhalin Ainu
0.0433 (0.0046)				
0.0035 (0.0046)	0.0106 (0.0059)			
0.0556 (0.0046)	0.0992 (0.0058)	0.0484 (0.0059)		
0.0583 (0.0058)	0.1019 (0.0071)	0.0608 (0.0072)	0.0539 (0.0071)	
0.1383 (0.0044)	0.1982 (0.0057)	0.1368 (0.0057)	0.1335 (0.0057)	0.0358 (0.0069)

Discussion

According to Debets (1951), the Siberian Mongoloids are divided into three major groups: the Arctic, Baikal and Central Asian, which was confirmed by the results of the present non-metric study.

The Neolithic Jomon and Hokkaido Ainu

There are close affinities between the Neolithic Jomon and Hokkaido Ainu, which has been noted by various anthropological studies (Howells, 1966; Yamaguchi, 1967; Turner, 1976; Dodo, 1986b; Ossenberg, 1986). Matsumoto (1987) has maintained that the Ainu people have the northern Mongoloid characteristics in the frequency of their Gm gene. But, none of the Siberian Mongoloids had affinities with either the Neolithic Jomon or the Hokkaido Ainu in this study. Some anthropologists have proposed that the Neolithic Jomon and Ainu have some connection with the southeastern Asian or Oceanian peoples (Turner, 1989, 1990; Brace

and Hunt, 1990), but we have no clear cranial nonmetrical evidence of it at present.

The Sakhalin Ainu

Certain morphological differences exist between the Sakhalin Ainu and the Hokkaido Ainu in craniometry and nonmetric traits (Hirai, 1972; Kodama, 1940, 1970; Kiyono, 1949; Yamaguchi, 1973; Mouri, 1988). It was postulated based on nonmetric cranial data that the Sakhalin Ainu appear to be a more mixed population than previously believed (Kozintsev, 1990; Ishida and Kida, 1991). Supposedly they intermarried with the Siberian, especially, the Amur peoples.

The Japanese

It can be said on the basis of the nonmetric traits (Dodo and Ishida, 1990) that the Japanese have been composed of almost the same populations from the protohistoric period to the present times. Some metric analyses and genetic studies have reached the conclusion that the Aeneolithic or modern Japanese have a close relationship to the northern Asian populations (Hanihara, 1985; Matsumoto, 1987; Mizoguchi, 1988). Comparing the data of nonmetric cranial traits, Ossenbergl (1986) indicated that the modern Japanese are closely related to the Tungus, which consist of the Ulch, Negidal and Evenki. Unfortunately, however, she did not use the data of either the Buryat or Mongolian. We find that the Japanese are more similar to the inland Mongoloids whom Debets (1951) called the Central Asian.

The Mongoloids in the Siberia and central Asia

It is said that the recent Kazach have some European mixture, or to put it another way, the Mongoloid people had migrated to central Asia from East Asia from the Bronze age to medieval times (Ismagulov, 1970). Although the Kazach have more prominent faces than the Buryat (Alekseev and Gochman, 1983; Ishida and Dodo, 1990b), the Buryat, Mongolian and Kazach made a cluster as the inland Mongoloids in this nonmetric analysis. The Kazach may have only a small European component.

Rychikov and Movsesyan (1972) claimed that the Neolithic Baikalian were more similar to the central Asiatic type of Siberian than to the Baikal type, based on the cranial nonmetric traits which are fairly different from those of our study and contained the *Cribr orbitalia*. In this analysis, we indicated that the Neolithic Baikal, Evenki, Yukagir and Amur are mutually alike and are positioned between the Arctic and inland Mongoloids. This genetic continuity from the Neolithic Baikal populations to the Tungusian-Manchurian has already been pointed out (Alekseev, 1979; Alekseev and Gochman, 1983). The inland Mongoloids, especially, the Buryat, do not resemble the Neolithic Baikal though they inhabit almost the same area. It is suggested that the inland Mongoloids came later from China to central Siberia which the Neolithic Baikalian had once inhabited.

The Arctic populations have peculiar characteristics and are considerably different from other Siberian Mongoloids. They have the so-called pinched nasal bones and lower incidences of the transverse zygomatic suture (Oschinsky, 1962; Kozintsev, 1988). Ossenbergl (1991) thinks there is a close relationship between the Aleut and Na-dene Indians, because the frequency pattern of the nonmetric cranial traits of the Aleut is somewhat different from those of other Arctic peoples. We will have to investigate the nonmetric traits of the American In-

dians to elucidate the people who had dispersed into the Americas.

Acknowledgements

For their permission to study cranial materials we wish to thank the following: Drs. I. Gochman, A. Kozintsev, the Institute of Ethnography-Leningrad Branch, Leningrad; Drs. A. Derevyanko, T. Chikisheva, the Institute of History, Philology and Philosophy, Novosibirsk; Dr. V. Alekseev, the Institute of Archaeology, Moscow; Dr. T. Alekseeva, the Moscow State University; Drs. B. Endo, T. Akazawa, University of Tokyo; Drs. H. Ishida, K. Katayama, Kyoto University. We are grateful to Mr. M. Umeda and Ms. H. Kawaguchi for technical work.

This study was supported in part by Grant-in-aid for Scientific Research on Priority Areas from the Ministry of Education, Science and Culture, Japan (No. 01643506 and 02225208) and the Fellowship for Research in Soviet Union from Japan Society for the Promotion of Science.

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頭蓋形態小変異に基づく北方モンゴロイドの分化

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シベリア、極東および北アメリカ地域のモンゴロイド集団の頭蓋形態小変異を調査し、その人々の分化と移動について考察した。小変異の頻度に基づく分析結果は、デベッツ (1951) がすでに述べているように、シベリアのモンゴロイドが基本的に3つの集団から構成されることを確認した。つまり、極北型 (エスキモー、チュクチおよびエクヴェン)、北東シベリア型 (アムール流域の集団、エヴェンキ、ユカギールおよびバイカル新石器時代人)、内陸型の集団 (モンゴロイド、ブリヤートおよびカザフ) の三つである。極北型の人々は他の2集団と比べやや特有の形質を持っている。興味深いことは、バイカル新石器時代人が現代同じところに住むブリヤートなどの内陸型の集団よりも、アムール流域の集団やエヴェンキに類似していることである。この理由は、おそらく新石器時代より後に、中国あたりから内陸型の集団がバイカル湖地域へ拡散したためと思われる。

現代日本人はこの内陸型の集団に近いが、一方、縄文人ないし北海道アイヌに類縁性を持つシベリア、極東のモンゴロイドは存在しないようである。