Study on 9 Traits in Mongolian Nationality of Hulunbuir League

Zheng Lianbin[1], Han Zaizhu[2], Lu Shunhua[3], Li Yonglan[3] ,Li Shuyuan[3]
([1]Department of Biology, Tianjin Normal University, Tianjin, China 300074;[2]Department of Psychology, Beijing Normal University, Beijing, China 100875;[3]Department of Biology, Inner Mongolia Normal University, Huhhot, China 010022)

Summary: A sample of 947 Mongolians of Bargud, Elute and Buriat was investigated on 9 indexes (hair form, forehead hair-ledge point, eyefold of upper eyelid, Mongoloid fold, lobe type, nasal profile, nostril type, front tooth type, and chin projection) in Hulunbuir league, Inner Mongolia in Sept., 1997. The result is as follows:(l)Most Mongolians in Hulunbuir league appeared straight half, forehead hair-ledge point, eyefold eyelid, Mongoloid fold goliarls in Hulunbuir league appeared straight half, forehead hair-ledge point, eyefold eyelid, Mongoloid fold appearance, shovel-shaped front tooth, straight nose, wide nostril, non-projecting chin. (2)The frequencies of forehead hair-ledge point appearance, shovel-shaped front tooth appearance and projecting chin showed significant difference between the 3 groups. (3)The incidence of lobe type, nasal profile, and front tooth type had obvious sexual difference. (4)Correlation did not occur between most of the 9 traits.

Key words: forehead hair-ledge point; Eyefold of upper eyelid; Lobe type; Correlation; Mongolian Nationality

Some morphological traits in man are concerned with genetic factors. Based on different genetic quantity, different groups show different frequencies in certain morphological traits. Mongolians have played an important role in the course of world history. The population number of Chinese Mongolians was 4.8 million in 1990[1]. Hulunbuir league is situated in eastern 1liner Mongolia in China, where Mongolian nationality live compactly. Mongolian nationality where is mainly composed of 3 groups: (l) Bargud: their ancestors inhabited on the east of Bajaer lake, and they moved in Hulunbuir league in the early 18th century. (2) Elute: they had been lived in Xinjiang before they settled down in Hulunbuir league. (3)Buriat: they lived around Bajaer lake formerly, and they moved in Hulunbuir league in the early 20th century. Presently, the population number of the group is several thousand. Because Mongolian nationality has not been reported on human population genetic research, we carry out the present study. We pay attention to study some head-face traits about the nationality.

1 Subjects and methods

In Sept.,1997,947 (439 boys,508 girls)Mongolian students among 3 groups (Bargud, Elute and Buriat) were investigated on 9 indexes (hair form, forehead hair-ledge point, eyefold of upper eyelid, Mongoloid fold, lobe type, nasal profile, nostril type, front tooth type, and chin projection) in Hulunbuir league, Inner Mongolia, China. Specifically, 413 Bargud students (196 boys, 217 girls) were investigated in the No. 2 middle school of Cheng Bargud banner. And 426 Elute students (201 boys,225 girls) and 108 Buriat ones (42 boys,66 girls) were investigated in the No.1 middle school of Ewenke banner and Ewenke middle school. All the subjects are healthy middle school sects are healthy middle school students aged 12 to 20 years old. We investigated all the students in the randomly selected classes.

Eyefold of upper eyelid, Mongoloid fold, front tooth type, chin projection were investigated to follow the *MEASURE HANDBOOK ON HUMAN BODY*[2],and forehead hair-ledge point, nasal profile, nostril type to follow *HUAMAN GENETIC BASIS*[3] and lobe type to follow the method of Martin and Saller (1961) [4] Hair form were classified into straight hair (S) and curling hair (C); and forehead hair-ledge point were point appearance (Y) and point disappearance (N); and eyefold of upper eyelid was eyefold appearance (Y) and eyefold disappearance N); and Mongoloid fold was fold appearance (Y) and fold disappearance (N); and nasal profile was straight nose (S) and projecting nose (P); and nostril type was wide nostril (W) and narrow

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nostril (N); and front tooth type was shovel-shaped tooth (Y) and non-shovel-shaped tooth N); and chin projection was straight chin (S) and projecting chin (P).

2 Result

In the 3 Mongolian groups in Hulunbuir league, the findings of 9 indexes is in table l, and the comparison of the indexes is in table 2, and the correlation analysis between the indexes is in table 3,and the gene frequencies of 7 indexes is in table 4.

Table 1. Findings of 9 indexes in Mongolian groups(N,%)

		Bargud			Elute			Buriat			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
		196	217	413	201	225	426	42	66	108	439	508	947
Hair form	S	178	194	372	184	208	392	35	61	96	397	463	860
		90.82	89.40	90.07	91.54	92.44	92.02	83.33	92.42	88.89	90.43	91.14	90.81
	C	18	23	41	17	17	34	7	5	12	42	45	87
		9.18	10.60	9.93	8.46	7.56	7.98	16.67	7.58	11.11	9.57	8.86	9.19
Forehead hair-ledge point	Y	85	98	183	91	95	186	11	20	31.00	187	213	400
		43.37	45.16	44.31	45.27	42.22	43.66	26.19	30.30	28.70	42.60	41.93	42.24
	N	111	119	230	110	130	240	31	46	77	252	295	547
		56.63	54.84	55.69	54.73	57.78	56.34	73.81	69.70	71.30	57.40	58.07	57.76
Eyefold of upper Eyefold	Y	163	186	349	165	181	346	30	51	81	358	418	776
		83.16	85.71	84.50	82.09	80.44	81.22	71.43	77.27	75.00	81.55	82.28	81.94
	N	33	31	64	36	44	80	12	15	27	81	90	171
		16.84	14.29	15.50	17.91	19.56	18.78	28.59	22.73	25.00	18.45	17.72	18.06
Mongoloid Fold	Y	191	208	399	198	210	408**	38	64	102	427	482	909
		97.45	95.85	96.61	98.51	93.33	97.77	90.48	96.97	94.44	97.27	94.88	95.99
	N	5	9	14	3	15	18	4	2	6	12	26	38
		2.55	4.15	3.39	1.49	6.67	4.23	9.52	3.03	5.56	2.73	5.12	4.01
Lobe type	Y	168	154	322**	171	171	342*	35	47	82	374	372	746**
		85.71	70.97	77.97	85.07	76.00	80.28	83.33	71.21	75.93	85.19	73.23	78.78
	N	28	63	91	30	54	84	7	19	26	65	136	201
		14.29	29.03	22.03	14.93	24.00	19.72	16.67	28.79	24.07	14.81	26.77	21.23
Nasal profile	S	157	188	345	150	182	332	28	57	85	335	427	762
		80.10	86.64	83.54	74.63	80.89	77.93	66.67	86.36	78.70	76.31	84.06	80.47
	P	39	29	68	51	43	94	14	9	23*	104	81	185**
		19.90	13.36	16.64	25.37	19.11	22.07	33.33	13.64	21.30	23.69	15.95	19.54
Nostril type	W	127	148	275	139	157	296	27	42	69	293	347	640
		64.80	68.20	66.59	69.15	69.78	69.48	64.29	63.64	63.89	66.74	68.31	67.58
	N	69	69	138	62	68	130	15	24	39	146	161	307
		35.20	31.79	33.41	30.85	30.22	30.52	35.71	36.36	36.11	33.26	31.69	32.42
Front tooth type	Y	186	183	369**	175	187	362	32	50	82	393	420	813**
		94.90	84.33	89.35	87.06	83.11	84.98	76.19	75.76	75.93	89.52	82.68	85.85
	N	10	34	44	26	38	64	10	16	26	46	88	134
		5.10	15.67	10.65	12.94	16.89	15.02	23.81	24.24	24.07	10.48	17.32	14.15
Chin projection	S	126	134	260	174	186	360	31	50	81	331	370	701
		64.29	61.75	62.95	86.57	82.67	84.51	73.81	75.76	75.00	75.40	72.84	74.02
	P	70	83	153	27	39	66	11	16	27	108	138	146
		35.71	38.25	37.05	13.43	17.33	15.49	26.19	24.24	25.00	24.61	27.17	25.98

*: significant sexual difference (0.01<p<0.05), **: very significant sexual difference(P<0.01)

Table 2. Comparison of 9 morphological traits in 3 Mongolian groups(χ^2)

	Bargud×Elute	Bargud×Buriat	Elute×Buriat
Hair form	0.976	0.131	1.072
Forehead hair-ledge	0.036	8.651**	7.991**
Eyefold of upper eyelid	1.590	5.364	2.081
Mongoloid fold	0.399	3.659	3.036
Lobe type	0.681	0.205	0.999
Nasal profile	4.222*	1.386	0.030
Nostril type	0.810	0.278	1.247
Font tooth type	3.570	13.258**	5.036*
Chin projection	50.501**	5.494*	5.414*

*: significant difference (0.01 <P<0.05); **:very significant difference

Table 3. Correlation analysis between 9 traits in Mongolian nationality of Hulunbuir League

		Hair form		Forehead hair-ledge point		Eyefold of upper eyelid		Mongoloid fold		Lobe type		Nasal profile		Font tooth type		Chin projection	
		C	S	Y	N	Y	N	Y	N	Y	N	P	S	N	W	Y	N
Forehead	Y	37	363														
	N	50	497														
	x^2	0.003															
Eyefoldof upper eyelid	Y	65	7if	327	449												
	N	22	149	73	98												
	x^2	3.385		0.017													
Mongoloid FoId	Y	86	823	387	522	742	167										
	N	1	37	13	25	34	4										
	x^2	1.303		1.046		1.517											
Lobe type	Y	67	679	317	429	613	133	711	35								
	N	20	181	83	118	163	38	198	3								
	x^2	0.178		0.093		0.124		4.207*									
Nasal Profile	P	19	166	89	96	154	31	174	11	142	43						
	S	68	694	311	451	622	140	735	27	604	158						
	x^2	0.323		3.247		0.263		2.231		0.56							
Nostri typel	N	35	272	149	158	255	52	296	11	229	78	86	221				
	W	52	588	251	389	521	119	613	27	517	123	99	541				
	x^2	2.688		7.380**		0.384		0.218		4.752*		20.770**					
Font tooth type	P	70	743	338	475	671	141	784	29	641	172	158	655	256	557		
	S	17	117	62	72	104	30	125	9	105	29	27	107	51	83		
	x^2	2.291		1.039		1.979		2.962		0.016		0.034		2.267			
Chin projection	P	24	222	103	143	203	43	233	13	193	53	52	194	72	174	214	32
	S	63	638	297	404	573	128	676	25	553	148	133	568	235	466	599	102
	x^2	0.129		0.019		0.075		1.396		0.02		0.543		1.505		0.357	

*:significant correlation between the 2 traits ($0.01<p<0.05$); **:very significant correlation between the 2 traits.

3 Discussion

3.1 Frequency of g indexes in 3 Mongolian groups

3. 1. I Hair form

The overwhelming majority of Mongolian students (90.81%) in Hulunbuir league belong to straight hair. The frequencies of straight hair in the 3 groups is as follows: Elute (92.02%) >Bargud (90.07%) >Buriat(88.89%). The frequencies of straight hair show no significant difference between the 3 groups and between sexes (see Table 1,2).

Compared with native nationalities, Mongolian nationality in Hulunbuir league has a lower frequency of straight hair than following nationality in Yunnan province: Hanil[5], Daizu[6], Baizull[7], Achang[8], Primi[9] (whose frequencies of straight hair are all 100%) and the following nationalities in Xiniiang: Mongolian nationality in of Tuerhute (male-92.63%, female-92.68%)[10] Mongolian nationality in Yili district (male-96.70%, female-98.42)[11]. In addition, the frequency of straight hair in Mongolian nationality in Hulunbuir league is close to Kazak (91.19%)[11] and is higher than Uygur (79.81%)[13] and Tank (male-25.71%, female-20.01%)[14].

On the whole, Mongolian nationality in Hulunbuir league shows a lower frequency of straight hair among Chinese nationalities.

Table 4.Gene frequency of 7 indexes in Mongolian nationality of Hulunbuir league

		Bargud	Elute	Buriat	Total
Hair form	H	0.0509	0.0407	0.0572	0.0471
	h	0.9491	0.9593	0.9428	0.9529
Forehead hair-ledge point	F	0.2537	0.2494	0.1556	0.2400
	f	0.7463	0.7506	0.8444	0.7600
Eyefold of upper eyelid	E	0.6063	0.5666	0.5000	0.575
	e	0.3937	0.4333	0.5	0.425
Mongoloid fold	M	0.8159	0.7943	0.7642	0.7998
	m	0.1841	0.2057	0.2358	0.2002
Lobe type	L	0.5306	0.5559	0.5094	0.5382
	l	0.4694	0.4441	0.4906	0.4618
Nasal profile	N	0.0860	0.1172	0.1129	0.1029
	n	0.9140	0.8828	0.8871	0.8971
Nostril type	W	0.4220	0.4476	0.3991	0.4306
	w	0.5780	0.5524	0.6009	0.5694

3.1.2 Forehead hair-ledge point

In Hulunbuir league, Mongolian nationality with forehead hair-ledge point appearance account for 42.24%. The frequency of forehead hair-ledge point appearance in the 3 groups is as follows: Bargud (44.31%)>Elute (43.66%PBuriat (28.70%). The frequency shows very significant difference between Bargud and Buriat, Elute and Buriat. And the frequencies reveal no significant sexual difference.

The trait has not been found to be studied in other populations.

3.1.3 Eyefold of upper eyelid

Quite most Mongolian students (81.94%) in Hulunbuir league belong to the eyefold appearance of upper eyelid. The frequency of the eyefold appearance in the 3 groups is as follows f Bargud (84.50%)>Elute (81.22%)>Buriat(75.00%). The frequency of the eyefold appearance is significantly different between Bargud and Buriat, and isn't significantly different between sexes.

Because western populations have comparatively low frequency of the eyefold appearance, they even treat it as an abnormal character[15]. However, it is exactly reversed in Chinese populations. With age's increase, the eyefold appearance gets a raise in frequency. The frequency of eyefold appearance is lower than Mongolian nationality aged from 12 to 20 years old in Alashan league (88.54%)[16] and is close to Huizu age from 9 to 18 years old in Huhhot city (82.47%)[15], and is distinctly higher than Manchu aged from 7 to 16 years old in Jilin province (39.22%)[18]

3.1.4 Mongoloid fold

Although Mongoloid fold is looked as an abnormal character in western population who have low frequency of the fold, it is regarded as an normal one in Mongolians who have a high frequency of the fold. There is a frequency of Mongoloid fold of 95.99% in Mongolian students in Hulunbuir league. The frequency of the fold in the 3 groups is as follows' Elute (97.77%)>Bargud (96.61%)>Buriat (94.44%). The frequency has no significant difference between the 3 groups. Because of no significant sexual difference in the Mongolian population

and in the 3 inter groups except Elute, it is believe that the frequency of the fold has no distinctly related with sex.

Previous studies reveal that the frequency of Mongoloid fold has close relation with average age of population. Therefore we compared Mongolian nationality with other populations about the same age. Mongolian students in Hulunbuir league have a close frequency of Mongoloid fold to Huizu aged from 9 to 18 years old, and Tibetan aged from 13 to 17 years old (93.65%)[19], and has a higher frequency than Mongolian nationality in Alashan league (89.13%), Yaozu aged from 7 to 16 years old in Guangxi province (87.17%)[20], and Manchu aged from 7 to 16 years old in Jilin province (77.45%). In general, Mongolian students show a higher frequency of Mongoloid fold in China. The incidence of the fold indicates obvious racial difference. Mongoloid fold is usually found in Mongolians in middle, northern, and western Asia while it is lack in Europeans, Australians, Melanesians, Africans[2].

3.1.5 Lobe type

Most Mongolian students (78.77%) appear lobe in Hulunbuir league. The frequency of lobe appearance in the 3 groups is as follows f Elute (80.28%)>Bargud (77.97%)> Buriat (75.93%). The frequency shows significant differences in the Mongolian population and in the 3 inter groups except Buriat. It can be blown that the frequency is related to sex. In other words, the frequency is higher in male than in female.

Mongolian students in Hulunbuir league show low frequency of lobe disappearance (21.23%) than following Asian populations: Chinese in Hongkong (64.3%)[21], Japanese (67.l%)[21], Pakistan(46.70%)[22],middle indian Murias (53.90%),Halbas (44.92%) and Bisonhorn Marias (64.40%)[23],and northern indian Panwales (45.9%), Settled Gaddis (49.9%), Transhumant Gaddis (50.4%)[24],Indian Skimm'Sherpas (43.6%),Lepchas (60.2%) and Bhutias (51 .3%)[25]. On the whole, Mongolian nationality in Hulunbuir league is higher in the frequency of lobe appearance in Asia.

3.l.6 Nasal profile

Most Mongolian students (80.47%) belong to straight nose. The frequency of straight nose in the 3 groups is as follows f Bargud (83.54%)>Buriat (78.70%)>Elute (77.93%). There is a significant difference between Bargud and Elute. In the Mongolian population, the frequency is very significant higher in female than in male ($p<0.0l$).

Mongolian nationality in Hulunbuir league show lower frequency of straight nose than Mongolian nationality (97.93%)[26] and Kazak (90.71%) in Xinjiang, and Yugur (96.2%)[27] and Huizu (92.3%)[28],in Gansu province, and show higher frequency than Manchu (68.33%) in Jinn province, Daur (67.38%)[29] in Heilongjiang province. Furthermore, compared with populations in southern China, Mongolian nationality in Hulunbuir league shows a lower frequency of straight nose than Ham (99.47%), Jino (95.60%)[30] Yaozu (98.08%). Generally, Mongolians in Hulunbuir league have a lower frequency of straight nose in Chinese populations.

3.1.7 Nostril type

Relative majority of Mongolian students (67.58%) in Hulunbuir league belong to wide nostril, which is interrelated with comparatively flat nose, low value of nose depth. It can be deduced that northern people tend to have narrow nostril, based on their projecting nose, high value of nose depth. The frequency of wide nostril in the 3 groups is as follows: Elute (69.48%)>Bargud (66.59%)>Buriat (63.89%). There is no significant difference between the 3 groups and is also no significant sexual difference.

3.1.8 Front tooth type

Great number of Mongolian students (85.85%) in Hulunbuir belongs to shovel-shovel front tooth. The frequency of shovel-shaped front tooth in the 3 groups is as follows: Bargud (89.35%)>Elute (84.98%)>Buriat (75.93%). Buriat has an obviously lower frequency of the shovel-shaped front tooth than the 2 groups. The Mongolian students show very significant sexual difference in the frequency ($p<0.0l$).

The study on the trait has been seldom found.

3.l.9 Chin projection

The frequency of straight chin is 74.02% in Mongolian students' ill Hulunbuir league. The frequency in the 3 groups is as follows f Elute (84.5l%)>Buriat (75.00%)>Bargud (62.95%).The frequency shows significant or very significant difference between the 3 groups. However, no sexual significant difference is found in the Mongolian population. Previous data showed the frequency of straight chin is lower in male than in female, such as Uygur (male-33.33%, female-63.95%),Mongolian nationality (male-69.18%, female-51.03%), Tuna (male-60.43%, female-91.47%)[31].Therefore, it need to be make further research on the sexual difference about this trait.

3.2 Interrelation analysis between 9 morphological traits (ac -Interrelated analysis)

The interrelated analysis between 9 morphological traits shows that, of the 36 pairs of traits, only 4 pairs have interrelation (see table 3). It can be deduced that the 9 head-face traits show little influence with each other. The 4 pairs of traits with interrelation are as follows: lobe type-Mongoloid fold, nostril type-forehead hair-ledge point, nostril type-lobe type, nostril type-nasal profile. The coefficient of interrelation is 20.77 between nostril type and nasal profile. Of 307 students with narrow nostril, the students with projecting nose account for 28.01%, and those with straight nose account for 71 .99%. However, of 640 students with wide nostril, the students with projecting nose account for 15.47%, those with straight nose account for 84.33%. 11 can be concluded that narrow nostril and projecting nose belong to a pair of related character, and wide nostril and straight nose do that.

3.3 Gene frequency of 7 genetic characters

Of the 9 indexes, 7 indexes have been confirmed their hereditary pattern. Specifically, dominant/recessive character is correspondingly curling/straight hair, forehead hair-ledge point appearance/disappearance, eye fold appearance/d is appearance, I o be appearance/disappearance, projecting/straight nose, wide/narrow nostril. Hair form, forehead hair-ledge point, nasal profile has high frequency of recessive gene. Thus, these recessive characters show the distinctly higher percentage of phenotype than their dominant characters.

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