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DERMATOGLYPHIC STUDY AMONG ETHNIC GROUPS OF MONGOL

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Abstract: *Over 20 ethnic groups and tribes inhabit the territory of Mongolia. Linguistically the ethnic groups and tribes are divided into two subdivisions of Altaic linguistic family (Turkic and Mongolian subdivisions). We investigated 7200 dermatoglyphic samples from 24 ethnic groups and tribes and compared the results with those found in other Asian populations using dermatoglyphic traits* ***(PII, MLI, t, Hy, AIT****). The geographic variations of the dermatoglyphic traits show three distinct patterns of variation. The first is a general* ***W-E*** *pattern - increasing from West to East for* ***PII and t****, and trend in the opposite direction for* ***MLI****. The second pattern is the patch variation observed for* ***Th/1*** *and* ***AIT****. The lowest and highest frequencies are found in the West as well as in the East. The third pattern is from North to East and South, decreasing for* ***Hy****. The comparison shows a presence of two dermatoglyphic variants in Mongolia. One of those variants is characterized by the moderate expression of "Mongoloid" dermatoglyphic features. All turkic speaking ethnic groups and some of Mongolian speaking groups from Western Mongolia belong to this variant. The typical maximum "Mongoloid" dermatoglyphic features (highest value of* ***PII*** *and* ***t)*** *characterize the second variant. All ethnic groups and tribes from Southeast Mongolia belong to this variant.*

Over 20 ethnic groups inhabit the territory of Mongolia. According to a census of 2000 the Khalkh occupy approximately 80%, the Myangad 2.6%, the Bayad 2.0%, the Khoton 0.3%, the Olet 0.5%, the Uriankhai 1.1%, the Zakhchin 1.2%, the Torguud 1.5%, the Kazakh 6.1%, the Buriad 1.2% the Uzemchin 1.1%, the Dariganga 1.5% and the Tuva 0.2% of total population. Geographic location of contemporary ethnic groups of Mongolia is shown in Figure 1.

Among them the Kazakh, the Khoton, the Tuva and the Tsaatan speak a language belonging to the Turkic subdivision of Altaic linguistic family. But the spoken languages of the Tuva, Tsaatan and Khoton are greatly influenced by Mongolian. The others speak different dialects of Mongolian branch of the Altaic linguistic family: the Torguud, the Myangad, the Zakhchin, the Urianhai, the Derbet and the Olet speak Oirad dialect and all tribes of Khalkh

ethnic groups (Sartuul, Eljigen, Khotgoid, Borjigon and Central Khalkh) speak Central Mongolian dialect. The language of ethnic groups Barga, Dariganga and Uzemchin belongs to Eastern Mongolian dialect (**Fig.2**.).

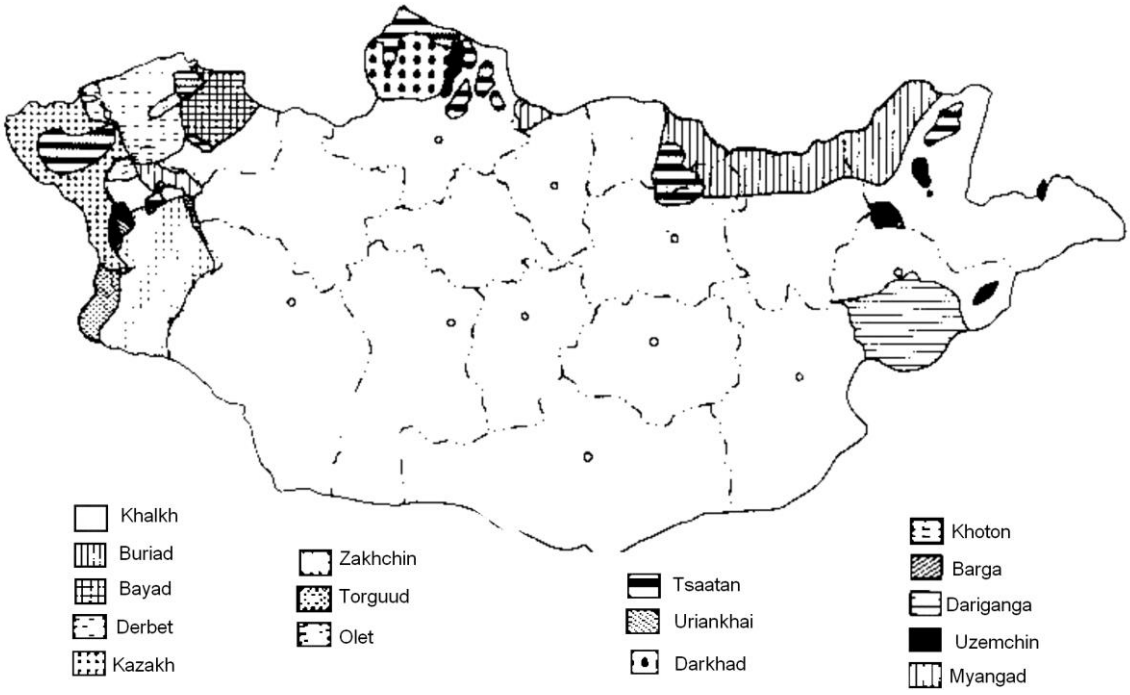

Fig. 1. Geographic location of contemporary ethnic groups of Mongolia

On the base of ethnohistorical aspects all ethnic groups speaking Mongolian could be divided into three ethnocultural subdivisions such as Oirad-Mongolians or Western Mongolians, Central Mongolians and Eastern Mongolians (**Fig. 2**.).

Russian anthropologist G.L.Heet (1975, 1983a, 1983b) studied the dermatoglypic traits of several groups (four geographic groups of Khalkh and Dariganga). She concluded that the dermatoglypic variation in Mongolian population is similar to that found in neighboring Central Asian population such as the Buriads and Yakuts. G.L. Heet (1983b) also noted that the Dariganga differs by highest frequency of Hypothenar pattern (**Hy**) and the lowest frequency of Axial triradii (**t**) from other studied Mongolian groups. The author noticed that the higher frequency of the Hypothenar pattern (***Hy***) and accessory interdigital triradii (***AIT***) are found among European populations than Asians and called as Caucasoid dermatoglyphic traits (Heet, 1989).

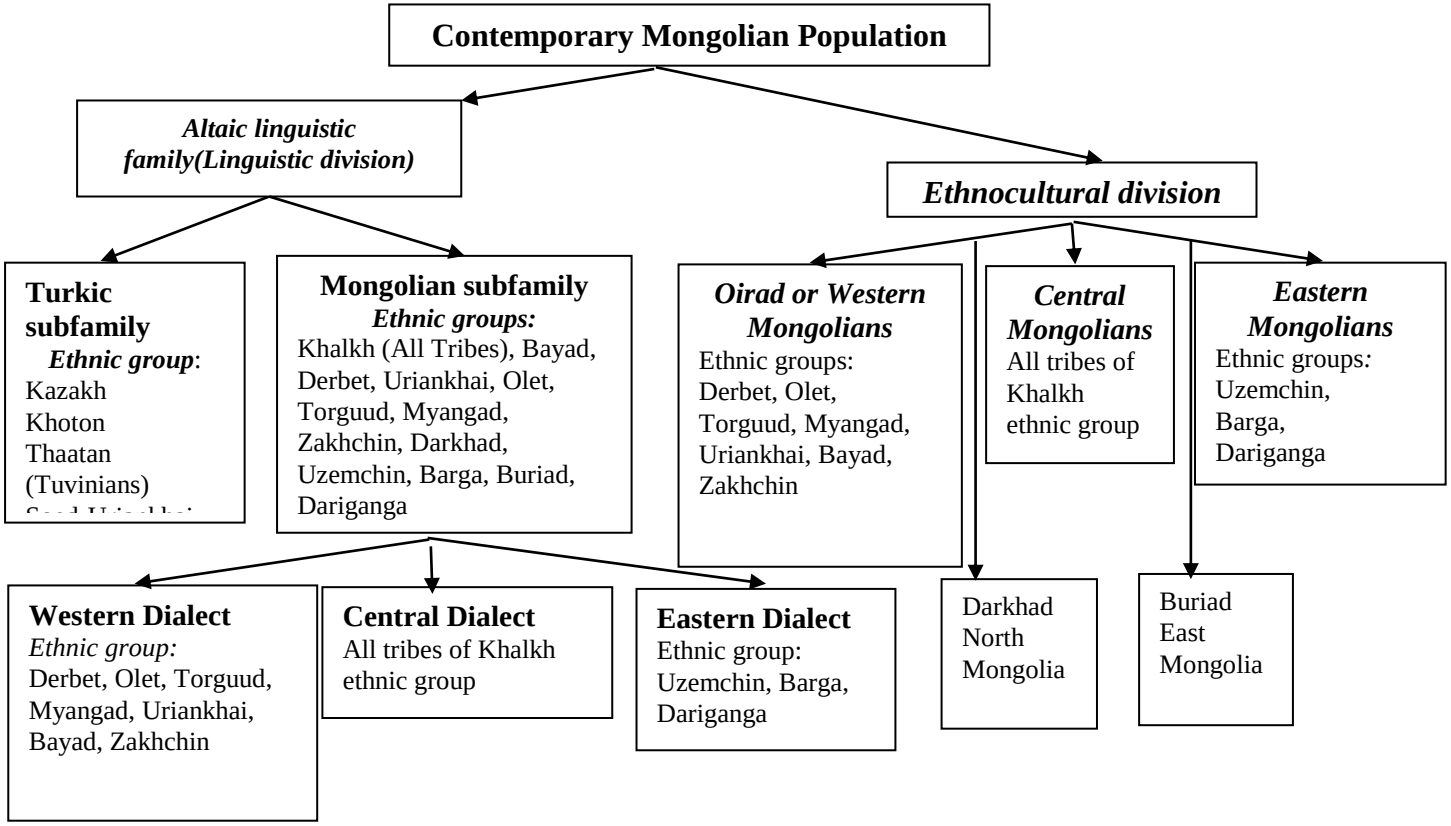

Fig. 2. Linguistic and ethnohistoric characteristics of Mongolian population

Dermatoglyphic traits of major ethnic groups of Mongolia have investigated by D.Tumen (1988, 1990, 1992, 1994, and 1997). According to her conclusion, dermatoglypically, studied ethnic groups of Mongolia are extremely heterogeneous.

In the article are given main results of comparative dermatoglyphic study carried out among Mongolian ethnic and cultural groups. The aim of the study is to describe geographic variations of dermatoglyphic patterns among Mongolian population and the origin and biological relationship of the studied ethnic groups of Mongolia.

MATERIAL AND METHODS

All the dermatoglyphic samples used in the present study have been collected among country people by the author of this line. From the population genetics point of view, the samples regarded are represent the descendants of the most stable groups of the native people formed at the turn of XII-XYII Century AC. Ethnohistory of some studied ethnic groups was described in historic sources such as "The Secret History of Mongolia" written in the 13th Century. Therefore the studied ethnic groups are the real part of the ethnohistorical population of the Mongolia. We examined more than 5000 individuals (2688 males and 2799 females) comprising 47 local groups belonging to 24 ethnic groups and tribes of Mongolia.

The approximate geographic location of studied dermatoglypic samples is indicated in **Fig.3.**

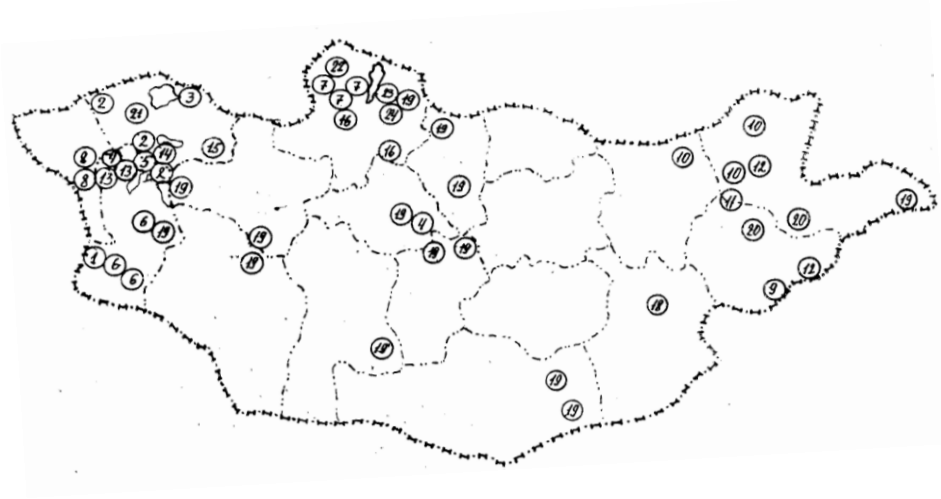

Fig. 3. Map showing the geographic locations of dermatoglyphic samples of studied ethnic groups of Mongolia

1 – Torguud; 2 – Derbet; 3- Bayad; 4 – Olet; 5 – Myangad ; 6 – Zakhchin; 7 – Darkhad; 8 – Kazakh; 9 – Dariganga; 10 – Buriad; 11 – Barga; 12 – Uzemchin 13 – Uriankhai; 14-20 – Different tribes of Khalkh (14 Khalkh-Isartuul, 15-Khalkh, Iljigen, 16-Khalkh Khotgoid, 17-Khalkh Uriankhai, 18-Khalkh Borjigon, 19-Central Khalkh, 20-Khalkh Khatigan); 21 – Khoton; 22 – Tsaatan (Tuvinians)

The following dermatoglyphic traits were studied among male of Mongolian population: 1) Pattern intensity index (***PII);*** 2) Main line index ***(MLI);*** 3) Frequency of the

Axial triradii ***(t);*** 4) Frequency of the Hypothenar pattern ***(Hy);*** 5) Frequency of accessory interdigital triradii ***(AIT***); 6) Frequency of the thenar and interdigital pattern ***(Th/1).***

Finger and palm prints have been analyzed according to methods described by Cummins and Midlo (1961), G.L.Gladkova (1966), and G.L.Heet (1983b). Comparative dermatoglyphic analysis was carried out using generalized dermatoglypic distance method suggested by G.L.Heet (1983). The Generalized dermatoglyphic distance (GDD) matrix was also used to construct dendrogram of relationship between studied ethnic groups from Mongolia and Asian populations.

$$d_{p1p2} = 100 \times \Sigma \left((g_i^{p_1} - g_i^{p_2}) / a_I \right) / n$$

Where **n** is number of analyzing traits, g_I **-** is frequency of analyzing i traits; p_1 and p_2 are numbers of comparing populations; a_I **-** Eurasian variation by **I-** traits. According to Heet's conclusion, the Generalized dermatoglyphic distance method is almost identical to Mahalanobis D^2 distance and Penrose 's shape distances method.

RESULTS AND DISCUSSION:

Geographic variation of dermatoglyphic traits among studied groups of Mongolia

The geographic variation of main dermatoglypic patterns are shown in Figures 4-8 and the frequencies of each studied dermatoglyphic traits in the studied ethnic groups of Mongolia are given in Tables 1-3.

In studied ethnic groups of Mongolia predominately, whorl type (**W**) of finger patterns was found than loop (**L**) and arch (**A**) types (**Tab. 1**) with exception of some Turkic speaking groups. The lowest frequencies of W type of finger patterns was displayed in the following Turkic speaking groups Tsaatan (32.3%), Khazakh (47.7%), Soed-Uriankga (35.4%) and Tuva-Uriankhai 946.2%) and highest values of the type exhibit in Mongolian speaking Myangad (61.9%), Buriad (58.2%) ethnic groups and Khalkh-Eljigen (57.9%), Khalkh-Khatigin (56.2%) tribes of Khalkh ethnic group.

The Pattern Intensity Index (***PII***) exhibits visible geographic gradient from West and Northwest to East and Southeast of Mongolia (**Fig. 4**).

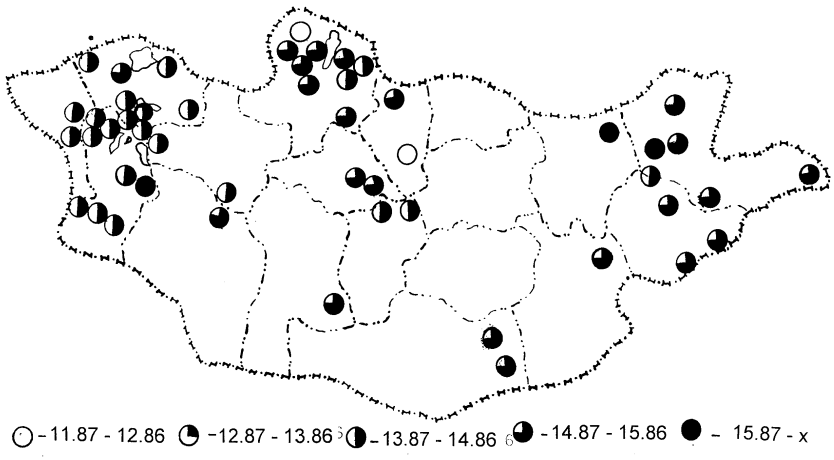

Fig. 4. Geographic variation of frequencies of the Pattern Intensity Index (**PII)** in the studied ethnic groups of Mongolia

The lowest value of the pattern intensity index are found among Turkic speaking Tsaatan and Soed-Uranhai groups (range from 11.3-12.4) from the Northwest Mongolia. In contrary, the highest frequency of this pattern are displayed among Buriad, Barga and Khalkh Borjigon (range from 15.5-15.8) from the East and South Mongolia.

However, the geographic distribution of Main line index (***MLI***) values shows totally different phenomenon than the **PII** pattern. The highest frequencies of the traits are defined among ethnic groups from Northwest of Mongolia and the lowest - among the southeastern ethnic groups: in the Khalkh-Borjigon (Southern group) and the Khalkh-Hatigin (Eastern group) tribes of Khalkh ethnic group (**Fig. 5**). Meanwhile, Buriads from East Mongolia has higher frequency of ***MLI*** than their low-valued neighbors. In another words, this trend of the MII pattern's values decrease from West to Southeast direction which is shown clearly on the **Figure 5**.

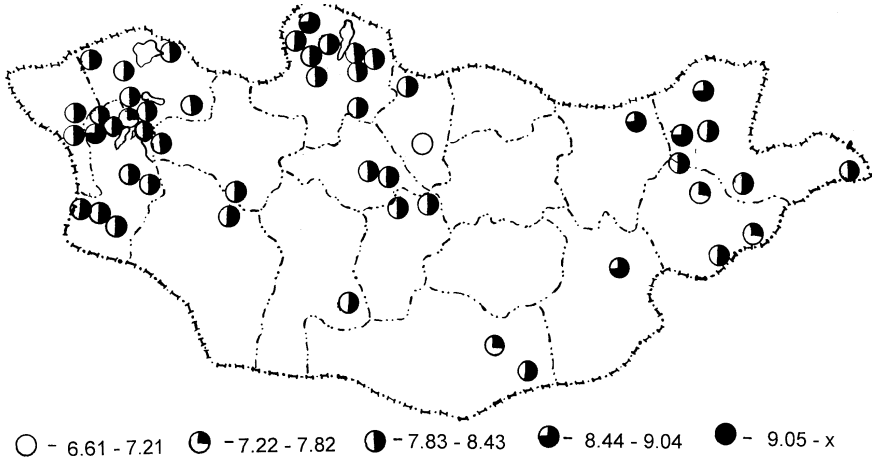

Fig. 5. Geographic variation of frequencies of Main line index (MLI) in the studied ethnic groups from Mongolia

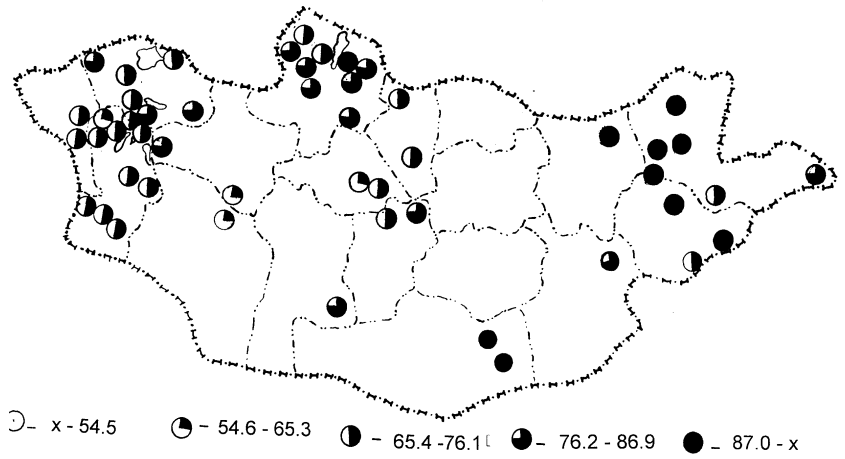

Fig. 6. Geographic variation of frequencies of the Carpal axial triradii (t) in the studied ethnic groups of Mongolia

The Carpal Axial Triradii ***(t)*** pattern shows clear tendency to increase from West to East and South direction (**Fig. 6**). The lowest frequency of the **t** is found in two Turkic speaking ethnic groups as the Kazakh from West Mongolia and Tsaatan from Northwest Mongolia. Among the western Mongolians the Urianhai ethnic group shows higher value of this pattern than other neighboring Mongolian speaking ethnic groups displaying low and intermediate values of the Carpal Axial Triradii pattern. The ethnic groups from East Mongolia (Buriads, Barga and Uzemchin) have the highest frequency of this pattern. The variation of the carpal axial triradii pattern clearly shows low frequency among western ethnic groups and the highest among the eastern groups (**Fig. 6**). It can be described that there is visible geographic gradient of the pattern from west to south direction.

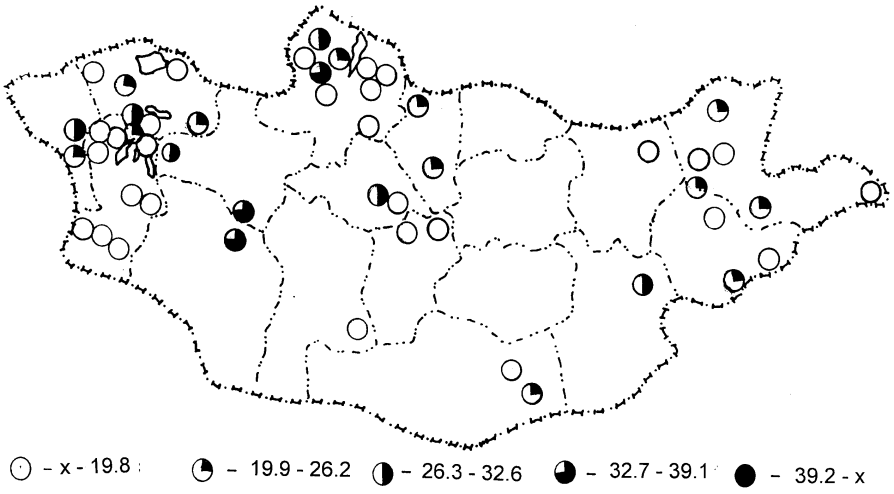

Fig. 7. Geographic variation of frequencies of the Hypothenar (Hy) in the studied ethnic groups from Mongolia

The frequency of Hypothenar Pattern ***(Hy)*** varies within the range of 12.5% (Uriankhai from Western Mongolia) to 34.6% (Tsaatan from Northwestern Mongolia). Geographic variation of **Hy** shows very patchy unclear pattern with no gradient noticeable (**Fig. 7**). Thus, the lowest and highest values of **Hy** are recorded not only for ethnic groups from West, but for groups from South and East parts of Mongolia.

The frequency of Accessory interdigital triradii ***(AIT)*** somewhat resembles the pattern of ***H,y*** as its all gradients are found in almost all the parts of Mongolia, particularly in West and South. In spite of that fact, the lowest frequency of ***AIT*** are found in the South and East with a tendency to increase to the West of Mongolia (**Fig. 8**). The frequency of ***AIT*** in Mongolian population ranges from 7.8 (Borjigon tribe of Khalkh from Southern Mongolia) to 52.6 (Turkic uriankhai group from Western Mongolia).

The geographic variation of ***Th/1*** frequency is more mozaical in Mongolian population. The highest ***Th/1*** frequency is found in Khoton ethnic group from Western Mongolia and quite different from neighboring western Mongolian ethnic groups the lowest values ***Th/1*** (0.7; 1.2) are found for the Borjigon tribe of Khalkh (Southern Mongolia) and Barga (East Mongolia).

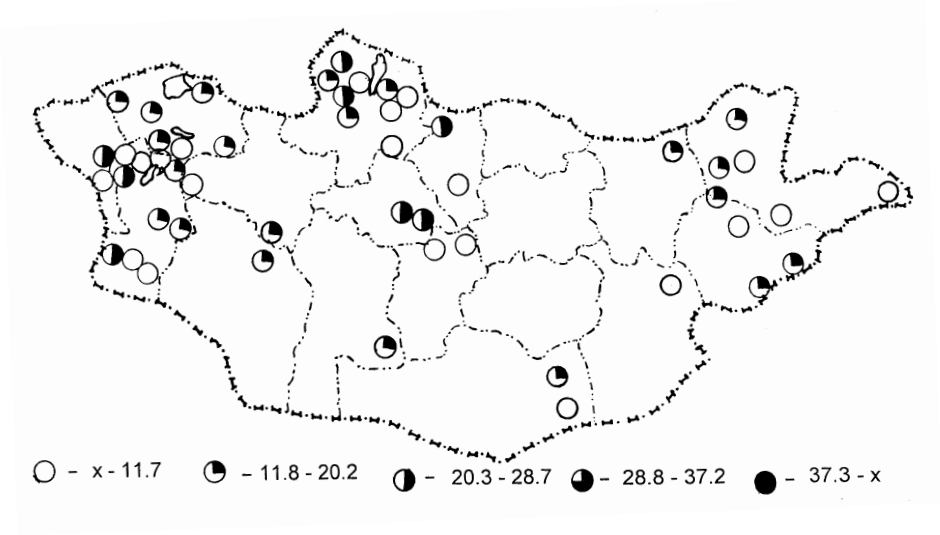

Fig. 8. Geographic variation of frequencies of the AIT
(accessorial interdigital triradii or II+III+IY) in the studied ethnic groups from Mongolia

Table 1. Percent frequencies of Finger print type and its index in ethnic groups of Mongolia (male)

	Ethnic groups	N	A	L^R	L^U	L^U+L^R	W	PII	A/L*100	A/W8100	W/L*100
1	Torguud	70	2.8	4.4	38.5	43.0	54.2	15.1	6.6	5.2	125.9
2	Derbet	159	4.1	2.6	44.4	47.1	48.9	14.49	8.68	8.4	103.8
3	Bayad	97	2.7	1.9	35.9	37.8	59.5	15.6	7.0	4.5	151.2
4	Olet	112	8.2	2.2	39.7	41.9	49.9	14.1	19.5	16.4	118.7
5	Myangad	90	3.3	1.4	34.1	35.4	61.2	15.7	9.4	5.4	112.7
6	Zakhchin	118	5.0	2.8	39.9	42.7	52.3	14.7	11.7	9.5	122.8
7	Central Khalkh	626	3.9	2.2	39.5	41.7	54.4	15.0	9.4	7.2	130.4
8	Khalkh-Khotgoid	147	1.8	2.0	42.3	44.3	53.9	15.2	3.1	3.2	121.8
9	Khalkh-Khatigan	122	3.1	3.0	37.7	40.7	56.2	15.3	7.6	5.5	137.8
10	Khalkh-Sartuul	59	3.1	2.7	43.2	45.9	51.0	14.7	6.6	5.9	111.1
11	Khalkh-Eljigen	72	3.2	3.4	35.6	38.8	57.9	15.1	8.2	5.5	148.7
12	Khalkh-Uriankhai	74	4.5	1.5	47.8	49.3	46.2	14.1	9.0	9.6	93.7
13	Khalkh-Borjigin	70	5.1	3.1	43.7	46.8	48.1	14.2	11.0	10.7	102.4
14	Darkhad	142	4.6	3.3	43.0	46.3	49.1	14.4	10.0	9.5	165.8
15	Khoton	97	3.0	2.4	37.8	40.2	56.8	15.3	7.4	5.2	141.2
16	Tsaatan	27	15.9	1.5	50.4	51.8	32.3	11.6	30.7	49.4	62.1
17	Soed-uriankhai	24	6.2	4.6	53.8	58.4	35.4	12.9	10.7	17.6	60.7
18	Tuva-uriankhai	26	4.2	3.4	46.2	49.6	46.2	14.2	8.5	9.2	93.0
19	Uriankhai	119	3.4	2.1	37.9	40.0	56.6	15.3	8.4	5.9	155.1
20	Kazakh	252	5.0	2.1	45.2	47.3	47.7	14.2	10.6	10.5	101.0
21	Uzemchin	79	2.3	2.3	38.8	41.1	56.6	15.4	5.5	3.9	140.6
22	Dariganga	86	2.1	3.3	42.6	46.0	51.8	14.9	4.5	4.0	112.6
23	Barga	58	2.4	2.6	45.5	48.1	49.5	14.7	2.4	4.8	102.8
24	Buriad	226	2.8	2.8	36.2	39.0	58.2	15.5	7.1	4.7	149.1

N- samples number**,** **A**-Arch, $\mathbf{L^R}$- radial loop**,** $\mathbf{L^U}$ – Ulnar loop, **W**-Whorl, **PII**- Pattern Intensity Index , **A/L*100** – Index Poll, **A/W*100**-Dankmeijer index**, W/L*100** –Furuhata

Table 2. Main dermatoglyphic patterns in ethnic groups of Mongolia (male)

	Ethnic groups	N	PII	Ic	t	Hy	AIT	Th (1)	MK
1	Torguud	70	15.12	7.98	73.6	21.4	22.1	12.8	62.6
2	Derbet	159	14.49	7.84	77.0	15.4	11.6	6.3	70.2
3	Bayad	97	15.60	7.77	75.7	19.6	18.0	8.7	69.7
4	Olet	112	14.17	7.81	65.6	16.1	14.7	9.8	62.9
5	Myangad	90	15.78	7.14	76.1	22.8	10.0	6.7	76.2
6	Zakhchin	118	14.73	7.74	70.9	22.0	14.8	11.0	63.1
7	Central Khalkh	626	15.05	7.74	70.4	22.8	14.5	6.7	65.2
8	Khalkh-Khotgoid	147	15.22	7.51	85.1	18.4	13.9	6.5	75.7
9	Khalkh-Khatigan	122	15.31	7.57	86.9	21.3	13.9	14.3	74.8
10	Khalkh-Sartuul	59	14.79	8.12	81.4	33.8	13.6	6.8	60.7
11	Khalkh-Eljigen	72	15.46	7.79	78.5	20.8	16.6	6.9	69.8
12	Khalkh-Uriankhai	74	14.17	8.29	91.8	12.8	12.2	14.8	79.9
13	Khalkh-Borjigin	70	14.28	6.86	86.1	26.4	7.8	0.7	75.0
14	Darkhad	142	14.45	7.88	74.6	21.8	13.4	12.7	64.7
15	Khoton	97	15.36	7.88	74.2	20.6	16.4	15.9	67.4
16	Tsaatan	27	11.64	8.75	66.6	29.6	22.2	5.6	37.1
17	Soed-uriankhai	24	12.92	8.10	81.2	12.5	8.3	12.5	67.1
18	Tuva-uriankhai	26	14.20	7.84	80.8	34.6	25.0	5.8	54.4
19	Uriankhai	119	15.32	7.76	89.1	14.7	18.9	3.4	75.7
20	Kazakh	252	14.27	8.05	68.1	26.6	18.2	5.1	55.7
21	Uzemchin	79	15.43	7.56	91.1	13.9	15.8	10.1	79.9
22	Dariganga	86	14.96	7.38	84.9	21.5	13.3	6.4	74.1
23	Barga	58	14.71	8.03	91.4	20.7	12.9	1.2	72.1
24	Buriad	226	15.54	7.55	89.4	18.4	14.8	12.4	77.5

N-Samples number, **PII**- Pattern Intensity Index, ***MLI*** - Main Line Index, **Hy**- Hypothenar pattern, **Th (1)** –Thenar pattern, **AIT**- Accessorial interdigital triradii, MK –Mongoloid dermatoglyphic complex

Table 3. Main dermatoglyphic patterns on palm in ethnic groups of Mongolia (male)

Ethnic groups		Palm patterns (%)						Accessorial interdigital triradii (AIT)			
		N	Íó	Th	II	III	IY	II	III	IY	Total (II+III+IV)
1	Torguud	70	21.4	12.8	4.5	24.3	42.8	4.3	2.8	15.0	22.1
2	Derbet	159	15.4	6.3	2.5	17.6	41.8	2.5	0.6	8.5	11.6
3	Bayad	97	19.6	8.7	6.7	17.5	44.3	6.7	0.6	10.8	18.0
4	Olet	112	16.1	9.8	3.6	17.4	41.1	3.6	0.4	10.7	14.7
5	Myangad	90	22.8	6.7	5.0	20.6	38.9	3.9	0.5	11.1	10.0
6	Zakhchin	118	22.0	11.0	3.8	19.9	42.8	3.4	1.7	9.7	14.8
7	Central Khalkh	626	22.8	6.7	4.8	8.1	44.9	3.9	0.5	10.1	14.5
8	Khalkh-Khotgoid	147	18.4	6.5	3.4	16.6	43.5	3.4	1.0	9.5	13.9
9	Khalkh-Khatigan	122	22.3	10.6	2.5	14.3	43.0	2.5	0.8	10.7	13.9
10	Khalkh-Sartuul	59	33.8	6.8	3.4	7.6	30.5	3.9	0.0	10.2	13.6
11	Khalkh-Eljigen	72	20.8	6.9	3.4	11.1	55.6	3.4	0.0	13.2	16.6
12	Khalkh-Uriankhai	74	12.8	14.8	4.7	15.5	34.4	4.7	0.0	7.4	12.2
13	Khalkh-Borjigin	70	26.4	0.4	0.0	12.1	40.7	2.8	0.0	5.0	7.8
14	Darkhad	142	21.8	12.7	3.9	17.6	34.8	3.9	0.3	9.2	13.4
15	Khoton	97	20.6	15.9	1.1	21.1	43.8	1.1	0.0	15.9	17.1
16	Tsaatan	27	29.6	5.6	7.4	16.6	33.3	7.4	0.0	14.8	22.2
17	Soed-uriankhai	24	12.5	12.5	0.0	12.5	37.5	0.0	0.0	8.3	8.3
18	Tuva-uriankhai	26	34.6	5.8	1.9	23.1	46.2	3.8	1.9	19.2	25.0
19	Uriankhai	119	14.7	3.4	6.3	14.3	37.8	7.6	0.8	10.5	18.9
20	Kazakh	252	26.6	5.1	5.6	16.8	39.9	5.5	1.6	11.1	18.2
21	Uzemchin	79	13.9	10.1	6.3	22.8	46.2	4.4	1.9	9.5	15.8
22	Dariganga	86	21.5	6.4	3.5	9.3	37.2	4.1	0.6	8.7	13.3
23	Barga	58	20.7	11.2	8.6	17.2	28.4	8.6	0.9	3.4	12.9
24	Buriad	226	18.4	12.4	5.5	21.0	28.8	5.5	0.2	9.1	14.8

N-Samples number, **Hy**- Hypothenar, **Th** -Thenar, **II,III,IV**- patterns on the Interdigital II,III andIV areas , **AIT**- Accessorial interdigital triradii, **II,III and IV** – accessorial interdigital triradii on the Interdigital II,III andIV areas

Table 4. Carpal axial triradii (%) among ethnic groups of Mongolia **(**male**)**

	Ethnic Groups	N	t	t'	t”	tt'	tt”	0	tt't”
1	Torguud	70	73.6	22.1	0.0	4.3	0.0	0.0	0.0
2	Derbet	159	77.0	19.2	0.0	2.8	0.0	0.7	0.3
3	Bayad	97	75.7	22.1	0.0	0.6	0.0	1.6	0.0
4	Olet	112	65.6	33.0	0.0	0.5	0.0	0.9	0.0
5	Myangad	90	76.1	21.1	0.0	2.2	0.0	0.6	0.0
6	Zakhchin	118	70.9	25.5	0.0	0.9	0.5	2.2	0.0
7	Central Khalkh	626	70.4	27.3	0.1	1.8	0.0	0.4	0.0
8	Khalkh-Khotgoid	147	85.1	10.9	0.0	2.0	1.0	1.0	0.0
9	Khalkh-Khatigan	122	86.9	10.7	0.0	1.6	0.0	0.8	0.0
10	Khalkh-Sartuul	59	81.4	16.9	0.0	1.7	0.0	0.0	0.0
11	Khalkh-Eljigen	72	78.5	21.5	0.0	0.0	0.0	0.0	0.0
12	Khalkh-Uriankhai	74	91.8	6.1	0.0	2.1	0.0	0.0	0.0
13	Khalkh-Borjigin	70	86.1	11.5	0.0	0.9	0.0	1.5	0.0
14	Darkhad	142	74.6	19.7	0.0	4.2	0.0	1.5	0.0
15	Khoton	97	74.2	19.6	0.5	5.7	0.0	0.0	0.0
16	Tsaatan	27	66.6	31.5	0.0	1.9	0.0	0.0	0.0
17	Soed-uriankhai	24	81.2	14.6	0.0	4.2	0.0	0.0	0.0
18	Tuva-uriankhai	26	80.8	11.6	0.0	3.8	0.0	3.8	0.0
19	Uriankhai	119	89.1	8.4	0.0	2.1	0.0	0.4	0.0
20	Kazakh	252	68.1	27.5	0.0	3.0	0.0	1.4	0.0
21	Uzemchin	79	91.1	5.7	0.0	2.5	0.0	0.7	0.0
22	Dariganga	86	84.9	12.2	0.0	2.3	0.0	0.6	0.0
23	Barga	58	91.4	6.0	0.0	1.7	0.0	0.9	0.0
24	Buriad	226	89.4	8.6	0.0	1.8	0.0	0.2	0.0

t - Carpal axial triraduis, tt’, tt”, t’t”, tt’t” – different composition of Carpal axial triraduis

Comparative Analysis

In order to determine relationship between investigated 24 ethnic groups and tribes of Mongolia we have calculated the generalized dermatoglyphic distance suggested by Heet (1983b) using 5 dermatoglypic traits, which are considered more significant value (PII; MLT; t; Hy; AIT) for population history. The generalized dermatoglypic distance matrix was used for cluster analysis based on which dendrogram of relationship was constructed (**Fig. 9**).In the dendrogram, most of the Turkic speaking ethnic groups from Western Mongolia form a separate coherent cluster.

All Mongolian speaking ethnic groups belong to one cluster, which is divided into three subclusters. The first subcluster contains most of the ethnic groups from Eastern Mongolia. The other two subclusters include all Mongolian speaking ethnic groups from western and central Mongolia. However, studied seven tribes of Khalkh group are included in the different subclusters. Comparative analysis displays that dermatoglyphically Oirad Mongolians and Central Mongolians are close to each other than Eastern Mongolians (**Fig.9**.).

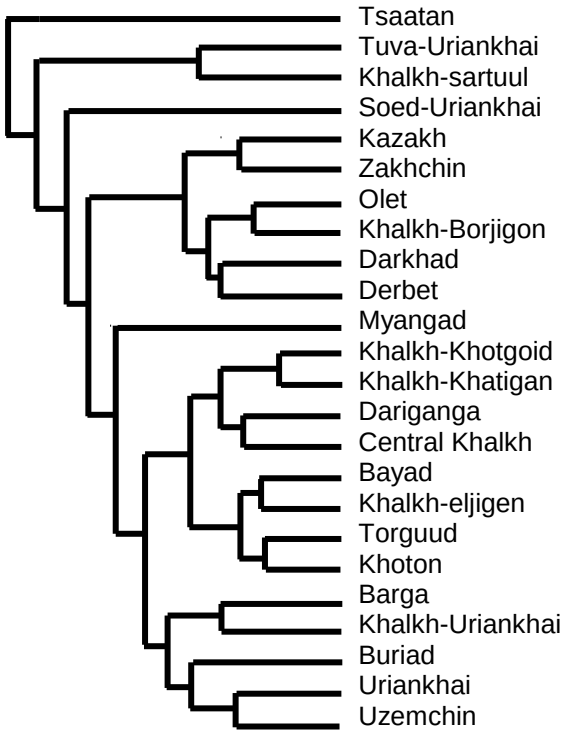

Fig .9. Dendrogram showing relationship of Mongolian ethnic groups

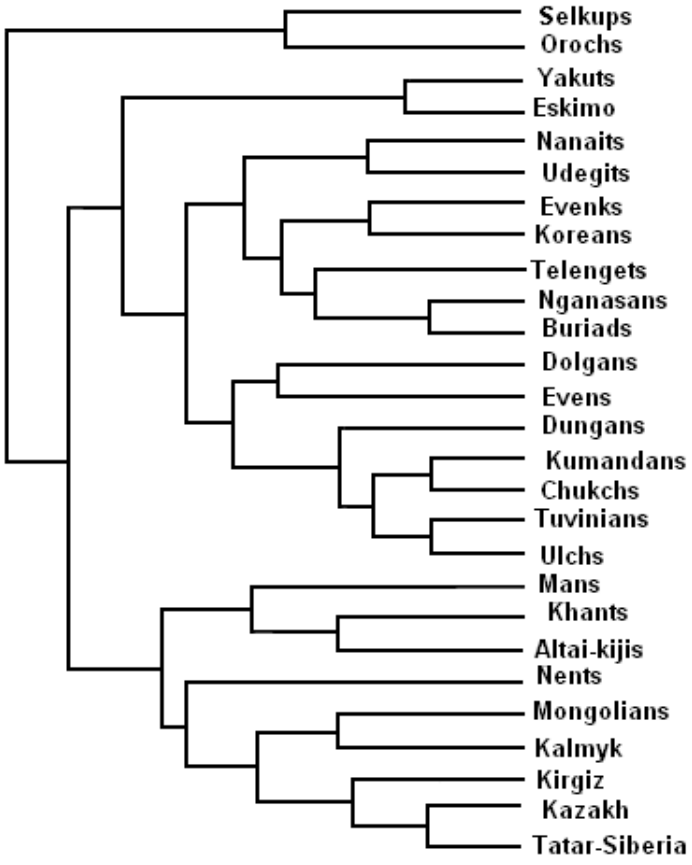

Fig. 10. Dendrogram showing dermatoglyphic relationship between Asian populations

Based on the generalized dermatoglyphic distances between Central Asian populations cluster analysis was conducted and a dendrogram was constructed displaying historical and biological relationship between compared populations from Asia (**Fig. 10**).

Among Asian populations Selkups and Orochs are located in a separate position in the dendrogram and other Asian populations are divided into two clusters. Mongolians, Kirgiz,

Kazakh, Tatar-Siberia, Kalmyk and Nents belong to one cluster. It means that they are very close to each other in dermatoglyphic features.

CONCLUSIONS

Based on the previous review of the geographic variation of six dermatoglyphic traits for 24 Mongolian ethnic groups and the comparison analysis of dermatolyphic samples of Asian populations, it can be offered the following conclusions:

1. The study clearly displays that there are at least two, and probably three, distinct geographic variation of studied dermatoglypcic traits among Mongolian ethnic and cultural groups studied. The first is trending **W-E** pattern which increases from west to East for Pattern intensity index (***PII)*** and Carpal axial triradii (**t)** and the second is trend in the opposite direction from East to West for Main line index ***(MLI).*** The third is the patterns which have the patch variation observed for Thenar (***Th/1)*** and Accessorial interdigital triradii (***AIT)***. The lowest and the highest frequencies of the traits are found in the West as well as in the East. Surprisingly, frequency of Hypothenar ***(Hy)*** trait increases from North to East and South**.** The phenomenon of the geographic variation of main dermatoglyphic patterns among the Mongolian population shows that contemporary ethnic groups of Mongolia are, dermatoglyphically, heterogeneous.

2. The results of comparative analysis of studied ethnic groups of Mongolia have shown a presence of local dermatoglyphic variants among Mongolian population. One of those variants is characterized by the moderate expression of “Mongoloid” dermatoglyphic features and located in the Western and Northern parts of Mongolia. All Turkish speaking ethnic groups and some of Mongolian speaking ethnic groups from Western Mongolia belong to this variant. The typical maximum “Mongoloid” dermatoglyphic features characterize the second variant. The variant has the highest value of pattern intensity index and the highest frequency of axial triradius. All the ethnic groups from Southeast of Mongolia belong to this variant.

Among Asian populations Mongolians, Buriads, Kalmyks, Kirgiz and Kazakhs are rather close in dermatoglyphic terms.

REFERENCE

Cummins N., Midlo Ch. 1961. Finger prints, palms and soles. An introduction to dermatoglyphics. Philadelphia, 2nd edition

Gladkova T.D., 1966. Kojnie uzory kisty i stopy obez'yany i cheloveka. *M.: Science. in Russian*

Heet G.L., 1983a. Dermatglyphika mongol'skih narodov. In: *Materialnaya i duhovnaya kul'tura Kalmykov. Elista. in Russian*

Heet G.L., 1983b. Dermatoglyphika narodov SSSR. *M.: Nauka. In Russian*

Heet G.L., Namsrainaidan L., 1975. Novye dannye po dermatoglyphike mongolov. *Sovetskaya ethnographia. No.2. in Russian*

Heet G.L., Namsrainaidan L., 1987. Dermatoglyphika mongolov v sravnenii s nekotorymi narodami Azii. *Voprosy Anthropologii. Vol.78. in Russian*

The Secret History of Mongols. 1975; 1992. (Translation into modern Mongolian language) Ulaanbaatar.

Tumen D. 1988. Dermatogliphicheskoe izuchenie ethnicheskih grupp MNR. *Trudy Instituta Obshei I Experimental'noi Biologii, Akademii Nauk Mongolii. No-21. In Russian*

Tumen D. 1990. Dermatoglyphika nekotoryh ethnicheskih grupp Zapadnoi Mongolii. In: *Archaeology, anthropology and ethnography of Mongolia. Novosibirsk. Nauka. In Russian.*

Tumen D. 1992. Anthropologiya sovremennogo naseleniya Mongolii. *Thesis of dissertation for Doctor of Science. Moscow. In Russian*

Tumen D. 1994. Dermatoglyphics of ethnic groups from East Mongolia. Reports of Mongolian Korean Joint research Project "Eastern Mongolia". Seoul. South Korea.

Tumen D. 1997. Dermatoglyphics of ethnic groups from Western Mongolia. Reports of Mongolian Korean Joint research Project "Eastern Mongolia". Seoul. South Korea.

ХУРААНГУЙ

Д.Түмэн

МОНГОЛЫН УГСААТНУУДЫН ДЕРМАТОГЛИФИКИЙН СУДАЛГАА

Манай орны 17 угсаатны бүлгүүд болон халхын долоон овгуудад хийсэн дерматоглификийн судалгааны гол үр дүнг оруулсан болно. Судалгаанаас харахад монголын угсаатны бүлгүүдэд хурууны цагираг хээ нэлээд өндөр давтамжтай тохиолдож байхад түрэг угсааны бүлгүүдэд, тухайлбал казак, цаатан, соёдурианхайчуудад гогцоо хээ өндөр давтамжтай байлаа. Дерматоглификийн үндсэн шинжүүдийн газар зүйн тархалтаас харахад хурууны дельта индекс, алганы үндсэн трирадиус зэрэг азийн хүн амд өндөр үзүүлэлттэй ажиглагддаг шинжүүдийн давтамж нутгийн баруунаас зүүн зүг рүү ихсэж байхад, камминсын индекс, хуруу хоорондын трирадиус зэрэг европын хүн амд нэлээд элбэг тохиолддог шинжүүд баруун монголчуудад төв болон зүүн бүсийн угсаатнуудаас илүү өндөр давтамжтай ажиглагдаж байлаа. Өөрөөр хэлбэл дерматоглификийн үндсэн шинжүүдийн тархалтанд газар зүйн тодорхой зүй тогтол ажиглагдаж байна.