PALEOANTHROPOLOGY OF EASTERN MONGOLIA

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ABSTRACT. *During archaeological fieldworks carried out in 2002-2003 several unknown before to scientists archaeological sites, belonging to different historical periods (from Bronze up to Mongolian Period) were discovered at Tsuvraa Uul and Bayan-Uul mountain areas in Khulenbuir sum, Dornod aimag. Around 30 graves dated to Hunnu and Mongolian periods were excavated in the site and some significant archaeological findings and well preserved human remains were unearthed. The aims of the paleoanthropological study are 1) To carry out craniological studies of human remains yielded from archaeological excavations in Eastern Mongolia, 2) To conduct comparative morphological analysis of ancient populations from Eastern Mongolia and Northeast Asia based on the obtained craniofacial data, to test the biological and historical relationships of the studied prehistoric populations from Eastern Mongolia and Northeast Asia. Cranial series used in the comparative research encompass 21 Neolithic samples, 26 Bronze and Early Iron samples and 14 Hunnu samples from Inner Asia. Fifteen cranial variables (five for the neurocranium, and ten for the facial skeleton) were defined by Martin (1928), V.P. Alexseev and G.F. Debets (1961) and W.Bass (1987) methodics and provided the metrical basis for the current study. The comparative study was conducted separately for each historical period. Penrose shape distances were calculated between each pair of compared populations. The main upshot of the paleoanthropological studies of the prehistoric populations from Eastern Mongolia is the following: generally, prehistoric populations from Eastern Mongolia is characterized with mongoloid anthropological features with an exception of the Hunnu population which is not anthropologically quite homogeneous. It may be explained by extensive migration of nomads from Eurasian steppe (Caucasoid or mixed populations from west to east and Mongoloids from East to West) lasted throughout the Bronze and Early Iron Age and Hunnu period in Inner Asia. This fact may show close genetic and biological relationships between Neolithic population from Eastern Mongolia, Bronze age populations with slab grave culture from Central and Eastern Mongolia, Hunnu, Early Mongolian, Mongolian period and contemporary populations of Mongolia.*

The paleoanthropological study of human remains from different prehistoric archaeological sites of Mongolia plays an important role in the problem of not only the origin of Mongols, but the prehistoric migrations and biological, cultural and historical relationships of ancient populations from Northeast Asia.

Russian investigators noticed several interesting archaeological monuments and sites in the Eastern Mongolia at the end of 1940s. One of the unique

archaeological discoveries in the Eastern Mongolia was the Neolithic site in Tamsagbulag and Kheree mountain regions in Dornod aimag. The site was discovered by Mongolian-Russian Joint archaeological Expedition in 1947-1949 led by C.B.Kiselev. The Tamsagbulag Neolithic site was excavated by Mongolian archaeologist D.Dorj and Russian archaeologist A.P.Okladnikov, who led the Stone Age research team of Mongolian-Russian historical and cultural expedition conducted during 1969-1989 (Okladnikov, 1963; 1964; 1972). Since that time, Mongolian archaeologists made extensive investigation and excavation of archaeological monuments from different historical periods in the Eastern Mongolia, giving the main attention to Neolithic and Bronze Age archaeology of Mongolia. Main results of the archaeological excavations of Neolithic sites and Bronze Age slab grave monuments are published in several monographs (Dorj, 1971; Navaan, 1975; 1980; Perlee, 1959; 1961; Ser-Odjav, 1956; 1964; 1977). According to these authors, ancient inhabitants of the Eastern Mongolia played an important role in the Central and Northeast Asian history and culture.

In 1990s the Mongolian-Japanese ("Gurvan Gol") and the Mongolian-Korean ("Eastern Mongolia") joint archaeological expeditions conducted reconnaissance survey in restricted areas of Eastern Mongolia and discovered numbers of archaeological sites, which have not still been excavated and studied.

The first actual archaeological data on Neolithic of Eastern Mongolia are published by D.Dorj (1971). According to D.Dorj, the Neolithic of Eastern Mongolia was divided into three chronological stages. The first stage belongs to 4th millennium BC, the second stage – to the 3rd millennium BC, the third stage – to the 2nd millennium BC. Based on the archaeological finds, D.Dorj pointed out that, generally, Neolithic population of Eastern Mongolia was nomads and practiced hunting and gathering, although, some groups practiced agriculture (Dorj, 1971).

The Tamsagbulag Neolithic site in the Eastern Mongolia was reinvestigated by Mongolian-French archaeological expedition in 1998. According to carbon dating analysis, absolute age of the Tamsagbulag Neolithic site is dated approximately around 5900 BC (Gunchinsuren, 2000).

The typical archaeological monument of the Bronze and Early Iron Ages in the Eastern Mongolia is slab grave. The monument is widely distributed all over the territory of the Eastern and Central Mongolia and Baikal lake region. Despite of its vast distribution, the slab grave culture is homogeneous by grave's external and underground construction and other archaeological findings (Navaan, 1975).

Mongolian archaeologists Kh.Perlee (1959), D.Navaan (1975), N. Ser-Odjav (1977), D.Sukhbaatar (1980), D.Tseveendorj (1984) believe that the populations with slab grave culture were ancestors of the Hunnu or Xiongnu.

Hunnu (Xiongnu) played an important role in the ethnic and political history, and culture of Eurasia (Bernsteim, 1951, Gumilev, 1960). In terms of archaeology, the Hunnu period is one of the best investigated historical period of Mongolia. Archaeological investigations show that Hunnu archaeological monuments or graves are very diverse by their size, surface and underground construction, and archaeological findings (Batsaikhan, 2002; Tseveendorj, 1984; Turbat, 2004). Most of the archaeologists and historians interpreted that Hunnu was direct ancestors of early, medieval and contemporary Mongols (Batsaikhan, 2002; Dorjsuren, 1961; Navaan, 1975; Sirotori, 1971; Sukhbaatar, 1980; Tseveendorj, 1984; Tumen, 1985; 1987; 1995; Turbat, 2004).

Prehistoric human remains from the Eastern Mongolia have been studied by L.Namsrainaidan (1975), N.N.Mamonova (1979) and D.Tumen (1980, 1985, 1992, 1993, 1995, 2002, 2003). The researchers pointed out that the Neolithic and the Bronze Age populations from Eastern Mongolia are characterized by mongoloid morphological features and anthropologically were close to ancient populations from Baikal Lake region and Amur river basin.

Since 2002 the Department of Anthropology and Archaeology, National University of Mongolia have carried out archaeological reconnaissance and excavation in the Eastern Mongolia within the research project "Ancient civilization of Eastern Mongolia". Financially the research project was supported by ARC at NUM and KFAS (Korean foundation for advanced studies). During the archaeological fieldworks carried out in 2002 – 2003, several archaeological sites from different historical periods (from Neolithic up to Mongolian Period), unknown before to scientists were discovered, in Tsuvraa Uul and Bayan-Uul mountain areas in Khulenbuir sum, Dornod aimag. Around 30 graves, dated to the Hunnu and Mongolian Periods, are excavated and some interesting archaeological findings and well preserved human remains are discovered during the archaeological expeditions. Some results of craniofacial morphological studies of the human remains from above mentioned Hunnu and Mongolian graves were published by D.Tumen (2002).

The aims of the paleoanthropological study of the research project are 1). To carry out craniological studies of human remains yielded from archaeological excavations carried out in Eastern Mongolia, '2). To conduct comparative

morphological analysis of ancient Eastern Mongolian and Northeast Asian populations based on the obtained craniofacial data to test the origin and relationship of the studied prehistoric populations from the Eastern Mongolia and the Northeast Asia.

In the paper, we give the main results of the comparative craniofacial morphological study of prehistoric human remains discovered during the archaeological excavations in the Eastern Mongolia in 2002-2003.
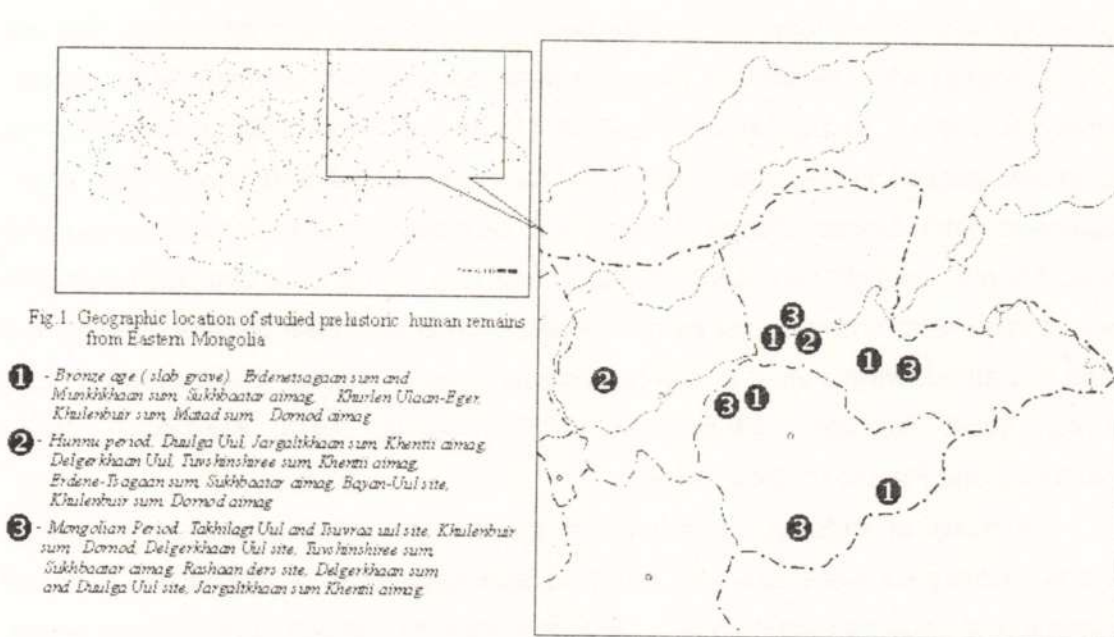
MATERIALS AND METHODS

During archaeological expeditions conducted in Khentii and Dornod aimags in 2002-2003 several archaeological sites belonging to Hunnu and Mongolian Periods (X-XII Century) were excavated and paleoanthropological specimens with different preservation were found from 35 burials (11 graves from Hunnu and 24 from Mongolian period) in the sites Takhilgat Uul, Tsuvraa uul and Bayan Uul areas, Khulenbuir Sum, Dornod aimag; Duulga Uul, Jargaltkhaan sum, Khentii aimag and Aurag balgas, Degerkhaan sum, Khentii aimag (Fig.1). All anthropological remains were studied from craniological point of view. Cranial variables were defined by the Martin's method, widely used in anthropological rsearch (Martin, 1928; Alexseev and Debets, 1964, Alexseev, 1966; Bass, 1987; Howells, 1973; Knusmann, 1988; Kharitonov and Perevozchikov, 1999).

Because of different underground preservation of the studied materials, various techniques were used for sex and age estimation of individuals found at excavation of Tsuvraa mountain site, Uguumur area, Khulenbuir sum, Dornod aimag. The sex was determined by basic criteria of specific development of a surface relief on a skull, by the hip bone form and general size of long bones (Alexseev, 1966; Bass, 1987).

The aging of skulls was based on criteria of occlusal wear of teeth, obliteration of skull sutures, preservation of surface joints of long bones, pubis symphyses and on some other additional parameters (Alexseev, 1966; Bass, 1987).

Cranial series for the comparative foundation from the Eastern Mongolian remains encompass 27 Neolithic samples, 28 Bronze and Early Iron samples and 14 Hunnu samples from Inner Asia. Fifteen cranial variables (five for the neurocranium, and ten for the facial skeleton) were defined by Martin (1928) V.P. Alexseev and G.F. Debets (1961) and W.Bass (1987) methods and provided the metrical basis for the present study.

The comparative study was conducted separately for each historical period. Penrose shape distances were calculated between each pair of compared populations. The shape distance actually measures the precision of the mean difference between two populations (Penrose, 1954), and is considered to be a reliable indicator of morphological difference based on body form, rather than difference based on absolute body size (Penrose, 1954; Brothwell, 1965). The diagonal matrix of Penrose distance values was used as input for cluster analyses. SPSS (version 11) statistical software is used for the statistical analyses.

Fig.1. Geographic location of studied prehistoric human remains from Eastern Mongolia

❶ - Bronze age (slab grave). Erdenetsogaan sum and Munkhkhaan sum Sukhbaatar aimag. Khurlen Ulaan-Eger, Khalenbur sum Matad sum Dornod aimag

❷ - Hunnu period. Duulga Uul, Jargaltkhaan sum Khentii aimag, Delgerkhaan Uul, Tuvshinshiree sum Khentii aimag, Erdene-Tsagaan sum Sukhbaatar aimag, Bayan-Uul site, Khalenbur sum Dornod aimag

❸ - Mongolian Period. Takhilagt Uul and Tsuvraa uul site, Khalenbur sum Dornod, Delgerkhaan Uul site, Tuvshinshiree sum Sukhbaatar aimag, Rashaan ders site, Delgerkhaan sum and Duulga Uul site, Jargaltkhaan sum Khentii aimag

RESULTS

Craniofacial morphological data of the studied anthropological materials from above mentioned archaeological sites are given in Table 1. Geographic location of the studied paleoanthropological findings is shown in figure 1.

Individual anthropological characteristics of the Hunnu human remains from Eastern Mongolia.

Khentii aimag, Jargaltkhaan sum. Good preservation of the skeleton. The skull's surface relief and skull sutures' development show that adult male individual was buried in the grave. The cranial indexes indicate that the skull is brachycranic, orthocrany and akrocrany (cranial index-88.7; breadth-height index-81.8; length-height index- 74.6). The face of the skull is meseny and mesognathic (upper facial index-50.4) with narrow and less prominent nose, and high and broad orbits (nasal

index- 51.8 and orbital index- 87.5). According to the above mentioned cranial traits, the skull is identified as mongoloid.

Khentii aimag, Jargaltkhaan sum, Duulga Uul. The preservation of the skeleton from the burial was in good condition. Due to surface relief of the skull and form of the mandible frame, the remain belongs to male individual. The condition of the teeth and skull sutures indicate the age of the individual as possible late adultus or early maturus. The skull is typical brachycranic (maximal length - 175mm, maximal breadth -146 mm, Basion - bregma height – 133 mm, cranial index- 83.4), width and slope of forehead (Least frontal breadth – 97 mm, frontal profile angle nasion - metopion – 76 degree), superciliary arches (brow ridges) are prominently developed, and face is orthognathous, medium high and narrow. The orbits are medium high and rectangular. The nasal bone roots are very low. All mentioned anthropological traits show the individual was mongoloid.

Khentii aimag, Jargaltkhaan sum, Duulga Uul.

The preservation of a skeleton from the burial is in good condition. The skull's surface relief and sutures, mandible frame form and teeth condition demonstrate that the skeleton belongs to adult male individual. The skull is typical mesocrany, metrocrany and orthocrany (maximal length – 182 mm, maximal breadth-137 mm, Basion-bregma height – 128 mm, cranial index-75.2), forehead is broad and slope (Least frontal breadth –98 mm, frontal profile angle – 75 degree), superciliary arches (brow ridges) are developed prominent, and face is mesognathy, lepteny and medium slightly high. The orbits are high, mesoconchy and rectangular. The nasal bone roots project very prominent. Such signs as mesocrany and projecting nose and narrow face resemble Caucasoid features. But such sign as sloped forehead, high orbits resemble as Mongoloid features. Based on the above mentioned mixed morphological traits it can be concluded that the skull is characterized by combination of Mongoloid and Caucasoid features.

Sukhbaatar aimag, Tuvshinshiree. The skeleton belongs to matured male individual. The skull is brachycrany, forehead is very wide, face is medium high, nose is broad and orbits are low. All mentioned features show that the individual undoubtedly was mongoloid.

Sukhbaatar aimag, Erdenetsagaan sum, Grave.1. In the grave was buried matured male individual. The skull characterizes mesocrany, chameacrany and tapeinocrany. Brain case vault is slightly low, moderate broad and receding forehead, medium broad, high and face with moderate horizontal profilation and medium broad nose,

slightly low orbits. The combination of above mentioned anthropological features demonstrates that the skull has intermediate anthropological type between mongoloids and Caucasoid.

Dornod aimag, Khulenbuir sum, Bayan Uul Mountain, Grave 4, AAT-569. The skeleton preservation is good. The features and relief of skull and skeleton show that anthropological specimen belong to male individual. Cranial sutures indicate the age of the male individual as maturus. The braincase is mesocranic with very low cranial vault (cranial index – 80.4). Forehead is narrow (frontal breadth -90mm). the skull has braod and mesoprosopic face (bizygomaxillar breadth – 143mm, upper facial height – 70mm, facial index – 51.7), the nose is platyrhiny and nasal projection is small (nasal index – 53.8 and nasal profile angle- 21 degree). The skull has hypsiconchic orbits (orbital index – 87.7). Due to both traits as alveolar angle (70 degree) and basion-nasion and prostion – basion index (105.2), the alveolar part is moderate prognathy. The above mentioned morphological features display that the skull morphologically belongs to mongoloids. However the alveolar proghathism may be show morphological similarity to ancient population from Southeast Asia.

Khentii aimag, Jargaltkhaan sum, Duulga Uul, Grave 7, AAT-566. Preservation of the human specimen was in very good condition. In accordance with relief development of skull and postcranial skeleton matured female individual was buried in the grave. The skull is chamea and mesocrany (cranial maximum length – 177 mm, cranial maximal breadth-139, bregma-basion height-131 mm, and cranial index- 78.4). The skull forehead is broad with more vertical position (frontal breadth-96 mm, frontal angle-83 degree), The skull's face is moderate high, broad and mesognathy (bizygomaxillar breadth – 132 mm, upper facial height – 69 mm and upper facial index –50.8),. The orbits are not too high (orbital height – 35 mm) and the nose is broad and leptorhiny (breadth of nasal aperture – 25 mm). The angles of the facial profile and the alveolar part indicate its moderate prognathism (alveolar profile angle 68 degree), the angle of protrusion of the nasal bones is high (nasal profile angle – 31 degree). The above-mentioned morphological traits show that the skull is characterized by Mongoloid and Caucasoid morphological features.

Dornod aimag, Khulenbuir sum, Bayan Uul Mountain, Grave 3, AAT-562. Hunnu period. In this grave an adult individual and child were buried. The preservation of skeletons (uncompleted skull and postcranial skeleton of both individuals) was in very bad condition. It was not possible to define age and sex of the adult individual

because of his very bad preservation. The relief and surface development of child's long bones show that the human remain belongs to individual 9-10 year of age.

Dornod aimag, Khulenbuir sum, Takhilgat Mountain, Grave 11, AAT-580. Hunnu period. The preservation of skeleton (fragment of skull and postcranial skeleton) was in bad condition. The relief and surface development of long bones show that the human remain belongs to individual 8-9 year of age.

Dornod aimag, Khulenbuir sum, Bayan Uul Mountain, Grave 6, AAT-575. Hunnu period. The preservation of skeleton (fragment of skull and uncompleted postcranial skeleton) was in bad condition. The relief and surface development of long bones show that the human remain belongs to individual 9-10 year of age.

Khentii aimag, Jargaltkhaan sum, Duulga Uul. An adult female in this grave was buried. The specimen is typical brachycrany, metro- and akrocrany with narrow reciting forehead. The face is narrow, high and slightly prominent in the zygomaxillary part. Nose is narrow and high projected (nasal angle-29). Orbits are mesoconchy. Alveolar angle, basion-nasion and basion-prostion lengths show that alveolar part is mesoghathic with tendency to prognathy. These morphological traits of the skull indicate its mixed anthropological type. The tendency to alveolar prognathism may be displayed some similarity to Southeast Asian populations from same historical period. At the same time its prominent face and nose characterizes the skull as Caucasoid one.

Khentii aimag, Jargaltkhaan sum, Duulga Uul. Grave.6. There was found uncompleted skeleton of an adult female individual in the grave. The skull is typical dolichocranic with very high cranial vault and orthognathous and moderate prominent face. Such kind of morphological traits are characterized that the skull anthropologically belongs to one of variants of Caucasoid.

The results of the individual craniofacial characteristics of human remains from Hunnu period of Dornod aimag (East Mongolia) show that the inhabitants were anthropologically not quite homogeneous in spite of that the most of remains predominantly, are characterized by mongoloid morphological features. However, some remains from Tsuvraa and Bayan-Uul mountain sites in Dornod aimag and Duulga Uul site, Khentii aimag have alveolar prognathism what is more characterized ancient populations from East Asian. Other specimens display intermediate morphological features between Mongoloids and Caucasoid such as dolichocranic or brachycranic, narrow and high face, moderate facial profilation and projected nose.

Such a combination of morphological traits demonstrates similarity to mixed prehistoric populations from South Siberia.

DISCUSSION

Craniofacial data on prehistoric populations from the Central Asia, South Siberia, Russian Far East, China, Korea and Japan (Alexseev and Gohman 1983, Kruykov and et. Al.1978; Wu and Olsen, 1985) provided a comparative foundation for the present study. Together, all skeletal samples span a timeframe from the Neolithic (8000-6000 BC) up to Hunnu Period (II Century AD)

Craniofacial data on the prehistoric populations from Eastern Mongolia are provided in Table 1.

Table 1. Mean values of craniometric variables of ancient populations
from the Eastern Mongolia (Males)

Historical period	Neolithic	Bronze and Early Iron age	Hunnu
1*.maximum cranial length	192.0 (2)	175.0 (9)	177.6 (8)
8. maximum cranial breadth	149.0 (2)	145.8 (10)	146.7 (8)
8:1. Cranial index	77.5 (2)	86.5 (9)	82.5 (8)
17. Bregma-Basion Height	147.1 (1)	122.5 (9)	128.0 (8)
5. Nasian-Basion length	120.0 (2)	93.3 (9)	98.5 (7)
9. Least frontal breadth	96.5 (2)	99.5 (14)	95.6 (8)
40.Basion-prostion length	118.0 (2)	96.0 (10)	94.6 (7)
45. Bizygomatic breadth	147.0 (2)	139.0 (10)	139.7 (8)
48. Upper facial height	82.5 (2)	74.5 (10)	74.0 (8)
48:45. Facial index	49.8 (2)	54.0 (10)	53.0 (8)
72. Total facial angle	92.0 (1)	89.7 (7)	88.8 (8)
75/1/. Nasal angle	19.0 (1)	18.1 (7)	25.0 (6)
77.Nasomalar angle	155.6 (2)	157.0 (10)	140.2 (7)
73.Alveolar angle	91.0 (2)	75.0 (7)	61.5(6)
52. Orbit height	35.0 (2)	35.0 (4)	36.1 (6)
52:51.Orbit index	85.3 (2)	85.3 (14)	86.9 (6)
54. Nasal breadth	28.0 (2)	25.8 (14)	27.6 (7)
54:55. Nasal index	44.3 (2)	52.8 (14)	52.1 (7)
DS. Dacryon subtense	8.0 (2)	9.9 (12)	10.5 (7)
DS:DC. Dacryon index	30.8 (2)	44.6 (12)	53.5 (7)
SS. Simotic subtense	3.0 (2)	3.1 (12)	4.6 (6)
SS:SC. Simotic index	36.5 (2)	50.9 (12)	55.4 (6)

*-Number of Martin or letters of Morant

The Eastern Mongolian Neolithic is represented by a few human remains obtained from the sites Norovlin mountain and Tamsagbulag, excavated in 60s and 70s. The main results of the craniofacial study of those skulls are published by D.Tumen (1979, 1985, 1987, 1992, 2004).

The Eastern Mongolian Neolithic skulls are mesocrany with high cranial vault and very high, broad and flattened face, they are orthognathic and flat nasal roots (Table 1). Due to the morphological features, the Neolithic crania is morphologically identified as Mongoloid.

Comparative morphological analysis and cluster analysis shows that the Neolithic populations from Asia are divided into five major clusters. One of the clusters includes populations from the East China and Primor'e. The second cluster contains populations from Amur river basin and Yakutia. The third cluster includes populations from Altai mountain, Eastern Siberia, Japan (Jomon period) and Western Mongolia. The fourth cluster includes populations from China and Korea. However, the Neolithic populations from East Mongolia, Baikal lake region (Cis-Baikalia and Transbaikalia) and North China are separated from other Asians and belong to fifth cluster. Morphologically, all populations belonging to the same cluster are more similar to each other than either is to other clusters.

The results of this cluster analysis confirm that the Eastern Mongolian Neolithic population share closer phenetic affinities to the Neolithic population from the Baikal lake region. It supports a biological relationship of those populations. This anthropological type of the Neolithic population from the Baikal region was called by Russian anthropologist Ya.Roginskii (1973) as proto-mongoloid type and by G.F.Debets (1948) and V.P.Alexseev (1987) as Baikalian anthropological type of the Continental Mongoloids. According to those facts, there were very close biological relationship between the Neolithic inhabitants from Eastern Mongolia and Baikal region. Archaeological evidence supports that there was common Neolithic culture in the Eastern Mongolian and Baikal lake region (Dorj, 1975).

The skulls from slab graves belonging to the Bronze and Iron Age from the Eastern Mongolia characterize brachycrany with low skull vault and medium broad, high and flattened face and more flat nasal roots (Table 1). The morphological patterns clearly show that Eastern Mongolian Bronze age inhabitants were anthropologically mongoloids.

The Penrose shape distance comparative analysis between Asian Bronze age populations shows that Eastern Mongolian Bronze age population is morphologically

more similar to the Mongoloid population from Baikal lake region. Comparison of Asian Bronze and Early Iron Age populations shows that these populations are divided into five major clusters with exception for the population from Manchuria which occupies a separate position in this dendrogram (Fig.3). The first cluster combines most of the populations from the Altai mountain region, South Siberia, West Mongolia (Chandman culture), Korea and Japan (Yayoi Period). However, the first cluster is divided into three subclusters. The Bronze and Early Iron age populations from Chandman culture from Western Mongolia, Tagar and Tashtyk culture from South Siberia are included to the same subcluster. The second cluster includes populations from Inner Mongolia, Central and Northwest China. The populations from Altai (Afanasevo culture), North Kazakhstan (Usunian culture) and South Siberia (Minusinsk, Andronovo culture) belong to the third cluster.

The populations of the Bronze Age slab grave culture from Eastern Mongolia and Karasuk culture from Central Tuva belong to the fourth cluster. The fifth cluster combines the populations from Cis-Baikalia (Slab graves Culture), Minusinsk (Okunevo culture) and West Mongolia (Culture with graves without inventory). The separation of the Bronze Age populations from Northeast Asia into several clusters and subclusters can be explained by extensive and intensive admixture between Caucasoid and Mongoloid populations during this historical period. According to V.P.Alexseev (1983) and O.Ismagulov (1970) Mongoloid and Caucasoid admixture in Central Asia (Kazakhstan and Kirgizia) and South Siberia increased step-by step, beginning in the end of Neolithic and Early Bronze Age. In addition, the authors concluded that Transbaikalia and Cis-Baikalian Bronze and Early Iron Age populations with slab grave culture were mongoloids characterizing brachycrany, high, broad, flattened face and flat nasal roots (Alexseev, 1983).

However, as mentioned above, the Eastern Mongolian Bronze and Early Iron Age population with slab grave culture and Karasuk population from South Siberia are included to the same cluster. This, probably, shows their biological and historical relationship noticed by V.P.Alexseev (1961, 1983) and G.V.Rykushina,1976).

According to the researchers, there is indeed some eastern mongoloid admixture in Karasuk population. Based on the numerous analogous decorative elements of artifacts and archaeological findings found in the area, Russian archaeologists E.L.Novgorodova (1970, 1981,1989) and V.V.Volkov (1967, 1981) concluded that the origin of Karasuk culture related to Bronze Age Culture of Mongolia and Inner

Mongolia. Authors state that an extensive regional migration took place across South Siberia, Mongolia and North China during the Bronze Age period.
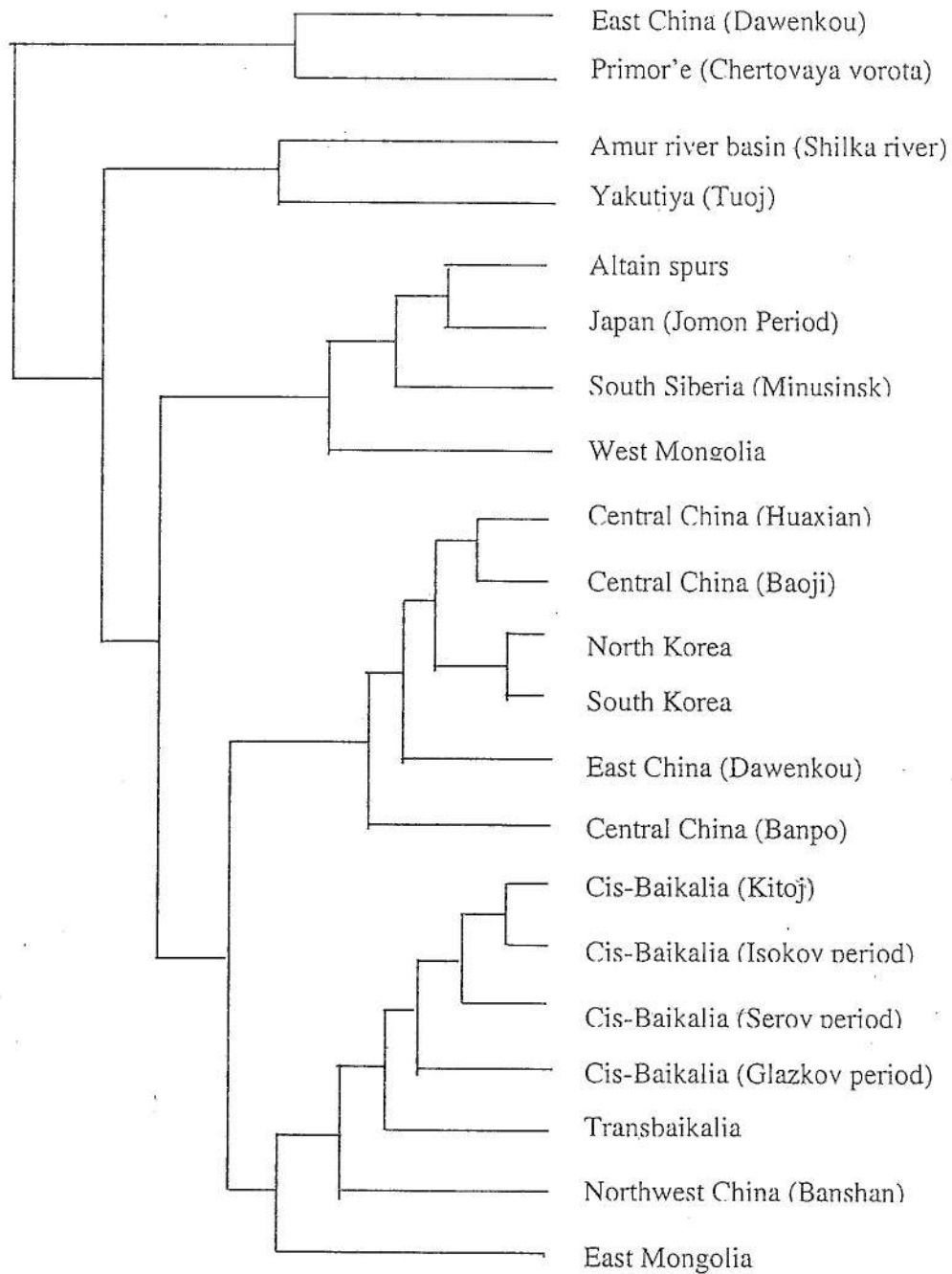

Fig.2. Dendrogram showing relationship of the Neolithic populations from Asia
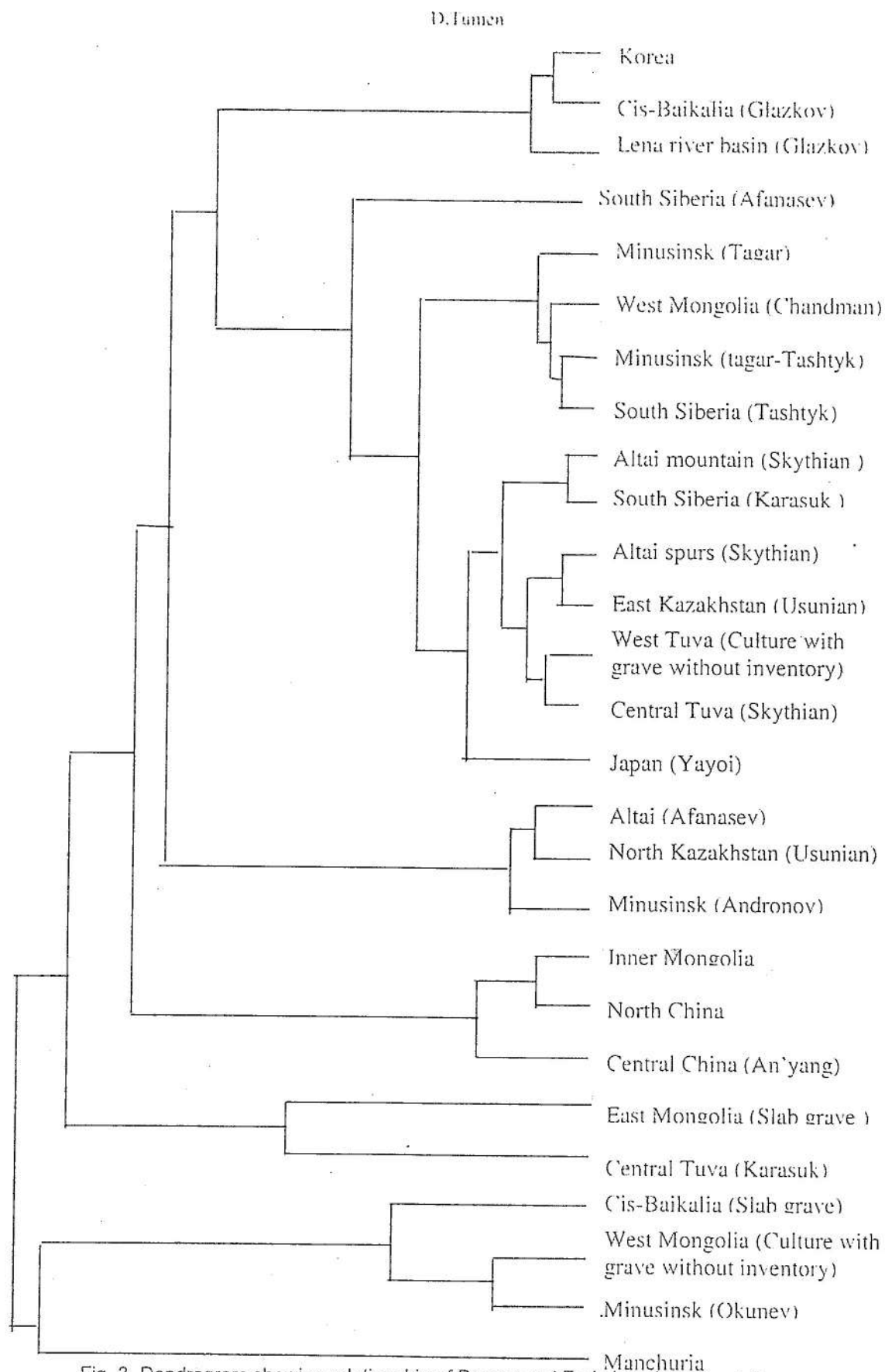(Penrose shape distance analysis for 15 cranial variables)

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Fig. 3. Dendrogram showing relationship of Bronze and Early Iron Age populations from Asia (Penrose shape distance for 15 cranial variables)
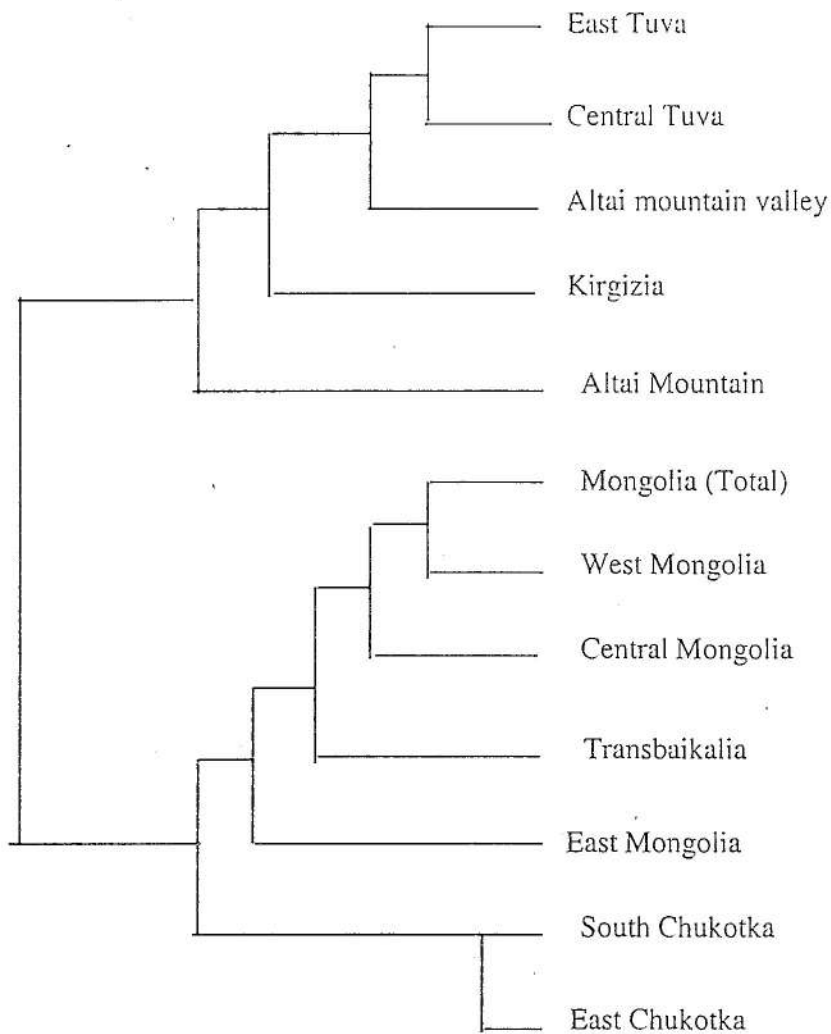
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Fig.4. Dendrogram showing relationship among populations from Hunnu Period of Asia (Penrose shape distance analysis for 15 cranial variables)

Hunnu skulls from Eastern Mongolia have medium size of maximum cranial length and maximum cranial breadth, low skull vault in general. They are more brachycrany with narrow forehead and have medium broad, high and flattened face and feebly degrees of horizontal facial profile and flat nasal roots. However, as mentioned above, some skulls have alveolar prognathism and several skulls have anthropological features intermediate between Mongoloid and Caucasoid. It may show that Hunnu were anthropologically and ethnically not quite homogeneous. The Penrose shape distance methods applied for the comparative analysis of craniofacial data on inhabitants from Hunnu period of Asia displays that all compared samples from this historical period are divided into two major clusters.

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The first cluster includes populations from South Siberia (Fig.4). The second cluster contains Hunuu populations from Western, Central and Eastern Mongolia and Baikal region. In the second cluster Hunnu from Eastern Mongolia are placed closely to the Baikalian Hunnu population than to the Central and Western Mongolian hunnu. The clustering of Hunnu population from Inner Asia clearly displays the Hunnu were anthropologically heterogeneous and there were at least two anthropological types: the Hunnu population from Mongolia and Baikal region may belong to the Central Asiatic variant of North Mongoloids and the Hunnu from Altai and Tuva belong to one of the variants of South Siberian mixed anthropological types. As V.P.Alexseev and I.I.Gokhman (1983) concluded, Hunnu migration from Mongolia to West through Altai and Tuva played an important role in the ethnogenetical process and anthropological structure of the region. V.V.Alexseev and I.I.Gokhman noticed that the Mongoloid admixture increases between local Caucasoid inhabitants of the region and Mongoloid migrants from Mongolia in the late Bronze Age and Hunnu period which is synchronized with the formation of the Hunnu tribal union in Mongolia and Baikalian steppe and with the extension of the Hunnic influence towards south and west. (Alexseev and Gokhman, 1983). Studying hunuu skulls from Baikal lake region and Far East, russian anthropologists G.F.Debets (1948), I.I.Gokhman (1960, 1967) and N.N.Mamonova (1979) observed a slight Caucasoid features and probable admixture of the Far-East race in the anthropological structure of the population from the period. These two facts go well together with archaeological data and written Chinese sources (Alexseev and Gokhman, 1983).

The craniofacial data on prehistoric populations from Eastern Mongolia have been compared with ancient populations from other parts of Mongolia. The comparative analysis is carried out by Penrose shape distance method and taxonomical distance matrix between ancient Mongolian populations is obtained. Based on the distance matrix we have conducted cluster analysis and results have drawn in the Figure 5.

The dendrogram clearly demonstrate that prehistoric populations of Mongolia are divided into two clusters. It may be expressed by two anthropologically distinctive populations inhabited in Mongolia (Fig 5). As the dendrogram exhibits, the populations from the Bronze Ages, Hunnu and Early Mongolian, Mongolian and Modern periods are included to the same cluster, which means they are morphologically very close to each other (Fig 5). This fact shows close genetic and biological relationships of Neolithic population from Eastern Mongolia, Bronze age

populations with slab grave culture from Central and Eastern Mongolia, Hunnu, Early Mongolian, Mongolian Period and contemporary populations of Mongolia.

Prehistoric populations from Western Mongolia belonged to another cluster which includes the Neolithic population. Bronze age population with Kurgan or kheregsuur culture and the Early Iron Age population (Chandman culture). According to anthropological data, populations from these historical periods of the Western Mongolia, especially the Neolithic population, are characterized by predominately Caucasoid anthropological features, (Mamonova 1979, Tumen, 1977, 1978, 1985, 1992). However, as a consequence of migration during Bronze and Early Iron Ages, the extensive admixture between local Caucasoid populations and Mongoloid immigrants with slab grave culture from Central and Eastern Mongolia took place and in accordance with this mongoloid component is increased in anthropological type of local Caucasoid population from Western Mongolia. The admixture is, probably, continued until the end of Hunnu period. This fact is supported by archaeological evidences and historical sources.

East and Central Mongolian Neolithic (8000-2000 BC)

East Mongolian Bronze Age (Slab graves Culture, 13-3d

Mongolian Period (12-14th Century AD)

Bronze Age of Central Mongolia (Slab Graves Culture. 13-3d Century BC)

Modern Period (from 17th Century AD)

Hunnu Period (3d Century BC- 2nd Century AD)

Early Mongolian Period (1st Millennium AD)

West Mongolian Early Iron Age (Stone Mound Culture. 7-3 Century BC)

West Mongolian Bronze Age (Kurgan or Stone Mound Culture. 13th-3d Century BC)
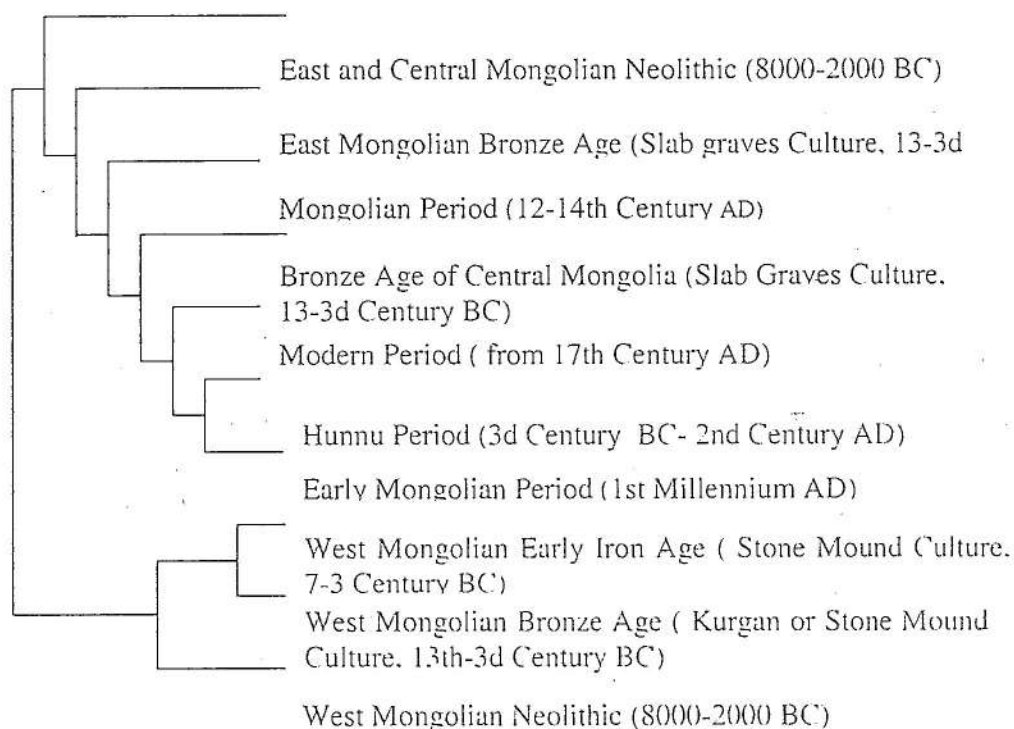
West Mongolian Neolithic (8000-2000 BC)

Fig.5. Dendrogram showing the relationship of ancient and contemporary populations from Mongolian

According to the recent historical and archaeological studies (Konovalov, 1999, Tsybektarov, 1998), Hunnu was not ethnically and linguistically homogeneous. .Based on the results of the archaeological studies of Hunnu in Mongolia, Ts.Turbat

(2004) concluded that Hunnu culture was created on the basis of mixture and combination of the Iron Age Slab graves culture and the culture of early nomads of Northern China. This process had been developed during 4th to 3d century BC ·(Turbat, 2004).

Investigating Hunnu archaeological monuments Z.Batsaikhan noticed that movements of Indo-European groups began in the 3rd century BC and progressed across the territories of Inner Asia in several stages. These migrations affected not only ethno-cultural development of Mongolia but also had significant impact on all the Central Asian populations. On the other hand, archaeological evident of migration of groups from nothern China to Northeast Asia could be the slab grave cultural complex known in the territory of Mongolia and Southern Siberia, established by these people (Batsaikhan, 2002).

CONCLUSION

The main upshot of the paleoanthropological studies of the prehistoric populations from Eastern Mongolia is the following: generally, prehistoric populations from Eastern Mongolia are characterized by mongoloid anthropological features with an exception of the Hunnu populaton that is not anthropologically homogeneous. It may be explained by the extensive migration of nomads from Eurasian steppe (Caucasoid or mixed populations from West to East and Mongoloids from East to West) which lasted during the Bronze and Early Iron Ages and Hunnu period in the Inner Asia.

Comparative study of populations from different historical periods of Mongolia clearly demonstrate genetic and biological relationship of Neolithic population from Eastern Mongolia, Bronze age populations with slab grave culture from Central and Eastern Mongolia, and populations from Hunnu, Early Mongolian and Mongolian Periods contemporary populations of Mongolia as well.

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SUMMARY

Түмэн Д.

ДОРНОД МОНГОЛЫН ЭРТНИЙ ХҮН АМЫН ПАЛЕОАНТРОПОЛОГИ

Дорнод Монголд 2002-2003 онд явуулсан археологийн малтлагаас илэрсэн хүннүгийн палеоантропологийн 10 гаруй олдворыг краниологийн үзүүлэлтүүдийг манай орны бусад нутгийн болон Азийн шинэ чулуун зэвсэг, хүрэл, төмөр, хүннүгийн үеийн олдворуудын краниологийн үзүүлэлтүүдтэй харьцуулан судаллаа. Судалгааны дүнгээс харахад Дорнод Монголд шинэ чулуун зэвсгийн үеэс монгол төрхтөн иргэншиж байжээ. Дорнод Монголын хүннү нар антропологи хэв шинжээр мэдэгдэхүйц гетероген байсан ба энэ нь Евразийн тухайн түүхэн үеийн хүн амын нүүдэлтэй холбоотой гэж үзэж болох юм.