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ANTHROPOLOGY OF ARCHAEOLOGICAL POPULATIONS FROM INNER ASIA

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ABSTRACT. *Comparative craniofacial morphological studies of the archaeological and contemporary populations of Inner Asia from Neolithic up to medieval or Mongolian period, show great heterogeneity of morphological traits. In the Neolithic, Early Bronze age and Xiongnu period, the Altai mountain, Xingjian and Western Mongolia were inhabited by people with Caucasoid or mixed morphological features while the Baikal region, East Mongolia and Inner Mongolia were occupied by populations with developed Mongoloid anthropological traits.*

Results of the craniofacial comparative analysis between archaeological populations from Inner Asia show that the first wave of mongoloid population migration from Eastern part of Inner Asia likely took place at the end of Neolithic period and the migration of Caucasoid population from West to East lasted up to medieval or Mongolian period. The cross regional migration of archaeological population played noticeable role in culture and ethnic process of populations from Inner Asia.

Archaeological human remains belonging to different historical periods of Central Asia, South Siberia, Altai mountain region, Baikal Lake region, Inner Mongolia and Mongolia have been studied by G.F.Debets (1948), M.G.Levin (1958), I.I.Gokhman (1960, 1967), O.Ismagulav (1970), V.V.Ginzburg and T.A.Trofimova (1972), M.V.Kruykov and et al. (1978), D.Tumen (1977, 1978, 1979, 1985, 1987, 1992, 2002, 2003, 2007), N.N.Mamonova (1979), V.P.Alexseev (1964, 1980, 1984) V.P.Alexseev and et al.(1987), A.N.Popov and et al. (1997), A.N.Baghashev (2000), T.A.Chikisheva (2000a, 2000b, 2003), T.A.Chikisheva and D.V.Pozdnyakov (2000), D.V.Pozdnyakov (2001, 2006), A.I.Buraev (2006), Zhu Hong and Zhang Quan-chao (2007), Zhang Quan-chao and et al. (2006) and D.V.Pozdnyakov and S.A.Komissarov (2007).Based on the results of the craniofacial studies of human remains from Neolithic up to medieval century from the mentioned regions of Asia, the authors concluded that ancient populations from these regions reveal great heterogeneity of morphological traits. People with Caucasoid morphological features inhabited Central Asia, Altai mountain region, South Siberia and Western Mongolia while population with developed Mongoloid traits

occupied Baikal Lake region, Amur river basin, Russian Far East, Inner Mongolia, central and eastern Mongolia. However, the Caucasoid populations of the Bronze Age from Altai Mountain and South Siberia exhibited more pronounced Mongoloid morphological features than seen in earlier times. It can be hypothesized that the Early Bronze Age was characterized by movements from eastern part of Asia to western Part of Inner Asia and thus intensive admixture between local Caucasoid and Mongoloid populations took place in the region.

The aims of the anthropological study of human remains belonging to different historical periods of Inner Asia are: 1) To carry out craniofacial studies of human remains from different historical periods of Inner Asia, 2) To conduct comparative craniofacial studies of prehistoric human remains from Central and Northeast Asia based on obtained craniofacial data of the ancient populations of Asia to clarify the cultural and historical relationship of prehistoric populations from the Central and Northeast Asia and to make clear some disputed problems of cross regional migration of ancient Asian populations from Neolithic through the medieval or Mongolian Period.

In the paper we give main results of craniofacial comparative study of archaeological populations from Inner Asia.

MATERIALS AND METHODS

During the visit in 2008 to the Laboratory of Anthropology, Research Center for Chinese Frontier Archaeology of Jilin University, Changchun, China, the Sector of Anthropology, Institute of Archaeology and Ethnography, Siberian Branch of Russian Academy of Sciences, Novosibirsk, and the Department of History and Culture of Central Asia, Institute of Mongolian Studies, Buddology and Tibetology, Siberian Branch of Russian Academy of Sciences, Ulan-Ude (Russia) we carried out craniofacial anthropological study of human skeleton collection of archaeological populations from South Siberia, Buryatia and Inner Mongolia (China) belonging to different historical periods housed at the above mentioned institutions. The sample consisted of 314 more or less complete skulls. Detailed information on studied human remains is given in the Table 1 and geographical location of studied anthropological samples is shown on the Fig. 1.

Cranial series used to provide a craniofacial comparative foundation for the studied human remains from China, Central Asia, Baikal Lake region and West and South Siberia encompass a timeframe from the Neolithic (8000-6000 BC) up to Mongolian period (13th century AD) and consist of twenty Neolithic samples, thirty six Bronze and Early Iron samples, thirty two Xiongnu samples, and twenty two contemporary samples. Materials for comparison includes craniofacial data on prehistoric populations from Mongolia (Tumen, 1977, 1985, 2006, 2007); Central Asia, South Siberia, Russian Far East, China, Korea and Japan (Rykushina,1976; Alexseev and Gokhman, 1983; Wu and Olsen, 1985, Kryukov and et al.1978, Popov and et al., 1997; Chikisheva, 2000a, 2000b, 2003; Pozdnyakov, 2001, 2006; Buraev, 2006; Zhang Quan-chao, Coa Jian-en, Zhu Hong 2006, Zhu Hong and Zhang Quan-chao and, 2007).

Table 1. Characteristics of the archaeological populations from Inner Asia under craniological investigation

Historical period	Sample size	Site	Curating institution
INNER MONGOLIA			Laboratory of Anthropology, Research Center for Chinese Frontier Archaeology of Jilin University, Changchun, China
Neolithic	4	Hebei	
Bronze	20	Jiangjungou	
Early Iron age	38	Nileke	
Warring States (403-221 BC)	33	Dashanquian Tuchenzi	
Xianbei	51	Ba gou Hulunbuir-zalanur Liaoning-Beipyo-Lamadong Liaoning-Tsoyang-Zartai yanze Tsayuhuji – Sandovan Tsayuhuji Ulaantsav Ulaantsav-Sandu-dundaji Tsayuzunji-Chilansan	
Qidan	26	Allucurchin-Yelyu Liaoning-Faku-Imotai Sandu-Chi-an-Haizi Shiliin hot-dunsan Ulaanhad-Chifeng-Ning-Shanzuizi Wu-nyu-zi	
Yuan	34	Chengpuzi Zhenzishan	
SOUTH SIBERIA and BURYATIA			
Neolithic	8	Educhanka Makarovo, Manzurka Marintui Obhoi, Olihon	Sector of Anthropology, Institute of Archaeology and Ethnography, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia
Early Iron age Pazyryk	40	Ala-Gail and Ala-Gail 2 Balyk-Sook Baratal-2 Bike-3 Bor burgazy-1,2 and 3 Borotal-2 Buraty-8 Jolin-2 Kara Tenesh	

		Maltalu and Maltalu-80 Ulandryk-1 and Ulandryk-2	
Xiongnu-Sarmat period	21	Kara-Bom-11	
Turcik period	22	Jolin-1 Yustyd-12	
Mongolian period, Buryatia	17	Enhor Kiya Olihon Onontycha Ulanhad	Department of History and Culture of Central Asia, Institute of Mongolian Studies, Buddology and Tibetology, Siberian Branch of Russian Academy of Sciences, Ulan-Ude, Russia
Total	**314**		

The investigated skeletons are of various preservation and different techniques are used for sex and age identification for each remains. The sex is determined by basic criteria of specific development of surface relief on a skull, the form of a hip bone and general size of long bones (Alexseev, 1964; Bass, 1987). The age estimation of skulls is based on criteria of occlusal wear of teeth, obliteration of skull sutures, preservation of surface joints of long bones, pubic symphyses and some other additional parameters (Alexseev, 1964; Bass, 1987).

Table 2. Cranial traits examined in the present study

CRANIAL VARIABLES	48:17*100. Vertical craniofacial index
1.Maximum cranial length	54.Nasal breadth
8. Maximum cranial breadth	54:55*100. Nasal Index
17. Cranial Height (Basion-Bregma)	52. Orbital height
20. Porion-bregma height	52:51*100. Orbital index
5. Basion-Nasion length	SS. Simotic subtense
8/1*100. Cranial index	SS/SC*100. Simotic index
17/1*100. Cranial length –height index	MS.Maxillofrontal subtense
17/8*100. Cranial breadth-height index	MS/MC*100. Maxillofrontal index
40:5*100. Gnathic index	DS. Naso-dacryal subtense
9/8*100. Horizontal cranial index	DS/49a*100. Dacryal index
9. Least frontal breadth	**ANGLES**
FACIAL SKELETON	32.Frontal angle (Nasion-metopion)
45. Bizygomatic breadth	72. Angle facial total
40.Basion-prosthion length	75(1). Angle nasal profile
48.Upper facial height	<77 Naso-malar angle
48:45*100. Upper facial index	<ZM. Zigomaxillary angle
45:8*100. Transversaler Craniofacial index	

Twenty six cranial variables are measured: seven for the neurocranium, and nineteen for the facial skeleton. Cranial variables are defined by the Martin's method widely used in anthropological investigation (Alexseev and Debets, 1964; Bass, 1987; Howells, 1973; Knusmann, 1988; Khrisanfova and Perevozchikov, 1999). List of the cranial variables used in the present study is given in the Table 2.

The comparative study was conducted separately for each historical period. Hierarchical cluster analysis was used for comparative analysis and Euclidean distance is calculated as actual measurement of the precision of the mean difference between two populations (Knusmann, 1988). The diagonal matrix of Pearson's distance values is used as input for cluster analyses. The cluster analyses are conducted using SPSS (version 15) statistical software.

RESULTS AND DISCUSSION

Geographic location of samples used for comparative analysis of Neolithic populations from Asia is shown in Fig. 2, of Asian Bronze Age populations is given in Fig. 4, Xiongnu population is given in Fig. 6 and Mongolian period population is given in Fig. 8. Craniological data on studied archaeological populations of China, South Siberia and Buryatia are given in the Table 3 and 4.

Fig.1. *Geographic location of studied cranial samples from South Siberia and Inner Mongolia*

Legend*: 1- Neolithic, China;* ***2****-Bronze age, Inner Mongolia,* ***3****-Early Iron Age, Xingjian,* ***4****-Warring States, Inner Mongolia,* ***5****-Han, Inner Mongolia,* ***6****-Xianbei, Inner Mongolia,* ***7****-Tang, Inner Mongolia,* ***8****-Qidan, Inner Mongolia,* ***9****- Yuan, Inner Mongolia,* ***11****-Neolithic, Buryatia,* ***12****-Bronze age (Afanasev),* ***13****- Early Iron age (Pazyryk), Altai mountain,* ***14****-Early Iron age (Tagar), South Siberia,* ***15****-Xiongnu-Sarmat period, South Siberia,* ***16****-Turkic period, South Siberia,* ***17****-Mongolian period, Buryatia*

Neolithic populations

Craniofacial morphological study of human remains from Neolithic period of Altai mountain, Buryatia and Inner Mongolia China show great heterogeneity of morphological traits. While, craniofacial data of the Neolithic Afanasev population from Altai mountain is characterized with Caucasoid anthropological features, Neolithic populations from

Inner Mongolia, Baikal lake region show typical mongoloid anthropological features. Nevertheless, most taxonomic traits of some skulls from Kharagol site of Afanasev culture of Altai mountain demonstrate their mongoloid features. It may show that Neolithic Afanasev population from Altai mountain was anthropologically quite heterogeneous and it can be explained by migration of mongoloid population from East Asia.

The Euclidean distance analysis and cluster analysis (Fig. 3) show that the Neolithic populations from Asia are divided into two major clusters. One of the major clusters includes several subclusters. All Neolithic populations from the Baikal lake region and East Mongolia are included into one subcluster. Surprisingly, Neolithic population from Usti-Isha and Itkuli site, Altai mountain joins the Neolithic population from Serovo and Kitoi period of Baikal lake region in the subcluster. The second subcluster contains ban'po population from Central China, Neolithic population from Transbaikalia (Fafonov site) and Korean Neolithic population. The Neolithic populations from Amur river basin and Central Yakutia belong to the third subcluster. However, Davenkou population from East China locates separately in the first cluster (Fig. 3.).

Fig. 2. *Geographic location of compared Neolithic and Eneolithic populations from Asia*

Legend*: 1-Usti-Isha, Altai mountain,* ***2****-Itkuli, Altai mountain,* ***3****- Afanasev culture, Altai mountain,* ***4****- Bazakhi, Minusinsk basin, South Siberia,* ***5****-East Kazakhstan,* ***6****- South Turkmenistan,* ***7****- Serov culture, Angar river basin, Cis-baikalia,* ***8****-Kitoi culture, Angar River basin, Cis-Baikalia,* ***9****- Serov culture, Lena river basin,* ***10****-Kitoi culture, Lena river basin,* ***11****- Shilka, Amur river basin,* ***12****-South Yakutia,* ***13****-Central Yakutia,* ***14****-Transbaikalia,* ***15****- Primor'e,* ***16****-East Mongolia,* ***17****-West Mongolia,* ***18****-Banpo, Central China,* ***19****-Davenkou, East China,* ***20****-Korea*

The second cluster contains populations from West Mongolia, East Kazakhstan, Altai mountain (Afanasev culture), South Turkmenistan. It can be concluded that all the compared populations from the region in the second cluster were Caucasoid and had very close anthropological relationship. However, the Neolithic population from Primor'e occupies the separate position in the clusters (Fig. 3).

Morphologically, the populations belonging to the same cluster are more similar to each other than to one from the other clusters. The results of the cluster analysis show close phenetic affinities of the Eastern Mongolian Neolithic population to the Neolithic population from the Baikal Lake region. It confirms biological relationship of those populations. This anthropological type of the Neolithic population from the Baikal region was called by Russian anthropologist Ya.Ya.Roginskii (1978) as proto-mongoloid type and by G.F.Debets (1948) and V.P.Alexseev and I.I.Gokhman (1983) as Baikal anthropological type of the Continental Mongoloids.

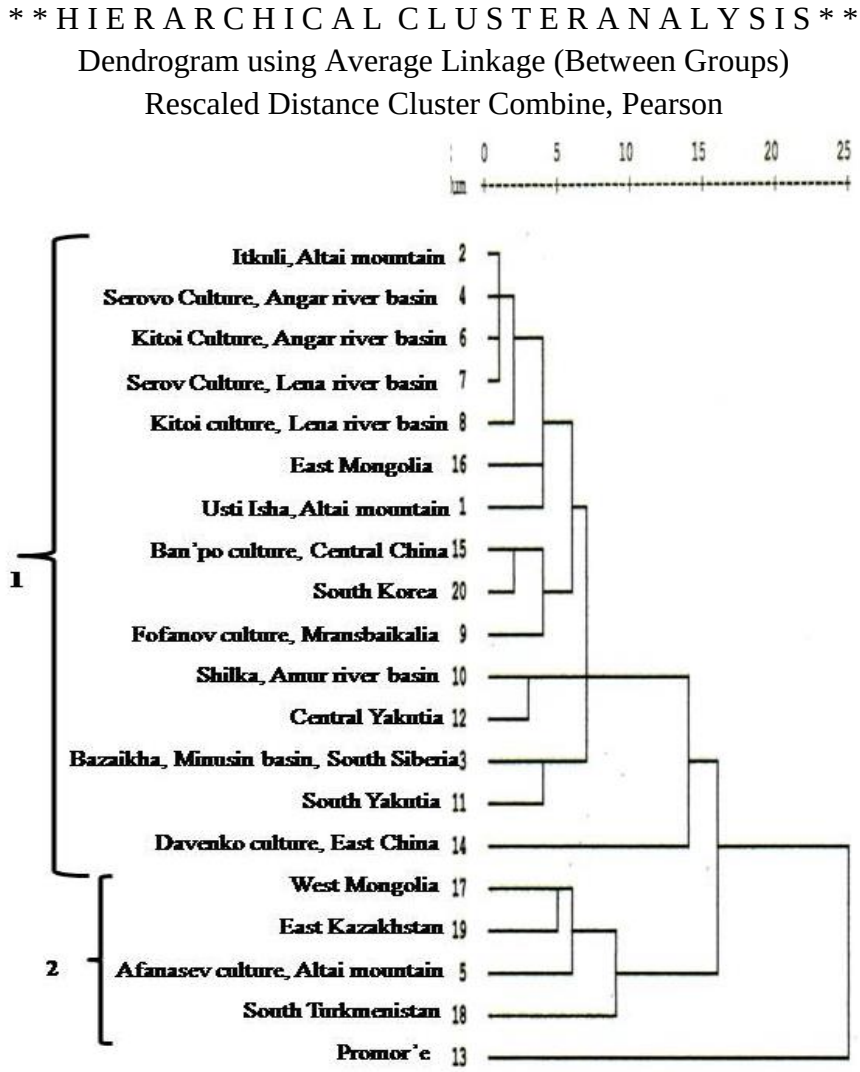

Fig. 3. *Dendrogramm showing relationship of Neolithic populations compared*

The biological relationship between the Neolithic inhabitants from Eastern Mongolia and Baikal region is supported by the archaeological evidence: there was common Neolithic culture in the Eastern Mongolia and Baikal lake region (Dorj, 1971).

The West Mongolian Neolithic population is included into the cluster with Caucasoid populations from South Siberia, Altai and Central Asia, which might evidence

about their close relationship and common ancestors in the earlier times. Surprisingly, Neolithic population from Itkuli and Usti-Isha sites in Altai mountain belong to the same subcluster with Neolithic populations from Baikal lake region. The phenomenon may display cross regional migration of the Neolithic populations from the region resulted in admixture between the populations.

Bronze and Early Iron age.

The obtained results of craniofacial studies of afanasev and pazyryk crania from the Bronze and Early Iron Age of Altai mountain, glazkov crania from Buryatia, nileke crania from Xingjian and warring states crania from Inner Mongolia illustrate great heterogeneity of morphological traits of Bronze and Early Iron age populations from the regions.

Fig. 4. *Geographic location of Bronze and Early Iron Age populations from Asia*

Legend: ***1****-Khara-depe, South Turkmenistan,* ***2****-Altan-depe, South Tajikistan,* ***3****-Tulkhar, South Tajikistan,* ***4****-Sapallitepa, Bukhar region, Uzbekistan,* ***5****-Daliverzan, Fergan valley, Uzbekistan,* ***6****-Kochka-3, Aral sea region, Uzbekistan,* ***7****-Andronov culture, West Kazakhstan,* ***8****-Andronov culture, North Kazakhstan,* ***9****-Andronov culture, Central Kazakhstan,* ***10****-Andronov culture, East Kazakhstan,* ***11****-Early saks, Aral sea basin, Uzbekistan,* ***12****-Saks, Tyan-Shani mountain region,* ***13****-Saks, Alai, Kirgizstan,* ***14****-Saks, East Pamir mountain region,* ***15****-Afanasev culture, Altai mountain,* ***16****-Afanasev culture, Minusinsk basin, South Siberia,* ***17****-Andronov culture, Minusinsk basin, South Siberia, Glazkov culture, Lena river basin,* ***18****-Okunev culture, Minusinsk culture, South Siberia,* ***19****- Karasuk culture, Minusinsk basin, South Siberia,* ***20****-Skythians, culture, West Siberia,* ***21****-Skythians, Altai mountain valley,* ***22****-Skythians, Altai High mountain region,* ***23****-Tagar culture, Minusinsk, South Siberia,* ***24****-Tashtyk culture, Minusinsk basin, South Siberia,* ***25****-Skythians, Tuva,* ***26****-Pazyryk, Altai mountain,* ***27****-Slab grave culture,Central and East Mongolia,* ***28****-Chandman culture, West Mongolia,* ***29****-Culture grave without inventory, West Mongolia,* ***30****-Bronze age, Inner Mongolia (China),* ***31****-Early Iron age, Xingjian (Nileke),* ***32****-Warring states, Inner Mongolia (China),* ***33****-Chaukhou culture, Xingjian, China,* ***34****-Slab grave culture, Transbaikalia,* ***35****-Glazkov culture, Angar river basin, Cis-Baikalia,* ***36****-Glazkov culture, Lena river basin, Cis-Baikalia*

People with Caucasoid morphological features inhabited Altai mountain region, Xingjian, while population from Glazkov culture, (Buryatia) and warring state population from Inner Mongolia show highly developed Mongoloid traits. Some Late Bronze and Early Iron Age crania from Altai mountain exhibit more pronounced Mongoloid morphological features than seen in earlier times.

* * * * * H I E R A R C H I C A L C L U S T E R A N A L Y S I S * * * *

Dendrogram using Average Linkage (Between Groups)

Rescaled Distance Cluster Combine

Fig. 5. *Dendrogram showing relationship of Bronze and Early Iron Age populations from Asia*

The Euclidean distance comparative analysis between Asian Bronze and Early Iron age populations exhibits several clusters of compared populations from Asia. It

undoubtedly show high anthropological heterogeneity of the studied Bronze and Early Iron Age populations from the region of Inner Asia (Fig. 5).

The Bronze and Early Iron age populations from South Tajikistan (Tulkhar site), Xingjian (Chaukhou culture) and West Mongolia (culture without inventory) are located separately among the Bronze and Early Iron age populations' cluster (Fig. 5).

The first cluster combines the populations from Cis-Baikalia (Glazkov culture, Angar river Basin), East Mongolia, Transbaikalia (Slab grave culture) and Inner Mongolia (Warring States). The second cluster is divided into several subclusters. The populations from South Turkmenistan, West Kazakhstan (Andronov culture), Uzbekistan (Bukhar region and Kochka-3 site), South Tajikistan and East Pamir mountain region belong to the same subcluster. The second subcluster contains andronov populations from Central and North Kazakhstan and Minusinsk basin, South Siberia, and Afanasev populations from Altai mountain region and Minusinsk basin of South Siberia (Fig. 5). The populations from Aral sea basin, Central Asia (Saks), Skytians of Altai high mountain region and Minusin basin, South Siberia (Okunev culture), exhibit the third subcluster (Fig. 5). The populations from West Mongolia (Chandman culture), Nileke population from Xingjian, Tagar, Tashtyk and Karasuk population from Minusin basin, South Siberia), Skytians from Tuva and Inner Mongolia belong to the fourth subcluster.

However, the andronov population is placed separately between the populations of the second and the third subclusters.

The separation of the Bronze Age populations from Asia into several clusters and subclusters can be explained by extensive and intensive cross regional migration and admixture between Caucasoid and Mongoloid populations during this historical period.

According to V.P.Alexseev and I.I.Gokhman (1983) and O.Ismagulov (1970), Mongoliod and Caucasoid admixture in Central Asia (Kazakhstan and Kirgizia) and South Siberia increases gradually, beginning at the end of the Neolithic and Early Bronze Age. The authors also concluded that Transbaikalian and Cis-Baikalian Bronze and Early Iron Age population with slab grave culture were mongoloids characterized with brachycrany, moderate high, broad, flattened face and flat nasal roots (V.P. Alexseev and I.I. Gokhman, 1983). According to their conclusion there indeed was some eastern mongoloid admixture in Bronze and Early Iron age population from Altai mountain region, South Siberia.

Based on many common decorative elements of artifacts and archaeological findings unearthed from excavations of archaeological grave monuments in South Siberia and Altai mountain region, Russian archaeologists E.L.Novgorodova (1970, 1987, 1989), V.V.Volkov (1967, 1981) and A.D.Tsybektarov (1988, 1995, 1998, 2002, 2003,2006) noticed that the origin of Okuvev, Pazyryk, Tagar, Karasuk culture of South Siberia and Altai mountain region had some relations to Bronze Age Culture of Mongolia and Inner Mongolia and concluded that during the Bronze age an extensive cross regional migration took place in South Siberia, Mongolia and North China.

Xiongnu period

The results of the craniofacial study of Xiongnu crania from Altai, Buryatia show that the studied population was not anthropologically homogeneous. Xiongnu sample from Altai is characterized by more pronounced Caucasiod features than Xiongnu samples from Buriatia.

The Euclidean distance methods applied for comparative analysis of craniofacial data on inhabitants from Xiongnu and subsequent historical period of Asia displays several major clusters (Fig.7).

The first cluster includes Usunians from Semirechiya (Central Asia) and East Kazakhstan, Xiongnu-Sarmatians from Altai high mountain, Turkic from Tuva (Fig. 7). Xiongnu of Kirgizstan, Central and West Tuva, Xiongnu-Sarmatians from Chui river basin, Altai mountain, Sarmatians from West Kazakhstan, Usunians from North Kazakhstan and Turkic from West Siberia are included into the second subcluster. The third cluster contains Usunians from Tyani-Shani mountain region and populations from Xiongnu-Sarmat period of Fergan valley, Tajikistan and West Turkmenistan. All Xiongnu populations from Xingjian, Mongolia and Altai mountain belong to fourth cluster. The fifth cluster includes Mokhe people from Primor'e, Xianbei from Inner Mongolia and Transbaikalia, and Xiongnu from Transbaikalia and Cis-Baikalia. The population from Xiongnu period of Chukotka is located in a separate position in the cluster.

The clustering of Xiongnu populations from Inner Asia clearly displays the high heterogeneity of Xiongnu people; we can see at least six anthropological types for the Xiongnu population. The Xiongnu populations from Mongolia, Altai mountain region and Xingjian (Chaukhou samples) belong to the same cluster. It shows similarity of their anthropological type. Chaukhou skulls were studied by Russian anthropologist D.V.Pozdnyakov and C.A.Komissarov (2007). According to their conclusion, chaukou crania reveal mixed Caucasiod and Mongoloid anthropological features. While, Caucasoid morphological traits may be related to local Caucasiod inhabitant from the earlier historical periods of the region, Mongoloid traits may genetically connect to migrants from mainland from North Asia. Russian anthropologist B.A.Dremov (1990), V.P.Alexseev (1984) and T.A.Chikisheva and D.V.Pozdnyakov (2000) studied Xiongnu-Sarmatian skulls from Altai mountain and concluded that Xiongnu from the region belong to populations with mixed anthropological type of caucasoids and mongoloids and noticed that female skulls demonstrate more mongoloid features than male skulls. According to their conclusion, the mongoloid traits took origin from Bronze and Early Iron age population, Xiongnu populations of Mongolia and Baikal lake region.

The studied Xianbei and Xiongnu people from Baikal lake region and Mokhe people from Far East are included into same cluster, showing their common anthropological features (Fig. 7). Russian anthropologist G.F.Debets (1948, 1951) and V.P.Alexseev (1984) concluded that Xiongnu people from Trans and Cis-Baikal demonstrate anthropological features of North Asian Mongoliods. Chinese anthropologist Wei Jian (2004) studied Xianbei crania from several sites of Inner Mongolia and noticed that their racial type is closely related to the modern North Asiatic Mongoloids, and some

physical characteristics of those skulls are closer to modern Mongols and ancient populations in North China. In accordance with the conclusion, the studied Xiongnu and Xianbei samples from Baikal and Inner Mongolia, morphologically, belong to the Central Asiatic variant of North Mongoloids.

Fig. 6. *Geographic location of compared populations from Xiongnu period of Asia*

Legend:1*-West Turkmenistan,* ***2****-Aral basin, Uzbekistan,* ***3****-Fergan valley, Uzbekistan,* ***4****-Tajikstan,* ***5****-East Uzbekistan,* ***6****-Usunians, Tyan-Shani mountain region, Kirgizstan,* ***7****-Xiongnu-Sarmatians, Chui river basin, Altai mountain,* ***8****-Xiongnu, Kirgizstan,* ***9****-Sarmatians, West Kazakhstan,* ***10****-Usunians, Semirechie, Uzbekistan,* ***11****-Usunians, North Kazakhstan,* ***12****-Usunians, East Kazakhstan,* ***13****- Xianbei, Inner Mongolia(China),* ***14****-Xiongnu, Transbaikalia,* ***15****-Xiongnu, Altai mountain,* ***16****-Xiongnu, Mongolia (Total),* ***17****-Mokhe, Russian Far East,* ***18****-Turkic period, Tuva,* ***19****-Uigurians, Tuva,* ***20****-Xianbei, Transbaikalia,* ***21****-Turkic, South West Siberia,* ***22****-Xiongnu, Xingjian, China,* ***23****-Xiongnu-Sarmatians, Altai mountain valley,* ***24****-Xiongnu-Sarmatians, Altai high mountain,* ***25****-Xiongnu (Kokeli), West Tuva,* ***26****-Xiongnu-Sarmatians, Central Tuva,*

As V.P.Alexseev and I.I.Gokhman (1983) concluded, Xiongnu migration from Mongolia to West through Altai and Tuva played an important role in ethnogenetical process and anthropological structure of the region as well. They noticed that the Mongoloid anthropological component increases in local Caucasoid inhabitants of the region. This phenomena related with Mongoloid migrants from Mongolia in the late Bronze Age and Xiongnu period which is contemporaneous with the formation of the Xiongnu tribal union in Mongolia and Baikal steppe and with the extension of the Xiongnu influence towards south and west. (Alexseev and Gokhman, 1983). Russian anthropologists G.F.Debets (1948), I.I.Gokhman (1960, 1967) and N.N.Mamonova (1979) studied Xiongnu skulls from Baikal region and the Far East and concluded about visible Caucasoid and Far-East mongoloids admixture in anthropological structure of population from this period. These two facts go well together with archaeological data and written Chinese sources (Alexseev and Gokhman, 1983).

According to recent historical and archaeological studies (Konovalov, 1974, 1976, 1999, 2008; Tsybektarov, 1998), ethnically and linguistically Xiongnu was not

homogeneous. Based on the results of archaeological studies of Xiongnu in Mongolia, Ts.Turbat (2004) concluded that Xiongnu culture was created on the basis of mixture and combination of the Iron Age Slab graves culture and the culture of early nomads of North China. This process developed during 4th – 3rd century BC (Turbat, 2004).

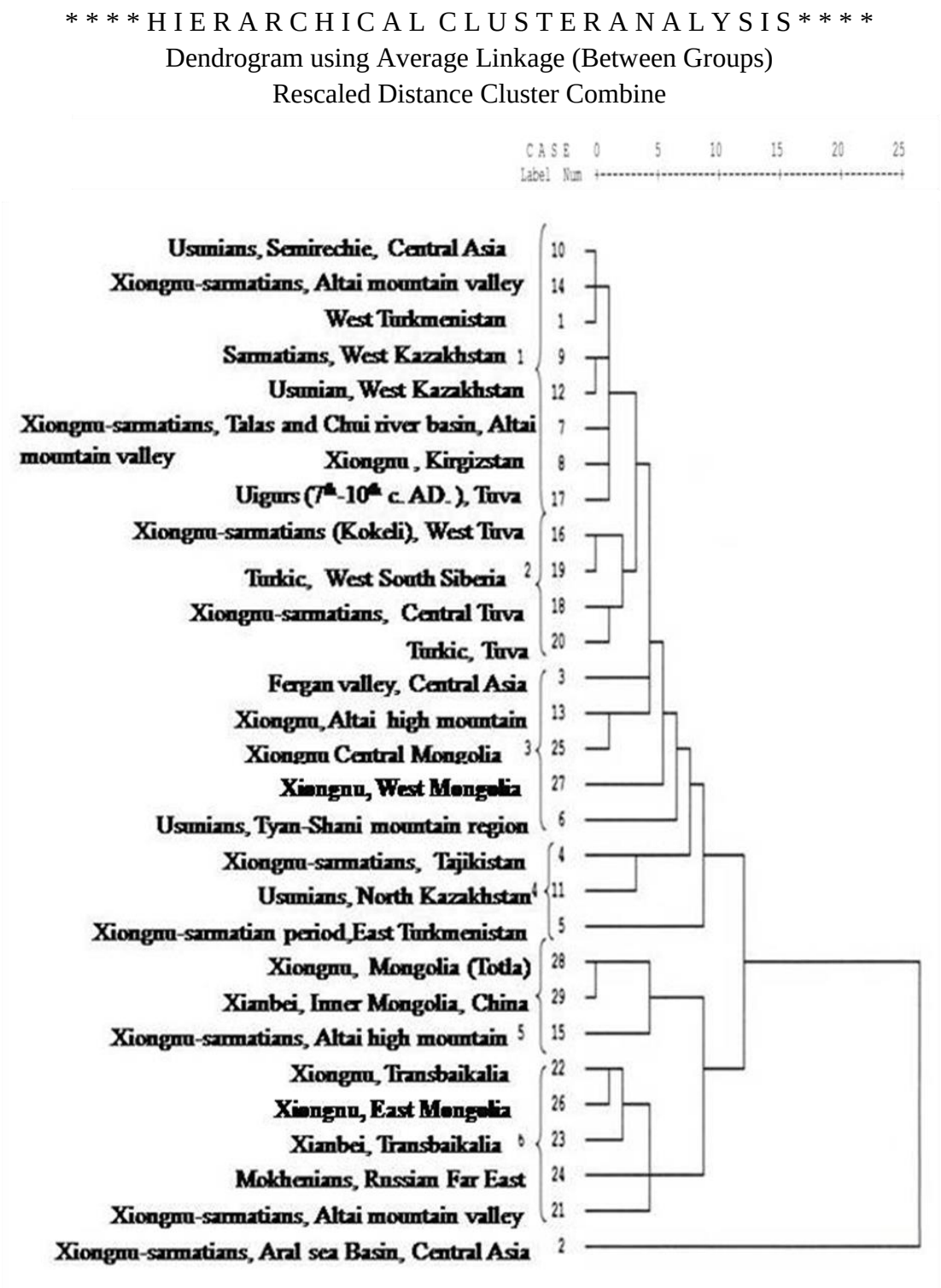

Fig. 7. *Dendrogram showing historical relationship of populations from Xiongnu period and the 1st millennium AD. from Asia*

Investigated Xiongnu archaeological monuments Z.Batsaikhan concluded that in the beginning of the 3rd century BC, Indo-European groups migration across the territories of Inner Asia progressed in several stages. These migrations affected not only the development of ethno-culture in Mongolia but also had significant impact on all Central Asian populations and really represented an important feature of global processes of the time. On the other hand, a migration of groups from northern China to Northeast Asia occurred and based on archaeological evidence, these populations established the slab grave cultural complex as known from the territory of Mongolia and southern Siberia (Batsaikhan, 2002).

Early medieval and Mongolian period

The results of craniofacial study of skulls from Early medieval (Turkic period) and Mongolian period of Altai mountain and Baikal region, and skulls from Qidan and Yuan period from Inner Mongolia demonstrate morphological features of North Asian mongoloid populations.

Fig. 8*. Geographic location of compared medieval and contemporary populations from North Asia*

Legend: ***1,2****-Medieval and modern Mongolians, Mongolia,* ***3****-Cis-Baikalia (X-XIV c.),* ***4****-Early Mongolian period, West Transbaikalia, Buryatia,* ***5****- Enkhor site, Early Mongolian period (VII-XIV c.),* ***6****-Eraven site, Mongolian period, East Buryatia (XII-XIV c.),* ***7****-Burkhutai site, Early Mongolian period (VI-X c.), East Buryatia,* ***8****-Premongolian period, Buryatia (X-XIVc.),* ***9****-Undugenskaya culture, late Mongolian Period, East Buryatia,* ***10****-Qidan period, Inner Mongolia (VIII-X c.),* ***11****-Yuan period, Inner Mongolia (XIII-XIV c.),* ***12****-Mongolian period (XII-XIV c.), Cis-Baikalia,* ***13****-Mongolian period, Altai mountain,* ***14****-Mongolian period (X-XIII c.), West Siberia,* ***15****-modern Tuvinians,* ***16****-modern Buryats,* ***17****-modern Buryats, Tunk region,* ***18****-modern Buryats, Transbiakalia,* ***19****-modern Reindeer Evenks,* ***20****-modern Kirgizs,* ***21****-modern Orochi,* ***22****- modern Koreans*

Comparative analysis between the Early medieval period, Mongolian period, and Asian contemporary ethnic groups demonstrates several clusters (Fig.9.).

The Fig. 9. shows that Cis-Baikalian population from medieval period (XII-XIV c.) belong to the same cluster with contemporary Tuvinians, Buryats from Tunk and Transbaikal, Kirgizs, Yakuts. However, all samples from early medieval (Burkhutai site-

VI-X c.), Premongolian (X-XIV) and medieval (XII-XIV) periods of Transbaikalia, and contemporary Mongolians belong to another cluster (Fig. 9). Mongolians from Mongolian Period (XII-XV c.), populations from medieval period of Altai mountain and West Siberia belong to the same cluster (Fig. 9).

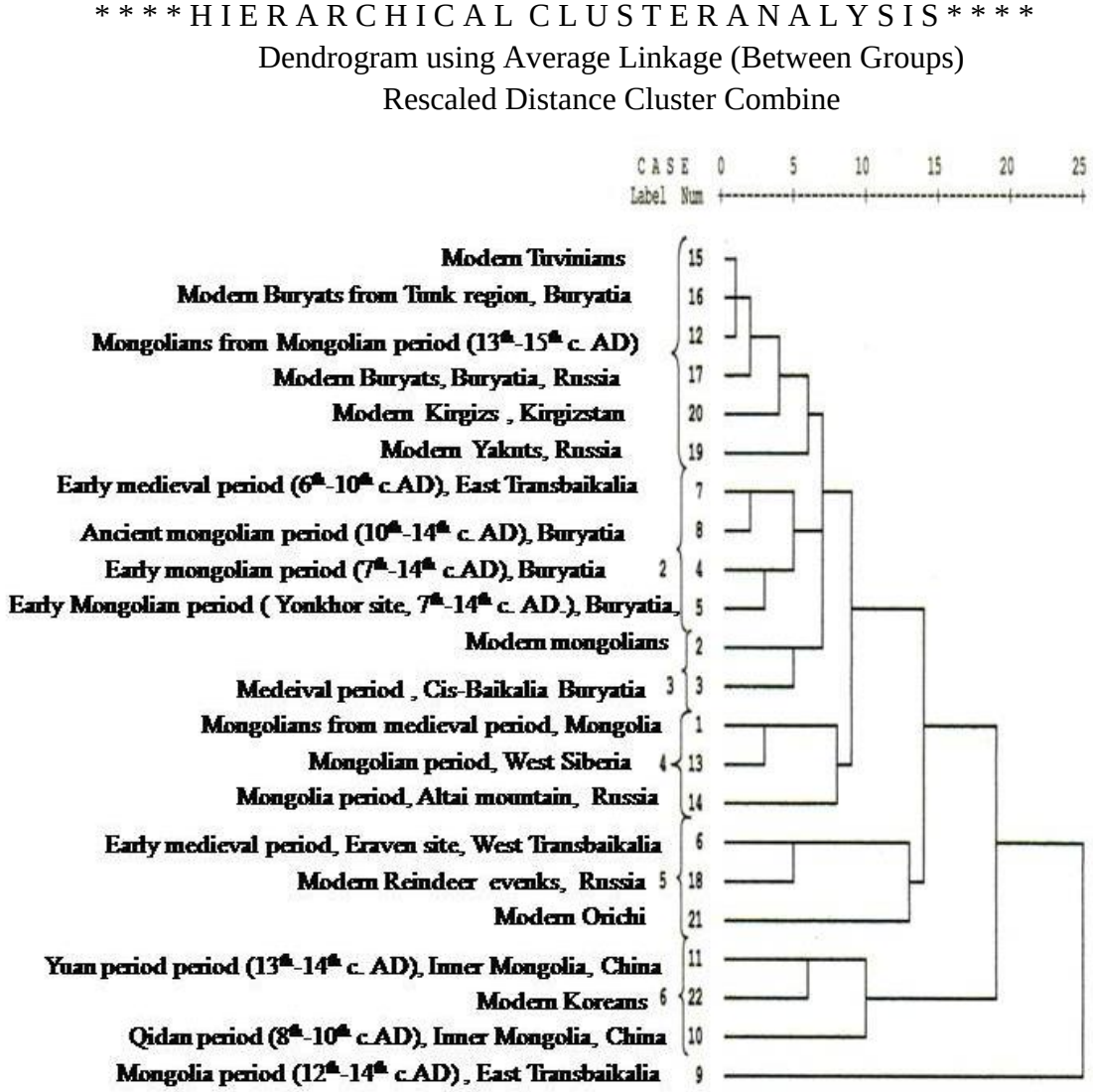

Fig. 9. *Dendrogram showing historical relationship of populations from Early medieval and Mongolian, and modern periods*

The third cluster includes population from Mongolian period of East Buryatia (Eraven site sample), contemporary Reindeer Evenks and Orochi (Fig. 9). On the dendrogram (Fig.9) it is clearly shown that the populations from Qidan and Yuan period, and contemporary Koreans join the same cluster. However Undugen samples from late Mongolian period of Buryatia occupies separate position in the cluster (Fig. 9). Based on the cluster of medieval and modern populations from Inner Asia it can be concluded that the ancient and contemporary populations from the same cluster might had close historical and genetic relationship, i.e. contemporary Koreans, population from Qidan and Yuan period are very close to each other, and Tuvinians, Tunk Buryats, Transbaikalian buryats,

Kirgizs and Yakuts might had close historical relationship with medieval population from XII-XIV century of Cis-baikalia.

CONCLUSION

The main upshot of the comparative craniofacial morphological studies of the archaeological and contemporary populations from Inner Asia is the following:

The studies of human remains from Neolithic, up to modern era reveal great heterogeneity of morphological traits among populations from the historic periods of Inner Asia. In the Neolithic and Early Bronze age, Xiongnu period the Altai mountain, Xingjian Western Mongolia was inhabited by people with Caucasoid or mixed morphological features, while the Baikal region, East Mongolia and Inner Mongolia were occupied by populations with developed Mongoloid anthropological traits.

Obtained results of comparative analysis between archaeological populations from Inner Asia show that the first wave of mongoloid population migration from Eastern part of Inner Asia likely took place at the end of Neolithic period and Caucasoid from West to East and the migration lasted up to medieval or Mongolian period. The cross regional migration of archaeological population played noticeable role in the culture, etnogenesis of populations from Inner Asia.

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Table 3. Craniofacial measurements of studied archaeological populations from North China, South Siberia and Buryatia

	CHINA											
	Bronze age			Early Iron Age			Warring States			Xianbei		
	N	M	STDEV	N	M	STDEV	N	M	STDEV	N	M	STDEV
1.Maximum cranial length	18	178,94	5,03	30	178,27	6,93	33	181,76	7,58	46	180,83	7,02
8. Maximum cranial breadth	17	138,71	5,43	29	144,34	5,93	32	140,25	4,61	45	144,44	5,14
17. Cranial Height (Basion-Bregma)	12	138,17	4,91	27	136,30	4,95	25	134,88	9,18	41	130,32	8,08
20. Porion-bregma height	9	115,33	3,43	26	116,96	3,38	27	114,74	4,50	39	111,36	5,27
5. Basion-Nasion length	12	102,58	3,23	26	101,35	4,05	25	100,72	3,98	39	97,69	5,04
8/1*100. Cranial index	17	77,33	3,46	29	81,13	4,56	32	77,23	3,46	42	79,82	4,14
17/1*100. Cranial length –height index	12	76,62	2,50	27	76,37	2,66	25	75,03	4,95	38	72,05	5,63
17/8*100. Cranial breadth-height index	12	100,55	3,12	27	94,97	4,75	24	96,59	6,95	38	89,74	6,55
40:5*100. Gnathic index	6	91,86	1,94	25	95,99	3,75	31	65,34	3,62	36	97,26	8,25
9/8*100. Horizontal cranial index	17	64,83	3,02	29	65,72	3,98	24	95,64	4,13	43	63,30	2,62
9. Least frontal breadth	18	89,61	3,29	31	94,71	4,50	32	91,66	5,36	51	91,41	3,18
45. Bizygomatic breadth	10	133,10	6,98	28	133,43	5,74	24	136,21	5,43	39	137,38	5,06
40.Basion-prosthion length	6	92,50	4,18	27	97,15	3,95	25	96,20	4,17	36	95,17	6,69
48.Upper facial height	10	68,50	4,14	28	67,43	4,33	32	70,03	4,62	49	71,06	4,36
48:45*100. Upper facial index	8	52,12	3,10	28	50,59	3,38	24	51,94	2,72	37	51,47	3,18
45:8*100. Transversaler Craniofacial index	9	94,99	3,80	27	92,90	3,27	23	97,13	4,54	37	94,55	3,25
48:17*100. Vertical craniofacial index	7	95,39	5,43	25	49,84	2,96	24	51,50	4,01	36	54,74	4,45
54.Nasal breadth	11	25,82	2,60	29	26,72	4,63	32	27,53	2,65	51	26,69	1,90
54:55*100. Nasal Index	9	49,07	4,15	29	58,34	33,12	32	51,69	6,05	50	49,25	4,11
52. Orbital height	12	33,33	4,16	30	33,00	1,60	32	35,00	2,77	49	34,82	2,21
52:51*100. Orbital index	12	80,28	12,07	28	78,43	3,88	32	83,54	6,39	46	82,25	5,79
SS. Simotic subtense	11	1,64	0,81	26	4,19	1,39	27	2,00	1,14	47	2,47	1,23
SS/SC*100. Simotic index	11	24,00	9,87	26	52,36	13,78	27	25,62	9,87	46	38,22	48,09
MS.Maxillofrontal subtense	11	4,18	0,75	26	7,54	1,48	27	4,67	2,22	47	4,28	1,10
MS/MC*100. Maxillofrontal index	11	23,62	5,54	26	41,52	9,75	27	25,77	12,82	46	23,73	6,64
DS. Naso-dacryal subtense	6	8,00	2,00	23	12,52	1,65	11	8,64	1,43	33	7,79	1,56
DS/49a*100. Dacryal index	6	36,07	9,14	23	59,72	12,31	11	38,55	7,12	32	35,13	7,01
32.Frontal angle (Nasion-metopion)	9	82,44	4,22	27	86,52	3,08	29	85,34	4,26	40	81,68	6,31
72. Angle facial total	8	85,25	3,49	27	84,85	3,37	29	82,55	3,30	40	86,53	4,17
75(1). Angle nasal profile	6	17,33	4,63	25	29,04	5,56	15	17,07	3,81	32	18,78	4,57
<77 Naso-malar angle	14	146,48	3,40	30	143,03	4,72	28	146,91	4,70	49	149,64	4,08
<ZM. Zigomaxillary angle	9	133,29	6,23	28	130,50	6,43	23	131,03	6,05	46	139,32	7,41

Continued

Table 3. Craniofacial measurements of studied archaeological populations from North China, South Siberia and Buryatia

	CHINA						Altai mountain region (RUSSIA)					
	Qidan			Yuan			Eoneolithic Period (Afanasev culture			Early Iron age (Pazyryk)		
	N	M	STDEV	N	M	STDEV	N	M	STDEV	N	M	STDEV
1.Maximum cranial length	24	176,58	7,28	22	174,59	6,38	6	188	5,40	39	180,74	8,32
8. Maximum cranial breadth	23	145,20	8,17	21	143,52	7,08	6	143,17	5,04	39	142,15	6,39
17. Cranial Height (Basion-Bregma)	18	136,25	7,41	19	133,11	6,64	4	135,25	6,29	36	134,06	6,83
20. Porion-bregma height	17	115,88	5,85	17	114,59	4,53	4	113,75	2,63	33	115,24	5,20
5. Basion-Nasion length	18	100,63	5,91	19	98,37	4,32	4	105,50	7,37	35	102,49	3,74
8/1*100. Cranial index	23	80,95	5,20	21	82,26	5,72	5	76,28	1,82	39	78,81	4,89
17/1*100. Cranial length –height index	18	75,49	4,01	19	76,38	3,58	4	72,06	3,74	36	74,40	3,88
17/8*100. Cranial breadth-height index	18	95,52	6,85	18	93,29	6,67	4	94,59	7,22	36	94,08	5,59
40:5*100. Gnathic index	14	96,47	6,66	19	96,07	4,59	4	97,31	4,19	33	94,89	4,21
9/8*100. Horizontal cranial index	23	62,78	4,08	7	65,59	3,67	6	70,73	4,91	38	68,77	5,09
9. Least frontal breadth	26	91,00	4,42	22	93,45	4,37	8	100,5	5,48	39	97,62	6,50
45. Bizygomatic breadth	16	140,38	6,16	21	136,67	6,51	6	139,17	1,17	34	137,88	6,22
40.Basion-prosthion length	14	95,83	8,62	19	94,47	5,64	4	102,5	5,07	33	97,33	4,56
48.Upper facial height	22	70,88	5,55	22	71,09	4,68	6	65,5	3,89	35	67,63	4,78
48:45*100. Upper facial index	15	51,62	3,82	21	52,18	2,88	6	47,06	2,68	32	48,87	2,72
45:8*100. Transversaler Craniofacial index	16	95,13	3,48	20	95,47	6,32	5	96,63	3,73	34	96,87	2,85
48:17*100. Vertical craniofacial index	15	53,14	3,63	19	53,98	4,24	4	47,53	1,62	34	50,68	4,73
54.Nasal breadth	20	26,56	1,88	22	25,64	2,32	7	26,14	1,68	37	25,14	2,07
54:55*100. Nasal Index	20	50,09	3,54	22	48,06	4,53	6	51,54	2,48	36	48,36	4,33
52. Orbital height	19	34,00	2,77	22	38,00	6,57	7	31,86	1,86	37	33,92	1,80
52:51*100. Orbital index	19	80,02	6,34	22	90,21	15,28	7	72,20	2,71	37	79,62	4,55
SS. Simotic subtense	20	1,50	0,83	21	2,76	1,45	8	4,125	0,83	35	4,30	1,45
SS/SC*100. Simotic index	20	24,90	7,19	21	35,84	20,12	8	45,33	7,49	35	52,39	17,66
MS.Maxillofrontal subtense	20	4,13	0,94	21	5,90	1,37	8	7	0,93	33	7,31	2,12
MS/MC*100. Maxillofrontal index	20	23,19	17,99	21	31,67	8,05	8	33,55	6,18	33	38,77	12,59
DS. Naso-dacryal subtense	8	7,00	1,83	14	9,71	1,64	6	14	0,63	27	12,75	2,31
DS/49a*100. Dacryal index	8	34,33	7,54	14	41,52	6,93	6	53,42	6,95	19	58,78	21,58
32.Frontal angle (Nasion-metopion)	15	84,13	4,37	22	80,73	17,89	5	84,6	4,39	31	80,71	7,15
72. Angle facial total	13	85,67	3,50	22	82,50	7,02	5	84,2	2,59	31	85,61	3,05
75(1). Angle nasal profile	11	17,60	4,23	20	24,20	15,77	5	26,4	7,23	29	26,00	5,73
<77 Naso-malar angle	24	148,19	4,01	22	145,29	6,34	8	138,95	3,30	37	141,33	5,87
<ZM. Zigomaxillary angle	15	137,14	6,46	21	132,50	4,25	6	133,42	3,53	33	131,71	4,58

Continued

Table 3. Craniofacial measurements of studied archaeological populations from North China, South Siberia and Buryatia

	Altai mountain region (Russia)									Buriytia (Russia)		
	Xiongnu			Turkic			Mongolian period			Mongolian period		
CEREBRAL SKELETON	*N*	*M*	*STDEV*	*N*	*M*	*STDEV*	N	M	STDEV	N	M	STDEV
1.Maximum cranial length	17	179,71	5,44	14	179,71	7,69	6	181,3	5,35	10	177,9	4,41
8. Maximum cranial breadth	17	143,06	7,64	15	145,61	3,17	6	148,2	4,54	10	148,8	4,94
17. Cranial Height (Basion-Bregma)	16	137,25	5,39	14	132,50	4,75	6	126,7	2,25	9	124,89	6,77
20. Porion-bregma height	18	118,56	3,73	13	115,27	3,67	7	114,6	5,04	7	110,43	1,90
5. Basion-Nasion length	17	100,79	4,04	13	102,00	4,58	6	98,8	1,33	9	96,44	2,92
8/1*100. Cranial index	16	79,77	6,06	13	80,84	4,41	6	81,8	3,48	10	83,68	3,06
17/1*100. Cranial length –height index	13	76,27	3,25	14	73,80	2,93	5	69,8	1,94	9	70,48	4,53
17/8*100. Cranial breadth-height index	14	96,40	6,29	13	91,65	4,16	5	86,2	1,74	9	83,75	5,80
40:5*100. Gnathic index	8	83,25	32,74	12	95,03	2,54	5	99,3	3,80	9	97,19	5,37
9/8*100. Horizontal cranial index	15	65,46	4,64	13	65,87	3,42	5	64,5	3,69	10	62,99	2,13
9. Least frontal breadth	19	93,18	4,50	14	94,86	4,96	6	97,2	5,03	10	93,7	3,71
45. Bizygomatic breadth	14	138,64	4,31	12	138,42	4,37	5	142,8	3,17	9	140,11	5,62
40.Basion-prosthion length	8	95,13	4,29	12	97,00	5,12	5	98,5	3,94	9	93,67	4,39
48.Upper facial height	20	73,10	4,42	14	76,61	3,93	6	73,5	6,62	10	72,70	3,16
48:45*100. Upper facial index	13	52,66	3,17	12	55,75	2,77	5	51,08	4,97	9	51,71	1,43
45:8*100. Transversaler Craniofacial index	12	97,71	4,51	11	95,49	3,25	4	95,4	3,81	9	93,82	2,09
48:17*100. Vertical craniofacial index	15	52,89	2,36	14	57,86	3,07	5	57,8	6,39	9	58,19	4,66
54.Nasal breadth	19	25,45	1,64	14	24,84	1,84	7	25,5	1,71	10	25,60	2,59
54:55*100. Nasal Index	19	48,38	3,38	14	45,37	2,89	7	47,8	4,40	10	46,88	3,41
52. Orbital height	21	34,00	1,92	15	35,24	1,81	6	34,3	2,62	8	34,38	2,62
52:51*100. Orbital index	19	79,16	5,47	15	81,61	4,38	6	79	3,51	8	79,54	4,57
SS. Simotic subtense	20	4,05	1,25	15	3,36	1,14	7	2,7	0,83			
SS/SC*100. Simotic index	20	52,20	13,54	15	41,82	11,87	7	34,2	10,34			
MS.Maxillofrontal subtense	20	6,91	1,47	15	6,03	2,05	7	5,3	1,14			
MS/MC*100. Maxillofrontal index	20	37,49	7,73	15	29,91	9,64	7	26	6,20			
DS. Naso-dacryal subtense	20	11,37	1,96	13	10,17	3,10	7	9,3	1,98			
DS/49a*100. Dacryal index	20	54,98	10,00	13	44,64	14,1	7	41,7	8,49			
32.Frontal angle (Nasion-metopion)	17	82,06	4,68	14	79,54	3,96	7	84,7	5,31	8	79,875	4,91
72. Angle facial total	16	88,50	3,41	13	87,77	2,83	6	87	4,43	8	86,5	2,67
75(1). Angle nasal profile	16	25,50	4,66	12	22,75	2,83	5	25,6	6,19	8	21,25	7,15
<77 Naso-malar angle	20	144,94	5,95	13	144,67	5,15	6	147,2	4,53			
<ZM. Zigomaxillary angle	20	132,53	4,63	14	140,5	4,56	5	135,7	1,45			

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ХУРААНГУЙ

Д.Түмэн

ДОТООД АЗИЙН ЭРТНИЙ ХҮН АМЫН АНТРОПОЛОГИЙН СУДАЛГАА

Өмнөд Сибирь, Буриад, Өвөр Монголын археологийн дурсгалын малтлагаас илэрсэн неолитийн үеэс дундад зууны үе хүртлэх түүхийн янз бүрийн үед холбогдох эртний хүний нийт олдворуудын краниологийн харьцуулсан судалгааны гол үр дүнг энэхүү өгүүлэлд оруулаа. Дотоод Азийн неолит, хүрэл, төмрийн эхэн үеийн хүн ам антропологи бүтцээр гетероген байсан болохыг энэхүү судалгаа харуулж байна. Тухайлбал, Өмнөд Сибирь, Баруун Монгол, Уулын Алтайн неолитийн хүн ам европиод шинжтэй, харин түүхэн тухайн үеийн Дорнод Монгол, Өвөр Байгал, Өвөр Монголын хүн ам монголиодууд байжээ. Өмнөд Сибирь, Уулархаг Алтай, Баруун Монголын хүрэл, төмрийн эхэн үеийн хүн ам антропологи онцлогоор европиодууд эсвэл монголоид, европиодуудын завсарын аантропологи хэв шинжтэй болжээ. Үүнийг тухайн түүхэн үед дотоод азийн энэ бүсэд дээрх хоёр төрхтний нүүдэл эрчимтэй явагдаж байсныг харуулж байгаа болно. Неолитын сүүлчээр эхэлсэн Монголоид, европиодуудын нүүдэл дундад зууны үе хүртэл үргэлжилсэн болохыг бидний судалгаа харуулж байна.