Metal Mirrors from Altai Sites of the Xiongnu Time

Results of a Complex Analysis

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Abstract

Metal mirrors are important indicators when reconstructing the history of the ancient peoples of Altai on the basis of archaeological materials. Among the latter there are imported products, recorded in the mounds of the Xiongnu time (2nd century BC – 1st century AD). The article gives an overview of the results of a comprehensive study of the mirrors. Only one mirror was found intact, and the rest are represented by fragments. This collection of 19 archaeological items is divided into two groups, reflecting the direction of contacts of the Altai population in this period. The first demonstrates Chinese products that could have entered the region indirectly from the Xiongnu who dominated Inner Asia. Some of them were made in the previous period, but were used for a long time. The analyses of metal alloys from the Yaloman-II site supplements the conclusions made during the visual examination. The second group, through its origin, is associated with the cultures of the so-called Sarmatian circle, whose sites were located to the west of the Altai. A separate section of the article is devoted to a discussion of reconstruction of some aspects of the social history of the nomads and their world.

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Keywords

Altai – Xiongnu – barrows – metal mirrors – complex study – X-ray fluorescence analysis – ethnocultural interaction

Introduction

In the 2nd century BC – 1st century AD the Altai was a part of the semi-periphery of the great nomadic power of the Xiongnu which dominated Inner Asia. Despite the fact that the proper Xiongnu burials in the region under consideration have not been identified, it is obvious that they have a significant impact on the peoples of the northern outskirts. This statement is clearly confirmed by the results obtained from studying the archaeological sites in the Altai during Xiongnu time, where the corresponding object complexes were found. This is especially relevant for armament, military and horse equipment. Funerary and ritual objects, dated by the indicated chronological frame, reflect the early (Ust-Edigan) stage of the formation and development of the so-named Bulan-Koby community.1

One of the outstanding indicators of the material culture of the Altai nomads in the 2nd century BC – 1st century AD are the discovered metal mirrors and their fragments. The analysis of such finds helps to determine the chronology of the investigated sites, shows facets of the processes of ethno-cultural interaction, permits to understand certain aspects of social history and the world view of ancient nomads. The purpose of this article is to give an overview of the results of a comprehensive study of a series of metal mirrors originating from the Altai burials of Xiongnu time.

Overview of Materials

The process of accumulating the objects and information concerning the subject under discussion began relatively recently, which is a result of the general situation of researches on the archaeological culture in the Altai.2

In 1991, S.M. Kireev, during the excavation of the burial mound No. 6 at the Chendek burial ground, located in the Ust-Koksinsky district of the Altai

2 Tishkin 2007, 158-184; 2010; Seregin & Matrenin 2014, 6-60.
Republic, recorded a fragment of a Chinese metal mirror. In the following year, field research on the same necropolis was conducted by an archaeological expedition led by V.I. Soenov. In barrow No. 28, among rather poor accompanying inventory, a small fragment of another ornamented mirror was found. A series of objects of this category was documented during excavation at the Ust-Edigan cemetery in the Chemalsky district of the Altai Republic. They were published by Yu.S. Khudyakov in a special article. The number of metal mirrors from the sites of the Xiongnu time increased as a result of research at the Yaloman-II archaeological complex (Ongudai district of the Altai Republic), which was carried out by the expedition of the Altai State University under the direction of A.A. Tishkin. Such objects were found in the mounds of the early group at that necropolis.

As a result, the collection of metal mirrors from three Altai sites of the Xiongnu time consists now of 19 examples (fig. 1). Almost all of these finds, with a single exception, are fragmentary. Some aspects have been discussed in a number of publications, including some with the direct participation of the authors of this article. However, a general study aimed at a comprehensive analysis of the materials has not been published so far. Therefore, this article treats the study of metallic mirrors as an important source of studying ethnocultural processes in the Altai and adjacent territories in the 2nd century BC – 1st century AD and intends to reconstruct various aspects of the social history of nomads and some of their world views.

Groups of Metal Mirrors

The study of the visually noticeable characteristics of 19 metal mirrors allows their division into two main groups. The first group is represented by products with one side embossed and the other smooth. The features of ornamentation indicate their Chinese origin. The chronology of such mirrors is determined by similar objects found in China, as well as in the funeral and settlement contexts of the Xiongnu.

The fragment of the mirror from burial mound No. 6 of the Chendek burial ground (figs. 2, 1, 3, 1), according to experts, refers to the type produced in

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4 Soenov & Ébel’ 1992, 50-51, fig. 18, 10.  
5 Khudyakov 1998.  
6 Tishkin & Gorbunov 2003; Tishkin & Seregin 2011, 17-18, 43-47.  
7 Tishkin 2006; Tishkin & Khavrin 2006; Tishkin & Seregin 2011.
China from the late 2nd century BC until the beginning of the 1st century AD and most commonly used during the period of the Western Han dynasty.\textsuperscript{8} Analogies to this find are known from the archaeological sites of the Trans-Baikal and Northern Mongolian Xiongnu.\textsuperscript{9}

Metal mirrors, similar to the fragment that was found in barrow No. 28 (fig. 2, 2) of the same necropolis, date to the 2nd century BC according to the conclusion of E.I. Lubo-Lesnichenko,\textsuperscript{10} although they were copied at a later time as well. Among northern analogies for this type we can note the discovery made during the excavations of the 2nd-1st centuries BC burial mound of Markovo-I cemetery in the Baraba Steppe.\textsuperscript{11} The fragmentary mirror recorded during the research at the Ust-Edigan site (fig. 2, 3) can be assigned to the same period.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{map.png}
\caption{Map of sites in the Altai of Xiongnu time, where metal mirrors have been found. 1: Ust-Edigan; 2: Chendek; 3: Yaloman-I.}
\end{figure}

\textsuperscript{8} Kireev 2008, 51.
\textsuperscript{9} Rudenko 1962, fig. 65a; Filippova 2000, 101-102, fig. 1, 1, 3.
\textsuperscript{10} Lubo-Lesnichenko 1975, 119, fig. 108.
\textsuperscript{11} Polos'mak 1987, fig. 33, 4.
This specimen is close to mirrors with ornament in the form of several knob-bles with the space between them filled with various stylized images.\(^{12}\)

\(^{12}\) Filippova 2000, 104-105, fig. 2.
Special attention should be paid to several metal mirrors found during the excavations at the Yaloman-II archaeological complex. The example found in burial mound No. 61 (figs. 2, 4, 3, 2), judging by the preserved details of the design, belongs to the type of mirrors widespread in China in the pre-Han period.13 The closest similar find comes from the well-known burial mound No. 6 of Pazyryk.14 Another similar fragment was recorded during the excavation of the Firsovo-XIV site (fig. 3, 6), which is located in the southern part of the Upper Ob region near Barnaul.15 Similar mirrors are found in other territories adjacent to the Altai as well. They were produced in times around the late 4th – early 3rd centuries BC, and their use continued for a fairly long period of time.17 P.I. Shulga, referring to modern studies by Chinese researchers, states the following: “Most of the types of mirrors decorated with T-shaped signs ... were produced from about the middle Zhanguo to the final Zhanguo (ca. 350-240 BC). Simultaneously, the circulation of the types of mirrors with images of animals that were not made for a long time (ca. 260-240 BC) stops.... After the unification of China under the rule of Qin Shi Huang (221 BC) and the unification of all spheres of life, mirrors with T-shaped signs almost disappear. Only two types of mirrors (3 and 16) were in circulation for another 15-20 years before the formation of the Western Han in 206 BC”.18

The next fragmentary mirror came from burial mound No. 52 of the Yaloman-II site (figs. 2, 5, 3, 3). It has an ornament in form of an acute-angled ribbon against a background of curls. The production of such mirrors in China dates back to the 3rd century BC.19 However, they continued to be in use also later: they are found in the sites of the Xiongnu time.20 The images on the other two fragments (figs. 2, 6-7, 3, 4) from burial mounds Nos. 51 and 56 of the Yaloman-II site are not visually identifiable, since the finds were severely corroded. These objects can be attributed to the early group of the burial ground. Judging by the dates of the contexts of the objects21 and the available data of radiocarbon analysis,22 the finds could have been used in Altai in the 2nd-1st centuries BC.

13 Lubo-Lesnichenko 1975, 37, fig. 1; Masumoto 2005, figs. 1, 2, 2.
14 Rudenko 1953, 114, fig. 85; Tishkin & Khavrin 2006, 77-78, fig. 1.
15 Tishkin & Seregin 2011, 42, tab. xvii.
16 Shul’ga 2015, 367.
18 Shul’ga 2015, 370.
19 Lubo-Lesnichenko 1975, 38, fig. 3.
20 Davydova 1985, fig. x, 9.
21 Tishkin & Gorbunov 2006.
22 Tishkin 2007, 267-268, 270-274.
In the course of research at the Yaloman-II necropolis, an intact mirror was found (figs. 2, 8, 3, 5). The details of its design (the rim in the form of continuing half-arches, four peculiar knobbles in the internal ornamental field and other elements) are characteristic of Chinese copies of the Han time. The production of mirrors of this type in China is usually dated to the 2nd – the late

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23 Davydova 1985, fig. x, 20, 25; Masumoto 1993, 249, 251, fig. 1, v; Ozheredov et alii 2008, tab. 2, I-3.
1st centuries BC.\textsuperscript{24} It should be noted however that a number of graphic elements, including the arch decoration of the rim, was also used a little earlier.\textsuperscript{25}

The first group of finds shows that Chinese mirrors (preserved mainly in the form of fragments) were distributed among the Altai population of the Xiongnu times and were deposited in the burials of the early stage of the Bulan-Koby culture. Most of them belong to the pre-Han period in the history of China, but could have entered northern territories later, during the period of the rule of the Xiongnu.

Metal mirrors from the Altai sites of the Xiongnu times, classified as the second group, are radically different in their design from the examples discussed above. The main characteristics of these finds are the following: a disc of a round shape, a flattened broad rim, a small lateral protrusion-spike and a lack of ornamentation. Only once an ornament in form of two drawn concentric lines is represented on one mirror. The mirrors of the second group were discovered only at the Ust-Edigan burial ground\textsuperscript{26} (fig. 4). These objects seems to belong to specimens common for the sites of the “Sarmatian” circle. Such mirrors were found in a wide area and existed for a long period: since the 6th century BC and throughout the 1st half of the 1st millennium AD.\textsuperscript{27} At the same time, the mirrors of this type were most frequently used from the last quarter of the 1st millennium BC to the beginning of the 1st millennium AD.\textsuperscript{28} The closest analogy is the object discovered during the work at Bakhchi-II site (fig. 5), not far from the north-western foothills of the Altai.\textsuperscript{29}

This group of metal mirrors demonstrates another direction of the ethnocultural interaction of the Altai population in the Xiongnu time and requires special consideration. So far, it can only be stated that such objects are characteristic of the northern part of the mountainous country (fig. 1), and contacts with steppe tribes could be made through natural corridors formed by the river valleys.

\textbf{X-ray Fluorescence Analysis of Some Mirrors}

Important information on the metal mirrors from the Altai sites of Xiongnu time was obtained during a special study of the alloy composition of the

\begin{thebibliography}{99}
\bibitem{24} Masumoto 1993, 251.
\bibitem{25} Filippova 2000, 105.
\bibitem{26} Khudyakov 1998.
\bibitem{27} Levina & Ravich 1995, 127.
\bibitem{28} Litvinskii 1978, 80-81; Zakharov 2000, 35.
\bibitem{29} Tishkin & Seregin 2011, 41.
\end{thebibliography}
Figure 4  Mirrors from Altai sites of Xiongnu time (second group). 1: Ust-Edigan, barrow No. 45 (after Khudyakov 1998, fig. 3, 3); 2: Ust-Edigan, barrow No. 16 (after Khudyakov 1998, fig. 1, 3); 3: Ust-Edigan, barrow No. 18 (after Khudyakov 1998, fig. 1, 1); 4: Ust-Edigan, barrow No. 35 (after Khudyakov 1998, fig. 1, 5); 5: Ust-Edigan, barrow No. 42 (after Khudyakov 1998, fig. 2, 1); 6: Ust-Edigan, barrow No. 61 (after Khudyakov 1998, fig. 2, 3).
objects. The finds from Yaloman-II burial grounds were studied by different methods and instruments. Detailed studies were carried out using the X-ray fluorescence spectrometer SERIES™ (model Alpha-2000, USA) complete with a test stand, a pocket portable computer and other devices. This complex is available in the Altai State University (ASU). It is intended for quantitative non-destructive analysis of the content of chemical elements by X-ray fluorescence spectrometry in samples and products of non-ferrous metals, steels, various alloys, control of the chemical composition of ores, liquid and powder samples. The device detects the presence of certain elements to a hundredth part of one percent in the analytical mode of operation (with small errors). The results obtained by one of the authors of the article, who used this analyzer, are summarized in Table 1. In the text below they will be supplemented with other indicators. Some samples were taken for a semi-quantitative spectral analysis in the Laboratory of Mineralogy and Geochemistry of Tomsk State University (TSU) (analysts – E.D. Agapova and E.M. Tsymbalova). In addition, the finds were tested in the Department of Scientific and Technical Expertise of the State Hermitage with the ArtTAX instrument complex, made in Germany (analyst – SV. Khavrin). The obtained data in general do not contradict each other. In a number of cases, they supplement or refine the general picture, and also identify the existing problems. Table 1 gives the results of testing of the

30 Tishkin & Khavrin 2006; Tishkin & Seregin 2011, 75-78.
sections of mirrors, where surface oxides were mechanically removed. Other data of comprehensive and repeated testing of finds in different places are published.31 All studied objects are stored in the Museum of Archaeology and Ethnography of the Altai in the Altai State University (ASU).

1. Fragment of a mirror from barrow No. 51 of Yaloman-II site. The results of the spectral analysis of the object, obtained from the selected sample at the Laboratory of Mineralogy and Geochemistry of TSU, are as follows: Cu – >5%; Sn – >2%; P – 0,1%; Mg – 0,07%; Ca – 0,04%; Pb – 0,03%; Fe – 0,03%; As – 0,01%; Co – 0,003%; Bi – 0,003%; Zn – 0,003%; Ti – 0,002%; Si – 0,001%; Al – 0,001%; Mn – 0,001%; Cr – 0,001%; Ag – 0,0005%; Ni – 0,0006%; In – 0,0006%; Ga – 0,0003% (in weight percent, i.e. the hundredth part of any mass: 1 wt.% = 10 kg/ton). In the Department of Scientific and Technical Expertise of the State Hermitage, the following elements were determined: Cu – basis; Sn – <30%; Pb – <0,5%; As, Ag, Bi – traces. Additional studies were carried out at ASU with the above-mentioned X-ray fluorescence spectrometer Alpha-2000 (Table 1). All the data obtained indicate a characteristic copper-tin alloy.

2. Fragment of a mirror from burial mound No. 52 of Yaloman-II site. First, a spectral analysis of the find was made at the Laboratory of Mineralogy and Geochemistry of TSU: Cu – >5%; Sn – >2%; Pb – >>1%; As – 0,7%; Bi – 0,06%; Zn – 0,03%; Fe – 0,01%; Sb – 0,007%; Ag – 0,005%; Ca – 0,005%; Ni – 0,002%; Co – 0,002%; In – 0,0015%; Mn – 0,001%; Mg – 0,001%; Ti – 0,001%; Cr – 0,001%; Al – 0,0005%; Ge – 0,0007% (wt%). In the Department of Scientific and Technical Expertise of the State Hermitage, the following results were obtained: Cu – base; Sn – 20-25 (30-35)%; Pb – 10-15 (15-20)%; As – <0,5%; Ni – <0,5%; Ag – <0,6%; Sb – traces.32 The number of elements on the surface covered with a "noble" patina

### Table 1 Results of X-ray Fluorescence Analysis of Metal Mirrors from the Altai Sites of the Xiongnu Times

<table>
<thead>
<tr>
<th>№</th>
<th>The name of site</th>
<th>Cu %</th>
<th>Sn %</th>
<th>Pb %</th>
<th>Fe</th>
<th>As %</th>
<th>Ni %</th>
<th>Sb %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Yaloman-II, mound 51</td>
<td>76,97</td>
<td>22,6</td>
<td>0,24</td>
<td>0,19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Yaloman-II, mound 52</td>
<td>61,28</td>
<td>22,93</td>
<td>14,69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Yaloman-II, mound 56</td>
<td>53,1</td>
<td>29,44</td>
<td>17,46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Yaloman-II, mound 57</td>
<td>89,14</td>
<td>1,04</td>
<td>8,49</td>
<td>0,59</td>
<td>0,74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Yaloman-II, mound 61</td>
<td>64,15</td>
<td>23,04</td>
<td>11,93</td>
<td>0,74</td>
<td></td>
<td>0,14</td>
<td></td>
</tr>
</tbody>
</table>

31 Tishkin & Seregin 2011, 74-78.
32 Tishkin & Khavrin 2006, 82.
is indicated in parentheses. X-ray fluorescence spectrometer Alpha-2000 analyses were made at ASU several times. Table 1 shows the results obtained at the point of the mirror break with the removal of oxides, where S.V. Khavrin measured the above mentioned data. All the conclusions indicate a copper-tin-lead alloy which was often used by ancient Chinese craftsmen to make metal mirrors.

3. Fragment of a mirror from burial mound No. 56 of Yaloman-II site. Spectral analysis was also made in the above mentioned TSU laboratory. The following results were obtained: Cu – >5; Sn – >2; Pb – >1; Fe – 0,03; Zn – 0,02; As – 0,01; Bi – 0,01; Ca – 0,005; Ga – 0,003; Co – 0,003; In – 0,001; Ni – 0,001; Mn – 0,001; Mg – 0,0003; Ge – 0,0006; Ti – 0,0007; Ag – 0,0007 (wt%). In the Department of Scientific and Technical Expertise of the State Hermitage, the following elements were determined: Cu – basis; Sn – 20-22 (25-30)%; Pb – 8-10%; Co – traces; Ni – ?33 In ASU, an area was studied with the X-ray fluorescence spectrometer, where the removal of oxides was carried out at the edge of the fragment of the mirror (Table 1). The data obtained allow us to make a confident determination of the copper-tin-lead alloy, characteristic of Chinese mirrors.

4. Mirror from burial mound No. 57 of Yaloman-II site. The analysis results obtained for this find, by S.V. Khavrin in the State Hermitage, are the following: Cu – basis; As – 12-15%; Pb – 1-2 (5-6)%; Sb – 1-2; Ni – 1-2%; Ag – 0,2%.34 There is here a problem of discrepancy between the identified alloy composition and that of traditional mirrors produced in China. A repeated and comprehensive study of the mirror with the X-ray fluorescence spectrometer was carried out in the Altai State University. Ultimately, the edge of the front surface of the product was tested on a section without surface oxides (Table 1). All the data obtained indicate that we apparently deal with a copy of a Chinese original. The colour of the mirror close to the original was obtained due to the increased content of arsenic, accompanied by such elements as lead, antimony and nickel, with a complete absence of tin.35

5. Fragment of a mirror from barrow No. 61 of Yaloman-II site. The results obtained in the Department of Scientific and Technical Expertise of the State Hermitage are as follows: Cu – basis; Sn – 20 (35)%; Pb – 8-10 (25-30)%; As, Ag, Ni – traces. In ASU, the fragment of a mirror has been studied repeatedly and in different places by an X-ray fluorescence spectrometer. Similar results were obtained for the place cleared of oxides at the point where S.V. Khavrin took a
sample (Table 1). The recorded data indicates a copper-tin-lead alloy characteristic for Chinese mirrors of the 2nd half of the 1st millennium BC.

The study of alloy composition of metal mirrors from the Altai sites of Xiongnu time allows confirmation of the Chinese origin of most finds. At the same time, a copy was also revealed, which is additional evidence of the existence of the forgeries of Chinese mirrors.

Unfortunately at present there is still no data on the composition of the alloy of metal mirrors from the second group, which show the western direction of contacts of the Altai population in Xiongnu time. However, it would be appropriate to cite the results of a single object of the same type that is stored in the Museum of Archaeology and Ethnography of the Altai State University. The fragment of a mirror was discovered at Bakhchi-11 site (Eastern Kazakhstan, not far from the north-western foothills of Altai). Originally, the determinations were made by S.V. Khavrin in the State Hermitage. The results obtained are as follows: Cu – base; Sn – 24-28%; Pb – <0.4%; As – traces. In the ASU, the X-ray fluorescence spectrometer study was done repeatedly and in different places. At the final stage, oxide removal was carried out at the breaking point of the product (at the edge) and testing was again carried out in two different places. As a result, the following similar elemental rows are noticed:

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\begin{align*}
\text{Cu} & \quad 69.57\%; \quad \text{Sn} \quad 27.71\%; \quad \text{Fe} \quad 2.51\%; \quad \text{Pb} \quad 0.21\%; \\
\text{Cu} & \quad 69.23\%; \quad \text{Sn} \quad 27.86\%; \quad \text{Fe} \quad 2.7\%; \quad \text{Pb} \quad 0.21\%.
\end{align*}
\]

Thus, we are speaking about a copper-tin alloy where the increased iron content appears somewhat anomalous.

The further collection of analysis results and the expansion of the range of materials involved will allow to study more in detail the issues connected with research of the penetration of imported products into the material culture of the nomads in the region discussed here.

**Metal Mirrors in the Imagination of the Altai Nomads of the Xiongnu Time**

The research literature contains extensive reflection on the symbolism of the metal mirrors from various chronological periods in the imagination of nomads.
of Eurasia. Publications of researchers, which are in most cases devoted to the analysis of objects from contexts of the Early Iron Age, present a large range of important observations. The point of view on the existence of a tradition of deliberate damage of mirrors in the ritual practice of nomads has become widely spread. The question of the social significance of the finds in question turned out to be closely related to the problem of distinguishing priestesses' burials. The main attribute of female graves, associated with the religious practice, is a stone censer. Almost in all such burials, which are distinguished by the “wealth” of the accompanying grave goods, metal mirrors are recorded.

Special attention to the magic properties of mirrors was paid in traditional imagination of peoples of the Far Eastern region, primarily of the inhabitants of the Celestial Empire. L.S. Vasiliev noted that the items in question played a certain role in the Taoist cult as protective amulets and against spells. Their main significance was connected with the symbolic meaning of the ornament on the reverse side of the disk, which provided the mirror holder with the support of heavenly powers. This could find expression in the property of these objects to neutralize evil demons. According to researchers, similar semantics of mirrors are quite steadily manifested in many ancient and traditional societies. The ideas of ancient and medieval inhabitants of China, associated with the designated properties of mirrors, found a certain expression within the framework of their funeral rite as well.

Analysis of the find contexts of some metal mirrors in the Altai sites of the Xiongnu time allows a number of conclusions about the role of such objects in the imagination of the nomads of the 2nd century BC – 1st century AD. First of all, it should be noted that all the items considered were found in female burials. In most cases, when the place of the original location of the object was documented, the mirrors were placed near the belt of the deceased. Judging from the available data, such objects were usually worn in a special leather purse or bag.

It is obvious that the metal mirrors were a prestigious element of the material culture of the Altai nomads in Xiongnu times. One evidence of this is the rarity of such finds, known in small number not only in the sites of the region

39 Kadýrbaev & Kurmankulov 1978, 66; Prokhorova & Guguev 1988, 47.
40 Litvinskiï 1964, 100; Litvinskiï 1978, 105-109; Khazanov 1964, 91-95; Kuznetsova 1988, 56-57; et alii.
41 Vasil’ev 2001, 257.
42 Ozheredov et alii 2008, 155.
43 Stratanovich 1961, 47; Khazanov 1964, 90; Filippova 2000, 106.
in question, but also in adjacent territories. Metal mirrors, as well as other products whose origin is associated with Chinese workshops, were part of the burial goods of the “elite” complexes of the Xiongnu. This is also an additional factor for the high value of such objects in the nomads’ society. In this regard, it can be assumed that the fragmentation of mirrors found in Altai sites was not due to any ritual, but most likely can be explained by the rarity of the objects, and by the difficulties to obtain them for the nomads living in the outskirts of the Central Asian empires, as well as by the long period of the mirrors existence. At the same time, the excavated materials of Xiongnu sites reveal the cases of deliberate breakage of intact mirrors for ritual practice. On the other hand, according to the observations of E.I. Lubo-Lesnichenko, almost all the Han mirrors found on the territory of the Minusinsk Basin, have been preserved in fragments with smoothed edges, which may indicate the continued use of the already broken products. The possibility of further consideration of this issue with reference to the Altai population must be associated to the continuation of field research of sites of the 2nd century BC – 1st century AD in this region.

Conclusions

The different groups of metal mirrors show two main directions of contacts of the Altai population in Xiongnu times. Those of the first group, which production is associated with workshops of China, could have been brought to the region through the nomads of the Xiongnu group, who had active relations with the Celestial Empire. The appearance of mirrors of Chinese origin in the sites of the mountainous and forest-steppe regions of the Altai dates to the end of the Scythian-Saka time. The sites of this region, dating from the 2nd century BC – 1st century AD reveal eight mirrors or fragments. I.V. Filippova once pointed out that 16 mirrors were found in the burials of the Transbaikalia and Northern Mongolia Xiongnu. Over the years, their number has increased. The Altai is another specific area of concentration, which demonstrates active

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44 Bulling 1960; Filippova 2000; Miller et alii 2006, 13; Miniaev & Elikhina 2009, fig. 5; Torbat 2011.
45 Rudenko 1962, 92, fig. 65g; Minyaev, & Sakharovskaya 2006; Polos’mak et alii 2013; Polos’mak, & Bogdanov 2015, fig. 3, 53; et alii.
46 Minyaev & Sakharovskaya 2006.
47 Lubo-Lesnichenko 1975, 11.
48 Tishkin, & Seregin 2011, 99.
contacts of the nomads in this direction. The second group of metal mirrors reflects the influence on the Altai nomads coming from the “Sarmatian” circle of cultures. It is possible that the appearance of such finds at the sites of the Altai reflects contacts with the population of Eastern Kazakhstan, through the territory of which these objects could penetrate to the Altai.\textsuperscript{50}

Most of the finds of Xiongnu time discovered at the Yaloman-II site can be associated with products of Chinese craftsmen. They differ not only in their external characteristics, but also in their chemical composition. Imported products were certainly highly appreciated. Many of them are preserved in small fragments. Attempts were made to forge prestige goods. At the Yaloman-II site, in barrow No. 57, an intact mirror was found which visually corresponds to a Chinese type product. However, as the results of the X-ray fluorescence analysis have shown, it is a copy, as evidenced by the composition of the alloy and the nature of the fabrication process (with casting mistake – casting in the form with insufficient material – and with an only roughly smoothed casting sprue). For a closer conformity, the craftsmen took a typical Chinese mirror as a model, made a mold and tried to preserve the color of the surface using another alloy. Obviously, the craftsman who produced the mirror under consideration used arsenic\textsuperscript{51} instead of tin, the high concentration of which changes the color of the copper to silver-gray.\textsuperscript{52} It is difficult to establish where this mirror was produced, although it is possible that this could have been done in China.

The presented results of the complex study of the objects require further analysis and more comparisons. They will be particularly relevant in the reconstruction of the technology of production of metal mirrors, their cultural and chronological attribution and in determining their role in the life system of the ancient population.

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\textsuperscript{50} Tishkin, & Gorbunov 2006, 38.
\textsuperscript{51} Tishkin, & Khavrin 2004, 305.
\textsuperscript{52} Ravich, & Rýndina 1984.
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