# SUPPORT INFORMATION. Description of chronologically indicative artefacts from the burials of the Bulan-Koby culture of the Karban-I necropolis

Presented here is the description of items which, on the basis of their morphological analysis, and the analysis of the typological development of items, as well as analogies with adjacent territories, date the burials of the Karban-I necropolis within the 2nd - 3rd c. AD.

In the weaponry complex, informative are the long-range combat items, represented by composite bows and arrows with iron heads. Most of the discovered bows with long median lateral crescent-shaped linings (Fig. SI1.1) reproduce the Xiongnu prototypes of the 2nd c. BC – 1st c. AD (Konovalov 1976, tables III–V; Hudyakov 1986, fig. 3.-1–7; I Sang po 2003, fig. 24.-3; etc.), and also find dated analogies in the military arsenals of the nomads of Tuva of the end of the 1st c. BC - beginning of the 3rd c. AD. (Mandelstam & Istanbulnik 1992, tables 82.-21; Nikolaev 2001, pp. 81–82, tables 77.-1; 94.-2; 95.-1–2; 114.-3; 118.-10; 120.-6) and the "Bulan-Kobyns" of Altai of the 2nd c. BC – 3rd c. AD (Sorokin 1977, fig. 10.-6; Mamadakov 1990, fig. 80–81; Soenov & Ebel 1992, fig. 22; etc.). The only bow from the necropolis of Karban-I with the median lateral bow-shaped linings linings (Fig. SI1.2) belongs to local specimens demonstrating the formation of a modification of hand-held throwing weapons, which became widespread among the population of Altai in the 2nd-5th c. AD (Tishkin et al. 2018, p. 42). Similar linings were found in the Xianbei burials of Eastern Transbaikalia of the late 1st - early 3rd c. AD (Yaremchuk 2005, fig. 61.-5–6; 62.-11–12, 65.-5–6) and in the Kokel culture complexes of Tuva of the second half of the 3rd – 4th AD (Nikolaev 2001, table 106). Among the population of the Bulan-Koby culture, bows with this design (median lateral linings) appeared as a result of the rounding of ends of crescent-shaped linings with a bent base (Gorbunov 2006, pp. 16-17).

The iron tiered arrowheads with a small upper tier found in the Karban-I complex (Fig. SI1.5) belong to samples of the Xiongnu military tradition. These items demonstrate a direct connection with products from the sites of Mongolia and Transbaikalia of the 1st c. BC – 1st c. AD (Konovalov 1976, table. II.-17–23; Hudyakov 1986, fig. 5.-7, 15, 24; Turbat et al. 2003, p. 204, fig. 2; p. 214, fig. 5; p. 226, fig. 1; etc.). In Central Asia, later analogies can be found in the Xianbi population of Inner Mongolia (late 1st – early 3rd c. AD) and the "Kokelians" of Tuva (second half of the 3rd - 4th c. AD; Hudyakov 1986, pp. 70–71; fig. 26.-1–8). In Altai, similar arrowheads without a stopper appeared from the 2nd c. AD. In quantitative terms, they prevail in the burials of the 2nd - first half of the 4th c. AD and are much less common in the complexes of the second half of the 4th – 5th c. AD. e. (Soenov & Ebel 1992, fig. 4.-7; 39.-7; Bobrov et al. 2003, fig. 26.-3–4; Gorbunov 2006, pp. 29, 38, fig. 23.-4, 24; Tishkin et al. 2018, fig. 6.-1; 8.-13). At the same time, the massive tiered arrowheads from Karban in their proportions are fully similar to those of the Xiongnu and, probably, belong to the early types.

The single discovered tiered arrowhead with even tiers without stopper (Fig. SI1.6) apparently belongs to "experimental" (transitional) examples of products from the Xiongnu (2nd c. BC – 1st c. AD) to the South Siberian (3rd-5th c. AD).

Iron three-bladed tips with asymmetrical-rhombic and rhombic body without stopper (Fig. SI1.7-8) became widespread in Central Asia among the Xiongnu warriors of the late 3rd c. BC – 1st c. AD (Hudyakov 1986, fig. 5.-1–13; Turbat et al. 2003, p. 219, fig. 2; p. 251, fig. 3). In the Bulan-Koby culture, they have been recorded since the 2nd c. AD and were actively used during the 2nd-5th c. AD (Gorbunov 2006, pp. 29–30, 38–39; Tishkin et al. 2018, pp. 49, 54; Seregin et al. 2020, pp. 107–108).

The iron armor-piercing three-bladed arrowhead of pentagonal shape without stopper (Fig. SI1.9), discovered inside a human skull from kurgan 14), has early similarities among the Xiongnu (1st c. BC – 1st c. AD; Hudyakov 1986, p. 31. fig. 6.-1). Such items were used most intensively in Central Asia from the 3rd c. AD (Kozhomberdiev & Hudyakov 1987, p. 84, fig. 6.-7–10, 13–24; Levina 1996, fig. 92.-20, 23, 45; etc.). The analysed specimen has no analogues in the quiver sets of the Bulan-Koby culture, which may indicate its connection with the population foreign to Altai. The probable dating of this piece is 1st - beginning of the 3rd c. AD.

**Fig. SI1. Chronologically indicative artefacts from the burials of the Bulan-Koby culture of the Karban-I necropolis**

1 – multi-compound bow with long median lateral crescent-shaped linings; 2 – multi-compound bow with median lateral bow-shaped linings; 3 – iron long-bladed knife with a straight and inclined handle; 4 – iron dagger with straight grip without quillon with an oval-shaped wooden pommel; 5 – iron tiered arrowheads with a small upper tier; 6 – iron tiered arrowhead with even tiers without stopper; 7, 8 – iron three-bladed arrowheads with asymmetrical-rhombic and rhombic body without stopper; 9 – iron armor-piercing three-bladed arrowhead of pentagonal shape without stopper; 10 – belt buckle with moving pin, equipped with an elongated-rectangular frame and a laminar shield in the form of open-ring plaque, quadrangular in terms of the shape of shortened proportions; 11 – iron belt plaques-linings of sub-rectangular and rectangular shapes of different sizes, with a pin fastening; 12 – iron rosette-shaped plaque-lining with a pin fastening; 13 – iron open-ring plaques-linings with a moving ring; 14 – bronze ringed earrings; 15 – bronze braid piece; 16 – bronze pendants; 17 – bronze "tip-pendant" made of a plate folded into a tube with a cut spoon-shaped front edge; 18 – bone "tip-pendant" of spoon-shaped type; 19 – iron "block" in the form of a ring; 20 – iron "block" of round-trapezoidal shape; 21 – bone arrowhead with a body diamond-shaped in cross-section and clamping socket; 22 – bone arrowhead with a body diamond-shaped in cross-section and protruding solid barrel-shaped whistler socket; 23 – bone arrowheads with attached bone whistlers; 24 – multifaceted and lens-shaped arrowheads of triangular form with curved in barbs; 25 – bone arrowhead with a body diamond-shaped in cross-section and leaf-like in contour; 26 – iron adze with an open socket, smoothly transforming into a blade with an expanding arcuate edge.

Shape, arrow

Description automatically generated with medium confidence

Iron long-bladed knife with a straight and inclined handle (Fig. SI1.3) were adopted in Altai as a weapon under the influence of late Xiongnu or early Xianbei military traditions. They were used as the main means of hand-to-hand combat among the "Bulan-Kobyns" in the 2nd-5th c. AD (Tishkin et al. 2018, pp. 58-59). Indicative is the "early" way of wearing them along the thigh, in a sheath without iron chains or other fasteners for hanging on the belt (Matrenin 2017, pp. 17–25).

The iron dagger with straight grip without quillon with an oval-shaped wooden pommel (Fig. SI1.4) has a probable prototype among the daggers of the Kushan-Yuezhi military tradition of the 1st c. BC – 1st c. AD with solid metal pommels, similar to those found in the archaeological sites of Sogdia and the Middle Yenisei (Obelchenko 1978, pp. 121-122, fig. 3.-5; Kuzmin 2011, fig. 53.-1, 2, 8). In Altai, individual, later, finds of daggers with a separately made wooden pommel come from the complexes of the second half of the 3rd-5th c. AD (Mamadakov 1996, fig. 1.-1; Bobrov et al. 2003, fig. 9.-29). Based on the available materials, the analysed sample can be dated to not earlier than the end of the 1st c. AD.

Among the equipment items, chronologically indicative is a buckle with moving pin, equipped with an elongated-rectangular frame and a laminar shield in the form of open-ring plaque, quadrangular in terms of the shape of shortened proportions (Fig. SI1.10). The study of a wide body of materials indicates that, among the pastoralists of Altai, such products appeared no earlier than the 2nd c. AD, probably under the influence of the equipment of the early Xianbi (Matrenin 2017, pp. 34, 46). The Karban specimen has an analogy in the Xianbei necropolis of Zorgol-I of the late 1st - early 3rd c. AD in Eastern Transbaikalia (Yaremchuk 2005, fig. 101.-8).

In the burials of Karban-I, iron belt plaques-linings of sub-rectangular and rectangular shapes of different sizes, with a pin fastening were found (Fig. SI1.11). In Central Asia, similar individual belt sets are firstly known among the Xiongnu of the end of the 1st c. BC - beginning of the 1st c. AD, but they are most numerous in the equipment of the northern Xianbi of the end of the 1st - beginning of the 4th c. AD (Erdelyi 2000, fig. 37; Turbat et al. 2003, pp. 209, 233, 235, 253, 257; Kovychev 2006, fig. 3.-8; Yaremchuk 2005, fig. 96.-6; 97.-4, 7; 99.-1–2, 5–7, 10; 100.-2–4; 101.-2–7; 103.-1–4). These belt plaques appeared in the Altai in the 2nd c. AD, probably as an imitation of the Xianbei models, and they were widely used by the "Bulan-Kobyns" until (including) the 5th c. AD (Matrenin 2017, p. 72).

Iron rosette-shaped plaque-lining with a pin fastening (Fig. SI1.12) by its shape resembles the polychrome plaques of the Xiongnu of Mongolia and Transbaikalia of the late 1st c. BC - 1st c. AD (Konovalov 1976, table. XIX.-19). In the monuments of Altai, no analogies to it have been found.

Iron open-ring plaques-linings with a moving ring (Fig. SI1.13) have early analogies relevant for determining the relative chronology in the equipment of the Xianbi of Eastern Transbaikalia (late 1st - early 3rd c. AD) and among the population of Tuva (2nd-4th c. AD; Nikolaev 2000, fig. 1.-4, 6, 10; 3.-4, 12; Yaremchuk 2005, fig. 96.-5). In Altai, such sets date no earlier than the 2nd c. AD (Matrenin 2017, pp. 64, 66, 75).

Very unusual is the bronze "tip-pendant" made of a plate folded into a tube with a cut spoon-shaped front edge (Fig. SI1.17). Importantly, this object was made of a bronze plate, and not casted in a form, which clearly indicates the technological tradition of non-ferrous metal processing, widely represented in Altai in the 2nd-5th c. AD (Soenov & Konstantinova 2015, pp. 53-54, 191-192, 195-200). The appearance of this item, which is later than cast samples with perforated socket, is possibly associated with the practice of producing similar iron objects in the Xiongnu period (Mandelstam & Istanbulnik 1992, table 81.-3–4; Kuzmin 2011, tables 40.-26–32; 74.-54; 76.-2–3; etc.). The Karban specimen demonstrates that, in Altai, the final period of the use of bronze spoon-shaped "tips-pendants" fell on the 2nd - early 3rd c. AD (Matrenin 2017, p. 90).

Bone "tip-pendant" of spoon-shaped type (Fig. SI1.18) has similarities in the equipment from the Bulan-Koby sites dating mainly from the 2nd c. BC – 1st c. AD and less often from the 2nd-3rd c. AD (Sorokin 1977, fig. 10.-1; Mamadakov 1990, fig. 65.-15; Soenov & Ebel 1992, fig. 21.-2; Matrenin 2017, pp. 84, 91). The relative dating of this object is the 2nd c. BC – 3rd c. AD

Among the recorded iron "blocks", the specimens in the form of a ring (Fig. SI1.19) were numerous among the "Bulan-Kobyns" during the 2nd-5th c. AD. Yet, the only product of a round-trapezoidal shape (Fig. SI1.20) shows similarities with the "t-shaped" buckles and belt distributors that were used by pastoralists of Altai in the 3rd-5th c. AD (Matrenin 2017, pp. 44-45, 50, 53, 54, 93-95; Tishkin et al. 2018, pp. 79-80, 94, 96).

In the jewellery complex of Karban-I, noteworthy are the ringed earrings (Fig. SI1.14). In Central Asia, they were intensively used in the late 1st - early 3rd c. AD by the Xianbi of Eastern Transbaikalia and less often in Inner Mongolia (Yaremchuk 2005, p. 101, fig. 114.-6–7, 14–15, 25; 115.-5–6; 116.-38; 117.-3–4; 118.-11–15). For the same period, they are recorded in Tuva among the nomads who left the necropolis of Aymyrlyg-XXXI, and later (second half of the 3rd-4th c. AD) among representatives of the Kokel culture (Savinov et al. 2010, pp. 61, 65)[[1]](#footnote-1). Similar earrings are found in the population of the Middle Yenisei in the 2nd-3rd c. AD (Vadetskaya 1999, fig. 16.-26–28; 65; table. 8.-4; Kuzmin 2011, p. 218, fig. 43). The appearance of these products in Altai apparently dates to the 2nd c. AD as earliest and probably reflects the influence of the cultural traditions of one of the ethnic groups of the northern Xianbi. Similar earrings have been found in the Bulan-Koby complexes of the 2nd - first half of the 4th c. AD (Trifanova & Soenov 2019, fig. 3.-2–3, 19–22).

Other decorative items are represented by bronze braid pieces (Fig. SI1.15) and pendants (Fig. SI1.16). Similar products appeared as an element of the costume of the Bulan-Koby population of the Northern and Central Altai in the 2nd-5th c. AD (Tishkin et al. 2018, p. 142, tables 47.-6–9; 48.-4–6, 10–17; Trifanova & Soenov 2019, pp. 49–52, 74, fig. 23–24; 27.-15–17).

In the necropolis of Karban-I, bone arrowheads with different mounting type and shape of the striking part were found chronologically indicative. Their comparison with the materials of other funerary complexes of Altai made it possible to establish that the stem modifications, diamond-shaped in cross-section and clamping socket (Fig. SI1.25), as well as multifaceted and lens-shaped arrowheads of triangular form with curved in barbs (Fig. SI1.24) date to a period not earlier than the 2nd c. AD (Tishkin et al. 2018, p. 122). Original are the specimens equipped with separately made bone whistlers (Fig. SI1.23), probably being a kind of "experimental" samples, reflecting the early experience of the production of socketed bone arrowheads with a protruding one-piece whistle, popular among the population of Altai from the middle of the 3rd c. AD.

Bone arrowhead with a body diamond-shaped in cross-section and protruding solid barrel-shaped whistler socket (Fig. SI1.22) shows similarities with tree-faceted products from Eastern Transbaikalia, found in the Duroy (3rd-4th c. AD) and Burkhotui (4th-6th c. AD) cultures, as well as from Mongolia (burial of the second half of the 3rd - early 6th c. AD; Kovychev 2006, fig. 6.-10; Tsavendorge et al., 2008, fig. 79). Among the population of Altai, such products were actively used in the second quarter of the 1st mil. AD, which obviously reflected the influence of bone-carving traditions of one of the groups of northern Xianbi. From the available materials, the arrowheads of this design could be introduced to the "Karbans" in the first half of the 3rd c. AD, which is confirmed by the presence in the burial complex of six tanged arrowheads with separately made whistlers, not known from other sites of Altai.

Bone arrowhead with clamping socket (Fig. SI1.21) differs by its morphological characteristics from the Xiongnu specimens, and it has the initial period of existence in the Altai within the 2nd - early 3rd c. AD. Such products were an indicative "ethnographic" element of the material culture of the "Bulan-Kobyns" in the 3rd-5th centuries AD (Tishkin et al. 2018, p. 125).

Quite indicative is the iron adze, discovered in one of the kurgans of Karban-1 (Fig. SI1.26). This product is characterized with an open socket, smoothly transforming into a blade with an expanding arcuate edge. In North Asia, the earliest of such objects are found in the sites of the Middle Ob region of the turn of the eras (Chindina 1984, p. 28, fig. 26.-8). Based on the available materials, the adzes of the Bulan-Koby population do not have local prototypes in the tool set of nomads of the previous period (Scythian-Saka). The Karban specimen belongs to the early typological samples, and it is illustrative of the spread of adzes among the Altai pastoralists, apparently in the 2nd - early 3rd c. AD. Similar objects known from the Bulan-Koby sites arrive from the complexes of the late 3rd – 5th c. AD (Mamadakov 1990, fig. 52.-4; Tishkin et al. 2018, pp. 151, 153, table 38.-1–2; etc.).

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