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## Metal Celts from the Little Sea Coast of Lake Baikal

*This article examines metal celts accidentally found 2 km west of Kurma on the Little Sea coast of Lake Baikal, in the foothills of Primorsky Ridge, Olkhonsky District, Irkutsk Region. Detailed information is provided on the conditions in which they were found and aspects of their technology, form, and decoration. The specimens have no eyelets, are rectangular in cross-section, and were cast in bivalve molds. They differ in size and decoration. On their wide sides, there are holes for supports inserted into the mold halves. While no exact parallels to the celts are known, several chronological indicators (body shape, socket cross-section, absence of eyelets, and decoration) point to the Scythian-Tagar stage. The most similar specimens are the Krasnoyarsk-Angara type of celt, distributed over the taiga belt from the Yenisei to the Angara. X-ray spectrometric analysis suggests that the celts were made of “pure” copper. In the Olkhon area, the Scythian-Tagar celts are associated with the Slab Grave culture, dating to 2778–1998 cal BP.*

**Keywords:** *Cis-Baikal region, Olkhon area, Lake Baikal, Scythian-Tagar period, copper celts, X-ray spectrometry.*

### Introduction

Metal items (copper or bronze) occur quite rarely among the evidence of the Bronze and Early Iron Ages from the Cis-Baikal region and particularly from its Olkhon area (western shore of Lake Baikal, from Cape Elokhin in the north to the Bolshaya Buguldeika River in the south, including Olkhon Island). Such items have been found in burials (most of which were destroyed in ancient times) and accidentally. In this regard, each new discovery of an item made of metal is of great scholarly value.

This article presents two metal celts discovered on the coast of the Little Sea of Lake Baikal, in the vicinity of the village of Kurma (Olkhonsky District of the Irkutsk Region). These wedge-shaped tools with socket perpendicular to the blade were used as axes or adzes. Their function can be established from the method of attachment to the handle and side view of the tool

(symmetric or asymmetric) (Gryaznov, 1947). Celts were widespread in the Bronze Age cultures of Southern and Western Siberia, Mongolia, North China, and other regions. In the Cis-Baikal region, such finds are rare, and almost all of them are surface finds. They have not been discovered before in the Olkhon area.

The celts discussed in this article were accidentally found by A.V. Vokin while walking as a tourist in the vicinity of the village of Kurma in 2016. In 2020, the finds were submitted to the “Baikal Region” Research Center at Irkutsk State University. In the summer of the following year, the locations where these items were found, were topographically surveyed.

### Description of the celts

The items were discovered 1.9 km north of the Khagdan-Dalai Bay of the Little Sea of Lake Baikal (near the

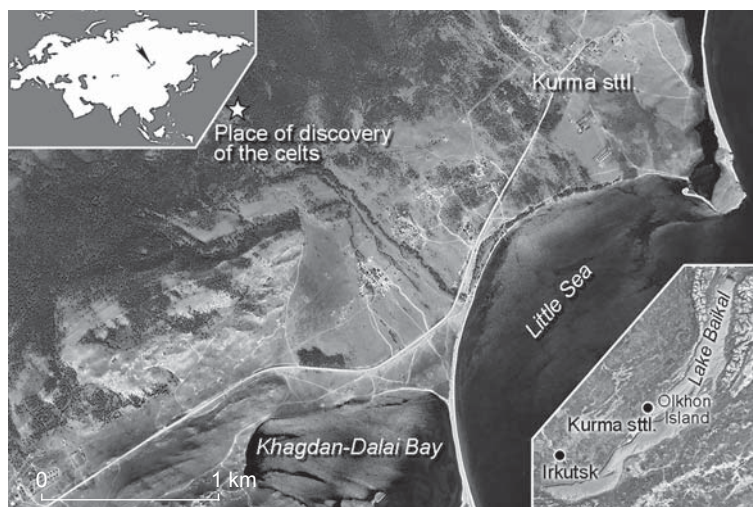


Fig. 1. Satellite image of the place where the celts were discovered.



Fig. 2. View from the west of the place where the celts were discovered.



Fig. 3. Celt 1 from the vicinity of the village of Kurma.

foot of the Primorsky Ridge), 2 km west of the village of Kurma (Fig. 1). A flat rectangular stone measuring about  $45 \times 20$  cm lay between ruts on a forest road that abutted a small watercourse. The tip of a metal item was visible from under the stone. Two celts were found there. No other stones were present on this section of the road. A survey of the area, carried out in 2021, showed that the road runs along a small spur of the Primorsky Ridge, which is located to the west of the road (Fig. 2). The slopes of the mountain are steep and overgrown with grassy vegetation. At the present, to the southeast-east of the location of the archaeological objects, there is a small clearing without any accumulations of stones, covered with dense grass and bushes. The location for a campfire, probably used by some tourist center in the vicinity of the village of Kurma, is on the edge of the clearing, about 3–4 m from the road.

The celts were both without eyelets, and differing in size and decoration, they were cast in split bivalve molds. The largest one (celt 1) is symmetrical relative to its vertical axis; the cross-section of its body and socket is rectangular (Fig. 3). The body of the item is wide and slightly expands towards the broken blade. The upper part of both wide surfaces was decorated with ornamentation in relief. A horizontal narrow band covering the item along the entire perimeter runs at a distance of 1 cm from the edge of the open facet. A V-shaped chevron pattern made in relief is below the band on one side. It is possible that initially there were five V's (the far right V was effaced, which possibly resulted from a defect in the casting mold). Ornamentation on the other side consists of three groups of chevrons in the form of V's set one inside the other, separated by vertical double lines. Holes with traces of grooves from protrusion-supports of the core appear on both wide surfaces in the central part of the ornamented field; these holes are wider on the inner side of the item. Protruding narrow pegs up to 0.8 cm long (Fig. 4) are on the sides and at the bottom at a distance of 0.6–0.7 cm from these holes. The pegs might have been for better fixation of the core inserted into the cavity of the casting mold. The height of the preserved part of the celt is 7.5 cm; the length of the socket

is 6.3, and its width is 2.9 cm. The weight of the item is 295.9 g.

The second celt (celt 2) is short and wide, with a rounded and slightly widening blade (Fig. 5). The side view of the item is slightly asymmetrical. The cross-section of the socket and body is rectangular. Parts of the socket and blade have been broken off. Casting seams are visible on the narrow (side) surfaces. A recessed ornamentation of inclined zigzags between two horizontal lines (the distance between them is 1.0–1.1 cm) is on the upper part of the item. There are holes below the ornamentation (in the center) on both wide surfaces. The height of the celt is 5.5 cm; the length of the socket is 5.5, and the width is 2 cm. The weight of the item is 97.4 g.

Both celts were studied at the Institute of Geochemistry of the Siberian Branch of the Russian Academy of Sciences in Irkutsk by L.A. Pavlova in order to establish the composition and chemical properties of the metal used. The method of X-ray spectral electron probe microanalysis using a Superprobe-733 device (Japan, JEOL Company) was applied. It was discovered that both items were made of “pure” copper (see Table).



Fig. 4. Inner side of celt 1.



Fig. 5. Celt 2 from the vicinity of the village of Kurma.

### Discussion of the material and its dating

All known metal celts are categorized using various combinations of features revealed by the shape and design of their socket part, as well as the absence or presence of different variants of band-like ornamentation. It has been observed that most celts of the eastern type, as opposed to the western type (Seima-Turbino, etc.), have distinctive rims and collars bordering the socket (Grishin, 1971: 20; Chlenova, 1992).

The Kurma celts do not have direct parallels. Some features of their shape and ornamentation, which can be used for periodization, make it possible to suggest their chronological attribution. Celts similar in shape and cross-section have been found in the Verkhne-Metlyaevo hoard in Balagansky District of Irkutsk Region (Maksimenkov, 1960b: 13). Two such tools stand out.

They are symmetrical relative to the vertical axis and have a rectangular horizontal cross-section (Fig. 6, 1). Ornamentation (on both sides of the items) was formed by convex bands; it consists of two horizontal lines and three groups of chevrons in the form of V's set one inside the other (Ibid.: 39–40). The celts were made of tin bronze (additives reaching 2.2 %) (Sergeeva, 1981: 22). G.A. Maksimenkov attributed the bronze items from the Verkhne-Metlyaevo hoard to the Tagar period (1960a: 151; 1960b: 17), and attributed small celts with geometrical ornamentation to the fourth group of celts of the Krasnoyarsk-Angara type. Notably, the main elements of relief decoration, appearing on the first Kurma item (horizontal band, vertical dividers, chevrons), have been found in various combinations on all celts of the Krasnoyarsk-Angara type. The items under consideration are distinguished by the presence of holes (on both wide

Composition of metal in the Kurma celts, wt%

Item	Cu	Sn	As	Pb	Sb	Fe	Ni	Ag
Celt 1	Base	0.68	0.59	0.09	0.20	0.04	0.07	0.02
Celt 2	Base	0.562	0.41	0.16	0.17	0.00	0.02	0.00



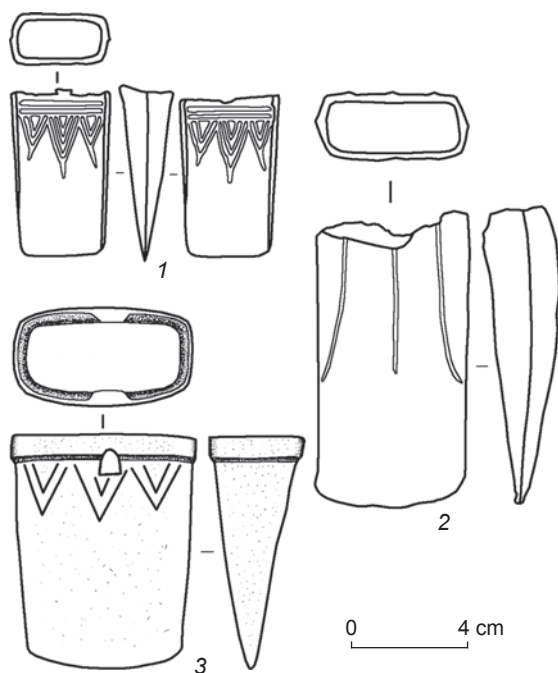


Fig. 6. Bronze celts (after (Maksimov, 1960b; Shmygun, Sergeeva, Lykhin, 1981; Tsybiktarov, 1998)). 1 – Verkhne-Metlyaevo hoard; 2 – Kurla, burial 1; 3 – Sayantui, burial 10.

surfaces) remaining from the supports for better fixing the core inside the casting mold.

Fragments of two bronze rectangular celts have been found in the compression layer on Sosnovy Island, located 8 km from Lake Baikal, at the source of the Angara River (Sedyakina, 1955). Judging by the published drawing (Ibid.: Pl. 1, 13), the body of one of them somewhat expands towards the rounded blade. The upper part of the item was partially broken off. There are three vertical thin bands reaching the middle of the tool on its wide surface. We cannot say anything about the presence of ornamentation on the other side due to the absence of a drawing.

A celt similar to the Kurma celts in shape, cross-section, and presence of holes on the wide surfaces was found at the Katun I site (Chivyrkuisky Bay of Lake Baikal), in the coastal talus (Goriunova, Nomokonova, Novikov, 2008). The item is asymmetrical; its body is low and wide; it has a rounded and somewhat widened blade (due to subsequent hammering) (Fig. 7). The cross-section of the socket and body is rectangular. Its wide surfaces have one round hole each. Bands run along the edge of the socket and at a distance of 1 cm from it. The height of the celt is 6.5 cm; the length of the socket is 5 cm, and the width is 2.6 cm. Analysis of the chemical

composition of the metal has revealed the presence of arsenic additives (more than 1 %), which makes it possible to describe it as arsenical bronze. The authors synchronize this celt-adze with the complex from layer IIIB of the Katun I settlement, which has been dated to the 7th–5th centuries BC (Ibid.). This dating was based on a dagger with a butterfly-shaped crossbar of Early Scythian appearance, typologically associated with the 6th–5th centuries BC (Gryaznov, 1941). It was also made of arsenical bronze with arsenic content of 1.0–1.5 %.

Two similar bronze celt-adzes were found in burials 1 and 3 at Kurla Bay in the Northern Baikal (Shmygun, Sergeeva, Lykhin, 1981). These items are asymmetric and rectangular in horizontal cross-section (see Fig. 6, 2). The bodies are straight; the blades are slightly convex. On both sides, the celts were decorated with three thin bands diverging in the form of rays, which reach the middle part of the items. The upper parts of the tools were broken off. Casting seams are visible on the side surfaces. The remains of wood have been preserved in the sockets of both tools. The height of one celt is 10 cm; the length of the socket is 5.2 cm, and the width is 2.5 cm. Spectral analysis has shown that one item was made of arsenical bronze (arsenic content 2.6 %), while the other celt was made of alloy with arsenic (4 %) and antimony (1.3 %) (Ibid.). According to N.F. Sergeeva, bronze with relatively significant arsenic content was typical of the Transbaikalian region, while in the Cis-Baikalian region, the arsenic content was low (1.0–1.5 %) (1981: 25). On the basis of the typological analysis and composition of alloys, bronze items from the burials in the Kurla Bay were dated to the middle or second half of the first millennium BC (Shmygun, Sergeeva, Lykhin, 1981).

In the Transbaikalian region, bronze celts are associated with the Slab Grave culture. One item with rectangular cross-section of the socket and body has been found in



Fig. 7. Celt from the Katun I site.

burial 10 at the Sayantui burial ground (Chlenova, 1992: 452, pl. 102, 10; Tsybiktarov, 1998: 60, 256) (see Fig. 6, 3). It has a wide band (collar) around the socket. Below it is a chevron-like ornamentation in the form of three groups of V's set one inside the other. There are holes in the middle on both sides under the band. The height of the item is 8 cm; the length of the socket is 6 cm; the width is 3.5 cm. A bivalve casting mold made of stone and intended for casting rectangular celts decorated with a horizontal band has been found in a slab grave in the Darasun area (Tsybiktarov, 1998: 60, 249). A.D. Tsybiktarov correlated these burial complexes with the Early Scythian-Tagar period (Late Bronze to Early Iron Age). The bronze items of the Zakamensk hoard, discovered in Buryatia on the Dzhida River (Khamzina, 1981; Chlenova, 1992: 451, pl. 101, 39–42) were dated to the same period. These celts (4 items) were rectangular in horizontal cross-section; some of them had a wide band (collar) around the socket; three celts had holes remaining from the support for fixing the core inside the casting mold. Decoration (a horizontal band) has been observed only on one item.

All of the celts under discussion belonged to the Scythian-Tagar period and did not go beyond the 8th (7th)–3rd centuries BC. They are similar to each other and to the Kurma items in the shape of the body (straight or slightly expanding towards the blade), cross-section of the socket and body (rectangular), and absence of eyelets. In terms of ornamentation, the first Kurma celt was the most similar to the Krasnoyarsk-Angara type (in particular, to the fourth group), common in the taiga zone from the Yenisei to the Angara region. Their similarities include the geometric thin-band ornamentation and main elements of the pattern (horizontal band, dividing vertical lines, and chevrons). A distinctive feature of the Kurma celts is the presence of holes from the support for fixing the core inside the casting mold and the specific decoration of the second item. They differ from the Transbaikalian celts, which also have holes on the wide surfaces, with the absence of a band or collar around the socket and ornamentation—it is simplified or completely absent on the Transbaikalian celts (with the exception of the celt from burial 10 at the Sayantui burial ground).

The Kurma celts are also distinguished by the composition of metal (“pure” copper). Celts of the Krasnoyarsk-Angara group and Transbaikalian Scythian-Tagar celts were mostly made of tin and arsenical alloys (specimens from “pure” copper are extremely rare) (Sergeeva, 1981: 22–25, 34–35).

## Conclusions

In terms of the set of specific features, the Kurma celts described in the article belong to the items of the

Scythian-Tagar period. In this period, burials belonging to the carriers of the Slab Grave culture appeared in the Olkhon area. The center of this culture was the Transbaikalian region and Mongolia (Chlenova, 1992; Tsybiktarov, 1998: 23–26; Turkin, 2003; Goriunova, Magdeeva, Novikov, 2019). The Olkhon area and Kudin steppe are the extreme northern zones of the Slab Grave culture. So far, 47 slab graves have been discovered there (almost all of them were damaged in the ancient times); copper-bronze items made in the Scythian-Tagar tradition were found in 14 graves (Goriunova, Magdeeva, Novikov, 2019). These items include figurative plaques and a hook-pendant with zoomorphic imagery, socketed arrowheads, stirrup-shaped horse bits, etc. A unique bronze sword that was accidentally found in one of the valleys of the Primorsky Ridge, between the village of Chernorud (the present-day Shara-Togot) and the Sarma Gorge (Molodin, Medvedev, 2015), was linked to that period. The authors who described it dated it to the Scythian period on the basis of a number of features (distinctive shape of the guard in the form of bear heads, mask in the center of the crossbar, etc.). In the Olkhon area, celts were found for the first time.

Currently, a series of corrected radiocarbon AMS-dates (20 dates) is available for slab graves in the Olkhon area. Their chronological range is 2778–1998 cal. BP (Waters-Rist et al., 2016; Goriunova, Magdeeva, Novikov, 2019). These dates testify to the penetration of carriers of the Slab Grave culture into this territory from the 8th century BC.

It could have been assumed that the Kurma celts belonged to a destroyed burial, but examination of the area where they were found has shown the absence of grave structures. Linking them to a settlement complex is also doubtful, since no other archaeological evidence that would indicate the presence of a cultural layer has been found in the vicinity of the place of discovery. It seems that the compact placement of the celts and their deliberate covering with a relatively large stone may indicate that they belonged to a small cache (hoard). Hidden metal things undoubtedly seemed valuable owing to their rarity and limited availability of raw materials for their manufacturing in the Cis-Baikal region. Complexes with similar functional purpose (caches, hoards) are widely known from the evidence of the Scythian-Tagar period in the adjacent territories (the hoards of Verkhne-Metlyaevo, Zakamensk, Korsukovo, etc.).

The Kurma celts show a general similarity to the Krasnoyarsk-Angara type, commonly found in the forest and forest-steppe belts, and to the Transbaikalian-Mongolian celts typical of the steppe regions. Some of their original features probably reveal cultural influence and borrowings from the inhabitants of neighboring territories. The composition of metal in the Kurma celts (“pure” copper) may indicate the use of local raw materials.

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