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A Late Krotovo (Cherno-Ozerye) Caster's Ritual and Memorial Complex at Tartas-1, Baraba Forest-Steppe

We describe a feature revealed at Tartas-1—a subrectangular pit No. 147, on the bottom of which a bivalve ceramic mold was found. A detailed description of the archaeological context and of the mold's technical properties is provided. It was destined for casting a socketed bronze chisel-celt. The process of manufacturing such a mold is reconstructed. The edges of the celt were reinforced by ribs, as in the Seima-Turbino specimens. As to cultural attribution, the pit belonged to the Late Krotovo (Cherno-Ozerye) part of the cemetery, closest to burials No. 120 and 155. The properties of these indicate a blend of Late Krotovo (Cherno-Ozerye) and Andronovo characteristics. This and related findings suggest that the mortuary ritualism of the Early and Middle Bronze Age cultures in the Ob-Irtysh forest-steppe focused on metalworking. This is especially evident at cemeteries where Seima-Turbino artifacts are present. Small memorial pits are located among the graves, or close to foundries, or within large sanctuaries. In Baraba, such autochthonous ritual practices are typical of the entire span of the Odino, Krotovo, and Late Krotovo (Cherno-Ozerye) cultures. They have not been affected by the Andronovo ritualism. A conclusion is made that rites related to metalworking mirror a progress in bronze-casting, a stage when the technological process had become specialized, and founders had acquired a special social status.

Keywords: *Baraba forest-steppe, ritual and memorial complex, Late Krotovo (Cherno-Ozerye) culture, bronze foundry, casting complex, reconstructions.*

Introduction

In Western Siberia, the Early to Middle Bronze Age burial sites associated with metallurgy reveal certain features that can be considered manifestations of the ritual and memorial practice of the relevant population (see, e.g., (Matyushchenko, Sinitsyna, 1988; Molodin, 1983; Durakov, Mylnikova, 2021; Molodin, Durakov, 2018; Molodin, Grishin, 2016, 2019)). This cult practice is best illustrated at the necropolises containing Seima-Turbino items. The features are most often represented by small memorial pits located either on the burial field or in the immediate vicinity of foundries. Sometimes, they are located on the territory of large sanctuaries, such as Lake Shaitanskoye (Korochkova, Stefanov, Spiridonov, 2020).

In the Baraba forest-steppe, similar features were noted at the sites attributed to the Odino and Krotovo cultures containing the items of the Seima-Turbino type (Durakov, Mylnikova, 2021: 43–48, 87–92). Apparently, the growing Andronovo influence in the Late Krotovo period did not change the production ritual practice developed in the Seima-Turbino time. The traits of this ritual practice were detected at Tartas-1, the largest cemetery of the Late Krotovo (Cherno-Ozerye) culture in Baraba (Fig. 1). The ritual complex located on this

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burial field (pit No. 109) contained a cache belonging to an ancient foundry man, and was described earlier in a special publication (Molodin, Durakov, Kobeleva, 2016).

This paper introduces a new similar feature located 22 m to the NW of the one described earlier.

Description of the feature and results of the study

The ritual and memorial complex was located at Tartas-1, on the southeastern slope of the terrace, where the Late Krotovo (Cherno-Ozerye) burials are concentrated, in a row of pits No. 148 and 149 associated with the Late Krotovo (Cherno-Ozerye) tombs No. 120 and 155 that were located in line with the Andronovo (Fedorovo) burials. The feature is a subrectangular pit (No. 147) elongated along the E-W line (Fig. 2). Its dimensions are 0.9 × 0.95 m. The walls are almost sheer. The depth from the virgin land level is 0.14 m. The pit's floor is flat; there are low steps in the NW and SE corners of the pit. The pit is filled with loose homogeneous dark grayish-brown sandy loam with inclusions of yellow loam. At the bottom level, 0.2 m from the western wall of the pit, there was a bivalve ceramic mold (Fig. 3). The total length of the item is 18.7 cm, the width of the halves is 5.6–6.2; the walls' thickness is 3.0–3.7 cm.

The assembled mold lay on its side. The halves were put together along the parting line, the core was missing

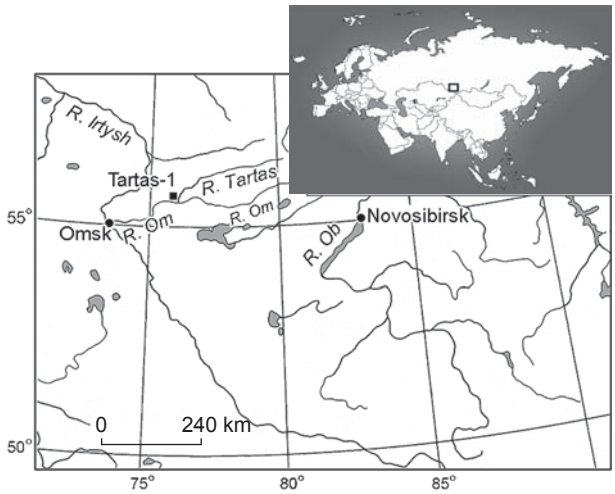

Fig. 1. Map showing location of Tartas-1.

(Fig. 4, *1*). Notably, this element of mold survives extremely rarely, because most often it is locked by the hardening metal and removed in pieces. The mold's halves were reused many times and stored in the toolkit of the ancient artisan; the core was disposable and made specifically for each cast.

The walls of the working chamber show signs of a strong thermal effect; clear traces of baking are visible on the surface. Metal intrusions were noted in the micropores of the mold's body (Fig. 4, *2*), which suggests significant

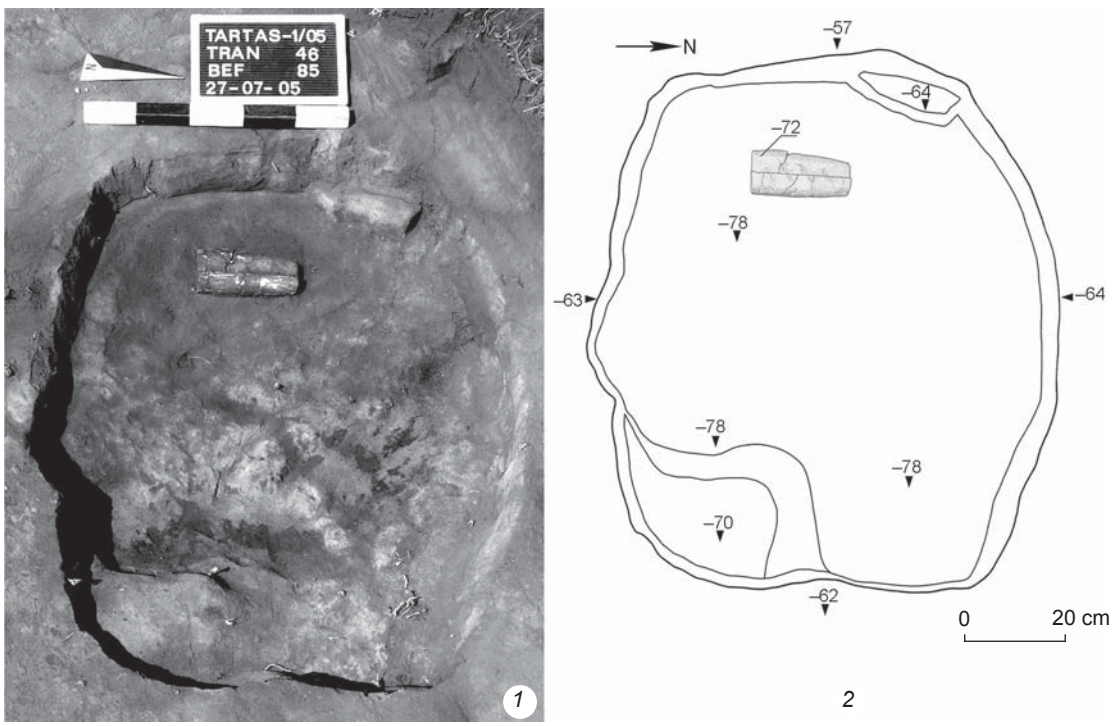

Fig. 2. Ritual and memorial complex (pit No. 147).
1 – photo; *2* – draft showing the ceramic mold location.

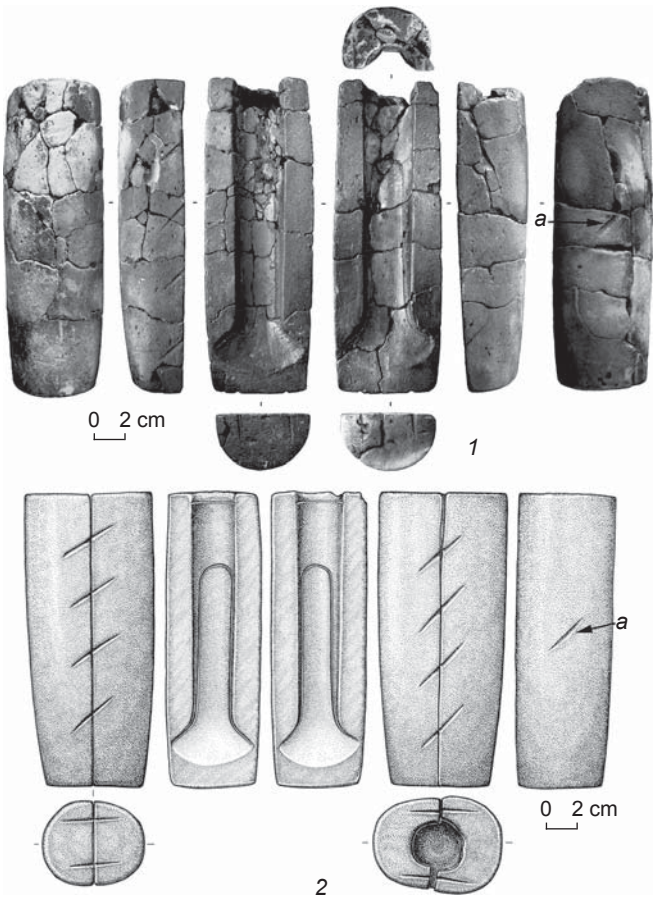

Fig. 3. Bivalve ceramic mold.
1 – photo; *2* – drawing.
a – an additional mark on the half of the mold.

overheating of it during pouring. The item was probably used many times before it was buried in pit No. 147.

The mold was made from a template; the parting edges are even, without signs of grinding. The molding mixture was composed mostly of ferruginous sandy clay, apparently taken from the Tartas banks: inclusions of small mica particles are clearly visible. The additives were dry clay, organic matter, and solitary inclusions of grog (Fig. 4, *3*; 4, *a–d*). A similar formula for molding compound of technical ceramics was used in the Ob-Irtysh forest-steppe as early as from the Odino period (Durakov, Mylnikova, 2021: 51). Such molding mixtures were also used by artisans of the classic Krotovo culture (Ibid.: 118–119, tab. 2).

The mold was designed for casting a socketed bronze chisel-celt (Fig. 4, *5*). Judging by the imprint of the working chamber, a finished tool with use-wear signs served as a template. This is indicated by the deformation typical of the template, and dents from forging of the tool visible on the imprint of the blade.

The mold making process is reconstructed as follows. At first, the tool that served as a template was half-embedded in some kind of ductile material (for example, raw clay or wax). After that, small patches of clayey paste were superimposed thereon, to form the half of the mold. The excess material was cut off from the outer side, to make the semicircular shape of the half. The surface was carefully smoothed and compacted. When the half was dried, it was turned over together with the template, and the operation was repeated to form the other half.

Upon removing the template, the surface of the working chamber was evened with a wet brush; there remained traces of the brush in the form of long parallel scratches. Most likely, several non-through punctures with a diameter not exceeding 0.8 mm were made in the mold to increase gas removal (Fig. 4, *6*). The surface of the imprint of the working chamber was smoothed, then stiffening ribs were made on its raw surface with a thin tool: this is indicated by relief lines, which are uneven in depth and width.

Four oblique lines are drawn through the parting line of the halves, on both sides of the mold; two more similar lines are drawn at the base and at the neck (see Fig. 3). This was done to facilitate centering when connecting the halves of the mold. This method of mold-centering was used by casters in the Early Bronze Age; their products were found at the sites of Saigatino (Surgut Region of the Ob) (Koksharov, Chemyakin, 1991: 46–47, fig. 2, *1*, *d*; 3, *1*, *c*, *f*) and Samus-4 (Tomsk region) (Matyushchenko, 1973: Fig. 7, *7*; 11, *1*, *2*). The Late Krotovo molds with centering marks were recovered from burial No. 91 of the Sopka-2/5 cemetery (Baraba forest-steppe) (Molodin, 1985: Fig. 28, *1*, *5*; Molodin, Grishin, 2019: 93–94, fig. 138, *2*; 140, *3*) and from grave No. 323 at Tartas-1 (Molodin, Durakov, 2018: 31, fig. 9). Among the Krotovo artifacts, such marks were recorded on a ceramic mold from the settlement of Abramovo-10 (Baraba forest-steppe) (Molodin et al., 2018: 50–51, fig. 2).

The mold under study, which currently has no analogs, shows one more oblique line scratched on the back side of one of the halves (see Fig. 3, *1*, *a*; 2, *a*). The line was probably a sign of marking of an interchangeable part, given a general standardization of production.

A celt-axe cast in the mold under consideration should have had a round socket decorated with a convex roller along the upper edge, and a broad arcuate blade (see Fig. 4, *5*). The total length of the tool is 17.2 cm; the width of the working part is 5.3 cm. The socket gradually increased in diameter from 2.8 to 3.1 cm. On the front side, the edges of the celt are reinforced with side stiffeners, which converge in the upper part forming an arch. The presence of stiffening ribs brings this item closer to the Seima-Turbino type celts, and apparently suggests the continuation of the Seima-Turbino trend of development. Evidence of the survival of the technology of making

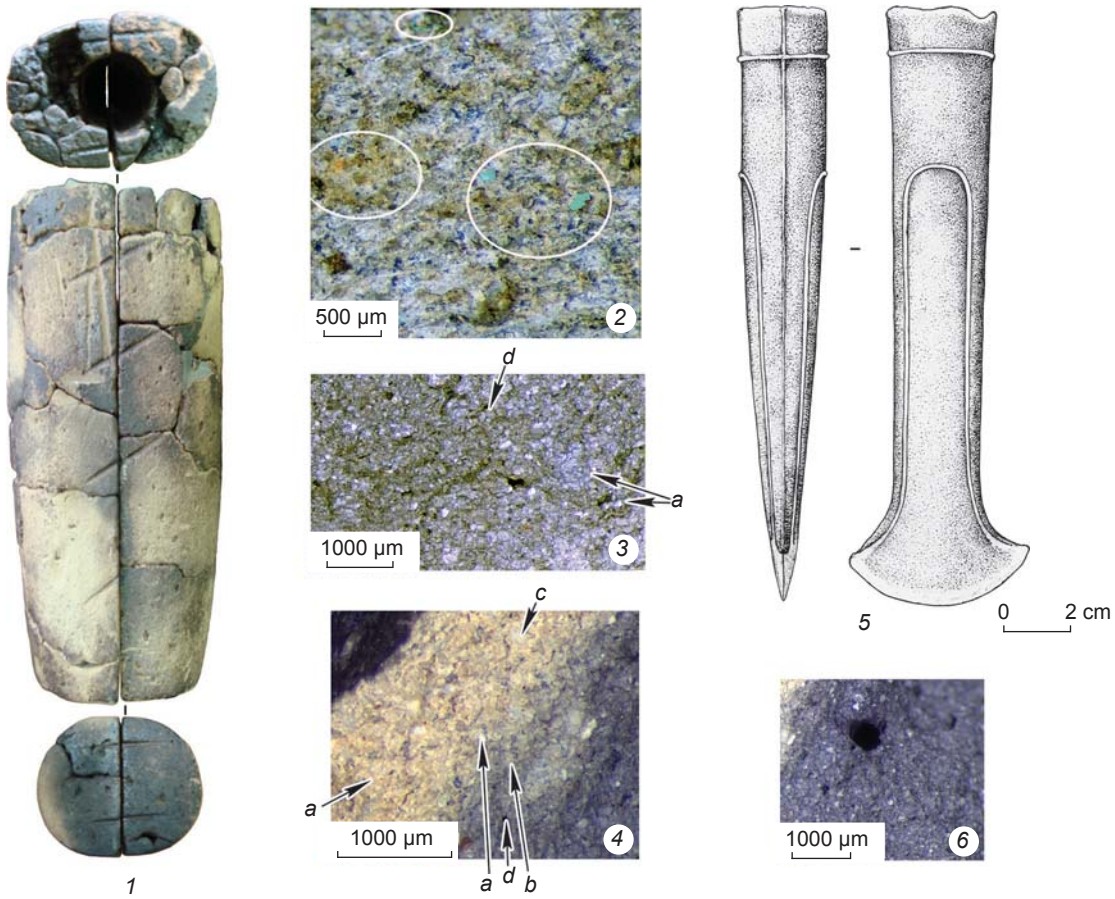

Fig. 4. Bivalve ceramic mold.
1 – assembled; *2* – micrograph of the molding-mixture sample showing metal intrusions in the micropores; *3*, *4* – micrographs of the molding mixture sample showing lumps of dry clay, organic matter, and solitary inclusions of grog: *a* – mica particles, *b* – dry clay, *c* – grog, *d* – traces of burnt out organics; *5* – reconstruction of a socketed bronze chisel-celt on the basis of the bivalve ceramic mold; *6* – micrograph of the molding-mixture sample showing a non-through puncture in the mold body.

celts of the Seima-Turbino type among the Late Krotovo (Cherno-Ozerye) people is a casting mold found in burial No. 323 at Tartas-1 (Molodin, Durakov, 2018: 31, fig. 8, *9*).

Notably, the arcuate facet formed by stiffening ribs makes this cast product similar to the Dancu-Jesenice (Florentin) type celts from the Danube-Carpathian region (Dergachev, 2011: 92–94, fig. 50, *1–12*). The overall proportions of the item (ratio of width and height) and the oval section throughout its length do not correspond to the Seima-Turbino standard; i.e. we can assume the elimination of this tradition.

Celt-adzes of elongated shape, with wide straight blades, have been reported from the Andronovo sites in Central Asia (Kuzmina, 2007: Fig. 53, *28*; 77, *12*). Apparently, they were used for specific purposes. A similar tool, re-forged from a grooved chisel, was contained in the Balandino cache, found on the left bank of the Irtysh River (Moshinskaya, 1957: 144–145, fig. 61, *4*).

The cultural affiliation of the studied complex is indicated by its location in the Late Krotovo (Cherno-Ozerye) part of the Tartas-1 cemetery. Pit No. 147 was located in the immediate vicinity of the Late Krotovo (Cherno-Ozerye) burials No. 120 and 155 set up in line with the Andronovo (Fedorovo) burials. Parallel to this row, there was another distinct line with at least 11 graves, four of which—No. 105, 110, 107, and 115 (Fig. 5)—represent the Late Krotovo (Cherno-Ozerye) culture. The funeral rite recorded in these and in graves No. 120 and 155 reflects merging of Late Krotovo (Cherno-Ozerye) and Andronovo features. For example, in burials No. 105 and 120, the dead were laid in an extended supine position (the Krotovo feature), while the grave goods included vessels of the Andronovo culture.

As noted above, ritual complexes associated with metalworking production were typical of the funeral practice in the Ob-Irtysh forest-steppe in the Early and Middle Bronze Age. Such ritual activity persisted throughout the Odino, Krotovo, and Late Krotovo (Cherno-Ozerye) periods. Two variants of funeral rite can be distinguished: the first—the ritual cache was placed

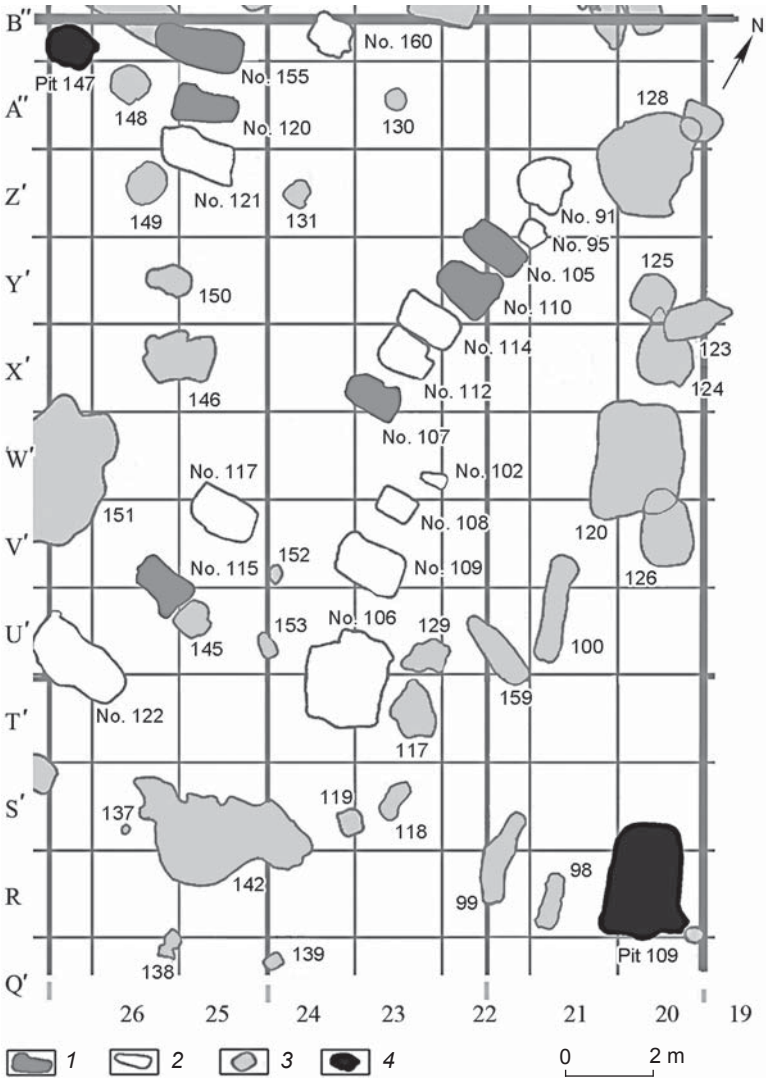

Fig. 5. Plan of the section of the Tartas-1 excavation area showing ritual pit No. 147 location.

1 – Late Krotovo (Cherno-Ozerye) burial; *2* – Andronovo (Fedorovo) burial; *3* – pit; *4* – ritual pits associated with bronze casting.

on the edge of the grave, under the turf, at the level of the virgin land; the second—a shallow pit was dug in the virgin land, into which sacrificial items were placed either all together at the bottom level, or in several stages as the grave was filled.

The connection of these structures with ideas about the other world is emphasized by the placement of the features on the sacred territory of necropolises and by similarity with burial features in design (subrectangular shape of the pits), orientation (they are parallel to the graves), and their inclusion in the rows of burials or memorial pits. Because of these peculiarities, such features were often perceived by researchers as cenotaphs. For example, "conventional burial" No. 4, found at the Rostovka cemetery, despite the absence of human remains therein, was interpreted as a grave-pit with fragments of foundry equipment (Matyushchenko, Sinitsyna, 1988: 10, fig. 11, *a*, *b*). The Late Krotovo (Cherno-Ozerye) burial No. 91 containing molds, at the Sopka-2/5 cemetery, can be considered a close parallel to the complex under discussion (Molodin, Grishin, 2019: Fig. 24).

Importantly, objects related to such ritual actions are epochal markers and are reported from a wider area than the distribution area of the Krotovo culture. For example, at the Turbino cemetery, most of the bronze tools were found in small pits under the turf, or in cenotaphs. Grave goods included items related to foundry production—sprues and semi-finished castings (Bader, 1964: 93, fig. 80, *A*; 83, *D*]. The same way of offering was recorded at the sanctuary of Lake Shaitanskoye (Korochkova, Stefanov, Spiridonov, 2020: 37–50). Foundry waste, sprues (casting bowls filled with metal, revealing remains of the gate), and small ingots were found over the sacral area at this site (Ibid.: 82, fig. 31, 38–40, 44–47).

The interment of foundry equipment at the territory of necropolis apparently symbolized the association of these items with the realm of the dead. Burying in the ground is the most ancient and common way of "moving" an object to the other world. In the ethnographically modern period, such rituals were practiced by most of the aboriginal peoples of Siberia (Kosarev, 2003: 145–146). Ideas about the relations of metalworking with the other world were widespread. In the general Turkic religious tradition, the lower realm is often associated with a forge (Lvova et al., 1988: 109–110). Similar ideas are typical, for example, among the Maasai and Wachaga (Chaga) in East Africa (Cline, 1937: 114–117].

The casting mold from the ritual and memorial complex in pit No. 147 at Tartas-1 can be considered either grave goods intended for the nearby buried casters, or the rite of disposal of a sacred object—a casting mold.

Traditional peoples familiar with metalworking used to bury obsolete blacksmith equipment until the ethnographically modern period. Wafipa tribes in East Africa perceive the forge as a living being experiencing cycles of birth, life, and death (Schmidt, 1931: 25). The sacralization of metallurgical equipment and its use as amulets are recorded among the Wachaga, Banyankole, and Bakitara peoples (Cline, 1937: 115–

119). Veneration of the main blacksmith tools and the sacralization of metallurgical waste have been noted among the Abkhazians (Ardzinba, 1988: 263; Adzhindal, 1969: 234–235; Chursin, 1957: 67). In the Buryats and Yakuts ideology, the blacksmith and his tools are associated with magic and otherworldly forces (Lygdenova, 2013: 63).

Conclusions

Scholars argue that the functions of intermediaries between the world of people and either the upper world of the gods, or the chthonic lower world, or between both of these worlds, were typical of blacksmiths (Metallurgiya…, 2018: 88). "In the archaic perception, the fact of mastery… brings the craftsman closer to the gods" (Ibid.). In early traditional societies, sacred activity was an integral part of production, and the ritual ceremony accompanying this production was a key factor for the success of an artisan (Schmidt, 1931: 1). Investigation of ritual pit No. 147 at Tartas-1 has allowed for the conclusion that the indigenous population of the Baraba forest-steppe in the Middle Bronze Age retained the ancient ritual practices, despite the arrival in this territory of the Andronovo (Fedorovo) people, who changed the history of the population of the region. The burial complexes of the Late Krotovo (Cherno-Ozerye) culture are built into the same rows with the Andronovo (Fedorovo) burials, while being (as earlier) accompanied by ritual complexes (see Fig. 5); the cultural affiliation of the ritual complexes is determined (as in the case of pit No. 147) by the features of the foundry-equipment manufacturing technology.

The casting mold found in the Late Krotovo (Cherno-Ozerye) ritual complex (pit No. 147) marks the cultural processes that took place among the population of that time. The progressive development of bronze casting is evidenced, for example, by an increase in the temperature of pouring metal, the complication of molding methods (changes in the design of the mold improved its performance—gas removal and heat capacity). The progress was ensured by a combination of Krotovo and Andronovo production traditions: casting the products of the Timber Grave-Andronovo types was carried out with maintaining the advanced Krotovo methods of making the molds. The irrational attitude towards foundry production also persisted among the indigenous population. The evidence of ritual practices associated with metalworking among the population of the Baraba forest-steppe in the Middle Bronze Age suggests a high level of separation of blacksmiths-casters within the community, and specialization of their activities.

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