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Considerations On The History Of Metalworking Crafts In Khorezm
(Based On The Example Of The Ancient Period)

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Abstract: The article provides a scientific analysis of the metalworking crafts in ancient Khorezm based on archaeological materials. The study highlights the developmental stages of blacksmithing, foundry work, weapon manufacturing, and jewelry making in antiquity, based on the results of archaeological research conducted at monuments such as Qoyqirilgan Qala, Tuprak Qala, Qalaliqir 2, Kaparas, and Yelkharas. Specifically, it has been determined that workshops of this period produced various products and decorative items from metals such as iron, copper, bronze, gold, and silver, and that craftsmen possessed technologies for metal casting, heat treatment, and the production of armor and weapons. It is also noted that there was a high demand for metal products in the fortresses and rural settlements of Khorezm in the ancient period, and some centers (Qalaliqir 2, Tuprak Qala) had metal production workshops.

The results obtained in the article demonstrate that metalworking played an important role in the craft culture and economic life of Khorezm in antiquity.

Keywords: Khorezm, antiquity, metalworking, blacksmithing, weapon making, foundry work, jewelry making, workshop, archaeology, Qoyqirilgan Qala, Tuprak Qala, Qalaliqir 2.

Introduction: In ancient times, urbanization processes, crafts, and agricultural culture flourished in Khorezm. During this period, not only did the number of fortresses increase, but also large fortresses such as Akchakhan Kala (56 ha), Bazar Kala (32 ha), Khiva (26 ha), and Kalalikir 2 appeared. The fortresses of Jigarband Kala, Kaparas, Elkharos, and Sadvar became centers of trade and crafts. Archaeological research indicates the development of crafts in fortresses and rural settlements during this period. In particular, various products related to blacksmithing, weaponry, and bronze casting were widespread in the settlements of Kuykirilgankala, Tuprakqala, Kaparis, Kalalikir, Elkhoras, and villages of this period.

Nevertheless, the metalworking crafts of Khorezm during this period are considered topics that have not been specially studied.

Metal objects related to jewelry making, blacksmithing, and weaponry were widespread in the ancient fortress of Koykirilgan Kala [5,P.132-161]. Bronze mirrors, pendants, rings, earrings, clamps, decorative appliqués, bells, gold foil ribbons, rods, and rings found in the fortress testify to the strong demand for metallurgical products among its inhabitants [5,P.147-156,16-161]. The decorative items at the site are made of bronze, lead, iron, and gold. Specifically, the iron rings in the fortress date back to the 5th-4th centuries BCE, while the bronze rings date to the 4th-2nd centuries BCE. The majority of jewelry and decorative items belong to the 1st century BCE and the 1st century CE. It dates back to the 4th-2nd centuries. The main part of jewelry and decorative items was found in B.C.E.

Weapons are relatively rare in the Qoyqirilgan fortress: several bronze and iron arrowheads, bone coverings of a composite bow, and numerous stone projectiles have been found.

In the Qoyqirilgan fortress, various blacksmithing products were widespread, including knives, long and

short-pointed awls, tongs, objects with handles, hooks, rings, and other items with unknown functions [5,B.158-160.-Ris.63]. The average length of the knives is 8-12 cm. The iron tongs (pliers) found at the site are 8.2 cm long, 2 cm wide, with a length of 1.1 cm across the arms, and 0.4 cm thick.

Although no blacksmith's workshop has been identified in Qoyqirilgan fortress, fragments of heavily oxidized iron objects whose original form cannot be determined, as well as iron ore remnants and slag, have been recorded in several rooms [5,B.160]. Ceramic nozzles and molds used in the process of blowing air into production furnaces, which were among the main tools of a blacksmith's workshop, have been found in the fortress.

Tuproq qal'a metalwork products represent another widely distributed monument of the ancient period [8,B.101-115,120-122.;Figs.50, 53,54,59]. Arrowheads, knives, iron coverings of the fortress gates, bladed weapons, and iron objects of unknown function were found at the site from armory and blacksmith products. Copper spoons, silver jugs, bronze mirrors, earrings, rings, pendants, buckles, and belt details were recorded among the products of casting, coppersmithing, and jewelry making. In particular, small bronze inlay decorations are commonly found. The gold-plated bronze palmettes, oval-shaped plates, teardrop-shaped pendants made of gold foil indicate that the production of gold items was established in the jewelry industry. A weapons workshop was discovered in the Tuproq qal'a palace, where fragments of bows, quivers, armored plates, spear and arrow tips were recorded [8,B.216-222.; Fig.88-89].

According to G. Khodzhaniyazov, in ancient times in Khorezm, the production of Khorezmian versions of scale and lamellar armor was established [9,P.95-104]. The depictions of armored horsemen on pottery vessels from Qo'yqirilgan qal'a, Tuproq qal'a, and Jonbosqal'a indicate that armorers had established armor production [5,B.203.;Fig.75,3].

The artistic metal objects in the Toprak-Kala palace are particularly striking due to their diversity and wide assortment. Among them, semi-spherical bronze pendants, gold foil, earrings and pendants, small gold discs, pendants, gold-plated bronze bells, rings, pins, bronze mirrors, small bronze knives, iron nails (80 pieces), a gold-plated bronze mask, and unidentified silver items were found [3, pp.226-229.; Fig.90]. The artifacts in the palace date back to the 2nd-3rd centuries AD.

40 bronze and 90 glass plates were found in rooms 90, 92, and 37 of the Toprak-Kala palace. These artifacts indicate that the production of bronze and glass plates used for decorating caftans, belts, and quivers was established in the fortress. Ceramic nozzles (used for supplying air to blacksmith furnaces) and molds were also found in the Toprak-Kala palace [8, P.216-220].

Based on archaeological materials, it can be said that in ancient times, the inhabitants of Koykyrylgan-Kala and Toprak-Kala had a strong demand and need for metalwork products. The quality and variety of ceramic nozzles, molds, tools, weapons, jewelry, and decorative items found in these monuments indicate the development of blacksmithing, weaponry, casting, and jewelry industries. [5, P.147-161.; 8, P.216-227] Toprak-Kala had craftsmen specializing in the production of gold and silver items.

In ancient times, the fortresses of Yelkharas and Kaparas were centers of trade and craftsmanship. M. G. Vorobyeva studied the distinctive features, chronology, and analogous similarities of metal objects in the Kaparis fortress [4,P.214-240.;Fig.81.]. Metalworking products in the fortress are categorized into cosmetic and decorative items (pins, clips, bronze plates, lead rods, mirrors, rings, bracelets), household items (knives, copper spoons), and arrowheads. A weapons workshop was discovered in the fortress, where bone plates of a semi-finished composite bow and three-bladed iron arrowheads were found. The arrowheads date back to the 3rd-4th centuries.

Research on the ancient site of Qal'aliqir 2 plays an important role in supplementing information about workshops in metallurgical industries [6,P.140-154]. Despite being a religious center in the 4th-2nd centuries BC, traces of metalworking workshops used during the construction period were discovered at the site. These workshops ceased their activities after the completion of the fortress construction.

In Qalaliqir 2 (4th - 1st centuries BC), a workshop for casting bronze items, a blacksmith's hearth, crucibles and ceramic nozzles were discovered, along with slag remains in addition to metal objects. Bronze casting at the site was carried out in two hearths located not far from the temple center, close to the continental layer [6, p.148]. One of them resembles a round depression with a diameter of no more than 40 cm and a depth of no more than 30 cm. The walls of the hearth were severely burned, and some parts were destroyed. There is another small depression in the center of the hearth, but its diameter is smaller.

The second hearth is poorly preserved, with an upper diameter of 40 cm. Its walls are made of clay. Near the hearth, there are several pits 30-40 cm deep, where a large number of ceramic crucible fragments are found. The thickness of their walls is 3-4 cm. Copper castings and some copper fragments have been recorded there. In one of the pits, a small copper casting with a jagged oval shape has a diameter of 3.5-4 cm and a thickness of

1 cm.

The crucibles at the site are cylindrical, 30-35 cm high and 15-20 cm in diameter. They are covered with dome-shaped lids with holes in the center and sides [6,P.148-151].

Experts note that in a small copper smelting workshop in Qalaliqir 2, the smelting of oxidized copper in a crucible was carried out when the copper alloy collected at the bottom of the crucible in the furnace. In this case, the smelting was carried out at a temperature of 450°C [2,B.14].

In other words, the bronze casting workshop operated using semi-finished raw materials. Melting in a crucible was carried out by blowing air into it. A similar method of smelting semi-finished raw materials was used in settlements of the steppe culture in the Donetsk Basin from a slightly earlier period, where copper ore was melted in small ring-shaped hearths made of sandstone, with crucibles placed in round depressions in the center. The hearths were filled with coal. After the smelting process was completed, the crucibles were broken and copper castings were extracted from them.

In the Kalalikir 2 fortress, in addition to a bronze casting workshop, traces of blacksmithing production were found. Near the temple, a series of large semi-underground structures, rounded and up to 1 m deep, were excavated. Here, the vertical construction of the lower parts of two "hearths" was recorded. Ceramic pipe holes, rising vertically from the bottom of the round hearth to its unpreserved upper part, were cleaned. Fragments of ceramic nozzles were found in a structure near the hearth. Traces of fire have been preserved in the upper part of the semi-underground structure.

Apparently, the blacksmith's forge was supplied with air in a vertical direction using bellows. In the upper "fire" part of the hearth, iron billets were heated, and then products were made from them. The surrounding pits were filled with fragments of iron slag [6,P.148-152.;Fig.4,1-4]. It seems that in the upper hearth stood a master blacksmith, while in the lower semi-basement, the master's apprentice was operating the bellows. In ancient workshops, a water-filled jug was buried in the ground, which was used for tempering metal products [6, p.148]. The layout of the forge's blacksmithing and bronze casting workshop was documented, and the blacksmithing workshop was reconstructed based on ethnographic materials.

All production complexes of the early period in Kalalikir 2 operated only during the construction of the fortress; after the completion of construction, the hearths were dismantled, and semi-basements were filled with debris.

In antiquity, workshops for foundry and blacksmithing crafts existed not only in fortresses and their surroundings but also in rural settlements. Craft villages of this period (4th-2nd centuries BC) were recorded in the Tarimqoya and Tuzqir hills near the Dovdon tributaries and in the Nurum oases [7,P.13-37]. During this period, artisans lived in the territories of Kuhna-Uaz and Qal'aliqir II in the Sariqamish delta region.

In the Nurum oasis, not far from the ancient Gaoir fortress 2 located on the borders of Khorezm, there is a center of diverse craftsmanship. More than 40 pottery kilns have been recorded at this site, as well as traces of casting and blacksmithing [1, p.72]. In particular, the construction of blacksmith furnaces, along with living quarters, was studied in the 15th fortress (1st century) of the Nurum oasis. The blacksmith's hearth was built of square (75 x 80 cm) mud bricks and its exterior was reinforced with clay, leaving gaps between the bricks in two places in the lower part.

The weapons of Khorezm in the ancient period were studied in the scientific works of S.P. Tolstov, M. Mambetullayev, G. Khodzhaniyazov, and many other local and foreign researchers [9, pp. 95-104]. The conclusions of these scientific works recognize that in ancient times in Khorezm, the metallurgical industry, particularly the field of weapons manufacturing, was highly developed. Additionally, artifacts from nomadic monuments in the Sarqamish Basin and the Ustyurt Plateau further enrich historical information about the products manufactured by the weapons industry in antiquity.

CONCLUSION

In conclusion, it can be emphasized that in the fortresses and rural settlements of ancient Khorezm, mainly individual metalworking and blacksmith workshops have been recorded. Nevertheless, the quality and quantity of metal finds in the monuments indicate the development of blacksmithing, weaponry, metalworking, and jewelry making during this period. During this time, the production of a new assortment of products was established in the metallurgical industries. In particular, in addition to metals such as iron, copper, and bronze, the metallurgists of Khorezm were also skilled in processing metals such as gold, silver, tin, and lead. In the 3rd-2nd centuries BC, silver vessels made in Khorezm were exported to the Ural region. The ceramic nozzles, molds, crucibles, and hearths found in Kalalikir 2, Tuproq Kala, and Qoyqirilgan Kala provide rich information about the nature of metalworking workshops of that period.

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