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BERENJ "BRASS" II. IN THE ISLAMIC PERIOD

ii. In the Islamic Period

In the Islamic period copper and zinc, both mined in Iran, were used in the manufacture of two particular alloys, *berenj* or *šabah* (brass) and *šabah mofraḡ* (cast brass).

There were numerous Iranian sources for the copper used in these alloys, but, according to the texts (e.g., Moqaddasī, p. 470; Kāšānī, p. 188), the zinc came exclusively from the province of Kermān. The methods used to obtain *tūtīā* (zinc oxide) from ores are described in medieval sources (Allan, 1979, pp. 39-42): The ore was smelted and the resulting zinc-oxide vapor allowed to condense on baked-clay pegs protruding from the walls in the upper part of the furnace. Such pegs have been found at a variety of sites in Kermān; they also occur elsewhere in Iran, suggesting a more widespread exploitation of zinc than the texts indicate, though the dating of such sites is problematic.

The purest brass alloy used, *berenj* (or *šabah*), was a mixture of approximately 80 percent copper and 20 percent zinc and was beaten into sheets, from which vessels were then manufactured (for analyses, see Allan, 1979, table 21). Inexpensive objects of this type must always have been in use in Islamic Iran. The most impressive surviving examples, however, are ewers and candlesticks produced in Khorasan (probably in Herat) in the late 6th/12th and early

7th/13th centuries. The workmanship is of such high quality, especially considering that the material is a base alloy, that it has been suggested that the craftsmen must have been silversmiths forced for economic reasons to work in a less expensive medium (Allan, 1976-77, pp. 5-21). Particularly noteworthy are the carefully disguised joints between the various sheets used, the quality of the inlaid designs in silver and copper, and above all the outstanding repoussé work. Associated objects in beaten brass include jugs with lids and small table tops.

Beaten brass was also produced in Sīstān during this period and manufactured into objects of relatively good quality, especially basins and trays. Inlays of silver, copper, or both were often used to enhance the pieces. One particular school practiced the art of repoussé on objects that may be bucklers (Melikian-Chirvani).

This same alloy seems to have been used for casting one highly specialized group of objects, astrolabes. No systematic study has yet been published, however, and provisional analyses of a variety of examples suggest some variation in the ratio of copper to zinc. Small amounts of lead, presumably added to facilitate casting, are also recorded.

The alloy known in Arabic texts as *šabah mofraḡ*, often called a "quaternary alloy" in contemporary publications, was widely used for a variety of cast metal objects. It consisted of copper, lead, zinc, and tin in descending quantitative order and was presumably made from melted-down scrap metal, with extra lead added to facilitate casting (see Allan, 1979, pp. 45-46 and table 21). Typical products of the early Islamic period are pestles and mortars, incense burners, cauldrons, ablution buckets, lamps and lampstands, and bottles and ewers. All these types occurred in a wide variety of forms before the 16th/12th century, and examples from eastern Iran and Afghanistan are numerous in museum collections and on the art market. From about 500/1100 onward the surviving objects are distinguished by less variety of form and greater richness of decoration, including inlay. Two famous examples may be cited: the so-called "Bobrinski bucket" in the Hermitage Museum, dated 559/1163 , and in the same collection an aquamanile in the form of a zebu and nursing calf, dated 603/1206 (*Arts of Islam*, nos. 178, 180). The latter was made by means of the lost-wax process (for a description of this process, see Untracht, pp. 338-77). The inscription on each piece records that the casters and inlayers were different individuals, indicating division of labor within the industry. Occasional pieces made for members of the ruling class have

survived, but most of those with owners' names belonged to merchants or other members of the bourgeoisie.

There were minor changes in the use of brass alloys between the 7th/13th century and the Safavid period (907-1145/1501-1732), reflecting changes in fashion and taste. Up to about 750/1350 fine inlaid brass was produced in northwestern Iran and in Fārs for both royal and courtly patrons, but from the 8th/14th century onward tinned copper became increasingly popular for less expensive objects, and in the 16th and 17th centuries a taste for heavily incised brasses became widespread. Inlay work was by then comparatively rare, being confined to a group of late Timurid and early Safavid jugs produced in Herat (Komaroff, pp. 11-16) and to an occasional Safavid piece of later date,(e.g., an "anchor" in the David collection, Copenhagen; see "Art from the World of Islam," no. 228). Instead objects are usually heavily decorated with incised designs drawn from the court styles of the period. Particularly striking are torch stands.

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PLATE VIII. Ewer, beaten brass (ca. 80 percent copper, 20 percent zinc) inlaid with silver and copper, ht. 40 cm, Herat, ca. 600/1200 (British Museum, 1848.8-5.2)

PLATE IX. Bucket, cast quaternary alloy of copper, lead, zinc, and tin, inlaid with copper, diam. 19 cm, Khorasan, 6th/12th or early 7th/13th century (Ashmolean Museum, Oxford, 1969.8)