



## COPPER I. IN ISLAMIC PERSIA

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Although copper is mentioned in geographical texts much less often than the precious metals, it appears to have been mined over wide areas of Persia in early Islamic times. Copper ores occur abundantly around the edges of the Persian plateau, and mines were probably worked seasonally until local supplies of fuel ran out (Allan, 1979, pp. 34-35). In the 10th century geographers reported copper mining in the mountains of Ferghana (Farġāna) and elsewhere in Transoxania (Ebn Ḥawqal, pp. 488, 515, tr. Kramers, pp. 468, 492; *Hodūd al-ālam*, tr. Minorsky, p. 116), in Khorasan (Ebn Ḥawqal, p. 434, tr. Kramers, p. 419: mountains of Ṭūs; *Hodūd al-ālam*, tr. Minorsky, p. 103: mountains of Ṭūs), in Kermān province (*Hodūd al-ālam*, tr. Minorsky, p. 65), around Isfahan (Ebn Rosta, p. 156, *ṣofr*), in Kūzestān (Moqaddasī, p. 324), and in Fārs. The ore from Sardan in Fārs was exported, especially to the southern port of Baṣra in Mesopotamia (Eṣṭaḳrī, p. 155; Ebn Ḥawqal, p. 300, tr. Kramers, p. 295). Indeed, Mesopotamia probably depended on Persia for copper (Allan, 1979, pp. 33-39). By the 17th century demand for copper in Persia had apparently outstripped the capacity of the indigenous mining industry. In the two decades 1060-81/1650-70 the Vereenigde Oostindische Compagnie (Dutch East Indies company; see [dutch-persian relations](#)) shipped 50,000-100,000 pounds of Japanese copper bars to Persia annually (van Dam, pp. 360-01). Partly owing to the discovery of new ore deposits in Persia at the end of the century (Fryer, III, p. 12), these imports fell to about 25,000 pounds a year in 1219/1805 (Algemeen Rijksarchief, KA 1805, f. 41).

In the 1730s Persia, encouraged by an improved exchange rate for copper



resulting from a shortage of gold and silver, even began to export copper [coins](#), blocks, and utensils to India to finance imports. In the early 19th century it reexported copper from Asia Minor to India (Jaubert, p. 152). Throughout the 19th century most copper used in Persia was imported in sheet form from Great Britain or to a lesser extent from Russia (Curzon, *Persian Question* II, p. 517; Polak, II, p. 175; McLean, Report, p. 24; Diplomatic and Consular Reports 2346, Bushire, 1899, p. 6; 1892, Meshed, 1892, p. 3; 1662, Ispahan, 1894-95, p. 19). There were a number of reasons why Persian mines could not keep up with rising domestic demand (Floor). Extractive methods were primitive, and there were no men trained to operate complex imported European machinery. Fuel for processing was in short supply; even when coal deposits lay near the mines they were not exploited (Schlimmer, pp. 173-74). Even rich deposits earned low profits because of heavy taxation by local governors, and in Khorasan Turkman raids periodically interrupted mining operations (Polak, II, p. 175).

In 1324/1906 the annual demand for sheet copper at Yazd was an estimated 60 tons, though “the demand greatly depends on general prosperity and the cost of living” (“Report on the Trade of Copper,” in *Diplomatic and Consular Reports*, p. 7). Persia remained a net importer of copper until 1347 Š./1968, when the Sařčařma mine near Kermān was discovered (*Iran Almanac 1968*, p. 325). It is one of the largest copper deposits in the world, with estimated reserves of 800 million tons of ore, with a copper content of 1.12 percent. The Šahīd Bāhonar copper works extracts 144,000 tons of metal from the mine annually; the nearby industrial complex has the capacity to produce 55,000 tons of copper goods each year, approximately half of national requirements (*Yearbook Iran 1989/90*, pp. 14-32, 1448).

*Uses of copper.* Apart from its continuous use in coins (*folūs*), in early Islamic times copper was the primary metal in the alloys [bronze](#) and [brass](#). In the 12th century it was also widely used for inlaying bronze and brass objects (e.g., the “Bobrinski bucket,” made in Herat in 559/1163; *Survey of Persian Art*, pl. 1308). Less luxurious objects might be inlaid only with copper, but on more sumptuous pieces it was used in combination with silver and a black bituminous compound to give polychrome effects. The balanced use of copper and silver on one 12th-century inkwell suggests that some metalworkers turned to such inlays as a way of transposing polychrome book illustrations into the medium of metalwork (Allan, 1982, no. 1). As metalworkers drew



away from manuscript sources and evolved their own decorative traditions, copper was less favored than the more prized metal, silver, as a material for inlays. Certainly after about 596/1200 copper inlays became increasingly rare on luxury objects. Goldsmiths also used copper, as an alloy for hardening or coloring gold (Hamdānī, fols. 71b-72a; Allan, 1979, pp. 9-10). Other compounds were manufactured for painting (verdigris, *zangār*; Wiedemann, p. 321), for coloring glazes (copper oxide; Allan, 1973, pp. 112, 114, 118-19), and for medicines (Bīrūnī, *Ṣaydana*, ed. Said, text pp. 361-62, tr. p. 321). The most attractive copper ore, malachite (*dahnaj*, *dahna*), was itself used for ornamental purposes; both Bīrūnī (*Jamāher*, ed. Krenkow, p. 196) and Kāšānī (700/1301; p. 134) singled out Kermān province as the main source of this mineral.

*Manufactured objects.* Objects apparently made of unalloyed copper survive in very small quantities from early Islamic times; some examples have been excavated at such archeological sites as Sīrāf (not yet published). None of these objects has been analyzed, however, so that their relative purity is uncertain; they may have been made of some sort of bronze or brass. The general rarity of early Islamic copper objects is probably owing to the fact that they were normally purely utilitarian, beaten out of sheet copper and left undecorated for town or village use; they would have been melted down and reworked when old.

In the 15th century, however, decorated objects made of tinned copper became common. The reasons for this change are unclear but may have been related to the gradual dwindling of interest in inlaid base metals and the return to precious metals for luxury objects. Tinned copper seems to have been used for decorated metalwork marginally earlier in the Mamluk world (primarily Egypt and Syria) and Iraq than in Persia (Ivanov, pp. 114-35, esp. figs. 1, 15), which probably explains its widespread use under the Turkman dynasties of northwestern Persia, Iraq, and eastern Anatolia, while the tradition of inlaid brass continued somewhat longer in Herat. The Turkman style is characterized by voluminous blossoms and cloud scrolls, which in their exuberance often recall the vivid use of color and fantastic landscape in Turkman miniature painting (Melikian-Chirvani, no. 110). A close link with Mamluk designs is visible, particularly in the inclusion on some pieces of a popular late Mamluk poem of good wishes in Arabic (Allan, 1991; cf. Melikian-Chirvani, nos. 109, 113) and the use of inscriptions framed in oval cartouches



that are interlaced with roundels filled with interlocked-Y patterns. On the other hand, the group is linked with Ottoman ceramics and metalwork by a taste for small plates with very flat, narrow rims and for candlesticks with beveled edges on the shoulders (Melikian-Chirvani, no. 110, fig. 63).

Under the Safavids tinned copper seems to have been common throughout Persia, whence the taste spread to Mughal India (Melikian-Chirvani, chaps. IV-V; Allan, 1986, nos. 39-40). The designs on most Safavid tinned-copper objects seem to have been derived from the Timurid tradition, rather than that of the Turkman dynasties, though some are related in style to Safavid painting. For example, a group of objects with figural decoration has been linked to western Persia in the second quarter of the 17th century (Melikian-Chirvani, nos. 152-53). How many of the tinned-copper objects ascribed to Persia in this period really are Persian, however, has yet to be established; many of them may be from Mughal India. The history of tinned copper under the Qajars is little known, though the late 18th and 19th centuries are notable for frequent municipal issues of copper *folūs* (Rabino di Borgomale). According to J. E. Polak, in about 1276/1860 there were 600 active copper workers in Kāšān, which was noted for the fine quality of its copper utensils (II, p. 175; Narāqī, pp. 270-72); Isfahan was another center (Taḥwīldār, pp. 106-07).

The products of the copper-sheet maker and the coppersmith in the 20th century, together with the techniques and terminology associated with these trades, have been studied by Hans Wulff (*Crafts*, pp. 22-28) and Sigrid Westphal-Hellbusch and Ilse Bruns (pp. 91-115).

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