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SILVER

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Silver (*sim*, *noqra*) in Iran was principally found during medieval times in the northeastern areas of greater Iran. Maria Deknowna identified four principle areas of importance: Panjhir (Ar. Banjhir; in present-day Afghanistan); the area of Ilāk (Ar. Ilāq), in the valley of the River Angren and the Karamazar Mountains (present-day Uzbekistan); the central valley of the River Talas (Ar. Ṭarāz; present-day Kirgizstan); the Pamir Mountains, in the valleys of the rivers Bāzār-Dara, Toguz-Bulak, and Shugnan (present-day Tajikistan; Dekowna, p. 500.) In Central Asia, the mines of Čāč (Ar. Šāš; Tashkent) were important during the 9th century CE, according to Ebn Ḵordāḏbeh (p. 39) and Qodāma (Allan, 1979, p. 116). Other mines in Central Asia operating in the 10th century CE included those at Samarkand and Bukhara, according to Ḥasan Hamdāni, and mines in Farḡāna described by Ebn Ḥawqal (Hamdāni, folio 25a, p. 144; Dunlop, pp. 40-41; Ebn Ḥawqal, p. 515). In eastern Iran, mines in Khorasan included those of Balkh, Ṭus, and Nishāpur (Dunlop pp. 40-41; Hamdāni, fol. 25a, p. 144). Of these, the richest mines were those at Panjhir and Ilāk, the latter declining towards the end of the 10th century CE.

Other areas in Iran with silver mines according to medieval authors included Mazandaran, Jebāl, Kerman, Fars, and Sistan (Allan, 1979, Table 7, pp. 116-18). Silver mines were reported in Ṭabarestān, the southern shore of the Caspian Sea, by Ebn Esfandiār (tr., p. 33), writing in the early 13th century CE, before the Mongol invasions.

Although a small amount of silver can be obtained in its natural state as small nuggets, as noted by Biruni and Kāšāni, the majority of silver comes from argentiferous lead ores, either galena or cerrusite (Allan, 1979, pp. 13, 30; Biruni, p. 244, tr. Said, p. 209; Kāšāni, pp. 224-27). Many of the medieval Islamic authors noted that silver is contained within lead. Abu Dolaf mentioned the extraction of silver from lead dross/litharge (*mordārsanj*/*mordārsang*) from a mine at Alarān, stating that he extracted 1½ *dang*s of silver from each maund/*mann* of litharge, or about one gram of silver from 3,120 grams of litharge (Minorsky, p. 33, par. 8; Allan, 1979, p. 17). Nišāpuri and Kāšānī also noted that most silver is extracted from lead (Nišāpuri, p. 315; Kāšāni, p. 224). As James Allan has observed, it is necessary to look at the location of lead as well as silver mines to obtain a full picture of silver exploitation in Iran (see MINING IN IRAN). James Mactear reported in the late 19th century that 13 oz. of silver per ton of lead was recoverable when he took samples from the lead mine of Ganjābād, a village in Zanjān district (Mactear, p. 10).

The separation of silver from lead is described by Hamdāni, who gives an account of a furnace for smelting crushed ore, resulting in a residue of combined lead and silver (Hamdāni, fol. 56a, p. 268; Dunlop, pp. 46-48). The ingot of lead and silver then required further refining to obtain the pure silver. This could be achieved through cupellation. Hamdāni described cupellation through use of crushed, burnt bones (Hamdāni, chap. 22, fol. 57b-60a, pp. 274-84) and also salt and crushed brick, thus providing the earliest known detailed description of the process. Nišāpuri describes a process using a cupel (*gāh*) of ash to remove lead (Nišāpuri, p. 315). Kāšānī, who is probably following Nišāpuri's description, recounted a similar process (Kāšānī, p. 227).

Recovery of silver from Iranian mines was always subject to economics and the availability of local resources. Mines could be uneconomical to work because of the difficulties of transporting the raw materials to a suitable place for processing. Equally, local lack of fuel could prevent effective smelting in situ. Ebn Ḥawqal noted that lack of wood had closed a silver mine at a place he called Silver Mountain (*jabal al-feżża*; Ebn Ḥawqal, p. 441; tr., p. 426). Both of these issues are mentioned by Abu Dolaf, with lack of fuel and the expense of extraction cited for failure of the mines at Šiz and Ray, respectively (Minorsky, pp. 2, 31, par. 4 and pp. 19-20, 51, par. 48). John Fryer, writing in the late 17th century, noted that there were gold and silver mines near Shiraz,

but that they were not economical to operate and had fallen into disuse (Fryer, p. 333). These issues continued to be a problem as late as 1895 (Mactear, pp. 30, 32, 36-37).

Hamdāni gives us a rare account of the social conditions and financial arrangements at the silver mines during the 10th century CE, describing the division of silver at the Andarāb mine in Khorasan after a day's work, with the government, the town, and the miners each retaining a third of the produce (Allan, 1979, p. 14; Dunlop, pp. 40-41; Hamdāni, fol. 24b-25a, pp. 142-45). Silver kept by the miners and local citizens was either worked by them or sold to a merchant. The government's share was stored or minted as silver dirhams (Allan, 1979, p. 15).

Some mints were established close to the silver sources, including Šāš and Panjhir, while some un-minted silver was carried further afield to other mints such as the one in the Balkh area, which, according to Hamdāni, received un-minted silver from the mines of Andarāb. (Allan 1979, p. 16; Hamdāni, fol. 24b, p. 142)

Silver obtained within the borders of greater Iran was often not sufficient for domestic requirements, and Iran regularly looked beyond its frontiers for supplies of silver. Additional silver in the 10th century CE probably came from the mines in Yemen, described in detail by Hamdāni, who mentioned merchants from Fars traveling to Yemen to buy silver (Allan, 1979, p. 16; Hamdāni, fols. 25b-26a, pp. 146-49). In the Il-khanid period, silver may also have been imported from Asia Minor (Rum) to supply Tabriz (Allan, 1979, p. 118; Kāšāni, p. 224). Safavid Iran needed large quantities of silver, and exported significant quantities of the metal to India to pay for textile imports throughout the 17th century. Lacking significant internal sources of silver, as mines were not economical to operate, Iran acquired much of this bullion as a result of the silk trade with Ottoman Turkey (Floor and Clawson, pp. 347-48).

Silver could be subjected to surface treatments, although to a lesser extent than gold. Nišāpuri noted that, if other metals were mixed with silver, the color would change but could be restored by refining again in a crucible (*gāh*). He also observed that, if sulphur was added to silver while it was being heated, the color and appearance would be ruined (Nišāpuri, pp. 315-16). Silver was often amalgam gilded and could be further enhanced by niello inlay, as in a silver bottle dating from the 11th-12th century CE (Freer Gallery of Art, Washington D.C. inv. no. 1950.5; Atil, Chase, and Jett, pp. 83-87, no. 10; Figure

1).

Efforts were made to find inexpensive, and possibly fraudulent, substitutes for silver, and Nišāpuri gives three recipes. The first is by mixing copper with a preparation of mercury and other minerals, producing a metal that turns white like silver. The second involves iron or steel filings. The third is again a mixture of minerals with glass and tin, which can be added to copper to make a material which he says is only distinguishable from silver by refining (Nišāpuri, p. 319)

Recipes for silver solder are given by Hamdāni, Nišāpuri, and Kāshāni. Hamdāni specifies two types of solder, one for fine silver, with 1 dirham of silver and ¼ dirham of brass, and another for poor silver, of 8/15 poor silver, 2/15 good silver, 4/15 copper, and 1/15 tin (Allan, 1979 pp. 18-19; Hamdāni, fol. 69a, p. 320.) Nišāpuri specifies ½ dirham of silver and 1 ½ dang of brass (Nišāpuri, p. 317). Kāšāni's recipe gives ½ dirham of silver and ½ *dāneq* (*dāneg*) of brass, melted and mixed with borax (Allan, 1979, p. 19; Kāšāni, p. 226).

The use of precious metals, including silver, for eating and drinking as well as personal adornment, was generally condemned in Muslim tradition (Juynboll, pp. 107-14; Spink and Ogden, pp. 13-19). Nevertheless, continuing pre-Islamic traditions, silver was used in Iran to make vessels and jewelry, as well as to decoratively enhance objects made in other metals and materials.

Relatively few vessels in silver survive from Iran during the entire Islamic period from the mid 7th to the 19th centuries CE. The scale of loss must be attributed to the continuous need for silver to finance wars and to pay for imports, particularly textiles from India, by the export of gold and silver (Floor and Clawson, pp. 348, 363). James Allan has suggested that fewer than 75-80 silver objects, apart from jewelry, survive from the medieval Islamic world (Allan, 1986, p. 57). Some surviving silver vessels have been found in hoards, including a group of eleven items found in northern Iran, which had been made for Amir Abu'l-ʿAbbās Valgir b. Hārun, probably in about 1000 CE (Iran Bastan Museum, Tehran; Pope and Ackerman, IV, pls. 1345-46). Other vessels have been discovered by chance, often in Siberia, where they may have been taken to trade for furs (Marshak, 2004, p. 255). Nevertheless, the form and decoration of remaining silver vessels provide crucial information for the understanding of the development of copper alloy within Iran, although there is little secure archeological evidence (Allan, 1976-77). Silver was used to make a wide variety of jewelry from the 7th century CE onwards in Iran,

including bracelets, earrings, pendants, and amulet cases, as well as horse trappings and belt fittings. Some silver jewelry types can be dated through hoards, including the Chimkent hoard found in the Sayram-Su River valley in Kazakhstan (Spitsyn, pp. 254-57; Spink and Ogden, pp. 167-68).

Most silver vessels datable to the Mongol period in Iran have emerged through the art market, without reliable information on their place of origin (e.g., Christie's lot 272). Other silverwork of the period includes a group of strap bracelets with distinctive lion-head terminals, made of both cast and sheet silver, datable to the 13th-14th centuries CE from Iran (Spink and Ogden, pp. 436-58).

Among the very few surviving Timurid silver objects are a jug and a bottle, made for an amir named Qāsem b. ʿAli, both now kept in the State Hermitage (State Hermitage, St Petersburg, CK-585 and CK-586; Ferrier, p. 182, fig. 22).

A shallow silver bowl decorated with arabesques may date from the late Timurid or early Safavid period (Freer Gallery of Art, no. 54/115; Atil, Chase, and Jett, pp. 186-90, no. 26; Figure 2). Silver mosque lamps, notable for their lack of decoration, include a specimen dated 1023/1614 in the Muza-ye Melli, Tehran (Allan, 1995, pl. XIVc). Silver was also used for architectural fittings during the 17th and 18th centuries, although none survives prior to the Safavid period in Iran. Among the most substantial survivals are silver facings on doors at Ardabil and Isfahan, dated between 1011/1602-3 (Ardabil) and 1126/1714 (Isfahan; Allan, 1995, pls. XV and XXa).

Despite the paucity of surviving silver vessels, literary evidence provides a coherent picture of the extravagant use of silver within a courtly environment. Gold and silver plate formed an essential component of the royal feast (*bazm*), and vessels of silver are described in accounts of feasts given by the Samanid and the Ghaznavid rulers (Melikian-Chirvani, p. 97). The Spanish traveler Ruy González de Clavijo described the use of platters and goblets of silver and gold during a feast at Timur's court (Clavijo, pp. 193-95). An account written by Adam Olearius, a visitor to the court of Shah ʿAbbās II in the mid-17th century CE, described large quantities of silver dishes used for food (Olearius, pp. 197, 202-3; Allan, 1995, p. 124). The same author described the massive silver chain hanging at the gate of the shrine of Shaikh Ṣafi in Ardabil (Olearius, pp. 178-79; Allan, 1995, p. 125).

Extensive use of silver inlay to enhance copper alloy vessels was made in

eastern Iran from the mid 12th to the early 13th century CE. The earliest dated piece inlaid with silver is a pen box in the State Hermitage Museum, dated 542/1148 (Giuzalian, pl.1, figs. 1-2). Silver inlay was also used in western Iran from the later 12th century CE onwards, where its use expanded following the arrival of refugees from Mongol invasions in the east. This use of silver inlays seems to have died out early in Safavid times. Later, silver was used as overlay on steel, especially on three-dimensional animals and other objects of the Qajar period.

Silver vessels made in Iran prior to the Mongol invasions (616/1220) may bear inscriptions naming their patron or owner. These include a silver bowl made for the Ziyarid queen of Gorgan, datable to the 1040s (Los Angeles County Museum of Art, inv. no. 73.5.149; Marshak, p. 113, note 46 and fig. 146) and the Amir Abu'l-ʿAbbās Valgir b. Hārun hoard, mentioned above. The overwhelming majority of patrons were of royal or noble origin—a fact suggesting that, in this period, silver products were generally owned by the aristocracy. The number of inscribed silver vessels that have survived from the 13th-15th century is not large enough to draw conclusions regarding patronage. From the Safavid period, a silver door facing in Ardabil, dated 1011/1602-3, was probably commissioned by the governor, Ḏu'l-Faqār Khan (d. 1018-19/1610), while others are known to have been commissioned by Shah ʿAbbās I (r. 995-1038/1587-1629). Silver door facings at Isfahan were commissioned by Shah Ṣafi I (r. 1038-52/1629-42; Allan, 1995, pp. 125, 130). However, once again, insufficient other silver vessels fails to enable us to determine how far down the social scale the use of silver went.

In the period before 1200, few silver vessels were signed by their maker, which contrasts with copper alloy vessels of the same period, which were more likely to bear a craftsman's signature. The number of signatures on silver may have increased under the Safavids and Qajars. Door facings at Ardabil were signed by Amir Khan Ardabili in 1020/1611-12 (Allan, 1995, p. 127). Among the few objects of Safavid silver, a bowl is recorded as signed by Taqi Jilāni, and dated 1063/1652-53 (Mayer, p. 86.). In the Qajar period, signed silver objects include a tray by Jaʿfar, held in the State Hermitage (State Hermitage, St Petersburg, inv. no. VS-110; Ivanov, Lukonin, and Smesova, p. 34, no. 87, pl. 144).

While in larger workshops or communities the silversmith (*noqrasāz*, *noqrakār*) might work separately from the goldsmith (*zargar*), in smaller communities the goldsmith might be working in both gold and silver (Wulff, p.

32).

Secure identification of silversmithing centers is rarely possible. Centers of production for silver work may well have been clustered around the areas with mines. There may have been a center in Ṭabarestān in the early Islamic period, as it had to pay a tribute of 400 silver cups to the Umayyad Solaymān b. ʿAbd-al-Malek (r. 96-99/715-17; Balāḏori, p. 338; Serjeant, p. 98). Significant silver production occurred in the region of Sogdia and eastern Iran in the period before conversion to Islam and continued thereafter; in the years before the Mongol invasions, the historian Bayhaqi recorded that Balkh had a silversmiths' quarter (Bayhaqi, apud Allan, 1979, p. 21; Marshak, 1971). During the Mongol period in Iran, from the later 13th to the 14th century CE, silver vessels were probably produced at court workshops. Under the Safavids, Qazvin may have been a silversmithing center when Sir Anthony Sherley was in Persia in the late 16th century (Ross, pp. 120, 210). The use of silver doors in Isfahan in the 17th and 18th centuries CE suggests that there was a silversmithing center there.

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