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CRYSTAL, ROCK
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CRYSTAL, ROCK

CRYSTAL, ROCK (*bolūr*, *bolūr-e kūhī*), a pure, transparent variety of quartz (SiO_2; see, e.g., *Encyclopedia Americana*, s.v. quartz), usually called "rock crystal" to distinguish it from crystal glass. The Persian term for "rock crystal," *bolūr* (Pahl. *bēlūr*), was ultimately borrowed from Sanskrit *vaiḍūrya*; Arabic *ballūr* or *bellawr* was probably borrowed from Persian and passed into Western languages as *beryl*. The meaning of the Sanskrit word is disputed; it probably did not refer to rock crystal, which was called *sphātáika* (see, e.g., Masters). In Sanskrit Buddhist texts *vaiḍūrya* appears to refer to lapis lazuli (for a survey of opinions on this point, see Birnbaum, pp. 64-66). In Sogdian Buddhist texts the word *ʾpkynʾk* is used to render Chinese *liu-li*, which in turn renders Sanskrit *vaiḍūrya* (see, e.g., MacKenzie, p. 74; Birnbaum, pp. 64-66). The etymologically related Pahlavi word *ābgēnag* is commonly rendered as "crystal, glass" in the literature, though there is no textual evidence for the kind of mineral to which it refers (for a discussion of this word, see Bailey, *Zoroastrian Problems*, pp. 130-31). In European languages the names for this mineral are derived from Greek *krystallos* < *kryos* "frost, cold, icy," expressing the idea that rock crystal is a form of petrified ice (Pliny, 37.9.23).

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i. Until the End of the Sasanian Period

The reports of Pliny the Elder on the rock crystal used in Rome seem to confirm the Indian origin of the mineral. As far as he knew, the Romans had learned the appreciation and use of rock crystal from the peoples of the Near East. He recorded sources of the mineral in Asia Minor, Cyprus, the Alps, Arabia (according to modern scholars, meaning the areas between the Fayyūm and Baḥrīya in the western desert of Egypt, as well as Sinai), Portugal, and India. That from India was preferred (Pliny, 37.9.23; Helck; cf. Diodorus Siculus, 2.52.2; Strabo, 15.1.67), and the derivation of the Persian term *bolūr* from Sanskrit *vaiḍūrya* suggests that the mineral may have been imported to ancient Persia from the Indian subcontinent. Rock crystal apparently does occur frequently in the mountain regions of Persia, though it is not possible to determine precise sources that might have been used in antiquity (see ii, below). Areas of present-day Afghanistan and Turkestan (Ḡazna, Kāšgar) where large deposits are found belonged at times to the Persian empire (cf. Lamm, p. 2604). Rock crystal occurs as large chunks in clefts, geodes, and caverns and as pebbles in gravel. Only a few, rather unclear discussions of how it was worked in the Near East and Egypt in antiquity have been published (Beck, pp. 19ff.; cf. Balfour, I, p. 849, III, pp. 287-88, 432; Helck).

Rock crystal was used in ancient times for many kinds of objects: tools,

jewelry, decorative pieces, vessels, optical devices, handles, and inlays. Taken together, the evidence from texts, controlled archeological finds, and examples in collections of every kind, as well as from the art market, produces so general a picture that it seems most appropriate to discuss the material according to the broad functional categories of objects and inlays.

Objects of rock crystal. In Paleolithic caves in northern and western Persia excavators found levalloiso-mousterian "quartz crystals, which looked as if they had been handled" (Coon, p. 67). Blades and other utensils made from rock crystal dating from the end of the Mesolithic and the proto-Neolithic periods have also been found along a diagonal line across Persia, approximating what later became the Persian section of the Silk Route (Ghirshman, 1935, p. 232; idem, 1938, pls. LV/43-44, XCVI/59; Huckriede, p. 39; Davoudzadeh, pp. 86-87; Ghorashi, pp. 151-52; Tosi, *RlA*, pp. 247-48). It is often difficult to evaluate the extent to which rock crystal was used, however, as it is not always distinguished from other quartzites in the descriptions of material remains given in excavation reports. The same is true of studies devoted to early bead manufacture (see, e.g., Amiet, p. 87).

Once precious stones began to be worked for jewelry, rock-crystal beads began to appear in Persia, as in the entire Near East, including Egypt. In general, however, rock crystal never became popular as a gemstone, for it lacked the appeal of color, which was so much appreciated in that part of the world. In excavated necklaces rock crystal is usually found in combination with beads of other stones (e.g., lapis lazuli, carnelian [q.v. Suppl.], calcite), gold, or both. Finely carved beads in various shapes, including teardrop, barrel, and especially disk forms, were found in 4th-millennium B.C.E. levels at Tepe Sialk (Sīalk) in central Persia (Ghirshman, 1935, p. 235; idem, 1938, pp. 56, 82, 99 pl. LXXXVI); in 3rd-millennium contexts at Tepe Hissar (Ḥeṣār) III in Gorgān (Schmidt, 1937, p. 223; cf. p. 226 figs. 136-37) and Shahr-i Sokhta (Šahr-e Sūḵta) in Sīstān (Tosi, 1969, p. 374 fig. 261); at 2nd-millennium Susa (de Morgan, pp. 57, 111); and at Achaemenid Persepolis (Schmidt, 1957, p. 76, table III, pls. 43, 44). The disk-shaped beads closely resemble examples found in Asia Minor (Koşay, pp. 119-20, pl. 124/34; cf. Rova, pp. 109ff.) and Mesopotamia (see, e.g., Speiser, p. 134; Heinrich, pp. 41-42 figs. 7/40-41, pl. 37a; Lenzen, p. 26, pl. 20*h*La terra, nos. 90-91, 149). Gradually milky-white or transparent glass beads came to be substituted for those of rock crystal, probably by less prosperous people (cf. Hassani Mahale [Ḥasanī Maḥalla] of the Arsacid period and Ghalekuti [Qalʿa-kūtī] of the Sasanian period, both in Gīlān; Sono and Fukai, pp. 67-68,

pls. XXXVIII/1-2, L/5a-b, color pl. 3/4). One piece of rock crystal set in copper from Hassani Mahale is evidence for the manufacture and use of pendants (Sono and Fukai, pp. 19 no. 29, 66, pls. XXXVIII/11, LXIV/13). Certainly rock crystal must also have been carved in the shapes of figures and objects and placed in settings of precious metal, to be worn as pendants suspended from necklaces. Examples have not been found at Persian sites but are known from the Bronze Age site of Ebla (Tell Mardīḵ) in Syria, as well as from Assur and Babylon in Mesopotamia; some have also appeared on the art market (Matthiae, p. 52 fig. 23; Andrae, pp. 129*as*, 130*aq*, 146, pls. 34/a, f, 35/d, h, 36/g-gl; Reuther, p. 180, pl. 54c; Akurgal, pl. 53 right; *Ancient Near East*, no. 36; Moortgat-Correns, p. 293). Rock crystal was used for both cylinder and stamp seals, but not as frequently as many other gemstones. This relative scarcity is certainly partly attributable to the hardness of the material, which makes it much more difficult to work. In general, however, the choice of rock crystal does not seem to have been determined by such practical motives but rather by the specific purposes for which an object was intended. Fine examples of seals from the Achaemenid, Arsacid, and Sasanian periods are to be found in various collections (Delaporte, 1910, pl. XXVII/390; idem, 1920, p. 84 no. D.284, pl. 56/60; Porada, no. 827; Vollenweider, pp. 85 no. 99, 89 no. 108; *Skatte*, no. 328; Bivar, p. 61 no. BL2, pl. 7; Buchanan and Moorey, no. 449; Brentjes, pl. 142/216; Brunner, nos. 23, 108, 210). It is also possible that appliqués for garments were made from rock crystal. The Achaemenids are known to have worn jeweled robes (Quintus Curtius, 3.3.13-14; see clothing ii), and the rock reliefs at Ṭāq-e Bostān provide important evidence for the Sasanian period (Fukai and Horiuchi, pls. III ff.; see CLOTHING iv).

Early in the 2nd century C.E. Athenaeus (see ATHENAIOS), in his *Deipnosophistae* (q.v.), included reports from earlier sources on precious ornaments and decorative objects at the Achaemenid court. Above the royal bed there were supposed to have been golden vines, studded with jewels, that is, with grapes made from precious stones (12.514, 12.539), and it is also possible that rock crystal was used in such decorations. Two lion heads now in the Cluny museum in Paris, though difficult to attribute, are indications that rock crystal was also used for furniture fittings (Caillet, p. 157 no. 72). In the *Šāh-nāma* a gold throne fitted with crystal is mentioned (Moscow, II, p. 76 v. 16). It can also be concluded that the transparency of rock crystal inspired stone carvers to make lamps or parts of lamps and objects for lighting from it, though literary and archeological evidence from Persia is lacking.

The use of drinking vessels made of rock crystal has a very long tradition in the Near East. A fragment of a bowl was found at Neo-Assyrian Nimrud (see, e.g., von Saldern, p. 30 fig. 8; Kantor, pl. 1494E). It provides evidence that the manufacture of glass and the carving of rock crystal were closely related, as the same shapes and decoration appeared in both media (von Saldern, p. 30), generally corresponding in turn to those of metal vessels. In the Near East, as later in ancient Rome (Pliny, 37.10.29), the manufacture of clear glass was stimulated by a desire to imitate rock crystal as closely as possible, in order to be able to provide a cheaper substitute for the market. Drinking vessels of rock crystal are attested in literary sources. Aristophanes, for example, provided this (probably not accurate) description of the Achaemenids' dining customs: “At the banquet we must drink sweet pure wine from golden bowls and crystal beakers, whether we want to or not” (*Acharnians* 59-85). A few fragments of rock-crystal vessels were found at Persepolis (Schmidt, 1957, p. 91, pl. 65/7-11). Although they are too few and too small to provide clues to Achaemenid vessel forms, they do furnish evidence that at least a small number of examples were richly carved. For example, there are sherds carved with a twelve-petaled rosette and a piece on which the end of the tail of a bird of prey and a meander decoration are recognizable. According to Pliny the Elder, the custom of drinking wine from rock-crystal vessels was adopted by the Romans after their conquest of the Near Eastern peoples, not only because of their sparkling brilliance but also because cooling properties were ascribed to the material; Pliny also reported on the great appreciation of these vessels and their costliness in ancient Rome (37.10.29). They must have been equally valued in ancient Persia. Several vessels from the art market, reportedly of Persian provenience, give an impression of the greatest cultivation and luxury (*Trésors*, p. 131 no. 775, pl. 84; cf. no. 776; *Abegg-Stiftung*, nos. 13, 16; Kantor, pp. 2981ff.). The use of rock-crystal vessels continued into the Islamic period; some were ornamented with gold, silver, and precious stones (e.g., Lamm, pl. 1456B).

It is possible that magnifying lenses and burning glasses were also made of rock crystal. A. H. Layard reported a lens of this mineral with one convex and one flat side from the Assyrian site of Nineveh in northern Mesopotamia (8th-7th century B.C.E. ; Layard, p. 148; cf. Forbes, pp. 186, 171ff.). The interpretation of the lens as a burning glass is consonant with reports from ancient Rome (Pliny, 37.10.28), Greece (Aristophanes, *Clouds*, 744ff.), and India (Rau, pp. 3ff.). It is thus permissible to assume that rock crystal was used in similar ways in Persia.

Rock crystal was also used for the manufacture of hilts, perhaps less because of its decorative properties than because it is comfortable to grasp. There is no archeological evidence of rock-crystal handles for weapons from Persia. Nevertheless, a dagger handle known from the art market (Galerie Koller, p. 11 no. 2), with a knop of gold and rock crystal, is stylistically very similar to the handles of daggers with broad leaf-shaped blades that have been found in Mesopotamia and in Luristan (see Calmeyer, pp. 17ff.). Together with other non-Persian examples (Mellaart, p. 159, pl. XXIIb; Carter, p. 185, pls. 30k, 87B; Dörpfeld, figs. 353-55) this piece demonstrates the popularity of rock crystal for dagger handles at the end of the 3rd and the beginning of the 2nd millennium B.C.E. and may be a clue to such use in Persia.

Rock-crystal inlays. Although in literary sources rock crystal is rarely explicitly mentioned among inlay materials, it must be remembered that it was probably among those mentioned in the following historical reports, beginning with the Achaemenid period. Among objects mentioned were jeweled gold vessels given as gifts (Athenaeus, 2.48-49), a horse with a gold-mounted bridle (Xenophon, *Anabasis* 1.2.27; idem, *Cyropaedia* 8.28; cf. the harness studded with precious stones on a relief from Persepolis, Schmidt, 1953, pl. 52; cf. pl. 42B), four jewel-studded posts for the baldachin of the Achaemenid great king (Athenaeus, 12.514c), the bejeweled yoke of the battle wagon of Darius III (336-31 B.C.E .), his sword (Curtius Rufus, 3.3.16, 3.3.18), his tent poles (Athenaeus, 12.538b-d), the standard above his tent (“an image of the sun encased in crystal”; Curtius Rufus, 3.3.8), and the fittings of the funeral chariot of Alexander the Great and the harnesses of the animals pulling it (Diodorus Siculus, 18.26.3ff.; cf. Masʿūdī, *Morūj*, ed. Pellat, II, p. 10; tr. II, p. 254). It is apparent that every precious and beautiful object could be set with jewels.

This practice continued in subsequent periods. There is a report of a gaming board made from two kinds of precious stone at the court of Mithradates VII of Pontus in 61 B.C.E. (Pliny, 37.6.14). It is obvious that there must have been Persian examples as well, for gaming boards had a long tradition in the ancient Near East, and Mithradates, as a king in Asia Minor, also had close ties to the Arsacid court and empire. There are reports that Arsacid and Sasanian rulers wore golden belts set with precious stones. The Sasanian Ḵosrow II Parvēz (590, 591-628) is said to have possessed “golden saddles set with precious stones and pearls” (Masʿūdī, *Morūj*, ed. Pellat, I, p. 321; tr. I, p. 243) and a golden table inlaid with different kinds of gemstones; he also sent a similar expensively decorated amber table as a gift to the Byzantine emperor

Maurice (Masʿūdī, *Morūj*, ed, Pellat, I, p. 316; tr. I, p. 240). Precious stones were used for the ornamentation of architectonic elements like walls and doors. In the foundation document for the Achaemenid palace at Susa Darius I (521-486 B.C.E.) recorded the quantities of gold and precious stones that he had brought from all over the empire in order to adorn the palace (Hinz, p. 19). Furthermore, holes for the attachment of original ornaments are still visible in the reliefs at Persepolis (Schmidt, 1953, pp. 133, 164, 242). It is certain that rock crystal was included among the stones and gems used in Sasanian mosaics, in order to reflect light and lend a mystical depth and splendor to them (Masʿūdī, *Morūj*, ed. Pellat, I, p. 620; tr. I, p. 233; cf. Sarre and Herzfeld, pp. 48, 70). In this connection it should be noted that in the sources there are several mentions of crystal floors in royal palaces of the ancient Near East. Particularly renowned was the jewel-encrusted carpet at the Sasanian court in Ctesiphon (*Survey of Persian Art* VI, pp. 2274ff.; see bahār-e kesrā). Gold vessels set with precious stones seem to have been highly treasured at Near Eastern courts from ancient times, as the reports of ancient authors suggest (for the Achaemenids, see above; for the court of King Mithradates VII of Pontus, see Pliny, 37.6.14; for the tent of Ptolemy, see Athenaeus, 5.197c), and the continuation of the tradition is attested through the Sasanian period. Three gold vessels of Sasanian date are inlaid with rock crystal. They show that not only plain crystal but also some pieces with finely carved decoration were used for such objects. The most important of the three is the so-called “bowl of Ḵosrow I” (531-79 C.E .). Set into its base is a round piece of rock crystal on which an enthroned ruler is carved in intaglio (e.g., Ghirshman, 1962, p. 205 fig. 244; Trümpelmann, pl. 19). The second example is a gold bowl from Susa, the base of which consists of a piece of rock crystal with carved geometric decoration (Lamm, p. 2603, pl. 1438/C-D; Ghirshman, 1962, p. 222 fig. 264). The third is a small gold basket with rosette-shaped openings from the treasure of Pietrossa in Romania. In the better preserved of the two small baskets included in the treasure the openings were still filled with sapphires, emeralds, rubies, and small plaques of rock crystal (Odobesco I, frontispiece, color pls., pls. XI-XII; II, pp. 91ff.; cf. Ackerman, p. 771, pl. 250A-B).

Precious stones serve not only as ornaments but also as a sacred material and for purposes of magic and divination. How far rock crystal was used this way in ancient Persia in general and particularly for making an impression upon the simple people is difficult to determine.

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(Brigitte Musche)

ii. In the Islamic Period

There is no reason to believe that the tradition of working rock crystal in

Persia was interrupted by the fall of the Sasanian empire (see i, above). Only a very limited number of objects is available for study, however. Not a single rock-crystal object among those that have survived in European church treasuries has a Persian provenience. Most of them seem to have been made in Fatimid Egypt, where an industry flourished until the looting of the palace of the caliph al-Mostanṣer between 453/1061 and 461/1069. It is not certain that rock crystal was ever as popular in Persia as it seems to have been in Egypt (Ruska and Lamm). According to Bīrūnī (10th century), as reported by Paul Kahle (p. 325), rock crystal was understood to have been derived from water because of its purity and transparency. A large number of surviving amulets and talismans are evidence that powers associated with water and attributed to rock crystal were of prime importance.

In the Islamic period raw crystal was reported to come from Armenia, Badaḵšān, Kashmir, India, and the region around Kāšḡar (Kāšānī, p. 141; Ruska and Lamm). There may also have been sources in Persia, for ʿAlī b. ʿĪsā b. Māhān sent 300 pieces of rock crystal from Khorasan to the ʿAbbasid caliph Hārūn al-Rašīd (170-93/786-809; Bayhaqī, ed. Fayyāż, p. 539; Lamm, p. 2597 n. 2). Abuʾl-Qāsem Kāšānī (p. 141) referred to such sources in the mountains of Kāšān and Ṭūs.

It is only from the early Islamic period, approximately 7th-11th centuries, that a small group of diverse objects, comprising vessels, jewelry, and objects used as amulets and talismans, is known. This period coincides with that in which Persian production of wheel-cut glass was at its height.

A small oval bowl set in a gold mount was excavated in Susa and has been given a late Sasanian (Harper, p. 85 no. 29; Pinder-Wilson, 1988, p. 290) or early Islamic (Pinder-Wilson, 1989, p. 17) date. As its archeological context was not recorded (Pézard and Pottier, p. 175 no. 403), a precise dating is difficult. The simple, symmetrical plant pattern is not typical of Sasanian glass decoration but does have parallels in wheel-cut glass of the 9th-10th centuries from Iraq and Persia, and thus an early Islamic date is more probable. No dish with a comparable mount is known from the Islamic period, but a similar oval dish with closely related decoration may be dated by similarities to glass vessels of the 9th-10th centuries, suggesting a wider use of rock crystal also in Persia (*Islamic Art*, lot 188).

Another vessel, a footed beaker in the British Museum, said to have been found at Qazvīn, is unquestionably of Islamic date. It has a collar, flanged rim,

and plant ornament on the body; the shape and design are clearly related to those of wheel-cut glass of the 9th-10th centuries (Ghirshman, pl. 46a; Pinder-Wilson, 1976, p. 120 no. 102; Brend, p. 37 fig. 21).

Undecorated vessels or vessels with simple patterns are difficult to assign to specific region of the Islamic world, and therefore the fairly numerous plain faceted miniature bottles and undecorated chessmen cannot be ascribed to Persia with certainty (Pinder-Wilson, 1988, pp. 292-93 no. R2; idem, 1989, p. 19 and back cover).

Rock-crystal beads, cut from blocks and bored, seem to have been relatively common in jewelry, but only one excavated example has been published. It is from Nīšāpūr in Khorasan (Jenkins and Keene, pp. 30-32 no. 11). Other finds from Nīšāpūr demonstrate that rock-crystal beads were often intended as imitations of more precious stones, even for fraudulent purposes. These imitations were made by applying a transparent blue or turquoise glaze to the bead, thus creating the impression of a sapphire or turquoise (Jenkins and Keene, pp. 27-28). This conclusion is confirmed by the testimony of Kāšānī (pp. 141-42), according to whom rock crystal was used to produce fake gems, including imitations of spinel rubies (*laʾl*), emeralds (*zomorrod*), rubies (*yāqūt-e sorḵ*), and sapphires (*yāqūt-e kabūd*). A single pendant, also excavated in Nīšāpūr and probably of the 9th-10th century, is an example of facet-cut decoration influenced by natural crystal forms (Jenkins and Keene p. 26 no. 8c). Among a group of related pendants, some have Kufic inscriptions (*Islamic and Hindu Jewellery*, pp. 32-33 no. 3).

A single ring (or annular pendant?), supposedly from Persia, cannot be taken as sufficient evidence that rock crystal was also used for such jewelry pieces (Pinder-Wilson, 1988, p. 306, no. R13). Ring stones (*negīn*), on the other hand, were apparently more common (Kāšānī, p. 141), though it is usually very difficult to determine the provenience of examples that have not been scientifically excavated. A superb faceted sealstone, with a pious inscription incised in reverse in Kufic script, has been dated by the style of the script to the 10th century (Jenkins and Keene, pp. 22-23, 149 no. 4a; Keene, p. 37).

The most numerous rock-crystal objects are those used as talismans. A number of circular or oval hemispherical stones inscribed in Kufic, in both positive and negative on one or both sides, are known (Kalus, 1981, pp. 91ff. nos. 2.4-2.11; idem, 1986, p. 4 no. 1.3.3). They, too, cannot be ascribed to Persia with certainty (Pinder-Wilson, 1988, p. 308 no R15 and unpublished stones in

various collections). These stones, which have been little studied, do not seem to have been used as ring stones but in a different way connected with their talismanic purposes. Their inscriptions are difficult to decipher but, according to Ludvik Kalus, are usually related to water (1981, pp. 91ff.; Spink p. 19 no. 1 [61-63]) and may have been “intended for rogatory rites meant to "call" the rain and "draw" water into wells.”

A number of pendants of a flattened crescent shape have been published recently. All are said to have come from Persia and have been dated between the 8th and 10th centuries. They are decorated with a strapwork of wheel-cut lines and have either been drilled for suspension or have remains of bronze mounts (*Islamic Works*, lot 360; *Islamic and Hindu Jewellery*, pp. 32-33 no. 2). Because of their very characteristic decoration they have been ingeniously interpreted as symbolic representations of an amulet in a leather bag wrapped with numerous straps to secure the contents (Pinder-Wilson, 1988, p. 292 no. R1). There can be little doubt that these pendants were worn because of the talismanic properties associated with rock crystal.

There is virtually no evidence that a rock-crystal industry flourished in Persia in the medieval period. It is very likely that by the time that the Mongols invaded Persia from Central Asia the use of rock crystal had already dwindled in favor of jade. Jade, also a hard stone to which talismanic powers were attributed, was certainly of prime importance from the Timurid period onward (Lentz and Lowry, pp. 221-26).

Safavid rock crystals were encrusted with precious stones in a fashion that was also popular at the Ottoman and Mughal courts (Lamm, p. 2605, pl. 1456B). Such hard-stone vessels, set with priceless stones, were given to shrines or kept in royal treasuries. As these repositories were often subject to looting, most works simply disappeared without trace (Rogers, pp. 149-55). In later periods vessels and jewelry of precious metals set with gems were favored (Meen and Tushingham, pp. 7ff.; Ivanov et al., pls. 68ff.); rock crystal was of little importance among these gems (see crown iv).

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