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CARPETS II. RAW MATERIALS AND DYES
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CARPETS

ii. Raw Materials And Dyes

For centuries Persian carpet weaving has depended primarily on local materials processed by traditional techniques. The introduction of merino wool from Australia was short-lived (Report of the Iran Carpet Company), and, even after synthetic chemical dyes were introduced around the turn of the 14th/20th century, they were often processed according to traditional techniques (see, e.g., A. C. Edwards, p. 167). Until the 1320s Š./1940s vegetable dyes continued in common use (Iran Carpet Company, 1949).

Fibers and their preparation. The basic raw materials for carpets are natural fibers, of which sheep wool (*pašm-e gūsfand*) is important. In different parts of Persia different kinds of sheep are raised, depending on the prevailing climate and available pasturage. In colder areas, for example, the sheep produce a finer, long-staple wool fiber (Formenton, p. 50); that of Khorasan is particularly fine (A. C. Edwards, p. 166). In warmer Kermān, however, a shorter, springier fiber is produced (Dhamija, 1971a); it is particularly durable and has a sheen. In Fārs local wool is used by the Qašqāʾī, Ḵamsa, and settled rural weavers, often from their own sheep. It is soft, lustrous, and absorbs dyes very well (Dhamija, 1971b). The wool of Kermānšāh is lighter and finer.

In northwestern Persia the wool is relatively coarse (A. C. Edwards, p. 61). That from around Ardabīl is strong and lustrous and absorbs dyes well. Weavers in the vicinity of Herīs (Harīs/Harīz), near Tabrīz, formerly used a fine, lustrous wool obtained from the nomadic Šāhsevan, but recently they have been buying it from Ardabīl; only in remote villages are the Šāhsevan still the main suppliers. At Dargazīn (or Darra-ye Gazīn), near Hamadān, wool is also still purchased from the Šāhsevan and blended with the fine local wool (A. C. Edwards, p. 91). In the northwestern region of Mākū, after the spring shearing (*pašm borīdan/čīdan, qeyčī zadan/kardan*), wool was customarily blended with lamb's wool (*quzem*) to produce a yarn of very high quality. Such a blend was used in the weaving of fine carpets (A. C. Edwards, p. 58).

In Persia wool was traditionally either sheared with scissors (*qeyčī*) or plucked (*kandan*), but in recent decades only the wool of dead animals (*ṭabāḵī*) has been plucked (Wulff, *Crafts*, p. 177). In most areas the sheep are prepared for shearing in the following way: Their wool is first combed (*šāna zadan*), then washed (*šostan*) with soap, potash (*qālī-āb*), or a solution of soap nuts (*Sapindus saponaria*) and potash (Wulff, *Crafts*, p. 179). Sometimes the sheared wool is sorted according to whether it comes from the underbelly (šekam), shoulder (*šāna*), back (*pošt*), or neck (*gardan*). The fibers are then straightened by hand and separated by means of an upright comb fastened to a base (*šāna-ye mīḵ*; see Wulff, *Crafts*, p. 182, fig. 260). This method is preferred to bowing (*kaman zadan*) because it loosens and separates the fibers and arranges them in parallel fashion, which facilitates spinning the yarn. The combed wool is then gathered into a coil (*kalāfa*), wound around (*pīčīdan*) a rod or the arm of the spinner (*rīsanda*), or simply put into a bag (*kīsa*). A spindle (*dūk*, *pīl*, *parra*) is most commonly used; the spinning wheel (*čarḵ-e rīsandagī*), though it is found among the settled peasantry (*raʿīyatī*), is more often used for plying or twisting the yarn. The spinner feeds the raw wool (*ḵāma*) onto the spindle, which is set spinning rapidly by means of a sharp twist of the wrist; the spinner continues to pay out the wool as the weighted spindle rotates toward the ground, spinning the fibers into yarn. The spindle is then lifted and the yarn (*naḵ, rīsmān,qātma*) wound round it before the entire process is repeated. In Persia the spindle is generally twisted outward to the left, and the resulting yarn thus has a Z twist (i.e., the yarn spirals in the same direction as the diagonal stroke in the letter Z), though an S twist does occasionally occur (Wulff, *Crafts*, pp. 185-86; see also early Islamic carpets, below). Lamb's wool is processed in the same way.

Camel's hair (*pašm-e šotor*) is used for less expensive carpets in the Čahār Maḥāl(l) area (see baḵtīārī tribe iii) and in Baluchistan (see A. C. Edwards, p. 186; baluchistan v), as well as to provide tan and brown colors in the weaving of kilims (*gelīm*s, *kelīm*s) in Khorasan and Baluchistan (cf. Jacoby, p. 2457). It has been particularly preferred for woven flour wrappers (*sofra-ye ārd*) in all parts of Persia, as it generates heat and thus ensures the rising of dough (information collected in Birjand, 1970). Camel's hair is usually plucked from the animals in the spring, often by the camel drivers as they walk along, and then processed in much the same way as wool (Wulff, Crafts, p. 177).

Goat hair (*mū-ye boz*), mixed with coarse wool from sheep, is often used for the warps of tribal carpets, especially those woven for domestic use (see also boz; field studies in Bīrjand, Sīstān, Baluchistan, Fārs). It is also in Baluch flat-woven carpets and is favored for the selvedges of the coarser Baluch carpets (A. C. Edwards, p. 25; baluchistan v). In contrast to wool, goat hair is clipped, washed, combed and then spun or combined with sheep wool and spun.

In the past silk (*abrīšam*) was used in the warps and pile of finer carpets (see Safavid carpets, below) and sometimes also to provide areas of white in deep maroon or crimson and black wool pile. In central Persia, particularly Kāšān, Nāʾīn, and Qom, carpets were woven entirely of silk; particularly noteworthy are the silk *barjasta* (relief) carpets, with only the patterns knotted in pile on a plain-weave foundation, which were made in Kāšān (personal communications from G. Anavian, Tehran, and traditional carpet weavers in Kāšān). Silkworms (*pīla-yeabrīšam*) are cultivated and processed by the peasants of Gīlān, Māzandarān, and the Isfahan area. The silk of the first two regions is reeled and marketed for carpet weaving in three grades: *dāna*, the finest, for knotted pile; *haštī*, used in the warps of very fine wool carpets; and *pūdī*, the coarsest grade, used for the wefts of silk carpets (Wulff, *Crafts*, pp. 182-83). The Turkmen of Māzandarān, especially around Marv Tappa, and in the Jargarān and Zāvīn areas of Khorasan also raise silkworms in a very primitive fashion and use part of the silk in their carpets (observed during field studies, 1972 and 1978; see also Dhamija, 1979, color pl. 4).

Gold-wrapped thread (*golābetūn*), which contributed to the luxury of court carpets in the past, when they were woven into the pile or non-tufted fine-quality silk (see Dimand, pp. 2, 59; see Safavid carpets, below), is only rarely used today, though it does occur in the form of brocading (*zarī*) on the flat-woven portions of the *barjasta* carpets (seen in private collections in Persia, India) and in the very fine kilims of Ḵᵛoy in Azarbaijan (private collection of A.

de Franchis; also seen with dealers in Mākū and Ḵᵛoy).

Short-staple cotton (*panba*, *katān*) is grown in many parts of Persia and was an important source of fiber for the carpet industry (see cotton). Generally commercially prepared undyed cotton is used in the warps of finer carpets made in commercial workshops because it is less elastic and holds its shape better (Jacoby, p. 2458; A. C. Edwards, pp. 25-26). It is also occasionally used to add white highlights in the kilims of the Lor and Baḵtīārī and to the so-called *palās* of the Turkmen (*Persian Handicraft*, p. 308; for medieval references to rugs called *palās*, see *Ḥodūd al-ʿālam*, fols. 20b, 23a, 32b; tr. Minorsky, pp. 106, 114, 142). Although as recently as the 1330s Š./1950s handspun cotton was used for less expensive commercial carpets (A. C. Edwards, p. 25), weavers generally buy cotton in skeins, then wind it into balls and ply or rewind it as required.

For further discussion of fibers used in tribal weaving, see Tribal carpets, below.

Dyeing. Persia has been renowned for its dyes for many centuries; in 987/1579, for example, an Englishman was sent to learn the secrets of dyeing wool and silk in the Persian manner (Hakluyt, p. 202; cf. Jacoby, p. 2459 n. 1). Traditionally Persian dyers have used vegetable, animal, and mineral products to produce both dyes and mordants, the agents used to enhance the fibers' capacity to absorb dyes and to fix the colors. Unfortunately, this aspect of carpet making has been little explored by scholars. Because reports in medieval texts are seldom detailed and often somewhat confused and because the colors of antique carpets have rarely been identified scientifically, it is difficult to trace the history of the dyestuffs and dyeing practices observed in the 13th/19th and 14th/20th centuries.

In the dyeing process as observed by ethnologists and other field workers wool yarn is first scoured (*šostan*) with a mixture of carbonate of soda and soap, then repeatedly rinsed in potash (*qālī-āb*) and hot water until the dirt and most of the grease have been removed (*Qashqāʾi*, p. 54; A. C. Edwards, pp. 31-32). Care must be taken not to remove the grease so completely that the fibers become brittle. The clean wool is then immersed in a mordant. The most commonly used mordant is alum (*zāj*), of which two varieties have been commonly available in Iran: aluminum sulphate (*zāj-esafīd*) and potassium alum (*zāj-eqālīya*). In this connection it should be noted that "pure alum" was exported from Persia to China as early as the T'ang period (Schafer, pp. 217,

330 n. 16). In the late 10th/16th century alum from Gīlān was being sold at Shemakha in the eastern Caucasus (A. Edwards, pp. 378-79). Sometimes a variety of astringents with high concentrations of tannic acid are combined with the mordants in order to enhance the fixative properties of the latter and also to darken the colors of the dyes. Very similar procedures were observed by A. C. Edwards in the late 1320s Š./1940s (pp. 31-34).

The range of dyes available in Persia seems to have been rather limited before the introduction of modern aniline dyes in the late 13th/19th century (Jacoby, p. 2459; cf. A. C. Edwards, pp. 29-34). The most popular color for carpets has always been red (*qermez*, *sorḵ*), of which a wide range of shades and tones can be obtained from various materials. Historically the most common was madder (*rūnās/rūnīās*), extracted from the root of *Rubia tinctorum*. Today the plant grows wild in Māzandarān, Kermān, and around Tehran and Yazd (cf. A. C. Edwards, p. 31). The dye yields different hues, shades, and tints, depending on the mordant used (e.g., whether or not astringents or acids are included), the quality of the fibers, the age of the plant from which the dye is extracted, the season in which it is harvested, and the like. The purity of the water and the addition of substances like dried yogurt (*dūḡ*) and the juice of sour grapes, *āb-e deraḵš-e torš* also affect the results (Wulff, *Crafts*, p. 190; Jacoby, pp. 2460-61; Edwards, pp. 31-32; *Handbook*, pp. 34-35). In the 4th/10th century madder was produced throughout Azarbaijan and Arrān, especially at Mūqān and in Barḏaʿa, in Warthān (Vartan, modern Altan, on the Araks river north of Ardabīl), and at Bāb al-Abwāb (Darband) and a neighboring island in the Caspian Sea; from these sources it was shipped by sea to Gorgān and thence overland to India (*Ḥodūd al-ʿālam*, fol. 32b; tr. Minorsky, pp. 142-43; Ebn Ḥawqal, pp. 347, 388; tr. Kramers, II, pp. 340-41, 378). At the same period it was exported to India from Qowāḏīān in Transoxiana (Eṣṭaḵrī, p. 298; Ebn Ḥawqal, p. 477; tr. Kramers, II, p. 459). According to Qazvīnī, in the Mongol period madder was produced in abundance at Ḵᵛāf in Khorasan (*Nozhat al-qolūb*, p. 154), and it was also grown at Yazd and Nāʾīn (*Camb. Hist. Iran* V, p. 502 n. 2, citing the anonymous 8th/14th-century author of *Ketāb-e ʿelm-e felāḥat wa zerāʿat*, ed. ʿA. Najm-al-Dawla, Tehran, 1323/1905, p. 94). In the reign of Shah Esmāʿīl (907-30/1501-24) the dye made at Ḵᵛoy in northwestern Azarbaijan was being shipped to India via Hormoz (Grey, pp. 165-66; cf. Jacoby, p. 2460 n. 1). At about the same time madder was also cultivated around Ḡazna in Afghanistan, and the entire crop was exported to India (*Bābor-nāma*, p. 218). Because of growing world demand for Indian textiles, the Indian market for madder remained important; throughout the 11-12th/17-18th centuries it continued to

be shipped from northwestern Persia via Bandar-e ʿAbbās, which had supplanted nearby Hormoz, except for a brief period between 1025/1616 and 1031/1622, when hostilities between England and Portugal forced a shift from the Gulf to an overland route from Ardabīl via Isfahan and Qandahār (Tavernier, I, p. 53; Ferrier, p. 202 and n. 99; *Camb. Hist. Iran* VI, pp. 447, 481; Fukasawa, pp. 49, 65 n. 90). Centers for production of the dye in that period included, beside Ardabīl, Tiflis (Tbilisi) in Georgia and Armenian Astabat (Ordūbād?), on the Araxes below Jolfā (Ferrier, p. 202; Tournefort, III, p. 170; Tavernier, I, p. 52; cf. Fukasawa, p. 64 n. 89). In the early 12th/18th century madder was also shipped in quantity from Tiflis to Erzurum, whence it reached other Anatolian cities (Tournefort, III, pp. 111, 170; Fukasawa, p. 65 n. 91). A few years later an Armenian from a village near Naḵčevān introduced the cultivation of madder into southern France (see althen). Today the dye is sold in prepared form at Shiraz and Isfahan (*Qashqāʾī*, p. 55), but it had already become scarce and expensive by mid-century, and it has been largely replaced commercially by aniline reds (A. C. Edwards, p. 30). Another category of red dyes includes those made from the dried bodies of female insects (*qermez-dāna*), found mostly in northern Persia and Armenia; it includes kermes, from *Kermococcus vermilio*, and "Armenian red" (Armenian *vortan*), from *Porphyrophora hamelii*, which is chemically similar to New World cochineal (cf. Forbes, IV, pp. 102-03; on cochineal see A. C. Edwards, pp. 33-34). Lac (*lāk*), a red dye from female insects (*Coccus lacca*), was produced in India. These dyes are frequently confused in medieval sources, and modern scholars also sometimes use the name of one type as a generic term for all (Lombard, pp. 118-22; Wulff, *Crafts*, pp. 189-90; Jacoby, p. 2460; Kurdian; Serjeant, XV, p. 35; A. C. Edwards, pp. 33-34). Red-dyed cloth from Armenia (Urartu) was mentioned in an inscription of Sargon II in 714 b.c. (Forbes, IV, p. 102). The dye used was very probably "Armenian red," for the insects from which it comes feed on grasses that are particularly common in the territory at the base of Mount Ararat (Kurdian, pp. 105-06). In the 3rd/9th century Balāḏorī noted that the town of Ardesāṭ (Artaxata) in Armenia was also known as *qarya qermez* (the village of kermes; *Fotūḥ*, p. 200; cf. Kurdian, p. 105; Levi della Vida, p. 288). His contemporary Jāḥeẓ mentions a red dye from insects that feed on grass (*Tabaṣṣor*, p. 24, apud Kramers, in Ebn Ḥawqal, tr., II, p. 335 n. 631) in Armenia. In the next century such dyes were important products of Azarbaijan and of Dabīl (Dwin) in Armenia (*Ḥodūd al-ʿālām*, fol. 32b; tr. Minorsky, pp. 142-43; Ebn Ḥawqal, II, pp. 342-43; tr. II, p. 335; Eṣṭaḵrī, p. 188). In the 7-8th/14-15th centuries kermes was still produced at Marand and elsewhere in Azarbaijan (*Nozhat al-qolūb*, ed. Le Strange, I, p. 88, II, p. 89 and

n. 2). Other red dyes were imported. In the early 11th/17th century sappanwood (*baqqam*; *Caesalpinia sappan*) from the Far East was being imported to Persia (Ferrier, p. 210), as was lac from India (Ferrier, p. 207 and n. 128; Wulff, *Crafts*, p. 191; A. C. Edwards, p. 33; cf. Heyd, II, pp. 612-13). Both were among the commodities brought from the east to Bandar-e ʿAbbās by the Dutch in 1135/1721 (*Camb. Hist. Iran* VI, p. 483). By the late 10th/16th century the English were importing cochineal from the New World into Baku (Burroughs, p. 446), and both cochineal and vermilion (a mineral dye) were among English imports to Persia in the early 11th/17th century as well (Ferrier, pp. 212-13; cf. *Camb. Hist. Iran* VI, p. 448). Later in the century Armenians from Isfahan were trading for cochineal in Aleppo (*Camb. Hist. Iran* VI, p. 460).

Blue (*nīl, rang-e kermānī, rang-e wasma*) is produced from the fermented leaves of the indigo plant (*Indigofera tinctoria*). According to one Chinese source, as early as the 98-99/717 indigo was sent as a gift from Samarkand to China (Schafer, pp. 212, 329 n. 47). In the Middle Ages the plant was grown in Kermān: at Sīrjān and in the districts between Maḡūn and Valāšgerd, on one hand, and Hormoz, on the other (Ebn Ḥawqal, p. 312, tr. Kramers, p. 307; Moqaddasī, pp. 465, 467; Eṣṭaḵrī, p. 167; *Ḥodūd al-ʿālam*, fol. 26b; tr. Minorsky, pp. 123-24; cf. Heyd, II, p. 598 n. 6). It was also grown in the region around Kabul (Ebn Ḥawqal, pp. 184-85, 450; tr. Kramers, p. 183; cf. Marco Polo, pp. 302, 304, 306). Maḥmūd of Ḡazna and his successors received indigo from their conquered territory of Multan; they kept part and sent some as diplomatic gifts to Baghdad and elsewhere (Bayhaqī, p. 293; ʿAwfī, *Jawāmeʿ al-ḥekāyāt*, in Elliot and Dowson, *History of India* II, p. 189; S. H. Hodivala, *Studies in Indo-Muslim History*, p. 176; cf. Bosworth, *Ghaznavids*, p. 76). By the 8th/14th century cultivation of indigo had died out in Persia, though Ḡāzān Khan made an unsuccessful attempt to revive it (*Camb. Hist. Iran* V, p. 502, citing the anonymous 8th/14th-century author of *Ketāb-e ʿelm-e felāḥat*). Instead dyers relied on imports from India, which seems to have been the main source of the dye through most of the subsequent centuries (see, e.g., Ferrier, pp. 207-08; *Camb. Hist. Iran* VI, p. 475). In the 14th/20th century, however, small quantities of the plant have been grown near Šūštar and Dezfūl in Ḵūzestān, though synthetic indigo seems largely to have replaced the natural dye (Wulff, *Crafts*, p. 192; Jacoby, p. 2460; A. C. Edwards, p. 33). Recently the Persian Carpet Company attempted to revive the cultivation and use of indigo in Persia.

Yellow dyes also come from a variety of sources. The flowers of *esparak* (weld,

Reseda luteola; A. C. Edwards, p. 32; cf. *Handbook*, p. 35), which grows wild throughout Persia and is also cultivated in Khorasan, yield a dye that is particularly effective with silk, though it can be used on wool if mixed with other dyes. Another important source of yellow dye is safflowers (*gol-e rang*; *Carthamus tinctorius*), also widely cultivated in Persia; the extract from the petals, when combined in solution with fuller's earth and potash, yields a range of colors from clear yellow to orange. Yellow is also obtained from autumn vine leaves, pomegranate rinds, turmeric (*zard-čūba*), *somāq*, and saffron (*Crocus sativus*; Wulff, *Crafts*, p. 191; Jacoby, p. 2461). Both saffron (*kurkum*) and turmeric were mentioned as dyestuffs in the *Bundahišn* (TD_2, p. 118.4; tr. Anklesaria, chap. 26.20, pp. 148-49). Saffron was particularly costly, and, though it is mentioned frequently in medieval sources, it is not clear that it continued to be used as a dye. All these yellow dyes are also used in combination with other dyes to achieve special shades. Cloth already dyed with indigo will turn green when immersed in *esparak* or *gol-e rang*. *Esparak* mordanted with copper sulphate produces a soft blue-green color (*āb-e sangar*); copper sulphate tends to destroy woolen fibers, however, so that it has not often been used for carpets (Jacoby, p. 2462 and n. 1). Green can also be obtained by mixing willow leaves with indigo before dyeing (Wulff, *Crafts*, p. 191).

Shades of brown, beige, and tan are produced from green walnut hulls (*pūst-e gerdū*; *Juglans regia*) and oak bark (*jaft*; Edwards, p. 32). Dyeing dark or natural black wool with iron oxide (ferruginous litharge) produces a deep, glowing black, which, however, fades quickly (A. C. Edwards, p. 186); it is most often found in Baluchistan. In other areas black was obtained by using oak galls (Formenton, p.53). Compounds of indigo and henna also produce a luminous black. The Lor and Baḵtīārī obtain black from the hulls of wild acorns (*balūṭ*) from which they occasionally make bread (information from the late Nāder Afšār Nāderī).

In most Persian towns there are professional dyers (*rang-raz*), whose secret recipes have often been handed down from father to son for generations. The dyeing trade was highly regarded in earlier times, and, as demonstrated above, dyers traveled to many parts of the world in order to train others to prepare special dyes for large workshops (*kār-ḵānas*). In remote rural areas and among tribal people dyeing is done by women, who gather flowers, bark, fruit seeds and peelings, nuts, and the urine of cows and horses (for fermentation and to achieve special tints). They also buy dried roots and other

essentials. Their skills and knowledge are passed on to their daughters and daughters-in-law.

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