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Two interesting floral finds from third millennium B.C. Tell Hammam et-Turkman, northern Syria

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Abstract. Charred flower-head remains of *Carthamus tinctorius* recovered from an Early Bronze Age site in northern Syria indicate that safflower was used as a dye plant. The kernels of *Prunus mahaleb* probably served as a flavouring agent.

Key words: *Carthamus tinctorius* - *Prunus mahaleb* - Dye plant - Flavouring agent

Introduction

Tell Hammam et-Turkman is a large settlement site, ca. 500 m in diameter and up to 45 m high, on the left bank of the Balikh, a tributary of the Euphrates, in northern Syria (Fig. 1). Excavations at this site were carried out under the direction of M.N. van Loon and D.J.W. Meijer between 1981 and 1988. Various archaeological periods are represented at Hammam: Ubaid (ca. 4500-3700 B.C.), Late Chalcolithic (ca. 3700-3000 B.C.), Early Bronze IV (ca. 2500-2000 B.C.), Middle Bronze (ca. 2000-1550 B.C.), Late Bronze I (ca. 1550-1350 B.C.). After ca. 1350 B.C. the site seems to have been largely deserted (van Loon 1982, 1983, 1988; van Loon and Meijer 1987). Some preliminary results of the palaeobotanical examination of samples of the 1982 and 1984 campaigns have been published (van Zeist et al. 1988), while data from Hammam are incorporated in an essay on the Bronze Age segetal flora of northern Syria (van Zeist, in press). Among the samples that were secured for botanical examination in 1988 two turned out to be of particular interest because of their unusual floral contents.

The results of the analysis of the two samples are presented in Table 1. As usual the charred vegetal remains were retrieved in the field by means of manual water flotation. Sample 1988/17 is from a context dated to ca. 2500 B.C. or slightly younger (pers. comm. Dr. D.J.W. Meijer). Sample 1988/101 is dated to 2400-2000 B.C

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The safflower find

The majority of sample 1988/17 is made up of the charred remains of flower heads (compound flowers) of *Carthamus*, most likely *C. tinctorius* L. (safflower), as will be discussed below. Reasonably intact specimens show the involucre consisting of several rows of involucral bracts of which the basal parts are preserved (Fig. 2:3). The upper part of the flower stalk is often still adhering to the bottom of the flower head. Various heads are in the flowering stage, showing a dense mass of scales (or pales), between which tubular florets should be present (Fig. 2:1). In many of the heads fruits had started to develop (Fig. 2:2); in some of them almost full-grown fruits could be observed. The loose parts include remains of spiny outer involucral bracts.

The flower head remains themselves did not allow satisfactory identification, particularly because not enough reference material was available. Among modern *C. tinctorius* plants, prickly and non-prickly specimens occur, so that the spiny outer involucral bract remains would not speak against safflower. Is there other evidence for the species identity?

A small number of loose *Carthamus* fruits were recovered, among them five well-developed specimens. Two are of the type shown in Fig. 2:4, the other three of the type illustrated in Fig. 2:5. Both types have four longitudinal ribs which may or may not be prominent. The type of Fig. 2:5 is characterized by a quadrangular apex bordered by a distinct rim (collar). The greatest breadth is at or near the level of the apex. On the upper part of the fruit transverse grooves are present. The other type (Fig. 2:4) has a more slender appearance, showing the greatest breadth well below the apex. The apex is rounded-quadrangular and without a rim. The surface is smooth over the whole of the fruit.

Van Zeist and Bakker-Heeres (1985(1988), Fig. 2:4,5) drew attention to the presence of two types of *Carthamus* fruits in Early Bronze Age (2400-2000 B.C.) Selenkahiye in northern Syria, corresponding with the Hammam types. Both Selenkahiye types are listed as *Carthamus* cf. *tinctorius*. In his paper on two *Carthamus* fruit finds from Early and Middle Bronze Age Feudvar (Vojvodina, Yugo-

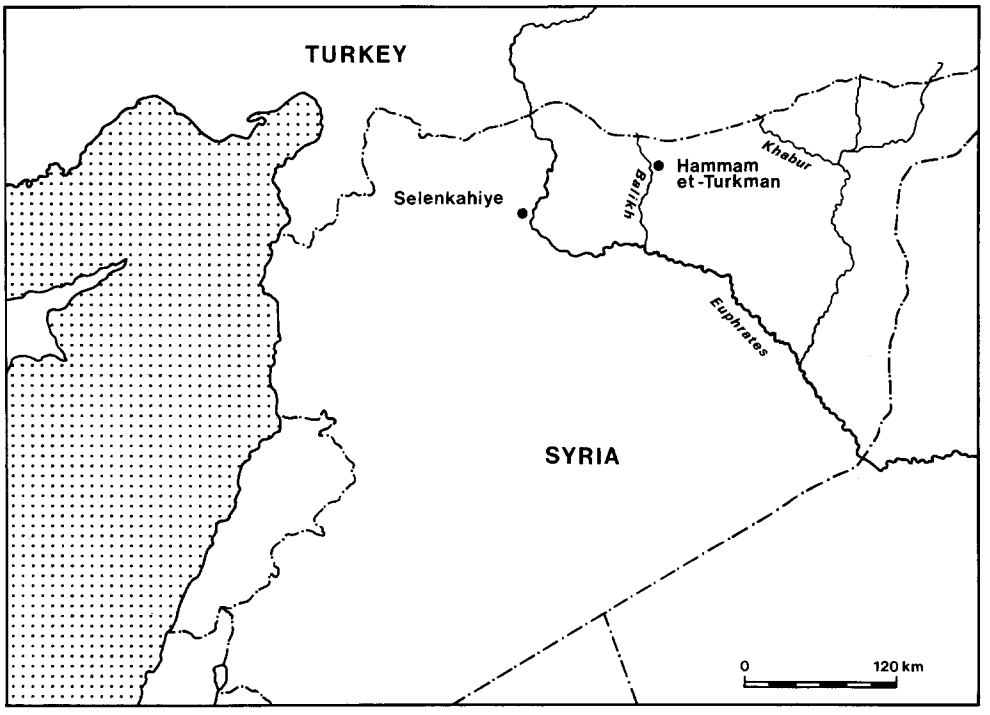

Fig. 1. Location of Tell Hammam et-Turkman.

slavia) Kroll (1990, Fig. 1) suggests that the two types may derive from different species. The smooth-surfaced type is attributed by Kroll to *C. tinctorius*, and the more squat type with the distinct collar, with some reserve, to *C. lanatus* L.

Because at Hammam the two *Carthamus* fruit types are found together, and in association with the flower heads, the obvious assumption is that fruits and flower heads are all of the same species. At Selenkahiye, too, both types occurred in the same samples. With respect to the species identity the following should be noted.

The type without collar and with a smooth surface (Fig. 2:4) matches the fruits of *C. tinctorius*, although the charred archaeological specimens are much smaller (about half the size) than modern ones, which measure 7-9 mm (cf. van Zeist and Bakker-Heeres 1985(1988), p. 252). It is evident that the flower heads had been collected on purpose, and the only sensible reason for doing so would be because of the dye which can be extracted from the florets. *C. tinctorius* is the only *Carthamus* species that is reported to be used as a dye plant. This, in combination with the presence of *C. tinctorius*-type fruits at Hammam, Selenkahiye and other sites, makes it most likely that, indeed, *C. tinctorius* (safflower) was cultivated.

As for the fruit dimorphism, this may be an "archaic" character, indicating that the cultivar had not yet developed into the modern one. A kind of transitional stage between *Carthamus lanatus* and *C. tinctorius* is not feasible because of the cytotaxonomic differences: *C. tinctorius* is diploid (2n = 24) and *C. lanatus* polyploid (2n = 44) (cf. Knowles 1979, p. 31). Cultivated safflower is believed to have been derived from a group of diploid wild and weedy summer thistles (cf. Zohary and Hopf 1988, p. 174). It should also be taken into account that *C. tinctorius* achenes in seed reference collections will usually be from plants cultivated for the oil. At present, safflower is predominantly an oilseed crop. Its cultivation as a dye plant has strongly declined, but several countries of the Near East still grow very small amounts for the dried flowers (Knowles 1979, p. 31). Selection for good oilseed strains may have resulted in a more uniform shape of the achenes.

The *Carthamus* fruits previously recovered from archaeological sites (for an enumeration, see Kroll 1990) left us in the dark as to whether the species was grown for the oilseeds or for the flowers. The Hammam evidence makes it clear that the cultivation of safflower for the flower heads dates back at least to the middle of the third millennium B.C. It remains uncertain whether oil was extracted from the fruits at that time or whether this practice was not developed until later.

Two kinds of dye can be extracted from the yellow-red flowers. One is a water-soluble, yellow dye used to colour foods, serving as a substitute for saffron. The other is the red, water-insoluble safflower carmine, widely used to dye textiles until the introduction of synthetic dyes (cf. Kroll 1990). In Egypt, chemical analysis of textiles from the twelfth dynasty (2000-1800 B.C.) showed safflower carmine to be one of the dyes used. Safflower was also used in ancient Egypt in making garlands that adorned mummies (cf. Darby et al. 1977, p. 805; Germer 1985, pp. 173-175). One wonders whether safflower also had a function in funeral and religious practices in Bronze Age northern Syria.

It is evident that the other plant remains in sample 1988/17 have no relation to the safflower. During or after the fire, the charred remains of a supply of safflower flower heads were mixed with the other remains.

The St. Lucie cherry find

Sample 1988/101 consists almost ecxlusively of carbonized stones and stone fragments of a *Prunus* species. Ad-

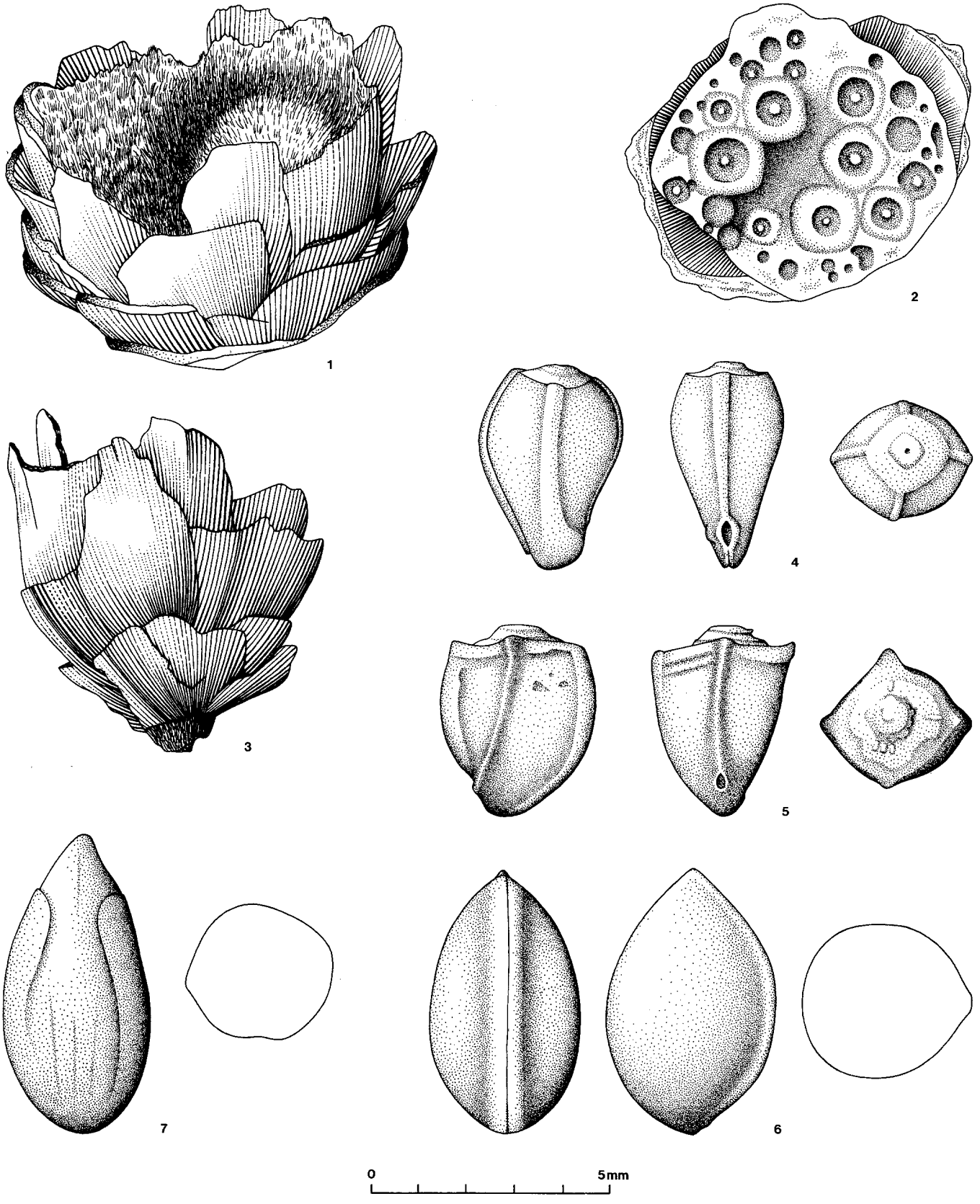

Fig. 2. 1-3 Flower heads of *Carthamus*: 1 in flowering stage; 2 with developing achenes; 3 involucral bracts; 4-5 achenes of *Carthamus*; 6 fruit stone of *Prunus mahaleb*; 7 kernel of *P. mahaleb* (Drawing: Miriam A. Weijns)

Table 1. Plant remains in two Later Early Bronze Age samples from Hammam et-Turkman

Sample number	1988/17	1988/101
Square	H23	J23
Area-level	17-8	40-2
Volume of soil floated (in litres)	2	1/4
Carthamus, flower heads	ca. 65[a]	-
achenes	7	-
Prunus mahaleb, fruit stones	-	ca. 260[b]
Hordeum (distichum), grains	13	6
rachis internodes	23	-
Triticum monococcum/dicoccum, spikelet forks	5	1
glume bases	4	1
Triticum durum/aestivum, grains	-	2
Cereal grain fragments	+	-
Aegilops, spikelet bases	2	-
Unidentified Gramineae	2	-
Capparis	1	-
Prosopis	1	-
Trigonella astroites type	4	-
Vaccaria pyramidata	1	-
Cephalaria syriaca	2	-
Adonis	3	-
Galium	13	-
Thymelaea	1	-
cf. *Ornithogalum*	1	-

[a] Total weight 2.45 g, 10 flower heads weigh 0.38 g.
[b] Total weight 4.18 g, 10 stones weigh 0.16 g.

mixture of other plant remains is negligible (Table 1). Although the field notes do not mention anything particular, the fruit-stone concentration must have been observed in the field, and apparently the whole cache was secured by the excavator.

The stones (Fig. 2:6) are elliptic in outline, almost circular to broadly elliptic in cross section, pointed at the apex and tapering at the base. The surface is smooth. The ventral ridge is only slightly protruding. Fruit flesh still adheres to many of the stones and stone fragments. The average size of the few stones suitable for measurement was 6.3 x 4.0 mm (n = 5). The Hammam stones conform to those of *Prunus mahaleb* L. (syn. *Cerasus mahaleb* (L.)P.Miller) (St. Lucie cherry, rock cherry) and not to those of *P. prostrata* Ser. The stones of the latter species have a rather broad base and a grooved surface.

In addition to the shells, intact and broken kernels (contents of the fruit stones) were found (Fig. 2:7). As a matter of fact, kernels and kernel fragments outnumbered shell remains.

According to the Flora of Turkey (Davis 1972, p. 19), *P. mahaleb* L. is a shrub or small tree, up to 10-15 m high, and the red to black ovate fruits are up to 12 mm in diameter. Mouterde (1970, p. 201) and Post and Dinsmore (1932, p. 452) describe the species as a shrub or small tree 2-4 m high with fruits of 5-6 mm. The fruit flesh is bitter. At present *P. mahaleb* is used as rootstock for low-growing sour cherry. The aromatic wood is used for making cherry-wood pipes (Polunin and Everard 1976, p. 76).

Where could the Hammam fruits have been gathered? *P. mahaleb* is widespread in Turkey (Davis 1972), but neither Post and Dinsmore (1932) nor Mouterde (1970) mention the species for (northern) Syria. As *P. mahaleb* is a species of dry mountains, it may have occurred at the time in the Jebel Abdul Aziz in northestern Syria, ca. 100 km east of Hammam. *P. mahaleb* stands in adjacent SE Turkey may not have been nearer to the site. Present localities for which the species is reported are at considerably greater distances from Hammam (cf. Davis 1972, map 8).

For what purpose may St. Lucie cherry have been gathered? As mentioned above, the fruits taste bitter, so that they are not attractive for human consumption. In *Mansfeld's Kulturpflanzenverzeichnis* (Schultze-Motel 1986, p. 422) it is reported that in India the kernels are used for flavouring liqueur. A similar use is known for plum (*P. domestica)* kernels. Thus, in a recipe for home-made brandy in an old Dutch cookery book (Haezebroek, no date), cinnamon, cardamom and plum kernels were used for flavouring. To that end dried plum stones had to be crushed by cautiously beating them with a hammer between two sheets of paper, after which the kernels could be retrieved. After a couple of weeks the brandy was strained over a cloth.

It may not be too far-fetched to hypothesize that at Hammam *P. mahaleb* served as a flavouring agent (in liquor?). The many kernels and kernel fragments support such an assumption. As the fruits had to be brought in from quite some distance, they must have been a valued commodity.

Epilogue

It goes without saying that the floral remains discussed above are chance finds. Nevertheless, it may not be wholly accidental that the finds are from a site which was an important administrative and commercial centre.

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