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Robert L. Miller

[...] [Djaajs], Peganum harmala L.

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 *Ḏaajs*, *Peganum harmala* L.

Robert L. MILLER *

 *Ḏaajs* is a previously unidentified plant that appears in medical texts, magical texts and on a list of plants that it was forbidden to eat or bring inside the temple of Isis at Philae (*Wb* V, 520-521,3; G. CHARPENTIER, *Recueil de matériaux épigraphiques*, no. 1473-1474; AUFRÈRE, 1986). According to the Pyramid Texts, the dead king was also forbidden to eat *ḏaajs* (*pyr.* 2083, R.O. FAULKNER, *The Ancient Egyptian Pyramid Texts*, Oxford, 1969, p. 297), and another magical text refers to a wicked daughter of Osiris banished to the desert for suggesting that he eat *ḏaajs* and honey (ERMAN, 1901, p. 14, D 2,7; VON DEINES, GRAPOW, *Grundriss* VI, p. 593). Despite its fairly extensive citation, an identification for this medicinal plant has not yet been suggested.

The use of *ḏaajs* to expel worms in two prescriptions in the Ebers papyrus, nos. 67 and 79, provides a valuable clue to the identification of this plant. Parasitic worms are common among human communities living in conditions of traditional rural life, whether in pharaonic Egypt or in contemporary Egyptian farming villages. Plant vermifuges which result in the expelling of segments of worms or whole worms are widely known and readily evaluated, and some of the same remedies have probably remained in continuous use since the prehistory and early history of agriculture in the Nile valley.

Over 230 species of plants growing in Egypt have medicinal uses documented in a recent survey (BOULOS, 1983). My estimate of 230 species of medical plants growing in Egypt excludes imported species, species with a range restricted to North African countries outside Egypt, and naturalized plants from America and Southeast Asia. One of the well-characterized subgroups of medical plants growing in Egypt are thirty eight species with active ingredients used to treat worm infections. These modern Egyptian anthelmintic plant species provide useful positive controls for approaching the identification of the subgroup of pharaonic medical plants also used as active ingredients in treating worm infestations.

* The Bioanthropology Foundation, Paleoepidemiology Project.

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The modern identification of a plant as a medicinal plant is based on its use for this purpose by Egyptian farmers, villagers, bedouin and traditional medical practitioners. Some of these plants are known to be effective vermifuges, and scientific studies of the active ingredients are sometimes available. Moreover, relying on botanists for plant identification reduces the risks of using historical sources with inaccurate botanical nomenclature or confusion between plants with similar appearances or names. By eliminating a layer of occasionally circular citations of late antique and early modern editorial and philological speculation, it may be possible to use scientific ethnobotanical and phytochemical descriptions to approach the identification of the plants that would have been used in pharaonic times and noted by the ancient sources (EL-HADIDI, 1992).

Worm-expelling plants now growing in Egypt, excluding recent New World introductions, include *Allium sativum* (Alliaceae), *Calotropis procera*, *Pergularia tomentosa* (Asclepiadaceae), *Balanites aegyptiaca* (Balanitaceae), *Capparis decidua* (Capparaceae), *Chenopodium vulvaria* (Chenopodiaceae), *Achillea fragrantissima*, *Achillea santolina*, *Artemisia herba-alba* (=Artemisia inculta), *Chrysanthemum coronarium*, *Otanthus maritimus*, *Senecio vulgaris* (Compositae), *Citrullus colocynthis* (Cucurbitaceae), *Cyperus rotundus* (Cyperaceae), *Ricinus communis* (Euphorbiaceae), *Ajuga iva*, *Ocimum basilicum*, *Teucrium polium* (Labiatae), *Alhagi graecorum* (=Alhagi maurorum), *Lupinus albus*, *Retama raetam* (Leguminosae), *Urginea maritima* (Liliaceae), *Hyphaene thebaica* (Palmae), *Polygonum aviculare* (Polygonaceae), *Portulaca oleracea* (Portulacaceae), *Punica granatum* (Punicaceae), *Nigella sativa* (Ranunculaceae), *Ziziphus spina-christi* (Rhamnaceae), *Rubia tinctorum* (Rubiaceae), *Haplophyllum tuberculatum* (Rutaceae), *Thymelaea hirsuta* (Thymelaeaceae), *Carum carvi*, *Coriandrum sativum*, *Crithmum maritimum*, *Foeniculum vulgare*, *Petroselinum crispum* (Umbelliferae), *Peganum harmala*, *Zygophyllum coccineum* (Zygophyllaceae).

Some of the same plant vermifuges documented in ancient Egypt (VON DEINES, GRAPOW, *Grundriss* IV/1, p. 110-116) are still used as worm remedies : *Punica granatum* (pomegranate) root (BOULOS, 1983, p. 149; Ebers prescriptions nos. 50 & 63; Berlin nos. 6 & 10); *Artemisia herba-alba* (*s'm*, AUFRÈRE, 1986, p. 13, 18; Ebers prescriptions nos. 56, 64 & 83; BOULOS, 1983, p. 57); *Carum carvi* (caraway/Kummel) (BOULOS, 1983, p. 180; Ebers prescriptions nos. 79 & 83; Berlin no. 8); the decoction or essential oil (*mw*) from *Cyperus rotundus* (*gjw*) (Ebers prescriptions nos. 58 & 83).

However it needs to be emphasized that it is not possible to make a one to one correspondence between ancient and modern lists of plant vermifuges. The occurrence of staple foods in some pharaonic worm-expelling remedies may perhaps be explained by the need to counter the risk of malnutrition that can be the result of heavy worm infestations (CREWE, HADDOCK, 1985). Neither barley nor sycomore figs are anthelmintic, although both plants are used in ancient vermifugal recipes (*Grundriss* IV/1, p. 110-116); nor are date pips (*ibid.*). It is also possible that such prescriptions represent the simpler (and cheaper) remedies that could be prepared for initial consultations with the patient in uncomplicated cases (WEEKS, 1976-1978). In many cases, symptoms are self-limiting and the patient recovers without the need for further treatment.

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Conversely, some modern plant vermifuges may not have been used in antiquity or may not be represented in the incomplete cross-section of ancient materia medica that survived burial and discovery. [1] Thus, although *Ziziphus spina-christi* leaves are at present used for treatment of diarrhea and worm infestations, as well as for bites, boils, abscesses and eye diseases (BOULOS, 1983, p. 153), this appears to be a recent development. The modern anthelmintic uses of the leaves are not noted among the ancient medical uses of *Ziziphus* leaves and fruits (Ebers prescriptions nos. 480, 536, 616), even though the ancient name of this plant has been identified thanks to finds of *Ziziphus* fruits in Early Dynastic jars labelled *nbs* (KEIMER, 1943).

There is also a wide range of anthelmintic plants not growing in Egypt that could have been obtained in trade with Mediterranean and Arabian as well as East African sources. For example, although *Juniperus oxycedrus*, a Mediterranean and Arabian mountain species, does not grow in Egypt, its berries were used to expel intestinal worms in pharaonic as well as modern Egypt (*wʿn*, Ebers prescription no. 85; BOULOS, 1983, p. 79). And although drugs from South Asia were probably not available before late Ptolemaic times, it is possible that *Aloe perryi*, which in the markets of North Africa is currently a popular drug vermifuge, was imported from Socotra Island where it occurs naturally (BOULOS, 1983, p. 128) via Punt by New Kingdom traders.

The references to *ḏaajs* in ancient Egyptian medical texts have been summarized by Aufrère (1986, p. 6-9), Germer (1979, p. 360-362) and by von Deines and Grapow (1959, p. 592-594). Both the plant and the seeds of the plant were used.

The medical uses of the *ḏaajs* plant can be summarized as follows :

External Uses

Fumigation, analgesic for schistosomiasis (Berlin 59).
Analgesic stomach cataplasm for *pnd*-worm (Eb. 67).
Topical application, analgesic for stiff knee (Eb. 605, 609).
Topical application, analgesic for arthritis (Eb. 689).
Topical application for refreshing the *mt.w* vessels (Eb. 95).
All-purpose topical application (Eb. 630).
To control scalp lichen (*mshpn.t*) (H. 164).
Applied to fresh wounds (Eb. 522 e).

1 The burning of papyri for winter fuel a century ago, or the failure to collect and study samples of pollen, seeds, charcoal and botanical remains in modern excavations have unfortunately both limited the scope for scientific investigation of ancient ethnobotany. The exemplary publication of botanical remains from twenty Late Antique tombs at Douch is a notable exception: H.N. BARAKAT, N. BAUM, *La végétation antique de Douch: une approche macrobotanique*, *DFIFAO* XXVII, 1992. The scientific study of material from excavations and ancient pictorial sources also provides valuable documentation of species of historic interest (EL-HADIDI, 1992).

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Internal Uses

Emetic, with fish and beer for stabbing (*st.t*) rheumatic pains (Eb. 856 f).
Analgesic, to reduce stomach ache (Eb. 167).
To reduce abdominal swelling (*šfw.t m ḫ.t*) (Eb. 587).
To kill the *pnd*-worm (Eb. 79).
Unidentified disease of both eyes (Eb. 751).

The medical uses of the seeds, *pr. t ḏ3js*, of the *ḏaajs* plant (AUFRÈRE, 1986, p. 7) can be summarized as follows :

External Uses

To treat the puncture caused by an acacia thorn (Eb. 732).
In a salve (*gs*) mixed with honey and wax, to treat polyarthritic rheumatism of joints (*r-ʿtj*) (Eb. 654).
To ease all pains, mixed with honey (H. 94 = Eb. 657 = P. Ram. V).
Remedy with honey that Re used on himself (Eb. 242).
Fumigation to reduce the pain of schistosomiasis (Bln. 58).

Internal Uses

Diuretic (Eb. 780; AUFRÈRE, 1986, p. 8).

The modern uses of *Peganum harmala* L. (Zygophyllaceae) (BOULOS, 1983, p. 195) correspond closely to the therapeutic contexts and preparations documented for *ḏaajs* in ancient Egyptian medical and magical texts.

Peganum harmala, a low shrubby plant also known as Syrian rue or Harmel, forms dark-green clumps 0.5-1 meter high [Fig. 1] (EL-HADIDI, 1974). *P. harmala* is a xerophytic, ruderal, segetal plant common in sandy habitats and in stony loess and gravel soils in the Middle East (ZOHARY, 1973, p. 274, 326, 438). This species is found in Sinai and in the Egyptian desert on silt wadi terraces (KASSAS, IMAM, 1954, p. 439) as well as on the fringes of the boundary between the limestone plateau of the Eastern Desert and the Cairo-Suez desert's sand and gravel formations (KASSAS, GIRGIS, 1965, p. 720-721, Table 1).

P. harmala is a major component of the flora in desertic steppe areas with a rainfall of 100-200 mm. per year such as that found in northern Egypt, and adjacent areas of Sinai. [2] When dry, it is a valuable sheep forage plant, although the potentially toxic active alkaloids

2 *Peganum harmala* is found throughout North Africa, the Mediterranean and the Fertile Crescent in areas with sufficient rainfall for mixed barley cultivation and sheep grazing. Its habitat is "along desert tracks, around encampments by wells, on rubbish heaps in villages and disturbed soil near ancient ruins and graveyards, an indicator of human settlement, also along wadis in the desert, a weed in fields on the steppe" (C.C. TOWNSEND, E. GUEST (eds.), with S.A. OMAR, *Flora of Iraq vol. 4: Cornaceae to Rubiaceae*, Baghdad, 1980, p. 303-304). The water requirements of Harmel, growing near wells and fields irrigated with concentrated run-off in wadis also corresponds to the habitat of *ḏaajs* "à proximité de l'eau" noted by Aufrère (*BIFAO* 86, p. 9).

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present in the seeds cause it to be avoided by shepherds when it is green, and flocks are not allowed to eat it until the seeds drop off the dry plant. This allows sheep and goats on the desertic steppe to have an additional source of food in the summer when spring grasses and forbs have dried up or been eaten. [3] An association between *ḏaajs* and the desert is indicated by a magical spell where a wicked goddess is exiled to the Syrian desert by her father Osiris after cheekily suggesting that he should subsist on a distasteful diet of two products of the arid steppe, honey and *ḏaajs* (ERMAN, 1901, D 2,7, VON DEINES, GRAPOW, *Grundriss* VI, p. 593; AUFRÈRE, *BIFAO* 86, p. 6). [4]

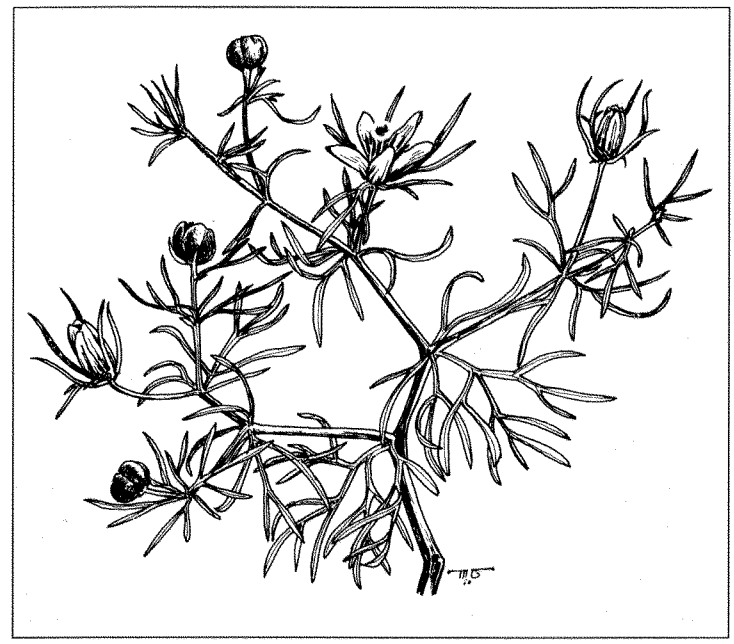


Fig. 1. *Ḏaajs, Peganum harmala*
Based on *Students' Flora of Egypt*, 2nd ed., 1974, pl. 100 by Magdy El-Gohary.

The primary use cited for Harmel by Boulos is "emetic, diuretic" (1983, p. 195), and the emetic uses of *ḏaajs* are equally stressed in the ancient medical and magical sources (noted by VON DEINES, GRAPOW, *Grundriss* VI, p. 593; GERMER, 1979, p. 360; AUFRÈRE, 1986). Thus the emetic desert diet of *ḏaajs* and honey suggested by the exiled daughter of Osiris would have been quite unpleasant daily fare, and her exile to Sinai or the Syrian desert implied by addressing her as Asiatic (ERMAN, 1901, p. 14) where *Peganum harmala* is a dominant component of the local flora would have been an appropriate punishment. Certainly her suggestion of an emetic diet for her father was rebellious behavior, even if the plant and the emetic remedy it provided were common enough for grown men to have nightmares about chewing *ḏaajs*. According to one of the dream interpretations in P. Chester Beatty III, no. 7, 9 (*HPBM* 3rd Series, GARDINER, 1935, p. 16) : "If a man sees himself in a dream, munching *ḏaajs*, (this is) bad - it means hostility." The alliterative word-play between ḏ3jt (plant) and hostility (ḏ3t), may perhaps suggest that the plant and the hostility shared a disagreeable and unpleasant character. This pun or alliteration may underlie the dispute between Osiris and his daughter. [5]

3 The forage properties of Harmel were pointed out by shepherds from Tell Hadidi, Syria in the Euphrates valley southeast of Aleppo and confirmed by Prof. K.H. Batanouny, of Cairo University's Botany Department, who also generously provided scientific references.

4 The pediatric magic discussed in this text is to expel an unidentified disease of childhood. "La maladie (*tmy.t* ou une autre?) est assimilée à une déesse, fille d'Osiris, qui dit de lui ou contre lui (*r*) : 'qu'il vive de *ḏaajs* et de miel'. Cette même maladie est assimilée à une Asiatique qui s'en va dans le désert (*jj.t ḥr ḫ:st. jj.t ḥr*, aussi "revenir de"), à une Nubienne qui s'en va dans le désert (*jj.t ḥr mrw*) (D 2, 7-8)." (N. Grimal, letter, 31.3.93).

5 The presence of *Peganum harmala* near graveyards and ancient sites noted by Guest and Townsend (n. 2, above) may also have influenced the association of *ḏaajs* with Osiris, magic and the afterlife.

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Consumption of emetics, while a necessary part of traditional medical experience, would lead to uncontrolled vomiting and nausea which would not be acceptable behavior in family gatherings, public functions, or a happy afterlife. By prohibiting the posthumous or ritual consumption of a powerful emetic such as *ḏaajs*, the Pyramid Texts and Philae interdict would have reduced the risk of unsociable vomiting by dead kings or living visitors to the temple of Isis at Philae.

The seeds of Harmel are anthelmintic (BOULOS, 1983, p. 195), and *ḏaajs* was used both internally to kill the *pnd*-worm (Eb. 79) and externally as a cataplasm to reduce abdominal pain during a worm infection (Eb. 67). The seeds of *Peganum harmala* are also widely used as a worm-expelling remedy in areas ranging from India (Unesco, 1960, p. 44-45) to Turkey and the Crimea (TOWNSEND, GUEST, OMAR, 1980, p. 304). According to a Unesco report, "The alkaloids are toxic to several lower forms of animal life, notably helminths and protozoa" (*Medicinal Plants of the Arid Zones*, Paris, 1960, p. 45). [6]

Aufrère has noted the analgesic effect of fumigation with *ḏaajs* (1986, p. 8). *Peganum harmala* is the only vermifuge growing in Egypt that is also used as a painkilling fumigant. Vapors of the burnt plant are used to treat headache and neurotic pains, and "Pounded roots and seeds mixed with tobacco are smoked in pipes for toothache" (BOULOS, 1983, p. 195). Only two other Egyptian anthelmintics are used in fumigation. *Balanites aegyptiaca* bark is burnt to heal circumcision wounds, but an analgesic effect is not noted (BOULOS, 1983, p. 35; IWU, 1993, p. 129), and *ḏaajs*, unlike Balanites, is not a tree. Although *Calotropis procera* leaves are smoked as cigarettes for asthma, no analgesic effects are noted, and the latex "may lead to blindness if it gets into the eyes" (BOULOS, 1983, p. 195). This would make it an unsuitable external remedy for the scalp such as the use for *ḏaajs* indicated in P. Hearst 164 (*Grundriss*, IV/ 2, p. 193). In contrast, the dried, powdered Harmel plant is used for the treatment of purulent conjunctivitis and so would be safe to use near the eyes.

Both *ḏaajs* and Harmel are used in preparations for treating the scalp. P. Hearst 164 suggests using *ḏaajs* as a remedy for scalp lichen (*Grundriss* IV/2, p. 193). This can be compared to the use of powdered *Peganum harmala* seeds boiled in olive oil "to ameliorate the quality of hair by making it thicker and stronger" and for treating hair loss and baldness by massage (BOULOS, 1983, p. 195).

Ḏaajs and *Peganum harmala* are both used in the treatment of rheumatism, as external salves as well as internal analgesics (AUFRÈRE, 1986; BOULOS, 1983, p. 195). According to Boulos, fresh Harmel plants digested in sheep's fat are "used against rheumatism by rubbing",

6 Experiments in the 1920s by Gunn and Marshall even found that one of the active alkaloids in Harmel was useful in treating *Plasmodium vivax* malaria infections (G.M. CROWFOOT, L.M. BALDENSPERGER, *From Cedar to Hyssop*, London, 1932, p. 103, note). Ghalioungui has suggested that the shivering in Eb. 193 may refer to malaria (*The Ebers Papyrus: A New English Translation, Commentaries and Glossaries*, Cairo, 1987, p. 59). Ghalioungui's suggestion that malaria could have been a disease of pharaonic times has now been confirmed by the discovery of circulating *Plasmodium falciparum* antigen incorporated in New Kingdom skin and lung tissue samples (R.L. MILLER, S. IKRAM, G.J. ARMELAGOS, R. WALKER, W.B. HARER, C.J. SHIFF, D. BAGGETT, M. CARRIGAN, S.M. MARET, "Diagnosis of *Plasmodium falciparum* infections in mummies using the rapid manual *Para*Sight test", *Transactions of the Royal Society of Tropical Medicine and Hygiene* 88, 1994, p. 31-32). Thus *ḏaajs* may have been one of the earliest anti-malarial drugs, as the abdominal spell noted in Eb. 167 could have referred to the splenic enlargement occurring in malaria, schistosomiasis and other diseases.

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powdered seeds mixed with honey and ginger are "rubbed on skin for articular pains and rheumatism", and a cataplasm of seeds is analgesic. [7]

All of these uses are closely paralleled by the topical applications of *ḏaajs* recorded in the medical texts. Animal fat is mixed with *ḏaajs* in many of its topical applications as a painkilling analgesic (Eb. 605, Eb. 609, Eb. 657 = H. 94 = P. Ram. V, Eb. 689), and beeswax is also used as a basis for salves incorporating *ḏaajs* (Eb. 242, Eb. 654). A mixture of *ḏaajs* and honey, with beeswax incorporated in the salve either because it was already in the honey or by adding it to the mixture, was an all-purpose topically applied painkiller (H. 94 = Eb. 657 = P. Ram. V), and the analgesic property of a cataplasm of Harmel seeds noted by Boulos was perhaps even appreciated by Re himself when he rubbed on *pr.t ḏ3js* mixed with honey, beeswax, juniper and other aromatic ingredients (Eb. 242; AUFRÈRE, 1986, p. 8).

Re's use of a plant forbidden in certain contexts and ritual applications may be related to ancient Egyptian concepts of health and the way in which medications were believed to take effect. The sense of the *mt.w* refreshed by an external application of *ḏaajs* in Eb. 95 was broader than simply "vessels", and included "not only arteries and veins but, as well, all manner of ducts and canals" (GHALIOUNGUI, 1981, p. 18). Thus the analgesic effect of a topical application of *ḏaajs* would perhaps have been perceived as the movement outward of malignant influence and accumulated waste assumed to circulate and accumulate within the body and its organs and *mt.w* during disease (YOYOTTE, 1968). Divinities and their living adherents who had reached the stage of maturity where rheumatism and the potential for conflicts with grown children sometimes coincided, could both have been considered to derive a significant benefit from the medical and magical efficacy of *ḏaajs*.

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7 According to Crowfoot and Baldensperger, "In Palestine this plant is, like other rues, thought to be a cure for rheumatism" (1932, p. 91). The use of *Peganum harmala* for treating rheumatism and muscular aches and pains is due to alkaloids in the seeds which have been shown to have a "depressant effect on contractility of the non-striated muscles" (Unesco, 1960, p. 45). The analgesic efficacy of *ḏaajs* may be one reason for its being paired with a mild narcotic *'f:j/w*, *Lactuca virosa* in a number of texts (AUFRÈRE, *BIFAO* 86, p. 2, 6-7). In addition, both plants were used in pediatric magic and medicine (P. Berlin 3027). There may also have been a powerful narcotic effect from taking *P. harmala* seeds, according to early European ethnobotanical sources. A dissertation written by one of Linnaeus' pupils cited the 1589 edition of Pierre Belon's travels in Asia Minor for the observation that *Peganum harmala* seeds were sold in Turkish markets and used to induce drunkenness. "This account tells how the emperor Soliman used to eat the seeds without knowing what they were, because they gave him a feeling of great lust and blotted out the memory of unpleasant events" (ALANDER, 1762 translated in HOLMSTEDT, SCHULTES, 1989, p. 188).

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