Taxonomic Revision of the Genus *Pistacia* L. (Anacardiaceae)

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ABSTRACT

*Pistacia* is an economically important genus because it contains the pistachio crop, *P. vera*, which has edible seeds of considerable commercial importance whose value has increased over the last two decades reaching an annual value of about $2 billion (harvested crop). The taxonomic relationships among its species are controversial and not well understood due to the fact that they have no genetic barriers. The taxonomy of this genus is revised in detail through our research. It includes the following taxa: *Pistacia atlantica* Desf., *P. chinensis* Bunge subsp. *chinensis*, *P. chinensis* subsp. *falcata* (Bess. ex Martinelli) Rech. f., *P. chinensis* subsp. *integerrima* (J.L. Stew. ex Brandis) Rech. f., *P. eurycarpa* Yalt., *P. khinjuk* Stocks, *P. lentiscus* L. subsp. *lentiscus*, *P. lentiscus* subsp. *emarginata* (Engl.) AL-Saghir, *P. mexicana* Humb., Bonpl., & Kunth, *P. X saportae* Burnat, *P. terebinthus* L., *P. vera* L., and *P. weinmannifolia* Poiss. ex Franch. The genus is divided into two sections: section *Pistacia* and section *Lentiscella*. A key to the 14 taxa that have been recognized by this study is included. The new combination *P. lentiscus* subsp. *emarginata* (Engl.) AL-Saghir is made, and the names *P. chinensis* subsp. *integerrima* (J. L. Stew. ex Brandis) Rech. f., *P. terebinthus* L., and *P. vera* L. are lectotypified.

Keywords: Taxonomy; Phylogeny; *Pistacia*; Anacardiaceae; Genus; *Pistacia vera*

1. Introduction

*Pistacia* L. belongs to the family Anacardiaceae (cashew family), order Sapindales [1]. It contains nine species and five subspecies according to the current study.

*Pistacia vera* L. (cultivated pistachio) is by far the most economically important species in the genus. The value of *P. vera* fruits has increased over the last two decades reaching an annual value of about $2 billion (harvested crop) [2]. It has edible seeds and considerable commercial importance. Pistachios are utilized mostly in the shell, for fresh consumption; processed uses include candy, baked goods, and ice cream. They also have traditional, medicinal, and non-food uses such as toothache relief. The resin is used as a blood-clotting agent in Europe and the Middle East, while husks are used in India for dying and tanning. Pistachios have been reported as a remedy for scirrhus and sclerosis of the liver, abscesses, poor circulation, and other medical problems [3]. Currently, Iran, the United States, Turkey, and Syria are the main pistachio producers in the world, contributing over 90% of the world production [2].

Members of the genus are dioecious trees or shrubs with well-developed vertical resin canals. Leaves are alternate, deciduous or persistent, pinnately compound, or impari-pinnate, membranaceous or leathery. Inflorescences are determinate and terminal or axillary. Flowers are almost always unisexual, radial, small, with well-developed staminodes or carpellodes, and apetalous; sepals are usually 5, distinct to slightly connate; stamens are 4 - 5, filaments are very short, usually glabrous, and usually distinct; pollen grains tricolporate or triporate; carpels are usually 3 and variously connate; ovary superior, with only 1 fertile and well developed carpel; gynoecium asymmetrical and unilocular with apical placentation, ovule 1; stigma capitate. Nectariferous disk present, usually intrastomal. Fruit a flattened asymmetrical drupe, embryo curved; endosperm scanty or lacking.

*Pistacia* is believed to have originated in Central Asia [4-7]. Two centers of diversity have been described. One comprises the Mediterranean region of Southern Europe, Northern Africa, and the Middle East. The second comprises West and Central Asia [6-9]. The species of the genus occur naturally from North Africa to the Philippines and from Texas to Nicaragua.
Few systematic studies have been published on this important genus. The first complete classification of the genus was published by Zohary (1952) [10]. Today, there are many questions about Zohary’s taxonomic treatment, the status of many of his species, and the accuracy of dividing the genus into four sections. This disagreement is mainly because of little information being available on the phylogeny of the genus. Studies such as the one performed by Zohary (1952) were hampered by the small sampling size, weak representation of the species, and inefficient methods. Consequently, the studies failed to resolve the relationships between species within the genus. Moreover, species of *Pistacia* easily form interspecific hybrids, suggesting close relationships, which limit the previous studies and make the actual level of speciation and relationships within the genus unclear [4]. A better understanding of these relationships is also needed to make the species more useful for plant improvement or genetic studies.

A comprehensive taxonomic revision, utilizing different types of data, is urgently needed for *Pistacia* in order to clarify the phylogenetic relationships between the species and to characterize the collective germplasm. This will provide a framework and guidelines for plant improvement and help to preserve the genetic resources of this important crop, especially since these genetic resources are under threat by extensive forest cutting in their native countries (especially in the Mediterranean countries, and Central and Western Asia).

### 2. Taxonomic History

Linnaeus was the first to establish the genus. In his *Species Plantarum*, Linnaeus (1753) [11] recognized six species of *Pistacia*: *P. lentiscus*, *P. narbonensis*, *P. simaruba*, *P. terebinthus*, *P. trifolia*, and *P. vera*. *Pistacia narbonensis* and *P. trifolia* are synonyms of *P. vera*; *P. simaruba* is Bursera simaruba (L.) Sarg. of the closely related Burseraceae.

Prior to Linnaeus, Tournefort (1700) [12] considered *P. lentiscus* a distinct genus, *Lentiscus*, while he classified *P. terebinthus* and *P. vera* under the genus *Terebinthus*.

At present, the most complete taxonomic study is that of Zohary (1952), who included 11 species in the genus and divided them into four sections: *Lentiscella* Zohary (containing *P. mexicana* Humb., Bonpl. & Kunth and *P. texana* Swingle); *Eu Lentiscus* Zohary (containing *P. lentiscus* L., *P. saportae* Burnat, and *P. weinmannifolia* Poiss. ex Franch.); *Butmela* Zohary (containing *P. atlantica* Desf.); and *Eu Terebinthus* Zohary (containing *P. chinensis* Bunge, *P. khinjuk* Stocks., *P. palaestina* Boiss., *P. terebinthus* L., and *P. vera* L.).

Since Zohary’s (1952) treatment, several new species have been added to *Pistacia*. Yaltirik (1967a, 1967b) [13, 14] classified *Pistacia* species in Turkey and described a new species, *P. eurycarpa*. This had been called *P. atlantica var. kurdica* by Zohary (1952), a synonym. Zohary considered *P. palaestina* as a separate species, whereas Yaltirik (1967a, 1967b) retained it as a variety of *P. terebinthus*. Kokwaro described a new species from East Africa, *P. aethiopica*, in Kokwaro and Gillett (1980).

Fifty-five binomials for *Pistacia* were found in the International Plant Names Index [15], only 14 were recognized by the authors (all those listed in this section). The hybrids will be further discussed in the taxonomic section of this study.

Yi et al. (2008) [16] assessed the phylogeny of *Pistacia* using five molecular sets, sequences of nuclear ribosomal ITS, the third intron of the nuclear nitrate reductase gene (*NIA-i3*), and the plastid *ndhF*, *trnL-F*, and *trnC-trnD*. Their molecular data were largely consistent with our independently derived intragenic classification based on morphology. They recognized the following species: *P. atlantica*, *P. chinensis*, *P. integerrima*, *P. khinjuk*, *P. lentiscus*, *P. mexicana*, *P. palaestina*, *P. saportae*, *P. terebinthus*, *P. texana*, *P. vera*, and *P. weinmannifolia*. Except for *P. palaestina* and *P. texana*, our study recognized these taxa (*P. integerrima* as a subspecies of *P. chinensis*), plus *P. chinensis* subsp. *falcata*, *P. eurycarpa*, and *P. lentiscus* subsp. *emarginata*. *Pistacia* was shown to be monophyletic in all analyses. The two accessions of *P. vera* formed a clade with *P. khinjuk* in all molecular data sets. Some of the ITS and *NIA-i3* sequences of these two species were identical, suggesting a close relationship. Earlier molecular results also suggested a close relationship between them [4-6, 17]. *Pistacia palaestina* was not well separated from *P. terebinthus* in either the plastid or the nuclear DNA data sets, and Yi et al. (2008, p. 245) stated that, “*Pistacia palaestina* may need to be merged into *P. terebinthus*.” Close relationships between these two species were also suggested by the AFLP and the RAPD results [17-19]. These results are consistent with Engler (1936) [20] and Yaltirik (1967a), along with our classification, in considering *P. palaestina* to be a synonym of *P. terebinthus*. *Pistacia mexicana* and *P. texana* were not distinguishable in plastid restriction analyses [4]. The ITS data suggest that *P. mexicana* and *P. texana* are sister taxa; and the sequence divergence between these two species is low. Our morphological data indicate that there is too little variation to warrant the recognition of two species. *Pistacia saportae* was shown to be a hybrid between *P. lentiscus* (maternal) and *P. terebinthus* (paternal), as others had hypothesized (e.g., Zohary 1952).

Neighbor joining and parsimony analyses were performed on the morphological data for section *Pistacia* using PAUP 4.0 b10 [7,21]. Both analyses show that
Section *Pistacia* contains three groups, the first group includes *P. atlantica*, *P. mutica*, and *P. eurycarpa*, the second includes *P. chinensis*, *P. falcata*, and *P. integerrima* and the third group contains *P. khinjuk*, *P. palaestina*, *P. terebinthus*, and *P. vera*. Neighbor joining and parsimony analyses were performed on the morphological data for section *Lentiscella* using PAUP 4.0 b10 [7,21]. Section *Lentiscella*, as indicated by the two analyses, is monophyletic

3. The Genus *Pistacia* and Its Sectional Subdivision

*Pistacia* L., Sp. Pl. 2:1025. 1753. Type: *Pistacia vera* L. Hitchcock and Green, Prop. Brit. Bot.: 191. 1929 (lectotype: not designated. Reg. Veg. 127: 77. 1993). *Pistacia vera* is lectotyped under its treatment below.

*Terebinthus* Mill., Gard. Dict. Abru. Ed. 4. 1754.

*Lentiscus* Mill., Gard. Dict. Abr. Ed. 4. 1754.

*Evrardia* Adans., Fam. Pl. 2: 342. 1763.

Members of the genus are dioecious trees or shrubs with well-developed vertical resin canals. Leaves are alternate, deciduous or persistent, pinnately compound, but sometimes trifoliolate or unifoliolate, pinnate or imparipinnate, membranous or leathery. Inflorescences are determinate and terminal or axillary. Flowers are almost paripinnate, memberanous or leathery. Inflorescences are usually unisexual, radial, small, with well-developed staminodes or carpelloides, and apetalous; sepals are usually 3, distinct to slightly connate; stamens are 4 - 5, filaments are very short, usually glabrous, and usually distinct; pollen grains tricolporate or triporate; carpels are usually 3 and variously connate; ovary superior, with only 1 fertile and well developed carpel; gynoecium asymmetrical and unilocular with apical placentation, ovule 1; stigma capitulate. Nectariferous disk present, usually intrastaminal. Fruit a flattened asymmetrical drupe, embryo curved; endosperm scanty or lacking.

*Common names.* —Pistache, Pistachio [10].

3.1. Key to the Species of the *Pistacia*

1. Leaves large, 8 - 23 cm long, 5.2 - 23 cm wide.
2. Leaf rachis not winged.
3. Leaves coriaceous or becoming coriaceous
   4. Petiole flattened; leaflets 3 - 5, obtuse or mucronulate…………………*P. vera*
   4. Petiole rounded, rarely flattened; leaflets (3-6)-11, mucronate………………*P. terebinthus*
3. Leaves membranaceous.
   5. Petiole angled or rounded; leaflets 1 - 9, acuminate………………….……*P. khinjuk*
   5. Petiole angled or flattened; leaflets 6 - 15, attenuate.
   6. Leaves imparipinnate………………………………………...…………….*P. chinensis* subsp. *falcata*
   6. Leaflets paripinnate.
   7. Leaflets broadly lanceolate, 6 - 11.5 cm long, 2 - 4 cm wide, average ratio 3.4:1…………………*P. chinensis* subsp. *integerrima*
   7. Leaflets lanceolate, 4 - 10 cm long, 9 - 24 mm wide, average ratio 4.1:1…………………*P. chinensis* subsp. *chinensis*
2. Leaf rachis winged.
8. Leaves coriaceous, to 10 cm long, evergreen...
8. Leaves membranaceous. 8 - 18.2 cm long, deciduous
9. Leaflets (1-3)-5-7, 4.5 - 6.5 cm long, 1.5 - 3.8 cm wide, average ratio 2.3:1…………………*P. eurycarpa*
9. Leaflets (5)-7-11, 3 - 7 cm long, 5 - 20 mm wide, average ratio 3.5:1………………….….*P. atlantica*
1. Leaves small, 2 - 15.1 cm long, 1.8 - 10 cm wide.
10. Leaves coriaceous.
   11. Leaflets 4 - 10, mucronate, lacking large lacking large distinct veins……………….*P. lentiscus* subsp. *lentiscus*
   11. Leaflets 6 - 16, emarginate, with large distinct veins…………………………………….*P. lentiscus* subsp. *emarginata*
10. Leaves membranaceous.
   12. Leaves paripinnate; leaflets (4-6)12-20, often alternate...........*P. weinmannifolia*
   12. Leaves imparipinnate; leaflets 10 - 30, never alternate…………….*P. mexicana*

3.2. *Pistacia* L. sect. *Pistacia*, Zohary, Palestine J. Bot. Jerusalem Ser. 5:194. 1952

*Eu Terebinthus* Zohary, Palestine J. Bot. Jerusalem Ser. 5: 196. 1952. *Terebinthus* Parfitt & Badanes, Proc. Natl. Acad. Sci. USA. 94:7991. 1997. *Pistacia* section *Butmelda* is a taxonomic synonym based on *P. atlantica* Desf. *Pistacia* section *Eu Terebinthus* is an illegitimate name, because the epithet in the name of a subdivision of a genus is not to be formed from the name of the genus to which it belongs by adding the prefix *Eu-*(ICBN, Art. 21.3, [22]). *Pistacia* section *Terebinthus* was published without a Latin diagnosis. Type: *Pistacia vera* L.

Deciduous small trees or shrubs; leaves pari- or imparipinnate, rarely trifoliolate or simple; leaflets 4 - 24; rachis winged or wingless; drupes with bony endocarp.

Includes the following species: *P. atlantica* Desf., *P. chinensis* Bunge, *P. eurycarpa* Yaltirik, *P. khinjuk* Stocks, *P. terebinthus* L., and *P. vera* L.

3.2.1. *Pistacia atlantica* Desf., Fl. Atlant. 2:364. 1799

*Lentiscus atlantica* (Desf.) Kunze, Revis. Gen. Pl. 152. 1891. Type: Probably Algeria, *Desfontaines* (BM) [10]
**Pistacia atlantica**

*Pistacia chia* Desf., Tabl. Ecol. Bot. 199. 1804. TYPE: not designated.

*Pistacia atlantica var. latifolia* DC., Prodr. 2:61. 1825. TYPE: GREECE: Chios, 1822, Olivier (G).

*Pistacia mutica* Fisch. & C.A. Mey., Bull. Soc. Imp. Naturalistes Moscou 4:338. 1838. *Lentiscus muticus* (Fisch. & C.A. Mey.) Kuntze, Revis. Gen. Pl. 153. 1891. *Pistacia atlantica* subsp. *mutica* (Fisch. & C.A. Mey.) Rech. f., Fl. Iranica 63:4. 1969. TYPE: AKBYRAN: Goygol & C.A. Mey.) Kuntze, Revis. Naturalistes Moscau 4:338. 1838. TYPE: GREECE: Chios, 1822, Olivier (G).

*Pistacia cabulica* Stocks, J. Bot. Kew Gard. Misc. 4: 143. 1852. *Pistacia mutica* subsp. *cabulica* (Stocks) Engl., Monogr. Phan. 4:288. 1883. *Pistacia atlantica* subsp. *cabulica* (Stocks) Rech f. Fl. Iranica 63:5. 1969. TYPE: PAKISTAN: Balochistan, Stocks, 1849 (K).

*Pistacia choulettei* Gand., Dec. Pl. Nov. 1:44. 1875. nom. illeg. (based on *P. atlantica* Desf.)

*Pistacia mutica* f. *multijuga* Engl. in A. & C. DC., Monogr. Phan. 4: 288. 1883. TYPE: ARMENIA: J.N. Szovits (W).

*Pistacia atlantica* var. *cypricola* H. Lindb., Acta Soc. Sci. Fenn. Ser. B, Opera Biol. 7:20. 1946. TYPE: CYPRUS: pre-" 

*Pistacia atlantica* var. *cypricola* H. Lindb., Acta Soc. Sci. Fenn. Ser. B, Opera Biol. 7:22. 1946. TYPE: CYPRUS: presumably a Harald Lindberg specimen at H.

*Pistacia atlantica* f. *oxycarpa* Zohary, Palestine J. Bot. Jerusalem Ser. 5:206. 1952. TYPE: AFGHANISTAN: Griffith 1269 (K).

Shrubs or trees, 3 - 15 m high; crown wide, rounded. Leaves deciduous, imparipinnate, 8 - 17.6 cm long, 5.2 - 14 cm wide, membranaceous; petiole flattened; rachis narrowly winged. Leaflets (5-)7-11, 3 - 7 cm long, 5 - 20 mm wide, average ratio 3.5-1, opposite, lower subopposite, lanceolate, obtuse, minutely puberulent; rachis minutely puberulent; terminal leaflet 2.7 - 7 cm long, 5 - 20 mm wide, same size or smaller than laterals. Staminate panicles to 7(-11) cm long, often clustered, stout, branched from base, densely flowered, pubescent; flowers red. Pistillate panicles to 15 cm long, subterminal with leaves, stout, branched from base, minutely pubescent; flowers pinkish. Drupes many, red or reddish, 3 mm long, mesocarp fleshy, endocarp bony.

**Phylogeny.**— *P. atlantica* is was close and sister to *P. eurycarpa* [7].

**Phenology.**—Flowering December, January, March to May; fruiting March to September.

**Habitat and ecology.**—Stony hillsides, steep dry slopes, limestone and sandstone hills; 30 - 2500 m.

**Use.**—Iran: Galls common, “used for dyeing (black)” (Lace 3677, 3678).

**Common names.**—Betoum, Butum (Zohary 1952), Cyprus: Gum Tree, Trimithia (*Ecoymides* 1019). Iraq (Kurdish): Kazwan (Gillett 7800, 7940). Libya: Batum (Keith 146), Bitam (*Sandwich* 2780; *Sandwich* & *Simpson* 39730). Pakistan: Gwan (*Ghafour* & *Goodman* 5164), Khanjak (27 Apr 1888, Lace).

**Distribution.**—From the Canary Islands, across North Africa, to Greece, Turkey, and Cyprus, and through the Middle East and Saudi Arabia to Ukraine, Georgia, and Azerbaijan, and Afghanistan and Pakistan.

**Specimens examined.**—AFGHANISTAN. Baluchistan: Khojak Pass, 04 Nov 1888, *J.F. Duthie* 8627 (BM). *Heart*: between Qala Charak and Chisht, 34°18'N 64°00'E, 1800 m, 04 Apr 1962, *K.H. Rechinger* 19192 (MO). Konor: Asmar Barikot, 900 m, 1949, *L. Edelberg* 1639 (K). Pakistan: Kurram [Karram] Valley, Alisai, 04 Apr 1879, *J.E.T. Aitchison* s.n. (BM, K). Shalina: May 19 1879, *J.E.T. Aitchison* s.n. (BM, K). Jordan: between Aflou and El Ghicha, 1350 m, 04 Jun 1975, *Davies* 58745, (BM). *Naama*: Djebel Mekter, near Aïn Safra, 1600 - 2000 m, May 1913, *E Hartert s.n.* (BM). *Mila*: between Grarem and Mila, 200 m, 22 May 1975, *Davies* 58207A (BM). *Saïda*: Saïda, May 1858, *G. Munby* s.n. (K); near Saïda, 22 May 1852, *B. Balansa* 340 (K). *Tlemcen*: Tlemcen, 1867, *G. Munby* s.n. (K). Unknown region: 1803, *Desfontaines* s.n. (BM). ARMENIA. Szovits (K); near Shvanidzov, Gerundara Valley, 03 May 1967, *E. Gabrishan* & *P. Gambarian* s.n. (K). Azerbajian: Zangelan: between Pircheran and Chari-Mushulag (cult.), 400 m, 09 May 1948, *A. Grossheim et al.* s.n. (MO); between Razadara and frontier with Armenia, 10 May 1948, *A. Grossheim et al.* s.n. (MO). Unknown region: near Shamkhoz, 130 m, 22 May 1982, *A.K. Shvortsov* s.n. (MO). CANARY ISLANDS. Gomera: Hermigua, 24 Apr 1845, *E. Bourgeau*...
812 (BM); La Roque, 600 m, Mar 1906, C.J. Pitard 545 (MO). Gran Canaria: E of Agaete, 100 m, 18 Apr 1981, Davis 67350 (E). Tenerife: Anaja Hills?, Cabrera s.n. (K); Sito del Pardo, Orotara (cult?), 19 Jun 1899, R.P. Murray s.n. (K). CYPRUS. Kambylí: 520 ft, 27 Feb 1955, L.F.H. Merton 1988 (K). Neophytoi: 1000 ft, 25 Jul 1967, S. Ecyoomides 1019 (K). EGYPT. Sharqiya: Tell-el-Kebir, Jan 1913, R. Muschler s.n. (MO). GEORGIA. Dedoplistskaro: Washillowani Forest Reserve, 41° 14’N 46°22’E, 13 May 1999, J.F. Gaskin 175, 192 (MO). GREECE. Crete: Gorges de Imbros, N of Chora Sfakion, 09 May 1968, R. Deschamps 371(1) (K). Kambyli: near Iefren, 700 m, 15 Mar 1970, R.P. Murray 571(5) (K). Istros: near Vaneio, 700 m, 15 Mar 1971, R.P. Murray s.n. (K). LIBYA. Beni Snassen: 10 km SSW of Berkane, 34°50’N 2°21’W, 630 m, 29 Oct 1993, S.L. Jury & T.M. Upson 13056 (BM); Gebel Nefoussa, Ain Zarga, 600 - 700 m, 17 Mar 1970, Davis 49685 (E); near Jefren, 700 m, 15 Mar 1970, Davis 49540 (E, K); Oroban, N of Senam Ulaad Brekk, 900 m, 11 May 1957, H.G. Keith 146 (K). Gharyan: Gharyan plateau, near El Rumia, 700 - 750 m, 25 Apr 1939, N.Y. Sandwith 2780 (K). Yafran: Jefren [Yafran], near Rumia, 25 Apr 1939, N.Y. Sandwith & N.D. Simpson 39730 (BM). MOROCCO. Wiwam to Jouner Oum En Rbie, 1700 m, 18 Jun 1991, J. Lewalle 13550 (MO). Agadir: Immouzer Valley, N of Agadir, 28 Mar 1972, D. Bramwell et al. 280 (K, MO). ER-Rachidia: near Gorge du Ziz, N of Er-Rachidia toward Midelt, 32°06’N 04°23’W, 1110 m, 12 Jul 1997, S. L. Jury et al. 17804 (BM). Marrakech: 63 km from Asni toward Tizi-n-Test, 30°54’N 08°20’W, 1650 m, 20 Jul 1989, M. Ait Lahkif et al. 780 (BM); 1 km NNE of ljoukak, 45 km SW of Asni, 31°01’N 08°09’W, 1170 m, 10 Jul 1993, S.L. Jury & L.S. Springate 11959 (BM, K); 65 km from Marrakech toward Tizi-n-Tichka, 31°29’N 07°26’W, 1510 m, 10 Jul 1987, S.L. Jury et al. 9157 (BM); Monildikh, between Tizi n’Test and Ichoukak, 5000 ft, 26 Jun 1936, E.K. Balls 2938 (BM). Rabat-Sale: 12 km SE of Ain-el-Aouda, 09 May 1968, G. Mines & J. Veilx s.n. (MO). Taroudant: Oued Issen, 16 Jun, H. Lynes 13a & 13b (BM). Tiznit: 11 km from Tafraout toward Titeki, 1250 m, 28 Mar 1969, P. & J. Davis 48863 (E); above Tafraout toward pass to Ait-Baha, 1200 m, 30 Mar 1972, Davis 53888 (BM); Tazerwat, Ihlwane, 800 m, 27 Jun 1981, J. Lewalle 9731 (BM, MO). PAKISTAN. Balochistan: Fort Sandeman [Zho], 4500 ft, 17 Jun 1976, I. Dar & A. Mohd 5 (MO); Gwál, 6000 ft, 27 Apr 1888, J.H. Lace s.n. (E); Hazarganj, near Quetta, 23 Aug 1962, R.R. Stewart 831 (K); Juryi Pass, 28°49’N 66°39’E, 11 May 1990, A. Ghafoor & S.M. Goodman 5164 (F); between Loralai and Qila Saifullah, 19 May 1984, S. Omar & A. Ghafoor 1635 (MO). New North Frontier Province: Ayun, 26 Jul 1976, M. Shah et al. 2227 (MO); Birmoghalsha, 7 - 8000 ft, 02 Aug 1954, M.A. Saddiqui & A. Rahman 26767 (BM); Maroi, between Chitral and Mastuj, 6000 ft, 28 May 1958, J.D.A. Stainton 2532 (BM). PALESTINE. Asher, 29 Feb and 15 May 1913, F. Myers 9239 (K); Jerusalem, 29 Mar and 15 May 1913, J. E. Dinsmore 9239 (F); 20 Apr 1903, F. Meyers 712 (F); Lower Galilee, between Yagur and Tiv’on, 01 Jun 1951, M. Zohary 441 (BM, K, MO). SAUDI ARABIA. Hejaz: near Suq ar Rubu, S of Taif, 7000 ft, 07 Apr 1977, J.S. Collette 258 (K). Mintaqat Jizan. Al-Khadra to near Ghamid-Al-Zinad, 15 Jul 1976, J. Dwyer & A. El-Sheikh
13772 (MO). Tabuk: Jabal Dabbagh, 100 km SW of Tabuk, 3000 ft, 03 Mar 1984, J.S. Collenet 4785 (K).

SOUTH AFRICA. Ganteng: Pretoria (cult.). 21 Sep 1961, coll. unknown (K). TUNISIA. Sidi Bouzid: Marbat Sidi Khaled, between Sidi Bouzid and Maknassi, 01 Apr 1968, L. Boulos 273 (MO).

TURKEY. Antalya: Selcukjuk bridge about 5 km E of Serik 30 m, 23 Apr 1959, E. Hennipman et al. 638 (K). Icel: Yenege [Yenice], between Tarsus and Adana, 50 ft, 10 Apr 1934, E.K. Balls 712 (BM).

Istanbul II: Western Thracia, Tarabya, 50 m, 23 Apr 1961, K.H. Rechinger 21958 (MO). Karabak: Igdir to Safranbolu, 350 m, 02 Aug 1962, Davis et al. 38799 (K, MO). Mугla II: Bodrum, Musgebi [Ortakent] to Karatoprak, 50 - 100 m, 12 Apr 1965, Davis 41003 (K). UKRAINE. Republika Krym: Tauria, near Nikita, 100 m, 25 Jul 1967, A.K. Shvortsov 82 (MO).

ZIMBABWE. Harare: Harare, Greenwood Park (cult.), 22 Oct 1937, R.J. Finlay m140/37 (BM).

3.2.2. Pistacia chinensis Bunge, Enum. Pl. China Bor. 15. 1833.

Type: “Peking leg. Bunge, in Herb, Petropol.” [LE] (Zohary 1952, p. 215).

3.2.2.1. Pistacia chinensis subsp. chinensis

Pistacia formosana Matsum., Bot. Mag. (Tokyo) 15:40. 1901. TYPE: not designated.

Pistacia chinensis f. latifolia Loes. in Gilg. & Loes., Beih. Bot. Jahrb. Syst. 34, 75:49.1904. TYPE: not designated.

Pistacia philippinensis Merr. & Rolfe, Philip. J. Sci. 3: 107.1908. TYPE: not designated. Zohary (1952, p. 215) refers to Vidal 1825 from Benguet Province, Luzon, Philippines (K) as an “isotype”.

Trees, 4 - 20 m high. Leaves deciduous, paripinnate, 8.2 - 23 cm long, 8 - 20 cm wide, membranaceous; petiole angled or flattened, minutely reddish-pubescent; racemis not winged, minutely reddish-pubescent. Leaflets 8 - 14, 4 - 10 cm long, 9 - 24 mm wide, average ratio 4.1-1, lanceolate, attenuate, apiculate, uppermost opposite, lower usually subopposite, midvein and margin pubescent, becoming glabrate. Stamine panicles to 4 cm long, many-flowered, catkin-like when young, pubescence reddish-brown. Pistillate panicles to 17 cm long, many-flowered, stout, branched from base, minutely puberulent with reddish-brown trichomes, which are longer on younger inflorescences. Drupes green turning red, drying grayish, apiculate, 5 mm long.

Phylogeny.—P. chinensis is sister to P. falcata and P. integrerrima [7].

Phenology.—Flowering April, September, and October; fruiting March, and May to November.

Habitat and ecology.—On limestone; 200 - 2500 m.

Uses.—China: “large tree, young leaves of which are eaten by the Chinese” (A. Henry 340); “fruit edible (for oil)” (Sino-British Expedition to Cangshan 125).

Common names.—China: Huang-lien-shur or Huang-m-ya shu [10]; Chinese pistachio [22]; Huang-lien-ya (Henry 3402). Taiwan (Japanese): Ransihiboku (Matuda, 07 Jan 1918).

Distribution.—Native to China, Taiwan, and the Philippines.

Specimens examined. CHINA. Beijing: near Peking [Beijing], 1867, S.W. Bushell s.n. (F); S.W. Williams s.n. (BM); Tehé-hai, 2500 m, Nov, Léveillé s.n. (E); Tongtehouen [Tongtian? 10 km N of Ganzhou?], 2500 m, Apr, Léveillé s.n. (E). Fujian: H.H. Chung 6228 (F); Tiger Hill, Amoy Island, 30 Apr 1923, H.H. Chung 1445 (K).

Gansu: Shuijiawan, Wen Xian, 630 m, 26 May 1992, X. Wang 159 (MO). Guangdong: Aug 1887, C. Ford 308 (K); Lian Xian, 02 Oct 1950, P. Teixiango 59618 (MO); S of Linchow, Yang Shan District, Jul-Sep 1932, T.M. Tsui 495 (F); near Lo Tsi Tsui, Lin District, 14 Oct 1918, N.C. Lam s.n. (MO); Ruyuan, 23 Oct 1956, C. Wang 42275 (MO); Yunfu Xian, 22 May 1934, C. Wang 37030 (MO).

Guangxi: Fushi Town, Liuliao, 20 km S of Ron-gan, 500 m, 10 May 1997, P.J. Cribb et al. 485 (K); Kweilin, 220 m, 1979, P.P. Wan & K.S. Chow 79169 (BM, K, MO); Lingyuan Xian, 28 Jul 1937, L. Xinqi 28776 (MO); Loh Hoh Tsuen, Ling Yün Hsien, 1150 m, 18 May 1933, A.N. Steward & H.C. Cheo 443 (BM).

Hong Kong: Kowloon, Tai-Hung Tung, 27 Aug 2002, S.Y. Hu & K.H. Yung 514 (K, MO). Hunan: Sing-Ch’u, Sintien Hsien, 600 m, 23 Aug 1935, C.S. Fan & Y.Y. Li 374 (BM). Hubei: W Hupeh [Hupei], Apr 1907, E.H. Wilson 380 (BM, E); Oct 1907, coll. un-known (BM). Ichang [Yichang], Oct 1887, A. Henry 3402 (K).

Jiangsu: 28 Aug 1995, W. Wenzhang 9963 (MO); I-hing, 10 Oct 1979, W.Z. Fang 7939 (MO); Jiangsu Botanical Institute (cult.), 08 Nov 1982, K. Yao 8535 (MO); Yun-tai-shan, Lian-yun-gang (cult.), 200 m, 22 Sep 19, K. Yao 848481 (MO).

Shandong: Chefoo [Chi-Fu; Yantai], 17 Sep 1880, F.B. Forbes s.n. (BM, 2 colls.); Ching Shan, Lao Shan, 600 m, 20 Jul 1930, C.Y. Chiao 2834 (E); Pao Shan, near Tsianfu, 200 m, 20 Sep 1930, C.Y. Chiao 3152 (F); Tsing-tao, 29 May 1979, C.R. Lancaster s.n. (BM).

Shanghai: near Shanghai, Apr and May 1887, W.R. Carles 275 (E, K); 1873, C. Cooper 275 (K). Sichuan: Bai Di Cheng, 280 m (cult.), 06 Jun 1996, C. Zhiduan et al. 96099 (MO); Kuan-hsien, 08 Apr 1938, W.P. Fang 12132 (BM); near Techang, 03 Apr 1914, C. Schneider 710 (K); Tianci Forest Farm, 960 m, 21 May 1996, C. Zhiduan et al. 960417 (MO). Yunnan: Cao Xi Temple, Anning, 42 km W of Kunming, 2025 m, 29 Apr 1981, Sino-British Expedition to Cangshan 126 (E, K), 127 (E, K); near Guylineangben and Loulantchean, 30 May 1897, E. Bodinier 2304 (E); Liao-mi-lan, near Cali, 19 Jul 1895.
3.2.2.2. *Pistacia chinensis* Bunge subsp. *falcata* (Becc. ex Martelli) Rech. f., Fl. Iranica 63:8.1969

Basionym: *Pistacia falcata* Becc. ex Martelli, Fl. Bogos. 24. 1886. *Rhus falcata* (Becc. & Martelli) Penz., Atti Congr. Bot. Genova 337. 1893. *Pistacia chinensis* var. *falcata* (Becc. ex Martelli) Zohary, Palestine J. Bot. Jerusalem Ser. 5:217. 1952. Type: ERITREA: Keren, from base, stout. Drupes to 7 mm long, greenish-white, turning reddish. Pistillate panicles to 15 cm long, not branched from base, stout. Drupes to 7 mm long, greenish-white, turning reddish.

Trees, 4 - 10 m high; twigs minutely brownish-yellow pubescent. Leaves deciduous, imparipinnate, 13 - 21 cm long, 11.4 - 18.2 cm wide, membranaceous; petiole flattened; rachis not winged. Leaflets 11 - 15, 5.2 - 9.1 cm long, 1 - 2 cm wide, average ratio 5.5-1, narrowly lanceolate, falcate, attenuate, glabrous, opposite to subopposite below; terminal leaflet commonly present, 2 - 4 cm long, 5 - 11 mm wide, smaller than laterals or reduced. Staminate panicles to 8 cm long, branched from base, branches spike-like, trichomes pale; flowers yellow, turning red. Pistillate panicles to 15 cm long, not branched from base, stout. Drupes to 7 mm long, greenish-white, turning reddish.

**Phylogeny.**—*P. falcata* is sister to *P. chinesis* and *P. integerrima* [7].

**Phenology.**—Flowering February and April; fruiting February, April to August, and November.

**Habitat and Ecology.**—Savannas, on calcareous or volcanic soils and old or recent lava flows; 1100 - 2600 m.

**Common Names.**—Somalia: Sisaye (*Glover & Gilliland* 1114), Sisei (*Glover & Gilliland* 1164).

**Distribution.**—Egypt, Saudi Arabia, and Yemen, to Eritrea, Ethiopia, and Somalia.

**Specimens examined.** **EGYPT.** **Al Bahr Al Ahmar:** Wadi Haikwil, Gebel Elba, 17 Sep 1936, M. Drar 57/884 (K); South Galala, Wadi Rigba, 520 m, 04 Apr 1944, P.H. Davis s.n. (BM). **ERITREA.** **Hamasien:** Monte Zagher, 2600 m, 20 May 1902, A. Pappi 5308 (BM, F). **ETHIOPIA.** **Afar:** about 50 km SW of Awash Station, 700 m, 05 Apr 1966, W.J.J.O. de Wilde & W. Burger 3616, 3618 (F); 29 km on Metahana to Nazret road, 8°52'N 39°45'E, 1450 m, 21 May 1980, B. Muchler et al. 1387 (MO). **Oromia:** Darro Mts, 18 Nov 1894, A. Donaldson Smith 266 (BM); 5 km E of Wolenchetti [Welenchitti], 8°04'N 39°30'E, 1300 m, 16 Feb 1965, W. Burger 3695 (F). **SAUDI ARABIA.** **Al-Bahah:** Beni Ghamid, 6500 ft, 14 Jun 1946, W. Theiger s.n. (BM).

**Asir:** 5 km S of Abha, 18°11'N 42°29'E, 2050 m, 04 Aug 1982, U. Baierle & P. König s.n. (E); Taif, 2000 m, 19 Aug 1978, A. R. Pittaway s.n. (BM). **SOMALIA.** **Sanaaq:** Tabah Gap [Pass], 05 Jul 1945 P.E. Glover & H. B. Gilliland 1114 (BM). **Woqooyi Galbeed:** Gan Libah, 5300 ft, 25 Jul 1945, P.E. Glover & H.B. Gilliland 1164 (BM). **YEMEN.** **San’a:** Jebel Bura, near Maghhaba, 1700 m, 27 May 1977, J.R.I. Wood 1642 (BM); Djebel Dhürän, 1931, H. van Wissmann 1849 (BM); Jebel Melhan, between Markah and Maghhaba, 1800 m, 02 Jun 1978, J.R.I. Wood 2372 (BM).
3.2.2.3. *Pistacia chinesis* Bunge subsp. *integerrima*
(J.L. Stew. ex Brandis) Rech. f., Fl. Iranica 63:8. 1969

Basionym: *Pistacia integerrima* J.L. Stew. ex Brandis, Forest Fl. NW. India 122. t. 22. 1874. *Pistacia chinesis* var. *integerrima* (J.L. Stew. ex Brandis) Zohary, Palestine J. Bot. Jerusalem Ser. 5:216. 1952. Type: not designated, nor are any specimens cited (lectotype, here designated: t. 22, Brandis 1874).

*Rhus kakrasingee* Royle, Ill. Bot. Himal. Mts. 5:175. 1835. nom. nud.

*Rhus integerrima* Wall., Numer. List 8474.1847. nom. nud.

*Pistacia kühnii* var. *stockii* Engl. in A. & C. DC., Monogr. Phan. 4:291. 1883. TYPE: not designated.

*Lentiscus kkradingee* (Royle) Kuntze, Revis. Gen. Pl. 1:152.1891.

Trees, 6 - 8 m high. Leaves deciduous, usually paripinnate, 11 - 22 cm long, 12 - 23 cm wide, membranaceous; petiole angled or flattened; rachis not winged, reddish-pubescent when young, becoming glabrate. Leaflets 6-(9)-10, 6 - 11.5 cm long, 2 - 4 cm wide, average ratio 3.4-1, opposite to subopposite, broadly lanceolate, attenuate, glabrous. Staminate panicles to 10 cm long, branched from base, branches spike-like, reddish-pubescent, young parts especially pubescent. Pistillate panicles to 16 cm long, branched from base, stout in fruit. Drupes red.

Phylogeny.—*P. integerrima* was sister to *P. chinesis* and *P. falcaté* [7].

Phenology.—Flowering March and April; fruiting April to June.

Habitat and ecology.—800 - 2900 m.

Common names.—Gusgu, Kakrangche, Kakrat, Kakring, Kakroo, Kanroo, Masua (Afghanistan), Sarawan, Shue, Tungu [10]. Pakistan: Kangar (Barrett 64).

Distribution.—Armenia, Afghanistan, Pakistan, and Nepal.

Specimens examined. **AFGHANISTAN. Paktia:** Kurrum [Kurram] Valley, near Shálizán, 06 Apr 1879, J.E.T. Aitchison 38 (K). **ARMENIA. Szovits 2510 (BM). NEPAL.** Purini, Pultanto Dara (cult.), 7000 ft, 21 Apr 1952, O. Polunin et al. 1808 (BM). **PAKISTAN. KASHMIR.** Bhibmer, 2500 ft, 28 Jun 1876, C.B. Clarke 28117 (K); M’Tilla, Cabilica (cult.), 27 Mar 1893, Aitchison 4 (K).

**North West Frontier Province:** Bromboret Gol, Chitrál, 35°41’N 71°38’E, 6800 ft, 15 May 1958, S.A. Bowes Lyon 651 (BM); Hazara, Bisian, 3000 ft, 24 Apr 1978, M. Shah & D. Khan 1808 (K); Hazara, Manchora, 14 May 1976, M. Shaukat & N. Ahmad 266 (K); Jaunsar District, Thadyar, 8000 ft, May 1891, J.S. Gamble 23024 (K); Jaunsar, Kachanu, 4000 ft, Mar and Jun 1890, K. Nand 214 (BM); Swat, Miadam, 6000 ft., 29 May 1976, M. Shah & D. Khan 1073 (MO). **PUNJAB:** Barrett 21602 (K); Banahul, 05 Nov 1848, J. Thomson s.n. (K); Harara District, 3000 - 5000 ft, 2003?, Barrett 84 (K); Rawalpindi, Margalla Hills, 14 Apr 1976, I. Dar et al. 1 (MO). **UNKNOWN REGION: W. Roxburgh s.n. (BM); Ramaon, Jun 1845, J. Thomson 1213 (K); Karrot [Kanof], 2300 ft, 07 May 1969, S. ul-Abedin 2775 (MO, 2 colls.).

3.2.3. *Pistacia eurycarpa* Yalt., Notes Roy. Bot. Gard. Edinb. 28:11. 1967

Type: TURKEY: Prov. Bitlis, Bilitus gorge below Tutu, S of Kambos (Humus) Da., 1250 m, 16 Aug 1956, McNeill 600 (holotype: E).

*Pistacia atlantica* var. kurdica Zohary, Palestine J. Bot. Jerusalem Ser. 5:206. 1952. *Pistacia atlantica* subsp. *kur-""""dica* (Zohary) Rech. F., Fl. Iranica 63:5. 1969. TYPE: not designated.

Shrubs or small trees, to 5 m high. Leaves deciduous, usually imparipinnate, 10.2 - 18.2 cm long, 9 - 13.5 cm wide, membranaceous; petiole flattened; rachis narrowly winged. Leaflets (1-3-) 5 - 7, 4.5 - 6.5 cm long, 1.5 - 3.8 cm wide, average ratio 2.3-1, lanceolate, obtuse, puberulent, margin ciliated to glabrous; terminal leaflet 5.2 - 8 cm long, 2.5 - 4 cm wide. Staminate panicles not seen. Pistillate panicles to 18 cm long, branched from above base, stout. Drupes bright red, wider than long, to 7 mm long and 8 mm wide.

Phylogeny.—*P. eurycarpa* is closest and sister to *P. atlantica* [7].

Phenology.—Flowering season unknown; fruiting May to August, October.

Habitat and ecology.—Stony slopes, shale or limestone; 1400 - 1800 m.

Uses.—Turkey: “Fruits eaten” (Sperling et al. 6787).

Common names.—Badwar, Butum, Gazwan, Giwan, Habbat, Khadra, Khayak (Zohary 1952). Turkey: Derekhti Sakhus (Loftus, 01 Aug 1851); Fistik (Sperling et al. 6787); Wann (Kurdish) (Loftus, 01 Aug 1851).

Distribution.—Turkey, Armenia, Iran, Afghanistan, and Pakistan.

Specimens examined. **AFGHANISTAN.** 1884-1885, J. E.T. Aitchison 1039 (BM). **Farah:** 60 Km SSW of Farahbad, 1600 m, 15 Jul 1969, J.S. Andersen & I.C. Petersen 434 (K). **ARMENIA.** Artashatskii region, between Arazdayn and Kiarkii, 26 Jun 1969, A.L. Takhtajan s.n. 1039 (BM). **IRAN.** **FARS.** S shore of Daryacheh-e Bakhtegan, 70 km WNW of Neyriz, 29°33’N 53°40’E, 1700 m, 17 Jun 1977, M.H. Bokhari & J.R. Edmondson 2093 (E); 3 km W of Saadatabad, 1800 m, 22 May 1964, M.L. Grant 15835 (MO). **GHARBI:** 25 km from Sardasht toward Baneh, 1400 m, 21 Oct 977, Fliegner & Simmons 486 (K). **KERMANSHAH:** Tauk i Girrah, near Kirrind, 01 Aug 1851, W. Roxburgh s.n. (BM). **KURDISTAN.** 101 km S of Baneh toward Marvan, 1700 m, 22 Oct 1977, Fliegner & Simmons 501(K); between Sardasht and Baneh, 1500 m,
3.2.4. *Pistacia khinjuk* Stocks, Hooker’s J. Bot. Kew Gard. Misc. 4:143. 1882

Type: PAKISTAN: Balochistan (“Beloochistan”), 1849, Stocks 719 (K).

*Pistacia acuminata* Boiss. & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou 12:53. 1860. TYPE: not designated.

*Pistacia khinjuk* var. *populifolia* Boiss., Fl. Orient. 2:7. 1872. TYPE: AFGHANISTAN: Heart, between Heart and Tabas (Iran), 1858, Bunge (HOLOTYPE: G).

*Pistacia khinjuk* var. *heterophylla* Engl. in A. & C. DC. Monogr. Phan. 4:290. 1883. TYPE: not designated.

*Pistacia khinjuk* var. *glabra* Schweinf. ex Engl. in A. & C. DC. Monogr. Phan. 4:292. 1883. TYPE: EGYPT: middle desert, eastern part, W. Rigbe (HOLOTYPE: B).

*Pistacia khinjuk* var. *glomerata* Schweinf. ex Boiss., Fl. Orient. Suppl. 154. 1888. TYPE: EGYPT: Al Bahr al Ahmar, Wadi Righbeh, 1887, Schweinfurth 228 (HOLOTYPE: G).

*Pistacia khinjuk* var. *microphylla* Boiss., Fl. Orient. Suppl. 154. 1888. TYPE: EGYPT: Al Bahr al Ahmar, upper Wadi Rigbeh, Schweinfurth 96 (HOLOTYPE: G; ISOTYPE: P).

*Pistacia khinjuk* var. *macrocarpa* Zohary, Palestine J. Bot. Jersulam Ser. 5:212. 1952. TYPE: IRAQ: Ninawa, Iskeftendivan, N of Shaaikh Adi, 1933, E. Guest 3666 (HOLOTYPE: K).

Trees, 2 - 5(-10) m high. Leaves deciduous, imparipinnate, 11 - 17.7 cm long, 8 - 15.5 cm wide, membranaceous; petiole angled or rounded; rachis not winged. Leaflets 1 - 9, 4.5 - 8.5 cm long, 1.5 - 4 cm wide, average ratio 2.3-1, opposite to subopposite, ovate to broadly ovate, acuminate, glabrous; terminal leaflet 2.9 - 8.5 cm long, 1.2 - 4 cm wide, often larger than laterals. Staminate panicles to 9 cm long, loosely branched, with large, white-pubescent bracts; flowers crimson. Pistillate panicles to 16 cm long, branched from base, stout, minutely pubescent to glabrous. Drupes red, to 8 mm in diameter. Phylogeny.—The closest relative of *P. vera* [7].

Phenology.—Flowering March to May; fruiting April to October.

Habitat and ecology.—Rocky limestone slopes, sandy loam, and granite; 400 - 2400 m.

Uses.—Afghanistan: “The nuts are roasted and eaten” (Aitchison 234, 606). “They make oil from the seeds for lighting” (Theisger 1670). Iraq: “The kernel and the stone is eaten (the flesh of the fruit is bitter and cannot be eaten)” (Just 1643). Pakistan: “seeds edible” (Ghafoor & Goodman 4936). Saudi Arabia: “red berries. edible” (Colletine 710).

Common names.—Gulgunoor, Gwn, Khinjuk, Shurumma (Afghanistan), Ushgai Bugzai (Baluchistan) [10].

Distribution.—Turkey south to Egypt and Saudi Arabia and east to Tajikistan, Afghanistan, Pakistan, and Nepal.

Specimens examined. AFGHANISTAN. Paktia: Kurrum [Kurram] Valley, 23 Nov 1878, J.E.T. Aitchison 234 (K); Kurrum [Kurram] Valley, Apr 1879, J.E.T. Aitchison s.n. (K); Kurrum [Kurram] Valley, 08 Sep 1880, J.E.T. Aitchison 606 (BM). Konar: Kargal Valley, 6000 ft, 01 Sep 1956, W. Theisger 1670 (BM). Unknown region: Griffiths 1270 (K). EGYPT. Janūb Sīna’; Sinai, 1930, A. Kaiser 693 (K); Wadi Thoneim, near Wadi Isln, 30 mi S of St. Catheirnes Monastery, 1300 m, 11 Feb 1968, N. Tadmor S-74 (MO). IRAN. Qum: Jamil Bazis Mts., 8-9000 ft, 05 May 1951, P. Popov 51/203 (BM). Baluchestan: Zahedian, 19 mi S of Zaboli toward Sarbaz, 4400 ft, 19 Mar 1971, C. Grey-Wilson & T.F. Hewer 216 (K). Kermān: Kuh-e Khabir, 10 km E of Khabir, 28°49’N 56°26’E, 2400 m, 09 Jun 1977, Assadi et al. 1723 (E). Kerman-shahah: Bisutun, 34°23’N 47°25’E, 1350 - 1650 m, 23 Jun 1963, M. Jacobs s.n. (K). Hormozgan: Ques du Jaz Murian, Route vers Bandar Abbas, 27°25’N 57°15’E, 530 m, 28 Apr 1972, J. Léonard 5889 (K). Luristan: May 1852, J. Olguin s.n. (BM); Sheshom, 32°45’N 48°15’E, 500 - 800 m, 25 Apr 1963, M. Jacobs 6417 (E). Sistan: Harmuk (cult.), 27 Mar 1964, M.L. Grant 15336 (MO). IRAQ. Arbil: Rawandiz Gorge, 1500 ft, 20 Apr 1932, E. V. Just 2142 (K). As Sulaymaniah: Garai Goran-Tawilah-Haraman, 25 Jun 1973, Weinert & Mousawi s.n. (F); Jarmo [E of Kirkuk], along wadi W of camp, 30 Apr 1955, H. Helbaek 1272 (K). Duhul: Bikhair Mt., near Zakho (90 km NW of Mosul), 800 - 1200 m, 02 Jul 1957, A. Rawi 23063 (K). Ninawa: Sheikh Adi, N of Mosul, 2750 ft, 10 Oct 1931, E.V. Just 1643 (K); near Ain Sifni, 13 Jun 1934, H. Field & Y. Lazar 708 (F).

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JORDAN. Ma’an: Bada, Little Petra, 04 Jun 2004, M.G. AL-Saghir JOR24 (VP1); Bada, Little Petra, 04 Jun 2004, M.G. AL-Saghir JOR2 (VP1); Petra, 04 Jun 2004, M.G. AL-Saghir JOR26 (VP1); Petra, 04 Jun 2004, M.G. AL-Saghir JOR 27 (VP1), NEPAL. Shimì, 28°59’N 82°35’E, 1300 m, 23 Apr 1974, J.F. Dobre mez 2707 (BM).

PAKISTAN. Balochistan: about 100 km from Bella toward Khuzdar, 07 May 1990, A. Ghafoor & S.M. Goodman 4936 (F); between Khish and Iranshahr, 1500 - 1600 m, 16 - 17 May 1948, K.H. Rechinger & F. Rechinger 4025 (MO); about 3 km from Kikin, between Shahrak and Khuzdar, 07 May 1990, A. Ghafoor & S.M. Goodman 4586 (F); about 18 mi from Larma, 11 Jun 1970, O. Qaisn et al. 1447 (MO); Onza, between Zhob and Shinghar (cult.), 03 Jul 1988, T. Ali & T. Ahmed 1063 (BM); Quetta, Loralei to Harnai, Torkhan Pass above Dilkuna, 1400 m, 14 May 1966, J. Lamond 1245 (E); Murdar Range, 31 Aug 1942, J. Lamond 710 (K).

Pistacia terebinthina var. angustifolia Lec. & Lamot. in A. & C. DC. Monogr. Phan. 4:289. 1883. TYPE: TUNISIA: Jebel Ichkeut, 1887, J. Boissier (HOLOTYPE: C).

Pistacia terebinthina var. oxycarpa Zohary, Palestine J. Bot. Jerusalem Ser. 5:209. 1952. TYPE: ALGERIA: Tissensimit, Col de l’Oued Massin, near Teniet-el-Had, 1871, Chebert (HOLOTYPE: FI).

Pistacia terebinthina var. oxycarpa Zohary, Palestine J. Bot. Jerusalem Ser. 5:209. 1952. TYPE: TUNISIA: Jebel Lebkeu, 1887, Letourneux (HOLOTYPE: C).

Shrubs or small trees, 2-6(-12) m high. Leaves deciduous, impari- or paripinnate, 10 - 19 cm long, 6 - 19 cm wide, becoming coriaceous; petiole rounded, rarely flattened; rachis not winged. Leaflets (3-6) 6 - 11, 3.5 - 8 cm long, 1 - 3.1 cm wide, average ratio 2.7 - 1, opposite to subopposite, ovate to narrowly ovate, mucronate, minutely pubescent to glabrous; terminal leaflet if present 1 - 6 cm long, 5 - 20 mm wide, smaller than laterals. Stamineate panicles to 8 cm long, diffusely branched, with large bracts bearing long white trichomes. Pistillate panicles 15(-23) cm long, larger in fruit, stout, minutely puberulent to glabrous, large bracts with long white trichomes soon falling. Drupes reddish, ripening blue.

Phylogeny.—P. palaestina and P. terebinthus are closely related (they are the same species) [7].

Phenology.—Flowering March to July; fruiting April to October.

Habitat and ecology.—Limestone, dolomite, schist; 225 - 1850 m.

Common names.—Adharia (Arabic), Butum (Arabic), Ela (Hebrew), Scornabeco, Terebinte, Terebinth, Terebinto [7]. Cyprus-turpentine, Pistachier, Térèbinthe, Terebinth, Turpentine-tree [22].

Distribution.—Native to the Mediterranean basin, from Spain to Turkey, Croatia, and Bosnia, and Morocco to Saudi Arabia, Jordan, and Syria.

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Specimens examined. ALGERIA. Ain Defla: below Ain N’Sour, Tipasa to Miliana, 900 - 1000 m, 30 May 1975, Davis 58367 (BM, E). Bejaia: Cap Carbon, near Bejaia, 250 m, 29 May 1971, Davis 52964 (BM). Djelfa: near Takesane Forest House, 45 - 50 km SW of Djelfa, 1400 m, 08 Jun 1971, Davis 53383 (BM, E). Sidi Bel Abbes: near Bossuet, 1300 m, 11 Sep 1929, A. Faure s.n. (K). Tiaret. Gueurtoufa, near Tiaret, Aug 1846, Romais s.n. (BM); Ras el Ain, Romais s.n. (BM). BOSNIA-HERZEGOVINA. Szovito, 1848, G. Zohcabése 100 (K). CROATIA. Dalmatia, Aeschinger s.n. (K). Dubrovnik-Neretva: Narenta [Neretva], Kargl s.n. (F, K). Istria: Lavrana, 09 May 1898, M.F. Spencer s.n. (F); between Parreno [Porez] and Revigno [Rovinj], 16 Aug 1922, W.B. Turrill 996 (K). Primorje-Gorski Kotar: near Fiume (Rijeka), Noe 345 (K); 14 May 1869, A.M. Smith s.n. (K); 19 May 1870, coll. unknown (K); 29 Aug 1871, coll. unknown (K). Sibenik-Knin: N of Sibenik, 12 May 1969, R.K. Brummit 6629 (K). CYPRUS. Castello Kantara, 18 Apr 1880, Sintenis & Rigò 17 (K); Karaman, 300 m, 18 Jul 1994, DV 1451 (K); mountain above Kykko Monastery, 1150 m, 11 May, T.F. Hewer 4629 (K). FRANCE. Ain: Culoz, base of Colombier, 08 Jun and 02 Jul 1879, A. Déséglise 96 (BM). Alpes-Maritimes: Cipières Commune, 580 m, 07 Jun 1994, F.N. Hepper 4629 (K). Alpes-de-Haute-Provence: Entrevaux, 327 m, 18 July 1994, M. Barghoutié [Barghut] valley, near Saida [Sidon], 25 Aug 1857, G. Zohcabése 145 (K). Aveyron: Filettole, May 1861, T.F. Hewer 1729 (BM, E). Hautes Pyrénées: Gèdre, Rochers d’Agos, 872, 01 Aug 1966, F. Meyers 906 (BM); near Azrou, 25 Jun 1984, P. H. Davis 9853 (K). LIBYA. Tarabulus: Suk et Sebet, km 40 between Tripoli and Tarhuna, 300 m, 28 Apr 1963, Mazzocchi 1217 (K). MO-ROCCO. Beni-Bu-Yahi, Djebel Kerker, 850 - 1000 m, 14 Jun 1933, Sennen & Mauricio 8727 (BM); Jebel Ti- souka, above Xanen, 900 - 1000 m, 05 Jul 1975, Davis 54792 (BM); West Rif, Jebel Lakraa, 35°07'0”N 5°08’W, 1450 - 1560 m, 11 Jun 1995, A. Boratynski & A. Romo R-8599/6 (BM); Zakarat, 1250 m, 16 Jul 1927, Font Quer 374 (BM); Zerhoun, Jebel Kemfoud, 550 m, 10 May 1929, E. Jahandiez 179 (BM). BENI MELLED: S of El Ksiba, 01 Aug 1966, R.M. & A.M. Harley 855 (BM); between Zaouia Ahanesal and Tilougguite, 1850 m, 15 Jul 1973, Davis 55241 (BM). MOYEN ASIE: Azrou, 1500 m, 08 Aug 1924, E. Jahandiez 906 (BM); near Azrou, 25 Jun 1919, H. Lynes 123 (BM). PALESTINE. Deires Sheikh, 20 Aug 1945, E. Hardy s.n. (BM); Jerusalem, 30 May 1902 F. Meyers 28 (F); 12 Apr and 09 Jul 1904, F.S. Meyers 2028 (F); 22 Apr 1905, J.E. Dinsmore 4028 (F); Upper Galilee, Wadi Qarn, 30 May 1926, A. Eig & M. Zohary s.n. (MO); Mt. Carmel, 1863-1864, B.T. Lowe s.n. (BM); Wadi Fallah (Carmel), 25 Mar 1942, P.H. Davis 4180 (K); Wadi Shomaza (Carmel), 18 Apr 1942, P.H. Davis 4928 (K). SAUDI ARABIA. Grande Lavone, 3000 ft, 04 Apr 1982, J. Grainger 447 (E). AL MADINAH: Jabal Radhwa, N of Yenbo [Yanbu ’al Bahr], 6500 ft, 10 Oct 1981, I.S. Colleenette 2896 (K). SPAIN. Granada: Sierra Nevada, Guejar Sierra, 1000 - 3500 ft. 28 Aug 1846 & Mar 1847, H.M. Willkom 1312 (K). JAÉN: Jabalcuz, 750 m, 01 Jul 1896, C. Fernández s.n. (K). LEÓN: Villa- franca del Vierzo, 06 Jul - 15 Jul 1860, J. Lange s.n. (K). Mallorca: Gorg Blau, 19 km from Soller toward Pol-
**3.2.6. *Pistacia vera* L., Sp. Pl. 2:1025. 1753**

*Lentiscus vera* (L.) Kunze, Revis. Gen. Pl. 153. 1891. Type: illustration, "Pistacia." in J. Bauhin, *Historia plantarum*, 1(1): 275. 1650. (lectotype, selected here).

*Comments*—Both Stearn (1957) and Jarvis (2007) strongly make the point that when choosing a lectotype for a Linnaean name it is best to choose a specimen rather than an illustration. However, in this case it is not possible to do so. None of the specimens of *P. vera* in Linnaeus’ herbarium can be used to typify this name. No. 1170.1 (not annotated by Linnaeus) appears to have been added after 1753. No. 1170.2 (annotated “2 narbonensis Kh” [Linnaeus’ student Martin Kahler in Linnaeus’ script] is a type of *P. narbonensis*. No. 1170.3 (annotated “Pistacia 3” in Linnaeus’ script) is from George Clifford’s herbarium (BM), but *Hortus Cliffortianus* (Linnaeus 1738) is not cited in his protologue; it is also annotated “an a P Terebinthus diversa? Non es vera” by J.E. Smith and indeed is *P. terebinthus*.

There is a specimen in Joachim Burser’s herbarium at Uppsala (Herb. Burser XXII: 60. UPS) that Linnaeus identified as *P. vera* [26,27]. Burser’s herbarium was arranged according to C. Bauhin (1623) (see Stearn 1957: 116-118). Linnaeus consulted Burser’s herbarium at the University of Uppsala and entered his identifications of the species into his own copy of a later edition of C. Bauhin (1671) [28]. Linnaeus cited Bauhin in numerous species’ protologues in *Species Plantarum*, including that for *P. vera*. Unfortunately, the specimen is unidentifiable: “Junge Zweige, vielleicht von *Pistacia vera* L.” (Juel 1936:145).

Three of the references cited by Linnaeus in his protologue contain illustrations. That of J. Bauhin (1650) is the most complete and recognizable as *P. vera*, with leaves, infructescences, and fruits. Lobel (1576:413) is poorer, with leaves and fruits. Tournefort (1700: 3:380; “Cotinus”), with flowers and fruits, is unidentifiable.

*Pistacia trifolia* L., Sp. Pl. 2:1025. 1753. TYPE: not designated.

*Pistacia nARBOnensis* L., Sp. Pl. 2:1025. 1753. *pro parte* TYPE: see above discussion.

*Pistacia nigricans* Crantz, Inst. Rei Herb. 1:184. 1766. TYPE: not designated.

*Pistacia officinarum* Aiton, Hortus Kew. 3:398. 1789. nom. illeg. *(P. trifolia* L. is listed as a synonym; ICBN, Art. 52).

*Pistacia variifolia* Salisb., Prodr. Stirp. Chap. Allerton 171. 1796. nom. illeg. *(P. trifolia* L. and *P. officinarum* Aiton are listed as synonyms).

*Pistacia reticulata* Willd., Sp. Pl. ed. 4. 4(2):751. 1806. nom. illeg. *(P. narbonensis* L. is listed as a synonym).

*Pistacia macrophylla* Pers., Syn. Pl. 2(2):615. 1806. nom. illeg. *(P. trifolia* L. is listed as a synonym).

*Pistacia badghysi* K. P. Popov, Izv. Akad. Nauk Turkm. SSR, Biol. Nauk 5:5. 1978. TYPE: TURKMENISTAN: Mary Welayaty: Kushkam mountains, Shor-Safel, E of Morgunovskiy, 28 Aug 1977. K. Popov (holotype: LE; isotype: WIR).

*Phylogeny*.—*P. vera* is sister to *P. khinjuk* [7].

*Phenology*.—Flowering May, June, August, October;
fruiting April to June.

Common names.—Pistachio, Pistache, Fistashka (Russian), Pista (Persian), Pistacchio (Italian), Pistacier (French), Fistuțu Halabi (Arabic), Botne (Hebrew) [10]. Green almond, Pistachier cultivé, Pistazie, Pistazienbaum, Písutachio, Alféncigo, Pistachero [22].

Distribution.—Wild P. vera is native to the eastern Mediterranean from Turkey to Palestine and Syria, and east to Central Asia (Turkmensian, Uzbekistan, Afghan-
nist, Tajikistan, and Kyrgyzstan.

Specimens examined. AFGHANISTAN. Badakhshan: Faisabad to Meshed [Mashad], Warduj Valley, 30 mi W of Faisabad, 4500 ft, 01 Jun 1964, P. Furse 6443 (K).

Badghis: 150 mi NE of Herat, pass NE of Qala-i-Naw, 4500 ft, 28 Jun 1971, C. Grey-Wilson & T.F. Hewer 1275 (K).

Baghdan: Kataghan, Paigah, Kotal, between Pul-i-Khumri [Pol-e Khomri], 35°55'N 68°45'E, and Hai-
bak, 36°15'N, 68°03'E, 1500 m, 1967, K.H. Rechinger 33910 (K). Unknown region: 14 May 1885, J.E.T. Ait-
chison s.n. (K); 03 May 1885, coll. unknown 3907 (K).

CYPRUS. Castello Kantara, 18 Apr 1880, Sintenis & Rigo s.n. (BM); Limassol, 50 ft (cult.), 20 Apr 1938, J. Michalides 360 (K). KAZAKHSTAN. Vostochnyy Kazak-
stan: Tumkubassk, W part of valley of Tersakan, 38°23'N 55°57'E, 30 Jun 001, D. Kurbanov 776 (MO).

Tajikistan: near Dushanbe, 08 Jun 1960, Romahnof s.n. (E); 25 May 1960, Shitshakhabob s.n. (MO); 930 m,
24 Jun 1967, G. Nyehpdn s.n. (K, MO). TURKEY. San-lirufa: Çümçümü, near Samsat, 37°27'N 38°27'E, ca 400 m (cult.), 1983-1984, N.F. Miller 886 (K). TURKI-
menistan. Ahal Welayat: Ashkhabad [Ashgabat], 500 - 600 m, 13 May 1975, V.V. Neketen & E.A. Evah-
nov s.n. (BM, K); Badchys [Reserve, Erilanduz, Marey District], 30 Jul and 10 Aug 1910, N. Samokisch & N. Androssov 7428 (K, MO); SW Kopet-Dag Mts, Palvan-
Zau [Kora-Kok region], 1975, N. Belianina & N. Proskuru-
akova 165 (MO); W Kopet Dag, W part of valley of Tersakan, 38°23'N 55°57'E, 30 Jun 001, D. Kurbanov 776 (MO).

USA. California: Chico, USDA Plant Introduction Station, (culti.), 10 Aug 1960, USDA s.n. (F, 2 colls). UZBEKISTAN. Buchara [Bukhara] or Ticket, May 1883, Regel s.n. (BM).

3.3. Pistacia L. sect. Lentiscella Zohary, Palestine J. Bot. Jerusalem Ser. 5:194. 1952

Pro parte Eu Lentiscus Zohary, Palestine J. Bot. Jeru-
salem Ser. 5:194. 1952. pro parte Lentiscus Parfitt & Badnes, Proc. Natl. Acad. Sci. USA. 94:7987-7992. 1997. Type: Pistacia mexicana.

Pistacia section Eu Lentiscus Zohary is an illegitimate name because the epithet in the name of a subdivision of a genus is not to be formed from the name of the genus to which it belongs by adding the prefix Eu- (ICBN, Art. 21. 3). Pistacia section Lentiscus Parfitt & Badnes was published without a Latin diagnosis.

Small trees or shrubs; leaves evergreen, paripinnate or imparipinnate; leaflets 6-32; rachis narrowly winged.

Includes the following species: P. lentiscus L., P. me-
xicana HBK, and P. weinmannifolia Poiss. ex Franch.

3.3.1. Pistacia lentiscus L., Sp. Pl. 2:1026. 1753

Terebinthus lentiscus (L.) Moench, Methodus 345. 1794. Type: Herb. Linn. No. 1170.8 (LINN) (Siddiqi in Jafri & El-Gadi (ed.), Fl. Libya 52:3. 1978) (lectotype: LINN 1170.8).

3.3.1.1. Pistacia lentiscus subsp. lentiscus

Pistacia messilensis Mill., Gard. Dict. ed. 8. n. 6. 1768. Pistacia lentiscus var. messilensis (Mill.) Duhamel, Traité Arbr. Arbust. 4:731, 1809. Lentinus messilensis (Mill.) Pourr., Ann. Soc. Linn. Lyon. Sér. 2, 17:195. 1869. TYPE: not designated (Figure 2).

Pistacia gummifera Salisb., Prodr. Stirp. Chap. Allerton 2:172. 1796. nom. illeg. (P. lentiscus is listed as a synonym; ICBN, Art. 52). Pistacia lentiscus var. chia Duhamel, Traité Arbr. Arbust. 4:72, [t. 8. delete] 1809. TYPE: not designated.

Pistacia lentiscus var. angustifolia DC., Prodr. 2:65. 1825. nom. illeg. (P. messilensis Mill. is listed as a syn-
onym).

Pistacia lentiscus var. latifolia Coss., Notes Pl. Crit. Ser. 1. 14. 1850. TYPE: not designated.

Pistacia brevifolia Gand., Dec. Pl. Nov. 1:44. 1875.

Figure 2. Pistacia lentiscus subsp. lentiscus shrub. This picture shows the sub species subcoriaceous leaves. This species is located in Jerash, Jordan. Scale bar 1:1000.
Pistacia subfalcata Gand., Dec. Pl. Nov. 1:44. 1875.
TYPE: not designated.

Pistacia multiflora Gand., Dec. Pl. Nov. 1:44. 1875.
TYPE: not designated.

Pistacia lentiscus St.-Lag, Ann. Soc. Bot. Lyon, 7:132. 1880. nom. illeg. (based on P. lentiscus L.; ICBN, Art. 52).

Pistacia lentiscus f. leptophylla Albo ex Fiori, Nuov. Fl. Italia 2:117. 1923. TYPE: not designated.

Shrubs or rarely small trees, 1 - 5 m high. Leaves evergreen, usually paripinnate, 2 - 7.5 cm long, 3.4 - 10 cm wide, subcoriaceous; petiole flattened; rachis narrowly winged. Leaflets 4 - 10 (-12), 1.6 - 4.5 cm long, 4 - 17 mm wide, average ratio 2.8 - 1, more or less opposite to subopposite, sessile, ovate to narrowly ovate or elliptical, rarely obovate, mucronate or rarely mucronulate, glabrous, margin thick, undersurface noticeably lighter than upper surface; terminal leaflet rarely present, 1.4 - 2.1 cm long, 4 - 9 mm wide, same size or smaller than laterals. Staminate panicles and racemes axillary, 4 - 5 cm long, 4 - 9 mm wide, same size or smaller than laterals. Pistillate panicles and racemes axillary, clustered with leaves, to 4 cm long, greenish, spike-like when young. Pistillate panicles and racemes axillary, 4 - 5 cm long, 4 - 9 mm wide, same size or smaller than laterals.

Flowering December to September; fruiting April and July to November.

Habitat and ecology.—Scrub, matorral, open oak forest; calcareous gravelly soil, rocky limestone, loamy sand; 0 - 2000 m.

Common names.—Akind, Droog, Elath, Hamastiq, Lentischio, Lentisque, Ochinos, Saris, Sondro [7]. Almecegueiralentisco, Arbre au mastic, Chios mastictree, Lentischio, Lentisque, Ochinos, Saris, Sondro [7]. Almecegueiralentisco, Arbre au mastic, Chios mastictree, Lentischio, Lentisque, Ochinos, Saris, Sondro [7]. Almecegueiralentisco, Arbre au mastic, Chios mastictree, Lentischio, Lentisque, Ochinos, Saris, Sondro [7]. Almecegueiralentisco, Arbre au mastic, Chios mastictree, Lentischio, Lentisque, Ochinos, Saris, Sondro [7].

Distribution.—From the Canary Islands across southern Europe from Portugal to Greece and Turkey, across North Africa from Morocco to Egypt and the Middle East.

Specimens examined. ALBANIA. Vadica to Valona [Vlora], 01 Aug 1892, A. Baldacci 189 (K). ALGERIA. Algiers: Alger [Algiers], May 1849, P. Jamin s.n. (F); Algiers, Apr 1857, coll. unknown (K); Forêt du Bainem, 13 km W of Algiers, 37°N 03°E, 1000 ft, 14 Jan 1978, R. P. Croston s.n. (MO); Hussein-Dey, near Alger [Algiers], 14 Apr 1860, C. Romain 1963 (F, 2 colls.).

Boumerdes: El Kaddous, 06 Apr 1851, P. Jamin 141 (K, 2 colls.).

ORAN: Oran to Santa-Cruz, 31 Aug 1930, A. Faure s.n. (MO); Forêt Moulay-Ismaël, near Tletat, 27 Jul 1930, A. Faure s.n. (MO). CANARY ISLANDS. Fuerteventura: Rio Palmas, 06 Apr 1859, R.T. Lowe 212 (BM); Virgenes de la Peña, coll. unknown 56 (BM). GRAN CANARIA: Findley s.n. (K); R.T. Lowe 54 (BM); El Dragonal, Mar 1846, Bourgeau 406 (K); Monte Lentiscal, 26 Apr 1849, R.P. Murray s.n. (K); 400 m, 01 Feb 1969, G. Kunkel 12438 (BM, MO); Tafira, Apr 1897, A.C. Cook 523 (F, MO); Tafira Alta, 400 m, 28 Mar 1969, D. Bramwell 1096 (E). CROATIA. Cres: Monte Osso [Oser], 21 May 1887, O. Stafp s.n. (K). DALMATIA: Biograd, 23 Apr 1962, F. H populous s.n. (F); Molunat, 15 km W of Herceg Novi [Herzegovina], 0 - 30 m, 19 Aug 1977, P. Frost-Olsen 1414 (MO). Dubrovacko-Neretvanska Zupanija: near Gravos [Gruz], Lapad Peninsula, 04 Apr 1925, Turrill W.B. 1027 (K). CYPRUS. near top of Be-fahreno, 29 Jul 1898, coll. unknown (BM); Karaman, 250 m, 8 Jul 1994, DV 1450 1 (K); W of Karmakiti, 09 Apr 1967, Landfentont 134 (K); Kyrenia, 0 m, 20 Mar 1956, J. C. Aherton 1198 (K). EGYPT. Aswan: Abu Simbel (cult.), Feb 1904, R. Muschler s.n. (MO). PORT SAID: Port Said, Feb 1904, R. Muschler s.n. (MO). FRANCE. ALPES MARITIMES: Cannes, 20 May 1900, K.H. Marguerite s.n. (F); Cap d’Antibes, Nov 1876, Dyer s.n. (K); Coteau du Sinaigiri, near Nice, 04 May 1862, Camul 842 (F, 2 colls.); Fréjus, 19 Apr 1861, E. Bourgeau 109 (F); Menton, Cap Martin, 09 Feb 1869, coll. unknown (K); Therebontauae, coll. unknown (F). BOUCHES-DU RHÔNE: Aix-en-Provance, May 1854, E.A. Willmott s.n. (K). HERAULT: Pic St. Loup, 10 km E of St. Martin de Londres, 43°46’N 03°49’E, 400 m, 06 Oct 1993, B. Summers et al. 6511 (MO). ORLES: Cosoulation, Penchinat, May 1851, Billot 1640 (F). VAR: Brignoles, 10 Nov 1928, coll. unknown (F); Le Luc (Var), Apr 1869, Faure s.n. (F); Toulon-sur-mer, Apr 1857, J. Parseau s.n. (F). GREECE. CHALKIDIKI: head of Cassandra Gulf, 12 Apr 1934, A.W. Hill et al. 2608 (K, 2 colls.). CRETE: Akrotiri, 13 Apr 1914, M. Gandoger 3317 (MO); Kisos, Gonia, 23 Mar 1914, M. Gandoger 4709 (MO); Sitia, Toplon, 25 Apr 1914, M. Gandoger 357 (MO). DODEKANISOS: Rhodos, Istrios, Kaiserswald, Jun 1885, F.W. Areschoug s.n. (F). EAST MACEDONIA & THRACE: Kizil Ada, 200 ft, 18 Apr 1837, H.G. Todd 1558 (K). EVVOIA: Euboea, Sotir Hagios Monastery, near Kymi, 05 Sep 1969, K.H. Rechinger 38178 (MO). KERKYRA: Corfu [Kerkyra], Castello Hotel, 300 m, 23 Apr 1971, W.R. Presl 369 (K). KYKLADES: Melos [Milos], 300 m, 17 Apr 1976, A.M. Young 393 (K). NOTIO AIGAIO: Sifnos, Profitis Illias, 800 ft, 22 Apr 1963, Royal Liberty School 55 (K). THESSALIA: Epiros, Parga, S of Igoumenitsa, 21 Aug 1964, B. Verdcourt 4129 (K). VOREIO AIGAIO: Chios, Acher-Eloy 927 (BM). ITALY. FOGGIA: Lesina, Apr 1843, R.C. Alexander s.n. (K). IM.
peria: Ospedalletti, between San Remo and Bordighera, Apr 1931, Metcalfe s.n. (K, 2 colls.). Napoli: Capri, 06 Apr 1892, M.F. Spencer s.n. (F); Naples, Kings Park Portici, 1854, coll. unknown (K); Pozzuoli, P. Savi s.n. (F). Pisa: Monte Pisano, 1846, Maggio s.n. (F); Pisa, Botanic Garden (cult.), 1863, H.H. Babeck s.n. (F).

Reggio di Calabria: Scilla, 21 Jun 1965, R.K. Brummitt et al. 5256 (K). Sardinia: Arbatax, Apr 1907, J.S. Gamble 28269 (K, 2 colls.). Savona: Capo di Noli, coll. unknown (F). Unknown region: (cult.), Mar 1907, R. Park 3 (F). JORDAN, Jerash. Jerash, Akhusheiba, 503 m, 29 May 2004, M.G. Al-Saghir JOR13a, JOR13b (VPI). LEBANON. Jabal Lubnan: Beirut, 500 ft, Apr 1945, F.H. Norris s.n. (BM). LIBYA. Al Fatih: Farzuga, near Barce [Al Marj], 16 Aug 1957, K. Prichard CYR57/31 (BM). Al Jabal Al Akhdar: Tocra Pass, between Benghazi and Derna [Darnah], 19 Aug 1952, O. Brittan (BM); Wadi Kouf, W of Beida [Al Bayda’], 300 m, 28 Mar 1970, Davis 5021 (E). Darnah: Derna [Darnah], 23 Jul 1908, T.F.W. Gregory s.n. (BM, 2 colls.); Ras el Hilal, 500 m, 28 Feb 1958, H.G. Keith 626 (K). MOROCCO. Agadez: between Cap Ghir and Agadir, 26 Mar 1972, D. Bramwell et al. 254 (MO); Immouzer Valley, N of Agadir, 28 Aug 1972, G. Bramwell et al. 280 (K, MO).

Agadir: between Cap Ghiv and Agadir, 26 Mar 1972, D. Bramwell et al. 254 (K). Al Hoceima: Beni Bu-Frah [Boufrah], 50 m, 05 Jun 1927, Font Quer 373 (BM); between Ketama and El Hoceima, 920 m, 16 May 1972, J. C.M. Alexander & F.K. Kupicha 235 (BM). Ben Silmane: Bouznika, 60 m, 23 Apr 1979, J. Levalle 9019 (BM, 2 colls.). Ben Mellal: Afourer to Bin-el-Ouidane, 1300 m, 13 Jul 1973, Davis 55163 (BM, MO). Essaouira: Djebel Hadid, near Mogadore [Essouira], Apr - May 1871, J.D. Hooker s.n. (K); Mogador [Essouira], 25 Apr 1859, R.J. Love 32 (BM); Feb 1934, A.W. Trethewey 120 (K). Fes: Bir-Tamtam, 12 Nov 1965, A. Taton 1669 (BM).

Kenitra: 10 km SW of Kenitra toward Mehdia Plage, 34°13’N 6°41’W, 30 m, 27 Oct 1994, S.L. Jury et al. 15170 (K). Khemisset: Imouzzer-des-Lda-Outanane to Oulma, 500 m, 21 Mar 1969, P. & J. Davis 48503 (E). Marrakech: 5 km from Asni toward Imlil, 31°12’N 07°58’W, 1285 m, 19 Jul 1989, M. Ait Lakhif et al. 683 (BM); Imigdal, 5 km N of Tizi-n-Test, 31°01’N 08°09’W, 2000 m, 06 Apr 1974, Miller et al. 778 (BM, MO, 2 colls.); N of Tizi-n-Test Pass toward Marrakech, 31 Mar 1972, D. Bramwell et al. 515 (K, MO). Meknes: Jebel Zerhour, above Moulay Idriss, 34°02’N 05°30’W, 1080 m, 23 Oct 1993, S.L. Jury et al. 12611 (BM); 9 km E of Moulay Idriss toward Nzala-des-Beni-Attmar, 34°04’N 05°27’W, 600 m, 04 Jun 1994, S.L. Jury et al 14951 (BM). Nador: Hemis de Tensaman, 04 Jun 1931, Senen & Mauricio (BM). Oujda: near Debdon, 900 - 1000 m, 03 Apr 1928, E. Wilczek et al. 170 (MO). Shkirat-Temara: Rabat toward Zaen, 200 m, 23 Jun 1990, J. Levalle 13877 (MO); Temara (Rabat), Oued Iquem, 100 m, 13 Mar 1981, J. Levalle 9710 (BM, MO); 50 m, 18 Mar 1984, coll. unknown 10893 (BM). Tangier: Grottes d’Hercules, NW of Tanga, 35°46’N 05°56’W, 10 m, 16 Oct 1993, S.L. Jury et al. 12194 (BM, K); Oued Dliane, E of Tanga toward Sebta, 35°50’N 05°39’W, 5 m, 17 Oct 1993, S.L. Jury et al. 12243 (BM); Tangier and Tetuan, Apr 1871, J.D. Hooker s.n. (K). Tetouan: Djebel Habibi, 1910-1911, M. Gandoger s.n. (MO); El Fandek Pass, W of Tetuan toward Zarache, 24 Mar 1972, D. Bramwell et al. 42 (K, MO); Ouribia, Apr - May 1871, J.D. Hooker s.n. (K); Reraja, Jun 1872, Rein & von Fritsch 449 (K).

PALESTINE. Ahuya Sir Henry Samuel, Sep 1946, J.L. Gilbert 36 (K); Bet. Masir, 02 Sep 1903, F. Meyers 815 (F); Caifafa [Haifa], 15 Oct 1860, J.D. Hooker & D. Hanbury s.n. (K); Jerusalem, 03 May 1907, J.E. Dinsmore 4815 (F); Kiryath-Anavim, near Jerusalem, 16 Oct 1933, A. Eig et al. 260 (E); Lower Galilee, top of Mt. Tabor, 31 Mar 1954, D. Jaffe & C. Shenker s.n. (MO); Mt. Carmel, 200 m, 28 Mar 1911, F.S. Meyers & J.E. Dinsmore 7126 (F); Valley of Ajalon, American Colony 815 (MO); Wadi Fallah, Carmel, 16 Feb 1942, P.H. Davis 3947 (K). PORTUGAL. Alrantes, Oct 1850, J. Ball s.n. (F). Coimbra: between Cabo Mondego and Sierra de Boa, 9 km from Viagem, 209 m, 16 Sep 1967, R. Wilczek 2464 (MO). SPAIN. Andalucia: Sierra de la Cruz, 1000 m, 24 Jul 1925, coll. unknown (K). Cadiz: Cadiz, 1826, Pignant s.n. (K). Jaén: Pozoaclón, Cerro Miguel, 900 - 1000 m, 09 Jun 1987, E. Villanueva et al. 1042EVG (F); Sierra Morena, Andújar, 15 May 1953, A. Rodriguez s.n. (K). Majorca: Pollensa, 300 ft, 22 Oct 1934, G. Martindale 54 (K); 200 - 300 ft, 27 Jan 1936, coll. unknown 158? (K). Murcia: Venta de los Pinos, 24 May 1996, A. Schini - nini & S. Sánchez García 30609 (F). Valencia: 5 km from Finestrat, 38°35’N 00°12’W, 08 Apr 1993, C.C.H. Jongkend & R.M.J. Nieuwenshuis 772 (MO); 5 km from La Nucia and 8 km from Benidorm, 38°35’N 00°08’W, 10 Apr 1993, C.C.H. Jongkend & R.M.J. Nieuwenshuis 795 (MO). SYRIA. Sep - Oct 1860, J.D. Hooker & D. Hanbury s.n. (F); 1863-1864, B.T. Lowne s.n. (BM, K). TUNISIA. Jendouba: Forêt de l’Oued Zeen, 20 km SE of Tabarka [Tabarqa], 600 m, 14 Jun 1965, J.W.A. Jansen 564 (MO); Forêt du Feidja, 20 km W of Ghardimaou, 16 Apr 1965, J.W.A. Jansen 166 (MO); Kroumirie, between Les Chenes and Ain Drahem, 400 m, 07 May 1984, Davis 70025 (E). Le Kef: between Nebenhi and Le Kef, 1000 ft, 15 Mar 1925, W.P. Lowe & D.A. Bannerman 155 (BM). Sili: 14 km from Maktar [Makhtar] toward Kairouan, 820 m, 03 May 1975, Davis & Lamond 57146 (BM, E). Zaghouan: Zriba, on road to Enfidaville, km 72 from Tunis, 18 Sep 1957, H.G. Keith 166 (K). TURKEY. Adana: Misis, near Adana, 200 ft, 11 Apr 1934, E.K. Balls B729 (BM). Antalya: [Okulu, 13 Feb 1966, coll. unknown 8515 (MO)]; Antalya to Alauya jolu,
20 km from Alanyaya, 23 Feb 1966, *A. Baytop* 8515 (E); Kiremi-thaneler, 15 km SW of Antalya, 40 m, 07 Apr 1959, *E. Hennipman et al.* 136 (K). **Mersin:** between Tarsus and Ulas, 200 m, 05 Apr 1957, *Davis & Hedge* 26417 (BM).

### 3.3.1.2. *Pistacia lenticus* L. subsp. *emarginata* (Engl.)

AL-Saghir, Comb. Nov.

Basionym: *Pistacia lenticus* var. *emarginata* Engl. in A. & C. DC., Monogr. Phan. 286. 1883. Type: SOMALIA: Meid Ahlgeb, 1000 m, 1875, *J.M. Hildebrandt* 1531 (holotype: BM!).

*Pistacia aethiopica* Kokwaro in Kokwaro & Gillett, Kew Bull. 34:755. 1980. TYPE: SOMALIA: Meid Ahlgeb, 1100 m, Apr 1875, *J.M. Hildebrandt* 1531 (HOLOTYPE: K; ISOTYPE: BM!).

Trees or shrubs, 2 - 15 m high. Leaves evergreen, pinnate, 4 - 10 cm long, 3.8 - 8.4 cm wide, coriaceous; petiole flattened of angled; rachis winged. Leaflets 6 - 16 cm long, 6 - 16 mm wide, average ratio 2.6 - 1, subopposite to alternate, ovate to narrowly ovate, rarely obovate, emarginate, glabrous. Staminate panicles to 15.1 cm long, 1.8 - 5.3 cm wide, membranaceous; petiole flattened; rachis narrowly winged. Drupes red, purple, blue, or black, 4 - 5 cm long in fruit, branched from base; flowers reddish. Pistillate panicles to 5.5 cm long in fruit, branched from base; flowers reddish. Drupes reddish, ca. 5 mm in diameter.

**Phylogeny.**—*P. lenticus* subsp. *emarginata* (P. aethiopica) and *P. lenticus* form a close pair [7].

**Phenology.**—Flowering January, April, May, and October; fruiting January, February, May, July, and November.

**Habitat and ecology.**—1200 - 2700 m.

**Uses.**—Somalia: “gum called Gubelli” (*Glover & Gilliland* 550).

**Common names.**—Hamar, Heis, Sisaye, Ulaaso (Zohary, 1952). Ethiopia: Borana (*Ash 2447*). Kenya (Masai): Oldaangudwa (*Rammell 3488*). Somalia: Hais (*Glover & Gilliland* 550).

**Distribution.**—East Africa (Ethiopia, Somalia, Kenya, Uganda, Tanzania).

**Specimens examined.** ETHIOPIA. **Oromia.** Neghelle [Negale], 05°20'N 39°40'E, 4850 ft, 22 Jan 1954, *H.F. Mooney* 5607 (K); 27 mi SE of Neghelle, 13 Apr 1974, *J.W. Ash* 2447 (K, MO); 20 km S of Neghelle toward Melka Guba, 1500 m, 18 May 1982, *I. Friis et al.* 3119 (K); 34 km on Negelle-Filtu road, 05°15'N 39°47'E, 1650 m, 09 May 1980, *M. Thulin et al.* 3450 (K).

**KENYA.** **Eastern.** Mt. Kulal, Gatab, 1600 m, 21 Nov 1978, *F.N. Hepper & P.M.L. Jaeger* 6972 (K, MO). **Rift Valley.** J.C. Rammell 3488 (K), Chyulu hills, 02°34'S 37°48'E, 20 Oct 1969, *J.B. Gillett & F. Kariuki* 18816 (K, MO); Kilima Kiu, 1926, *Mrs. P. Decie* s.n. (BM); 9 mi SE of Narok, 6200 ft, 23 Jul 1957, *C.G. Trapnell* 2339 (K). **Tere:** native reserve, 6200 ft, 1914, *Ms. P. Decie* s.n. (BM). **Unknown region:** E.R. Napier 2325 (K).

**SOMALIA.** **Sanaag:** Erigavo, Daloh Forest, 26 Jan 1945, *P.E. Glover & H.B. Gilliland* 550 (BM); Obda doho, Daloh Forest, 07 Jul 1945, *P.E. Glover & H.B. Gilliland* 1129 (BM); Surud [Shimbiris], 2350 m, 17 Jan 1973, *J.J. Lavranos & Horwood* 10359 (E); Surud Forest Reserve, 20 - 24 km NW of Erigavo, 17 Jan 1973, *P.R.O. Bally & R. Melville* 16001 (K, MO).

**Woqooyi Galbeed:** Gan Libah, Golis range [Gar Golis], 5400 ft. 16 Jul 1945, *P.E. Glover & H. B. Gilliland* 1162 (BM, K); Libab Mele Mt., above Biyu Suldan [Buja Suldan], 5200 - 5950 ft, 03 Dec 1932, *J.B. Gillett* 4697 (K). **Unknown region:** Meid Ahlgeb, 1100 m, Apr 1875, *J.M. Hildebrandt* 1531 (BM, holotype).

**TANZANIA.** **Arusha.** Gendabi, Mt Hanang, 7500 ft, 10 Feb 1946, *P.J. Greenway* 7690 (K); M’bulu, 17 May 1954, *L. Matalu* 3124 (K).

**UGANDA.** **Karamoja.** Timu forest, 5000 - 6000 ft, Apr 1960, *J. Wilson* 1017 (K).

### 3.3.2. *Pistacia mexicana* Humb., Bonpl. & Kunth, Nov. Gen. Sp. 7:22, t. 608.1824

*Lentiscus mexicana* (Humb., Bonpl., & Kunth) Kuntze, Revis. Gen. Pl. 153. 1891. Type: MEXICO. Guerrero: Chilpancingo, 1825, *Bonpland* (BM).

*Pistacia texana* Swingle, J. Arnold. Arbor. 2:107. 1920. TYPE: TEXAS: Valverde Co.: Rio Grande valley near mouth of Pecos River, near Hinojose Spring, 18 Mar 1911, *S.C. Mason* (HOLOTYPE: US; ISOTYPE: AA).

Trees or shrubs, 2 - 15 m high. Leaves evergreen, clustered towards ends of branches, usually imparipinnate, 5.1 - 15.1 cm long, 1.8 - 5.3 cm wide, membranaceous; petiole flattened; rachis narrowly winged. Leaflets 10 - 30, 1 - 2.5 cm long, 3 - 10 mm wide, average ratio 2.7 - 1, narrowly ovate, slightly falcate, mucronate, glabrous; terminal leaflet 5 - 25 mm long, 3 - 10 mm wide, same size or smaller than laterals. Staminate panicles to 4 cm long, reddish to yellowish, clustered at branch tips with and below expanding leaves, densely flowered, pubescent. Pistillate panicles to 10 - 17 cm long in fruit, branches spreading, clustered towards ends of branches below leaves; flowers red. Drupes red, purple, blue, or black, 4 - 5 mm in diameter, pendulous.

**Phylogeny.**—*P. mexicana* and *P. texana* form a close pair (AL-Saghir, 2010).

**Phenology.**—Flowering February, March, May, August; fruiting April to August.

**Habitat and ecology.**—Hillsides, deciduous scrub, dry forest, open pine-oak woods; limestone mountains, calcareous soil over limestone, rocky or gravelly areas; 550 - 2200 m.

**Common names.**—Copall [7]. Mexican Pistachio [22]. Guatemala: Copalillo (Steyermark 32975). Mexico: Copál (Hinton et al. 10258); Lantrisco (*Wilson* M-11); Tezelpom (Tzeltal, *Ton 5589*).

**Distribution.**—Native to southern Texas, Mexico, Gu-

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atemala, and Honduras.

Specimens examined. GUATEMALA. Baja Verapaz: near Santa Rosa, 1500 m, 04 Apr 1941, P.C. Standley 91089 (F); N of Santa Rosa, 30 Mar 1939, P.C. Standley 69749 (F). Chiquimula: Quetzaltzalpec, El Guataión, 900 m, 17 May 1999, M. Vélez 99.7046 (BM). Guatemala: Estancia Grande, 600 m, 08 Dec 1938, P.C. Standley 59171 (F); near Fiscal, 1080 - 1140 m, 12 Dec 1938, P.C. Standley 59573 (F); 1100 m, 18 Dec 1940, P.C. Standley 81411 (F); above San Sebastián H., 2000 - 2200m, 13 Aug 1942, J.A. Steyermark 50518 (F). Jalapa: between Jalapa and San Pedro Pinula, 1400 - 1800 m, 12 Nov 1940, P.C. Standley 77021 (F); W of San Pedro Pinula, 1000 m, 12 Nov 1940, P.C. Standley 77124 (F); near Zapote, 1 mi NE of San Pedro Pinula, 1500 m, 09 Dec 1939, J.A. Steyermark 32975 (F). Quiché: 1942, J.I. Aguilar 846, 1157(F). HONDURAS. Comayagua: Rancho Grande, San Luis, 4000ft, 22 May 1932, J.B. Edwards P-269 (F). Francisco Morazán: between Cantarranas and San Juanico, 722 m, 24 Mar 1957, A. Molina R. 7789 (F); Pinares, 20 km W of Cedros, 900 - 1000 m, 28 - 30 May 1976, C. Nelson & E. Vargas 3481 (MO); Puente Colorado, N of Tegucigalpa, 900 - 1000 m, 07 Dec 1949, P.C. Standley 24932 (F); Quebrada El Chimbo, SW of Tegucigalpa, 1200 m, 17 Mar 1957, A. Molina R. 7760 (F); Quebrada la Orejona, 750 m, 24 May 1985, G. Rodríguez M. s.n. (MO); Quebrada de Suyapa, near Suyapa, 1100 - 1200 m, Sep - Dec 1948, P.C. Standley 12938 (F); Quebrada Suyapa, Aldea de Suyapa, NE of Tegucigalpa, 1200 m, 07 Oct 1948, A. Molina R. 1206 (F, MO); 1100 m, 10 Aug 1949, coll. unknown 2551(?, F, MO); between Quebrada Tarán and Valle de Angeles, 1300 m, 03 Aug 1962, A. Molina R. 11094 (F, near Suyapa, 1200 m, 25 Nov - 14 Dec 1946, P.C. Standley & L.O. Williams 1421 (F, 2 colls.); 13 Dec 1946, L.O. Williams & A. Molina R. 1421 (F, 2 colls.); Tegucigalpa, 07 May 1975, M. Erazo 86 (MO). Olancho: Campo Abierto, 960 m, 08 May 1984, R. Ramos 109 (MO); 2 km NE San Francisco de la Paz toward Gualaco, 700 m, 04 Apr 1983, Mccarter & Hughes 4 (MO). MEXICO. Chiapas: S of Amatencango del Valle, 5900 ft, 14 Mar 1967, A.S. Ton 2144 (F, MO); Arroyo Jeshab, 900 m, 05 Mar 1983, A.M. Ton 5589 (MO); 800 m, 20 Apr 1983, coll. unknown 5874(?) (MO); junction of Mexican Highway 190 and road to Bochil and Simjovel, 3400 ft, 10 Apr 1965, D.E. Breedlove 9624 (F); above El Chorreadero, 800m, 16 Apr 1972, D.E. Breedlove 24568 (F); 4 mi W of Comitán, 3750 ft, 26 Apr 1949, M.C. Carlson 1994 (F); 10 km NE of Las Margaritas toward La Soledad, 1700 m, 17 Feb 1973, D. E. Breedlove 33391 (MO); Reserva del Ocote, road from Bajada del Macho, to rancho La Cruz, 08 May 1983, J.I. Calzada et al. 10098 (F); Trapichito, 1350 m, 02 Jun 1945, E. Matuda 15660 (F); 3 km N of Tuxtla Gutiérrez toward El Sumidero, 1800 ft, 07 Apr 1965, D.E. Breedlove 9567 (F); 1 km SE of Tzimol toward Uninajob, 16°08'N 92°11'W, 1110 m, 24 Feb 1988, A. Reyes García et al. 338 (BM); 5 km SW of Tzimol, 1150 m, 04 May 1988, A. Reyes García 483 (BM); 80 km SE of Villa las Rosas toward Tzimol, 800 m, 22 Apr 1987, E. Martínez & A. Reyes 20230 (BM). Coahuila: Cañon de la Gavia, S of Rancho de la Gavia, 26°18' - 20°N 101°15' - 18W, 1250 - 2200 m, 02 - 03 Aug 1973, M.C. Johnston et al. 12001 (MO); N end of Cañon de la Hacienda, Sierra de la Madera, 27°06'N 102°25'W, 1500 m, 11 May 1973, M. C. Johnston et al. 10985 (MO); Cañon de la Madera, 4 km E of Rancho Buena Vista, Sierra de los Guajes, 07 Sep 1941, R.M. Stewart 1495 (F); Cañon de Milagro, E side of Sierra de los Guajes, 12 km W of Hacienda de la Encantada, 10 - 16 Sep 1941, R.M. Stewart 1509 (F); Mina El Aguirrenero, Sierra de la Paila, 26°06'N 101°36'W, 1550 m, 06 Jul 1973, M.C. Johnston et al. 11718 (F, MO); Monclova, 06 Aug 1939, E.G. Marsh 1982 (F); Muzquiz, 1935, E. Marsh 91 (F); Yerda spring, 07 Jul 1936, coll. unknown 358(?) (F); near El Puerto de San Lázaro, 16 Jun 1936, F.L. Wynd & C.H. Mueller 105 (K, MO); 1 km N of Rancho de la Gavia, Sierra de la Gavia, 26°20'N 101°14'W, 1200 m, 18 Mar 1973, M.C. Johnston et al. 10278 (F, MO); 5 km SE of Rancho Cerro de la Madera, Sierra de la Madera, 27°07'N 102°23'W, 1250 m, 20 Sep 1972, F. Chiang et al. 9388 (MO); about 2 km SW of Rancho San Miguel, N side of Serranías del Burro, 29°12'N 101°31'W, 575 m, 02 Jun 1972, F. Chiang et al. 75028 (UT); Saltillo, 1898, E. Palmer 140 (BM, F, MO); Sierra del Carmen, 178 km from Muzquiz, 28°47'N 102°30'W, 1200 m, 20 Aug 1949, M.A. Carranza et al. 2107 (MO); 4 km E of San Francisco, 27°30'N 102°33'W, 1450 m, 10 Jun 1972, F. Chiang et al. 7605 (MO); Sierra de la Paila, N side just below Mina El San Luis, Aug 1878, C.C. Parry 98 (BM, K); Sierra Pata Galana, Mar 1905, C.A. Purpus 1117 (F). Guanajuato: 10 km N of Atarjea toward Los Cocos, 1100 m, 17 Apr 1989, E. Ventura & E. López 6664 (MO); Rancho Beltran, 10 km S of Xichú, 1600 m, 15 Jun 1989, E. Ventura & E. López 6782 (MO). Guerrero: Chichihualco, 11 km W of Xochipala, toward Fito de Caballo, 1640 m, E. Martinez S. 701 (2 colls.); 12 Apr 1982, coll. unknown 714(?) (F); 10.3 mi W of Chilpancingo toward Omiltemi, 1800 m, 27 - 28 Jul 1968, W. Anderson & C. Anderson 4916 (MO); San Antonio, 900 m, 06 Jan 1937, Hinton et al. 10258 (F, MO). Hidalgo: 7 km N of Atotonilco el Grande, 1900 m, 07 May 1981, R. Hernández M. et al. 6016 (MO); Barranca de Venados, Metztitlan, 1800 m, 06 Aug 1979, R. Hernández M. 3615 (MO); Jacala, 4500 ft, 13 Jul
1939, V.H. Chase 7445 (F, MO); 1 km N of Jacala, 08 Jun 1987, A. García M. & J. Miller 3192 (F, MO); near Lagunilla, Cerro Santa María, 2200 m, 03 Feb 1971, Rezadowski 28059 (F); near Pedreroito, 28 Apr 1981, D.H. Lorence & D.L. Venable 3341 (MO). **Jalisco:** near El Salto del Río Jiquilpan, 28 Jun 1981, E.J. Lott & J.A. Magallanes 387 (MO); Cerro Viejo, abou Santa María Cuyutlán, 1850 m, 22 Jun 1991, T.S. Cochrane & M. Cházaro B. 12617 (MO). **Michoacán:** Coacolman, 1260 m, 09 May 1938, G.B. Hinton et al. 12135 (K); Zitacuaro to La Florida, 21 Jun 1938, G.B. Hinton et al. 11983 (MO). **Nuevo Leon:** below Alamar, about 15 mi SW of Galeana, 45 - 5000 ft, 30 May 1934, C.H. & M.T. Mueller 630 (F); Diente Canyon, near Monterrey, Jul 1933, C.H. & M.T. Mueller 333 (F); 8 km SE of Galeana, toward Linares, 1700 m, 24 Mar 1970, J. Rezadowski 27177 (F); Huajuco Cañon, 35 mi S of Monterrey, 3500 ft, 29 Mar 1954, A.F. Wilson M-11 (F); Lampazos, 21 Jun 1937, M. T. Edwards 286 (F); Montemorelos, Las Adjuntas, 25°18' N 100'08"W, 750 m, 05 Sep 1992, T.F. Patterson et al. 7098 (UT); Monterrey, Pastora, 550 m, Jul 1911, G. Arsène & Abbon 6332 (MO); Rancho Las Adjuntas, Cañon Marisio Arriba, 24 Jun 1935, C.H. Mueller 2040 (BF, MO); Sierra Madre toward Monterrey, Jun 1888, C. G. Pringle 1930 (F); Monterrey, 1835, C.G. Pringle s.n. (F). **Oaxaca:** Barranca Ceniza, NNW of El Parian, 17° 25'N 97°W, 1500 - 1600 m, 30 May 1992, A. Salinas T. et al. 6906 (MO); Cañada de Carrizalillo, Cerro Verde, 1600 - 1820 m, 17 Jul 1984, P. Tenorio L. et al. 6976 (F); Cerro El Ramón, 1 km W of El Rodeo, 2200 m, 08 Jul 1986, A. García M. et al. 2421 (MO); between Cuicatlán and Telixtlahuaca, 1800 m, 04 May 1978, E. Hernández X. 16746 (F); Hierve el Agua, SW of San Lorenzo Albaradas, 16°52'9"W, 1760, 05 Feb 1986, R.E. Gereau et al. 2038 (MO); Hierve el Agua, E of Mitla, 16°52'9"W, 1730, 23 Apr 1989, S.C. Caran 5 (UT); 8 km E of Ixtlán de Juárez, 03 Apr 1981, R.C. Trigos & D. Lorence 635 (BM, MO); Las Sedas, 1900 m, 19 May 1907, C. Conzatti 1802 (F); Rio El Molino, 4.5 km N of Ixtlán, 2000 m, 27 May 1983, R. Cedillo T. & D. Lorence 2327 (MO); San Juan Coatlán, 16°15'N 96°53"W, 1600 m, 18 Apr 1990, A. Campos V. et al. 3018 (F); San Miguel del Rio, 1400 m, 18 Aug 1979, F. Ventura A. 16367 (MO); 2.5 km W of Oaxaca-Puerto Escondido highway toward San Sebastián de las Grutas, 1480 m, 16 May 1982, R. Torres C. et al. 452 (MO); 3 km N of Santos Reyes Tepejillo, 17°27'N 97°56"W, 1510 m, 19 Apr 1996, J.I. Calzada 20923 (MO); Sierra de San Felipe del Agua, 24 May 1984, A. Saynes V. 11 (MO); Telixtlahuaca, “Parián-Las Sedas”, 17°23'N 97°W, 1500 - 1625 m, 29 May 1992, A. Salinas T. et al. 6882 (MO); Tonaltepec, 1900 m, 26 Mar 1980, F. Gonzalez M. et al. 843 (F). **Puebla:** Agua Socoya, Barranca Agua Palenque, 18°13'N 97°24"W, 2070 m, 14 Mar 2001, P. Tenorio L. 19998 (MO); Cañada de Mamacla, 12 km W of Molexacax, 04 May 1982, F. González Medrano et al. 12380 (MO); Cerro Mezize, N of San Luis Atotitlán, 2100 m, 10 Apr 1984, P. Tenorio L. & C. Romero de T. 5771 (F); Colonia San Miguel, 6 km SW of Acatepec, 23 Mar 1980, F. Gonzales M. et al. (MO); Majada Salea, SW of San Simón, 1870 m, 24 Jun 1983, P. Tenorio L. & C. Romero de T. 3957 (MO); Tehuacan, May 1912, C.A. Purpus 5848 (F); near Tehuacan, 5500 ft, 01 Aug 1901, C.G. Pringle 8553 (E, F, K); W of Tehuacán, 02 Aug 1901, J.N. Rose & R. Hay 5858 (K); 5.5 km from Zamarilla toward Magdalena y Clavijero, 18°28'N 97°46'W, 2025 m, J.I. Calzada. 24053 (K). **Queretaro:** Río Motomezuma, 2.5 km S of Casa de Máquinas, Cadereyta, 1120 m, 28 Apr 2000, S. Zamudio et al. 11387 (UT); **San Luis Potosí:** 6 km S of Acatepec, 23 Mar 1980, F. Gonzalez et al. F-734 (MO); Buena Vista, Nov 1911, C.A. Purpus 4889 (F); Minas de San Rafael, May 1911, C.A. Purpus 5362 (F); 8 mi E of San Francisco, 22°03'N 100°32'W, 5500 ft, 05 Jun 1979, W. Hess & L. Byrne 4043 (F). **Tamaulipas:** Cerro de los Armadillos, near San José, 10 Jul 1930, H.H. Bartlett 10206 (F); road to Cerro el Diente de San Carlos, 700 m, 03 Jun 1986, M. Yanez 805 (MO); 10 km S of Padron y Juarez toward Guerrero, 1100 m, 23 Mar 1985, M. Yanez 57 (MO); La Tamaulipeca, near San Miguel, 29 Jul 1930, H.H. Bartlett 10700 (F); near Victoria, 320 m, 01 Feb - 09 Apr 1907, E. Palmer 204 (F, K); between Victoria and Jaumave Valley, 31 May 1898, E.W. Nelson 4445 (F). **Veracruz:** 4 km from Acultzingo toward Orizaba, 2000 m, 28 Jul 1971, Neving & Gomez-Pompa 2222 (F); Cerro de Achiucha above Tuzamapan-Huatusco highway, 19°23'N 96°49"W, 600 m, 09 May 1981, A. Vovides & I. Calzada 665 (F). **Unknown region:** 1791, T. Haenke 1007, 1199, 1693 (F). **USA:** Texas: Val Verde Co., Hidden Trail Canyon, NW of Rio Grande about 8 mi below mouth of Pecos River, 18 Feb 1977, A.M. Powell 3055 (UT).

3.3.3. **Pistacia weinmannifolia J. Poiss. ex Franch., Bull. Soc. Bot. France 33:467. 1887** Type: CHINA: “Yun-nan, circa Tapin-tze; fl. mart.; fr. jun. [Delav[ay]. n. 562 [P]].”

**Pistacia coccinea Collett & Hemsl., J. Linn. Soc. Bot. 28:36. 1890.** TYPE: MYANMAR: Shan. Shan Hills, 1888, Collett 649 (HOLOTYPE: K).

**Pistacia malayana M.R. Hend., Gard. Bull. Straits Settlem. 7:97, t. 19. 1933.** *Pistacia weinmannifolia var. malayana* (M.R. Hend.) Zohary, Palestine J. Bot. Jerusalem Ser. 5:202. 1952. **TYPE: MALAYSIA: Perak, Gunong Runto, Lenggong, 1930, Henderson 23,831 (K).**

Trees or shrubs, 1 - 15 m high. Leaves evergreen, paripinnate, 5 - 10.2 cm long, 2 - 6.4 cm wide, membraneous; petiole flattened or angled; rachis narrowly winged. Leaflets (4 - 6)12 - 20, 1 - 3.2(-9) cm long, 5 -
16(-37) mm wide, average ratio 2.6-1, alternate to subopposite, ovate to narrowly ovate, rarely obovate, glabrous, margin revolute. Stamine panicles to 4 cm long, spike-like when young, branches short; flowers bright pink. Pistil- late panicles to 10 cm long, clustered among terminal leaves, minutely pubescent; flowers red. Drupes bright green, red when mature, ovoid, to 7 mm long.

**Phylogeny.**—*P. weinmannifolia* is sister to *P. mexicana* [7].

**Phenology.**—Flowering November to May, July; fruiting December, May to July.

**Habitat and ecology.**—Limestone outcrops; 480 - 2500 m.

**Uses.**—leaves used for making incense (Henry 11913).

**Common names.**—China: Chin hsiang (Henry 11913).

**Distribution.**—Southwestern China, Myanmar, Vietnam, and Malaysia.

**Specimens examined.** 
**CHINA.** Guangxi. 1.5 km W of Hongdong, NW of Huanjiang, 960 m, 07 Mar 1997, P.J. Cribb et al. 433 (K). **Guizhou:** Po Gang, S of Xingyi, 1100 m, 13 Mar 1996, Z.H. Ts et al. 52 (K). **Sichuan:** between Hualinpin and Chinchihsien, 1600 m, 29 Jun 1934, H. Smith 10275 (MO); Nin-yüan-fu, 13 May 1922, A. Henry 433 (K); Baihualing, E side of Gaoligong Shan, 1460 m, coll. unknown 13953 (F); Chuxiong Xian, near Longtang, 159 km W of Kunming, 25°04'N 101°47'E, 1820 m, 25 Jul 1984, Sino-American Botanical Expedition 1251 (E); Cao Xi Temple, Anning, 42 km S of Kunming, 2025 m, 29 Apr 1981, Sino-British Expedition to Cangshan K127 (E, K); Lao-Kou-Chan, 2500 m, Apr 1923, E.E. Maire 4 (K); Lijiang Hillsides, 07 Jul 1999, S.Y. Hu & Y.C. Kong Y1179 (K, MO); Liekiang Valley, 27°30'N, 9000 - 10000 ft, Jun 1913, G. Forrest 10153 (E); Lunan, A. Henry 9600A (BM); Machang, near Kieon-yapin, 20 Feb 1909, F. Duclos 1244 (E); coll. unknown 6236? (K); Mengsa, 4500 ft, A. Henry 9600B (K); Shonggui, 2100 m, 01 Jul 1966, Y. Lou 43 (K); Szemao, 8000 ft, 05 May, A. Henry 11913 (BM). **Unknown region:** 2000 m, 14 May 1988, C.D. Chu 1218 (MO); Western China, dry warm valleys, 3000 ft, Jul 1903, E.H. Wilson 3367 (BM, K). **MALAYSIA.** Selangor: Bukit Takun, Kanching, 500 ft, 03 Nov 1937, M Nur 34398 (BM). **MYANMAR.** Tenasserim: Molodaung Ridge, 480 m, 21 Jan 1927, R.N. Parker 2457 (K). **VIETNAM.** **Cao Bang:** near Ban Lung and Lung Phuc, about 50 km E of Cao Bang, 22°46'N 106°44'E, 650 - 700 m, 25 Nov 1998, L. Averyanov et al. 661 (MO); about 35 km SSE of Cao Bang, 22°21'N 106°27'E, 600 m, 03 Dec 1998, Averyanov et al. 839 (MO); near Lung Hoai, about 43 km E of Cao Bang, 22°43'N 106°40'E, 600 - 650 m, 28 Nov 1998, L.A. Averyanov et al. 746 (MO); near Lung Mu, about 14 km N of Cao Bang, 22°47'N 106°18'E, 800 m, 13 Dec 1998, L. Averyanov et al. 1194 (MO); near Thang Heng and Lung Tao, 650 - 1000 m, 25 May 1997, L. Averyanov et al. 4891 (MO). **Hà Giang:** Bat Dai Son, 27°09'N 105°00'E, 1200 - 1250 m, 04 Apr 2000, D.K. Harder et al. 5039 (MO); 28°08'N 105°00'E, 1310 m, 06 Apr 2000, D.K. Harder et al. 5238 (MO). **Ninh Bình:** Cuc Phoung National Park, 600 m, NE of headquarters, 20°14'N 105°43'E, 20 Dec 1999, N.M. Cuong et al. 768 769 (MO).

### 4. Hybrids

*Pistacia × saportae* Burnat, Fl. Alpes Marit. 2:54. 1896. Type: Presumably in Burnat’s herbarium at G.

*Pistacia lentiscus × terebinthus* Saporta & Marion, Ann. Sci. Nat. Bot. ser. 5, 14(1):2. 1871. *nom. illeg.* (a formula, not a true epithet; ICBN Art. H.10.3).

*P. × hybrida* Gasp. ex Parl., *Fl. Ital.* 5:383. 1875. *nom. illeg.* (a generic name followed by one or more words not intended as a specific epithet; ICBN Art. 23.6.b).

*Pistacia lentiscus × terebinthus* Saporta & Marion ex Engl. in A. & C. DC., Monogr. Phan. 4:286. 1883. Type: FRANCE: Var. St. Zacharie, *Saporta & Marion* (P).

*Pistacia saportae var. oxycarpa* Zohary, Palestine J. Bot. Jerusalem Ser. 5:204. 1952. TYPE: ITALY: Liguria, near Ventimiglia, 1898, *Bickwell* (C).

Shrubs, 2 - 3 m high; branches grayish-brown. Leaves evergreen, imparipinnate, to 10 cm long coriaceous; rachis narrowly winged. Leaflets 7 - 9, to 5.8 cm long and 2.2 cm wide, ratio 2.6 - 1, subopposite, sessile, oblong, often falcate, acute, mucronate, glabrous, upper surface darker, margins slightly revolute; terminal leaflet smaller than laterals, linear-lanceolate. Stamine inflorescences not seen. Pistillate inflorescences clustered in racemes or panicles, to 7.5 cm long. Drupes greenish-pink, globose, 3 - 5 mm in diameter.

**Phenology.**—Flowering March to May; fruiting February, September, and October.

**Habitat and ecology.**—Maquis, calcareous soils; elevation is 450 m.

**Distribution.**—Scattered through the Mediterranean basin where its supposed parent species, *P. lentiscus* subsp. *lentiscus* and *P. terebinthus*, occur. Zohary (1952: 14) discusses several other putative hybrids, but we have seen only those specimens cited below.

**Specimens examined.** 
**CYPRUS.** Akamas Forest, Feb 1955, E. Chapman s.n. (K); between baths of Aphrodite and Fontana Amorosa, 28 Oct 1981, R.D. Meikle 5043 (K). **PALESTINE.** Upper Galilee, Nabi Yusha, 16 Sep 1951, D. Zohary s.n. (MO); 16 Sep 1951, D. Zohary & I. Amdursky 440 (BM, MO). **SPAIN.** Tarragona: Cardó, 450 m, 08 Jun 1946, Font Quer 458 (F).
5. Excluded and Problematic Species

Pistacia americana Mill., Gard. Dict. Ed. 8. N. 7. 1768. = Simarouba glauca DC., Ann. Mus. Par. 7:424. 1811 (Simaroubaceae)?

Pistacia × cappadocica Planch., Bull. Soc. Bot. France 11(Sess. Extraord.):46?:. 1864. = Pistacia terebinthus × Pistacia vera?

Pistacia cusphuongensis T.D. Dai, J. Biol. (Vietnam) 3(3):24. 1981. = ? (does not appear to be a Pistacia)

Pistacia fagaroides Willd., Enum. Pl. Suppl. 66. 1814. = ?

Pistacia narbonensis L. Sp. Pl. 2:1025. 1753. pro parte = Pistacia terebinthus × Pistacia vera.

Pistacia nemausensis Req. ex Planch., Bull. Soc. Bot. France 11(Sess. Extraord.):46?:. 1864. = Pistacia terebinthus × Pistacia vera.

Pistacia occidentalis Baill., Adansonia 11:181. 1874. = Dacyrodes hexandra Griseb., Fl. Brit. W.I. 174. 1859.

Pistacia oleosa Lour., Fl. Cochinch. 615. 1790. = Schleicheria trijuga Willd., Sp. Pl., ed. 4. 4(2):1096. 1806. (Sapindaceae). Zohary (1952), as Schleicheria.

Pistacia simaruba L., Sp. Pl. 2:1026. = Bursera simaruba (L.) Sarg., Gard. & Forest 3:200. 1890 (Burseraceae).

Pistacia vitex Steud., Nomencl. Bot. 627. 1821. = Vitex pubescens Vahl, Symb. Bot. 3:85. 1794 (Lamiaceae).

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