

ELAEAGNACEAE (J.F. Veldkamp, Leyden)¹

This small family has a typical northern hemisphere range; it is absent from South America, extends in Eurasia only to the Mediterranean and in Southeast Asia to Malesia and NE. Queensland. There are 3 genera of which *Elaeagnus* occurs throughout the range (20–50 spp.), *Shepherdia* occurs only in North America (c. 3 spp.), and *Hippophaë* occurs throughout Eurasia (c. 3 spp.). The habitat is chiefly in steppes and along coasts, but in SE. & E. Asia, Malesia and N. Queensland *Elaeagnus* is found as a substage liana in the everwet rain-forest, showing no special preference for seasonal climates.

A characteristic feature is the universal occurrence of an often dense indument of scales and frequent occurrence of short-shoot thorns.

About the affinity three opinions prevail. BENTHAM & HOOKER *f.* (1880) placed the family near the *Thymelaeaceae* and this position in the *Thymelaeales* was still upheld by MELCHIOR (1964) and supported by RAO (1974). Most authors, e.g. RENDLE (1952) follow VON WETTSTEIN (1911), who accommodated the family in the *Myrtiflorae*. CRONQUIST (1981) included it in his *Rosidae*-order *Proteales*, but wondered whether this was not an artificial place. He also pointed out affinities to the *Thymelaeaceae* which he included in the *Rosidae*-order *Myrtales*, but remarked (*l.c.* 603) that "As a putative member of the *Myrtales*, the *Elaeagnaceae* would stand out like a sore thumb on anatomical as well as floral morphological grounds, but an evolutionary relationship via the *Thymelaeaceae* cannot be ruled out on the basis of present evidence. For the present it will do no harm to retain the *Proteaceae* and *Elaeagnaceae* in the same order. When more evidence is available it may become necessary to restore the order *Elaeagnales* and insert it in a position following the *Myrtales*."

The latter view was held by TAKHTAJAN (1969), who in 1980, however, placed the *Elaeagnales* with the *Elaeagnaceae* as its only family next to the *Rhamnales* in the *Celastranae*, which super-order he placed next to the *Proteanae*, which include the *Proteales*. The *Thymelaeaceae* he put in the *Malvaneae* and the *Myrtales* in the *Myrtanae*. Such a relationship with the *Rhamnales* was also proposed by HUTCHINSON (1926, 1959, 1973) and THORNE (1983).

DAHLGREN (1975) recognizes *Elaeagnales* but does not make a decision about affinity other than those mentioned.

Pollen structure does not lead to an unequivocal opinion about affinity (LEINS, 1967).

Fossil pollen considered to represent *Elaeagnus* dates from the Oligocene (MULLER, 1981).

References: BENTHAM & HOOKER, *Genera Plantarum* 3 (1880) 203; CRONQUIST, *An integrated system etc.* (1981) 603, 606; DAHLGREN, *Bot. Notis.* 128 (1975) 119–147, especially p. 134; HUTCHINSON, *Fam. Fl. Plants* 1 (1926) 245; ed. 2 (1959) 342; ed. 3 (1973) 424; LEINS, *Grana Palynol.* 7 (1967) 390–399; MELCHIOR, *Syllabus der Pflanzenfamilien* ed. 12, 2 (1964) 320; MULLER, *Bot. Review* 47 (1981) 87; V.S. RAO, *J. Ind. Bot. Soc.* 53 (1974) 156–161; RENDLE, *Classification Fl. Pl.* 2 (1952) 372; TAKHTAJAN, *Flowering Plants* (1969) 229; *Bot. Review* 46 (1980) 225–359; THORNE, *Nordic J. Bot.* 3 (1983) 105; VON WETTSTEIN, *Handb. Syst. Bot.* (1911) 669.

ELAEAGNUS

TOURN. *ex* LINNÉ, *Sp. Pl.* 1 (1753) 121; *Gen. Pl.* ed. 5 (1754) 57; SCHLECHTEND. in DC. *Prod.* 14, 2 (1857) 606; MAXIM. *Mél. Bot.* 7 (1870) 559; SERV. *Bull. Herb. Boiss.* II, 8 (1908) 381; *Beih. Bot. Centralbl.* 25, 2 (1909) 1 ('Mon. Eléagn. '); T HART & VELDK. *Blumea* 26 (1980) 393. — **Fig. 1, 2.**

Shrublets, shrubs, rarely trees, or (in Mal.) woody climbers, branching monopodially, with stellate scales; older parts usually armed with thorns derived from short-shoots. *Leaves* spiral, simple, entire. *Flowers* usually bisexual, in axillary

(1) Introduction by the General Editor.

inflorescences, or pseudo-terminal, cymose, actinomorphic, 4(-5-8)-merous, often scented. Bracteoles absent. *Perianth* simple; tube \pm cylindrical, quadrangular, constricted above the ovary, then inflated ('limb'); perianth-segments (in Mal.) 4, valvate. *Disk* usually inconspicuous, intra-staminal. *Stamens* (in Mal.) 4, alternitepalous, inserted in the throat; anthers dorso-versatile, introrse with 2 longitudinal slits. *Ovary* superior, 1-locular; style 1; stigma unilateral, elongated. *Ovule* 1, basal, anatropous. *Fruit* a drupe, enclosed in the enlarged fleshy perianth-tube, usually with 8 longitudinal ribs; exocarp fleshy, mesocarp bony or leathery, endocarp woolly pubescent inside (in Mal.). *Seed* 1; endosperm absent (in Mal.), rarely scanty; embryo straight.

Distr. About 20-?45 *spp.* over the northern hemisphere through tropical Southeast Asia and Malesia to N. Queensland; in *Malesia* 2 *spp.*

Ecol. Primary and secondary rain-forest, without a preference for dry regions or a seasonal climate, from the lowland up to c. 2100 m.

Taxon. SERVETTAZ (1908, 1909) made an excessively detailed classification of the genus, splitting up the classical species into a number of others, subspecies, and varieties. This work is often more an impediment than a help in the study of the taxonomy of *Elaeagnus*. The delimitating characters used by SERVETTAZ have usually been drawn from too few specimens, and his use of the shape, size, colour, and consistency of the leaves and the colour of the flowers has proven to be of little value, as these generally are individual features of the specimens, but not of taxa. He had a very confusing way of citing his material. In Malesia he distinguished 6 *spp.* and a number of infraspecific taxa. Later authors have recognized only one, joining all into *E. latifolia*, or two, *E. conferta* and *E. triflora*. I agree with the latter opinion, although it may be remarked that the differences between these two species and *E. latifolia* are only slight. The differences seem to be clear-cut when flowers are available, but vegetative material is impossible to identify. None of SERVETTAZ' infraspecific taxa could be maintained.

The Malesian species of *Elaeagnus* belong to *sect. Elaeagnus (sect. Sempervirentes, nom. inval., SERVETTAZ, 1909)*.

Uses. The Malesian species are usually misidentified as *E. latifolia* and the possibly different uses of the species can therefore not be disentangled. HEYNE (Nutt. Pl. 1927, 1152) mentioned the presence of more or less edible, sourish fruits (*areuj susumunding* or *areuj dudurenan*) and of extremely acid ones (*areuj dudurenan*). This may be due either to the presence of various races of one or both species, or it may be of specific significance.

Field notes. Flowers fragrant, white, cream, pale yellow, whitish and brown dotted, pale inside. Fruit pinkish to glossy red or pale brown, when ripe juicy and sweet to very acid. Measurements of the fruit are taken from dry specimens in the herbarium; they are much smaller than in the living state; collectors hardly ever measure them in the field.

KEY TO THE SPECIES

The term 'limb' means the inflated, quadrangular part of the perianth between the constriction of the tube and the perianth segments.

1. Flowers tubulose-campanulate; limb 4.5-7 mm long. Style straight, sparsely scaly at base only. Perianth segments (2-)3-4 by 2-3.25 mm. Continental Southeast Asia **E. latifolia**
1. Flowers trumpet-shaped; limb 1-4 mm long. Style at apex hook-shaped.
 2. Limb 3.5-4 mm long, sometimes thickened at base. Style densely stellate-scaly, especially near the base. Perianth segments (1-)1.5-2 by 1.5-2 mm **1. E. conferta**
 2. Limb 1-3(-4) mm long. Style glabrous, rarely with some stellate scales at base. Perianth segments 2-4(-5) by 2-3 mm **2. E. triflora**

1. *Elaeagnus conferta* ROXB. [Hort. Beng. (1814) 11, *nomen*] Fl. Ind. 1 (1820) 460; ed. Carey 1 (1832) 440; A. RICH. Mém. Soc. Linn. Paris 1 (1823) 385, 405; SCHLECHTEND. in DC. Prod. 14, 2 (1857) 612; Linnaea 30 (1859–60) 367; *ibid.* 32 (1863) 301; KURZ, For. Fl. Burma 2 (1877) 331; SERV. Bull. Herb. Boiss. II, 8 (1908) 389, *incl. ssp. javanica* (BL.) SERV. *et ssp. dendroidea* (SCHLECHTEND.) SERV.; Beih. Bot. Centralbl. 25, 2 (1909) 89, 91, f. 5.1, *incl. ssp. euconferta* SERV., *var. calcuttensis* SERV., ? *var. malaccensis* SERV., *var. septentrionalis* SERV., *et var. silhetensis* SERV.; LECOMTE, Fl. Gén. I.-C. 5 (1915) 181; BACK. & BAKH. f. Fl. Java 2 (1965) 86; 'T HART & VELDK. Blumea 26 (1980) 396, with full synonymy and discussion. — *E. javanica* BL. Bijdr. (1826) 638; SCHLECHTEND. in DC. Prod. 14, 2 (1857) 614; Linnaea 30 (1859–60) 377; BACK. in Heyne, Nutt. Pl. (1927) 1152. — *E. arborea* ROXB. *var. dendroidea* SCHLECHTEND. in DC. Prod. 14, 2 (1857) 612. — *E. gaudichaudiana* SCHLECHTEND. l.c. 612; Linnaea 30 (1859–60) 370; SERV. Bull. Herb. Boiss. II, 8 (1908) 390; Beih. Bot. Centralbl. 25, 2 (1909) 103; MERR. Trans. Am. Phil. Soc. II, 24 (1935) 279. — *E. dendroidea* SCHLECHTEND. Linnaea 30 (1859–60) 362. — Fig. 1a–d.

Evergreen woody climber, occasionally erect, up to 12 m, innovations silvery scaly. Axillary buds 2, collateral. *Leaf* elliptic to obovate, 6.5–11(–12.5) by 3.5–5(–5.5) cm, base obtuse, sometimes rounded, apex acute to acuminate; nerves 5–8 pairs, loop-shaped; blade above with a slightly immersed midrib, below brown to silvery scaly. Petiole 8–11 mm. *In-florescences* 1–5(–or 6-)flowered fascicles; bracts up to 2 mm long. Pedicels 1–2(–3) mm. *Flowers* trumpet-shaped, 6–8 mm long; tube 1.5–2(–2.5) by c. 1 mm \emptyset ; limb 3.5–4 by 1.5–2.5(–3) mm \emptyset , about twice as long as the perianth-segments; these triangular to broadly ovate, (1–)1.5–2 by 1.5–2 mm, inside with stellate scales. *Filaments* filiform, broadly winged towards the base, 0.5–1.5 mm long; anthers (0.5–)1(–1.5) mm long. *Ovary* 1–2 by c. 0.5 mm \emptyset , glabrous. *Style* terminally hook-shaped, exerted for (0.5–)1–2 mm above the throat, densely stellate-scaly; stigma 1–2 mm long. *Fruit* ellipsoid, up to 35 by 15 mm \emptyset (spirit); seed and peanut-shaped embryo to 20 by 7 mm \emptyset ; radicle up to 3 mm long.

Distr. Continental SE. Asia: Nepal, India (Assam), through Bangladesh, Burma (Pegu), Indochina, Andamans & Nicobars, to *Malesia*: Malaya (P. Penang, Perak), Sumatra, throughout Java (Bogor, Priangan, Semarang, Madiun, Surabaya).

Ecol. Rather rarely recorded, in bamboo and mixed deciduous, and in evergreen forests; 400–2000 m.

Vern. Java: *areuj dudurenan*, *a. susumunding*, *kakaduan*, *meligi*, S.

Notes. 'T HART & VELDKAMP (1980) at length dis-

cussed the typification and location of the types of the complicated synonymy. *Elaeagnus gaudichaudiana* has been included, the type of which came from Indochina. MERRILL (1935) suggested in his evaluation of LOUREIRO's species (Flora Cochinchinensis, 1790) its conspecificity with *Octarillum fruticosum* LOUR. (*E. fruticosa* (LOUR.) CHEVAL.), which he claimed to be the only representative of *Elaeagnus* in Indochina. As the LOUREIRO specimen in the BM is sterile, and SERVETTAS distinguished 3 species in Indochina, this conclusion cannot be accepted. It may be further noted that LOUREIRO described his species with solitary flowers, while *E. conferta* usually has several-flowered fascicles which are only occasionally reduced to one flower. *Elaeagnus conferta* is thus the oldest name available of certain application.

Field notes. Usually climbing, rarely a tree, with reddish brown bole. Flowers yellowish, pendulous. Fruit orange-red when ripe, juicy, delicious but acid, up to 4 by 2 cm \emptyset .

2. *Elaeagnus triflora* ROXB. [Hort. Beng. (1814) 11, *nomen*] Fl. Ind. 1 (1820) 459; ed. Carey 1 (1832) 439; SERV. Bull. Herb. Boiss. II, 8 (1908) 390, *incl. ssp. rigida* SERV., *ssp. obsoleta* SERV., *ssp. polymorpha* SERV. *et ssp. tetragonia* SERV.; Beih. Bot. Centralbl. 25, 2 (1909) 104, *incl. var. brevipes* SERV. *et var. longipes* SERV.; BACK. & BAKH. f. Fl. Java 2 (1965) 86; 'T HART & VELDK. Blumea 26 (1980) 398. — *E. latifolia* (non L.) A. RICH. Mém. Soc. Linn. Paris 1 (1823) 386, 404; MOR. Syst. Verz. (1846) 70; MIQ. Pl. Jungh. 2 (1852) 173, *incl. forms*; ZOLL. Syst. Verz. 2 (1854) 117; SCHLECHTEND. in DC. Prod. 14, 2 (1857) 610, *p.p.*, *incl. var. triflora* SCHLECHTEND.; Linnaea 30 (1859–60) 347; KURZ, Nat. Tijds. N. I. 27 (1864) 172; BENTH. Fl. Austr. 6 (1873) 39; HOOK. f. Fl. Br. India 5 (1886) 202, *p.p.*; FORB. & HEMSL. J. Linn. Soc. Bot. Lond. 26 (1894) 403, *p.p.*; GILG in E. & P. Nat. Pfl. Fam. III, 6a (1894) 251, *p.p.*; GAMBLE, J. As. Soc. Beng. 75, ii (1912) 267; KOORD. Exk. Fl. Java 2 (1912) 658; RIDL. J. Fed. Mal. St. Mus. 8 (1917) 81; MERR. Sp. Blanc. (1918) 279; RENDLE, J. Bot. 63 (1925) Suppl. 90, *p.p.*?; C.T. WHITE, Contr. Arn. Arb. 4 (1933) 75; VON MALM in Fedde, Rep. 34 (1934) 282. — *E. ferruginea* A. RICH. Mém. Soc. Linn. Paris 1 (1823) 387, 404; MIQ. Pl. Jungh. 2 (1852) 173; SCHLECHTEND. in DC. Prod. 14, 2 (1857) 610; Linnaea 30 (1859–60) 350; *ibid.* 32 (1863) 303; SERV. Bull. Herb. Boiss. II, 8 (1908) 390, *incl. ssp. sumatrana* SERV.; Beih. Bot. Centralbl. 25, 2 (1909) 110, *incl. var. richardia* SERV. *et var. atrovirens* SERV. — *E. philippinensis* PERROTTET, Mém. Soc. Linn. Paris 3 (1824) 114; MERR. Sp. Blanc. (1918) 279; En. Philip. 3 (1923) 134; QUIS. Medic. Pl. Philip. (1951) 638; LIU & LAL, Quart. J. Taiwan Mus. 33 (1980) 247. — *E. rigida* BL. Bijdr. (1826) 639; MIQ. Pl. Jungh. 2 (1852) 173; SCHLECHTEND. in DC. Prod. 14, 2 (1857)

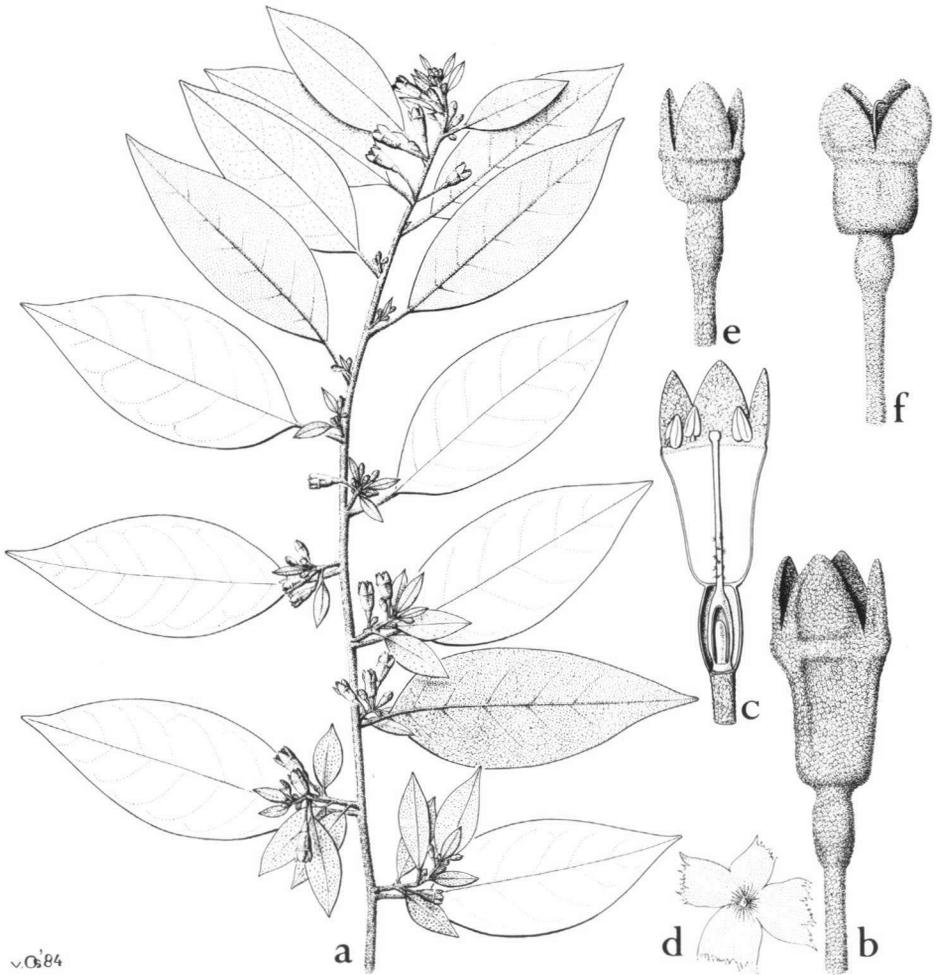


Fig. 1. *Elaeagnus conferta* ROXB. a. Habit, $\times 1/2$, b, c. flowers, $\times 3$, d. scale, $\times 25$. — *E. triflora* ROXB. var. *brevilimbata* 'T HART. e. Flower, $\times 3$. — *E. triflora* ROXB. var. *triflora*. f. Flower, $\times 3$ (a–d ARENS 34, e HOOGLAND 4537, f LÖRZING 8523).

614; Linnaea 30 (1859–60) 376. — *E. angustifolia* (non L.) BLANCO, Fl. Filip. 1 (1837) 74; ed. 2 (1845) 53; ed. 3, 1 (1877) 100. — *E. perrottetii* SCHLECHTEND. in DC. Prod. 14, 2 (1857) 613, *nom. superfl.*; MIQ. Fl. Ind. Bat. 1, 1 (1858) 981. — *E. cumingii* SCHLECHTEND. in DC. Prod. 14, 2 (1857) 613; SERV. Bull. Herb. Boiss. II, 8 (1908) 391, *incl. ssp. perrottetii* SERV. *et ssp. philippinensis* SERV. — *E. rostrata* SERV. Bull. Herb. Boiss. II, 8 (1908) 392; Beih. Bot. Centralbl. 25, 2 (1909) 113, f. 5: 40–42. — *E. zollingeri* SERV. Bull. Herb. Boiss. II, 8 (1908) 392; Beih. Bot. Centralbl. 25, 2 (1909) 112, f. 5: 36–39. — Fig. 1e, f.

KEY TO THE VARIETIES

1. Limb 2–3(–4) mm long, subequal to 1.5 times as long as the segments. Style glabrous or rarely with some stellate scales at base a. var. *triflora*
1. Limb 1–1.5 mm long, about half as long as the perianth segments. Style glabrous b. var. *brevilimbata*

a. var. *triflora* — Fig. 1f.

Evergreen woody climber, occasionally shrubby, up to 10 m high, innovations silvery scaly. Axillary

buds 2, collateral. *Leaf* elliptic to oblong, 1.5–10(–12) by (0.3–)1–4(–6) cm, base obtuse, sometimes rounded, apex acuminate, sometimes acute; nerves 5–8 pairs, loop-shaped; blade above with a slightly immersed midrib, below brown to silvery scaly. *Petiole* (4–)5–6(–7) mm. *Inflorescences* 1–3(–8)-flowered fascicles; bracts up to 2 mm long. *Pedicels* 2–5(–7) mm, elongated in fruit to 8 mm. *Flowers* trumpet-shaped, 6–9 mm long; tube 1.5–2.5 by c. 1 mm \emptyset ; limb 2–3(–4) by (1.5–)

2–2.5(–3) mm \emptyset , slightly shorter than to 1.5 times as long as the perianth segments; these broadly ovate, (2–)2.5–4(–5) by 2–3 mm, inside sometimes with stellate scales. *Filaments* filiform to cone-shaped, 0.3–1 mm long; anthers (0.5–)1(–1.5) mm long. *Ovary* 1–2 by 0.5(–1) mm \emptyset , glabrous. *Style* filiform, terminally hook-shaped, exerted for (0.5–)1–2 mm above the throat, glabrous, rarely with a few scattered stellate scales at base; stigma 1–2 mm long. *Fruit* ellipsoid, up to 4 by 2 cm (in spirit), seed and peanut-like embryo up to 17 by 6 mm; radicle up to 3 mm long.

Distr. N. Queensland, throughout *Malesia*, incl. also New Britain. Also in Botel Tobago, SE. of Taiwan. Not in New South Wales.

It cannot be ruled out that this species occurs in continental Asia as well under some other name. Although not all names have been checked for that area, so far none were discovered which should have been included here.

Ecol. Primary rain-forest, swamp forest, secondary scrub with *Gleichenia*, sometimes gregarious, from the lowland up to 1800 m.

Uses. The ripe fruit is given to children suffering from amoebic dysentery (SULIT, 1934, cited by QUISUMBING, 1951, *sub E. philippinensis*). CHOPRA (1933, *ex QUISUMBING, l.c.*) stated that the flowers are astringent and cardiac.

Vern. Sumatra: *hail-hail*, Toba-Batak, *kail-kail*, Karo-Batak. Java: (*areuj* or *daun*) *dudurènan*, *empos*, *kakduan*, *kitjepot*, *leutik*, S, *berbikuda*, *godong wadang*, *ketadak*, Md. Bali: *kelintju*. Philippines: *bantap*, Sul., *banekan*, Bon., *kopapei*, *padias*, Ig., *lagot*, Buk., *malaimus*, P. Bis.

Note. Field note. Shrub or woody climber. Flowers strongly scented.

b. var. *brevilimbata* 'T HART, *Blumea* 26 (1980) 400 (*'brevilimbatus*'). — *E. triflora* ROXB. *ssp. tetragonia* (*non SERV.*): MERR. & PERRY, *J. Arn. Arb.* 22 (1941) 267. — Fig. 1e.

Leaf with (5–)6–11 pairs of nerves; *petiole* (2–)3–4(–5) mm long. *Inflorescences* 1–4 (or 5)-flowered fascicles. *Flowers* 4–7.5 mm long; tube 1.5–2 by c. 1 mm \emptyset ; limb 1–1.5 by 1.5–2 mm \emptyset , \pm half as long as the perianth segments; these broadly ovate, 2–3 by (1.5–)2(–2.5) mm, stellate-scaly inside. *Fruit* 15–17 mm long. *Seed* up to 12 by 4.5 mm; embryo up to 9 mm long.

Distr. N. Queensland and in *Malesia*: throughout New Guinea.

Ecol. Primary rain-forest, *Castanopsis*-forest, swampy secondary forest; (0–)450–1600(–2125) m alt.

Note. Field notes. Climber or scrambling shrub, to 30 m high. Flowers grey green, white, yellow, very fragrant. Fruit red, fleshy.



Fig. 2. Stem thorns on the stem of an *Elaeagnus* liane (West Java, Tjibodas; VAN STEENIS 11162), $\times 1/2$.

Uncertain

***Elaeagnus conferta* ROXB. var. *palescens* SERV.**
Beih. Bot. Centralbl. 25, 2 (1909) 96. — This is based
on KORTHALS *s.n.* from Sumatra (in L), but its identity
remains uncertain as the specimens are sterile.