# PLUMBAGINACEAE (C. G. G. J. van Steenis, Buitenzorg)

Boiss. in DC. Prod. 12 (1848) 617; Miq. Fl. Ind. Bat. 2 (1859) 993; B. & H. Gen. Pl. 2 (1876) 623; Clarke, in Hook. f. Fl. Br. Ind. 3 (1882) 478; Benth. Fl. Austr. 4 (1869) 265; Pax, in E. & P. 4, 1 (1889) 116; Boerl. Handl. 2, 1 (1891) 274; Baill. Hist. Pl. 11 (1892) 359; Bail. Queensl. Fl. (1900) 943; Gamble, J. As. Soc. Beng. 74, II (1906) 84; Ridl. Fl. Mal. Pen. 2 (1923) 224; Sprague, J. Bot. 62 (1924) 267; Gams, in Hegi, Ill. Fl. Mitt. Eur. 5, 3 (1926) 1877; Hutch. Fam. Fl.Pl. 1 (1926) 290; Backer, Onkruidfl. Jav. Suik. (1931) 477.

Herbs or undershrubs. Leaves simple. Stipules absent. Flowers bisexual, actinomorphic, often in unilateral inflorescences, or subumbellate. Bracts often sheathing, dry and membranous. Bracteoles 2. Calyx tubular, gamosepalous, often conspicuously ribbed, folded, the membranous folds often hyaline, lobes 5, often scarious. Petals free, but mostly connate at the base, contorted. Disk 0. Stamens 5, epipetalous, and connate with their base. Anthers 2-celled, opening lengthwise. Ovary superior, mostly sessile, often angled, 1-celled with 1 ovule pendulous from a basal funicle; styles 5, free or variously connate; stigma subcapitate. Capsule membranous, mostly included, circumscissile near the thin base, rarely valvate from the base upwards. Seed 1, with or without endosperm, cylindric.

Distr. Throughout the world, ca 10 genera.

Ecol. Mostly in salty steppes, or littoral. Leaves variously reduced to needle-shape, often provided with glands secreting water, mucus, salts or CaCO<sub>3</sub>.

Uses. Several species are medicinal; see Plumbago.

## KEY TO THE GENERA

- - Flowers in heads. Scape unbranched. Leaves 1-nerved.
    Flowers in wide-branched corymbs, unilateral, spicate. Leaves large, pinnatisect-spathulate
    - 4. Limonium

## 1. AEGIALITES

R.Br. Prod. (1810) 426 (not of Trin. 1820); Roxb. Fl. Ind. 2 (1832) 111 (Aegelatis); Boiss. I.c. 621; Griff. Not. 4 (1854) 207 (Aegiatilis); Miq. I.c. 994; B. & H. I.c. 624; Kurz, J. As. Soc. Beng. 46, II (1877) 217; For. Fl. Burma 2 (1877) 96; Clarke, I.c. (Aegianilites); Boerl. I.c. 278; Pax I.c.; Baill. I.c.; Gamble I.c.—Aegialinites Presl, Bot. Bem. (1844) 103.

Simple-stemmed shrub, or undershrubs, 1/3-3 m tall, branches with pith. Leaves alternate, orbicular, glabrous, coriaceous, entire, smooth, gland-dotted; nerves and veins parallel; petiole long, thick, winged, clasping the stem, leaving annular scars, glandular inside. Flowers solitary in the axil of a bract, erect, in leafy panicled often fork-branched racemes not much exceeding the leaves. Bracts sheathing, enclosing 2 similar but smaller boat-shaped bracteoles, all persistent, glandular inside. Calyx persistent, wholly or only upwards with 5 prominent ribs, folded between, tubular, lobes short. Corolla white, longer than the calyx, easily detached circumscissile at the base, lobes elongate-spathulate, subconcave 3-nerved, mutually connate at the base in a short tube together with the stamens; tube annular or barrel-shaped, after anthesis when pushed out splitting upwards from the base.

Stamens inserted on the apex of the tube, anthers basifix c. as long as the corolla, sagittate at the base; cells  $\pm$  parallel, halfway free, latrorse; connective a narrow furrow between the cells; pollen 90–120  $\mu$  diam. Styles free, articulate at the base; stigma small, punctiform-capitate, reaching just above the stamens. Capsule linear, long-exserted, pentagonal, dehiscing finally along the angles.

Distr. 2 spp., SE. Asia to Australia, absent in many districts of Malaysia (fig. 1).

Ecol. In the open mangrove, according to TEYSMANN and BRASS also on rocky beaches and exposed shorelines, on sandy soil (WARBURG), locally in small pure groves. The stembase in Ae. rotundifolia is said to be swollen and conical (GRIFFITH, CRAIB, BRANDIS). Aerophores are not found (WARBURG). GRIFFITH says that the petioles, bracts, and bracteoles exude a viscose fluid. This is due to muci-laginous glands which are widely distributed in the family (cf. WILSON, Ann. Bot. 4 (1890) 244). In the Ceram specimens I found sand adhering to calyx and corolla. The exocarp is coriaceous; the mesocarp is swollen and spongy and contains air in the herbarium; the endocarp is thin. The mesocarp therefore seems to contribute the means by which the fruit can drift. The elongated fruit reminds of viviparous Rhizophoraceae, Aegiceras, &c. The flowers seem not to be ephemeral; therefore measurements of the ovary (proportion length/diameter) are not constant, as it enlarges during anthesis. The corolla is after anthesis circumscissile at the base and is slowly pushed out, and its basal obconical part enclosing the ovary is partly slit upwards. Field study is urgently needed to clear the life-history and variability of this peculiar genus.

Notes. The genus consists of two widely separated populations which show rather unimportant differences in the flower. As no intermediates are known and the ecological behaviour is different I accept them provisionally as two distinct species. The disjunction is similar to that in Aldrovanda, Philydrum lanuginosum, &c; the absence in the intervening area is unexplained.

### KEY TO THE SPECIES

- Leaves dull above, reticulations indistinct s.s. Flowering parts smaller than in the prec. species. Flower sessile or up to 5 mm pedicelled. Calyx 7-8 mm, lobes distinctly imbricating, their apex rounded to subtruncate, mucronulate. Corolla tube 1-2 mm high, lobes 9-10 by 1½-2 mm. Anthers 2 mm long, filament inserted at ½ of the length. Ovary 3-4 by 1½-2 mm, oval . . . . . . 1. Ae. annulata

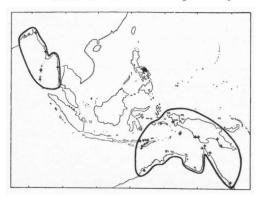


Fig. 1. Distribution of Aegialites.

1. Aegialites annulata R.Br. Prod. 1 (1810) 426; GAUD. in FREYC. Voy. (1826) t. 51; Boiss. in DC Prod. 12 (1848) 621; MiQ. Fl. Ind. Bat. 2 (1859) 995; BENTH. Fl. Austr. 4 (1869) 266; TEYSM. Nat. Tijd. N.I. 34 (1874) 456; HEMSL. Rep. Chall. Bot. pt 3 (1884) 161; WARB. Bot. Jahrb. 13 (1891) 400; BAILL. Hist. Pl. 11 (1892) 359; BAIL. Queensl. Fl. (1900) 943; PULLE, Nova Guinea 8 (1910) 397; BAIL. Compr. Cat. Q. Pl. (1913) pl. 298; WHITE, J. Arn. Arb. 10 (1929) 258.—Aegianilites annulata PRESL, Bot. Bem. (1844) 103.

Stembase swollen, conical. Leaves rotundate to oval, 4–8 by 2<sup>1</sup>/2–7 cm. Petiole 3<sup>1</sup>/2–8 cm long. Bracts 7–9 by 6 mm, bracteoles 6–8 by 2 mm. Flowers sessile or up to 5 mm pedicelled. Stamens 7–8 mm long. Styles 6–7 mm. Fruit 2 mm diam., first straight, gradually elongating, later falcate up to 5 cm long, but not thickening.

Distr. Queensland, NW. Australia, Thursday Isl. and E. Malaysia: S. New Guinea, Moluccas (Aru, Ceram) and Lesser Sunda Isl. (Timor, Semau, Alor, Solor, Adonara, E. Flores (Larantuka)).—Fig. 1.

Ecol. Brass's Papuan specimens were only 30-45 cm tall. Grows in isolated specimens or small colonies in more sandy and rocky places than the following species.

2. Aegialites rotundifolia Roxb. Fl. Ind. 2 (1832) 111 (Aegelatis); GRIFF. Not. 4 (1854) 207, t. 461, f. 2; Prain, Beng. Pl. 1 (1903) 638; CLARRE in Hook. f. Fl. Br. Ind. 3 (1882) 479; Brandis, Ind. Trees (1906) 413; GAMBLE, J. As. Soc. Beng. 74, II (1906) 85; RIDL. Fl. Mal. Pen. 2 (1923) 225; CRAIB, Fl. Siam 2 (1938) 320.—Aegianilites rotundifolia Presl., Bot. Bem. (1844) 103; GRIFF. Ic. pl. As. (1854) t. 654.—Ae. annulata var. rotundifolia Boiss. in DC. Prod. 12 (1848) 621; KURZ, J. As. Soc. Beng. 46, II (1877) 217; For. Fl. Burma 2 (1877) 96.

Leaves orbicular, base mostly rounded or broad-

cuneate to slightly cordate, apex truncate or slightly obtuse, protruding, 4<sup>1</sup>/<sub>2</sub>-7 cm diam. Petiole 5-7<sup>1</sup>/<sub>2</sub> cm long. Bract 10-11 mm. Bracteoles 8-9 mm. Flowers pedicelled up to 13 mm. Stamens 13-18 mm. Styles 9-10 mm. Ripe fruit not described.

Distr. Bengal, Burma, Siam, Mergui, Tenasserim, Andaman Isl., according to RIDLEY erroneously recorded for the Malay Peninsula, but likely to occur there somewhere or in N. Sumatra.—Fig.1. Ecol. Low muddy mangrove.

# 2. PLUMBAGO

LINNÉ, Sp.Pl. 1 (1753) 151; cf. lit. under family; STEEN. Trop. Natuur 26 (1937) 12. Perennial herbs or undershrubs, rarely annual, often straggling or subscandent. Leaves spread, entire, older ones often below pale-lepidote by excreted carbonates, or reduced on the flowering stems; petiole often semi-amplexicaulous-auriculate at the base. Flowers in terminal racemes or spikes, often united in a leafy panicle, blue, rosa, white or violet, ephemeral, not caducous. Calyx tubular, outside often with sessile or stalked glands, teeth erect, not enlarged in fruit. Corolla funnel-shaped, lobes spreading. Stamens free, broadened at the base. Style short, with 5 branches. Capsule included in the persistent calyx and (often twisted) corolla; pericarp thin, hardened above, circumscissile near the base, caducous part often splitting towards the apex with 5 valves.

Distr. About 10 spp. in all tropics, often used as ornamentals.

Ecol. Not limited to saline localities, but preferably under semi-arid conditions. Of *P. indica* no fruit has ever been found, and *P. aphylla* and *P. auriculata* never produce fruit in Java; they are propagated vegetatively. The leaves of the latter are often covered below with greyish scales of excreted CaCO<sub>3</sub>.

Uses. Plumbago, leadwort, derives its name from the colour adapted by the skin after the medicinal use of the European Pl. europaea, a plant used in historic time for curing plumbum, an illness of the eyes. The Indian species too are often used medicinally. The active substance, plumbagin, is known as a narcotic and specially as a vesicatory and anthelmintic. It is specially extracted from the roots; radix vesicatoria was already figured by Rumphius, Herb. Amb. 5, p. 453, t. 168 (P. indica). Several spp. are known as ornamentals, mostly P. auriculata. In a strict sense none is native in Malaysia, though P. zeylanica might be accepted as such.

#### KEY TO THE SPECIES

- 1. Corolla white, tube less than 21/2 cm long, limb 12-15 mm diam. Rachis of the raceme or spike with sessile or stalked glands.
  - 2. Leaves well-developed on flowering stems, 3-121/2 by 2-5 cm. Rachis with sessile glands

- Corolla red, lobes distinctly mucronate. Calyx red, 8-9 mm long, glandular all over, glabrous
  Pl. indica

1. Plumbago zeylanica LINNÉ, Sp.Pl. (1753) 151, cf. lit. under family; BENTH. Fl. Austr. 4 (1869) 267; MERR. Fl. Man. (1912) 362; Sp. Blanc. (1918) 300; En. Philip. 3 (1923) 275; HEYNE, Nutt. Pl. (1927) 1222; MERR. Comm. Lour. (1935) 301; BACKER, Bekn. Fl. Jav. 8 (1949) fam 181, p. 2.—Pl. auriculata (non LAMK) Bl. Bijdr. 14 (1826) 736. —P. viscosa Blanco, Fl. Filip. (1837) 78; ed. 2 (1845) 58; ed. 3, 1 (1877) 111.

Straggling shrub. Twigs long, not rooting, 1<sup>1</sup>/<sub>2</sub>-2<sup>1</sup>/<sub>2</sub> m. Young *leaves* with caducous small auricles. Racemes 6-30 cm, glands green often red-tipped. Calyx glabrous, glandular all over, green. *Corolla* tube 18-22 mm, lobes obovate 6-7 mm. Anthers blue-purple. Ovary and style glabrous. *Fruit* oblong, acute with 5 furrows, calyx patent and recurved.

Distr. Tropics of the Old World to Hawaii,

possibly only indigenous in SE. Asia, in *Malaysia*: not yet found in Borneo and the Moluccas, also cultivated.

Ecol. Both under feeble and strong dry-season conditions, preferably in the latter, always in anthropogenic localities, savannahs, thickets, &c, up to 1000 m, fl. Jan.—Dec.

Vern. Bama, bantji, poksor, godong èntjok, J, karèka, Md, ki èntjok, Sd, daun èntjok, M, bama (Bali), oporio (Timor), jarak, cheraka (Mal. Pen.); Philippines: bangbang, Ilk., sangdikit, Tag., talankan, Ilk.

2. Plumbago aphylla Bojer ex Bojss. in DC. Prod. 12 (1848) 694; PAX in E. & P. 4, 1 (1889) 117; STEEN. Trop. Natuur 26 (1937) 13; BACKER, Bekn. Fl. Jav. 8 (1949) fam. 181, p. 2.

Strong taproot producing few-branched, rather



Fig. 2. Plumbago indica L., × 1/2. (Courtesy Pasuruan Exp. Station)

straight, rod-shaped stems <sup>1</sup>/<sub>2</sub>-1 m long, often rooting and producing new plants. Leaves without auricles. Racemes 2-6 cm long. Calyx 7-8 mm high, hairy between the glands. Corolla-tube 14-16 mm, much broader than in the prec. sp., lobes emarginate. Anthers green-yellow. Style base long-hairy.

Distr. Indigenous in Madagascar, in Java sometimes in gardens but not very recommendable as an ornamental; no fruit is produced in Malaysia. Fl. Jan.-Dec.

3. Plumbago auriculata LAMK, Encycl. 2 (1876) 270; MERR. Fl. Man. (1912) 361; En. Philip. 3 (1923) 275, non Bl. (1825).—P. capensis THUNB. Prod. Fl. Cap. (1794) 33; DC. Prod. 12 (1848) 693; NAVES in BLANCO, Fl. Filip. ed. 3 (1877) 83, t. 27; F.-VILL. Nov. App. (1880) 122; STEEN. Trop. Natuur 26 (1937) 13; BACKER, BEKN. Fl. Jav. 8 (1949) fam. 181, p. 2.

Erect shrub or halfshrub, 1/3-11/2 m. Leaves oblong to obovate, 11/2-5 by 3/4-2 cm, auricles mostly large. Upper axils with a bundle of leaves. Racemes mostly combined to leafy corymbs; rachis 1-6 cm long, densely puberulous. Calyx green, 10-14 mm long, lower 1/3-2/3 puberulous but without glands. Ovary pear-shaped, style base glabrous.

Distr. Native of S. Africa, in *Malaysia*: a common ornamental, up to 1100 m, does not run wild. Fl. Jan.-Dec.

Vern. Mannentrouw, verliefde luitenantjes (Dutch).

4. Plumbago indica LINNÉ in STICKM. Herb. Amb. (1754) 24; Amoen. Acad. 4 (1759) 133; HORSF. Verh. Bat. Gen. 8 (1816) 108; MERR. Int. Rumph. (1917) 414; En. Philip. 3 (1923) 275; HEYNE, Nutt. Pl. (1927) 1221; BACKER, Onkruidfl. Suik. (1931)

478; STEEN. Trop. Natuur 26 (1937) 13; BACKER, Bekn. Fl. Jav. 8 (1949) fam. 181, p. 3.—Radix vesicatoria RUMPH. Herb. Amb. 4 (1750) 453, t. 168 (type).—Pl. rosea Linné, Sp.Pl. ed. 2 (1762) 215; BURKILL, Dict. (1935) 1774; Miq. Fl. Ind. Bat. 2 (1859) 993; CLARKE in HOOK. f. Fl. Br. Ind. 3 (1882) 481; GRESH. Schets. 210; MERR. Fl. Man. (1912) 362; PELLEGRIN, Fl. Gén. I.C. 3 (1930) 752; RIDL. Fl. Mal. Pen. 2 (1923) 225.—Pl. coccinea (LOUR.) SALISB. Prod. (1796) 122.—Fig. 2.

Branched from the base, stems flaccid, sometimes rooting, 1/2-11/2 m. Leaves oblong, 5-15 by 2-8 cm, without fascicled leaves in the axils, petiole not auriculate. Calyx red, 8-9 mm high, glabrous, glandular all over. Racemes not corymbiform, rather sparse. Rachis glabrous, 10-30 cm long. Ovary ovate-oblong. Style base short-hairy. Fruit unknown.

Distr. Widely distributed in the Old World tropics, probably native in SE. Asia, certainly not a sport or variety of *Pl. zeylanica*, in *Malaysia*: not yet recorded from the Malay Peninsula, Borneo, and New Guinea, ascending to 1000 m, also cultivated.

Ecol. Always in anthropogenic localities, locally run wild or semi-spontaneous, often persistent in abandoned cultivations, also in teak-forests, fl. Jan.-Dec.

Uses. Ornamental, sometimes medicinal as a substitute for Rauwolfia serpentina BTH.

Vern. Poelè pandak (lalaki), tjeraka mèrah, akar binasa, M, bama, J, daun srunèn, Md, vuurwortel, Dutch, akar binasa, Mol., setaka, Mol., mehulatoe, Amb., auwarian, Banda, mehutana hane, Mol., nehulatu, Mol.; Philippines: laurel, Bik., Sp., Tag., panting panting, Mag., sutungau, Tagb., ulanda, Sul.

### 3. ARMERIA

WILLD. En. Hort. Berol. 1 (1809) 333, nom.cons.—Statice L. p.p.

Perennial tufted scapose herbs with narrow rosulate *leaves* and a subterraneous, branched rootstock. *Flowers* in heads subtended by dry bracts, bases of the outer ones coalescent into a tubular sheath. Calyx obconical, 5-lobed, lobes mucronate. Petals united at the base. Stamens inserted on top of the tube. Style  $\pm$  free, stigma cylindric. *Fruit* circumscissile at the base.

Distr. Spp. 10 or 60 depending on the specific concept, cosmopolitan, not native in Australia and Malaysia.

1. Armeria maritima (MILL.) WILLD. I.c.—Statice armeria LINNÉ, Sp.Pl. (1753) 274.—Statice maritima MILL. Gard. Dict. ed. 8 (1768) no 3.—Armeria vulgaris WILLD. I.c.—Statice armeria var. maritima (MILL.) GAMS, in HEGI, Ill. Fl. Mitt. Eur. 5, 3 (1926) 1888; BACKER, BCKN. Fl. Jav. 8 (1949) fam. 181, p. 3.

Leaves 1-nerved, slightly puberulous on margins

and midrib, 5-7 by 1 mm. Culms 10-20 cm, thin and hard, puberulous, apex hollow. Heads 2-2<sup>3</sup>/<sub>4</sub> cm diam., sheath 10-18 mm. Calyx 6 mm high. *Petals* cuncate-spathulate, emarginate, rosa to red, their base pale, rarely white, 8-10 mm long. Style bases hairy.

Distr. Native of Europe, sometimes cultivated in the mountains of Java (acc. to BACKER), fl. Aug.

# 4. LIMONIUM

MILL. Gard. Dict. Abridg. ed. 4 (1754); ADANS. Fam. 2 (1763) 283; DRUCE, Rep. Bot. Exch. Club Br. Isl. (1913) III, 433.—Statice L. em. WILLD. non MILL.

Stiff, erect herbs. Leaves rosulate, spathulate, entire or lobed, often large. Flowers in widely branched corymbs, consisting of unilateral spikes. Bracteoles unequal. Calyx tube narrow, 5-ribbed; limb scarious, coloured, teeth often mucronate. Petals mostly  $\pm$  free, at the base connate with the stamens. Styles  $\pm$  free, stigma cylindric, rarely (§ Goniolimon) capitate. Fruit indehiscent or capsular at the apex.

Distr. More than 100 spp., cosmopolitan, not native in Malaysia. This absence is surprising as the genus occurs both in Australia and Asia. This distributional discontinuity is found in several plants, e.g. Philydrum lanuginosum, Rothia trifoliata, Samolus valerandi, &c. Some of the plants of this type have occasionally been found in Malaysia, e.g. Eriocaulon setaceum, Hydrocotyle peltata, Aldrovanda vesiculosa, Montia, Anagallis pumila, but remain exceedingly scarce.

1. Limonium sinuatum (L.) MILL. Gard. Dict. ed. 8 (1768) no 6; GAMS in HEGI, III. Fl. Mitt. Eur. 5, 3 (1926) 1881; BACKER, Bekn. Fl. Jav. 8 (1949) fam. 181, p. 4.—Statice sinuata LINNÉ, Sp.Pl. (1753) 276; CURT. Bot. Mag. t. 71; Boiss. in DC. Prod. 12 (1848) 635.

Robust,  $\frac{1}{2}$ -1 m. Leaves lanceolate-spathulate, deeply pinnatisect, 20-50 by  $2\frac{1}{2}$ -6 cm (incl. the long petiole), sparsely long-hairy. Peduncle and branches distinctly winged, wings  $\pm$  crisped, on

each fork with 3 erect, leafy, linear, 1-12 mm long appendages. Unilateral *spikes* dense, stalk between the bracts 3-alate, one wing narrow, the others broadening. Large bracteole folded, short-3-lobed, apex on the back with 2-3 teeth, narrow bracteole needle-tipped. Calyx tube 6 mm long, limb entire, fine-plaited, blue, white or rosa, 6-7 mm long.

Distr. Native of the Mediterranean, sometimes ornamental in the mountains of Java (acc. to BACKER), fl. July, Nov.

### Excluded

Limonium billardieri (GIRARD) O.K. Rev. Gen. (1891) 394.—Statice billardieri GIRARD, Ann. Sc. Nat. III, 2 (1844) 325; Boiss. in DC. Prodr. 12 (1848) 658; Miq. Fl. Ind. Bat. 2 (1859) 995; HALLIER f. in Elbert, Sunda Exp. 2 (1912) 294; Koord. Exk. Fl. Java 3 (1912) 36 (sic).

This species was based on a specimen said to have been collected by LA BILLARDIÈRE in Buru Island (Moluccas) on the expedition of 'La Recherche et l'Espérance' which went along the Cape Verde's to Cape of Good Hope, Australia and Meanesia to the Moluccas, and stayed in Buru from

Sept. 18-30 at Kajeli, the principal harbour. A cotype kindly sent by Dr Baehni agrees with Burchell 512 at Leyden and is identified as L. equisetinum (Boiss.) Dyer var: depauperatum (Boiss.) from the Cape. There are one developed flower and one reduced flower in each spikelet. It is closely allied to L. scabrum (Thunb.) O.K. The occurrence of minute tufts of hairs on the scape is typical. Cf. also Wright, in Fl. Cap. 4, 1 (1909) 422. This is the 2nd instance in which a species of this genus was mislabelled (cf. Kew Bull. 1948, 368).