

A KEY TO THE SPECIES OF HALOPHILA
(HYDROCHARITACEAE), WITH DESCRIPTIONS
OF THE AMERICAN SPECIES

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(*Foundation Flora Malesiana, Leyden*)

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During the revision of the Hydrocharitaceous genus *Halophila* for the Flora Malesiana it appeared for nomenclatural reasons necessary to study the genus in its entirety. In this Flora (DEN HARTOG, 1957b) I have already accounted for the Malaysian species. In that paper I have also included *H. stipulacea* (Forsk.) Aschers. which is commonly distributed in the western part of the Indian Ocean and the Red Sea and has immigrated in recent years via the Suez Canal into the eastern Mediterranean. A new species, *H. linearis* Hartog, I have described (DEN HARTOG, 1957a) from Portuguese East Africa. The remaining American species, all occurring in the Caribbean, will be treated in this paper. In order to facilitate the study of this interesting marine genus a key to all species has been prepared.

KEY TO THE SPECIES

1. Lateral shoots with 2 scales at the base.
 2. Lateral shoots with at the top at most 5 pairs of petioled leaves.
 3. Lateral shoots short, 1 cm or smaller, often not developed with 1 pair of leaves at the top; petioles not or unequal-sided sheathing sect. HALOPHILA
 4. Midrib joining the intramarginal nerves; cross-veins present.
 5. Scales to 8 mm; leaves ovate or elliptic; petiole not sheathing.
 6. Lateral shoots scarcely or not developed; glabrous, margin entire, dioecious.
 7. Leaves 1-4 cm, with 12-25 pairs of cross-veins ascending at an angle of 45-60°.
 1. **H. ovalis** (R.Br.) Hook. f.
 7. Leaves 0.7-1.4 cm, with 3-8 pairs of cross-veins, ascending at an angle of 70-90°.
 2. **H. minor** (Zoll.) Hartog
 6. Lateral shoots 0.5-10 mm; hairy, margin serrulate, monoecious . . . 3. **H. decipiens** Ostenf.
 5. Scales large, 12-17 mm, bright white, leaves linear; petioles unequal-sided sheathing.
 4. **H. stipulacea** (Forsk.) Aschers.

4. Midrib joining the marginal nerves in the top, cross-veins absent 5. **H. linearis** Hartog
3. Lateral shoots longer, 1–2 cm, with 6–10 leaves at the top; petioles with a broad sheath; midrib crossing the intramarginal nerve, reaching the margin; cross-veins absent. sect. MICROHALOPHILA Aschers 6. **H. beccarii** Aschers.
2. Lateral shoots with 10–20 pairs of sessile, distichous leaves. sect. ASCHERSONIA Hartog. 7. **H. spinulosa** (R.Br.) Aschers.
1. Lateral shoots with 2 basal scales and 2 others halfway up or higher, at the top 2 or 3 pairs of leaves, placed in a pseudo-whorl. sect. AMERICANAE (Ostenf.) Ostenf.
 8. Leaves distinctly petioled, obtuse, with 3–5 pairs of cross-veins; petioles 3–5 mm 8. **H. baillonis** Aschers.
 8. Leaves subsessile or very shortly petioled, acute, with 6–8 pairs of cross-veins 9. **H. engelmanni** Aschers.

SECT. HALOPHILA. — sect. *Barkania* (Ehrenb.) Aschers. Nuov. Giorn. Bot. Ital. **3**: 301. 1871; Hartog, Act. Bot. Neerl. **6**: 46. 1957; *Typicae* Ostenf. Bot. Tidsskr. **24**: 240. 1902; Pfl.-areale **1**³: 37. 1927. Lateral shoots short, 1 cm or smaller, often not developed, with only 1 pair of leaves at the top.

Halophila decipiens Ostenf. Bot. Tidsskr. **24**: 260 fig. 1902; Aschers. in Neumayer, Anl. Wiss. Beob. Reisen ed. 3, **2**: 395. 1906; Gagnep. Fl. Gén. I.-C. **6**, 1: 4. 1908; Ostenf. Pfl.-areale **1**³: 37, 38, map 23. 1927; Steenis, Trop. Natuur **22**: 46. 1933; Setchell, Am. Naturalist **69**: f. 3. 1935; Hartog, Fl. Mal. **5**: 410 f. 18. 1957. — *H. baillonis* (non Aschers. 1874) Aschers. in Neumayer, Anl. Wiss. Beob. Reisen ed. **1**: 367. 1875; d'Eggers, Smiths. Inst. Bull. Nat. Hist. **13**: 98. 1879 (*baillonii*); Holm, Bih. K. Svenska Vet.-Ak. Handl. **9**, 13: 1–18, pl. 1–3. 1885; Aschers. & Gürke in E. & P. Nat. Pfl. fam. **2**, 1: 249. 1889; Aschers. in Neumayer, Anl. Wiss. Beob. Reisen ed. 3, **2**: 395. 1906; Rydberg, N. Amer. Fl. **17**: 67. 1909; Bowman, Science **43**: 245. 1916; Pap. Michigan Ac. Sc. Arts & Lett. **2**: 5, pl. 2. 1922; Ostenf. Pfl.-areale **1**³: 37, 38 map 23. 1927; Setchell, Am. Naturalist **69**: f. 3. 1935.

After the character of the indument of the leaves and the spathal leaves two varieties can be distinguished. The var. *decipiens* has hairs on one side of the leaf only and glabrous spathal leaves. The var. *pubescens*, however, has the leaves hairy on both sides, and the spathal leaves with hairy outer side.

var. **pubescens** Hartog, Fl. Mal. **5**: 411. 1957.

Monoecious. Stems thin, easily breaking, with one root at the nodes, internodes 1–4½ cm. Scales transparent, scarious, obovate, doubled, keeled, 3–7 mm, outside hairy, apex incised, base amplexicaulous. Leaves oblong-elliptic, obtuse or rounded, cuneate at the base, green, at both sides faintly covered with short, rigid, unicellular hairs, margins very fine-serrulate, 10–23 by 3–6 mm, only 1 pair on a 1–10

mm long shoot; cross-nerves 6–9 pairs, ascending, joining the intramarginal nerve; midrib united at the top with the intramarginal nerves running at c. 5 mm distance from the margin; petiole 3–15 mm, triquetrous. Spathe ovate, acuminate, keeled, scarious, transparent, 3–4 mm, margin ciliate and keel with fine serrulate teeth, hairy outside, tearing at the top as the fruit is ripening, containing 1 ♂ and 1 ♀ flower, spathe leaf enclosing the female flower, embracing the other. Male flower: tepals oblong-elliptic to ovate, obtuse, convex, 1–1½ mm long, anthers c. 1 mm, pollen grains elliptic; pedicel 3 mm; after anthesis the complete flower with its pedicel caducous. Female flower subsessile, ovary ovate, 1 mm; beak 1–2 mm; styles 3, 2½ mm. Fruit broad-elliptic, 2½ by 1½ mm; pericarp scarious, transparent, beak 1½–2 mm. Seeds c. 30, ovate, 1/5 mm.

Distribution: West Indies (Porto Rico, Jamaica, Guadeloupe, Martinique, St Thomas, St Croix); Florida. Also with great disjunctions in the Indo-Pacific: Tahiti, Ceylon.

The closely related var. *decipiens* occurs very localized in a few stations, but widely distributed in the Indo-Pacific.

Ecology: On muddy bottoms and on coarse coral sand, from 1–50 m depth; in shallow water sometimes associated with *H. baillonis*, in deep water sometimes together with *H. engelmanni*. Fl. and fr. probably the whole year round.

Material studied:

CARIBBEAN: Martinique, L. Hahn 1271, Plante marine, mer de la Casi-Pilatz. Nov. 1849 (P); St Croix, Christiansted Lagoon, Ostenfeld 290, 9 Febr. 1914 (C); Porto Rico, Margarita Pass, near Parguera, dredged in 18–20 m of water between outer reefs, Howe 7219, 27 June 1915 (P); Island of Culebra Harbor, Howe, 3–12 March 1906 (K); Florida, 10 fms, 18–20 fms, without other data (BM).

INDO-PACIFIC: Tahiti, Papeete Harbour, Challenger Expedition, Moseley, Sept. 1875 (BM, K); at 18 m, 15 Oct. 1928 (C, L); Páea, 5 ft deep near head of deep channel, Crossland 7149, 26 Jan. 1929 (K); Ceylon, Chilam, in 6 fms, Nevill 1484, April 1881 (K).

Nomenclature: Difficulties around the name *H. baillonis* are exclusively due to Ascherson, whose imperfect description applies to 2 species. The name had been used for the first time by him in a letter to Prof. Oliver, about a *Halophila* species, collected by Moseley during the Challenger Expedition at St Croix. In this letter, published by Hooker f. in 1874, Ascherson stated that *H. baillonis* differs from *H. ovalis* by the serrulate leaves. Further he communicated the species had previously also been collected by Hahn in Martinique. I have seen the Challenger material which has been kept together with Ascherson's letter in the Kew Herbarium and I consider this material to represent the type specimen of *H. baillonis*. It has 2 scales halfway or higher on the lateral shoot, and at the top a pseudowhorl of 4 shortly petioled leaves.

The specimens collected by Hahn, in 1874 erroneously referred to *H. baillonis* by Ascherson, which I have examined, have also a very

fine serrulate leaf margin but they belong to *H. decipiens*. In his material the lateral shoots are very short, bear no scales and have at the top only 1 pair of rather long-petioled leaves. Fortunately Ascherson did not cite the Challenger St Croix material in his paper of 1875, and mentioned only localities where *H. decipiens* had been found. The very detailed descriptions of d'Eggers and of Holm also concern this

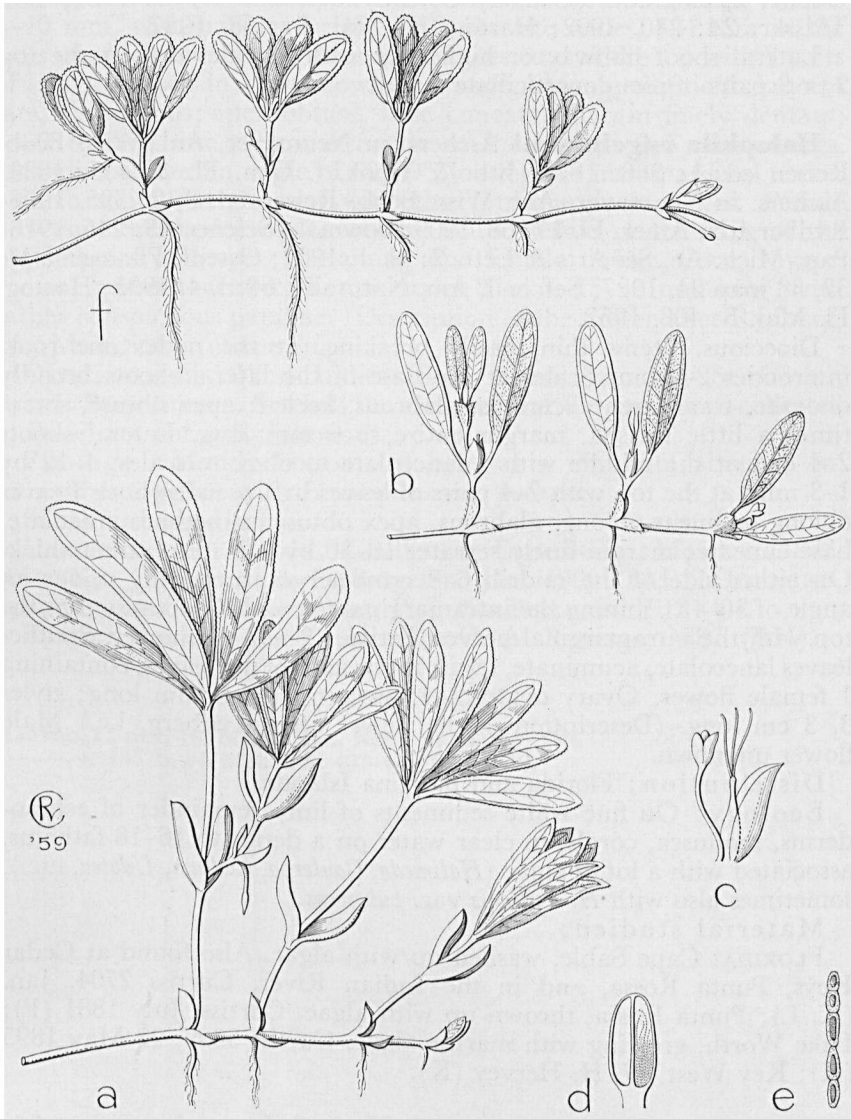


Fig. 1. a. *Halophila engelmanni* Aschers., habit, nat. size. b. *H. decipiens* Ostenf., habit, nat. size, c. flowers, d. lengthwise section of anther, e. part of pollen thread, enlarged. f. *H. baillonis* Aschers., habit, nat. size (a Curtiss 2704 in L, b-f after Ostenfeld, 1902).

species. Thanks to the excellent illustrations of Holm, all subsequent authors identified it wrongly as *H. baillonis*. Recently (DEN HARTOG 1957b) I merged both species (i.e. *H. baillonis* auct. and *H. decipiens*), because the differences are very slight and show no geographic separation.

SECT. AMERICANAE (Ostenf.) Ostenf. Pfl.-areale **1**³: 37. 1927; Bot. Tidsskr. **24**: 240. 1902; Hartog, Fl. Mal. **5**: 408. 1957.

Lateral shoot halfway or higher up with 2 scales and at the top 2 or 3 pairs of pseudoverticillate leaves.

Halophila engelmanni Aschers. in Neumayer, Anl. Wiss. Beob. Reisen ed. **1**: 368. 1875; Bth. & Hook. f. Gen. Pl. **3**: 455. 1883; Aschers. in Neumayer, Anl. Wiss. Beob. Reisen ed. **3**, **2**: 395. 1906; Rydberg, N. Amer. Fl. **17**: 68. 1909; Bowman, Science **43**: 245. 1916; Pap. Mich. Ac. Sc. Arts & Lett. **2**: pl. 1. 1922; Ostenf. Pfl.-areale **1**³: 37, 38 map 24. 1927; Setchell, Am. Naturalist **69**: f. 4. 1935; Hartog, Fl. Mal. **5**: 408. 1957.

Dioecious. Stems thin, easily breaking, at the nodes one root; internodes 2–4 cm. Scales at the base of the lateral shoots broadly obovate, transparent, scarious, glabrous, keeled; apex obtuse, sometimes a little incised, margin entire, 3–6 mm long. Lateral shoots 2–4 cm, at the middle with 2 lanceolate to obovate scales, 4–12 by 1–3 mm, at the top with 2–4 pairs of leaves in a pseudowhorl. Leaves oblong or linear-oblong, glabrous, apex obtuse, sometimes apiculate, base cuneate; margin finely serrate; 10–30 by 3–6 mm, rather thick. On either side of the midrib 6–8 cross-nerves, ascending under an angle of 30–45°, joining the intramarginal nerve. Midrib united at the top with the intramarginal nerves. Petiole: 2 mm or shorter. Spathe-leaves lanceolate, acuminate, sessile in the axils of the leaves, containing 1 female flower. Ovary ovate, 3–4 mm; rostrum 5 mm long; styles 3, 3 cm long. (Description of the flower after Rydberg, l.c.) Male flower unknown.

Distribution: Florida and Bahama Islands.

Ecology: On fine white sediments of limy remainder of echinoderms, mollusca, corals, in clear water on a depth to 16–18 fathoms, associated with a lot of algae (*Halimeda*, *Caulerpa*, *Codium*, *Udotea*, etc.), sometimes also with *H. baillonis* var. *pubescens*.

Material studied:

FLORIDA: Cape Sable, washed up with algae. Also found at Cedar Keys, Punta Rossa, and in the Indian River, Curtiss 2704, Jan. (K, L); Punta Rossa, thrown up with algae, Curtiss, July 1881 (P); Lake Worth, growing with marine algae, Curtiss 5399, 22 May 1895 (K); Key West, W. H. Hervey (K).

Halophila baillonis Aschers. ex Hook. f. Journ. Linn. Soc. **14**: 317. 1874; Bth. & Hook. f. Gen. Pl. **3**: 455. 1883; Hartog, Fl. Mal. **5**: 408. 1957. — *H. aschersonii* Ostenf. Bot. Tidsskr. **24**: 239, fig. 1902; Aschers. in Neumayer, Anl. Wiss. Beob. Reisen ed. **3**, **2**: 395. 1906;

Rydberg, N. Amer. Fl. **17**: 68. 1909; Ostenf. Pfl.-areale **13**: 37, 38 map 24. 1927; Setchell, Rev. Sudamer. Bot. **1**: 107. 1934; Am. Naturalist **69**: f. 4. 1935.

Dioecious. Stems thin, easily breaking, at the nodes one root; internodes 1–3 cm. Scales at the base of the lateral shoots lanceolate to obovate, transparent, scarious, pubescent, keeled, 1–2½ mm; apex obtuse, sometimes a little incised; margin entire. Lateral shoots 6–40 mm, with halfway or higher 2 obovate scales, 3–4 mm in the axils of which often arise secondary shoots, and at the top with 2 pairs of leaves, placed in a pseudowhorl. Leaves oblong, elliptic to lanceolate, hispidulous; apex obtuse, base cuneate; margin finely dentate; 5–20 by 2–8 mm. On either side of the midrib 3–5 cross-nerves, ascending under an angle of 60–80°, joining the intramarginal nerve. Midrib united at the top with the intramarginal nerves. Petiole 3–5 mm. Spathe-leaves lanceolate, acute, sessile in the axils of the upper pairs of leaves, containing one female flower. Ovary ovate, 2 mm; rostrum slender, 5 mm; styles 2 or 3, 15–30 mm long, with rather conspicuous papillae. (Description of the flower after Rydberg, l.c.) Male flower unknown.

Distribution: West Indies (Porto Rico, Jamaica, St Croix). Brasil: Pernambuco. Setchell l.c. assumes that the specimens collected in Brasil are not autochthonous.

Ecology: Muddy bottoms of bays at a depth of about 1 m, sometimes together with *H. decipiens* var. *pubescens*.

Material studied:

CARIBBEAN: St Croix, Challenger Expedition, Moseley, 1873, type (K); Christiansted, F. Børgesen, Jan. 1906 (BM); Curaçao, Spaanse water bij Brakke Punt, P. J. van Breemen, 1913 (U).

BRASIL: Pernambuco, on mud, G. A. Ramage, 1887 (BM).

REFERENCES

- HARTOG, C. DEN. 1957a. Act. Bot. Neerl. **6**: 46, fig.
———. 1957b. Fl. Mal. I, **5**: 407–413, fig. 16–19.