Acta Bot. Neerl. 21(5), October 1972, p. 512–516

THE SEA-GRASSES OF BRAZIL

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There is still hardly anything known about the occurrence of sea-grasses in South America. The number of records is extremely small. Therefore, one wonders whether these plants are extremely rare or absent along long stretches of coast, or whether it is just that they have been overlooked by botanists. It seems that the latter applies to the coast of Brazil, from where up to now only two collections had been recorded (SETCHELL 1934; DEN HARTOG 1970). Thanks to the active, gratefully acknowledged co-operation of Dr. Liliane Forneris (Universidade de São Paulo) I received a number of sea-grasses from several places along the Brazilian coast. I am also indebted to Dr. Emilia Santos (Museu Nacional, Rio de Janeiro) and Dr. Graziela M. Barroso (Jardim Botanico, Rio de Janeiro) for sending me a specimen and a photograph, respectively, of *Halophila decipiens*. Further, I am grateful to Dr. V. J. H. de Jilovice de Sternberg (Companhia 'Algimar', Rio de Janeiro) for his co-operation in obtaining material.

At present there are 5 species now known from Brazil.

KEY TO THE SEA-GRASSES OF BRAZIL

1. Leaves ligulate, linear, with 3 nerves. Tannin cells present.
   2. Leaf-tip bicuspidate; leaves $^1/_3$–1 mm wide — 1. *Halodule wrightii*
   2. Leaf-tip obtuse or emarginate, with very faintly developed lateral teeth, or without such teeth; leaves wider than 1 mm.
      3. Leaf-tip emarginate — 2. *Halodule emarginata*
      3. Leaf-tip obtuse — 3. *Halodule lilianeae*
1. Leaves without a ligula, arranged in pairs or in a pseudowhorl, differentiated into a short petiole and an elliptic or ovate leaf-blade, up to $2^1/_2$ cm long; veins 3, connected by ascending cross-veins. Tannin cells none.
   4. Lateral shoots extremely short, with 2 scales at the base, bearing 1 pair of leaves. — 4. *Halophila decipiens*
   4. Lateral shoots erect, with 2 scales at the base, 2 other scales about halfway up and a pseudowhorl of 4–8 leaves at the top. — 5. *Halophila baillonis*

POTAMOGETONACEAE

1. **Halodule wrightii** Aschers., Sitz.-Ber. Ges. Naturf. Fr. Berlin 1868 (1868) 19, 24; ibid. 1869 (1869) 4; den Hartog, Blumea 12 (1964) 304–308, f. 6–8 (map); Sea-grasses of the world (1970) 154–157. – *Diplanthera wrightii* (Aschers.) Aschers. in E. & P., Pfl-Fam. Nachtr. (1897) 37. – *fig. 1.*

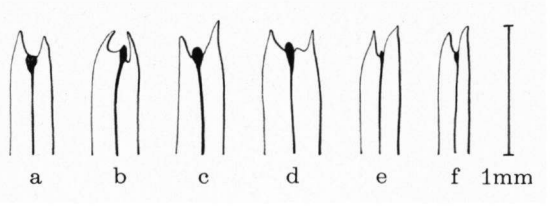

Fig. 1. Leaf-tips of *Halodule wrightii* Aschers. from the Brazilian coast. – a. Paracurú, Montouchet 4; b-d. Suape, Montouchet 2; e-f. Vitória, Sazima.

Halodule wrightii has a very peculiar area of distribution. Apart from the fact that it is the only tropical amphi-atlantic sea-grass, it is also the only sea-grass species which occurs on both the West and the East coast of Africa. It has been recorded also from Madagascar, Mauritius, the Persian Gulf and one place in Western Australia. In the Atlantic it is mainly distributed in the Caribbean area, but is absent from the Gulf of Mexico and the coast of the U.S.A. In spite of the fact that it is recorded here for the first time from the tropical coast of Brazil it is probably not uncommon there. Along the African West coast it occurs in Mauretania, Senegal, and Angola.

Localities in Brazil. Ceará: Paracuró, 15-9-1970, Montouchet 4 (L).

Pernambuco: Ponta de Pedra, September 1970, Montouchet 5 (L); Suape, 4-9-1970, Montouchet 2 (L).

Bahia: Mar Grande, one specimen in a collection of *Halodule lilianeae*, 18-8-1970, Montouchet 1A (L); Salvador da Bahia, west coast of Ilha Itaparica, 15-2-1972, E. Demetrio de Oliveira (L).

Espirito Santo: City of Vitória, Sacré-Coeur Beach, sandy shore, exposed at low tide, 8-2-1970, I. P. Sazima (L).

2. **Halodule emarginata** den Hartog, Blumea 18 (1970) 65–66, f. 1. – *fig. 2.*

This species, which had been described from Ilha São Sebastião in the state of São Paulo, has now been found in another locality in this state.

Distribution: Brazil. São Paulo: Saco da Ribeira Beach, Bay of Flamengo, north-east of Santos, common on mud of calm bays, always submerged,

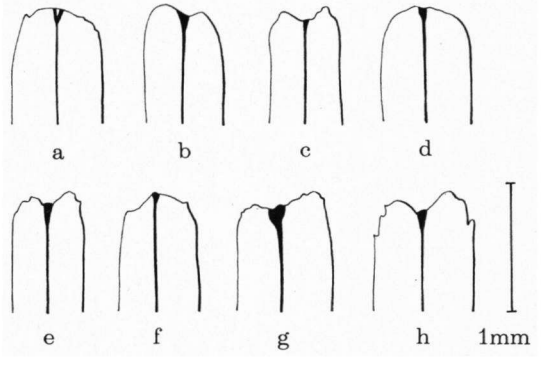

Fig. 2. Leaf-tips of *Halodule emarginata* den Hartog. (a.-f. Saco da Ribeira, Sazima; g. Siriuba, Soares Moreira; h. Praía de Araça, Petersen, type).

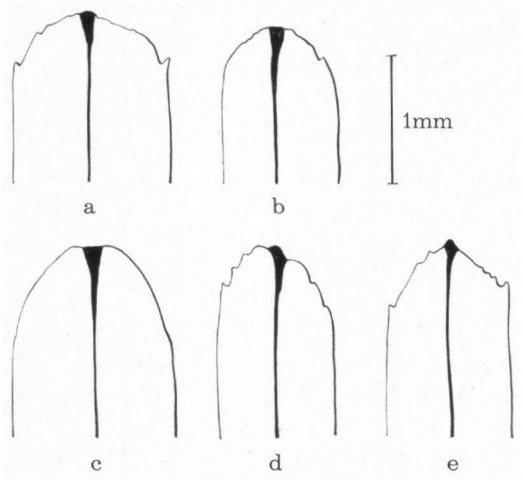

Fig. 3. Leaf-tips of *Halodule lilianeae* den Hartog (Mar Grande, Montouchet 1, type).

even at the lowest tides, 21-10-1968, I. P. Sazima (L). – Ilha de São Sebastião, Praía de Araça, 15-10-1969, J. A. Petersen (Type, L); Siriuba Beach, sublittoral fringe on sand, 27-3-1970, Mrs. M. G. Soares Moreira (L).

3. **Halodule lilianeae** *nov. sp. – fig. 3.*[1]

Rhizoma repens, 1–$1^1/_2$ mm diam., radicibus 2 simplicibus, cauli erecto ad nodos 3–6-foliifero. Radices usque ad 10 cm longae. Rhizomatis internodia 8–35 mm longa. Internodia caulis erecta brevissima, inter $^1/_2$ et 2 mm longa. Vaginae 20–28 mm longae, magis persistentes quam foliorum laminae, adultiores stramenticiae, cicatricibus orbicularibus radices 2 emittentibus. Foliorum laminae $2^1/_2$–7 cm longae, basi sine colore atque paulo angustatae, parte viridi ubique 1–$1^2/_3$ mm lata, ad apicem non angustata. Costa apice dilatata. Foliorum vertex obtusus, integer vel serrulatus dentibus paucis minutis irregularibus; dentibus lateralibus vix efformatis vel nullis. Cellulae tanniferae numerosae. Flores atque fructus ignoti.

Rhizome creeping, 1–$1^1/_2$ mm thick, with 2 unbranched roots and a short erect stem, bearing 3–6 leaves at each node. Roots up to 10 cm long. Internodes of rhizome 8–35 mm long. Internodes of erect stem very short, between $^1/_2$ and 2 mm. Leaf-sheath 20–28 mm long, persisting much longer than the leaf-blade, becoming strawy with age, when shed leaving a circular scar; 2 roots developing from each leaf-scar. Leaf-blade $2^1/_2$–7 cm long, at the base pale and slightly narrowed; green part of the blade uniformly 1–$1^2/_3$ mm wide, not narrowed near the apex. Midrib widened at the apex. Leaf-tip obtuse, entire of with a few, very small, irregular serrations; lateral teeth very faintly developed or absent. Tannin cells quite numerous. Flowers and fruits unknown.

[1] Dr. R. C. Bakhuizen van den Brink, Leiden, rendered the diagnosis of this species into Latin.

Distribution: Brazil. Bahia: Mar Grande, 18-8-1970, Montouchet 1 (L, type); Salvador da Bahia, west coast of Ilha Itaparica, a few fragments amongst a collection of *Halodule wrightii*, 15-2-1972, E. Demetrio de Oliveira (L).

Notes: The species is in many respects similar to *H. emarginata*, but differs from it as its leaf-tip is always obtuse and the leaf is uniformly wide and not narrowed in the apical part. This is quite obvious when one compares *fig. 2* and *fig. 3*. The leaf-tips of *H. emarginata* are much narrower than those of *H. lilianeae*, but the middle parts of the leaves show hardly any difference in width. The shape of the leaf-tip of *H. lilianeae* is practically identical with that of *H. pinifolia* (Miki) den Hartog from the western Pacific. The latter species, however, has narrower leaves $^3/_5$–$1^1/_5$ mm wide in the middle part) which taper apically.

Although there are some obvious differences between the material of *H. emarginata* and *H. lilianeae*, it is clear that these species are very closely related. I even think that in the future they may turn out to be only forms of one species. As *Halodule* is a tropical genus and all records of *H. emarginata* are from the subtropics, it is possible that the latter species represents underdeveloped populations of the tropical species existing at the limit of their ecological tolerance. It should also be mentioned that the tips of the young leaves of *H. emarginata* are rounded. It is also possible that *H. lilianeae* and *H. emarginata* are derivatives of the Caribbean *H. beaudettei* (den Hartog) den Hartog. Additional material from many localities along the coast of Brazil is needed to solve these problems. Morphogenetical studies on the development of the leaves and particularly of the leaf-tips and karyological studies may contribute to a better understanding of the taxonomy of *Halodule* in general.

HYDROCHARITACEAE

4. **Halophila decipiens** Ostenf., Bot. Tidsskr. 24 (1902) 260, with fig.; den Hartog, Fl. Males. I, 5 (1957) 410–411, f. 18; Acta Bot. Neerl. 8 (1959) 485–488, f. 1 b-e; Sea-grasses of the world (1970) 254–258. – *H. baillonis* auct. non Aschers., 1874: Aschers. in Neumayer, Anl. wiss. Beob. Reisen ed. 1 (1875) 367, pro parte (as '*H. baillonii*'); Holm, Bih. K. Svenska Vet.-Ak. Handl. 9, 13 (1885) 1–18, Pl. 1–3. – *H. decipiens* var. *pubescens* den Hartog, Fl. Males. I, 5 (1957) 411.

H. decipiens is a pantropical sea-grass, widely distributed in the Indian Ocean and in the Pacific, extending even into warm-temperate waters. In the Altantic it is mainly restricted to the Caribbean and the Gulf of Mexico. Further it has been found on the Bermuda Islands. Its occurrence in Brazil is recorded here for the first time.

Distribution in Brazil. Pernambuco: Ponta de Pedra, 30-8-1970, Montouchet 3 (L).

Guanabara: Rio de Janeiro, Niteroi, 'em agua salgada', 31-8-1931, Dr. Marques Lisboa (RB, 53163; R, 24597).

5. **Halophila baillonis** Aschers. ex Dickie in Hook.f. J. Linn. Soc. Bot. 14 (1874) 317; in Neumayer, Anl. wiss. Beob. Reisen, ed. 1 (1875) 367, pro parte (as '*H. baillonii*'); den Hartog, Acta Bot. Neerl. 8 (1959) 488, f. 1f; Seagrasses of the world (1970) 267–268. – *H. aschersonii* Ostenf., Bot. Tidsskr. 24 (1902) 239, with fig.; Setchell, Rev. Sudamer. Bot. 1 (1934) 107.

This species is widely distributed in the southern part of the Caribbean and also occurs along the Pacific coast of Panama. The only Brazilian record of it has been published by SETCHELL, l.c.

Distribution in Brazil. Pernambuco: Growing on the sea-bottom in the strait between Ilha Itamaraca and the mainland, 1-2-1888, G. A. Ramage (BM).

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SETCHELL, W. A. (1934): South American sea-grasses. Rev. Sudamer. Bot. **1**: 107–110.

POSTSCRIPTUM (Added in the proof)

Very recently I came across a paper by Françoise Laborel-Deguen: Nota preliminar sobre a ecologia das pradarias de fanerógamas marinhas nas costas dos estados de Pernambuco e da Paraíba – Trab. Inst. Oceanogr. Recife 3, 1963, pp. 39–51, in which a description of the ecology of *Halodule wrightii* (sub nomine *Diplanthera* sp.) and *Halophila decipiens* in the north-eastern part of Brazil is given. Unfortunately it was too late to incorporate these data in my paper.