

SOME NOTES ON CHAROPHYTA COLLECTED IN THE
NETHERLANDS WEST INDIES, NORTH VENEZUELA
AND COLOMBIA

by

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As far as I know, only three papers are dealing with Charophyta of the Netherlands West Indies. In 1858, in "Monatsbericht der königlichen Akademie der Wissenschaften, Berlin", BRAUN records two species from Paramaribo, viz. *Nitella microcarpa* A. BR. and *Chara hydropitys* REICHENB. ap. MOESSL. These species are also enumerated in the "Fragmente einer Monographie der Characeen" (BRAUN & NORDSTEDT, 1882), in which another species is recorded from Curaçao, viz. *Chara gymnopus* A. BR. f. *curassavica* A. BR., now to be named *Chara zeylanica* WILLD. f. *curassavica* (A. BR.) H. et J. GROVES. The third paper is that of H. and J. GROVES in URBAN's *Symbolae Antillanae* (1911), in which the last-named species is once more recorded.

In 1930 Mr P. WAGENAAR HUMMELINCK made an excursion to Curaçao, Aruba and Bonaire with the main object of studying the land and freshwater fauna. In 1936 and 1937 he again visited these islands and, moreover, a.o. the island of Margarita off the Venezuelan coast, the Venezuelan peninsula Paraguaná and the Colombian peninsula La Goajira (WAGENAAR HUMMELINCK, 1940). In the various inland-waters also Algae and Phanerogams have been collected. The aquatic Phanerogams were described by VAN OOSTSTROOM (1939); the Charophyta will be the subject of the present paper.

As a result of these trips only two species of *Chara* were collected, one of which, viz. *C. fibrosa*, was new for the area under discussion. No representative of the other Charophyta genera was detected. Though several species are recorded from the north coast of South America (cf. BRAUN, 1858; BRAUN & NORDSTEDT, 1882), so little is known of the Charophyta of the Netherlands West Indian islands that it is worth publishing these few notes. Moreover, a number of

ecological data were gathered, which are enumerated at the same time.

The specimens are preserved in formalin with the exception of an unnumbered specimen from Curaçao and are now added to the collections of the Rijksherbarium at Leiden.

No attempt has been made to give an extensive description of the species and various forms; these are to be found in the literature cited at the head of the species and forms. For an extensive list of synonyms, cf. ZANEVELD (1940).

Chara fibrosa AG. ex BRUZ. ssp.? **flaccida** (A. BR.) ZANEV in Blumea IV, 1940, p. 162. — *C. flaccida* A. BRAUN in HOOKER'S Journ. Bot. I, 1849, p. 296. •

Suriname, trench behind the Cultuurtuin (Experimental Garden), Paramaribo, 2 V 1936, WAGENAAR HUMMELINCK 119 — in stagnant, probably permanent water with clayish-mud and shells, crowded with algae; 28—34° C, 30 mg Cl/l, 127 mg HCO₃/l, hardness 11.6 German degrees.

As I already pointed out (ZANEVELD, 1940, p. 165), *Chara Curtissii* T. F. ALLEN in C. B. ROBINSON (1906, p. 272) most probably has to be regarded as a synonym. In that case the subspecies was already known from Florida, otherwise the new locality forms an important extension of the known area. Ssp. *flaccida* can only be distinguished from ssp. *gymnopitys* by the colour of the ripe oospore; these are golden-brown in ssp. *flaccida*, whereas they are purple-black in ssp. *gymnopitys*. As our plants are immature, the ssp. cannot be determined with certainty.

The ssp. has been recorded from N. Africa, S. E. Asia and Japan.

Chara zeylanica WILLDENOW in Mém. Ac. Roy. Berlin p. 1803, p. 86, 1805 — *C. polyphylla* A. BRAUN in HOOKER'S Journ. Bot. I, 1849, p. 299 — *C. gymnopus* A. BRAUN var. *ceylonica* A. BRAUN in Abh. Kön. Ak. Wiss. Berlin, 1882, p. 197.

This is the most common species in the West Indies. According to its great variability a number of forms have been distinguished, which were described either as forms, cf. BRAUN & NORDSTEDT (1882), or as species, cf. ROBINSON (1906). As most plants, which came under the eyes of the writer, are more or less intermediate, I agree with BRAUN & NORDSTEDT and H. & J. GROVES (1911) in regarding all these specimens as forms of one large, polymorphous species. Therefore no attempt has been made to describe these forms; a description is to be found in the papers of these last-mentioned authors.

Another question referred to already in Blumea IV, 1940, p. 206,

is provided by the name. WILLDENOW's name *zeylanica* (1805) has come into use after a paper of H. & J. GROVES (1898), in which it was pointed out that this name has priority. However, in the paper of WILLDENOW *Chara zeylanica* (No. 4) is preceded by a species named *Chara foliolosa* (No. 3), which, in BRAUN's opinion (1858, p. 361), is identic with one of the forms of *C. zeylanica*. If this will prove to be the case, then the name *foliolosa* has place priority over that of *zeylanica*. As I did not see the type, I have to refrain from a decision just now.

1. f. *elegans* (T. F. ALLEN) H. et J. GROVES in Symb. Antill. VII, 1911, p. 41.

Aruba, Tanki di Goudmijn Tibusji, 9 XII 1936, WAGENAAR HUMMELINCK 99 — in stagnant water of a pool, which is dry for several months; 27—33° C, pH 8.5—9.0, 170 mg Cl/l, 354 mg HCO₃/l, hardness 5.8 (immature).

Klein Bonaire, Tanki Calbas, 15 XI 1936, WAGENAAR HUMMELINCK 63 — in stagnant, probably permanent water of a pool in coral limestone; 28—32° C, pH 8.4—8.6, 119 mg Cl/l, 102 mg HCO₃/l, hardness 4.9 (plant large, but slender, oogonia hardly developed).

Curaçao, Tanki Koenockoe Hatoen, Hato, 15 X 1936, WAGENAAR HUMMELINCK 70 — in stagnant water of a little pool, which is rarely dry; together with *Najas guadalupensis* (SPRENG.) MORONG (cf. VAN OOSTSTROOM, 1939, p. 707); 28—34° C, pH 8.4—8.6, 689 mg Cl/l, 404 mg HCO₃/l, hardness 27.1 (immature; identification not certain). Ibid., Tanki Mamaja, Hato, 11 X 1936, WAGENAAR HUMMELINCK 75a — in stagnant, permanent water of a pool on coral limestone and shale-detritus; together with *Najas guadalupensis*, *Echinodorus* and grasses; 27—30° C, pH 8.4—8.6, 371 mg Cl/l, 225 mg HCO₃/l, hardness 21.1. Ibid., Hato, 1936, WAGENAAR HUMMELINCK s.n. — without further comment, a dried specimen. Ibid., Hato, 1909—'10, BOLDINGH 5348a — together with *Najas guadalupensis*.

Plants characterized by 10—14 branchlets, containing 7—10 articulations, of which the last 1—4 are ecorticate. All bract-cells of about the same length. Gametangia produced at the lowest three branchlet-nodes.

This form is known from the island of Barbados and from Florida.

2. f. *trichacantha* (A. BRAUN) H. et J. GROVES in Symb. Antill. VII, 1911, p. 41.

Klein Bonaire, Tanki Calbas, 27 XI 1930, WAGENAAR HUMMELINCK 63c — in stagnant water of a pool on limestone; 800—1200 mg Cl/l, 102 mg HCO₃/l, hardness 4.9 (the number of articulations is most frequently 10; the spine-cells are longer than the diam. of the stem).

Venezuela, Paraguaná, Estanque de Santa Fé, NE of Moruy, 18 II 1937, WAGENAAR HUMMELINCK 109 — in stagnant water of a little pond on limestone and marl; together with *Najas guadalupensis*, *Ruppia*, *Echinodorus* and some algae; 28—32° C, pH 8.7—8.9, 121 mg Cl/l, 256 mg HCO₃/l, hardness 4.3 (the posterior bract-cells are not ventricose and inflexed).

These plants have 11—13 branchlets, containing 9—14 articulations, of which the lowest and ultimate are ecorticate. Anterior bract-cells up to as long as the ripe oogonium, posterior ones usually half as long as the oogonium. Gametangia produced at the 1st to 3rd branchlet-nodes.

The form was known from the island of Key West and from Western Texas, Mexican Boundary and South Carolina.

3. *f. inconstans* (KUETZING) H. et J. GROVES in *Symb. Antill.* VII, 1911, p. 41 — *Chara Oerstediana* A. BR. et *C. Cruegeriana* A. BRAUN in *Monatsber. Kön. Ak. Wiss. Berlin*, 1858, pp. 367, 368.

Curaçao, Tanki di Hofje Savonet, 29 X 1936, WAGENAAR HUMMELINCK 89 — in stagnant water of a well, together with some algae; 28—34° C, 3199 mg Cl/l, 784 mg HCO₃/l, hardness 163 (the lowest articulation frequently as long as wide, however, sometimes much longer).

Plants with 10—12 branchlets, consisting of 7—10 articulations, of which the lowest and ultimate 1—3 are ecorticate. I did not find entirely ecorticate branchlets. Anterior pair of bract-cells as long as the oogonium, lateral and posterior ones half as long. Gametangia produced at the lowest 1—3 branchlet-nodes.

Already recorded from the island of Trinidad and from Nicaragua.

4. *f. guatemalensis* (NORDST.) ZANEV., nov. comb. — *Chara gymnopus* A. BRAUN ssp. *guatemalensis* NORDSTEDT in *Hedwigia* 27, 1888, p. 193; T. F. ALLEN, *Charac. Americ.* 1, 1888, p. 64 — *Chara guatemalensis* (NORDST.) C. B. ROBINSON in *Bull. New York Bot. Gard.* 4, 1906, p. 286.

Curaçao, Bron Wadongo, Hato, 6 X 1936, WAGENAAR HUMMELINCK 76A — in streaming water (c. 500 l/hour) of a spring in coral limestone, together with *Najas guadalupensis*; 28° C, pH 7.1—7.3, 230 mg Cl/l, ± 300 mg HCO₃/l, hardness ± 18 (the gametangia developed at the lowest 1—3 branchlet-nodes; plant heavily incrustated).

The number of branchlets is usually 10, consisting of 6—8 articulations, being always ecorticate. Anterior bract-cells somewhat longer than the oogonia, lateral and posterior ones up to half as long as the oogonium. The plants differ from the type description in having gametangia at the lowest node. The form is not mentioned by H. & J. GROVES (1911).

Hitherto known from Guatemala and Honduras.

5. *f. Michauxii* (A. BRAUN) H. et J. GROVES in *Symb. Antill.* VII, 1911, p. 42.

Margarita, Estanque Lato, W of Boca del Rio, Macanao, 20 V 1936, WAGENAAR HUMMELINCK 13 — in stagnant water of a pond, together with

Najas guadalupensis and few algae; 30—33° C, pH 6.8—7.1, 71 mg Cl/l, 148 mg HCO₃/l, hardness 2.9.

Venezuela, Paraguaná, Estanque de Moruy, 18 II 1937, WAGENAAR HUMMELINCK 108 — in stagnant, permanent water of a pond in limestone and hornblende-rock, together with few algae and *Najas guadalupensis*; 28—31° C, pH 8.7—8.9, 50 mg Cl/l, 205 mg HCO₃/l, hardness 6.1 (ripe antheridia only).

Plants with 10—14 branchlets, containing 9—12 articulations, of which the lowest and the ultimate ones are ecorticate. Anterior bract-cells $\frac{1}{4}$ the length of the ripe oogonia, posterior and lateral ones papilliform. Gametangia not produced at the lowest node.

This form has been recorded from U.S.A., Caracas (S. America) and the islands of Key West, Cuba, Jamaica, Haiti and St. Domingo.

6. f. *Humboldtiana* (A. BRAUN) ZANEV., nov. comb. — *Chara polyphylla* A. BR. ssp. *Humboldtiana* A. BRAUN in ENGELMANN & GRAY in Boston Journ. Nat. Hist. V, 1845, p. 264 — *Chara polyphylla* A. BR. var. *Humboldtii* KUETZING, Spec. Alg., 1849, p. 522; BRAUN in Monatsber. Kön. Ak. Wiss. Berlin, 1858, p. 360 — *Chara gymnopus* A. BR. var. *Humboldtii* A. BRAUN in Abh. Kön. Ak. Wiss. Berlin, 1882, p. 196; NORDSTEDT in Hedwigia 27, 1888, p. 192; T. F. ALLEN, Charac. America 1, 1888, p. 64 (nomen) — *Chara zeylanica* WILLD. f. *Humboldtii* (KUETZ.) H. et J. GROVES in Symb. Antill. VII, 1911, p. 42.

Margaritha, Laguna Honda, SE of Juan Griego, 16 V 1936, WAGENAAR HUMMELINCK 18 — in stagnant, permanent water of a pool, together with some algae; 26° C, pH 6.4—6.7, 149 mg Cl/l, 160 mg HCO₃/l, hardness 4.7 (the spine-cells are shorter than the diam. of the stem; the number of articulations is usually 9).

Plants with 9—12 branchlets, containing 8—11 articulations, of which the lowest and ultimate 1—2 are ecorticate. Anterior bract-cells as long as the oogonium, lateral and posterior ones up to half as long as the oogonium. Gametangia produced at the 2nd to 4th branchlet-nodes.

This form has been recorded from the Bahama Islands, Cuba, Haiti, Portorico, St. Croix, from U.S.A. and from Venezuela.

BRAUN first (1845) published this form under the name "*Humboldtiana*". KUETZING, however, in 1849, used the name "*Humboldtii*", which name was afterwards used by the other authors and by BRAUN himself. It follows from this that the name "*Humboldtiana*" has priority.

7. f. *curassavica* (A. BRAUN) H. et J. GROVES in Symb. Antill. VII, 1911, p. 42.

NE Colombian Continent, La Goajira, Laguna del Pájaro, S of El Pájaro, 21 I 1937, WAGENAAR HUMMELINCK 114 — in stagnant, permanent water of a pond, together with *Najas Wrightiana* (cf. VAN OOSTSTROOM, 1939, p. 707); 26—32° C, 818 mg Cl/l, 448 mg HCO₃/l, hardness 18.9 (the spine-cells are extraordinarily long, viz. 3—4 times as long as the diam. of the stem; immature).

Plants with 9—12 branchlets, consisting of 7—11 articulations, of which the lowest and ultimate ones are ecorticate. Gametangia at the 3 lowest branchlet-nodes.

This form was detected in the island of Curaçao by SEEMANN in 1864. It has not yet been found elsewhere.

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