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Studies on the marine algal flora of Venezuela. VI. *Cryptonemia delicatula* subsp. *venezuelensis* subsp. nov. (Rhodophyta, Cryptonemiales)

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A new subspecies of *Cryptonemia delicatula* Joly *et* Cordeiro subsp. *venezuelensis* Ganesan (Rhodophyta, Cryptonemiales) is described and figured from eastern Venezuela (southeastern Caribbean Sea).

Introduction

Cryptonemia is comprised of foliose marine red algae that usually occur in the sublittoral region. The genus is distinguished from other foliose members of the Cryptonemiaceae by 'a thickening of the thallus at the junction of the expanded blade and the stipe-like portion below this, by a relatively thin cortex and a medulla of predominantly periclinally flattened filaments, interspersed with some highly refractive cells of the medullary filaments' (Abbott, 1967). Geographically, *Cryptonemia* is widely distributed both in tropical and temperate regions and at present is credited with more than twenty-five species (Chiang, 1970). In the tropical and subtropical western Atlantic only four species have been recorded, viz. *C. crenulata* J. Ag., *C. bengryi* Taylor, and *C. luxurians* (Mertens) J. Ag. from the Caribbean Sea (see Taylor, 1960) and *C. delicatula* Joly *et* Cordeiro (Joly *et al.*, 1965) from southern Brazil. Among the deep water algal collections trawled near the Institute of Oceanography, Universidad de Oriente, Cumaná, Venezuela, a species of *Cryptonemia* resembling *C. delicatula* in many respects was collected on a number of occasions; this material is described here as a new subspecies of *C. delicatula.*

Cryptonemia delicatula Joly et Cordeiro subsp. *venezuelensis* subsp. nov.

Plants epizoic, growing on small gastropod shells (Figs 1, 2 and 3) at a depth of 10–15 m; thallus composed of one to several erect fronds arising from a crustose base (Figs 10 and 12); fronds 10–30 mm high, generally with a terete, filiform stalk (1–6 mm long), which gradually expands above into a membranous blade; blades generally simple, rarely bi- or trilobed, 3–7 mm broad, margin smooth, blades of 2nd, 3rd and 4th order frequently arising from torn-off margins (Figs 4 and 10).

Blades 40–60 μm thick at the base, 20–30 μm in the apex; medulla thin with slender filaments and stellate cells (Figs 8 and 11), some medullary filaments and some arms of the stellate cells staining deeply with aniline blue (Fig. 15), probably containing refractive material; cortex thin, one to two layered with squarish to rounded cells.

Tetrasporangia spherical to oval in surface view (Fig. 7); in section (Fig. 14) 17–23 μm long and 12–16 μm in diameter, cruciately to irregularly divided; auxiliary cells in special ampullary clusters (Figs 9, 13 and 16); carpogonial branch not observed; cystocarps 170–240 μm in diameter in surface view; male thalli not observed.

Diagnosis: Cryptonemia delicatula subsp. *venezuelensis* subsp. nov.

Fronds 12–30 mm high, with a terete filiform stalk, 1–6 mm long; blades 3–7 mm broad; medulla with stellate cells, the arms of some of which stain deeply with aniline blue; in other respects resembling typical *C. delicatula.*

Frondes 12–30 mm alt., stipite tereti filiformique, 1–6 mm long., laminae 3–7 mm lat., medulla cellulas stellatas habens; plantae crassitudine thalli necnon

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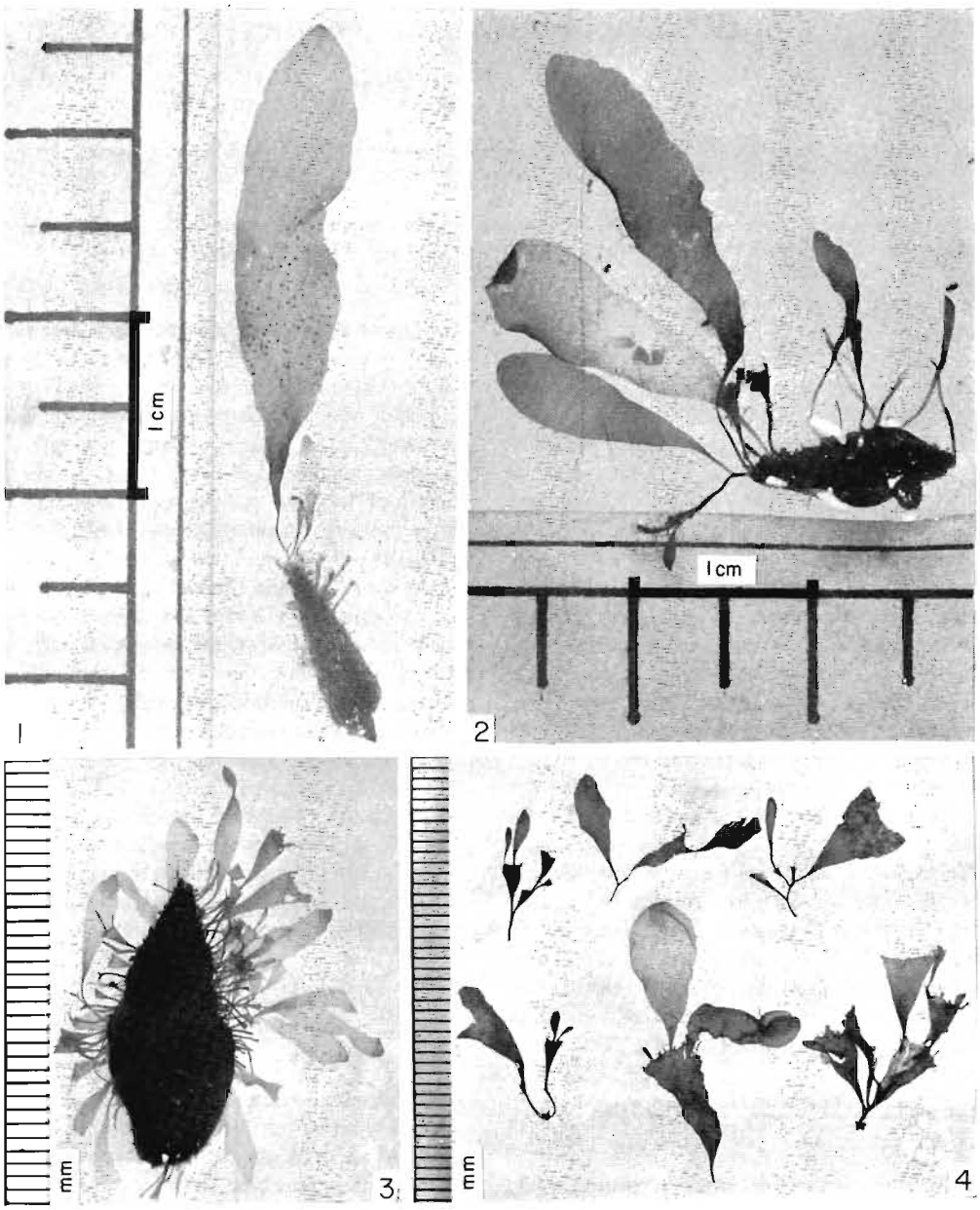
tetrasporangiis necnon cystocarpis *C. delicatulae* typicae similes.

Type locality: Peñoncito, Cumaná, Sucre State, Venezuela, at 7–10 m depth. Holotype: Peñoncito, Cumaná, 17.vi.1970, *E.K.G.* 777 deposited in the Herbarium, Instituto Oceanográfico, Universidad de Oriente, Cumaná, Venezuela. Additional collections: Playa Manzanillo, 7–10 m deep, 17.vi.1970, *E.K.G.* 775; Patiño, 9–14 m deep, 9.xi.1971, *E.K.G.* 791; Puerto Escondido, 10–14 m deep,

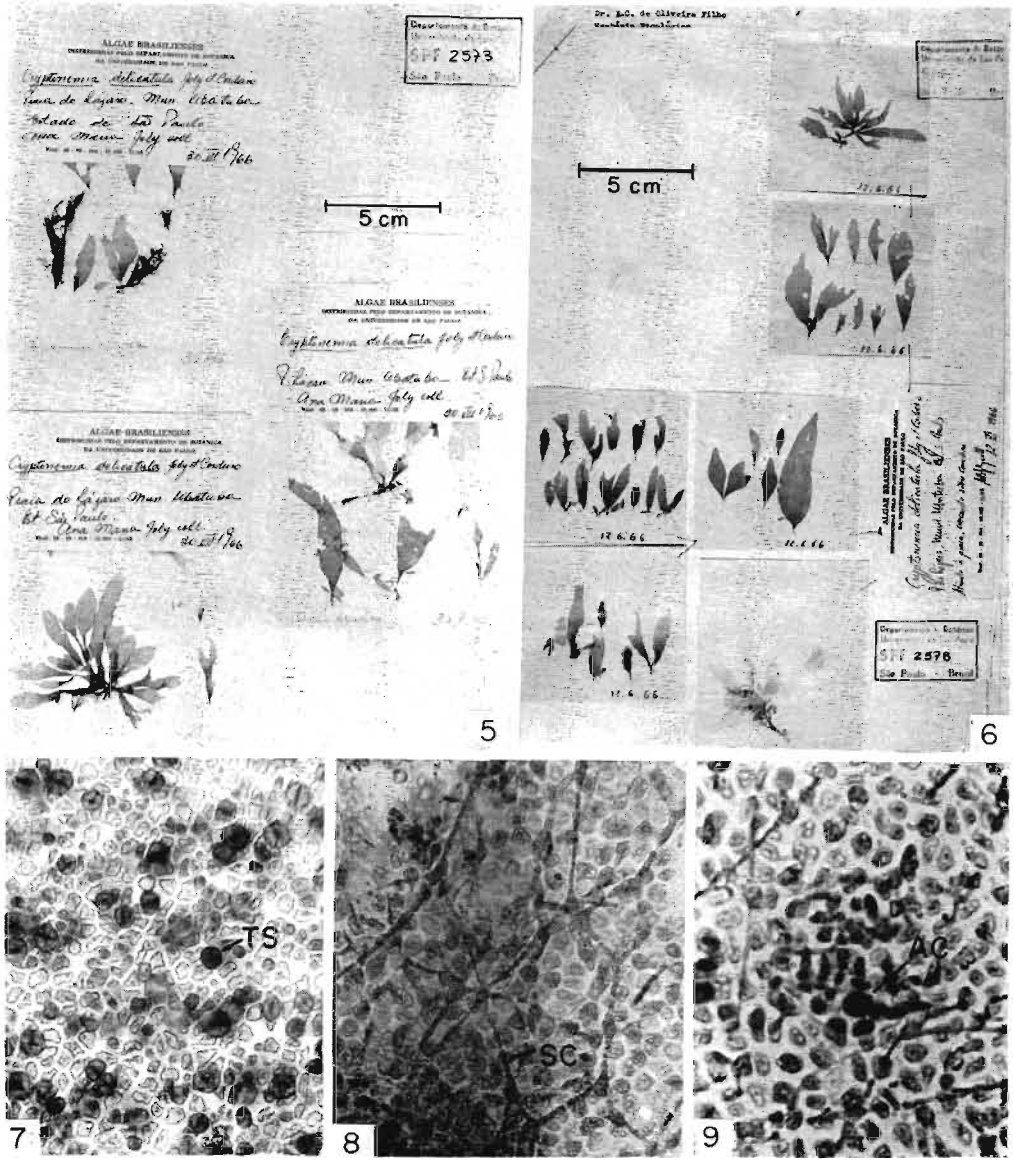


FIGS 1–4. *Cryptonemia delicatula* subsp. *venezuelensis* subsp. nov.
FIG. 1. Habit of a carposporangial plant.
FIG. 2. Habit of a group of tetrasporangial plants.
FIG. 3. Habit of sterile plants, many with only filiform stalks.
FIG. 4. Plants showing branched stalks and formation of secondary and tertiary fronds from the torn margins.

9.xi.1971, *E.K.G.* 793 and Peñoncito, 10–15 m deep, 13.vi.1973, *E.K.G.* 802.

Discussion

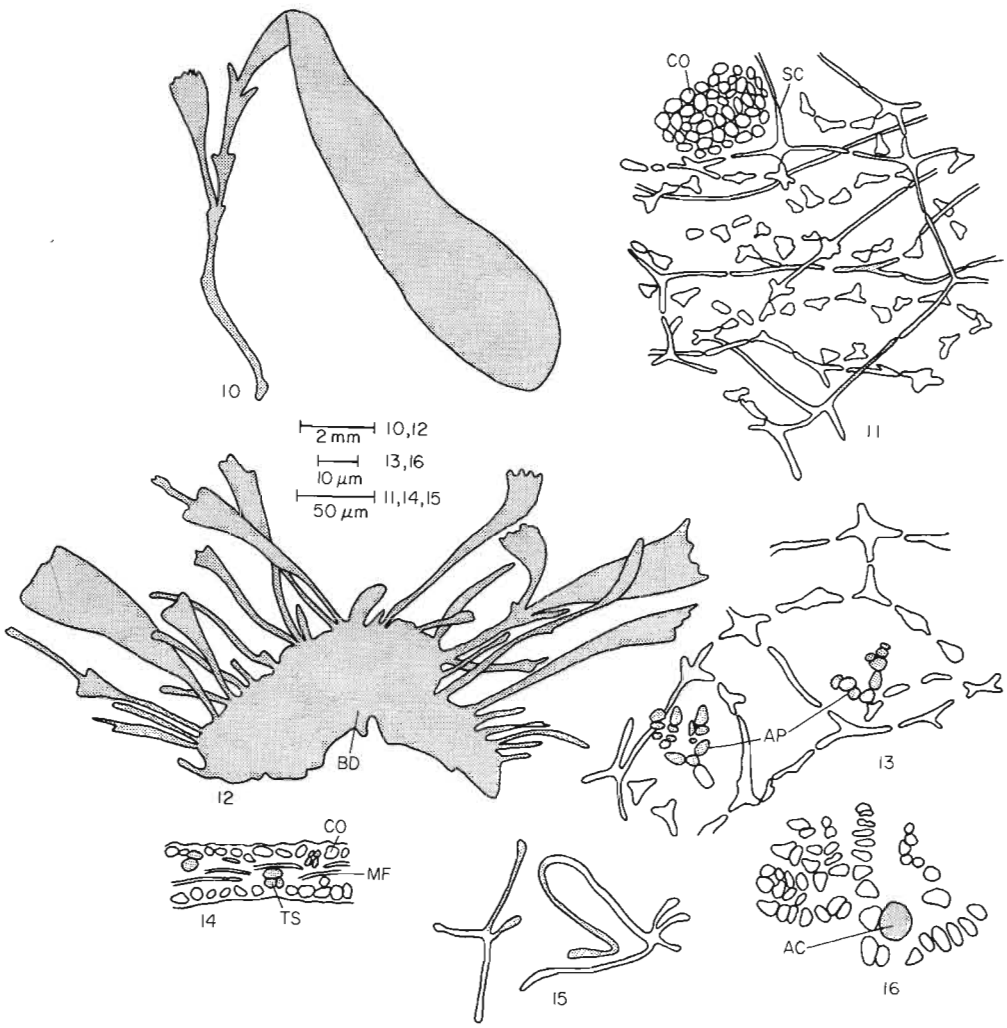
In general appearance of the fronds, thickness of thalli, and size of tetrasporangia and cystocarps, the material described above is undoubtedly closely related to *Cryptonemia delicatula*, known from Brazil (Joly & Cordeiro in Joly *et al.*, 1965). Also, there is a close correspondence in geographical distribution, as it is well known that many Caribbean taxa extend to southern Brazil and *vice versa* (Taylor, 1955, 1960; Joly, 1965). Hence, the Venezuelan plants are



FIGS 5 and 6. Herbarium specimens of *Cryptonemia delicatula* from Brazil (SPF, 2573; SPF, 2578) collected at the type locality.
FIG. 7. Surface view of part of a tetrasporangial frond of *C. delicatula* subsp. *venezuelensis*, showing tetrasporangia (TS). ×248.
FIG. 8. Squash preparation of the Venezuelan plant showing stellate cells (SC). ×248.
FIG. 9. An auxiliary cell ampulla with a central auxiliary cell (AC) in *C. delicatula* subsp. *venezuelensis*. ×256.

included under *C. delicatula*. However, in the author's opinion, the following differences justify treatment of the Venezuelan population of *C. delicatula* as a new subspecies.

The Brazilian plants are up to 9 cm high when proliferous and up to 6 cm high when growing isolated and well developed with a maximum width of 12 mm (Joly & Cordeiro in Joly *et al.*, 1965, p. 163). The Venezuelan material is only up to 3 cm high and 7 mm broad, i.e. half the size of typical *C. delicatula*. I have also been able to examine through the kindness of Drs A. B. Joly and Oliveira Filho two herbarium sheets (SPF 2573, Ana Maria Joly, 30.vii.1966; SPF 2578, A. B. Joly, 12.vi.1966), containing several plants of *C. delicatula* collected from the type locality (Figs 5 and 6). Fully grown plants of *C. delicatula* evidently are much more robust (Fig. 5, lower left) than the diminutive



FIGS 10–16. *Cryptonemia delicatula* subsp. *venezuelensis* subsp. nov.
FIG. 10. Habit of a sterile plant showing proliferation of frond from broken apex of parent blade.
FIG. 11. Squash preparation showing cortex (CO) and medulla with stellate cells (SC).
FIG. 12. Large basal disc (BD) with numerous erect fronds.
FIG. 13. Two young auxiliary cell ampullae (AP).
FIG. 14. Longisection of tetrasporangial frond, showing cortex (CO), medullary filaments (MF) and tetrasporangia (TS).
FIG. 15. Two stellate cells of medulla with dense contents (stippled) in some of the arms.
FIG. 16. Mature auxiliary cell ampulla showing the auxiliary cell (AC).

Venezuelan plant. The possibility of the Venezuelan specimens being an ecophene of *C. delicatula* should also be considered, in as much as the genus *Cryptonemia* is morphologically variable and taxonomically complex (Abbott, personal communication). *C. delicatula* is known only from the type locality. According to Dr Oliveira Filho (personal communication) 'the Brazilian plants have a very restricted distribution. As a matter of fact, it has been collected for many years (abundantly) at only one beach and probably is endemic to the north of São Paulo state.' The Venezuelan material also appears to have a very restricted distribution in Venezuela, since it has been obtained so far only at the type locality and nearby areas. The reason for this restricted occurrence is not known. In the absence of information on the range of thallus variation in different environmental or geographical regions of *C. delicatula*, I am inclined to consider the Venezuelan plants distinct from the Brazilian population.

In *Cryptonemia delicatula*, according to Joly & Cordeiro (in Joly *et al.*, 1965), there is no indication of the so-called 'ganglionar' cells common in other species of the genus. Stellate ganglionar cells with dense contents in some of the arms (Figs 8 and 15) were commonly observed in the Venezuelan material.

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