

First Report of *Chamaeobotrys proliferus* (Rhodymeniaceae, Rhodophyta) from the Philippines

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We report the first record of *Chamaeobotrys proliferus* from the Indo-Pacific waters in the Philippines. The rarely collected alga is previously known only from its type locality in Puerto Rico. This species is morphologically characterized in part by its proliferous vesicular branches. We also report, for the first time, its growth rate.

Keywords: *Chamaeobotrys*, distributional record, morphology, seaweed, Tawi-Tawi

In November 2019, we encountered an unidentified alga growing on a polyvinyl chloride settling plate. This plate was placed in a tank with flow-through seawater at a land-based, outdoor abalone cultivation facility located at the College of Fisheries (COF), Mindanao State University Tawi-Tawi College of Technology and Oceanography (MSU-TCTO) (5°02'14.0" N 119°44'34.6" E). During the conduct of this study, the seawater temperature in the facility ranged from 26–30 °C and a salinity of 33–35 ppt.

At first, the alga was diminutive, deep red in color, oval-shaped, and possessed a stout holdfast (Figure 1A). One week later, numerous individuals were observed on other plates. We, thus, had the opportunity to observe the alga's growth development (Figure 1B) over a six-month period. Intuitively, colonization of the plates was by spores. The seawater was sourced from Bongao Channel, Tawi-Tawi, Philippines. Hoping to find this alga *in situ*, we surveyed around Bongao Channel several times, including its neighboring waters. Unfortunately, our attempt to recollect it in a natural environment was unsuccessful.

On the basis of morpho-anatomical examination, we identified the alga as *Chamaeobotrys proliferus* D.L.

Ballantine, H. Ruiz & C. Lozada-Troche. The description of the Philippine specimens is provided below.

Description. Thalli were deep red, repent, and spreading to 8.0 cm across, anchored by a single peg-like holdfast (Figure 2A). Branches were compressed and peltate (Figure 2B). Anastomosing on branch margins were small ovate compressed branchlets. These branchlets (vesicles) coalesced resulting in habit disorganization, particularly in the mid-section of the thallus. Medullary cells measured 40–120 µm in diameter and composed of abutting larger rectangular and smaller triangular cells (Figure 2C). The medullary cavities were mucilage-filled. The cortical layer was two-celled thick and made up of pigmented cells, 15–25 µm in diameter (Figure 2C). Gland cells were spherical, up to 25 µm (Figure 2D) and projected into the inner cavity. Gametophytes were monoecious. Cystocarps, up to 700 µm in diameter wide, were dark red and hemispherical, which equally protruded into the thallus cavity and from the surface (Figure 2E). Spherical spermatangia measured 1–2.5 µm in diameter and were located in the cortex (Figure 2F). Tetrasporophytes were not observed.

Voucher specimens examined. MSUH1232 (field no. RD1837), 29 Apr 2020, coll. R. V. Dumilag and R. F. J. Robles, attached on plates at tanks in MSU Hatchery;

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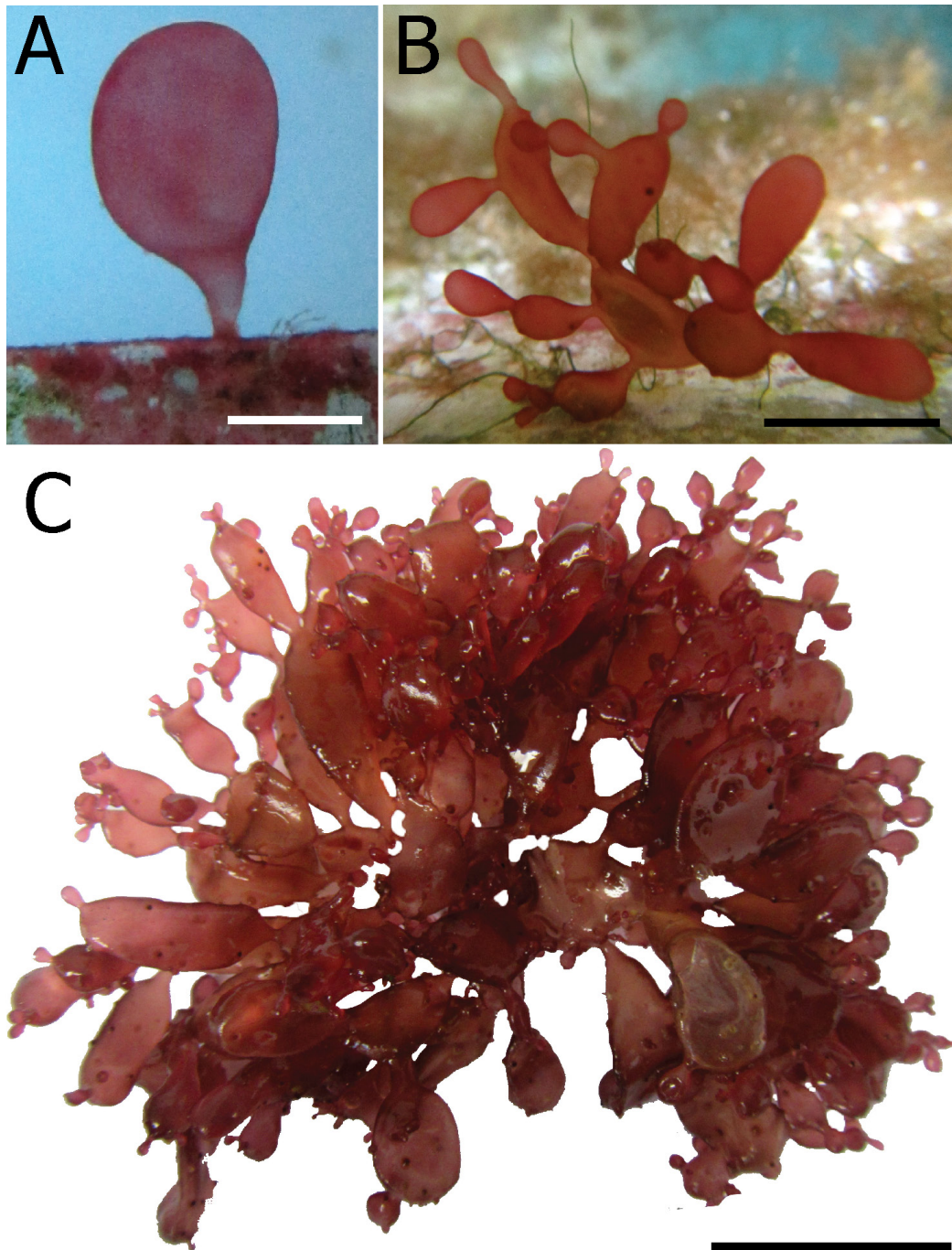


Figure 1. *Chamaebotrys proliferus*. MSUH1232. A) An ovoid habit of an early-stage individual growing on *Hydrolithon* sp., scale = 2 mm. B) Developing thallus with septate branches, scale = 1 cm. C) Habit of a mature thallus, scale = 2 cm.

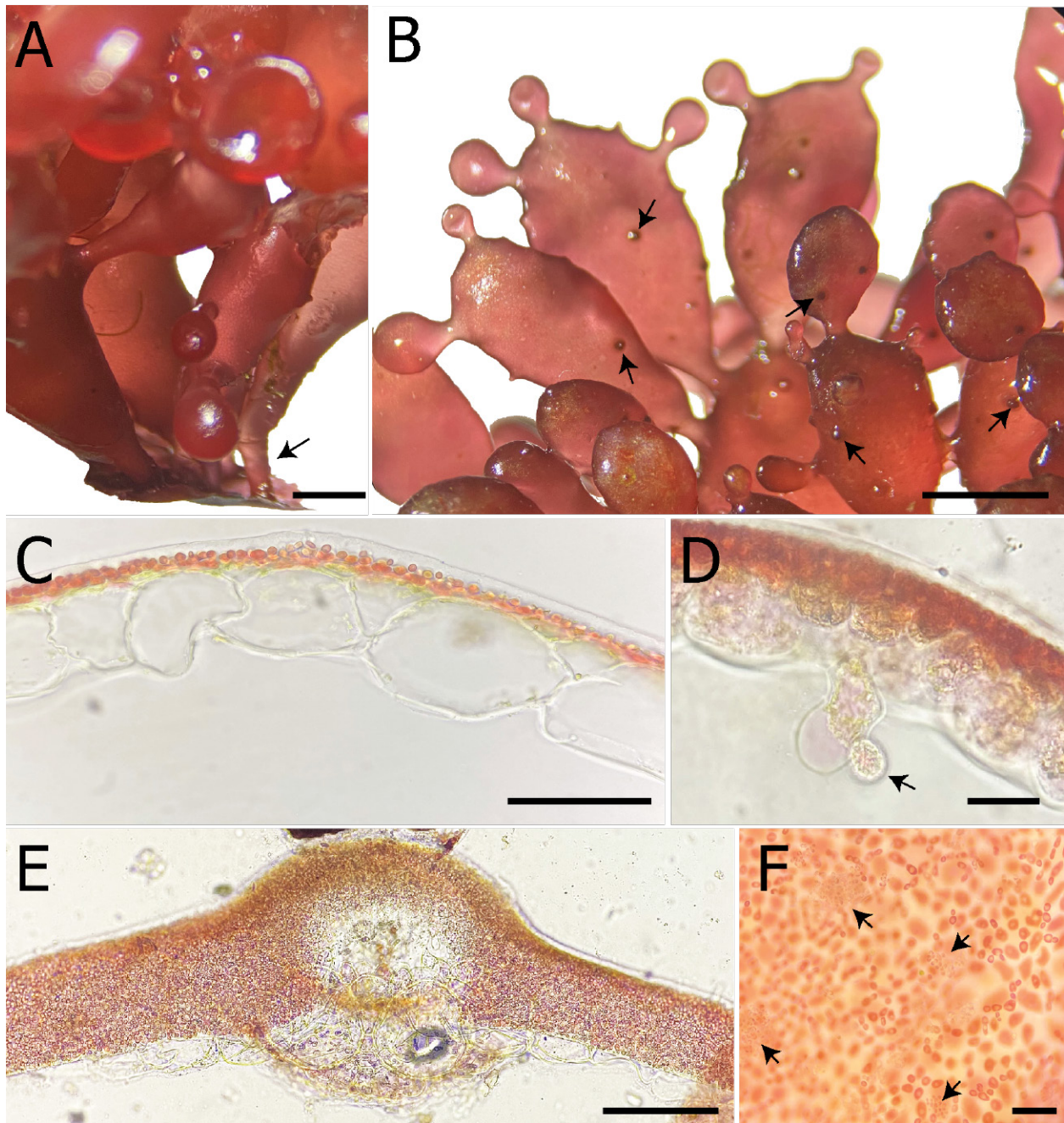


Figure 2. *Chamaebotrys proliferus*, MSUH1984. A) A detail of the peg-like rhizoid (arrow) attached on a *Hydrolithon* sp. crust, scale = 3 mm. B) Compressed branches showing vesicles arising on the margin of the parent branches; the arrow indicates immersed cystocarps scattered randomly on the branch surface, scale = 5 mm. C) Cross-section through a vesicle wall, showing the layer of pigmented cortical cells and large unpigmented medullary cells, scale = 100 µm. D) Close up view of an ovoid gland cell (arrow), scale = 50 µm. E) Median section through a cystocarp, scale = 100 µm. F) Surface view of cortex with spermatangia (arrows), scale = 10 µm.

MSUH1984, 21 Jul 2020, coll. A. M. P. Samuyag, *ibid.* Herbarium specimens were lodged at the Mindanao State University Herbarium in MSU-TCTO.

Growth rate. Following Yong *et al.* (2014), the Philippine *C. proliferus* growth rate in terms of height and width were calculated to be 0.049% d⁻¹ and 0.057% d⁻¹, respectively.

The proliferation of vesicles from the parent branches constituted the most apparent morphological characteristic that distinguishes *C. proliferus* from its congeners (Ballantine *et al.* 2010). This primary morphological feature, in addition to those matched internal morphological characters for *C. proliferus*, strongly supports the identification of the Philippine specimens.

Chamaeobotrys proliferus was first described from San Juan, Puerto Rico by Ballantine *et al.* in 2010. The type locality is over 17,000 km away from the herein reported record. In addition to *C. proliferus*, the genus currently accommodates three more species: *Chamaeobotrys boergesenii* (Weber Bosse) Huisman (Huisman 1996), *Chamaeobotrys erectus* Schils & Huisman (Schils *et al.* 2003), and *Chamaeobotrys lomentariae* (Tanaka & Nozawa) Huisman (Tanaka 1964). Until the present account, only *C. proliferus* was known to have an Atlantic distribution (Guiry and Guiry 2020). With the recognition of *C. proliferus* from the Philippines, we have presented evidence that all of the currently recognized species of *Chamaeobotrys* can be found in the Indo-Pacific waters.

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