

Two Marine Brown Algae (Phaeophyceae) New to Pratas Island

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ABSTRACT: Two marine brown algae, *Cladosiphon okamuranus* Tokida and *Styopodium flabelliforme* Weber-van Bosse, are reported from Pratas Island for the first time. Diagnostic morphological features are illustrated and the taxonomic status of the two species is also discussed.

KEY WORDS: Marine brown algae, Phaeophyceae, *Cladosiphon okamuranus*, *Styopodium flabelliforme*.

INTRODUCTION

The marine macro-algal flora of Taiwan has been studied by numerous phycologists (summarized in Lewis and Norris, 1987). The recorded number of species reaches over 500 (Lewis and Norris, 1987; Chiang and Wang, 1987; Huang, 1990, 1991, 1999a, 1999b; Wang and Chiang, 1993; Wang *et al.*, 1993; Huang and Chang, 1999; Lin, 2002, 2004; Lin *et al.*, 2002, 2004a, 2004b; Lin and Fredericq, 2003). The number of marine macro-algal species for the region has recently increased due to intensive investigations this past decade (Huang, 1991, 1999a, 1999b; Wang *et al.*, 1993; Huang and Chiang, 1999), and numerous new species continue to be discovered (Lewis *et al.*, 1996; Lin *et al.*, 2002).

The marine flora of Pratas Island, a remote island situated at South China Sea between Hong Kong and the Philippines and one of territories of Taiwan, has been little studied in the past decades (Chiang, 1975; Lewis and Lin, 1994). Pratas Island, 2 km in length by 0.8 km in width, is part of emerged coral reef areas in western side of Pratas Atoll, ca. 20 km in diameter. The marine macro-algal flora of the island is composed of tropical to subtropical assemblages (Lewis and Lin, 1994). The first author's recent collections from Pratas Island (Fig. 1, E116°43', N20°42') contain two brown algae, *Cladosiphon okamuranus* Tokida and *Styopodium flabelliforme* Weber-van Bosse, previously unrecorded from Pratas Island.

MATERIALS AND MERHODS

Collections were made by snorkeling. Voucher specimens and materials used in the morphological study were preserved in 5-10% formalin/seawater, and then stored in 5% formalin/seawater or pressed as herbarium sheets, and deposited in the seaweed laboratory, Department of Natural Science Education at National Taitung University, Taiwan. Whole-mount material and hand section were stained in 1% iodine solution. Photomicrographs were taken on an Olympus BX51 microscope with a Pixera ESM 150 digital camera (Tokyo, Japan) or a Sony digital camera (Tokyo, Japan) for taking habit pictures.

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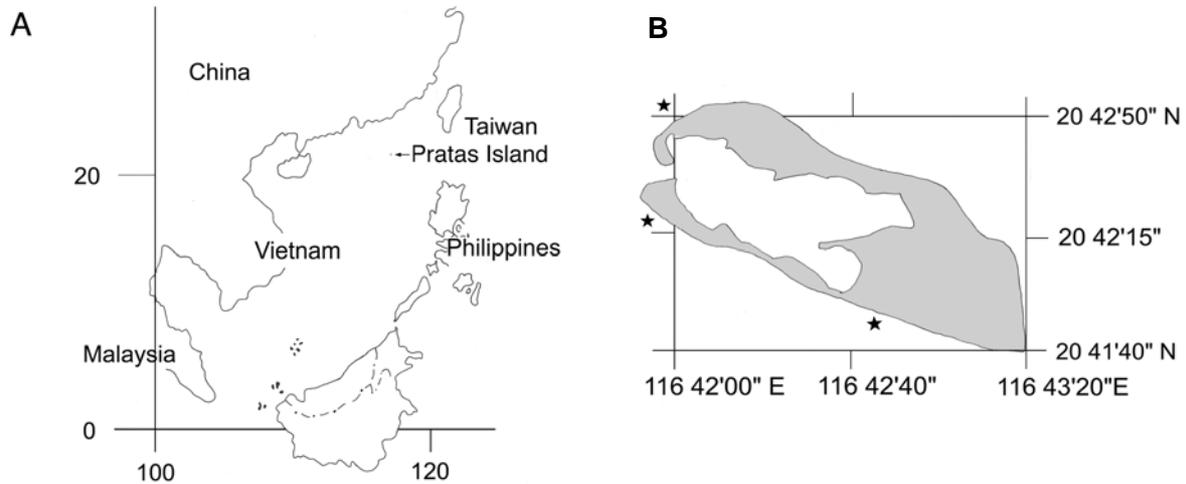


Fig. 1. A: Map of Pratas Island in South China Sea. B: Close-up of Pratas Island. Asterisks refer to the collecting sites around the island.

RESULTS

Family Chordariaceae (Ectocarpales, Phaeophyceae)

Cladosiphon okamuranus Tokida, J., 1942. Phycological observations. V. Trans. Sapporo Nat. Hist. Soc. 17: 82-95. Figs. 2A, 3 & 4

Type locality: Okinawa Island, Japan.

Thalli are light to dark brown, erect, filiform, 25-60 cm high, 3-4 order-branched, very mucoid, attached to sandy substrate in seagrass beds, arising from a minute discoid holdfast (Fig. 2A). Cortex is consisting of simple assimilatory filaments/hairs, 10-40 cells long, 55-325 μm , and basal rectangular to ovoid sub-cortical cells (Fig. 3D). Cortical cells in young branches consist of 1-2 pseudoparenchymatous celled-layers (Fig. 3A), when old, producing outer, 2-3 orders of branched filaments (Figs. 3B & C). These branched cortical filaments in lower portions of old branches are elongated (Fig. 3D). Medullar layers are mostly hollow, multiaxial, composed of elongated un-pigmented filaments (Figs. 4A & B). Plurilocular (Figs. 4B & C, 60-70 μm long by 20-25 μm wide) and unilocular sporangia (Figs. 4B & D, 50-70 μm long by 25-30 μm wide) are produced laterally from sub-basal cells of assimilatory filaments.

Specimen examined: Pratas Island, 24 April 2004, coll. S.-M. Lin *s. n.*

Family Dictyotaceae (Dictyotales, Phaeophyceae)

Styopodium flabelliforme Weber-van Bosse, 1913. Liste de algues du Siboga. I. Myxophyceae, Chlorophyceae, Phaeophyceae avec le concours de M. Th. Reinbold. Vol. 59a, (1)-186, Figs. 1-52, pls I-V. Leiden. Figs. 2B & 5

Styopodium hawaiiensis (Doty et Newhouse) Abbott, 1977: 6, fig. 1b; *Zonaria hawaiiensis* Doty et Newhouse, 1966: 143, figs 2c-d.

Type locality: Rotti, Indonesia.

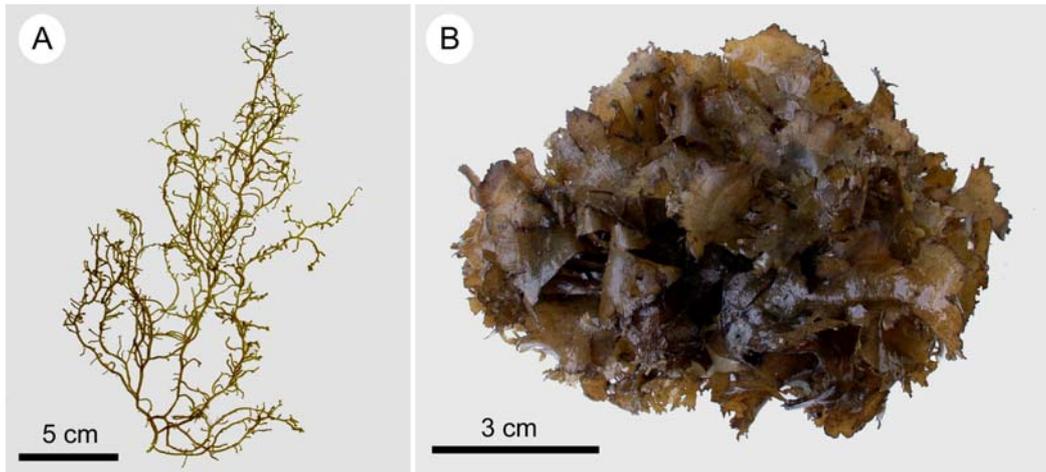


Fig. 2. A: *Cladosiphon okamuranus* Tokida. Habit of sporic thallus. B: *Stypodium flabelliforme* Weber-van Bosse. Habit of sterile thallus.

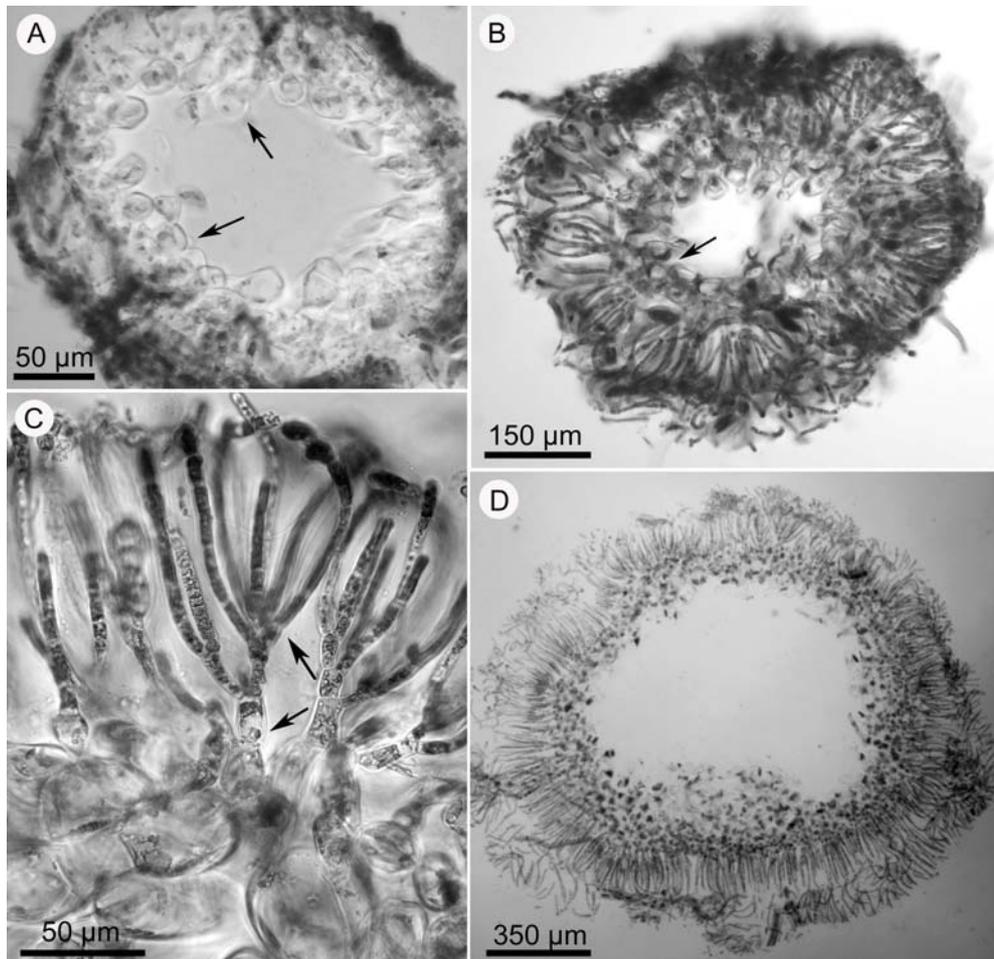


Fig. 3. *Cladosiphon okamuranus* Tokida. Vegetative structures. A: Transverse section of a young branch showing cellular, pseudoparenchymatous cortex. B: Transverse section of a further stage of A. C: Close-up of young cortical filaments. D: Transverse section of old branch showing filamentous cortex and largely cell-free center.

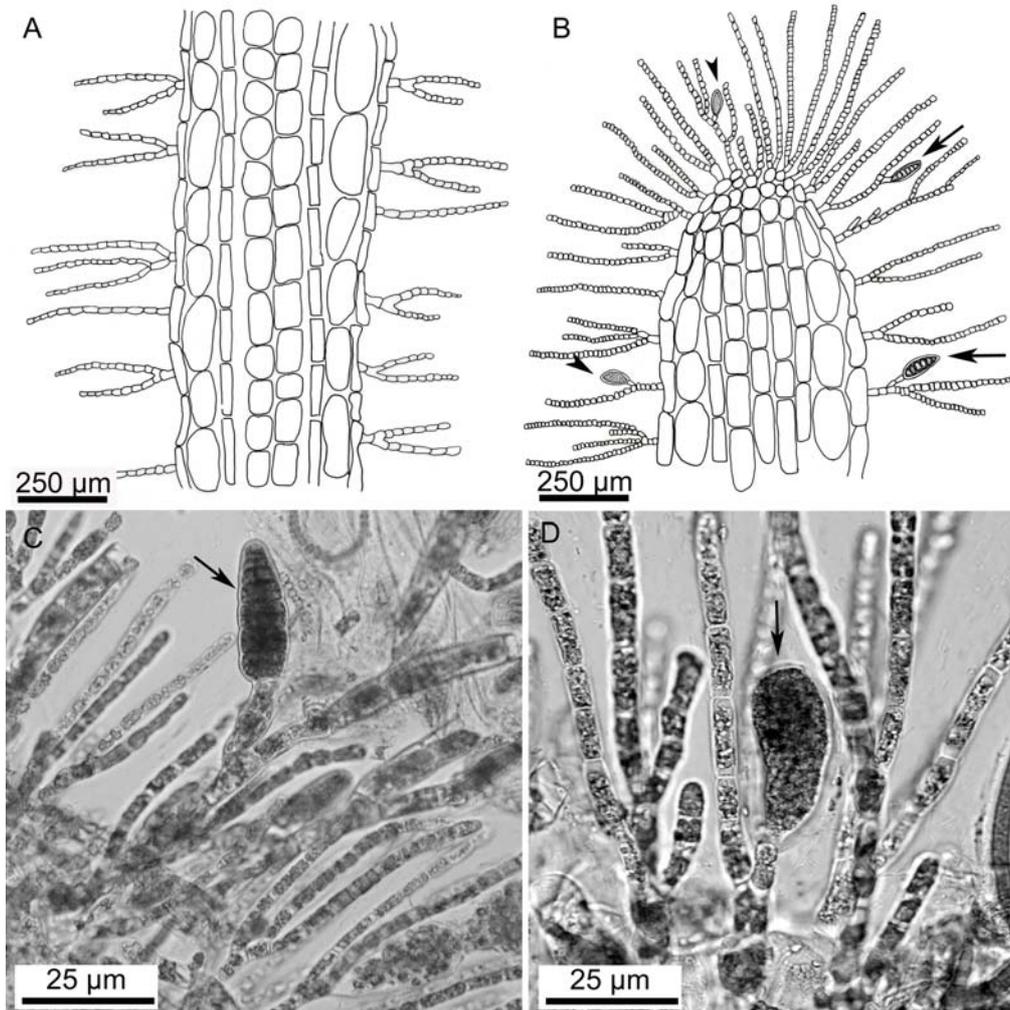


Fig. 4. *Cladosiphon okamuranus* Tokida. Vegetative and reproductive structures. A: Longitudinal section of a young branch showing cortex bearing assimilatory filaments and medulla. B: Longitudinal section of a tip showing unilocular sporangia (arrowheads) and plurilocular sporangia (arrows). C: Close-up of a plurilocular sporangium (arrow). D: Close-up of an unilocular sporangium (arrow).

Thalli are erect or prostrate, arising from a rhizoidal holdfast, up to 6 cm long, membranous, flabellate, when old, fan-shaped blades splitting into cuneate to linear segments (Fig. 2B). Growth is by marginal apical cells (Figs. 5A & C). Blades are four celled layers, 70-120 μm in thickness throughout, consisting of an outermost layer of small cortical cells, 10-20 μm, in both sides and 2 larger medullary cells, 110-250 μm (Figs. 5A-C). Concentric hair lines on both sides of thallus surfaces (Fig. 5D). Reproductive structures were not found in this study.

Specimen examined: Pratas Island, 23 April 2004, coll. S.-M. Lin *s. n.*

DISCUSSION

The genus *Cladosiphon* is characterized by its muscoid, branched thallus composed by filamentous cortex and the center is largely cell-free. Nine species of *Cladosiphon* are

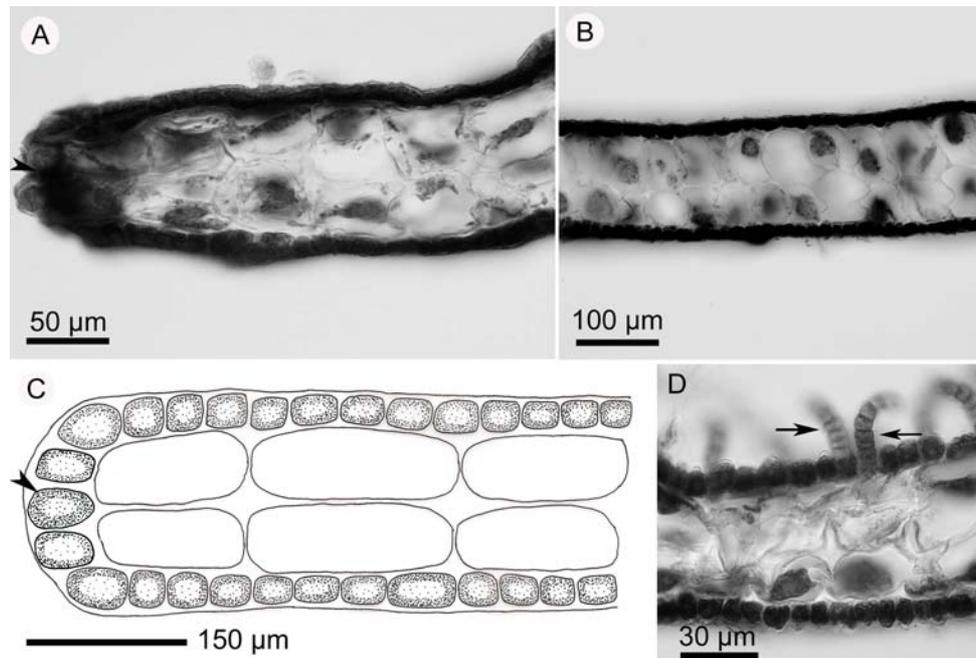


Fig. 5. *Stypodium flabelliforme* Weber-van Bosse. Vegetative structures. A: Transverse section showing a marginal apical cell (arrowhead). B: Transverse section of middle part of fan shaped blade showing small cortical and large medullary cells. C: Hand-drawing of transverse section showing a marginal apical cell (arrowhead). D: Transverse section of middle portion of a blade showing hairs arising from cortical cells (arrows).

currently recognized from around the world, only *Cladosiphon okamuranus* occurs in northern Pacific Ocean. *Cladosiphon okamuranus*, an edible species commonly found in southwestern part of Japan (Yoshida, 1998), can be distinguished from the rest species by its smaller (25-60 cm long) and higher-order branched thallus compared to the other species (up to 80-800 cm long). In addition, the plurilocular sporangia in *C. okamuranus* are mostly cut off at middle or lower portions of assimilatory filaments, in contrast to the other species, in which their plurilocular sporangia are borne at upper cells of cortical filaments (Womersley, 1987, p. 121, Fig. 36G, p. 123, Fig. 37E).

Stypodium flabelliforme is a common brown alga occurring in Indo-Pacific Oceans (Huisman, 2000; Abbott and Huisman, 2004) and is characterized by its fan shaped, less split blades when compared with the rest four known species from tropical Atlantic Ocean, Caribbean Sea, West Africa and Indian Ocean (Taylor, 1960; Lawson and John, 1987; Littler and Littler, 2000).

This study reinforces in the notion that the species composition of the marine flora in Pratas Island, which shares many species with that occurring in the Indo-Pacific basin (Silva *et al.*, 1996). The number of algae in Pratas Island will certainly continue to increase as more collecting is carried out and unidentified specimens on herbarium shelves are carefully examined.

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來自東沙島兩種海洋性褐藻：崗村棕葉藻和扇形剛管藻

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摘 要

本文報告採至東沙島兩種海洋性褐藻的兩種新紀錄：崗村棕葉藻和扇形剛管藻，兩者均為東沙島第一次記錄。文中並提供型態描述之簡短討論。

關鍵詞：海藻、褐藻綱、崗村棕葉藻、扇形剛管藻。

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