



Notes on the taxonomy of the Philippine endemic *Porphyra marcosii* Cordero (*Bangiaceae*, *Rhodophyta*)

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Porphyra marcosii Cordero is an economically important species considered to be endemic to the northern Philippines. This foliose, monostromatic species with microscopic teeth was first described based on a sample from Dirique Bay, Burgos, Ilocos Norte, in north-western Luzon (Cordero 1976, 15: figs A-H, pl. 1). Together with other foliose Bangiales, *Porphyra marcosii* is locally known as “gamef” and collected from the wild, dried as sheets called “pedazo”, and sold in local markets for consumption as food (Trono & Ganzon-Fortes 1988, Prud’homme van Reine 2001, Cordero 2008).

Ogawa (2001) noted the overlap in the morphological characters of *Porphyra marcosii* with the earlier described *Porphyra vietnamensis* Tak.Tanaka & P.H.Hô (Tanaka & Hô 1962), now known as *Phycocalidia vietnamensis* (Tak.Tanaka & P.H.Hô) Santiañez & M.J.Wynne (Santiañez & Wynne 2020). Ogawa (2001) alluded that the two species are conspecific. Prud’homme van Reine (2001) also considered *Porphyra marcosii* as heterotypic synonym of *Porphyra vietnamensis*. However, *Porphyra marcosii* is still regarded as distinct by some authors (e.g., Cordero 2008, Monotilla & Notoya 2010, Dumilag & al. 2017, Dumilag & Monotilla 2018).

Yang & al. (2020) recently described the new genus *Calidia* L.-E.Yang & J.Brodie, *nom. illeg.*, later renamed *Phycocalidia* Santiañez & M.J.Wynne (Santiañez & Wynne 2020), to accommodate all warm-water taxa previously referred to the genus *Pyropia* J.Agardh. Consequently, all taxa under *Pyropia* reported in tropical waters, including those with confirmed distributions in the Philippines, were transferred to *Phycocalidia* (Santiañez & Wynne 2020). Meanwhile, as *Porphyra marcosii* was still retained in the genus *Porphyra* prior to the description of *Phycocalidia* (as *Calidia*), it was suggested that the identity and validity of the taxon had yet to be verified based on morphological observations and molecular analyses of the type and/or topotype materials (Dumilag & al. 2017).

Recent changes in the systematics of the Bangiales proposed by Yang & al. (2020) provided insights on the diversity and distribution of these economically important seaweeds. The description of *Phycocalidia* (as *Calidia*), along with other new genera segregated from the *Pyropia* complex, narrowed down the characteristics used to distinguish taxa in the *Bangiaceae*, at least to the genus level. Based on the generic concept of *Phycocalidia* (Table 1), the tropical distribution and morphological characteristics of *Porphyra marcosii* suggest that it is attributable to, and thus should be transferred, to the genus *Phycocalidia*. However, in proposing such a transfer of *Porphyra marcosii*, the earlier suggestions that it was conspecific with *Phycocalidia vietnamensis* (Ogawa 2001, Prud’homme van Reine 2001) needed to be considered.

The morphological characters as well as the ecology of *Porphyra marcosii* and *Phycocalidia vietnamensis* are quite similar (Table 1). Culture studies conducted on *Porphyra marcosii* from Burgos, Ilocos Norte, Philippines by Monotilla & Notoya (2010) and on *Phycocalidia vietnamensis* from Songkhla, Thailand by Lewmanomont & Chittpoolkusol (1993) likewise showed similarities in their responses to culture conditions, especially as exhibited by the growth and development of their ‘conchocelis’ stage, the formation of conchosporangia, and the germination of conchospores into foliose blades (Table 1). Despite the absence of molecular data to confirm that they are conspecific but taking into consideration the similarities of *Porphyra marcosii* and *Phycocalidia*



vietnamensis in morphology, growth and development in culture, and ecology, I am in agreement with Ogawa (2001) and Prud'homme van Reine (2001) in considering these two species as conspecific. Accordingly, I propose here to synonymize *Porphyra marcosii* with *Phycocalidia vietnamensis*. As *Phycocalidia vietnamensis* has nomenclatural priority, *Porphyra marcosii* is relegated here to a later heterotypic synonym.

Phycocalidia vietnamensis (Tak.Tanaka & P.H.Hô) Santiañez & M.J.Wynne

Basionym: *Porphyra vietnamensis* Tak.Tanaka & P.H.Hô, *Memoirs of the Faculty of Fisheries, Kagoshima University* 11: 34, figs 10, 11, 1962.

Homotypic synonyms: *Pyropia vietnamensis* (Tak.Tanaka & P.H.Hô) J.E.Sutherland & Monotilla in Sutherland & al., *Journal of Phycology* 47(5): 1145, 2011; *Calidia vietnamensis* (Tak.Tanaka & P.H.Hô) L.-E.Yang & J.Brodie in Yang & al., *Journal of Phycology* 56(4): 866, 2020.

Heterotypic synonym: *Porphyra marcosii* Cordero, *Acta Manilana* [University of Santo Tomas Research Center], *Series A* 15 (24): 15, figs A–H, pl. 1, 1976.

Table 1. Summary of taxonomic characters of the genus *Phycocalidia* and two morphologically similar foliose Bangiaceae reported from the Philippines.

Character	<i>Phycocalidia</i> Santiañez & M.J.Wynne	<i>Porphyra marcosii</i> Cordero	<i>Phycocalidia vietnamensis</i> (Tak.Tanaka & P.H.Hô) Santiañez & M.J.Wynne
Thallus	Membranous, monostromatic	Membranous, branched, monostromatic	Membranous, branched, monostromatic
Colour	Purple (light to greenish to dark), red (greenish-red, brownish-red, dull grey-brownish red) brown (yellowish brown) to bronze	Light purplish or brownish-red	Light to dark purple
Shape	Orbicular, linear to lanceolate ovate, reniform, reniform, cordate	Linear-lanceolate, base cordate	Lanceolate to linear-lanceolate, base cordate
Margins	Undulate or slightly undulate, with microscopic teeth	Crenulate, with microscopic teeth	Undulate, with microscopic teeth
Holdfast	Single	Single, discoid	Single, discoid
Size	5–10 cm (some 2–17 cm) high, 0.3–5 cm broad, 18–50 µm thick	10–14 cm high, to 1 cm broad, 11.4–26.6 µm thick	3–27 cm high, 0.3–3.6 cm broad, 20–28 µm thick
Reproduction	N/A	Monoecious	Monoecious
Spermatangia	32–64 spermatia	64 spermatia [64 (a/4 b/4 c/4)]	64 spermatia [64 (a/4 b/4 c/4)]
Zygotosporangia	8–16 zygotospores	8 zygotospores [8 (a/2 b/2 c/2)]	8 zygotospores [8 (a/2 b/2 c/2)]
Conchosporangia	N/A	Form at 30°C	Form at 30°C
Conchospores	N/A	Germinate at 25°C	Germinate at 25°C



Conchocelis	N/A	Optimum growth at 20–25°C	Optimum growth at 25°C
Habitat	Typically, upper littoral to splash zones	Upper littoral, on rocks, exposed to strong waves	Upper littoral, on rocks, exposed to strong waves
Seasonality	N/A	November–January	November–February
References	Yang & al. (2020, as <i>Calidia</i>)	Monotilla & Notoya (2010), Cordero [1974 (as <i>Po. sp.</i>), 1976, 2008 (as <i>Po. marcosii</i>)]	As <i>Po. vietnamensis</i> [Tanaka & Hô (1962), Lewmanomont & Chittpoolkusol (1993), Lewmanomont & Ogawa (1995), Tsutsui & al. (2005)]

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