

Proposal to recognize the new brown algal genus *Nothocolpomenia* Santiañez, *gen. nov.* (*Scytosiphonaceae*, *Phaeophyceae*)

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The brown algal genus *Colpomenia* Derbès & Solier is commonly found in shallow areas of tropical to cold-temperate coastal waters worldwide. Traditionally, *Colpomenia* species are known to be highly polymorphic, with thalli forms ranging from being saccate, convoluted, and branched (Santiañez & Wynne 2024). Recent taxonomic and phylogenetic studies in the *Scytosiphonaceae*, however, challenged this assumption, resulting in the segregation of taxa from *Colpomenia* and the descriptions of *Dactylosiphon* Santiañez, K.M.Lee, S.M.Boo & Kogame in Santiañez & al. (2018a) and *Encephalophycus* Santiañez (2022). Species of the genus *Dactylosiphon* formerly assigned to *Colpomenia* are distinguished by having finger-like, hollow thalli and by having sporophytes that produce only unangia (*vs Colpomenia* species that produce both unangia and plurangia; Santiañez & al. 2018a). *Encephalophycus* is characterised by its rigid brain-like form due to the deep, convoluted folds in its thalli, and by having membranes with blunt protuberances. Comparing *Colpomenia* with *Encephalophycus*, the latter is known to possess a thicker cortex and medulla, primarily due to a greater number of cells in these layers (Santiañez 2022).

Colpomenia ramosa W.R.Taylor (1945) is a unusual species of *Colpomenia*. Originally described by Taylor in 1945 based upon a specimen [MICH 1306284] from South Bay, Isla Cerros (Cedros Island), Baja California, Pacific Mexico, it was distinguished from other species of *Colpomenia* by its adherent and branched hollow thalli, the irregularly subdichotomous to polychotomous branches of which gradually taper to the tips. Additionally, it also possesses a single cortical cell layer bounding a medulla of 6–7 cell layers (Taylor 1945). The latter author also noted the gross morphological similarities of *C. ramosa* to *Iyengaria stellata* (Børgesen) Børgesen (1939: 91, figs 23–25) but differentiated it as being more intricately clumped, with more tapered and relatively more numerous branches. Compared with *I. stellata*, *C. ramosa* also has thinner membranes and crisp thalli, while the former has thicker membranes and tough thalli (Taylor 1945). Wynne & Norris (1976) noted the strong resemblance of *C. ramosa* to *Rosenvingea endiviifolia* (Martius) M.J.Wynne [as *Rosenvingea intricata* (J.Agardh) Børgesen] but distinguished the former as “prostrate expanses, coarsely branched and often with short peg-like branches”, contrasting it to the erect forms of the latter. Compared to other *Colpomenia* species, *C. ramosa* is morphologically distinct as it possesses hollow branches that are occasionally adherent, with membranes that have a single cortex and medulla of 6–8 cell layers (Taylor 1945, Wynne & Norris 1976, Norris 2010). Unlike other *Colpomenia* species with uniseriate or biseriate plurangia, *Colpomenia ramosa* was known to produce only uniseriate plurilocular sporangia (Taylor 1945, Wynne & Norris 1976, Norris 2010). *Colpomenia ramosa* is distinct from *Encephalophycus tuberculatus* (D.A.Saunders) Santiañez (2022: 3) in having branched thalli with a smooth surface and lacking the deep convoluted folds of the thick and robust membranes typical of *E. tuberculatus*.

Within the Tribe *Hydroclathreae* Santiañez (2023), thalli shape and form, number of cortical and medullary cell layers, and shape and nature of plurangia of gametophytic thalli—along with phylogenetic information—are integral to differentiate one genus from the other. The utility of this framework has been repeatedly used within the Tribe, particularly in describing and distinguishing *Tronoella* Santiañez & Kogame in Santiañez & al. (2018b), *Manzaea* Santiañez & Kogame (2022),

and *Encephalophycus* Santiañez (2022) from other closely related and morphologically similar genera.

Studies on the phylogenetic relationships of *Colpomenia sensu lato* using *cox3* sequence data by Lee & al. (2012; fig. 2) showed that their specimen of *C. ramosa* collected from near the type locality (Punta La Esmeralda, Baja California, Mexico) formed a strongly supported clade with *E. tuberculatus* (as *Colpomenia tuberculata* D.A.Saunders) that is somehow closely related to their *Colpomenia sinuosa* (Mertens ex Roth) Derbès & Solier. The succeeding molecular work on the *Scytosiphonaceae* based on *cox3* sequences by Santiañez & al. (2018a, fig. 1) also showed the same affinity between *C. ramosa* and *E. tuberculatus* and similarly recovered the genus *Colpomenia sensu lato* as a polyphyletic group. I have computed the sequence divergence (*p*-distance) between *C. ramosa* and other closely related taxa in the *Scytosiphonaceae* following Santiañez & Wynne (2020). Divergence values based on *cox3* sequence data between *C. ramosa* and other *Colpomenia* species ranged from 14.3% to 16.1%. These *p*-distance values are considerably higher than those computed for other closely related genera, such as *Tronoella* and *Manzaea*, and *Pseudochnoospora* Santiañez, G.Y.Cho & Kogame in Santiañez & al. (2018a) and *Manzaea*, both at 9.3%, and *Pseudochnoospora* and *Tronoella* at 9.8%. Comparable divergences were also found between *C. ramosa* and *E. tuberculatus* (9.7%) and between *C. ramosa* and *I. stellata* (9.0%, unpublished sequence data).

Considering the distinct morphology, anatomy, and molecular divergence of *Colpomenia ramosa* with other closely related taxa that I outlined above, I believe that *C. ramosa* represents a distinct lineage that should be segregated from other members of the *Scytosiphonaceae* at the genus level. As such, I propose below the recognition of a new genus:

***Nothocolpomenia* Santiañez, gen. nov.**

Description: Scytosiphonacean algae growing as prostrate branched expanses; hollow branches gradually tapering, occasionally adherent; membranes smooth and crisp; walls consisting of a single cortical cell layer and 6–8 medullary cell layers. Plurangia uniseriate, unangia unknown; paraphyses absent.

Etymology: The genus name is derived from combining the Greek word ‘*nothos*’, meaning ‘illegitimate or false’, and *Colpomenia*—the genus under which the type species was originally classified—in reference to its original assignment in the genus *Colpomenia*.

Type: ***Nothocolpomenia ramosa*** (W.R. Taylor) Santiañez, *comb. nov.*

Basionym: *Colpomenia ramosa* W.R.Taylor, *Pacific marine algae of the Allan Hancock Expeditions to the Galapagos Islands. Allan Hancock Pacific Expeditions* 12: 84, pl. 6: fig. 2. 1945.

Holotype: **AHFH** ex **UC** 694799 *W. R. Taylor* no. 34-651, 10 March 1934.

Isotype: **MICH** [1306284](#), *W. R. Taylor* no. 34-651, 10 March 1934.

Type locality: in littoral pools, South Bay, Isla Cerros (Cedros Island), Baja California, Mexico (Taylor 1945).

PhycoBank Registration (of genus name): <http://phycobank.org/106751>.

PhycoBank Registration (of new combination): <http://phycobank.org/106752>.

Remarks: *Nothocolpomenia* is distinguished from the typically saccate and unbranched *Colpomenia* species by its branched thalli and membranes with more cell layers. It is also differentiated from *Encephalophycus* by having branches and by its thinner, crisp membranes compared to the latter’s thick, coriaceous membranes. Lastly, *Nothocolpomenia* is distinct from *Iyengaria* in having gradually tapering and occasionally inter-adhesive branches with thinner and less tough membranes (Table 1). Plants commonly found growing with other algae on hard substrata in the intertidal to shallow subtidal areas (Taylor 1945, Norris 2010).



In segregating *C. ramosa* from *Colpomenia* and establishing the new genus *Nothocolpomenia*, genus-level diversity within the *Scytosiphonaceae* is again increased, perhaps leading to over proliferation of new genera in the family (Santiañez & Wynne 2024). While I understand that caution is necessary in establishing new genera relative to the apparent taxonomic inflation within the *Scytosiphonaceae*, I believe that in recognising *Nothocolpomenia*, I provide an opportunity to clarify the persistent problems in the taxonomy, classification, and molecular phylogenetic relationships in the family especially particularly within the poorly known members of the Tribe *Hydroclathreae*.

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Table 1. Morphological comparisons between *Nothocolpomenia* Santiañez, *gen. nov.*, and other closely related genera in the family *Scytosiphonaceae*.

Character	<i>Nothocolpomenia</i> Santiañez	<i>Iyengaria</i> Børgesen	<i>Encephalophycus</i> Santiañez	<i>Colpomenia</i> (Endlicher) Derbès & Solier
Thalli form	Adherent clumps possessing hollow branches, with multiple attachments; branches irregular, often polychotomous, tapering to rounded apices; crisp	Globular to amorphous cushion with hollow branches; compressed branches terminally rounded; crisp to coriaceous	Amorphous brain-like cushions, with deep convoluting folds; hollow and rigid; coriaceous surface with blunt protuberances	Saccate, globular to cushion-like, hollow
Cortex	1 layer, pigmented	1–2 cell layers, pigmented	3–7 layers, pigmented	1–2 cell layers, pigmented
Medulla	6–8 layers, clear	6–8 layers, clear	4–8 layers, clear	3–6 layers, clear
Paraphysis	Absent	Absent	Absent	Present
Plurangia	Uniseriate	Uni- to biseriate	Uniseriate, sometimes biseriate	Uni- to biseriate
References	This study, Taylor (1945, as <i>Colpomenia ramosa</i>), Wynne & Norris (1976, as <i>Colpomenia ramosa</i>), Norris (2010, <i>Colpomenia ramosa</i>)	Anderson & al. (2016), Børgesen (1939), Santiañez & al. (2020)	Santiañez (2022)	Boo & al. (2011), Santiañez & al. (2018a)