Notes on the tribes of the brown algal family *Scytosiphonaceae* (*Phaeophyceae*)

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In our reassessment of the taxonomy and molecular phylogeny of Indo-Pacific *Scytosiphonaceae* Ardissone & Strafforello (*Ectocarpales, Phaeophyceae*; Santiañez & al. 2018), we noted the segregation of the family into two distinct clades, like those observed by Cho & al. (2006). This segregation has been repeatedly seen in succeeding studies of the *Scytosiphonaceae* by Santiañez & Kogame (2019, 2022) and Santiañez & West (2019), among others. One of the observed clades, which we assigned as '*Hydroclathrus* group', consisted of taxa that are mostly found in tropical seas but extend into warm temperate waters (Santiañez & al. 2018). The other clade, which we referred to as the '*Scytosiphon* group', is represented by taxa that are typically found in subtropical to cold temperate regions (Santiañez & al. 2018).

Aside from these differences in distribution patterns, we further provided some details for each group. Accordingly, those found in the '*Hydroclathrus* group' have "varied morphologies ranging from upright to spreading, of either hollow or solid construction, and saccate to branched, some branches anastomosing to varying degrees. …have prostrate sporophytes that produce both uni- and plurilocular zoidangia" (Santiañez & al. 2018). By contrast, those within the '*Scytosiphon* group' "… have upright, elongate and terete to flattened thalli that are hollow, partially hollow or solid in construction. Some members of this group produce only unilocular zoidangia in the prostrate sporophyte stage" (Santiañez & al. 2018). Despite all this information, we did not make any formal taxonomic proposal for these groupings that we have observed and informally named. Previously, Cho & al. (2006) suggested the establishment of two tribes *Chnoosporeae* and *Scytosiphoneae* to classify these two phyletic groups. However, they did not provide formal descriptions for these names.

During my thesis studies on the systematics and molecular phylogenetic relationships of members of the brown benthic marine macroalgal family *Scytosiphonaceae*, I introduced two new tribe designation based on morpho-anatomy, life history, and molecular phylogenetic information (Santiañez 2018). Therein, I proposed the new tribes *Hydroclathreae* for taxa found under the '*Hydroclathrus* group' and *Scytosiphoneae* for those belonging to the '*Scytosiphon* group' (Fig. 1). The name *Scytosiphoneae* has been used several times to refer to a group of brown algae at various phyletic levels (i.e., family, subfamily, tribe, and subtribe). Of these, Thuret (in Le Jolis 1863: 14), Reinke (1889: 60), and Kjellman (1893: 201) used *Scytosiphoneae* for a group corresponding to a tribe. Based on the principle of priority, which applies to names at the family level and below, Thuret (in Le Jolis 1863) is the earliest authority for the name *Scytosiphoneae* (Athanasiadis 2021: 282). Athanasiadis (2021: 282) included three taxa under tribe *Scytosiphoneae*: *Hydroclathrus* Bory, *Phyllitis* Kützing, and *Scytosiphon* C.Agardh.

Based on morphology, life history and molecular phylogenetic information (Fig. 1), *Hydroclathrus* should be segregated to a different tribe, which I referred to as the *Hydroclathreae* (Santiañez 2018). However, my proposal for tribe *Hydroclathreae* cannot be considered as validly published in accordance with the International Code of Nomenclature (ICN). Thus, while the Portable Document Format (PDF) version of my dissertation has been made publicly available online, it does not include an International Standard Serial Number (ISSN) or an International Standard Book Number (ISBN), as required by ICN Art. 29.1 (Turland & al. 2018). Similarly, the printed version of my dissertation does not have "…an ISBN or the name of the printer, publisher, or distributor…", nor

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did I explicitly state that I considered the proposals therein as being made in an effective publication, a requirement for valid publication after 1 January 1953 (ICN Art. 30.9, Note 3, Turland & al. 2018). Taking all of the above in consideration, I provide here an emended description of tribe *Scytosiphoneae* as well as validating the name '*Hydroclathreae* Santiañez'.

Scytosiphoneae Thuret (in Le Jolis), *emend*. Santiañez

Description: Scytosiphonacean algae possessing erect and rarely branched thalli; occurring solitary or gregarious, mostly terete to compressed, some flattened; construction hollow, partially hollow, to generally solid; uni- to biseriate plurangia develop basipetally (but acropetally in *Dactylosiphon*), arranged in firmly coherent columns to loose palisades, some cuticulate, extensively growing on thalli; paraphyses, when present, closely associated with plurangia. Exhibit isomorphic or heteromorphic life histories; the latter display discoid to filamentous microscopic sporophytes, producing unangia only.

Generitype: *Scytosiphon* C.Agardh.

Type species: *Scytosiphon lomentaria* (Lyngbye) Link.

Remarks: Taxa under tribe *Scytosiphoneae* typically occur in relatively colder waters, from the subtropics to the cold temperate regions. Tribe *Scytosiphoneae* include taxa under seven genera, namely: *Dactylosiphon* Santiañez, K.M.Lee, S.M.Boo & Kogame, *Jolyna* S.M.P.B.Guimarães, *Melanosiphon* M.J.Wynne, *Myelophycus* Kjellman, *Petalonia* Derbès & Solier, *Planosiphon* McDevit & G.W.Saunders, and *Scytosiphon*. The molecular phylogenetic position of *Jolyna* is yet to be determined, but Guimarães & al. (1986) have pointed out the similarities in the characters of the type species *Jolyna laminarioides* S.M.Guimarães with *Endarachne binghamiae* J.Agardh [=*Petalonia binghamiae* (J.Agardh) K.L.Vinogradova].

Hydroclathreae Santiañez, *trib. nov.*

Description: Scytosiphonacean algae possessing branched (free or inter-adhesive) erect to decumbent or saccate to amorphous and spreading thalli; generally hollow, partially hollow or solid in construction; plurangia occur as cohesive masses or arranged in uni- to biseriate palisades, these forming sori, mostly ecuticulate, some with cuticles; paraphyses typically absent (except in *Colpomenia*). Exhibits heteromorphic alternation between macroscopic gametophyte possessing plurangia and microscopic sporophyte bearing unangia and plurangia.

Type genus: *Hydroclathrus* Bory de Saint-Vincent.

Generitype: *Hydroclathrus clathratus* (C.Agardh) M.Howe.

Remarks: Members of this tribe are found mostly in tropical waters, but some taxa may extend to warm temperate regions. Currently, the tribe *Hydroclathreae* includes taxa under 10 genera (Figure 2A–C): *Chnoospora* J.Agardh, *Colpomenia* (Endlicher) Derbès & Solier, *Encephalophycus* Santiañez, *Hapterophycus* Setchell & N.L.Gardner, *Hydroclathrus, Iyengaria* Børgesen, *Manzaea* Santiañez & Kogame, *Pseudochnoospora* Santiañez, G.Y.Cho & Kogame, *Rosenvingea* Børgesen, and *Tronoella* Santiañez & Kogame. Although the monotypic genus *Iyengaria* was not included in my current molecular tree (Fig. 1), our phylogenetic assessment based on *rbc*L and *psa*A sequence data has shown that it is within the clade of tribe *Hydroclathreae* (Santiañez & al. 2020). I also included the genus *Encephalophycus*, which I recently described based on *Colpomenia tuberculata* D.A.Saunders, within the tribe *Hydroclathreae* as phylogenetic information based on *rbc*L sequences pointed to its close relationship with other members of the tribe especially *Iyengaria* (Santiañez 2022). Cho & al. (2006) have previously suggested to name this phyletic group as *Chnoosporeae*, but no formal proposal was made to effectively publish this name.

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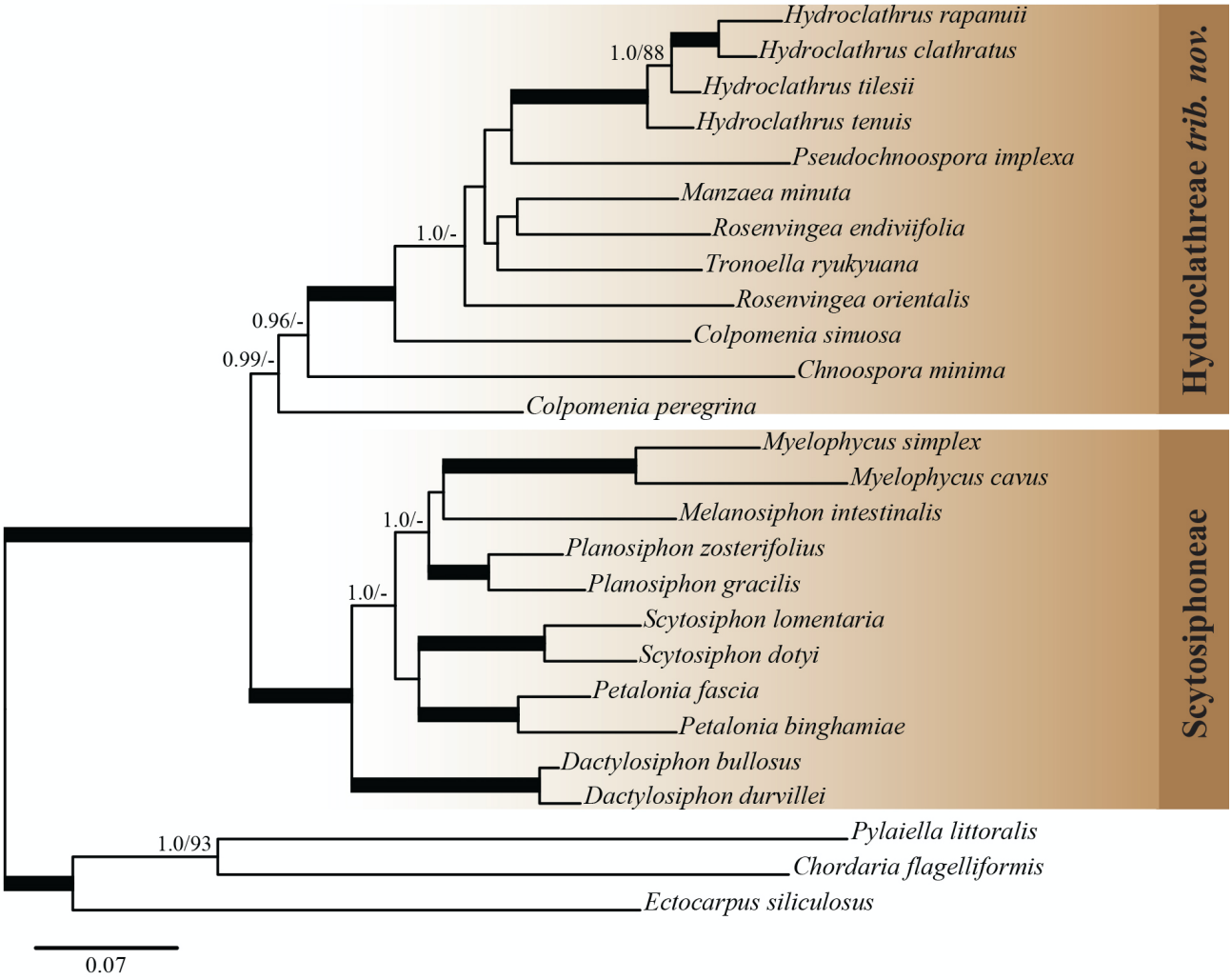

Fig. 1. Molecular phylogenetic tree of some members of the brown algal family *Scytosiphonaceae* based on concatenated sequence (*cox*3 + *psa*A + *rbc*L: 2,733 bp) data, as modified from Santiañez (2018). Node values are Bayesian posterior probabilities (PP) and Maximum Likelihood bootstrap percentages (BP), respectively. Highly supported nodes (PP: ≥ 0.98 and BP: ≥ 95%) are indicated by thickened lines while values <50% BP and <0.50 PP are removed. Molecular analyses followed those described in Santiañez & al. (2017).

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