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**Proposal of the new genus *Gazzaea* (Rhodymeniaceae, Rhodophyta) to accommodate *Botryocladia flookii* C.W.Schneider & C.E.Lane**

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Since the onset of genetic sequencing to gain a more accurate understanding of evolutionary relationships in the algae, taxa in the rhodophytan order Rhodymeniales have expanded greatly, resulting in a significantly greater biodiversity of species and genera (e.g., Saunders & al. 1999, 2006, 2007; Dalen & Saunders 2007; Wilkes & al. 2006; Rodríguez-Prieto & al. 2007; Le Gall & al. 2008; Lozada-Troche & al. 2010; Saunders & McDonald 2010; Filloramo & Saunders 2015, 2016; Schmidt & al. 2016, 2017). In the protologue of *Botryocladia flookii* C.W.Schneider & C.E.Lane, Schneider & Lane (2008: 627) noted that *rbcL* sequences of the new species did “not cluster within the other *Botryocladia* sequences, but rather as a sister taxon with only weak support”. Their Bermudian species had striking morphological and anatomical similarities to *B. macaronesica* Afonso-Carrillo, Sobrino, Tittley & Neto from the Canary Islands in the eastern Atlantic (Afonso-Carrillo & al. 2006: 285), yet differences were found to separate these two large-vesicled, short-stalked *Botryocladia* species including the presence of vesicle to vesicle attachments, absence of secretory cells in the stipe, and presence of medullary cell growth under cystocarps (Schneider & Lane 2008: 626, Table 3).

Over the past 12 years, the genetic database available for the Rhodymeniales as cited above, and in particular the family Rhodymeniaceae, has dramatically increased. With a large number of taxa and infrgeneric *rbcL* sequences for *Botryocladia*, *Chrysymenia* and related Rhodymeniaceae, many newly generated for their study, Schmidt & al. (2017: 126, fig. 1) demonstrated that *B. flookii* nested in a clade as sister to *Halopeltis* and *Coelarthrum cliftonii* (Harvey) Kylin and did not resolve with other *Botryocladia* species including the generitype, *B. uvaria* (Murray) Harvey [= *B. botryoides* (Wulfen) Feldmann]. The molecular evidence of Schmidt & al. (2017: 134) suggested “the erection of a new elongate-saccate genus within the Rhodymeniaceae”. Therefore, we formally propose the following new genus to accommodate *B. flookii*:

Gazzaea C.W.Schneider & C.E.Lane, *gen. nov.*

Description: Plants composed of one to many, small to large mucilage-filled vesicles on short, simple and solid stipes attached by small discoid holdfasts; vesicles elongate to obovoid and slightly bending during development, producing lateral attachments to adjacent vesicles; vesicle walls multilayered with pigmented cortical layers and hyaline medullary cells, the larger medullary cells ultimately projecting into the inner vesicle cavity and producing one to many pyriform to obovoid secretory cells; outer cortex surface initially incomplete, becoming nearly complete at maturity; gametophytes and tetrasporophytes isomorphic; tetrasporangia formed in scattered discrete sori in the outer cortex, spherical to subspherical, cruciately arranged; gametophytes monoecious, spermatangia scattered on outer cortical cells and ostiolate

cystocarps scattered on vesicles, slightly protruding from the exterior of the vesicle; carposporangia subglobose, obovoid to irregularly angled.

Eponymy: Named for Dr Gary W. Saunders, Professor of Molecular Systematics & Biodiversity at the University of New Brunswick, Canada, for his voluminous and exceptional work pioneering molecular phylogenetics of marine macroalgae, in particular red algae, throughout the world. In that the surname Saunders is already in use for the endemic Brazilian orchid genus *Saundersia* H.G.Reichenbach (1866) and the phaeophyte *Saundersella* Kylin (1940, for De Alton Saunders), we chose to create a generic name using the nickname he acquired during a postdoctoral fellowship in Australia, “Gazza”.

Generitype: *Gazzaea flookii* (C.W.Schneider & C.E.Lane) C.W.Schneider & C.E.Lane, *comb. nov.* [Fig. 1].

Basionym: *Botryocladia flookii* C.W.Schneider & C.E.Lane, *Phycologia* 47(6): 623, figs 24–34, 2008.

Representative DNA barcodes in GenBank: EU977492, EU977493, EU977494 (*rbcL*). Schneider & Lane (2008).

Type locality: Walsingham Pond, Hamilton Parish, Bermuda I., Bermuda, western Atlantic Ocean.



Fig. 1. Type specimen of *Botryocladia flookii* C,W,Schneider & C.E.Lane [= *Gazzaea flookii* (C.W.Schneider & C.E.Lane) C.W.Schneider & C.E.Lane], CWS/CEL 05-8-13, Walsingham Pond, Bermuda [US]. Scale bar = 1 cm.

Notes: *Gazzaea* is genetically distinct from the morphologically similar saccate genus, *Irvinea* Guiry in Saunders & al. (1999: 36) (Schneider & Lane 2008, Schmidt & al. 2017). *Irvinea* develops vesicles from a branched stoloniferous holdfast that coalesces to form a discoidal structure that emits additional axes bearing vesicles, has secretory cells borne exclusively on morphologically smaller specialized medullary cells, and develops dioecious gametophytes (Saunders & al. 1999, Wilkes & al. 2006). Other than *Irvinea* spp. and *Botryocladia macaronesica*, there are also several short-stalked, few- and large-vesicled *Botryocladia* spp. [e.g., *B. chiajeana* (Meneghini) Kylin, *B. darwinii* C.W.Schneider & C.E.Lane, *B. fernandeziana* Levring, *B. ganesanii* Aponte Díaz, *B. senegalensis* G.Feldmann & Bodard] and *Chrysymenia brownii* (Harvey) De Toni that have a similar habit to *G. flookii*, and all are distinguished by a suite of anatomical differentiating characteristics.



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