***Torngatum varicrassum gen. et sp. nov.* expands taxonomic breadth for both the *Meiodiscaceae* (*Palmariales, Rhodophyta*) and the red algal flora of the Canadian Arctic**

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Routine barcoding (see Saunders & Moore, 2013) of red algal crusts from the Canadian Arctic yielded a unique *rbc*L-3P sequence with affinities to the Palmariales. Consequently, an extended *rbc*L fragment was generated (Saunders & Moore, 2013) and included in phylogenetic analyses with a variety of palmarialean taxa (*rbc*L alignment, 23 taxa and 1358 sites; RAxML, with partitioning by codon and 1000 bootstrap replicates) (BOLD public dataset: DS-TORNGAT1). A strong affinity between the novel genetic group and species of the genera *Meiodiscus* and *Rubrointrusa* in the *Meiodiscaceae* was uncovered (Fig. 1). In consideration of the relatively deep phylogenetic position for this species, and anatomical differences relative to recognised genera (discussed below), *Torngatum varicrassum gen. et sp. nov*. is proposed.

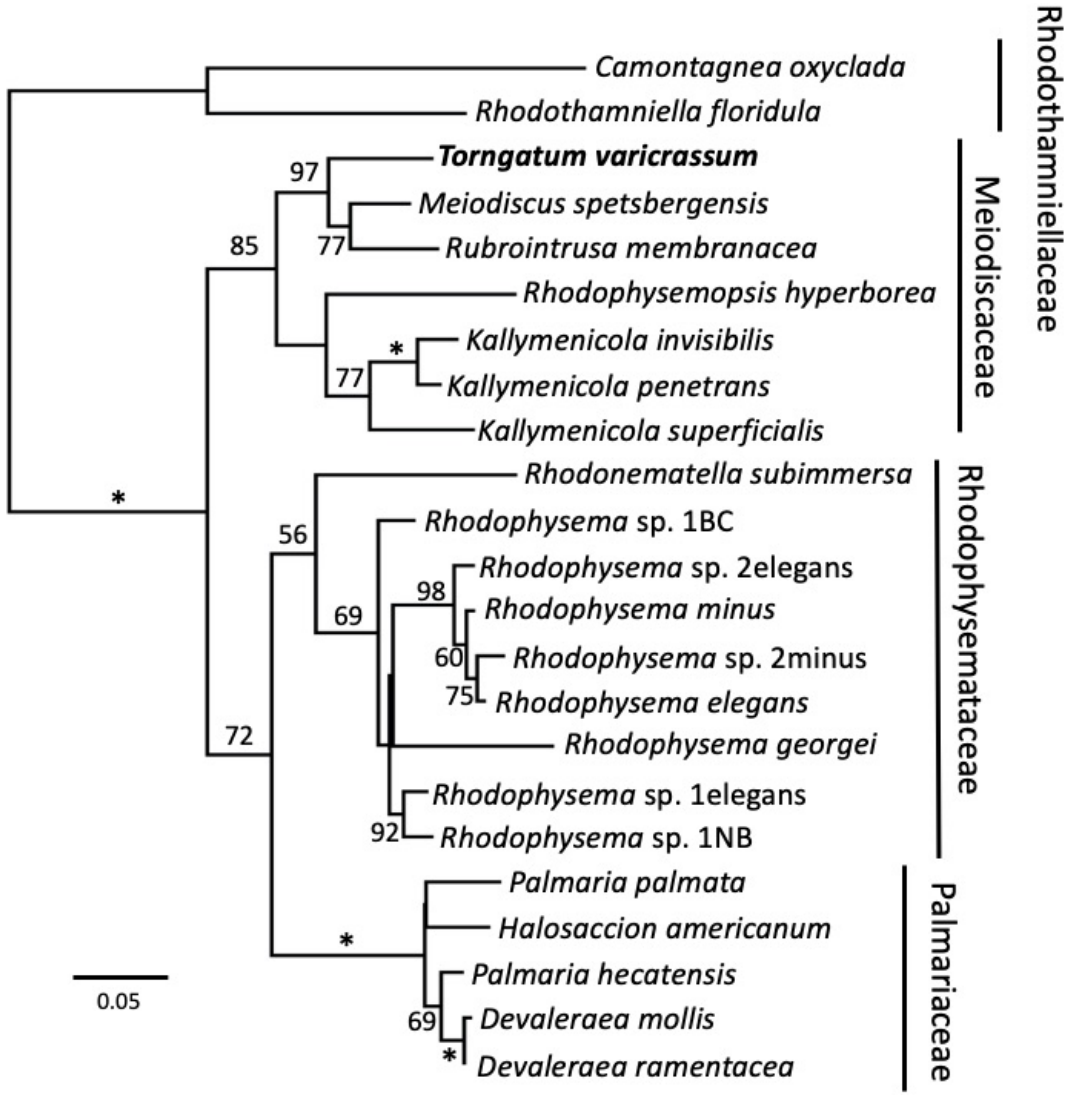


Fig. 1. Maximum likelihood phylogeny of *rbc*L sequences for a variety of Palmariales. Values at nodes represent bootstrap support (values <50% not reported; * indicates 100% support). The new genetic group, *Torngatum varicrassum*, is indicated in bold type. Scale = substitutions per site.

Torngatum *gen. nov*.

Description: Epiphytic meiodiscacean taxa that form predominantly monostromatic crusts with localised bistromatic and tristromatic regions. Erect filaments, where formed, are consequently only 1–2 cells long and are coherent. Cellular fusions appear confined to cells of the basal layer and absent (rare?) among erect filament cells. Reproduction uncertain, possibly by asexual tetrasporangia as is typical of *Meiodiscaceae*. Tetrasporangial initials apparently produced directly by cells of the basal layer, regenerative stalk cells intercalary in the basal filaments.

Etymology: Named for the Torngat Mountains National Park on the Labrador Peninsula, location of the type collection.

Type species: *Torngatum varicrassum sp. nov*.

Torngatum varicrassum *sp. nov.* (Figs 2-7)

Description: Thalli crustose, forming extensive covering on host kelp stipe (Fig. 2) with the extent of individual crusts difficult to discern. Growth of the basal filaments from small, 6–8 µm tall by 6–10 µm long, marginal cells (Fig. 3). Basal filaments laterally coherent to form a monostromatic crust, which follows closely the contour of the host surface (Fig. 4). Production of short, 1-2 celled, erect filaments yield localised bistromatic to (rarely) tristromatic regions of the crusts (Fig. 4). Basal filament cells are 4–6 µm wide by 7.5–15.0 µm long by 8–12 µm tall and form cellular fusions (Fig. 5), whereas erect filament cells, although similar in dimensions and also coherent, appear to lack cell fusions (Fig. 4). Putative tetrasporangial initial (only one clearly observed), 8 by 16 µm, with a single transverse division, clearly developing through transformation of a basal layer cell to produce a putative stalk cell intercalary in the basal layer subtending the tetrasporocyte initial (Fig. 6). Putative mature tetrasporangia observed, but details difficult to discern (Fig. 7).

Type collection: Coll. G.W. Saunders, K. Dixon & C.E. Lane, 8 Sept. 2014, N Head of Evans Bight, Torngat Mountains National Park, Labrador Peninsula, NFLD, Canada, 59.29849˚N, 63.52443˚W, subtidal 6 m on kelp stipe.

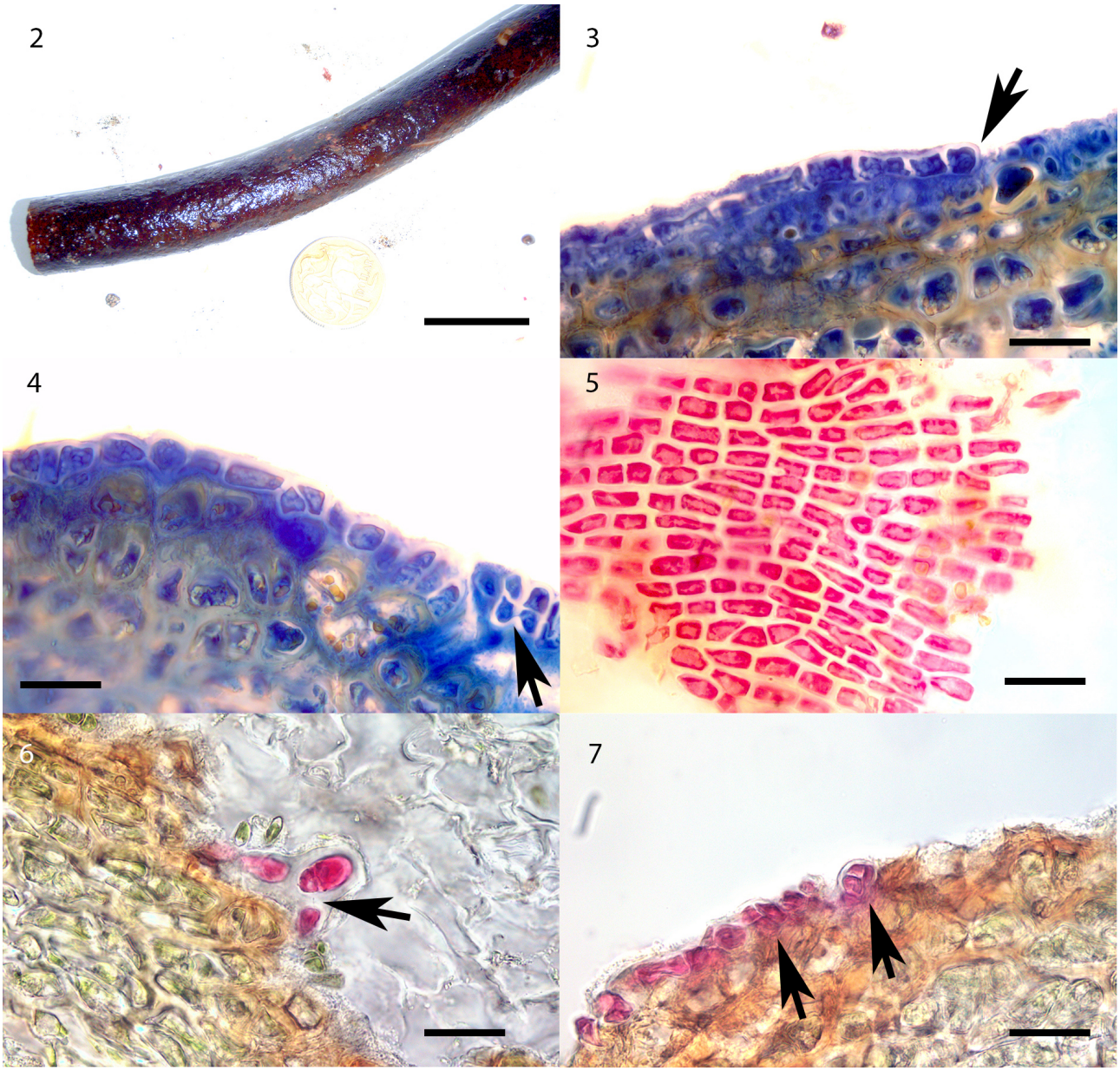
Etymology: In reference to the variable thickness of the crust, typically monostromatic but with localised bistromatic and tristromatic regions.

Holotype: GWS040284 (**UNB**), BOLD ABMMC20447-14, (Figs 2-7).

Holotype DNA barcode GenBank: MN992104 (*rbc*L).

Remarks: *Torngatum* differs from other genera in the *Meiodiscaceae* in a variety of ways. Like *Meiodiscus* it is epibiotic in contrast to species of *Kallymenicola* and *Rubrointrusa*, which are largely endobiotic (Clayden & Saunders, 2010; Evans & Saunders, 2017). In species of *Meiodiscus* the erect filaments are relatively long (to 4 mm long) and free (Saunders & McLachlan, 1991), while in *T. varicrassum* erect filaments are coherent and consist of only 1–2 cells (Fig. 4). In producing coherent erect filaments (apparently) lacking cell fusions, *T. varicrassum* is superficially similar to *Rhodophysemopsis,* but phylogenetic analyses indicate that these are distant relatives within the *Meiodiscaceae* (Fig. 1) and the latter is characterised by more extensive development of the erect axes (Masuda, 1976). Tetrasporangia in the *Meiodiscaceae* typically have a regenerative stalk or supporting cell, which can be a cell of the basal layer in some species of *Kallymenicola* (Evans & Saunders, 2017) as hypothesised here for *Torngatum* (Figs 6–7). However, these genera differ in their endophytic versus epiphytic habit, respectively.

Another interesting result was the unexpected diversity for *Rhodophysema* in North America. Whereas three species were expected (Sears, 2002; Gabrielson & Lindstrom, 2018), nine were uncovered (eight in Fig. 1, as well as *R. lundii* (Edelstein) C.W.Schneider & M.J.Wynne not included owing to low-quality *rbc*L data). A thorough review is necessary. Of those included here, only *R. georgei* Batters can be considered correctly identified at this time (Fig. 1).



Figs 2–7. Images of the holotype (GWS040284). **Fig. 2.** Kelp stipe covered with red crusts of *T. varicrassum*. Scale = 2.5 cm. Fig. 3. Long section at the margin of a crust showing the apical cell (arrow) of a basal filament (aniline blue stained). Scale bar = 20 µm. **Fig. 4**. Long section of a crust following the irregular contours of the host kelp stipe, and cross section of a different individual with a fusion between two basal cells in a bistromatic region of the thallus (arrow) (aniline blue stained). Scale bar = 20 µm. **Fig. 5.** Surface view of a monostromatic region of a crust with evident cell fusions. Scale bar = 20 µm. **Fig. 6.** Putative tetrasporangial initial, with a single transverse division (basal stalk cell subtending putative tetrasporocyte), clearly differentiating directly from a basal layer cell (arrow highlights a pit connection to one adjacent cell of the basal layer, the pit connection to the cell to the left is just out of the field of focus). Scale bar = 20 µm. **Fig. 7.** Putative tetrasporangia (arrows) close to the host surface (details were difficult to discern in this thicker section). Scale bar = 20 µm.

Tanya Moore generated the *rbc*L data for this study, while Kyatt Dixon and Chris Lane assisted with collection of this novel entity. All are deeply appreciated as is Craig Schneider for his guidance in Latin and Josh Evans for comments on this manuscript. This work was supported by

Discovery grant funding from the Natural Sciences and Engineering Research Council of Canada, as well as funding from the Canada Foundation for Innovation and the New Brunswick Innovation Foundation.

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