T3. A TAXONOMIC REVISION OF AUSTRALIAN *SARGASSUM*, WITH A NEW PERSPECTIVE ON THE SUBGENERIC CLASSIFICATION OF THE GENUS

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There are currently over 100 *Sargassum* species in Australia representing three of the four subgenera. A recent study of the Sargassaceae transferred the most widely distributed species of subgenus *Phyllotricha*, *S. decurrens*, to the reinstated genus *Sargassopsis*. Using a combination of morphological and molecular sequence data, the present study examined subgenus *Phyllotricha*, alongside other species of *Sargassum*, and the closely related genera *Sargassopsis*, *Sirophysalis* and *Carpophyllum*. Our results suggest that the genus *Sargassum* and subgenus *Phyllotricha* are polyphyletic with four species, *S. decipiens*, *S. varians*, *S. verruculosum* and the *Phyllotricha* generitype, *S. sonderi*, clustering as a monophyletic group sister to *Carpophyllum*. As such, the genus *Phyllotricha* is resurrected. The remaining species of subgenus *Phyllotricha sensu lato* were transferred to Sargassopsis and *Sargassum peronii* is synonymised with *Sargassopsis decurrens*. Species from subgenus *Arthrophycus* were found to be monophyletic and distinct from other Australian subgenera but showed low levels of genetic diversity among species. Subgenus *Sargassum* remains the most diverse and widespread of the subgenera, however, recent species additions and a growing number of synonyms indicate that much taxonomic work remains.

T4. THE CASPASE REACTOME OF *KARENIA BREVIS* DURING ROS-DRIVEN CELL DEATH

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Although many phytoplankton demonstrate morphological characteristics typical of programmed cell death, the proteases involved in potentiating death signals for cell suicide remain unresolved. Metacaspases, caspase-like homologs present in phytoplankton, are often proposed to be responsible. Quantification of caspase 3-like activity, using both the fluorogenic substrate DEVD and live cell imaging using the CellEvent Caspase 3/7 marker, identified significant induction in caspase activity during oxidative stress-induced death in *Karenia brevis*. Bioinformatic mining of a *K. brevis* EST library for caspase-like enzymes suggests that subtilisins and/or vacuolar processing enzymes (VPEs), not metacaspases, may be responsible for the caspase 3-like activity observed. In concordance, caspase 3-like protein abundance was induced during ROS-driven cell death as demonstrated by western blotting, while metacaspase 1 (KbMC1) significantly decreased. Furthermore, MALDI-TOF analysis of a candidate substrate revealed an increase in cleavage of its caspase 3-specific DEVD recognition motif by ROS-activated cell extracts. Together these results indicate metacaspases do not mediate dinoflagellate PCD. Computational prediction of downstream substrates for caspase 3-like activity identified a wide range of biological processes likely involved in the execution of death in dinoflagellates.

T5. THE SYSTEMATICS AND BIOGEOGRAPHY OF THE THOREALES, A FRESHWATER RED ALGAL ORDER

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The order Thoreales is composed of freshwater macroalgae with a worldwide distribution and contains only two genera, *Nemalionopsis* with two species, and *Thorea* with four to 11 species recognized by various authors. The controversy surrounding the number of species in *Thorea* stems from a lack of

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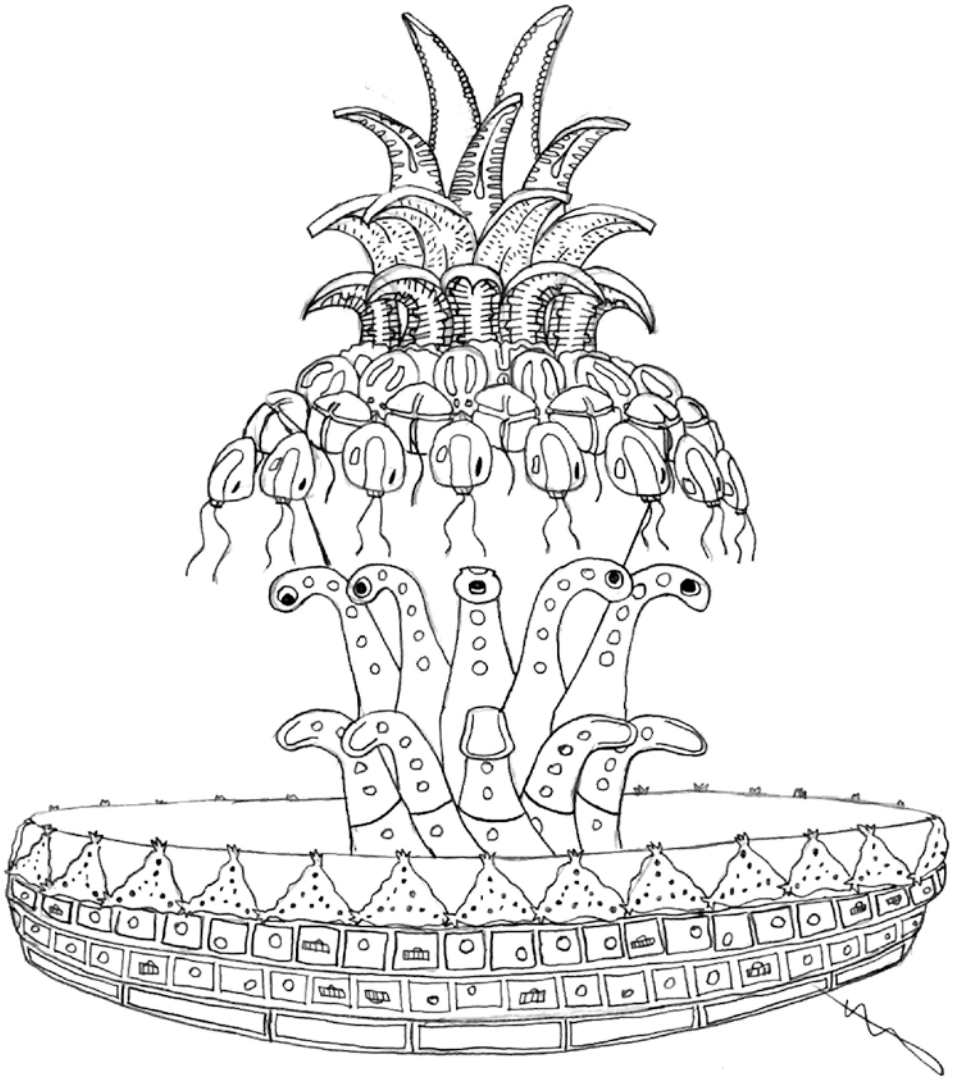

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