

Ph.D. Candidate

Lesleigh Gwynyth Ka`iulani Kraft

Graduate Academic Unit

Biology

August 13, 2020

10:00 a.m. (Atlantic)

Virtual Defence

Examining Board:

Dr. Adrian Reyes-Prieto (Biology)

Dr. Dion Durnford (Biology)

Dr. Thierry Chopin (Biological Sciences, UNBSJ)

Dr. Gary Saunders (Biology)

Supervisor

External Examiner:

Dr. Amy L. Carlile, Associate Professor

Chair, Biology and Environmental Science Dept.

University of New Haven

The Oral Examination will be chaired by:

Dr. Mary McKenna, Assistant Dean of Interdisciplinary Studies

BIOGRAPHY

Universities attended (with dates & degrees obtained):

2010 – present PhD candidate, University of New Brunswick
2008 MSc Botany, University of Melbourne
2005 BSc (Hons) Botany, University of Melbourne
2004 BSc Psychology, University of Melbourne

Publications:

Schneider, C.W., Popolizio, T.R., **Kraft, L.G.K.**, & Saunders, G.W. (2019). New species of *Galene* and *Howella* gen. nov. (Halymeniaceae, Rhodophyta) from the mesophotic zone off Bermuda. *Phycologia* **58**: 690-697.

Schmid, M., **Kraft, L.G.K.**, van der Loos, L.M., Kraft, G.T., Virtue, P., Nichols, P.D. & Hurd, C.L. (2018). Southern Australian seaweeds: a promising resource for omega-3 fatty acids. *Food Chem.* **265**: 70-77.

El-Haddad, H., Pryzborski, J.M., **Kraft, L.G.K.**, McFadden, G.I., Waller, R.F., Gould, S.B. (2013). Characterization of TTALV2, an essential charged repeat motif protein of the *Tetrahymena thermophila* membrane skeleton. *Eukaryot. Cell* **12**: 932–940.

Gould, S.B., **Kraft, L.G.K.**, van Dooren, G.G., Goodman, C.D., Ford, K.L., Cassin, A.M., Bacic, A., McFadden, G.I. & Waller, R.F. (2011). Ciliate pellicular proteome identifies novel protein families with characteristic repeat motifs that are common to alveolates. *Mol. Biol. Evol.* **28**: 1319-1331.

Kraft, L. G. K., Kraft, G. T. & Waller, R. F. (2010). Investigations into southern Australian *Ulva* (Ulvophyceae, Chlorophyta) taxonomy and molecular phylogeny indicate both cosmopolitanism and endemic cryptic species. *J. Phycol.* **46**: 1257-1277.

Selected Conference Presentations:

2017, April 21-23. 56th Northeast Algal Society meeting, Bretton Woods, NH.
Poster: Recognition of two new Australian genera in the order Halymeniales (Florideophyceae, Rhodophyta) reduces polyphyly in the genera *Cryptonemia* and *Halymenia*.

2015, November 4-6. Australasian Society for Phycology & Aquatic Biology, Hobart, Tasmania, Australia.
Talk: Biodiversity of the red algal order Halymeniales in Australia.

2015, August 10-13. Phycological Society of America, Philadelphia PA.
Talk: Examining the molecular phylogeny and taxonomy of the red algal order Halymeniales (Florideophyceae) in Australia to better conceive its biodiversity.

2015, April 17-19. 54th Northeast Algal Society meeting, Syracuse, NY.
Poster: Updated diversity of the red algal order Halymeniales (Florideophyceae, rhodophyta) in Australia.

2014, April 25-27. 53rd Northeast Algal Society meeting, Newport, RI.
Talk: The genus *Tsengia* (Tsengiaceae, Halymeniales) in tropical and temperate Australian waters.

2013, August 4-10. 10th International Phycological Congress, Orlando, FL.
Talk: Systematic investigation of the red algal order Halymeniales (Florideophyceae, Rhodophyta) in Australia. **(Several other Conference Presentations)**

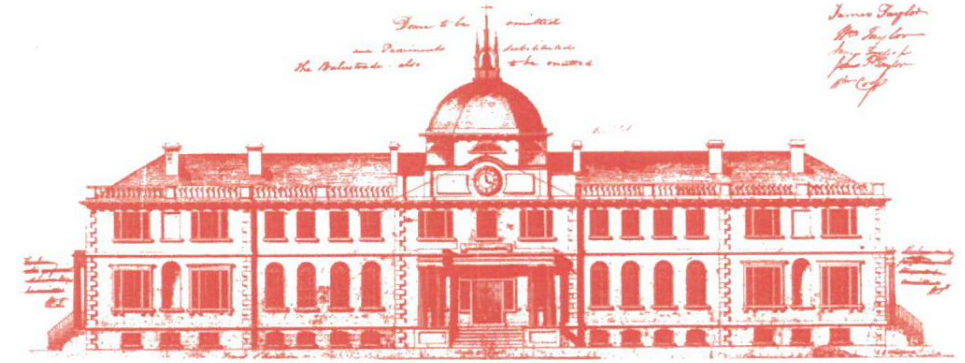
Exploring Species Diversity within the Order Halymeniales (Rhodophyta, Florideophyceae) of Predominantly Southeastern Australia using Molecular-assisted Alpha Taxonomy and Multi-gene Phylogenetics

Abstract

Appreciation of the diversity of biological life is fundamentally important not only to our understanding of the world around us, but imperative in management of our environments and assessing our impact upon same. Systematics and taxonomy are the disciplines dedicated to delving into characterizing the myriad species we share our planet with. This study was undertaken to assess species diversity in an order of red algae, the Halymeniales (Florideophyceae, Rhodophyta), from predominantly Australian collections. Modern methods have vastly increased the amount of data available to assess species diversity, with molecular barcoding being the fastest and simplest tool with which to quickly sequence large volumes of collected material and sort them into genetic species groups. From over 400 individual samples, the findings from barcode data revealed that the Halymeniales has many overlooked species (approximately doubling the biodiversity). The combination of molecular barcoding and traditional morphological assessment of anatomical features (viz. ‘alpha taxonomy’) is both more powerful than traditional taxonomy and more meaningful than simply knowing how many species groups there are, especially where novel species are uncovered by the molecular barcode. This combined approach, dubbed ‘molecular-assisted alpha taxonomy, or MAAT, was employed in this study and presented in the following chapters are many detailed observations of both existing species and species previously unknown to science.

Phylogenetic analyses placed this Australian biodiversity into a global evolutionary context, with data from Australian halymeniaceous taxa added to Halymeniales data from extra-Australian locations. Phylogenetic results indicated that some reorganization at the genus-level within the order is required, which is detailed in Chapters 2-4.

Presented here is the largest and most comprehensive molecular study of the Australian Halymeniales to date, using the combined approach of Molecular-assisted alpha taxonomy and phylogenetics to more accurately conceive the biodiversity of this large and morphologically diverse order of red algae.



Home of the School of Graduate Studies, Sir Howard Douglas Hall was designed by J.E. Woolford in 1825 and is the oldest university building in Canada still in use.

The University of New Brunswick recognizes that the university sits on traditional Wolastoqey territory. The river that runs right by our university – the St. John River – is also known as Wolastoq, along which live the Wolastoqiyik -- the people of the beautiful and bountiful river.

UNIVERSITY OF NEW BRUNSWICK SCHOOL OF GRADUATE STUDIES

ORAL EXAMINATION

Lesleigh Gwynyth Ka`iulani Kraft

**IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF**

DOCTOR OF PHILOSOPHY