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## LITHOTHAMNION SPECIES (HAPALIDIALES, RHODOPHYTA) IN THE ARCTIC AND SUBARCTIC: PROVIDING A SYSTEMATICS FOUNDATION IN A TIME OF RAPID CLIMATE CHANGE

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Coralline red algae in the genera *Clathromorphum*, *Phymatolithon* and *Lithothamnion* are important benthic ecosystem engineers in the photic zone of the Arctic and Subarctic. In these regions, the systematics and biogeography of *Clathromorphum* and *Phymatolithon* species have mostly been resolved whereas *Lithothamnion* species have not. Seventy-three specific and infraspecific names have been given to Arctic and Subarctic *Lithothamnion* specimens, the vast majority by Mikael H. Foslie in the late 19th and early 20th century. From the type specimens of 38 of these names, partial rbcL sequences were obtained that enabled us to correctly apply the earliest available names and to correctly place the remainder in synonymy.

Three of the four Arctic and Subarctic *Lithothamnion* species, *L. lemoineae*, *L. soriferum* and *L. tophiforme* were distinct based on all three sequenced genes, two plastid encoded, rbcL and psbA, and the mitochondrial encoded COI-5P; rbcL and COI-5P also segregated *L. glaciale* from *L. tophiforme* but psbA did not. Based on DNA sequences, morpho-anatomy and biogeography, we recognize all four species. It is difficult to identify these species based on morpho-anatomy and they can all occur as encrusting corallines, as rhodoliths or as maerl. We demonstrate the importance of sequencing these historical type specimens by showing that the recently proposed northeast Atlantic *L. erinaceum* is a synonym of one of the earliest published Arctic species of *Lithothamnion*, *L. soriferum*, itself incorrectly placed in synonymy under *L. tophiforme* based on morpho-anatomy. Based on sequenced specimens, we update the distributions and ecology of these species.

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