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Maërl beds are formed by free-living coralline algae (Corallinales) also called rhodoliths (Figures 1 and 2). Species with this habit are ascribed to at least 7 different genera and occur at all latitudes in all oceans of the world. The phylogenetic relationships of these organisms are poorly understood, due to the scarcity of molecular data. The information currently available concerns the southern hemisphere (taxa from Australia and New Zealand sequenced by Broom et al., 2008); molecular data are unavailable for the northern hemisphere. Additionally, Broom et al. (2008) remarked several problems affecting the taxonomy of these algae, especially in the family Hapalidiaceae (concerning the circumscription of the genera *Phymatolithon*, *Synarthrophyton* and *Mesophyllum*).



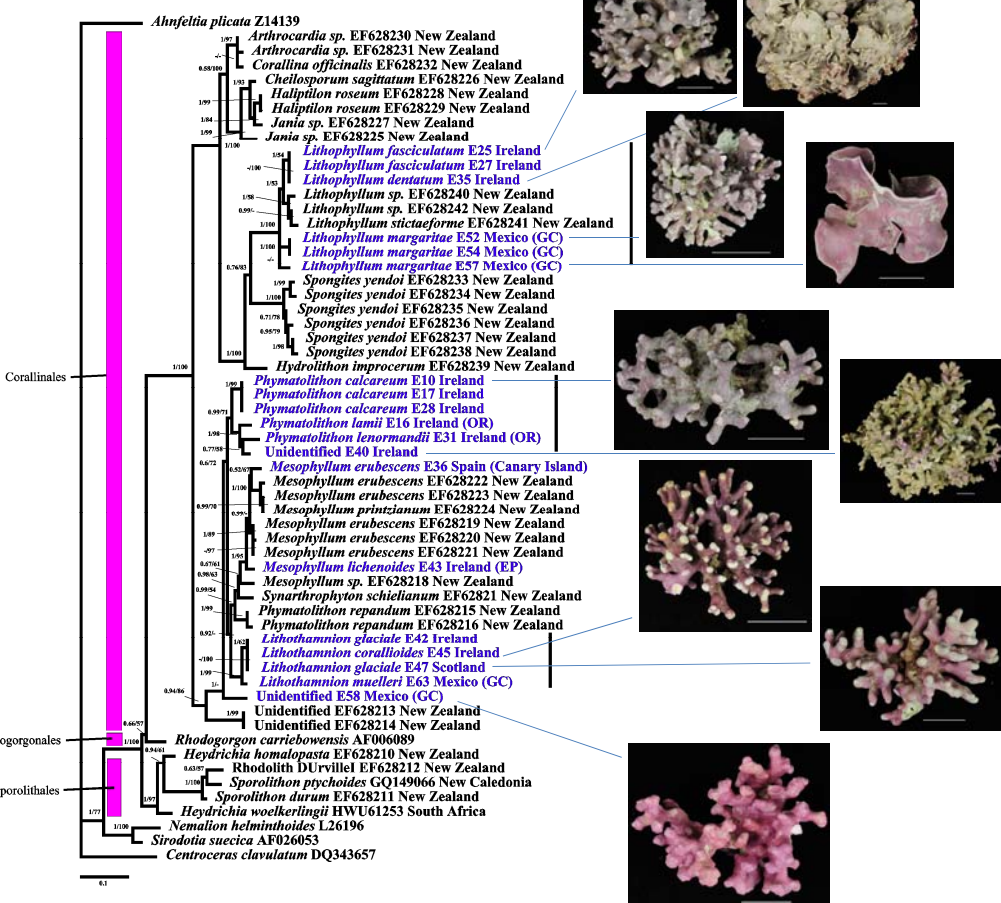
Figure 1. Subtidal maërl bed, Mexico.



Figure 2. Intertidal, maërl bed, Ireland.

Our objective is to clarify the phylogenetic relationships of the maërl-forming species occurring in the northern hemisphere. For this goal, we are using sequences of the 18S rRNA, *psbA* and *rbcL* genes.

18S rRNA sequences have been obtained so far for samples from Ireland, Scotland, Canary Islands and Mexico (Gulf or California). The material was dried in silica or air dried. Procedures for DNA extraction and PCR followed Broom et al. (2008). Phylogenetic inference was based on Maximum Likelihood and Bayesian analyses, using Treefinder version October 2008 (Jobb, 2008) and MrBayes v3.1 (Ronquist and Huelsenbeck, 2003). Selection of the model used for the Bayesian analysis was made using jModeltest (Posada, in press).



Phylogeny of the 18S rRNA gene of maërl-forming species inferred by Bayesian analysis. Numbers at nodes are Bayesian posterior probabilities/ML values. Phylogram scale is in substitutions per site. Abbreviations used: GC= Gulf of California, OR= On rock-crust, EP=Epiphyte. Pink bars indicate orders, Black bars remark genera. The scale in all photographs associated with the phylogram is 1 cm.

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Main conclusions

- Rhodolith species of the northern hemisphere occur in at least 5 separate lineages.

- The results are in agreement with the traditional classification at genus level, but some genera (such as *Phymatolithon*) are recovered as polyphyletic.

- *Lithophyllum dentatum* and *L. fasciculatum* have identical 18S rRNA sequences, despite the different morphology; their identity needs to be reassessed using more variable markers. Despite of great morphological similarity, *Lithophyllum dentatum* and *L. margaritae* are distinct entities.

- *Phymatolithon* is not recovered as monophyletic. *P. calcareum* is the type species and occurs in a well-supported clade with encrusting species living attached to rock (*P. lamii* and *P. lenormandii*).

- *Mesophyllum* is recovered with high support. *M. erubescens* from the Canary Islands might be a separate entity from *M. erubescens* from New Zealand.

- The genus *Lithothamnion* is well supported in our analyses. Specimens from Ireland and Scotland attributed to *L. glaciale* have identical sequences despite of different morphology.