UNIVERSITY OF GOTHENBURG

New Insights into the Evolution of Bryozoa
– An Integrative Approach

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Akademisk avhandling för filosofie doktorsexamen i Naturvetenskap, som med vederbörligt tillstånd från Naturvetenskapliga fakulteten kommer att offentligt försvaras fredagen den 11 mars 2011 kl. 10.00 i föreläsningssalen, Zoologiska institutionen, Medicinaregatan 18, Göteborg. Opponent: Dr. Joanne Porter, School of Life Sciences, Heriot-Watt University Edinburgh, United Kingdom. Avhandlingen kommer att försvaras på engelska.

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Dissertation abstract

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Bryozoa is a group of aquatic, sessile invertebrates with circumglobal distribution and includes about 6000 recent species. Bryozoans have an indirect life cycle with a larval stage that settles and metamorphoses into the adult. Although a bryozoan individual is barely visible with the naked eye, all bryozoans form colonies, which are often macroscopic in size and display a variety of beautiful shapes and forms. Ever since their first scientific description in the 16th century, bryozoan relationships to other animal groups have been enigmatic. Bryozoan morphology and life history show various differences to other invertebrates, so that their closest relatives could not be identified with certainty. Also, a reliable hypothesis about the evolution of the variety of bryozoan larval and adult body forms is greatly in dispute.

In this thesis, questions concerning bryozoan evolution are addressed from diverse angles by exploring different life cycle stages and methodological tools. A new phylogeny of Bryozoa based on molecular data is presented. A similar approach is used to investigate the phylogeny of another animal taxon, Entoprocta, which was long thought to be the sister group of Bryozoa. The results reveal that Bryozoa is a natural group with a single origin (monophyletic clade) and that Bryozoa and Entoprocta are not sister groups. Further, gene expression in the larval stage of the bryozoan *Bugula neritina* was studied and indicates the importance of molecularly pre-patterned blastemic tissues for adult body plan formation. In addition, a new bryozoan species from the West Coast of Sweden is described and a genetic barcode is provided for the new species, which will help to identify this species in the future.

The thesis demonstrates that molecular data combined with high taxon sampling are essential to reveal bryozoan phylogenetic relationships and that gene expression studies of the enigmatic taxon Bryozoa are valuable to get insights into the evolution of their life cycle and to contribute to our general understanding of metazoan body plan evolution.

Keywords: Ectoprocta, moss animal, systematics, phylogeny, barcode, COI, gene expression

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