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In brown algae (Phaeophyceae), pyrenoids are reported to occur on the plastids of only a few taxa, where they often prove valuable for systematic delineation. Members of the Ectocarpales display large, stalked and exerted pyrenoids on their plastids, while the Scytothamnales as well as the genera *Asterocladon*, *Asteronema* and *Bachelotia* exhibit stellate plastidomes with pyrenoids embedded in the plastidial stroma. Although previous molecular studies have initiated the resolution of the systematic position of some of the latter taxa, a significant amount of work remained to be done, particularly in order to shed light upon relationships between and within Ectocarpalean families. To reassess phylogenetic relationships of pyrenoid-bearing taxa among brown algae, a seven-locus data set (>6000 bp) was generated for a species-rich, class-level taxon sampling with a particular attention to the order Ectocarpales. Within the Ectocarpales, the inter-familial relationships have been clarified as well as the position of several enigmatic genus, *Bachelotia* (included in the Scytothamnales). Our resolved phylogenetic analyses lead to new taxonomic proposals, particularly within the negatively-defined family Chordariaceae, which leads to a discussion on the evolution of pyrenoid-bearing plastids et pyrenoid architecture within Phaeophyceae.

7A.8

HISTORICAL BIOGEOGRAPHY, DIVERSIFICATION AND NICHE SHIFTS OF MARINE MACROALGAE

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It is often hypothesized that many of the modern algal families have a Mesozoic origin in cold- and cool-temperate waters of the southern hemisphere rather than tropical regions. Support for a southern origin of many algal groups comes from the recognition of possible ancestral taxa in the cold- and cool-temperate shores of Australia, Tasmania and New Zealand. Tropical regions on the other

hand are thought to be dominated by relatively young lineages, having largely diversified in the Paleocene and Eocene possibly in response to increased herbivory. Data availability, e.g. inadequate diversity estimates, geographical sampling bias, uncertainty about phylogenetic relationships and divergence times, as well as methodological issues related to historical biogeography, make that scenarios of macroalgal diversification have rarely been tested explicitly. By integrating parametric models in historical biogeography we test the hypothesis that: 1.) independent marine algal flora's developed along the western and eastern shores of Australia while it was still part of Gondwana; 2.) the Australian algal flora acted predominantly as a donor region from which species dispersed in the Cenozoic; 3.) the diversification of typical tropical families is a relatively recent phenomenon coinciding with thermal stratification of the oceans and increased herbivory. We make use of global algal phylogenetic datasets (e.g. Dictyotales, Bryopsidales) developed over the last decade in our research group and integrate these data with species distribution models and divergence time estimates to explore the evolution of ecological niches.

7A.9

MACROALGAL CRYPTOGENESIS: WHERE ARE WE?

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In the light of global change, biological invasions are considered as one of the most important threats to biodiversity. Over the 20th century, introduction events have increased exponentially. A higher frequency of vector movements and new transport pathways are clearly responsible for that trend. Introductions of exotic species of seaweeds have been recorded for two centuries. However, on global scale, transport pathways have been in place at least since the Age of Discovery (15th century). As a result, many marine species have now a cosmopolitan distribution and are considered as cryptogenetic (i.e. neither native nor exotic). Using some macroalgal examples, we show how phylogeographic studies can help to resolve these issues, but also the limits of this approach for some taxa with a long history of transport with a resulting strongly influenced global distribution.