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binary cell division. Time-lapse video observations revealed that, after division of the flattened amoeboid cell, one daughter cell became a mobile amoeboid cell, while the other daughter cell remained as a flattened amoeboid cell. The strain P314 differs from the only known species of *Gymnochlora*, *G. stellata* in 1) having flattened non-mobile amoeboid cells, 2) lacking formation of large multinuclear cells, 3) having smaller average cell size [7-(9.7)-14 µm], and the position of an electron-opaque droplet in the nucleolus. We concluded that the strain P314 should be described as a second species of *Gymnochlora*. Molecular phylogenetic analyses using 18S rDNA sequences supported the proposed taxonomic position of strain P314.

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SHOULD WE RECOGNIZE AN ORDER RALFSIALES WITHIN THE PHAEOPHYCEAE?

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In order to investigate the monophyly of the crustose brown algal order Ralfsiales Nakamura nom.nud., excluding *Analipus* which was shown not to be related to *Ralfsia* since 1994, and to assess phylogenetic relationships of genera currently placed in this order, nucleotide gene sequences for both the nuclear-encoded small and large-subunit RNA (SSU and LSU domains C'1 D2), and plastid-encoded large subunit of RuBisCO (*rbc*L) were determined for *Hapalospongidion*, *Nemoderma*, *Pseudolithoderma* and *Ralfsia*. Parsimony, maximum-likelihood analyses and neighbor-joining distance analyses were performed using unambiguously aligned *rbc*L, SSU and LSU combined sequences. Evidence of the polyphyly of Ralfsiales, was obtained and this appears consistent with some morphological features, especially, plastid ultrastructure which is confirmed of phylogenetic value within Phaeophyceae.

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CHEMICAL DEFENCE AGAINST BACTERIA IN THE RED ALGA *ASPARAGOPSIS ARMATA*; LINKING STRUCTURE WITH FUNCTION

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Tests of the antimicrobial activity of marine algal products have generally focussed on the susceptibility of bacteria to whole algal extracts and/or isolated compounds. Yet due to limited knowledge of metabolite localisation in algae, the ecological roles of these natural products are not well understood. In this study, tests of the crude and non-polar extracts of *Asparagopsis armata* revealed antibacterial activity against marine and other bacterial strains. The major natural products in *A. armata* (as determined by gas chromatography – mass spectrometry analysis) were bromoform (ranging between 1 - 4.5 % dry weight) and dibromoacetic acid (0.5 - 2%). Both were active against the same bacteria. To determine ecological relevance of these antimicrobial tests, we examined the localisation of metabolites in the specialised cells of this alga (using light and transmission electron microscopy) and observed a delivery mechanism for the release of metabolites to the surface. Bromoform and dibromoacetic acid were subsequently quantified in the surrounding medium of laboratory cultures, establishing their release from the alga. In a novel ecological test of algal natural products, halogenated metabolites in *A. armata* were manipulated by omitting bromine from an artificial seawater medium. Significantly higher densities of epiphytic bacteria occurred on algae that no longer produced halogenated metabolites. Furthermore, bromoform and dibromoacetic acid were active against bacteria isolated from the algal surface. The localisation of brominated compounds in *A. armata* was integral to understanding the chemical defence against epiphytic bacteria.

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POPULATION GENETIC STRUCTURE OF DIOECIOUS VERSUS HERMAPHRODITE

Abstracts of papers to be presented at the

8th International Phycological Congress

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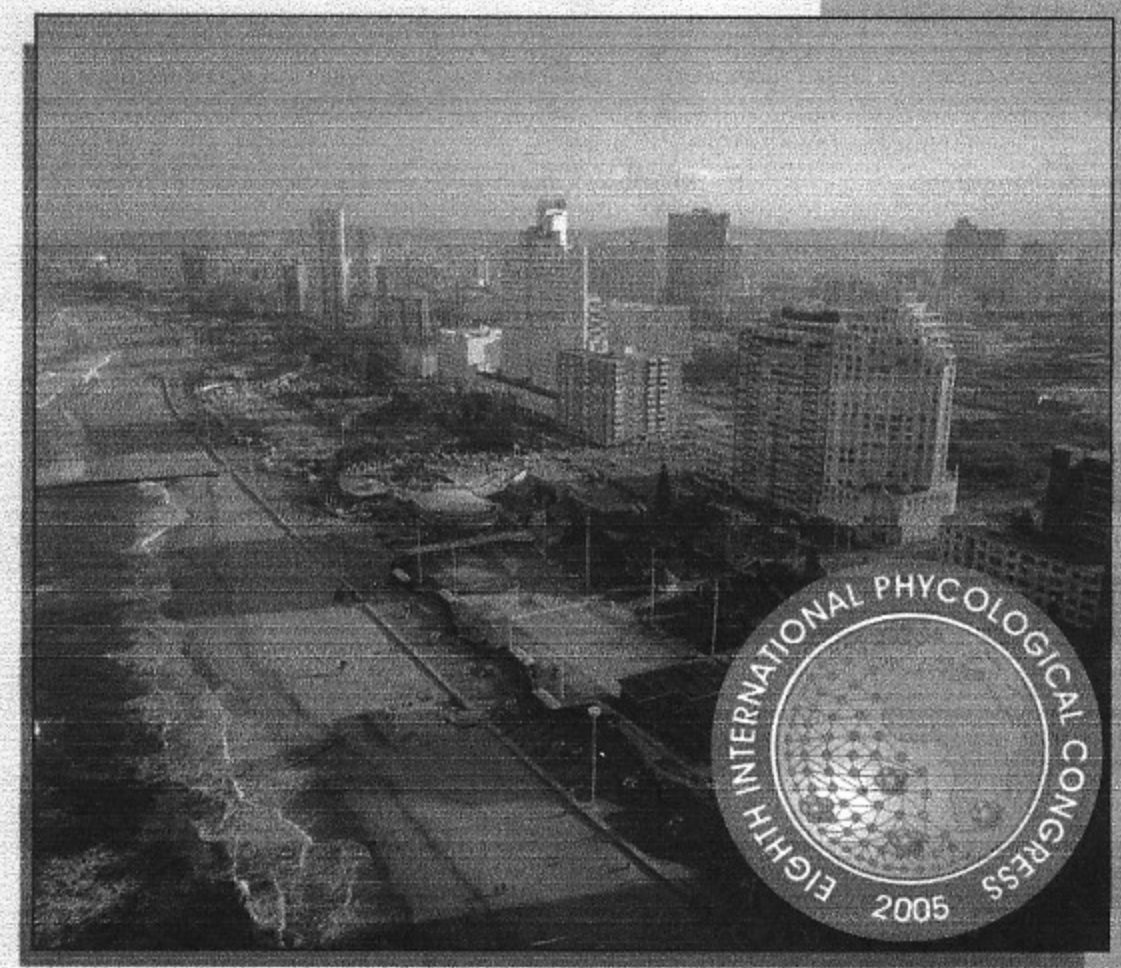

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