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 Gymnochloa, 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 nucleus. We concluded that the strain P314 should be described as a second species of Gymnochloa. 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?

M. I. Parente, 1, 2 F Rousseau, 3 B L Fletcher, 1 A L Neto 1 and B Reviers 3

1 Institute of Marine Sciences, University of Portsmouth, Fossy Road, Eastney, Portsmouth PO4 9L Y, Hampshire, United Kingdom, 2 CIRN and Sociedade de Biologia Marinha, Departamento de Biologia, Universidade dos Açores, Rua de Mãe de Deus, 9501-801 Ponta Delgada, Açores, Portugal, 3 Muséum National d'Histoire Naturelle, Département Systématique et Évolution, UMR 7138, Systématique, Adaptation, Évolution, 57, rue Cuvier 75231 Paris cedex 05, France

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 C1-D2), and plastid-encoded large subunit of RuBisCO (rbcL) were determined for Hapalosiphonidion, Nemoderma, Pseudolithodera and Ralfsia. Parsimony, maximum-likelihood analyses and neighbor-joining distance analyses were performed using unambiguously aligned rbcL, 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

N A Paul 1, R de Nys 2, P D Steinberg 1

1 School of Biological, Earth & Environmental Sciences, and, Centre for Marine Biofouling and Bio-Innovation, University of New South Wales, Sydney 2052, Australia, 2 School of Marine Biology and Aquaculture, James Cook University, Townsville 4811, Australia

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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