Recent Advances in Science in Western Australia

Earth Sciences

Twelve genera of chlorophycean algae in Triassic palynological assemblages from north-western Australia are reviewed by W Bremmer (GEOMAR, Kiel) and C Foster (AGSO, Canberra). They suggest a possible evolutionary pathway for certain chlorococcalean coenobial families based on comparison with some living green algae (Orders Chlorococcales and Zygnematales) which develop resistant outer organic walls and/or cysts during their life cycle.

Brenner W & Foster C B 1994 Chlorophycean algae from the Triassic of Australia. Review of Paleobotany and Palynology 80:209-234.

Glengarry Group stratigraphy identified in the fold belt to the north can be applied to the southern foreland area on the Glengarry 1:250 000 map sheet. Four of the five major tectonic events that affected the Nabberu Province can be recognised on the foreland: listric faulting (Phase 1) relates to early basin subsidence by crustal extension; the succeeding convergent-styled Phases 2-4 (4 has no expression on the foreland) probably relate to the collision of the Capricorn Orogin; and the final tectonic act of normal faulting (Phase 5) may relate to the onset of crustal extension controlling the development of the younger Bangemall basin.

Gee R D & Grey K 1994 Proterozoic rocks on the Glengarry 1:250 000 sheet — stratigraphy, structure and stromatolite biostratigraphy. Geological Survey of Western Australia, Report 41.

Boudinage is shown by D Findlay (Consultant, South Perth) to be an important aspect of the structure of the goldfield, the lode distribution to be coincident with the principal necks, and the configuration of the lodes to match the characteristic fracture patterns of classical boudin necks. Boudinage is therefore interpreted to be an important control on the emplacement of mineralization and is proposed as a simpler alternative to the more complex shear-related models, and may be useful in exploration for deposits of similar type.

Findlay D 1994 Boudinage control on the emplacement of lodes of the Kalgoorlie goldfield. Australian Journal of Earth Sciences 41:105-113.

A U/Pb isotopic age determined by researchers from the Key Centre for Strategic Mineral Deposit Research (University of Western Australia) and the Research School of Earth Sciences (Australian National University), of 2991 ± 12 Ma, for zircons from the Mt Brown Rhyolite, in the Whim Creek Supersequence, supports previous evidence that the main periods of silicic volcanism in the west Pilbara are much younger than in the East Pilbara. Available data now favour the westwards growth of the Pilbara Craton from *ca.* 3.5 to 2.9 Ga, rather than the single essentially tabular stratigraphy for the craton originally proposed.

Barley M E, McNaughton N J, Williams I S & Compston W 1994 Geological note. Age of Archaean volcanism and sulphide mineralization in the Whim Creek Belt, west Pilbara. Australian Journal of Earth Sciences 41:175-177.

Studies of Archaean lode-gold deposits from Western Australia, by local scientists (Key Centre for Strategic Mineral Deposit Research, University of Western Australia) indicate that the Pb isotopic data distribution for ore-associated galenas and pyrites is commonly linear, and determination of the initial Pb ratio relies on selecting the least-radiogenic composition. Detailed studies of Victory Mine samples have led to the development of criteria for selecting target pyrite samples which best preserve the initial Pb ratio of the sulphide, and hence the ore fluid. The most important controls on the displacement of the measured Pb ratio of pyrite from the initial Pb ratio are the Pb content of pyrite, pyrite abundance, proximity of pyrite to ore-fluid channelway, and host rock.

Ho S G, McNaughton N J & Groves D I 1994 Criteria for determining initial lead isotopic compositions of pyrite in Archaean lode-gold deposits: a case study at Victory, Kambalda, Western Australia. Chemical Geology 111:57-84.

Life Sciences

Collaborative research, by scientists from James Cook University (Qld), Department of Conservation and Land Management (WA) and the Conservation Commission (NT), has examined the abundance and distribution of the dugong in Shark Bay, Western Australia. Aerial survey counts (corrected for perception and availability biases) indicated 10146 ± se 1665 individuals, at a density of 0.71 ± se 0.12 dugongs km^{-2}, with a high percentage of calves (19%). Shark Bay is confirmed to be an internationally significant dugong habitat.

Marsh H, Prince R I T, Saalfield W K & Shepherd R 1994 The distribution and abundance of the dugong in Shark Bay, Western Australia. Wildlife Research 21:149-161.

A comparison by two South African scientists (Department of Botany, University of Cape Town) of plant traits for edaphically-matched sites at the Barrens, southwestern Australia, and the Agulhas Plain, southwestern South Africa, indicated strong convergence in a wide range of traits related to morphology and function. Examples of non-convergence are attributed to regional and historical processes rather than differences in the contemporary physical environments of the two areas.

Cowling R M & Witkowski E T F 1994 Convergence and non-convergence of plant traits in climatically and edaphically matched sites in Mediterranean Australia and South Africa. Australian Journal of Ecology 19:220-232.

Bird censuses at 20 mulga sites across Australia enabled North American ornithologist, M Cody of the University of California at Los Angeles, to use null (binomial) models to show that community composition is far more consistent among censuses than expected at random. Of the total of 81 bird species censused, 32% were interpreted to be “core species” in “core niches” that accounted for almost 75% of the bird density in mulga communities. Regional variations in the composition of some guilds illustrated various factors that contributed to a large species total in mulga, despite the predominance of “core species”

Cody M L 1994 Mulga bird communities. I. Species composition and predictability across Australia. Australian Journal of Ecology 19:206-219.

A study of the parrotfish family (Scaridae) by D Bellwood uses comparative morphology to identify species groups within the family, and determine their phylogenetic relationships. Examination of 143 character states for 69 of the 180 species of Scaridae are used for analysis by the principal of maximum parsimony. A diagnosis of supraspecific taxa, a key to genera, and a list of Recent species are also provided.

Bellwood D R 1994 A phylogenetic study of the parrotfishes family Scaridae (Pisces: Labroidei), with a revision of genera. Records of the Australian Museum. Supplement 20.

Researchers from the CSIRO Tropical Ecosystems Research Centre (NT) and Harvard University (USA) used an experimental study of the influence of abundance, high activity, and aggressiveness of Australian meat ants to demonstrate that their interference with other ant species has important implications for the sizes and densities of colonies of the other species, and ultimately the overall ant community structure.

Andersen A N & Patel A D 1994 Meat ants as dominant members of Australian ant communities: an experimental test of their influence on the foraging success and forager abundance of other species. Oecologia 98:15-24.

The structure and fecundity of *Banksia menziesii* varies between its mesic range (Swan Coastal Plain) where the tree form has a relatively low fecundity, and its xeric range (Eneabba Plain) where the shrub form has a higher fecundity. Plants on road verges had a larger crown and a higher fecundity than plants more than 50 metres from the verge.

Lamont B B, Whitten V A, Witkowski E T F, Rees R G & Enright N J 1994 Regional and local (road verge) effects on size and fecundity in *Banksia menzesii*. Australian Journal of Ecology 19:197-205.

Study of algal zonation on the intertidal limestone platforms off Perth by R Scheibling, of Dalhousie University, Halifax, indicates a characteristic pattern of dense macroalgal beds nearshore with a barren zone on the seaward edge. Manipulative experiments indicated that the extent of algal cover was inversely related to the numbers of grazing molluscs, and that limpets and chitons accounted for 55 to 89% of the variation in algal cover whereas abalone accounted for <10%. The effect of the grazers was both through decreased space for colonization by algae due to the home scar area of the molluscs, and by grazing around the home scar area.

Scheibling R E 1994 Molluscan grazing and macroalgal zonation on a rocky intertidal platform at Perth, Western Australia. Australian Journal of Ecology 19:141-149.

Note from the Hon Editor: This column helps to link the various disciplines and inform others of the broad spectrum of achievements of WA scientists (or others writing about WA). Contributions to "Recent Advances in Science in Western Australia" are welcome, and may include papers that have caught your attention or that you believe may interest other scientists in Western Australia and abroad. They are usually papers in refereed journals, or books, chapters and reviews. Abstracts from conference proceedings will not be accepted. Please submit either a reprint of the paper, or a short (2-3 sentences) summary of a recent paper together with a copy of the authors' names and addresses, to the Hon Editor or a member of the Publications Committee: Dr S D Hopper (Life Sciences), Dr A E Cockbain (Earth Sciences), and Assoc Prof G Hefter (Physical Sciences). Final choice of articles is at the discretion of the Hon Editor.

"Letters to the Editor" concerning scientific issues of relevance to this journal are also published, at the discretion of the Hon Editor. Please submit a word processing disk with letters, and suggest potential reviewers or respondents to your letter. *P C Withers, Hon Editor, Journal of the Royal Society of Western Australia.*