

Fossil clitellate annelid cocoons and their microbiological inclusions from the Eocene of Seymour Island, Antarctica

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ABSTRACT

Clitellate annelids have a meagre body fossil record but they secrete proteinaceous cocoons for the protection of eggs that, after hardening, are readily fossilized and offer a largely untapped resource for assessing the evolutionary history of this group. We describe three species of clitellate cocoons (*viz.*, *Burejospermum seymourense* sp. nov., *B. punctatum* sp. nov. and *Pegmatothylakos manumii* gen. et sp. nov.) from the lower Eocene La Meseta Formation, Seymour Island, Antarctica. The cocoons probably derive from continental settings and were transported to, and preserved within, nearshore marine to estuarine environments. The cocoons provide the first evidence of commensal or parasitic relationships in the Eocene continental ecosystems of Antarctica. Moreover, numerous micro-organisms and the oldest fossilized examples of animal spermatozoa are preserved as moulds within the consolidated walls of the cocoons. Fossil annelid cocoons offer potential for enhanced palaeoenvironmental interpretation of sediments, correlation between continental and shallow-marine strata, and improved understanding of the development of clitellate annelid reproductive traits and the evolutionary history of soft-bodied micro-organisms in general.

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