



A New Chytridiomycete Fungus Intermixed with Crustacean Resting Eggs in a 407-Million-Year-Old Continental Freshwater Environment

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The 407-million-year-old Rhynie Chert (Scotland) contains the most intact fossilised remains of an early land-based ecosystem including plants, arthropods, fungi and other microorganisms. Although most studies have focused on the terrestrial component, fossilised freshwater environments provide critical insights into fungal-algal interactions and the earliest continental branchiopod crustaceans. Here we report interactions between an enigmatic organism and an exquisitely preserved fungus. The fungal reproductive structures are intermixed with exceptionally well-preserved globular spiny structures interpreted as branchiopod resting eggs. Confocal laser scanning microscopy enabled us to reconstruct the fungus and its possible mode of nutrition, the affinity of the resting eggs, and their spatial associations. The new fungus (*Cultoraquaticus trewini* gen. et sp. nov) is attributed to Chytridiomycota based on its size, consistent formation of papillae, and the presence of an internal rhizoidal system. It is the most pristine fossil Chytridiomycota known, especially in terms of rhizoidal development and closely resembles living species in the Rhizophydiales. The spiny resting eggs are attributed to the crustacean *Lepidocaris rhyniensis*, dating branchiopod adaptation to life in ephemeral pools to the Early Devonian. The new fungal interaction suggests that, as in modern freshwater environments, chytrids were important to the mobilisation of nutrients in early aquatic foodwebs.

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Liens

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