Kalania pusilla, an exceptionally preserved non-calcified alga with the oldest documented gametophores from the lower Silurian (Aeronian, Llandovery) of Estonia

Oive Tinn, Viirika Mastik, Leho Ainsaar and Tonu Meidla
University of Tartu, Estonia

Dasycladacean algae are an order of unicellular organisms within the Division Chlorophyta. Having been in existence since the Cambrian period, they constitute a substantial component of algal geological history. A significant proportion of dasyclads develop a calcium carbonate skeleton, the main characteristics of the order are the radially symmetrical thallus architecture and the siphonous body plan of the cell. A working quarry in Kalana, Estonia, has revealed rich exceptionally-preserved flora and fauna of Early Silurian (Aeronian, Llandovery) age with algae, especially dasyclads, as the most diverse and abundant fossil group. Here we present a new dasycladacean species Kalania pusilla. The fossils of the siphonous unicellular algae occur as black or dark brown carbonaceous compressions on surfaces; many of them reveal three-dimensional preservation together with finely preserved details. The algal fossils are non-calcified and do not show any traces of possible carbonate skeleton. K. pusilla is characterized by a cylindrical uniaxial thallus, two orders of lateral segments – perpendicularly arranged whorls of short bulbous primary laterals, which bear clusters of ovate gametophores in their mature stage, and fine hairy secondary laterals. The reproductive structures of the fertile specimens represent the oldest documented evidence of gametophores in the fossil record.

Camouflage patterns in an ornithischian dinosaur

Jakob Vinther¹, Robert Nicholls², Stephan Lautenschlager³, Gerald Mayr³, Emily Rayfield¹ and Innes Cuthill¹
¹University of Bristol, UK
²Palaeocreations
³Senckenberg Institute, Germany

Countershading is one of the most widespread forms of camouflage. A dark dorsum and light ventrum counteract the gradient created by illumination from above, obliterating cues to 3D shape. Because the optimal countershading varies strongly with light environment, pigmentation patterns give clues to an animal’s habitat. Melanosomes are preserved in feathered dinosaurs and aspects of original colour patterns can be reconstructed from these. Here we present a study of an exceptionally well-preserved specimen of Psittacosaurus from the Chinese Jehol biota, at the Senckenberg Museum. This Psittacosaurus was countershaded with a light underbelly and tail, while the chest is relatively more pigmented. Other pigmentary patterns resemble disruptive camouflage, while the chins and lateral horns on the face appear heavily pigmented. SEM analyses show that the impressions preserve small, spheroidal melanosomes, suggesting a brownish colour to the body. We have projected the colour patterns onto an anatomically correct lifesize model of Psittacosaurus in order to assess their function experimentally. These are compared to the predicted optimal countershading from the measured radiance patterns generated on an identical grey-scale model in direct versus diffuse illumination. These studies suggest that Psittacosaurus inhabited a closed habitat such as a forested area with a relatively dense canopy.
The Palaeontological Association

59th Annual Meeting
14th–17th December 2015

Cardiff University and Amgueddfa Cymru – National Museum Wales

PROGRAMME, ABSTRACTS and AGM papers