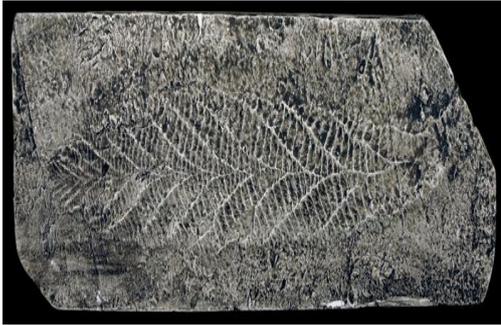


"The Ediacaran biota and the initial evolution of animal life" by Alex Liu

October 2013

Alex Liu began his talk with a surprise: he showed us a picture of a dinosaur! What had this got to do with the only Ediacaran fossil we had all heard of – *Charnia* – from the Precambrian rocks of Charnwood Forest in Leicestershire? Well, he said, we know almost everything we could possibly want to know about an animal such as *T. rex*: size, shape, locomotion, what they ate, colour, internal structure of organs, etc., but what sort of life form *Charnia* represents we have no idea; even whether it is plant or animal is speculation. So, for a look at up-to-the-minute research in geology Alex took us right back to Ediacaran times, in the late Precambrian, way before the dinosaurs.

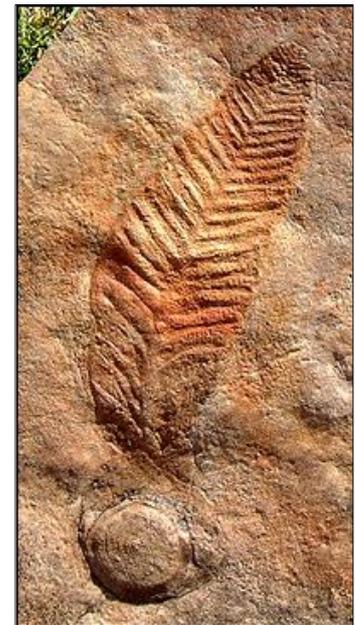


Charnia from Charnwood Forest, Leicester

The Burgess Shale, dated as late Precambrian, contains remarkably well-preserved strange animals unrelated to any present day forms. Dated at about 1 billion years ago, the Torridonian of Scotland, a terrestrial deposit, is found to contain cysts. This period marks a significant transition of life from the microbe dominated Proterozoic towards the animal dominated Phanerozoic. The Ediacaran fauna dated at 635-541 Mya possibly consists of animals.

He described “Darwin’s dilemma”, the problem of the fossil record apparently suddenly commencing at the start of the Cambrian with such a diversity of forms, to which there was no satisfactory answer. In 1856, John W Salter described forms found in the Long Mynd as trace fossil, but his interpretations were incorrect. For twenty years no other Precambrian fossils were known. In 1872, Billings described a fauna in St John’s, Newfoundland, but little attention was paid to his work. In the 1930s Georg Gürich described fossils from Namibia but their age was uncertain and Reg Sprigg described some soft bodied fossils from southern Australia in the 1940s. In 1958 the fossil *Charnia*, found by a schoolgirl in 1956 and taken by Roger Mason to Leicester University in 1957, was confirmed as being found in rocks considered to be below, and therefore earlier than, Cambrian aged rocks. The previous descriptions slotted into place. The Ediacaran fauna represents a transition phase into the Cambrian. It contains animals, macroscopic biomineralisation, evidence of predation, similarities to modern ecosystems, surface locomotion, and bioturbation.

Through Ediacaran times there were dramatic global changes in the form of equatorial pan-glacial events, changes in ocean chemistry and a rise in atmospheric oxygen levels, plus tectonic change with two super-continent splitting apart and creating more shallow seas. Evidence for the rise of animals comes from varied sources, for instance Chinese ‘embryo’ cells of protists – microscopic primitive ‘pre-animals’. The Lantian assemblage from China shows seaweed-like forms, but it is not until the Ediacaran biota that animals are fully recognised in impressions of 100 different species at around 100 localities. In the 1980s they were assigned to an extinct kingdom, but reassessment and looking at environments 1km underwater off Newfoundland shows what are thought could be microbial colonies, bizarre terrestrial lichens, fungi and giant protists, described by Seilacher in 2003. But are they bacteria, plants or animals?



Ediacarian organisms appear after a series of ice ages that covered the Earth

