Ice, ironstone, oxygen and the cryptic evolution of the craniates

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The Adelaide Rift Complex, represented in the Adelaide region and Flinders Ranges, South Australia, offers a textbook example of Neoproterozic to transitional mid- Cambrian (over 800 to c.505 Ma) shelf, clastic and carbonate sediments forming a cumulative c. 30 km thick pile deposited in an extensional trough. Although two principal glacigenic events are traditionally identified in the Neoproterozoic, the 'Sturtian' and 'Marinoan' glaciations, the present record of predominately glacio-marine mixtites and/or dropstones indicates as many as seven ice 'advances'. Their association with ironstones and/or red detritus from an oxidized regolith is suggestive of a causative interrelationship, which may be modelled on modern oceanic circulation [1]. In the absence of a terrestrial megaflora, superoxygenation may even have occurred. The question of which ice advances in the Flinders Ranges succession correspond to overseas glacial events is one of some importance for subdivision of the new Ediacaran Period, and potentially even in the definition of the Cryogenian Period. Isotopic and palaeontological evidence favours dropstones low in the Bunyeroo Formation as corresponding to the close of the Nantuo event of China, and the local Billy Springs advance as equating with the Gaskiers glaciation in Newfoundland.

Discovery of a chordate-like animal in the Winnowie Member of the Rawnsley Quartzite (immediately preceding the classical Ediacaran biota) poses an evolutionary question in that the form surprisingly resembles putative non-marine fish from the Late Silurian. A possibility is that 'craniates' and perhaps stem invertebrates had a lengthy prior cryptic evolution, and that subsequent animal colonization of marine environments was linked closely to sustained oxygenation of the sea beginning about 580 Ma ago.

[1] Jenkins *in* Bryant (ed., 1994) *Metazoan life without oyygen*, Chapman & Hall, 38-64.

The use of Sr isotopes as a tracer for geographical origin of Chinese cabbage

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Recently, the origin of food is becoming a matter of importance as a growing number of consumers are more concerned about their welfare (including the credibility of food) than in the past. For instance, Chinese cabbage is one of the most commonly used vegetables in usual Korean meals, and many Korean consumers claim to know their origin.

In this preliminary study, we investigated the possibility of applying Sr isotope compositions of the Chinese cabbages to trace their origins. Chinese cabbages and soils samples were taken from several locations in both China and South Korea. The $^{87}Sr/^{86}Sr$ ratios of soil samples taken from Beijing and Gamsuk area in China are in the range of 0.7113–0.7152, while those from Nonsan and Anseong in South Korea show slightly higher Sr ratios (0.7163–0.7215). Similarly, $^{87}Sr/^{86}Sr$ ratios of Chinese cabbages in Beijing and Gamsuk are lower than those in Nonsan and Anseong. These results indicate that Sr isotopes can be used to potentially discriminate the geographical origin of Chinese cabbages. In addition, it was observed that the use of $^{87}Rb/^{86}Sr$ ratios and Sr contents, together with Sr isotopes, can improve the ability of discrimination of the geographical origin of Chinese cabbage.