

PRESENTATION OF THE 2010 PALEONTOLOGICAL SOCIETY MEDAL TO BRUCE RUNNEGAR

STEFAN BENGTON

Department of Palaeozoology, Swedish Museum of Natural History, Stockholm, Sweden

LADIES AND gentlemen, friends and colleagues, the 2010 Paleontological Society Medal is awarded to Professor Bruce Runnegar of the University of California at Los Angeles.

Preparing for this presentation, I got hold of a list of Bruce's invited lectures, given during the past ten years. There are 86 titles on almost as many subjects. I will mention what these presentations were about, so you can get an impression of this Renaissance mind:

Carbon isotopes and ocean evolution; Precambrian–Cambrian stratigraphy; Molecular evolution and the fossil record; Ediacaran organisms; Life on Mars; Oxygen and metazoan evolution; Orbital dynamics of the Earth–Moon system; Snowball Earth; Multiplated mollusks; Mass-independent fractionation of sulfur; Biomineralization; The Cambrian Explosion; Geobiology in the Archean; Cross-calibration of geological and astronomical time scales; Origins of biological complexity; Astrobiology of the Earth; Astrobiology of everything else; The Acraman impact of the Ediacaran; Biosignatures in ancient rocks; Microbial metabolism in the Early Archean.

Now, most people can waffle about almost anything. A good teacher can read up on such topics and deliver useful lectures on them to students. But, as you will know if you are the least bit familiar with Bruce's work, these are nearly all topics in fields where he has made startlingly innovative and pioneering contributions. Some would say that his most important contributions are missing from this list, such as molecular paleobiology, for example, or—if you prefer more tangible fossils—the systematics and evolution of Cambrian and Permian mollusks. But what is represented on the list is sufficient to document several brilliant careers in science: Bruce broke new ground in understanding the biomineralization processes of early mollusks by working with natural phosphatic replicas of the now vanished crystals of various species of calcium carbonate. He published a seminal set of papers on the evolution of the earliest mollusks, together with his longtime friend John Pojeta. And, as a leader of the astrobiology movement, Bruce has not only inspired everyone to start looking at life in a universal context, he has also brought his visions to life as Director of NASA's Astrobiology Institute. It was in this context that Bruce was formally transformed from a U.S.-based Aussie to a full-fledged Australian–American (which is, I think, the politically correct term).

In reference to molecular paleontology, I have some personal recollections. Bruce and I both have backgrounds as editors of paleontological journals. Bruce founded and for several years edited the successful Australasian journal *Alcheringa*, which is still going strong. Some of my first interactions with Bruce occurred in the 1970s, when he submitted manuscripts to *Lethaia*, of which I was an editor. One of my early forays was to question the number of authors of one of these manuscripts. I knew that no less than five authors of a single paper was excessive and confronted Bruce with this. It may have been the first time I really annoyed him, as he politely told me not to forget to turn my brain on, next time I wrote to him. Well, recently I saw an article in *Nature* with 230 authors, at which point it finally became clear to me that Bruce was ahead of his time.

But back in those times I was a wee bit miffed, so when Bruce sent me a manuscript in which he estimated geological ages of major animal lineages using molecular clock techniques, I knew I could get my revenge. I sent the paper out for review by the sharpest molecular biologists of the day, smugly expecting to receive patronizing comments about paleontologists who should stick to their snail shells rather than pretending to be real scientists. No such luck. The reviews that came in were extravagant in their praise of the paper. Published in 1982, it predated by almost 15 years the avalanche of contributions that later came out on this topic. As usual, Bruce was ahead of the pack, but when others reached the spot where he had stood 15 years earlier, he wasn't there anymore. Discrepancies between molecular and fossil data for a while seemed insurmountable, not to mention the discrepancies between different sets of molecular data and different sorts of analyses. But Bruce had inspired a bright set of younger biologists and paleontologists to refine their calculations. When the dust settled, one of those with whom Bruce had shared his spark, Kevin Peterson, was able to show that there is no significant conflict between the dates provided by fossils and by molecules.

But I mentioned molecular paleontology. In 1986, Bruce published a seminal paper with just that title. In it he expressed his credo, thus: “palaeontologists should use all available sources of information to understand the evolution of life and its effect on the planet.” These are not empty words; they present a formidable challenge. Like all splendid visions, they stake out a direction rather than a goal. That it is possible to pursue this vision we see from the example set by this year's Schuchert Award winner, Phil Donoghue, who together with Kevin Peterson and Roger Summons wrote a stimulating twenty-first century follow-up to Bruce's earlier paper. But the foremost example is Bruce Runnegar himself. Here is a taste of the way in which his productive mind works. In 1982, Bruce used the anatomy and hypothesized physiology of the Ediacaran fossil *Dickinsonia* to estimate constraints for ambient oxygen levels in the Ediacaran atmosphere. This paper is much cited, and geochemists are only now catching up with him, developing geochemical proxies to test the hypothesis that a rising oxygen level was a trigger for the Cambrian Explosion, or, as Bruce so aptly put it, that one “ingredient, as in most explosives, may well have been a strong oxidising agent.” Finally, consider another example. In 1998, Bruce published a cladistic analysis of glaciogenic sediments, testing and corroborating the hypothesis that there were only two major Neoproterozoic glaciations, a result that still seems to stand. Who but Bruce would have thought of such a preposterous idea, using cladistics to resolve a stratigraphical conundrum?

Bruce Runnegar has, over the years, formed collegial bonds with many scientists. The many younger people inspired by him include Phil Donoghue, now standing on Bruce's shoulders. Bruce himself has stood on the shoulders of other giants, as he is quick to acknowledge. But, like Sir Isaac Newton, he has no reason to be bashful about his success, and I don't think he is. The Paleontological Society Medal was really made for Bruce Runnegar, so please, Mr. President, give it to him!