



## EARLY LIFE, SCIENCE, AND WRESTLING

**Stefan Bengtson**

The road to wisdom? – Well, it's plain  
and simple to express:  
Err  
and err  
and err again  
but less  
and less  
and less

Piet Hein

To someone who has been reading the recent media reports, the foundations of palaeontology and astrobiology would seem to be crumbling. The up till now widely accepted geochemical and palaeontological evidences for the earliest life on Earth (Schopf 1993; Mojzsis et al. 1996) have been thrown into serious doubt (Brasier et al. 2002; Fedo and Whitehouse 2002; Zuilen et al. 2002). The issue is of paramount importance for our understanding of life on Earth and beyond: The apparent establishment of life on Earth as soon as environmental conditions allowed it some 3.85 Ga ago, and the appearance of microbial fossils soon thereafter (well, about 400 million years later), have suggested to us that life is somehow built into the fabric of the universe and will start evolving as soon as conditions are right. If our basic presumption is wrong, the possibility of finding life elsewhere in the universe suddenly becomes bleaker.

It would seem as though in this most important of contexts paleontology has failed its most basic task: to identify the

fossilized signatures of life correctly. The fact that most natural entities, life not least, have fuzzy boundaries is commonly ignored or denied, because words, the tools of our thoughts and communication, seem so crisp. Either a thing is a fossil organism or it isn't, isn't it? Either a thing was living or it wasn't, wasn't it? The simple fact, however, is that right at the boundaries of life, at its very beginning here on Earth, the task to recognize it is hardest of all and demands the utmost of our skill and imagination – and humility.

Let's not worry for the moment about where the correct, or best, answers lie in this ongoing debate, but rather a little about how the scientific process is portrayed in the media, and how that influences us as scientists. The open-ended nature of the scientific inquiry is its most important characteristic. This is a much more crucial piece of knowledge in a modern society than any single scientific discovery. But it's a difficult one to grasp, for its message of "there is no absolute certainty" is confusingly similar to "there is no absolute truth". The latter is a recipe for "anything goes"; the former describes science.

In retrospect, it's often easy to see which ideas were right and which were wrong. When matters are developing, it's not so easy. Furthermore, "wrong" ideas sometimes lead to good science. Just one example: The hypothesis of spontaneous

generation of life has many times been shown to be inadequate, but it has probably inspired more good science than most "correct" hypotheses – just think of Francesco Redi, Louis Pasteur, and John Tyndall. Today, the hypothesis isn't dead, but it has moved to the Archean stage, where it continues to generate good research. Only the future will tell us whether in the end the hypothesis will be as inadequate to explain the origin of life on Earth as it was to account for the appearance of maggots in flesh or infusorians in water. But even if that turns out to be the case, the hypothesis will have continued to stimulate good research. It's thus a good hypothesis. Had it been just a nutty idea, few would have bothered to refute it. The world is full of nutty ideas, most of which are not even worth refuting, but we shouldn't be afraid of nut-flavored scientific hypotheses as long as they are in some way testable. Even if "wrong", they may teach us something.

Life isn't fair. A palaeontologist who misidentifies a clam for a coral may be temporarily embarrassed but isn't likely to suffer any career damage only for that blunder. Only his or her peers will know, and will likely shrug it off, knowing that they may goof someday too. One who mistakes an a biologically formed structure for the world's oldest fossil is in deeper trouble, however much more difficult that task is, if only because the action takes place in the limelight. Colleagues will turn on him or her. The same media that have hyped the discovery in the first place will be quick to pooh-pooh it now.

In a way, there's a fair balance here: The greater the rewards for success, the greater the punishment for failure. A scientist should enter that mined territory with eyes wide open. But fame and shame is not what good science is made of, or should be made of. We all pay lip service

to the principle that science is an open-ended search, that the value of a hypothesis lies in whether it can help to advance knowledge rather than being in an absolute sense true. Above all, we take pride in our ability to learn through error. At the same time we know that scientists – like all creative people – have egos, often big ones. But unlike art (where the products are, by definition, artificial), scientific products concern themselves with facts and histories about which there is ultimately only one "right" answer. When a prominent scientist's prominent interpretation of an object is falsified, some personal damage is all but inevitable. So, science is a human endeavor, run by humans for humans. No change there, then.

Nevertheless, a healthy scientific culture shouldn't encourage itself or the general public to focus on the egotistical aspects of the process. Certainly, it should foster honest and careful work (there is no inherent value in making errors), but it should also encourage retractions from earlier held positions when they lead into a cul-de-sac. A cornerstone of such a culture is prestige-less dialogue. Do we have such a culture? Maybe, but when one of the flagships of science suddenly looks more like a tabloid picked up at a supermarket checkout counter, it's time to realize that such a culture has to be nurtured in order to survive.

So finally to the point. What prompts this diatribe is Rex Dalton's (2002) recent news feature in **Nature** on the arguments between Bill Schopf and Martin Brasier regarding the alleged earliest fossils on Earth. I don't read wrestling magazines, but I figure their readers would be comfortable with this portrayal of a scientific dispute as a heavy-weight match, where one of the combatants is painted as a righteous if haughty knight, and the other as a scoundrel who has been able to fool the

world for too long. No matter that the "scoundrel" has probably done more to advance the science of Precambrian paleobiology as a multidisciplinary endeavor than anybody else – down with him!

It's disheartening to read such a yarn in a journal dedicated to the advancement of science. Yet we cannot just blame science journalists for the shortcomings of the scientific culture. It's each and everyone's responsibility to help keep it sound. Indeed, we should blow the whistle at villains who forge or steal results. But being right or wrong in science is not a matter of heroes and villains, and shouldn't be construed as such. Instead, we should foster an atmosphere where we can deal constructively with conflicting interpretations. In a good atmosphere there is an open scientific discussion, where ideas are tested against each other and against observations in a spirit of mutual cooperation and collaborative search for the best available interpretation. In a foul atmosphere, the proponents of the respective ideas punch each other to pulp in a wrestling ring before a cheering audience. If they want to do it anyway, that's their busi-

ness, but as scientists we should be much more concerned with the science than with the splatter entertainment. Besides, good science is much more fun – and much more honest – than media-manufactured wrestling matches.

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