Should the life's clock be backed by 400 million years?

A report[1] on fossilized traces claimed to be 1100 m.y. old generated sensation among the scientists. If accepted, the discovery will push the origin of multicellular life by 400 m.y. The sedimentary rocks concerned are the Chorhat Sandstone of the Vindhyan Supergroup exposed in Central India generally thought to be more than 1100 m.y. old. However, besides several lacunae in identification of these 'assumed' fossilized traces[2], the radiometric age of the Vindhyan rocks too has been questioned[2,3].

The oldest traces of complex-animal activity have been found elsewhere in the age range of 550–600 m.y. Some scientists, however, pointed out that this is much younger than evidence from analysis of the ribosomal RNA of living organisms would suggest. Assuming that gene sequences evolve with such regularity that differences can be used as 'molecular clocks', it can be argued that invertebrate linkages began to diverge about 1,200 m.y. ago[4]. This would mean that the earliest animals are missing from the first record because they left few remains, if any. For example, they may have lived in water column or as microscopic life in sediments[2]. Accordingly, the so-called Cambrian 'explosion' 600 m.y. ago would then largely relate to the acquisition of skeletons[2].

Besides, there are more queries in the work of Seilacher and co-workers[1]:

(i) Did the gastropods appear before worms? The reported traces[1] were previously illustrated by Pradip K. Bose (in co-authorship with Sarkar and Banergee, see their figures 7, 8–10) (ref. 5) from Chorhat Sandstone in association with markings similar to those made by gastropods, *Pagiogamus* or *Solicia*. If both, the 'worm traces' and 'gastropod trails' occur together in the Chorhat Sandstone, the age assigned to worm traces now (1000 Myr K–Ar age)[1] should rather be that of the gastropods, and the worms, in that case should be older. It is surprising that Seilacher as editor of the journal[5] and Bose as co-author of the paper[5] did not consider it important to refute the gastropod trails while putting a claim of finding the 1000 m.y. old (?) 'worm traces' in Chorhat sandstone now[1].

(ii) Did the trails belong to the multicellular animals? A claim that these are the traces of 'triploblastic' (multicellular) animals[1] however, may be refuted as in such a case these animals had a gut and a fluid-filled coelom, which is found only in complex animals from worms to chordates[2]. Likewise an argument that, at 5 mm, the burrow diameters are too large to have been made by single-celled protists[1] may be discarded since the unicellular protists, including early Cambrian forms can be that large and can make burrows[2]. Moreover, at 5 mm diameter, how could such organisms have remained hidden from the fossil record for over 500 m.y.? (ref. 2). Lastly, the branching in tunnels implies a behavioural sophistication, which is thought to have appeared about 500 m.y. ago[2].

(iii) Are the potassium–argon and fission-track dates reliable in this case? Assigning an age of 1100 m.y. to the Chorhat Sandstone based on the published fission-track or potassium argon dates is not desirable as these dates were obtained about forty years back[6]. Geochronologist, Samuel Borroweing of the Massachusetts Institute of Technology, however, noted that the dates might accurately reflect the age of individual grains, but those grains may have formed long before they eroded from the parent rock and washed into the sea to become part of the Vindhyan sedimentary rocks[3].

In a paper published about the same time (1 October 1998), Azmi[7] has suggested forwarding of the age of the Vindhyan supergroup by 600 m.y. based on the discovery of shelly fossils in Rohtas Formation (rocks resting on Chorhat Sandstone without break in sedimentation[7]).

These seeming paradoxes in the work of Seilacher and co-authors[1] may yet be explained by a fresh look at the age of Vindhyan rocks. Nevertheless, the publication has enhanced the scope of a rational thinking/search of other fossils in these rocks *vis-à-vis* the radiometric re-dating of the entire sequence preferably ash layers, if any, which offer secure dates because they are deposited as soon as they are formed.

More evidences to forward the date of start of Vindhyan sedimentation by 600 m.y. are required, however, backing of the life's clock by a large span of time is uncalled for.

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