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2

We have read the paper carefully and would wish to draw the attention of the authors to the following points:

- i) The photo-plate accompanying the paper gives unconvincing illustrations of the 'Ediacaran metazoa'. Predominantly only one type of the 'metazoan' is illustrated. The individual photos have been cut to small size. This prevents the reader from assessing the outline of the features illustrated. Only a presumed outline is conveyed through the line-diagram (Fig. 4). A careful examination of the photos shows no proper confining outline of the structures that are illustrated. In our opinion a reasonably

larger dimensioned photo of the bedding surface, containing the 'Ediacaran metazoa', should have been given to help the reader properly understand the total 'Ediacaran faunal facies' in the 'Upper Krol' of Nainital Syncline.

- ii) The Ediacaran faunal facies is known to exhibit a few distinctive characters, viz., a) usually high-relieved impressions with proper outline, b) presence of a variety of metazoan morphologies, c) lack of any orientation in the impressions, d) occurrence along bedding surfaces, e) occurrence of impressions usually in fair abundance, etc. Except for the d) above, no information is given to the reader about all the other aspects of the 'fauna'. Being the first record of 'Ediacaran fauna' from India, the authors are obliged to furnish all the relevant information.
- iii) In the course of our field work in the same locality and on the same section, we have come across a number of wavy-bedded and rippled slate/siltstone horizons in the Narain Nagar Member of Tal Formation (Valdiya, 1988; uppermost Krol of the authors), which on splitting along the bedding surfaces show sedimentary structures which are identical in appearance to the ones shown as *Pteridinium*. The sedimentary features noticed by us are formed by the acute crests of ripples or waves (cf. Median axis, Fig. 4), from which a fine net-work of markings diverge away at all angles (cf. Primary furrow and secondary furrow, Fig. 4), some of these being more prominently etched than the others. However, all such structures are, as a rule, unidirectional and consist of an abundant assortment of the bedding-surface sedimentary features and the entire succession is replete with such structures of sedimentary origin. We have also come across one or two bedding surfaces in the slate horizon at the base of the Narain Nagar Member which are full of small, rounded pits, sometimes coalescing and of varying diameters, that have been interpreted as rain-drop imprints by Misra (1983, 1984). The coalescing rain-drop imprints are identical to '*Beltanelliformis* sp. cf. *B. brunsa*' of the authors.
- iv) Valdiya (1980, 1988) has shown that the topmost about 150 m thick sequence in the Nainital Syncline, consisting of shale/slate, sandstone and minor carbonate bands in the lower part, overlying the massive-bedded dolomite of the topmost Upper Krol (= Krol E of Auden, 1934), constitutes the post-Krol sequence in the area, possibly equivalent to the Tal Formation. The litho-column furnished by the authors (Fig. 3) also corroborates this lithological succession. However, the authors, without referring to or criticizing the later work, have used an old map of the area (Fig. 2), which does not even include the topmost lithounit of their litho-column and have referred the entire sequence in the Nainital Syncline as Krol Formation.
- v) The small shelly fossil assemblage of Meishucunian Zone 1, recently recorded from the Nainital sequence (from the same section that yielded the 'Ediacaran metazoa'; Bhatt and Mathur, in press), comes from the lithostratigraphic interval that falls below the level yielding 'Ediacaran

metazoa'. This is totally irrational in the current chronostratigraphic scheme, wherein the Ediacaran soft-bodied fauna clearly precedes the Meishucunian shelly fauna.

- vi) We have examined the topotype material of Mathur and Ravi Shanker (1989) lying in the authors' collection and harbour no doubt that the features contained in it are identical to the wave-, current- or sub-aerially generated sedimentary features that are so prolific in the slate/siltstone sequence of Tal Formation at Nainital.

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REPLY

- i) The photo-plate accompanying the paper exhibits three genera of Ediacaran metazoa—*Beltanelliformis* sp. (Pl. I, Fig. 1, 3A), *Pteridinium* sp. (Pl. I, Fig. 5) and ? *Pteridinium* sp. (Pl. I, Figs. 4 and 6) (*Charniodiscus arboreus*, Narbonne, 1989, personal communication). Besides these fossils, few medusoid coelenterates (*Tirasiana* sp., *Medusinites* sp., and *Beltanella* sp., have been recorded from the same horizon and locality (Mathur and Ravi Shanker, 1989, in press). Available preserved fossil area has been photographed and no part of the photograph containing any part of fossil impression has been trimmed. The photographs and actual specimens are replica of each other.

Pteridinium and *Charniodiscus* and related Ediacaran genera generally show ill-defined/obscured outline due to their soft bodied nature (Glaessner, 1984, pp. 50 and 51; Glaessner and Wade, 1966, p. 617; and Misra, 1969, p. 2137)

- ii) Authors do agree that few distinctive characters, viz., a) usually high relieved impressions with proper outline, b) presence of a variety of metazoan morphologies, c) lack of any orientation in the impressions, d) occurrence along bedding surface, e) occurrence of impressions usually in fair abundance, etc., are generally shown by fossils of hard-parts-bearing

organisms in ideal conditions. But in the case of the soft bodied Ediacaran fossils, distinctive characters, viz., a, b and e may be well developed only as exceptions rather than as a rule. The described Ediacaran fossils generally do not show any particular preferred orientation and are preserved on bedding surfaces.

- iii) Few sedimentary features, viz., rhythmites (shale/siltstone intercalations, wrinkle-marks, micro-ripples, lenticular bedding; microfolding and few indet. ichnofossils (not described) were noticed in the fossil-bearing horizon of upper Krol Member in the core of Nainital Syncline. But the described forms *Pteridinium* sp. (Fig. 4 and Pl. I, Fig. 5) with median axis giving rise to primary furrows laterally at about right angle to it, which are faintly divided into secondary furrows, preserved at few places, and ? *Pteridinium* sp. (Pl. I, Figs. 4 and 6) (*Charniodiscus arboreus*, Narbonne, 1989 personal communication) with median axis giving rise to primary furrows laterally at an acute angle (40–60) to it, are different from unidirectional bedding surface sedimentary features.

Beltanelliformis sp., because of their mode of occurrence – sporadic and in clusters and the intertidal to subtidal nature of sediments represented by intercalations of shale/siltstone (rhythmites) and lenticular bedding (Reineck, 1963 and Straaten, 1954 in Reineck and Singh, 1973) do not appear to be rainprints. Plate I, Fig. 3A may represent an assemblage of juvenile forms of *Beltanelliformis* (Narbonne, 1989, personal communication).

- iv) It will be worthwhile to mention here that the upper part of the Upper Member of Krol Formation (Fig. 3) comprising interbedded purple and greyish shale with a thin calcareous siltstone, is the same as part of the Narayan Nagar Formation of the Krol Group of Misra (1984) and Narayan Nagar Member of the Tal Formation of Valdiya (1988). It was in fact mentioned in the original manuscript but was deleted by the advice of scrutinizer. In Figure 2, 'Upper Krol' is broadly comprised of bedded dolomitic limestone/limestone siliceous with band of quartzites, siltstone and shale. Shale was not included in its composition as would be evident from the detailed lithocolumn in Figure 3. We have examined the lateral variation of various litho-stratigraphic units in the entire Blaini-Tal sequence from Solon to Nainital in fairly great detail and we are convinced that lithologies similar to one from which Ediacaran fossils are recorded and present in the core of Nainital Syncline, are found in Upper Krol Member also underlying the lowest Tal beds, in other synclines as well.
- v) The authors have referred to one of their papers still in press, wherein they appear to have recorded small shelly fossils and correlated them with Meishucunian Zone I. We have no idea of the fossils being described by the authors. We only hope that the authors are aware that small shelly fossils make their first appearance in latest Precambrian (Vendian) and also known to occur in association with Ediacaran fossils (Germis, 1972; in Trompette, 1982; and Matthews and Missarzhevsky, 1975) and, therefore,

the authors' contention that the Ediacaran soft bodied fauna clearly preceded the Meishucunian shelly fauna is not valid. The two can coexist.

- vi) We wish the authors had examined the holotype material before offering their comments. We had an opportunity to examine the collection of Bhatt and Mathur, A. K., made subsequent to the publication of our paper. We fully agree that their collection contains only sedimentary structures and are entirely different from those described by us. All our type specimens are in the GSI repository at Calcutta and are open for examination by one and all.

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'Geology is a Field Science — but Who Cares?' **— 'I Care!'**

The two recent articles on the above subject by S. K. Tandon and S. M. Mathur should produce distress and alarm in geology teachers not only in India but in other developing countries as well. H. H. Read said somewhere — 'The best geologist is, other things being equal, he who sees the most rocks' — or words to that effect. That was the basic philosophy behind the teaching of geology at Imperial College during the time of Read and his pupil John Sutton. And it was that philosophy that made the Geology Department at Imperial College one of the finest in the U.K. and in the world during those years.