

COMMENT

Discovery of Late Palaeozoic Brachiopod in the Upper Krol of the Nainital Hills, Kumaon Himalaya

(A comment on paper by K. S. Valdiya, published in the Journal of the Geological Society of India, Vol. 21, No. 2, pp. 97-101).

Valdiya (1980) records a solitary occurrence of a brachiopod – *Linoproductus?* sp. from the Upper Krol sediments of Nainital and discusses its implications on the age of Krol Belt sequence. However, there are certain points in this report which need some clarification and further analysis:

1. Valdiya does not give the detailed litholog, thickness, and the extent of the horizon, which has yielded the lone specimen of brachiopod. It would be desirable to know the lateral extent and thickness of the unit which produced this specimen and contact of this unit with the underlying and the overlying sediments.
2. Valdiya on p. 100 asserts a definite Upper Carboniferous age for the Krol Formation, although according to J. A. Talent, the identification of the brachiopod is doubtful even on generic level, and age may be anywhere from Carboniferous to Permian.
3. Valdiya quotes a paper by Kumar (1979) where supposedly typical Upper Palaeozoic stromatolite assemblage has been described. All these forms are new forms erected by Kumar himself and cannot be considered typical of any age as there is no other independent age criteria. Biostratigraphy solely on the basis of algal genera as done by Kumar (1979), is hazardous. In many recent papers, e.g., Walter and Awramik (1979), Kazmierczak (1979) algal genera which until now were considered to be typical of Palaeozoic or even Mesozoic, are being reported from the Proterozoic sediments.

The paper of Kumar (1979) is available only in the abstract form and has not yet been published, although Valdiya wrongly gives a full reference with page numbers.

4. The Upper Krol sediments of Nainital area are typically deposits of tidal flat environment. They dominantly show well-developed algal mat facies with various types of stromatolites, including those considered to be typical of Late Proterozoic, e.g., *Conophyton*, *Baicalia* etc., but characteristically lack any Phanerozoic metazoans-molluscs etc. If the Permian age suggested by Valdiya is true, what are the reasons for the absence of Phanerozoic metazoans or signs of their activity in the form of bioturbation in an open sea tidal flat environment where algae was profusely available as food for the metazoans?
5. The productidine dominantly live as colonies in a subtidal environment. What are the reasons for the occurrence of a single productidine specimen in algal mats of intertidal zone?
6. On p. 100, Valdiya quotes several papers which have reported Mesozoic fossils from the Krol Formation, but he does not specify why he rejects these reports? Whether they are cases of wrong identification or contamination?
7. Valdiya again emphasizes a Permian age to Tal Formation. One of the main reasons for suggesting a Permian age to Tal Formation by Valdiya (1975) has been the report of *Fusulina* by Kalia (1974) from shell limestone associated with Tal sediments. Later workers (Tewari and Gupta, 1978; Kumar and Dhaundiyal, 1980; Bhatia, 1980) consider these *Fusulina* to be *Oolites*. Singh (1980) clearly demonstrates that the *Fusulina* reported by Kalia are deformed oolites, and the Bansi Member of Valdiya (1975) contains Cretaceous foraminifera and bryozoa; hence cannot be Permian. Further, Kalia herself has found Paleocene fossils in the Shell Limestone and considers the

older fossils (if they are) reported by her to be reworked fossils (Ahluwalia, 1980).

Moreover, the forms, described to be moravamminids by Patwardhan (1978) are considered by Ahluwalia (1980) to be indeterminate algal forms which closely resemble the alga *Cylinderoporella*, but cannot be considered to be of any definite age.

8. Simultaneous with Valdiya's paper has appeared a paper by Tewari (1979), who reports a fossiliferous horizon associated with Blaini Formation in Nainital area. This horizon has yielded *Proteropora*, productids, and fusulinids of Permian age.

Further, Tewari and Singh (1979, ms. received Feb. 5, 1980) record a horizon of plant fossils of Permian age in association with the Infrakrol sediments of Nainital area.

If we combine the observations made by Valdiya (1980), Tewari (1979) and Tewari and Singh (1979), then the complete sequence of Blaini-Infrakrol-Krol-Tal becomes Permian in age. Although, the sequence is basically unfossiliferous, with only few, thin, scattered bands/outcrops of fossiliferous Permian sediments.

It is logical to connect these Permian outcrops of Nainital area as a single episode of Late Palaeozoic transgression on a Precambrian terrain along a narrow zone.

Department of Geology
Lucknow

INDRA BIR SINGH

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AUTHOR'S REPLY

The aim of my note was to place on record the occurrence of a datable faunal remain helping fix the position of the Krol Formation in the stratigraphic column. The two sections (Figs. 1-2) and, the Table not only clearly indicate the exact position of the fossil-bearing horizon, but also elucidate the lithological succession of the Upper Krol. Facies variation and environmental reconstruction not being the objective, it was not necessary to give 'detailed litholog, thickness and extent' which the critic has demanded.

In spite of a degree of uncertainty, there is no doubt that the Krol fossil is a productidine, most likely *Linoproductus* as clearly stated. I suggested Upper Palaeozoic, probably late Carboniferous or Early Permian age of the Upper Krol (see abstract) and stated that 'in the perspective of the assignment of the Tal Formation of Garhwal to the Permian period' the present discovery in Nainital Hills is consistent with the late Carboniferous age (see last para, p. 100). This statement is certainly not an assertion, rather pleading a case, of course ardently.

As to the age of the Tal, Kalia (per. com. 1980) has found additional evidence favouring the Permian age of the *Tal that conformably succeeds the Krol*. The moravminid-bearing phosphorite beds at Surkhet (Maldeota) in the Mussoorie Hills have yielded Upper Palaeozoic endothyrid foraminifera. Significantly, the Permian fossil-bearing Tal limestone at Bhadsi (3 km NE of Nilkanth) is overlain—with an intervening horizon of the conglomerate—by oolitic shell limestone characterized by Paleocene algae and globigerinids. Likewise, at the confluence of the Tal and Bidasini rivers, and at Bansi (Dugadda) the oolitic shell limestone contains not only Paleocene globigerinids, algae and bryozoans but also derived remains of such Permian algae as *Gymnocodium* and *Eugonophyllum*. Thus Kalia has not only isolated the Tal (which is a Permian unit) from the Tertiary succession but also recognized a new horizon belonging to the Paleocene below the Eocene Subathu.

The Krol stromatolites are entirely different from those of the Riphean Deoban, Shali, Jammu and Vindhyan, and are certainly not *Conophyton* and *Baicali* as Singh and Rai (1977) have deduced. Such active stromatologists as M. E. Raaben and P. K. Raha—whom I have shown these stromatolites—are in full agreement with my views. If the critic would care to read carefully, my note unambiguously states that the discovery of *Linoproductus?* indicates (abstract), or helps to delimit (lines 11-12, first para, p. 97), the age not only of the lithostratigraphic unit but also of the stromatolite assemblage. It is thus not a case of putting the cart before the horse. A writer quotes or refers to the works germane to his thesis, that are relevant in developing his idea, and is entitled to the freedom to quote the published and/or unpublished work of associates and colleagues.

As to the absence of the signs of metazoan activity or the isolated occurrence of the gregarious productidine, it is up to the critic, with his superior and vast knowledge of recent tidal flat deposits, to solve the enigma. I, like any humble worker, can only wonder.

The Bhawali-Gethia-Jeolikot belt, in which Tewari (1979) noticed Permian fossils, is an area of extreme structural complexity, characterized by repeated folding and splitting by thrust movement. It is thus difficult at this stage to assign the horizon a proper place in the stratigraphic column. Moreover, the fossiliferous unit has been compared variously with the Nagthat, Blaini, Tal and Subathu! Until a clearer picture of structural layout emerges, uncertainties would continue to bedevil the problem.

K. S. VALDIYA