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Reply by U. K. Bassi

Prof. Gupta in his comments on my paper has avoided the points which were raised by me including that of the Devonian ammonoids from the Muth Formation. Instead he has raised extraneous and uncalled for issues. My reply not only caters to these comments but also provides additional information on his work from some other areas.

1. The stratigraphic positions assigned to different formations are based on the lithostratigraphic equivalence with the well established stratigraphy of the Spiti Basin and cannot be termed arbitrary though also not final. His statement that the ages assigned are open to modifications on the basis of future work is true for all scientific publications.

2. Prof. Gupta's accusation of not referring to some publications is baseless. Every paper on Kinnaur basin, without exception, has been referred including the one on the Muth Fossil (p. 593).

3. The age of the Takche Formation, contrary to what Prof. Gupta writes, as is stated in the text, is based on Bhargava and Bassi (1986). The lower

age of the Muth Formation is based on its conformable contact with the Takche Formation. The upper age limit cannot be exactly defined in this basin as it is unconformably overlain by the Permian Kuling Formation. However, the upper age assigned is based on the presence of Devonian elements in the normally overlying Lipak Formation in the Spiti basin (Hayden, 1904; Bassi, 1990). May I advise Prof. Gupta to kindly read this paper once again. It will make clear my stand on *Heliolites*.

4. The stratigraphic positions of the Gechang and Gungri Members of the Kuling Formation are well established in this part of the Himalaya. Chopra *et al.* (1980) has been referred in the introduction itself.

5. Nowhere in the text is mentioned that *Spiriferella rajah* and *Eurydesma* occur together.

It is heartening to learn that Prof. Gupta now realises the importance of *Eurydesma* which he earlier had reported from the Malung Shales (Gupta, 1973) occurring above the Sarchu Limestone enclosing the *Marginifera himalayensis* zone of upper Permian age (Gupta, 1981).

6. The issue of enlarged column was raised by me in Nature (1989a). The column in Bassi (1988), for Prof. Gupta's information, is only up to a part of the Kuling Formation and hence is irrelevant to the point in question (Carnian rocks). The thickness of the Lilang Group in the column by Chopra *et al.* (1982) is 42 m, whereas in that of Bassi *et al.* (1988) is 87 m. The difference of 45 m in thickness may look insignificant to Dr. Gupta but to me it is not so. We had twice published (Chopra *et al.* 1980, 1982) the lithocolumn of the Khimokul La Section and had no motive to falsify it.

7. It is explicitly mentioned on p. 593 (para 3) that Khimokul La is situated on the *Daonella* bed which is well-known to represent Ladinic age. I reassert that no rocks younger than Ladinic are exposed here. For Prof. Gupta's information Carnian is younger than Ladinian and hence no contradictory statements about the Carnian rocks on the Khimokul La, within three months as stated by Prof. Gupta (probably referring to Bassi, 1989a and 1989b) have been made.

8. Prof. Gupta quotes from Chopra *et al.* (1982) to show the presence of Carnian conodonts at Khimokul La. It may be made clear that all conodonts referred in this paper are from one single sample macerated by me as is evident from the stratigraphic level of conodonts shown in the accompanying column. The identification of these conodonts was done by Profs. Gupta and Budurov. The conodont *Paragondolella polygnathiformis*, which Prof. Gupta states is of Carnian age cannot co-exist with the typical Pelsonian conodonts. It is either a case of misidentification or contamination and that is why Prof. Gupta himself avoided referring to this conodont in his Carnian conodont paper (Gupta, 1983) from this very section.

9. Both Profs. Gupta and Waterhouse seem to take the report of Sulcispiriferinidins from Khimokul La lightly but for others it is of grave

consequence. Neither have they visited the section nor have mentioned the collector's name in their paper.

10. Prof. Gupta has time and again spoken about his visit to Khimokul La in 1974 (*The Tribune, Nature,* present comments). It is a terrain with very limited working season and one cannot go at will all alone. He should have been more specific with the dates, names of other party members, muleteers and/or porters. Contrary to his claim of 1974, it is stated in Gupta and Waterhouse (1982) that the collection was made after Chopra *et al.* (1980). We had visited the section in August-September 1980. Is it that he had gone to Khimokul La twice? The check post register at Rangrik Tungma in 1984 had a different tale to tell. Let the geoscientific community at large draw its own conclusions.

11. Similar to the Khimokul La episode, Gupta has published three papers on imaginary Devonian fossils from the Yulang Valley in Kinnaur (*Spinocyrtia,* Gupta, 1987; Vertebrate remains, Gupta and Janvier, 1979; and *Subtransversa* faunule, Gupta and Struve, 1987) without visiting this section as pointed out by Bassi (1989a and 1990). Had he been to the Yulang Valley, he would not have given contradictory lithologies for the same section and would have also not missed the inversion in the sequence.

12. These are not the isolated cases. In August 1989, I had an opportunity to see the Baralacha La-Pang La Section (Lahaul-Ladakh).

His reports of *Eurydesma* from the Malung Shale (Gupta, 1973), *Spiriferella rajah* and other Permian fossils from Lachlung La and fusulinids, conodonts of *Gondolella rosenkrantzi* zone and other Permian fossils from the Sarchu bridge (Gupta and Kumar, 1975) are highly suspect as no Permian rocks are exposed at these localities. Similarly, he has reported Devonian fossil *Schellwienella williami* from Bara Lacha Pass where, even as per his own map, only Cambrian is exposed (Gupta and Kumar, 1975).

Prof. Gupta in his response to Prof. Talent (1989) had stressed in *Nature* that the collections of fossils were made by various teams of geoscientists. Though we had a posthumous rebuttal of Prof. M. R. Sahni through his son Prof. Ashok Sahni (1989), it is a pity that the living ones have not spoken so far either in favour or against in any scientific journal.

Sco. 98-100 Sec. 17C
Chandigarh-160 017

U. K. BASSI

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