

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.

Himalayan Geology Division
Geological Survey of India
Lucknow 226 020

V. K. MATHUR AND RAVI SHANKER

References

- GLAESSNER, M. F. (1984) The dawn of animal life, a biohistorical study. Cambridge University Press, Cambridge, London, New York, New Rochelle, Melbourne and Sydney.
- GLAESSNER, M. F. and WADE, M. (1966) The Late Precambrian fossils from Ediacara, South Australia. *Palaeontology*, v. 9, pp. 599-628.
- MATHUR, V. K. and SHANKER, RAVI (1989) Ediacaran medusoids from the Krol Formation, Naini Tal Syncline. *Jour. Geol. Soc. India* (In press).
- MATTHEWS, S. C. and MISSARZHEVSKY, V. V. (1975) Small shelly fossils of Late Precambrian and Early Cambrian age; a review of recent work. *Jour. Geol. Soc. London*, v. 131, pp. 289-304.
- MISRA, S. B. (1969) Late Precambrian (?) fossils from Southeastern Newfoundland. *Geol. Soc. America Bull.*, v. 80, pp. 2133-2140, 2 figs, 8 pls.
- (1984) Depositional environment of the Krol Group of the Naini Tal area and its impact on the stromatolites. *Proc. Indian Acad. Sci.*, v. 93, no. 4, pp. 447-464.
- REINECK, H. E. and SINGH, I. B. (1973) Depositional sedimentary environments. Springer-Verlag, Berlin, Heidelberg, New York.
- TROMPETTE, R. (1982) Upper Proterozoic (1800-570 Ma) stratigraphy : a survey of lithostratigraphic, palaeontological, radiochronological and magnetic correlations. *Precambrian Research*, v. 18, pp. 27-52.
- VALDIYA, K. S. (1988) Geology and natural environment of Nainital Hills, Kumaon Himalaya. Gyanodaya Prakashan, Nainital, p. 155.

'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.

This philosophy expressed itself in 'field work, more field work and still more field work!' for geology students at Imperial College from the first year to the last. We were taken on mapping classes and field excursions during almost every vacation, and I still remember the classes in Yorkshire, Scotland, southern England, Wales, N. Ireland and Connemara.

Two such exercises remain strongly in my mind. In our first year we spent a week in with Dave Carter in Yorkshire where we were given an unforgettable training in how to map, how to make notes and how to make sketches in the field. Each of us was given a map of the area and we were shown what to put down on the map and how to do this at every step. At the end of the exercise each had to write a full report on the week's work.

The other exercise took place in the last long vacation, before the final year. Each student was given an area of several square miles, put there for six weeks, and asked to map the geology of the area on the scale of 6 inches = 1 mile. No supervision was provided and each was on his own. This was known as the 'independent mapping exercise' and it was compulsory for everyone.

I carried these experiences with me into Africa when I went there to teach in 1967, and we introduced this system into the programmes at the University of Ife in Nigeria and University of Lusaka. This comprised:

- a) a mapping field class early in the course when we taught the students how to map and how to make notes; and
- b) an 'independent' mapping exercise in the final year when they were left alone in an area of a few square miles and asked to map it within a month. We did, however, give them some supervision.

If it is really true that nobody cares much about field work for students in India, then that is a serious and alarming situation, and one that every single person in the academic and professional fields should be concerned about. In the last few years I have been conducting geoscientific writing workshops in centres in India and Pakistan, during which I have looked at a large number of post-graduate theses and technical reports. One thing that has struck me very forcibly has been the conspicuous lack of field sketches in these theses and reports. This suggests that geology students in India and Pakistan are given little or no training in this art. Perhaps this is because taking photographs has been made so easy now. However, my one belief is that the camera is only an aid, and pictures are no substitute for sketches. The sooner this is realized, the better for future generations of geologists.

The other thing that was brought to my notice just this year is that most of our students are not taught how to make notes in the field. That too, is a serious gap in training, and it needs to be recognized and rectified.

Professor Eberhard Klitzsch of the Technical University, Berlin, came out to Nigeria and Zambia as our External Examiner, and on both occasions he made the same remark to me—'your students are better than mine in theory, but mine are superior to yours in the practical applications of theory!' His favourite test was to present each student with a simple problem in the form of a sketch and ask for a solution—many of the students failed this test. That, really, is what field classes are all about. They are meant to teach students how to apply what they have learnt in the classroom to problems met with in the field. I keep saying to my

fellow geologists: 'the basis of all geology is field work, and as much of it as possible.' That is what Read's saying, quoted at the beginning, really means.

So what can we do to remedy this unfortunate situation, a situation that is really detrimental to the proper training of our geologists in India and elsewhere? Firstly, there must be the acceptance by geology teachers that this is the situation and that it must be changed. Secondly must be the will and desire to change. If those two preconditions exist, then we must find the means by which we can teach our geology teachers themselves how to conduct the field classes. Teaching geology in the field itself is an art, and not everyone is capable of taking a field class. Those who can must be identified and persuaded to pass on their expertise. The next step would then be to conduct one or more 'workshops' or 'training courses' in different regions of India on 'Teaching Field Geology'. Such workshops or training courses would be specifically for geology teachers, with at least one person from each University with the required aptitude being selected to attend the course. He should be the person identified by the Department as the staff member to be in charge of field training. On completion of the course he would go back to his University, and given every encouragement to work out ways and means to teaching the subject. He should select an area where several geological features can be seen within an accessible area and which would be good for teaching students how to map. He would map it and study it himself, and he would then take successive groups of students, year after year to the same area, and teach them (a) how to map, (b) how to make field notes and sketches, and (c) how to write a geological report on the area.

I have made these comments on the basis of my own experience both as field geologist and a geology teacher, because I, for one, have been quite alarmed by what I have read in the article mentioned. I hope these comments will reinforce the views that have been expressed, and that they will help in some way to solve this very serious problem.

P. G. COORAY

Addendum

Malanjkhand Proterozoic Porphyry Copper Deposits, M. P., India by D. B. Sikka published in *Journal Geol. Soc. India*, v. 34, pp. 487-504.

The following missing reference may be added :

SIKKA, D. B., NEHRU, C. E., SUBHEADER, S. S., (1964b). Application of statistical methods to calculation of average grade in iron ore deposits. *Mineral Markets*, September-October issue pp. 17-21.

Fig. 5. After the title, please include: after Titley 1982, *Advances in Geology of the Porphyry Copper Deposits: Southwestern North America*, The University of Arizona Press, Copyright 1982.