



REPORT ON THE “WORKSHOP ON VINDHYAN STRATIGRAPHY AND PALAEOBIOLOGY”

(March 19-20, 1999)

Recent discoveries by Azmi (1998) of small shelly fauna from the Rohtas Formation and triploblastic animals from the Chorhat Sandstone (the Semri Group) by Seilacher *et al.* (1998) not only challenged the Meso-Neoproterozoic age assignment to the Vindhyan Supergroup but also modified the concepts of evolutionary palaeobiology. It was felt that in-depth discussion is urgently needed to evaluate the findings of Azmi (1998) as it suggested the Precambrian-Cambrian boundary within the Rohtas Formation, thereby challenging the conclusions drawn on the basis of stromatolites, carbonaceous megafossils, microfossils and radiometric dates. Against this background, a Workshop on Vindhyan Stratigraphy and Palaeobiology was organised by the Palaeontological Society of India on 19th and 20th March, 1999 in collaboration with the Department of Geology, University of Lucknow. The workshop was followed by a four day field work in Maihar-Rewa area between 21st to 24th March, 1999.

For the workshop, in all 29 extended abstracts were received and subsequently published in the form of an Abstract Volume. Out of these, 25 research papers were presented during the workshop for discussion. The Geological Survey of India presented a special report on the study of “Reported Fossiliferous Horizons of Lower Vindhyan at Maihar (Madhya Pradesh) and Ramdhira Quarry (Bihar)”.

A good collection of stromatolites, megafossils, trace fossils and microfossils from the Vindhyan Supergroup was also displayed in the Display Hall during the workshop with facility to study them under the microscopes. Shelly fauna reported by Dr. Azmi and the material recovered by the team of the Geological Survey of India from the Semri Group were available for scrutiny on 20th March, 1999.

The workshop was inaugurated by Hon'ble

Minister for Higher Education, Dr. N.K.S. Gaur, Government of Uttar Pradesh, on 19th March, 1999. Mr. Ravi Shanker, Senior Deputy Director General, Geological Survey of India, Northern Region, Lucknow introduced the theme of the workshop and explained its importance and significance. The workshop was divided into seven technical sessions which covered themes on Radiometric Dating and Isotope Geochemistry, Stratigraphy and Sedimentology, Stromatolites, Megafossils and Microfossils. A valedictory session was held on 20th March, 1999.

K. Gopalan (NGRI, Hyderabad) reviewed the available radiometric data for the Vindhyan Supergroup and discussed their reliability and significance. D.M. Banerjee (Delhi University) and W. Frank (University of Vienna) presented a new ⁴⁰Ar/³⁹Ar date for porcellanite of the Semri Group. They gave 617±3.5 Ma as the plateau age at lower temperature for the porcellanite and tentatively interpreted it as the depositional age. But at higher temperature steps, higher ages from 920 to 1073 Ma have been measured. Their data was, however, received with much scepticism.

New carbon and oxygen isotope data was given by S. Kumar (Lucknow University) and M. Schidlowski (Max Planck Institute, Mainz) for the Rohtas Formation. They did not record any significant shift in $\delta^{13}\text{C}$ values. B. Kumar and co-workers (NGRI, Hyderabad) presented a fairly good amount of data on carbon, oxygen and strontium isotopes for both the Lower and Upper Vindhyan. They compared their data with worldwide Proterozoic successions and suggested a Mesoproterozoic-Terminal Proterozoic age for the Vindhyan sediments. S. Kumar (Lucknow University) noted very negative $\delta^{13}\text{C}$ values for the Lakheri Limestone of the Kota-Bundi area of Rajasthan and suggested that it should not be correlated with the Bhandar Limestone of the

Maihar area as it has very positive $\delta^{13}\text{C}$ values.

A.D. Ahluwalia (Panjab University, Chandigarh) in his paper argued in favour of the younger age for the Vindhyan sediments against the backdrop of the discovery of small shelly fauna from the Rohtas Formation and record of triploblastic animals from the Chorhat Sandstone. R.J. Azmi (WIHG, Dehra Dun) justified the younger age assignment for the Rohtas Formation on the basis of newly discovered small shelly fauna and suggested Vendian to early Palaeozoic age for Vindhyan Supergroup. V. Rai (Lucknow University) presented a critical review regarding the small shelly fauna reported by Azmi (1998) as well as the discovery of triploblastic animal from the Chorhat Sandstone by Seilacher *et al.* (1998). He rejected both the reports. M.N. Joshi (D.B.S.College, Dehra Dun) reviewed the available data for the Vindhyan Supergroup and the Lesser Himalayan carbonates. V.C. Tewari (WIHG, Dehra Dun) also reviewed the available data for the Vindhyan Supergroup and the Lesser Himalayan carbonates for the stratigraphic correlation and sedimentational history. He noted that the Vendian stromatolites of the Krol -Tal succession are not recorded from the Vindhyan. He also pointed out that the typical Lower Cambrian taxa are not found in the Vindhyan assemblage as reported by Azmi (1998). He rejected the correlation of the Mussoorie Group with the Semri Group. He also discussed the sedimentation model for the Proterozoic-Cambrian rocks of the western Lesser Himalaya and their correlation with the eastern Himalayan rocks and the Vindhyan. P.K. Raha (GSI, Calcutta) also reviewed the correlation of the Vindhyan with other equivalent sedimentary deposits.

S. Kumar (Lucknow University) justified the use of stromatolites for intrabasinal and inter-regional correlation. On this basis, he rejected the correlation of Lakheri Limestone with the Bhandar Limestone as is traditionally being done. S.M. Mathur (Lucknow) raised the basic issue of subdividing the Vindhyan Supergroup into Lower and Upper Vindhyan and suggested that this subdivision should be given a fresh thought. A.K. Moitra (GSI, Hyderabad) presented a stromatolite based biostratigraphy of the Chattisgarh Basin and suggested possible correlation with the Vindhyan

Basin. According to him, the lower biozone of the Chattisgarh Basin is comparable to the assemblage of stromatolites in the Semri Group of the Vindhyan Basin. He further noted that the stromatolite assemblage of the Bhandar Group is also present in the upper biozone of the Chattisgarh Basin.

R. Sharma and co-workers (GSI, Lucknow) discussed the geology of the parts of Allahabad and Mirzapur districts, Uttar Pradesh. A.G. Pramanik and co-workers (ONGC, Dehra Dun) gave a comprehensive account of tectono-sedimentation model of the Vindhyan Basin in the Son Valley and discussed the implications of probable hydrocarbon prospects. P. S. Misra (GSI, Nagpur) gave a detailed account of evaporite cyclothems and Sabkha sedimentation of Simrawal Shale, Bhandar Group of Rewa Plateau area.

M. Sharma and M. Shukla (BSIP, Lucknow) gave a comprehensive review of the reported megafossils from the Vindhyan Supergroup. S. Kumar (Lucknow University) described seven megafossils from the Suket Shale of Rampura area. He concluded that *Chuarina* and *Tawuia* are parts of a multicellular chlorophycean plant. A number of new carbonaceous megafossils were described by P. Srivastava (Lucknow University) from the Bhandar Group of the Maihar area. A. Chakraborty (IIT, Kharagpur) recorded the imprints of metazoan activity from the Bhandar Sandstone in the form of burrowing activity of worm-like animals. V. Rai (Lucknow University) described the microbial mat texture and probable Ediacaran fossils from the Maihar Sandstone.

P.K. Maithy (BSIP, Lucknow) reviewed the occurrence of microfossils from the different stratigraphic horizons of the Vindhyan Supergroup and concluded that the acritarchs are the most important microfossils for the Vindhyan biostratigraphy. According to him, on the basis of the study of acritarchs the age of the Rohtas Formation can best be bracketed in the age ranging between 1000 and 850 Ma.

On the claim of small shelly fossils and inarticulate brachiopods of early Cambrian age from the Lower Vindhyan of Son Valley, Central India by Azmi (1998) a special investigation report was presented by a team of geologists of the Geological

Survey of India comprising Dr. D. K. Bhatt, Shri G. Singh, Shri M. K. Soni, Dr. A. K. Moitra, Shri D. P. Das, Shri S. Gupta and Shri C. De on 20th March, 1999. The work was introduced by Mr. Ravi Shanker, Senior. Deputy Director General, Geological Survey of India, Northern Region, Lucknow and the report was presented by Dr. D. K. Bhatt. The entire field work was videotaped and the same was shown to the participants with a commentary with the help of T.V. screens. The team noted some discrepancies in the field observation given by Azmi (1998,1999). They reached the conclusion that the cherty limestone from which Azmi has discovered the small shelly fossils is absent, and instead the lithology is entirely represented by cherty shale. As such, they contended that the lithology is not amenable to acid treatment as claimed by Azmi (1998). According to this report, a variety of mineral growth structures of microscopic dimensions similar to the *Azmi's shelly fossils* were recovered from the Ramdhira quarry section and no biogenic structure could be seen at all.

The valedictory session was held at the end of the workshop which was presided over by Dr. S.K. Acharyya and assisted by Prof. S. Kumar. Prof. A.R. Bhattacharya acted as reporter. The following members participated in the discussion: Dr. S.V. Srikantia (Geological Society of India, Bangalore), Dr. B.S. Tewari (Palaeontological Society of India, Lucknow), Prof. A.K. Jain (Roorkee University), Dr. K. Gopalan (NGRI, Hyderabad), Dr. N.K. Verma (ONGC, Dehra Dun), Prof. A. Chakrabarty (IIT, Kharagpur), Dr. A.D. Ahluwalia (Panjab University, Chandigarh). Dr. B. Kumar (NGRI, Hyderabad), Mr. R. Shanker (GSI, Lucknow), Dr. S.K. Acharyya (GSI, Calcutta), Dr. A. K. Jauhri (Lucknow University), Dr. P.K. Maithy (BSIP, Lucknow) and Prof. S. Kumar (Lucknow University). The following recommendations were unanimously made:

1. The palaeontological findings should always be published with location map and litholog.
2. Identification of the fossils should be first confirmed and expert opinion taken before publishing the findings.
3. Efforts should be made to generate more radiometric dates for the Vindhyan sediments. Both the K/Ar and Ar/Ar dating have been recommended for the Vindhyan glauconites.
4. Efforts should be made for regional correlation of different lithounits of the Vindhyan Supergroup.
5. Detailed geological maps should be made available to the workers.
6. Proceedings of the Workshop should be published as early as possible.

Between 21st to 24th March, 1999, a number of participants also joined the field excursion to the Maihar-Rewa area, Madhya Pradesh. For first three days the field work was done jointly with the members of the field party lead by Dr. R.J. Azmi and arranged in the same area by the Wadia Institute of Himalayan Geology, Dehra Dun. The participants visited different localities around Maihar township including the fossiliferous locality reported by Dr. Azmi. It was confirmed that Dr. Azmi has misidentified the cherty shale as cherty limestone. The participants also spent considerable time in the locality from where Seilacher *et al.* (1998) had reported triploblastic animals. No biogenic structure could be recovered by any participant.

REFERENCES

- Azmi, R.J. 1998. Discovery of Lower Cambrian small shelly fossils and brachiopods from the Lower Vindhyan of Son Valley, Central India. *Jour. Geol. Soc. India*, **52**: 381 - 389.
- Azmi, "R.J. 1999. Discussion on "Discovery of Lower Cambrian small shelly fossils and brachiopods from the lower Vindhyan of Son Valley, Central India". *Jour. Geol. Soc. India*, **53**: 125 - 130.
- Seilacher, A., Bose, P.K. and Pfluger, F. 1998. Triploblastic animals more than one billion years ago: Trace fossil evidences from India. *Sci.* **282**: 80 - 83.

SURENDRA KUMAR
ORGANISING SECRETARY
WORKSHOP ON
VINDHYAN STRATIGRAPHY AND PALAEOBIOLOGY
DEPARTMENT OF GEOLOGY,
UNIVERSITY OF LUCKNOW
LUCKNOW - 226 007

