

**WORKSHOP ON VINDHYAN STRATIGRAPHY AND PALAEOBIOLOGY,  
MARCH 19-20, 1999, LUCKNOW.**

The Department of Geology, University of Lucknow, and the Palaeontological Society of India, organised a workshop at Lucknow during March 19-20, 1999, on the Vindhyan Supergroup. This workshop assumed considerable significance in the light of the recent report of discovery of small shelly fossils from the Semri Group of the Vindhyan Supergroup (Azmi, 1998, 1999a, b) and also the triploblastic animal trace fossil of over one billion years old (Seilacher et al. 1998). Papers pertaining to geochronology, isotope data, megascopic, microscopic faunal and floral data, sedimentation and environment were presented.

The session started with a critical review of K/Ar fission track and Rb/Sr dates available for the Lower Vindhyan rocks (K. Gopalan). It was stated that the Kaimur Group rocks cannot be younger than 1100 Ma even after making allowance for various constraints pertaining to geochronological methods adopted for many published data on the Vindhyan rocks. The isotope event stratigraphy of Proterozoic succession of the Vindhyan basin (B. Kumar et al.) seems to suggest Mesoproterozoic-Terminal Proterozoic age for the Vindhyan sediments based on worldwide analogues of Proterozoic successions. Carbon and oxygen isotope data collected from the Son Valley-Ghurma area and the Maihar area have not indicated any possibility of Precambrian-Cambrian boundary in the Rohtas Subgroup of the Semri Group (S. Kumar and M. Schidlowski). Preliminary  $^{40}\text{Ar}/^{39}\text{Ar}$  dating of porcellanite and detrital mica from the Vindhyan have given various ages of  $617 \pm 3.5$  Ma and higher ages of 920 to 1073 Ma for "porcellanite" from Madhya Pradesh. The basal Vindhyan sandstone of Chittorgarh, Rajasthan has given an age of  $938.5 \pm 3.9$  Ma for detrital mica (D.M. Banerjee and W. Frank). These numbers do not substantially help to clarify the stratigraphic problem unless the samples are collected systematically by workers who have geologically mapped on regional scale and the dates are determined with a full understanding of the palaeobiological, depositional and tectonic history of the Vindhyan basin.

The Vindhyan rocks have provided a wide ranging organic-walled microfossils and acritarchs, which constitute the dominant Meso-Neoproterozoic assemblage (Maithy). The metazoan activity in the Vindhyan has made headlines. Now the lower Bhandar Sandstone shows features which suggest burrowing activity of worm-like animals during the Upper Vindhyan (A. Chakrabarti). The Suket Shale (= Bhagwar Shale) representing the uppermost formation of the Semri Group has yielded seven megafossils of chlorophycean affinity from the Rampur area and these are *Chuarina circularis* Walcott, *Chuarina vindhyanensis* sp. nov. *Tawuia dalensis* Hoffmann, *Tawuia indica* sp. nov. *Suketia rampurensis* gen. et. sp. nov., *Tilsoia khoripensis* gen. et. sp. nov. and *Chambalia minor* gen. et. sp. nov., with a definite relationship between *Chuarina circularis*, *Tawuia* and *Tilsoia* (S. Kumar). A regional systematic palaeontological survey may bring to light the existence of a single biogene of palaeobiological significance at the level of Suket Shale (= Bhagwar Shale) at the top of the Semri Group. An appraisal of megascopic fossils in the Vindhyan sediments also points to the importance of *Chuarina-Tawuia* assemblage, which are generally found in the 600-1000 Ma sediments of the world (Mukund Sharma and Manoj Shukla). The Bhandar Group provides many additional carbonaceous megafossils in addition to *Chuarina-Tawuia* assemblage which exhibit relatively more diversification and better preservation of forms in comparison with the other known megafossil assemblages of the Vindhyan Supergroup (Purnima Srivastava).

The Proterozoic carbonate sequences all over the world contain prolific growth of stromatolites. Biostratigraphy based on these stromatolites has greatly advanced our understanding of the Proterozoic stratigraphy. The workshop brought to light many such attempts in the Chhattisgarh basin (A.K. Moitra), the Vindhyan basin (S.Kumar) and Lesser Himalaya (V.C. Tewari). In the

Vindhyan basin, the *Inzeria-Gymnosolen* assemblage, *Baicalia* and *Tungussia* are characteristic of the upper part of the Bhandar Group and the assemblage of *Kussiella*, *Conophyton* and *Colonella* is typical of the Semri Group. This distinction has provided a basis for inter-regional correlation of the Vindhyan and Chhattisgarh basins. The identification of algal mat covered bedding surfaces of the sandstone from the upper Bhandar Sandstone is cited as evidence for palaeobiological evolutionary events that occurred close to the Ediacaran time. This has also led to the proposal of Vendian age for the Bhandar Group (Vibhuti Rai).

There was an attempt to view Vindhyan stratigraphy in the inter-regional perspective of the subcontinent with a suggestion to have a variety of inputs for determining the Precambrian-Cambrian boundary (Pulak Kumar Raha). There was a strong suggestion for discontinuing the division of the Vindhyan into "Lower" and "Upper" and for uniform adoption of four fold classification of the Vindhyan Supergroup (S.M. Mathur).

Sedimentation and environmental aspects were covered by workers from GSI and ONGC. The Chopan Porcellanite Formation, also called as the Deonar Formation of the Mirzapur Subgroup of the Semri Group, is described as the submarine and terrestrial volcanoclastic and volcanogenic epiclastic sediment deposited in a tidal flat region (R.N. Srivastava et al.). In another presentation it was brought out that the Son Valley Vindhyan sequence shows a depositional environment with recurrent sea level fluctuations, continued throughout the deposition, due to uplift of the southern marginal parts of the Vindhyan basin corresponding to pulsating tectonism (Sumant Gupta et al.). The multi-disciplinary geological, geophysical and geochemical investigation of the Vindhyan basin has brought out that it is a simple saucer-shaped syncline with complex extensional fault system in the sub-surface of the Semri Group, diagnostic of rift-basin geometry with depositional cycles of recurring transgressive and regressive sea and hydrocarbon occurrence, in association with porcellanite of the Deonar Formation (A.G. Pramanik et al.). This work suggests a diagenetic transformation of silica into porcellanite preferentially in a layer of higher biogenic silica content.

The recent report of small shelly fossils (SSFs) from the Semri Group (Azmi, 1998, 1999a, b) was an important focus of the workshop. These SSFs from the Rohtasgarh Limestone Formation of the Rohtas Subgroup of the Semri Group was cited as heralding the global skeletonization event which occurred only near the Precambrian-Cambrian boundary, thereby necessitating a revision of Precambrian age for the Semri Group (R.J. Azmi). Analysing the implication of the report Early Cambrian SSFs from the Semri Group, it was suggested that they come from a Cambrian transgressive sequence overlying the Vindhyan (A.D. Ahluwalia).

As a counter to the contention of Azmi, the Geological Survey of India presented, through D.K. Bhatt, a video report of their recent (post-publication of Azmi, 1998, 1999a, b) investigation at Maihar (M.P.) and Ramdihra quarry (Bihar) of the Lower Vindhyan. This work has brought out that the "fossil" horizon in the Maihar section, which Azmi considered as older, is stratigraphically younger and lies at least 60 m above the one reported by him from Ramdihra section. The samples collected by the GSI from the two reported horizons after maceration were found to be devoid of small shelly fossils (D.K. Bhatt).

The material collected by GSI and also by Azmi were on display. According to GSI, the samples from Ramdihra quarry superficially resemble some elements of "small shelly fossils" and are quite misleading if viewed simply for their shape and dimensions. The samples from Maihar, being cherty siltstone, were not at all suitable for extraction of small shelly fossils by conventional acid treatment. Many of the samples shown by Azmi had the unmistakable small shelly fossil character. But they were all found highly coated. Samples showing stromatolites, carbonaceous mega-fossils *Chuarina-Tawuia* assemblages were also displayed for examination.

The Valedictory session was utilised for a discussion on critical aspects of the age of and life in the Vindhyan. It was pointed out that a lack of Geological map of the entire Vindhyan belt on 1:250,000 scale has impeded research work and the GSI is the best agency to bring out such a map. The need for coordinated dating of Vindhyan rocks, particularly the amygdaloidal andesitic lava occurring intermittently along the western edge of the basin and also dolomite and glauconite in the sequence, by systematic Ar/Ar, Rb/Sr, Pb-Pb and other modern methods was stressed. The need for understanding the biological evolution of *Chuaria-Tawuia* assemblage on a regional basis was also suggested.

There were references to small shelly fossils. The present reporter explained that the paper was reviewed by Martin Brasier of Department of Earth Science, University of Oxford, who strongly encouraged its publication. As this find represents the first and new report from the Vindhyan rocks, the Geological Society of India wished to subject the reported localities and the fossils for a detailed scrutiny. Accordingly a Vindhyan Field Meeting was proposed.

*Geological Society of India*  
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#### **PETROTECH-99: LIFETIME ACHIEVEMENT AWARD TO DR. HARI NARAIN**

The International Petroleum Conference, PETROTECH-99 was held in Delhi from 9th to 12th January 1999. This was the third conference; the earlier two were organised by the ONGC Ltd. in January, 1995 and January 1997. This conference was organised by the Indian Oil Corporation Ltd. with full support of the entire oil industry in the country and under the patronage of the Ministry of Petroleum and Natural Gas. There were nearly 1500 participants including a large number of foreign delegates representing various oil companies including those dealing with refining and petrochemicals. The PETROTECH-99 Lifetime Achievement Award for outstanding contributions to the development of earth sciences in general and geophysics in particular, with emphasis on its application to the petroleum industry in India was awarded to Dr. Hari Narain, former Director, National Geophysical Research Institute, Hyderabad. Award Lecture on "Research Perspectives for Exploration of Hydrocarbons in the 21st Century" was delivered by Dr. Hari Narain on the occasion.