

## NOTES

### GENESIS AND EVOLUTION OF STRATABOUND ORE DEPOSITS OF INDIA

A seminar on 'Genesis and evolution of stratabound ore deposits of India' was held at the Jadavpur University during 21-23 June, 1984, to celebrate 3 decades of continuous teaching and research in Geological Sciences at the Jadavpur University and completion of 25 years of service in the promotion of research in Earth Sciences by the Geological Society of India. A large number of Earth Scientists from different academic institutions and government agencies participated in the Seminar. The scientific sessions of the Seminar were divided into four sections: (1) Manganese deposits, (2) Iron ore deposits, (3) Base metal deposits, and (4) Radioactive and other miscellaneous deposits.

Professor Supriya Roy of Jadavpur University, in his key-note address on 'Metallogeny of Manganese and the Indian scenario' brought out the temporal and spatial aspects of the global metallogeny of manganese, in contrast to those for iron-formations and massive sulphide deposits. He pointed out the absence of manganese deposits in the available global rock record for the first 600 million years and the general paucity of these ores in the Archaean period. Even out of the few manganese deposits of Archaean age, only two are recognized from typical greenstone belts, while others occur in Archaean basins of Proterozoic affinity. This contrasts with the typical volcanic-hosted Archaean massive sulphide deposits and iron-formations and suggests that the Archaean environment in general and the nature of contemporary volcanism and exhalation in particular, were not conducive to manganese deposition. The nature of manganese metallogeny in the Proterozoic and Phanerozoic periods was traced and the spectacular development of these deposits in Cenozoic time, in land-based rock record and on the floors of modern basins was pointed out.

Commenting on the Indian scenario, it was pointed out that out of the very few Archaean manganese deposits of the world, three important deposits (in Iron Ore Group, Chitradurga Group and the Eastern Ghats Khondalite sequence) occur in India. All other Indian deposits were formed in Proterozoic basins. The deposits so far studied in detail are all terrigenous-sedimentary in character. Only the deposits of Chitradurga Group occur in the upper sedimentary sequence of a greenstone belt. The pristine and modified nature of these manganese ores and manganese silicate rocks were described.

The session on Iron Ore Deposits was prefaced by key-note addresses by Dr. R. N. Misra and Dr. A. K. Chatterjee, of the Geological Survey of India and the National Mineral Development Corporation Ltd. In his key-note lecture entitled, 'Origin and evolution of banded hematitic ore deposits', Dr. Misra, reviewed the modern concepts on the genesis and evolution of the banded iron formations and the associated hematitic ores. He adduced arguments in favour of primary precipitation of iron, drawing examples from the Indian as well as deposits from outside.

Dr. Chatterjee in his address, entitled 'Problems in the study of Precambrian iron-formation and associated iron ores—a survey of Indian scenario' laid emphasis on the view that major development of iron formation in India was in the Archaean,

rather than in the Proterozoic. He emphasized that intensive researches on field relationships, study of stable isotopes, minor element distribution and micro-biota of iron formations should be made before a firm conclusion is made on the origin of these formations. Specific factors controlling sectoral localization of enriched ores and other ore-types in some Indian ore belts were presented.

The session on base metal deposits was initiated by two key-note addresses, delivered by Prof. A. Mookherjee of the Indian Institute of Technology, Kharagpur and Prof. S. C. Sarkar of Jadavpur University respectively. Professor Mookherjee in his address on 'The genesis of "stratiform" ore deposits' identified seven geological situations which may generate stratiform character. As a very large group of 'stratiform' deposits represents the end-product of a long-continued process in which ore elements are *dissolved* from a dispersed source-area, *transported* to a potential site and *deposited* in a fairly concentrated form, several major facets of 'The Hydrothermal Continuum' were emphasized. Modern avenues of research, related to (a) ancestry of ore fluids and their important constituents, (b) chemical and physical states of ore fluids, (c) mechanisms of transport, (d) causes of deposition, and (e) the life-span and history of hydrothermal systems. Thermodynamic constraints imposed by local and partial equilibria prevailing within the system—as complex, seemingly-unrelated mass exchange reactions take place, while the potential ore-fluid reacts with its mineralogical environment, continuously and irreversibly, all the way—were briefly alluded to; and the extent to which calculations of the mass transfer phenomenon can help in obtaining a 'motion-picture' of the moving panorama that a mineralization episode represents, was pointed out.

Prof. Sarkar in his address concentrated on post-depositional changes in the base metal deposits of the strata-bound type. It is the post-depositional changes which are at the root of many of the controversies with respect to their genesis. The changes discussed referred to (1) changes of shape, size and disposition of ore bodies, (2) changes in ore petrology involving changes in mineralogical composition, bulk chemistry, textures and micro-structures, ore-silicate relationships, changes in wall-rocks. Estimation of the temperature, pressure and other variables controlling these changes were discussed. Evolution of a number of strata-bound base metal deposits of India were traced.

In another key-note lecture Prof. Sarkar discussed the origin and evolution of a number of strata-bound uranium deposits of the Indian sub-continent in the light of evolution of the lithosphere, atmosphere and biosphere, in general and local geology, in particular.

Other papers read at the session on manganese deposits were on the geochemical study of the Mn-ore deposits of Srikakulam, Vizianagaram and Visakhapatnam districts of Andhra Pradesh by T. V. S. R. Kshirsagar and the mineralogy and textures of Mn-ores of a part of the Koirā Valley, Orissa by B. K. Mahapatra and A. K. Paul.

Papers read on iron-ore deposits were related to those of Donimalai area of the Sandur schist belt by P. S. N. Murthy and A. K. Chatterjee, stratiform magnetite deposits in the Naga Hill ophiolites by R. K. Roy and others, and the banded iron formation of Sidhi, M. P., by A. K. Bhattacharyya. S. Acharyya in his paper discussed the features of syngensis and epigenesis in the iron-ore deposits of India.

A relatively large number of papers were read on the base metal deposits of India. A paper on the mineralization of the Gonkhola copper deposit, Central Bhutan, by C. P. Bhora and others discussed uncommon features in the Tethyan

Himalaya. Other papers on Himalayan deposits read at the seminar were the Gorubathan Pb-Zn deposit in Darjeeling by A. B. Saha and the polymetallic sulfide deposit of Askot, Pithoragarh, by A. K. Bhattacharyya and others. Papers on the Rajasthan deposits were presented by A. B. Roy and N. N. Singh on the tectonic-stratigraphic framework of the Pb-Zn deposit at Zawarmala, Udaipur; A. D. Mukherjee and others on the polymetallic sulfide mineralization in Ajari-Basantgarh-Pipala-Golia section, Sirohi; J. N. Roy and others on the stratiform base metal deposits occurring in Delhi Supergroup of rocks in southern Rajasthan and northern Gujarat.

A number of papers were presented also on the South Indian deposits. Two such relate to the Ingladhah deposit, Chitradurga schist belt, by H. N. Bhattacharyya and others, and A. Chowdhury respectively. A paper on the evolution of the Archaean copper deposit at Kalyadi, Hasan district, Karnataka, was presented by B. Krishna Rao and his co-workers.

Some aspects of the Singhbhum copper deposits were highlighted in a paper by C. D. P. Singh and S. K. Biswas.

In the section on radioactive and other stratabound deposits, papers by T. K. Mallik on the placer deposits of Kerala Beach and the stratabound tungsten mineralization in the Himalayas by P. S. Chakravorty and A. K. Basu deserve mention.

All the papers contained either some new information or new interpretation or both and they aroused keen interest amongst the participants as evidenced by the lively discussions that followed the presentation of most of the papers.

S. C. SARKAR

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## ANNOUNCEMENT

### YOUNG SCIENTISTS' PROGRAMME

Indian Society of Earth Sciences is going to organise an All India Competition amongst young earth scientists (below 30 years), under the Young Scientists' Programme sponsored by Dept. of Science & Technology, New Delhi. Authors of the selected articles will have to present their papers personally at the Technical Meetings of the Society to be held during February, 1985. Articles should be of the nature of review work which should include some original contribution by the author on any one of the following topics:

- (i) Modern trends of mineral exploration
- (ii) Marine Geology
- (iii) Plate tectonics and the Himalayas.

Articles on the above mentioned subjects should be restricted to 15,000 words including space for illustrations; some of the selected articles will be published in the quarterly issues of the Indian Journal of Earth Sciences. Invited authors will be provided T.A. and D.A. for their journeys from outside Calcutta. A cash prize worth Rs. 500/- + Society medal will be awarded to the author of the best article or paper. Final date for receiving: November 30, 1984.

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