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## AN EXPERIMENT AT MOTIVATING YOUNG EARTH SCIENTISTS

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In June this year, in a unique experiment, the Department of Science and Technology in cooperation with the Geological Society of India got together a group of young earth scientists (in the age group 30–35 years) who had a proven track record of high quality research and associated them in the process of identifying goals for earth science activity in the coming decade.

The whole object of this exercise of motivating young scientists was based on the principle enunciated by C. V. Raman a long time ago. Based on analyses of the history of science Raman had arrived at the conclusion that great discoveries in science and youthful genius were remarkably closely associated and that 'the principal requisite for means of scientific research was not the maturity of knowledge associated with age and experience, but the freshness of outlook which is the natural attribute of youth'. The conservatism which developed with increasing age was detrimental to great achievements in science. 'The principal function of the older generation of scientific men was to discover talent in the younger generation and to provide ample opportunities for its free expression and expansion.'

The workshop was held at the Geological Society of India in Bangalore on 17 and 18 June. Of seventeen young scientists invited, fifteen responded, and ten actually participated in the meeting. The young scientists were given full freedom to present their viewpoints. Each presentation was followed by a lively discussion and exchange of views between the young scientists and senior participants. The result was that a better perception of the other person's point of view became possible. The discussion provided the seed for many a collaborative programme of research between individual scientists. The main objective of the organisers, which was to bring together persons working in different disciplines and different regions of the country and promote interaction between them, was more than fulfilled.

It was emphasized during the course of the workshop that the Indian continent presented some of the best geological sections in the world, and that it should be possible to identify certain challenging areas and work hard to secure significant results. A review of the proceedings of the workshop was appeared in the *Journal of the Geological Society of India* (vol. 34, no. 2, pp. 215–219).

Taking full note of individual capability, infrastructure facilities available at different centres, and the geological formations that are unique to India, six main topics on which work could be initiated were identified. These are:

### *Understanding of the plate tectonic processes in the Himalaya and their extension to the Proterozoic and the Archaean*

The pre-eminence of the Himalaya as the classic ground for the study of collision tectonics was emphasized. Much team work and sustained effort were necessary to unravel the complicated geological history of the terrain. Palaeomagnetism plays a vital role in the study of these areas. All earth science institutions in the country should get involved in the study. Transects of all collision zones should be attempted. Exchanges of visits and ideas between geologists working in the younger terrain and the considerably older terrains in the south should be encouraged. This will enable a clear perception to be gained of the changing patterns of plate tectonic processes through time.

### *Understanding of the role of fluids in geological processes*

The important role fluids play in metamorphism and mineralization processes has come into prominence in recent years. This field is still new in India and requires to be pursued with vigour. The help of physicists in the IITs and BARC should be availed of in venturing into studies of fluids by adopting the latest techniques of Raman spectroscopy and laser Raman spectroscopy. Groups of individuals and institutions engaged in this study should be identified and given encouragement to pursue the subject more intensively and contribute to our knowledge of metamorphic and mineralization processes.

### *Study of Proterozoic sedimentary basins*

The study of Proterozoic sedimentary basins of India has not received much attention so far. They are a fantastic storehouse of sedimentary structures. Detailed sedimentological studies should receive urgent attention. Geophysical

input in defining subsurface characterization, mapping of the basement and seismic profiling to outline the structure are essential. Since, in some sections at least, the sedimentary record as preserved in these basins transgresses the Precambrian-Cambrian boundary, a detailed palaeobiological study should be undertaken. Geologists working in the Himalaya should get deeply involved in the study of these basins in peninsular India.

#### *Study of mafic dyke swarms*

India has a priceless heritage of a vast variety of dyke swarms of different kinds and different ages which require to be studied from all angles—petrographical, geochemical, geochronological, palaeomagnetic and structural. They are sure to throw considerable light on the evolution of the Indian lithosphere.

#### *Geochemical characterization of Deccan flood basalts*

This is an ongoing research project which has yielded good results. Geochemical characterization and establishment of stratigraphy for the entire Deccan trap region should be attempted. Petrological and isotopic studies should be intensified, as the Deccan flood basalts represent the best candidates for studying crustal contamination in continental flood basalts and continental lithosphere.  $^{40}\text{Ar}$ - $^{39}\text{Ar}$  age determination should enable precise fixture of the time and duration of the eruption. Correlation of flood basalt eruption with mass extinction is a fruitful field of research which must receive attention. Another fascinating and challenging problem relates to the study of the processes and causes of uplift of the Western Ghats and its possible effect on the drainage pattern of the peninsula.

#### *Studies on groundwater, soil and weather*

As a piece of relevant research that has great bearing on the welfare of the people, earth

scientists will have to take greater interest in carrying out basic research in respect of groundwater, weathering and soil formation and on the changing patterns of climate.

*Groundwater:* Processes that cause fluctuation in water table; the manner of recharge and the consequences of large-scale withdrawal; the role played by the vadose zone in transferring water; groundwater contamination, which is posing a serious threat—all these aspects should receive immediate attention.

*Soils:* A clear understanding of the chemistry of the weathering process in relation to soil formation is another important field on which research has to be concentrated. Valuable soil is getting rapidly eroded. Studies should be aimed at controlling this menace, through geomorphological appraisal, terracing, contour bunding, afforestation of watersheds and such other constructive measures.

*Weather:* Studies on the changing aspects of climate are equally important. All investigations, like the study of shallow oceanic sediments in the shelf region, tree rings, sand dunes, loess and glaciers should be intensified and knowledge gathered from a study of these aspects periodically synthesized.

The emphasis of the workshop was on bringing out the best in young earth scientists. An assurance was held out to them on behalf of the Department of Science and Technology and the Geological Society of India that every effort would be made to support their research to contribute significantly to our knowledge of the geology and resources of the country.

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