

## Book Reviews

**SCIENTIFIC REPORT OF THIRD INDIAN EXPEDITION TO ANTARCTICA.**  
Technical Publication No. 3. Prepared by Centre for Earth Science Studies, Trivandrum,  
1986. pp. 286.

The scientific report incorporates the details of research work carried out by the Third Indian Scientific Expedition to Antarctica during 1983-84, in the fields of meteorology, biology, geology and geophysics, communication and radiophysics and environmental science. The Third Indian Expedition under the leadership of Dr. Harsh K. Gupta achieved the distinction of setting up the first Indian permanent station *Dakshin Gangotri* on ice-shelf of Princess Astrid coast of Queen Maud Land of Antarctica in a record time of 60 days.

The section I of the report contains two papers (Singh *et al.* and Rizvi). The setting up of a permanent full-fledged surface and upper air observatory in Antarctica is an important achievement. Considering that the weather of Antarctica has a great influence on global weather, the meteorological information emanating from this station will be of immense benefit to India.

Oceanographic observations and biology form part of section II. The oceanographic observations pertain to hydrographical and hydrochemical details in the southwest Indian ocean and Antarctic sea (Naqvi). The biological section in the environ of Antarctica contains the maximum contribution of 9 papers. The studies of Antarctic phytoplankton suggests that the Antarctic ice-edge ecosystem has two entirely different biotopes (Pant). The study of daily variations in the abundance of zooplankton in the coastal waters of Queen Maud Land has indicated a considerable difference in the volumetric and numerical increase of plankton in different weeks during 1983-84 summer (Mathew and Vincent). Description of six species of sponges collected from the Antarctic sea forms the subject matter of one paper (Thomas and Mathew). The study of avian fauna clearly indicates definite geographical limits in distribution (Mathew). Gorgonids accidentally caught in plankton net from Antarctic sea have been separately described (Thomas and Mathew). The bacterial population from Schirmacher Oasis of Antarctica show seasonal and site-wise variation in size and diversity (Prabhu Matondkar). The spatial distribution of krill and other zooplankton in the Antarctic sea has been observed (Mathew, Mathew and Vincent). The study of air samples have indicated variation in the concentration of 14 types of spores in the Antarctic air (Tilak).

There are three papers on the geology of Schirmacher Hill region (Singh, Sengupta, Ravindra Kumar), one each on recent sediments (Madan Lal) and on geophysics (Gupta and Varma).

The Antarctica continent can be divided into six tectonic provinces, viz., East Antarctic shield (mainly Precambrian), Ross Orogen (Early Palaeozoic), Borchgrevink Orogen (Middle Palaeozoic), Ellsworth Orogen (Early Mesozoic), Andean Orogen (Late Mesozoic to Early Cenozoic) and Cenozoic volcanic province. The East Antarctica Shield, of which the Schirmacher Range, the area of Indian investigation forms a part, comprises the larger segment of the continent and it is bound on the Pacific side by the Ross Orogen comprising of the Trans-Antarctic Mountains. The rocks exposed in East Antarctica with an average crustal thickness of 35-45 km

can be divided into four broad groups: (i) The basement complex of mainly Early Precambrian age upon which rest, (ii) nearly undisturbed strata of Upper Precambrian, (iii) Late Palaeozoic continental sediments and basic intrusions, and (iv) Phanerozoic igneous rocks of various ages – mostly of alkaline composition. The basement complex consists of high-grade metamorphic rocks of granulite and amphibolite facies along with diverse plutonic intrusive rocks. The charnockitic rocks of this sector comprise one of the most extensive charnockite provinces of the world. Available information suggests a multiphase Early Precambrian history. It consists mostly of several Proterozoic mobile belts which contain relics of Archaean high-grade metamorphic terrains. Some of the oldest rocks ( $4000 \pm 100$  and  $3700 \pm 200$  m.y. Pb isochron) are reported from Fyfe Hills which appear to the east of Queen Maud Land. The rocks were metamorphosed under granulite facies conditions 2500 m.y. ago.

Banded gneiss, alaskite, garnet-biotite gneiss, calc gneiss and associated migmatite with relics of metabasics, charnockite and khondalite are the main rock types exposed in the Schirmacher Hills. The rocks have undergone an early metamorphism under granulite facies conditions and an early migmatisation leading to the development of charnockites, later superimposed by amphibolite facies of metamorphism and extensive granitisation; also a superposed folding of at least five generations (Sengupta). Based on mineral chemical data  $550\text{--}750^\circ\text{C}$  metamorphic temperature for garnet-biotite mineral pair and 5.31 Kbar at  $600^\circ\text{C}$  for khondalites have been estimated (Ravindra Kumar). There is a strong petrological and metamorphic event comparison between East Antarctica and South India.

The magnetic studies over Princess Astrid Shelf and the adjoining Schirmacher Hill have indicated a magnetic response by low amplitude fluctuations suggestive of low order magnetisation with significant anomalies over the contacts of garnet-biotite-gneiss and sulphide-bearing banded gneiss (Gupta and Varma).

The study of snow condition of the ice-shelf in *Dakshin Gangotri* as part of the environmental study has indicated an average ice-thickness of 390 m and the net snow accumulation of 70 to 80 cm/year (Sharma).

The study of ionospheric variation for the purpose of HF communication between Antarctica and India has given encouraging results (Hanjura). The volume also contains notes on satellite communication (Nayak) and on amateur radio operations (Singh).

The scientific report represents a significant contribution from India to Antarctic science. At present, various results are being presented in the form of routine reports. It is time the scientific work becomes more comprehensive and in-depth so as to make an international impact and publications are brought out discipline-wise for a wider coverage of each branch. The present report has a good get-up and represents a welcome addition to the growing literature on Antarctic science. Copies of the report can be obtained from the Centre for Earth Science Studies, Trivandrum.

A.M.S.E. Wing  
Geological Survey of India  
Bangalore

S. V. SRIKANTIA