Interest in gas hydrate began in 1970 when it was identified in bore holes intersecting oceanic sediments along continental margins and at polar continental settings and its characteristic responses to seismic reflection profiles and oil-well electric logs. Several regions of gas hydrate concentration have been identified in the offshore region between New Jersey and Georgia and Alaska in USA and in Siberia and Norway. Deep hydrocarbon exploration has been initiated by several countries and drilling to confirm the existence of large quantities of gas seriously attempted. Information gathered is exchanged between oil companies and academic institutions. We are not sure whether any gas hydrate has been identified by ONGC. Since hydrates are stated to have a strong effect on acoustic reflections, seismic reflection profiles should be able to locate concentrations of hydrate over large areas. It is stated that gas hydrates are indicated by an anomalous seismic reflector known as the Bottom Simulating Reflector or the BSR which may occur as sub-parallel to the sea floor.

Since gas hydrates could be the most abundant carbon fuel resource, the study is deserving of serious attention. Ocean research technology has enabled scientists to get a closer look at these unique chemical compounds which look like chunks of ice but burn like candles. It is stated that world-wide gas trapped in hydrates is estimated at 20,000 trillion cubic metres (personal communication, Dr. S.N. Visvanath).

We invite a more comprehensive note on this remarkable carbon fuel resource with immense potential and the possibilities of identifying and developing this resource in the submarine deltaic regions of our country - *Ed.*

GROUP DISCUSSION ON 'DRAINAGE EVOLUTION OF NORTHWESTERN INDIA WITH SPECIAL REFERENCE TO THE LOST SARASVATI'

'Ambitame Naditame, Devitame Sarasvati.' Rgveda (2.41.16)

A group discussion on the drainage evolution of northwestern India, emphasising on the ancient River Sarasvati organised by the Geological Society of India, was conducted at the Department of Geology, M.S.University of Baroda from 26th - 28th, December 1997. 30 papers were presented. The discussion commenced with the Keynote address by B.P.Radhakrishna which brought to the fore the essence of Rgvedic information on the mighty Sarasvati. Theme introductions were given by S.S.Merh (Vadodara), K.S. Valdiya (Bangalore) and A.Kapadia (Vadodara).

Primarily the Group Discussion revolved around three approaches taken. The first involved the characterisation of the ancient Sarasvati from ancient literature and archaeological studies. The Rgveda was used as a credible source of factual information by D.S.Chauhan (Jodhpur), S.Kalyanaraman (Chennai), S.G.Kantawala (Vadodara), R.N.Mehta (late) communicated by D.M.Shringarpure (Vadodara), K.N.Prasad (Chennai), S.V.Srikantia (Bangalore), R.N.Athavale (Hyderabad) and R.S.Bisht (New Delhi). This approach helped to arrive at following conclusions:

(i) The river Sarasvati was an independent river that originated in the Himalaya (ii) it had six major tributaries; (iii) It's discharge was perennial and was frequently affected by floods (iv) It had high stream power that was sufficient to erode and entrain bedrock efficiently (v) The area drained by the rivers was periodically affected by intensive earthquakes (vi) It sustained a great Vedic civilization along its banks.

A rather complex and somewhat controversial picture emerged from the results of palaeochannel mapping using various types of remotely sensed data, geomorphology of the river basins and topographical sheets. This methodology was adopted by a large number of workers including S.M.Ramasamy (Tiruchirapalli), A.S.Rajawat and co-authors (Ahmedabad), B.Sahai (Ahmedabad), D.P.Rao (Hyderabad), J.N.Malik & co-authors (Vadodara), A.Kar (Jodhpur), V.Sridhar and

co-authors (Vadodara), K.C.Tiwari (Vadodara), S.Yadav (Jodhpur), G.Das Gupta (New Delhi) and J.L. Thussu (Nagpur).

A network of palaeochannels was shown to exist in the Great Indian Desert that represent a gradual northwesterly migration from 'Luni' to 'Ghaggar'. This migration which requires geochronological confirmation was attributed to the gradual rise of a roughly NE-SW orientated cymatogenic arch. Combined satellite and archaeological data suggests that the river Satluj and the river Yamuna were tributaries of the Vedic Sarasvati. This connection was terminated by re-activation of a major transverse fault in the Kiarda Dun sector of the Siwaliks. Studies on the Haryana floodplains indicate a linkage between the Sarasvati and the Yamuna. Studies in the Kachchh area have helped in the identification of four deltas, probably belonging to Shatadru, Sarasvati and Drishadvati and the present day Indus north of the Rann of Kachchh. At a less regional scale several feasibility studies were presented of the use of synthetic aperture radar imagery data.

Singh, S.B.(Hyderabad) and D.Atchuta Rao (Hyderabad) highlighted the efficacy of aeromagnetic data and resistivity data in identifying lineaments respectively.

Based on field investigations Rajaguru and co-authors (Pune) identified five terraces in the Markanda river valley. They highlighted the presence of calcretes in Middle Palaeolithic terraces suggesting a relatively drier climate in the past. Another useful approach for palaeoenvironmental interpretation - palynology was introduced by C.Sharma (Lucknow) using examples from the Garhwal and Kumaun Himalayas. L.S.Chamyal (Vadodara) and K.S.Raghav (Jodhpur) stressed on sedimentological studies of river bank and aeolian successions and advantages of the 'facies' approach using case studies from Central Gujarat and Thar Desert respectively.

A.K. Singhvi and co-authors (Ahmedabad) discussed the age of the Thar desert using variants of the luminescence dating method and suggested that the Thar desert aeolian activity began around 200 ka BP and has since fluctuated in periodic phases. Studies around Kundala by N.Juyal and co-authors (Ahmedabad) in the Luni Basin revealed a fluvial activity between 81 - 40 ka BP, succeeded by aeolian sedimentation between 10 to 8 ka BP.

Stable isotopic studies by S.V.Navada and co-authors pointed that no present day recharge was taking place along the palaeochannels around Jaisalmer and the rate of groundwater movement was around 5 m/year.

A panel discussion was undertaken on the theme 'Relevance of palaeochannel studies in water resources management'. The discussion was conducted by P.P.Patel (Vadodara) under the Chairmanship of P.Ramachandran (Vice Chancellor, M.S. University of Baroda, Vadodara). The participants were N.Barot, K.C.B.Raju, R.N.Athavale and S.Choksi. A half day field excursion to sites in the Mahi river valley was also undertaken.

Department of Geology, Faculty of Science ANIRUDDHA S. KHADKIKAR
M.S.University of Baroda, Vadodara 390 002 D.A. SANT

EXQUISITE PRESERVATION OF PRECAMBRIAN LIFE

An important article has appeared in the recent issue of Nature (vol.391, 5th Feb.1998, pp.553-558) illustrating three dimensional preservation of algae and animal embryos in a Neopreterozoic (570±20 Ma) sequence from southern China. This is an exceptionally well preserved record of multicellular life from just before the Ediacaran appearance of macroscopic life. What is most striking is the preservation in three dimensional detail of cellular structure throwing light on early animal evolution. The myth of the missing fossil record ascribed to the soft and microscopic forms of early life is now blown over as fossils in an exquisite state of preservation are reported. This discovery emphasizes the importance of a close study of Proterozoic phophorite horizons in this country - *Ed.*