G.P. Srivastava, 18/144, Indira Nagar, Lucknow – 226 016 replies:

The samples studied were collected from Payangadi Clay Mines located near Payangadi Railway Station about 22 km NNW of Kannur. Further, it is clarified that the samples were collected from Payangadi Clay Mines and not from Nileshwar Mines. The geological map (Fig.1) has been taken from Paulose, K.V. and Narayanswami, S. (1968) as it is shown in the paper by Shukla et al. (2000a).

The geological map (Fig.1) shows continuous outcrop of Quilon Formation in the coastal tract which has been reproduced from Paulose, K.V. and Narayanswami, S. (1968) and duly acknowledged by Shukla et al. (2000a). As regards to the thickness of alluvium shown in the lithology, I feel it is variable.

NOTES

SPECIAL PUBLICATION ON THE SHIVA STRUCTURE

Attention of the readers is drawn to a recently brought out 39-page special publication of the Museum of Texas Tech University (No.50, October 2006) on the "Shiva Structure: A Possible KT Boundary Impact Crater on the Western Shelf of India" by Sankar Chatterjee, Necip Guven, Aaron Yoshinobu and Richards Donofrio. The submerged Shiva Crater in the Mumbai offshore Basin is presumed to be the largest (a 500 km diameter) of the known impact craters showing a structural relief of about seven kilometers.

The authors "..... speculate that the Shiva bolide (~40 km diameter) crashed obliquely on the western continental shelf of India around 65 Ma, excavating the crater and shattering the lithosphere. The peak ring of the Bombay High area has a core of Neoproterozoic granite with a veneer of Deccan Trap that rebounded upward for more than 50 km during the transient cavity stage as revealed by the mantle upwarping. Pseudotachylite veins of silica melt are observed within the drill cores of granitic target rock that may be linked to the impact-melting event. The combined Neoproterozoic granite and Deccan Trap target lithologies generated two kinds of impact melt ejecta that were emplaced radially in the down range direction within the Deccan lava pile: rhyolite dykes and iridium-rich alkaline igneous complexes. The age of the crater is inferred from its brecciated Deccan lava floor and the overlying Palaeocene Panna Formation within the basin, isotopic dating of the presumed proximal ejecta melts, and the magnetic anomaly of the Carlsberg Ridge that was created by the impact. Concentric geophysical anomalies, thermal anomalies, seismic reflection, and structural drill core data endorse the impact origin of the Shiva structure. The KT boundary sections in India, often preserved within the Deccan lava flows, have yielded several cosmic signatures of impacts such as an iridium anomaly, iridium-rich alkaline melt rocks, shocked quartz, nickel-rich spinels, magnetic and super-paramagnetic iron particles, nickel-rich vesicular glass, sanidine spherules, high-pressure fullerenes, glass altered smectites, and possibly impact-generated tsunami deposits. The impact was so intense that it led to several geodynamic anomalies; it fragmented, sheared, and deformed the lithospheric mantle across the western Indian margin and contributed to major plate reorganization in the Indian Ocean. This resulted in a 500 km displacement of the Carlsberg Ridge and initiated rifting between India and the Seychelles. At the same time, the spreading center of the Laxmi Ridge jumped 500 km westerly close to the Carlsberg Ridge. The oblique impact may have generated spreading asymmetry, which caused the sudden northward acceleration of the Indian plate in Early Tertiary. The central uplift of a complex crater and the shattered basement rocks form ideal structural traps for oil and gas. Many of the complex impact structures and events at the KT transition such as the Shiva crater, Chicxulub crater and the Boltysh crater create the most productive hydrocarbon sites on the planet. The kill mechanisms assocated with the Shiva crater appears to be sufficiently powerful to cause worldwide collapse of the climate and econsystems leading to the KT mass extinction when the dinosaurs and two-thirds of all marine animal species were wiped out."

The publication carries excellent diagrammatic sketches, sections and photomicrographs to buttress the contentions of the authors. This special publication is a recommended reading for the general reader as well as the specialist interested in the role of extra-terrestrial impact processes in the crustal evolution of our planet, mass extinctions, triggered/induced volcanic processes, location of productive hydrocarbon sites and a host of related processes.

Bangalore M.S. Rao