

M.S.100. RAJENDRAN, C.P.—Systematic Stratigraphic Studies of Cenozoic Sediments of Kerala with Special Reference to Warkalli and Quilon Formations—1988—Dr. K. Soman.

The Kerala region is marked by a sedimentary basin which is one in the chain of coastal basins along the western margin of India. The marine incursions that occurred in the Mesozoic and the Cenozoic, have a bearing on the depositional

facies of the western coastal basins of India. The knowledge hitherto gathered with regard to the distribution of the sediments in the Kerala basin in space and time has been much limited. This has restricted a proper assessment of the evolution of this sedimentary basin and interrelationship of various facies. New evidences on the age and the stratigraphy of these sediments necessitate a re-examination of the stratigraphic evolution of the Kerala sedimentary basin. The geological sections comprise variegated sandstones and kaolinitic clays with lignitic seams and isolated occurrences of limestone around Quilon. In the peripheral parts of the basin in the east, a sequence of ferruginous gritty sandstone could be traced. Laterites have been observed under the basal ferruginous sandstones at several places in Kerala. Apart from the scattered outcrops, thick sub-surface sections of sediments (more than 600 metres) have been recorded in the coastal plain around Alleppey ($9^{\circ}23'50''$). The litho-units recorded in the outcrops extend and attain the maximum development in this area and extend further into the offshore area. Ferruginous gritty sandstones, traced in various locations in the peripheral parts of basin are coarse, gritty and well indurated and comprise angular to subangular grains of quartz in a hematitic matrix. The deposition of these sandstones occurred in a warm oxidising environment possibly during Late Cretaceous-Early Tertiary times. Laterite zones underlying these ferruginous sandstones with predominance of gibbsite in this laterite suggest initiation of desilication or bauxitisation under some favourable conditions. At a later stage, the desilication process stopped and lateritization process was started. Two events of lateritization, the first spell during Late Mesozoic prior to the deposition of sedimentaries and the second spell of lateritization during late Tertiary, developed over the sedimentaries, have been proposed for the Kerala region, on the basis of superposition, mineralogy and palomagnetic data.

The sedimentary basin of the coastal plain is thickest around Alleppey. A thicker blanket of Quaternary deposits in this area has also been noticed. The boundary of Quaternary and Tertiary sediments is marked by a laterite horizon in the sub-surface sections. The top of the Tertiary is marked by a sandstone clay bed alternations followed by a thick zone of clay beds. The clay beds are underlain by a thick zone of coarse pebbly sandstones which extend to a depth of 210 metres. Fossiliferous calcareous and carbonaceous clays with intercalations of sandy horizons continue down to a depth of 350 metres. This is followed downward by the carbonaceous clays.

Lenses of limestones and microfossils have been recovered around 470 metres. Below a depth of 560 metres, the sediments consist mainly black shales and clays. The ferruginous sedimentary units occurring above and below the carbonate facies in the western part become a single unit in the eastern part with the absence of carbonate unit in the middle.

Palaeontological studies indicate that the outcrops and upper part of the Quilon Formation (200-270m) in the boreholes belong to the Early Miocene to Middle Miocene period. The Oligocene sequence (290 metres to 350 metres) is marked by characteristic planktonic foraminifera. Eocene (454 metres to 494 metres) is marked by the larger foraminifera in the lower part of the subsurface sections apart from Oligocene and Miocene markers in the overlying sediments.

Based on the evidences, it is proposed that during a regressive phase of the sea, possibly in the Late Miocene, the sediments including lignitic pieces and fossils were eroded and redeposited in the coastal area and that the overlap

sequence at Varkala (type area) should be younger (Late Miocene-Pliocene) than the sediments around Kundara, Pedappakkara, Perar and Edavai.

The results of radiocarbon dating bring out an event of regression (3000–5000 Y.B.P) which gave rise to extensive shell and peat deposits during Holocene in Kerala.

The evolution of Kerala sedimentary basin started with the taphrogenic fragmentation and block uplift along the NNW-SSE basement trends. The presence of laterite and bauxites underlying the sedimentaries points to the long period of non-deposition during Late Mesozoic times. The lowest unit of basal clastics in the sedimentary sections in the eastern periphery of the basin formed as a response to the uplift of the source area associated with rifting. Initial transgression in Early Eocene was related to the first major subsidence of the region. The carbonate platform developed landwards from early Oligocene and attained its maximum development during Early Miocene. The end of Miocene witnessed the regression of the sea and reactivation of the basin margin fault. The occurrence of Molocene sediments on the elevated terraces of the coast suggests tectonic movements during this period.