

A New Find of Ediacaran Biota and its Depositional Environment in Bairenkonda Formation, Cuddapah Basin, India

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The Ediacaran biota is recorded for the first time from the ortho-quartzites of the Bairenkonda Formation at Kallivettu in the Cuddapah basin. The study area forms part of the 'Nagri outliers' which are the southern continuation of the Neoproterozoic Nallamalai sub-basin. In the revised stratigraphic framework of the Nallamalai type sections, the Bairenkonda Formation has been identified to be the upper stratigraphic unit and also incidentally to be the youngest unit of the Cuddapah succession.

The Bairenkonda Formation at Kallivettu consists of the lower fossiliferous quartz arenite and the upper non-fossiliferous lithic arenite beds. The fossiliferous horizon is ~6 m thick in quartz arenite and characterised by the presence of MISS (Microbial influenced sedimentary structures) like siliclastic biolaminated beds, cross stratification with bi-directional paleocurrents, channel scours, tidalites, rippled beds and sediment surface textures viz. wrinkle marks and elephant skin patterns indicating shallow water deposition along shoreline. Long axis of ripples is oriented in NW-SE. Paleoslope deciphered from channel scours is varying between NNW and NE. Cross bed foreset azimuth shows bi-directional pattern in which the principal current direction varying between NNW and NE indicating supra to intertidal zone of the tidal-flat depositional setting existed during the deposition of the lower member.

Petrographic studies of quartz arenites have revealed that well sorted, medium to fine quartz grains are shaped into circular/semicircular and disc shaped patterns. The Ediacaran biota comprises sand chips, algal mats, biscuits, pillows and also one to three cm size enigmatic megafossils of Ediacaran biota preserved as positive epirelief forms which are provisionally identified to be *Nemania*, sp., *Funisia*, sp., *Kimberella*(?) sp., *Medusinites*, sp., *Ediacaria*, sp., *Sekwia* sp., *Aspidella*, sp., *Parvconcorina*, sp., *Namacalathus*, sp., *Cloudina*, sp., *Conichnus*, sp. Ichnofossils of horizontal burrows viz. *Cruziana*, isp, *Dimorphicus*, isp. *Triptichnus* isp. and vertical tubes of *Conichus*, isp. *Bergueria* isp. are identified. Abundance of fossil types are enumerated which shows the predominance of the Ediacaran discs. These are categorised into nine types viz. (1) algal biscuits, (2)sand chips, (3) *Nemania*, (4) *Aspidella*, (5) *Medusinites*, (6) *Arkarua* (7) *Ediacaria*, (8) *Sekwia* and (9) *Conichnus*. Mode of preservation like

bioimmuration and organelle for mobility and feeding habits are documented. The Ediacaran biota at Kallivettu is 'cosmopolitan'. It contains forms typical of Nama (Namibia) in Africa, Avalon, Sonora (Mexico) American, and Ediacaran (Australian) forms indicating Precambrian - early Cambrian age contemporaneity to the Kallivettu biota. The Ediacaran age to the Kallivettu fossils is in conformity to the radiometric age interpretations available in the domain (Nallamalai sub-basin).

The upper lithic arenite is light grey, texturally immature and made of coarse to very coarse grained and strewn with pebble size clasts of charnockite and basic rocks, sub-angular to sub-rounded, quartz, lithic fragments and rich in labile (ferro-magnesian) minerals and iron oxides. Lithic fragments and labile minerals constitute more than 30% of the whole rock. The quartzite displays trough cross stratification whose paleocurrents azimuth is unimodal varying between N and NE and mean towards NNE indicating unidirectional paleo-flow common in alluvial environments. Mineral composition of lithic arenites indicated by the predominance of grey layers rich in iron oxides (ilmenite, magnetite), pyroxenes and garnets and inter layered with quartz, feldspar rich white layers point to reorganization in provenance that supply sediment to the basin. The lithic arenite shows sheet morphology formed by surface run-off of short headed streams discharging into nearby coastal plains. At variance to the lower arenites, the predominance of lithic fragments and labile mineral in the upper member may indicate change in paleoenvironment that favored rapid weathering and less time for decomposition and disintegration of ferro-magnesian minerals. Accordingly it is envisioned that the disappearance of Ediacaran biota could be due to changes in paleoenvironments and tectonic considerations at the turn of the Neoproterozoic which could be a possible manifestation of pan-African orogeny in southeast India.

Significance of the present finding is that it has established late Neoproterozoic to the Ediacaran age deposition in the Cuddapah basin and possible Pan African orogeny. The alkali granitic activity witnessed during the amalgamation along the eastern margin of the Cuddapah Basin could be a source for rare earth mineralisation as recorded in Rapur area.