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Pre-Ediacaran to Ediacaran Radiation in the Vindhyan Supergroup, India

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The Vindhyan Supergroup is globally acknowledged amongst the best repositories of the Proterozoic life evidences. Fossils of the Vindhyan Supergroup exhibit extensive diversity and variable biologic affinities represented by: bacteria, cyanobacteria, algae, fungi, acritarchs, metaphytes and metazoans (including members of the Ediacaran Fauna). The size of fossils ranges from less than a micron to almost a meter. As the Ediacaran fauna has already been recorded from the uppermost Vindhyans that is from the Bhander Group, strata lying beneath and above the Ediacaran fossil bearing horizons, exhibit presence of a vast range of fossils (both micro and mega fossils) inclining towards variable biologic affinities stated earlier. Besides identified fossils, a number of peculiar morphologies (due to deviation of morphologies from conventional structures), present in various stratigraphic horizons of the entire Vindhyan Supergroup, have also been observed. It is very difficult to identify and decide biologic affinities of these peculiar morphologies or bizarre fossil forms.

In thin sections of Lower Vindhyan cherts (of Semri Group), microfossils resembling, a Volvox colony like structure and a vase- shaped body without an opening, Lichen- like or fungal forms in which a sac encompassing a coiled filament may possibly indicate a symbiotic relationship are unique. Megascopic branching and associated Grypania like structure is another form preserved as an impression on a micritic limestone slab. A very unusual and interesting fossil is a transparent disc of about one mm in diameter, composed of numerous chromosome-like structures or the appendages of an unidentified mesoscopic insect- like organism.

In Upper Vindhyans, microscopic unidentified forms (in thin sections of chert) include acritarchs and acanthomorphs of variable morphologies and a dividing cell like structure interpreted as rhodophycean form or a cleaving embryo of an animal affinity. Among the carbonaceous fossils, peculiar morphologies are branched filaments that have attached sporangia-like vesicles, Chuaria-like body comprising cluster of very small sized spheroids resemble with scale like structure; a chrysophycean alga or a multicellular tissue of a metaphyte. Another carbonaceous fossil represents a possible metazoan exhibiting an elongate body and a mid-gut like structure or a voucheriacean alga. Although the biologic affinities of these forms can be a matter of debate, their biogenic nature is almost undoubted. The presence of such forms in the Vindhyans, well exhibits pre-Ediacaran – Ediacaran radiation, advancement in morphology and a gradual evolution of life during the Palaeoproterozoic- Neoproterozoic period that is the time of Vindhyan deposition. In addition, presence of large- sized acritarchs, especially the presence of an age marker acanthomorph; Trachystrichosphaera sp. in Bhander Group (Uppermost Vindhyans) also suggests Vendian as an upper age limit of the Vindhyan Supergroup (which is also supported by the presence of Ediacaran fauna from the uppermost Vindhyans.