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Chemostratigraphy of the Ediacaran- Cambrian Lesser Himalaya, India, Eastern Gondwana and correlation with South America, Western Gondwana

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The Lesser Himalayan sedimentary succession is divided in two sedimentary belts. The older Deoban belt is characterized by Mesoproterozoic stromatolites and organic walled microfossils, whereas the younger Krol belt has yielded Ediacaran metazoan in the Krol Formation and Lower Cambrian fossils in the Tal Formation [1,2,3]. The chemostratigraphy of the Deoban Formation is correlated with the pre-Cryogenian-Ediacaran (Mesoproterozoic) successions, and the absence of the Ediacaran biota also supports this correlation. The Lower Vindhyan Semri Group of the central India is correlated with the Deoban Group of the Lesser Himalaya of north India on the basis of identical stromatolites, microfossils, age and carbon isotope chemostratigraphy [1,2].

The Neoproterozoic–Early Cambrian chemostratigraphy of the Blaini-Krol-Tal succession of the Lesser Himalaya of India in Eastern Gondwana strongly supports the Precambrian-Cambrian transition lies in the Lower Tal Formation ($\delta^{13}\text{C} = -4\text{‰}_{\text{PDB}}$). The Ediacaran Krol Belt in the Lesser Himalaya is characterized by positive $\delta^{13}\text{C}$ value (+1 to 6‰_{PDB}). The emergence of multicellular Ediacaran life in the Upper Krol is consistent with an increase in atmospheric oxygen ($\delta^{18}\text{O} = +3.0\text{‰}_{\text{SMOW}}$). The base of the Ediacaran System in the Lesser Himalaya is established in the cap carbonate, Blaini Formation [1,2,3]. The pink cap carbonate of the Blaini Formation (Blainian) shows negative $\delta^{13}\text{C}$ value (-3‰_{PDB}) and correlated with Marinoan glacial event [1,2,3]. A comparison of the available carbon and oxygen isotope profiles from other regions of the Eastern Gondwanaland and South China, parts of Siberia and North Africa suggest that the Neoproterozoic-Early Cambrian chemostratigraphy is consistent in the isotopic variation. There is a strong carbon isotopic similarity between Neoproterozoic Bambui Group in Central Brazil, South America and the Cryogenian-Ediacaran Blaini-Krol Formation of the Lesser Himalaya, India. Consistency in the C-isotopic composition during the Ediacaran- Lower Cambrian period has been observed globally. The Ediacaran – Early Cambrian period must have been a time of continental extension and rifting in the Lesser Himalaya. The Ediacaran Krol carbonates of the Lesser Himalaya were deposited in the peritidal carbonate ramp- shelf depositional environment [1,3]. Continental extension caused breakup of the Rodinia supercontinent and the creation of shallow epicontinental seas at low paleolatitudes in which Blaini – Krol-Tal Cryogenian diamictites, Ediacaran carbonates and Tal phosphorite were deposited. The Lesser Himalayan sedimentation might have terminated due to West Gondwana- Brasiliano- Pan African orogeny around 500 Ma, strongly supported by the occurrence of granites of this age in entire Indian subcontinent in the Eastern Gondwana. The Neoproterozoic period is characterized by the major paleoclimatic and paleobiological evolution after the breakup of the Rodinia Supercontinent and assembly of the eastern Gondwanaland.

References:

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