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Detailed Ichnofacies and Sedimentological Analysis of the Cambrian Succession (Tal Group) of the Nigalidhar Syncline, Lesser Himalaya, India and the Interpretation of Its Palaeoenvironment

Authors : C. A. Sharma, Birendra P. Singh

Abstract : Ichnofacies analysis is considered the best paleontological tool for interpreting ancient depositional environments. Nineteen (19) ichnogenera (namely: Bergaueria, Catenichnus, Cochlichnus, Cruziana, Diplichnites, Dimorphichnus, Diplocraterion, Gordia, Guanshanichnus, Lockeia, Merostomichnites, Monomorphichnus, Palaeophycus, Phycodes, Planolites, Psammichnites, Rusophycus, Skolithos and Treptichnus) are recocered from the Tal Group (Cambrian) of the Nigalidhar Syncline. The stratigraphic occurrences of these ichnogenera represent alternating proximal Cruziana and Skolithos ichnofacies along the contact of Sankholi and Koti-Dhaman formations of the Tal Group. Five ichnogenera namely Catenichnus, Guanshanichnus, Lockeia, Merostomichnites and Psammichnites are recorded for the first time from the Nigalidhar Syncline. Cruziana ichnofacies is found in the upper part of the Sankholi Formation to the lower part of the Koti Dhaman Formation in the NigaliDhar Syncline. The preservational characters here indicate a subtidal environmental condition with poorly sorted, unconsolidated substrate. Depositional condition ranging from moderate to high energy levels below the fair weather base but above the storm wave base under nearshore to foreshore setting in a wave dominated shallow water environment is also indicated. The proximal Cruziana-ichnofacies is interrupted by the Skolithos ichnofacies in the Tal Group of the Nigalidhar Syncline which indicate fluctuating high energy condition which was unfavorable for the opportunistic organism which were dominant during the proximal Cruziana ichnofacies. The excursion of Skolithos ichnofacies (as a pipe rock in the upper part of Sankholi Formation) into the proximal Cruziana ichnofacies in the Tal Group indicate that increased energy and allied parameters attributed to the high rate of sedimentation near the proximal part of the basin. The level bearing the Skolithos ichnofacies in the Nigalidhar Syncline at the juncture of Sankholi and Koti-Dhaman formations can be correlated to the level marked as unconformity in between the Deo-Ka-Tibba and the Dhaulagiri formations by the conglomeratic horizon in the Mussoorie Syncline, Lesser Himalaya, India. Thus, the Tal Group of the Nigalidhar syncline at this stratigraphic level represent slightly deeper water condition than the Mussoorie Syncline, where in the later the aerial exposure dominated which leads to the deposition of conglomeratic horizon and subsequent formation of unconformity. The overall ichnological and sedimentological dataset allow us to infer that the Cambrian successions of Nigalidhar Syncline were deposited in a wave-dominated proximal part of the basin under the foreshore to close to upper shoreface regimes of the shallow marine setting.

Keywords : Cambrian, Ichnofacies, Lesser Himalaya, Nigalidhar, Tal Group
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