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Article

Integrated sedimentological and ichnological studies of the Cambrian of the Tidong Valley, Kinnaur, its correlation with Zanskar–Spiti regions, and reconstruction of the northern margin of Indian Plate

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With 9 figures

Abstract: A low diversity trace fossil assemblage that includes *Bergaueria perata*, *Bergaueria hemispherica*, *Bergaueria* isp., *Dimorphichnus obliquus*, *Monocraterion* isp., *Psammichnites gigas circularis*, *Psammichnites gigas gigas* along with arthropod scratch marks, are for the first time, recorded from the Cambrian Kunzam La Formation exposed between the Charang and Alingdhar localities in the Tidong Valley, Kinnaur. These traces are from the uppermost part of the Kunzam La Formation and confirm the presence of *Psammichnites gigas gigas* sub-ichnozone in the Kunzam La Formation (latest part of Cambrian Series 2, Stage 4) immediately below the rocks of the Ordovician Thango Formation. The bioturbation (ii = 1–2) is only confined to the uppermost part of the section. Body fossils have not been recovered. Sedimentological analysis shows five lithofacies i.e., (i) dominant trough cross-bedded facies with rip-up mud clasts (fluvial to nearshore), (ii) wavy (tabular) bedded sandstone facies (proximal to the shoreline), (iii) conglomerate facies (fluvial), (iv) sandstone-siltstone-shale facies (shoreface) and (v) bedded siltstone facies (transition zone). These lithofacies although do not show sedimentary cycles but overall they record upward shoaling. Hummocky cross-stratification (HCS), dark shale facies (offshore), and carbonate facies, which are well known from the Zanskar–Spiti regions, as well as contains trilobite and brachiopod fossils, are absent in the Tidong Valley (Kinnaur). Integrated sedimentological and ichnological data suggest that the Kunzam La Formation in the Tidong Valley was deposited in a shallow-marine, nearshore to upper shoreface environment, where the main river fed the northern margin of the Indian Plate during the Cambrian period.

Key words: Kunzam La Formation, Cambrian, trace fossils, Tidong Valley, Kinnaur region, Himalaya.

1. Introduction

The Cambrian of the Himalaya has received global attention as a result of the revision of previously known fossils and the discovery of new fossiliferous horizons (Jell & Hughes 1997; Peng et al. 2009; Singh et al. 2016; Singh et al. 2017; Singh & Bhargava 2020). A formal Cambrian biostratigraphic trilobite and brachiopod biozonation is now available for the Himalayan rocks (Peng et al. 2009; Popov et al. 2015; Hughes 2016; Singh & Bhargava 2020). However, the formal Cambrian biozonation is patchy and dominantly available for the Zanskar and Spiti regions (Tethyan Himalaya), and partially for the Lesser Himalayan rocks (Singh & Bhargava 2020).

Tethyan strata in the Kinnaur region, which lies east of the Satluj Valley (Himachal Pradesh) and west of the Kumaun–Garhwal regions (Uttarakhand), have received little attention (Bassi et al. 1983; Bhargava & Bassi 1998) including its Cambrian depositional history and biostratigraphy. Furthermore, it has been established in recent years that the Cambrian successions

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