

# First record of late Devonian-early Carboniferous palynoflora from the Lipak Formation, Spiti Basin, Tethyan Himalaya, India, and their biostratigraphic implications

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## Abstract

The present work elucidates palynofloral records from the Lipak Formation (late Devonian–early Carboniferous) of the Spiti Basin. The study has been carried out from three different sections of Spiti and Pin valleys to look for the signatures of terrestrial plants in the Tethyan realm and assess the relative palynodating of the studied sediments. The recovered palynoassemblage from the exposures of Lipak Formation, near Takche Locality, Spiti Valley, mainly comprises spores and has the dominance of *Verrucosiporites*, *Dictyotriletes*, *Lophozonotriletes*, *Convolutispora* followed by subordinate occurrences of *Rugospora*, *Cymbosporites* and *Knoxisporites* along with reworked pollen grain *Plicatipollenites*. The recovered palynoassemblage of Lipak Formation exposure at Guling Village of Pin Valley comprises *Spelaeotriletes*, *Tricidariporites*, *Calamospora*, *Callumispora* and reworked pollen grains. The reworked pollen grains are characterised by the dominance of *Faunipollenites*, *Scheuringipollenites* and *Parasaccites* and followed by subordinate occurrences of the *Densipollenites*, *Striatopodocarpites*, *Platysaccus*, *Alisporites*, *Striomonosaccites*, *Chordasporites* and *Verticipollenites* pollen grains. The exposure of this Formation near Muth Village of Pin Valley is found to be palynologically barren. The recovered palynoflora is correlated with palynofloral records of the Tethyan realm of India and palynofloral records from coeval sequences worldwide. The recovered palynocomposition shows a close resemblance to *Retispora lepidophyta*–*Verrucosiporites nitidus* (LN) and *Vallatisporites verrucosus*–*Retusotriletes incohatus* (VI) Assemblage zones of Western Europe and *Cordylosporites*–*Verrucosiporites* Biozone of Argentina which indicates that studied section of the Lipak Formation is upper Famennian to early Tournaisian age. The recovered reworked palynomorphs belong to the Permian age, which may be deposited in the Lipak Formation through stratigraphic leakage. Palynomorphs include spores of affinities of Zygopteridiales, Marattiales, Botryopteridales, Equisetales/Noeggerathiales/Sphenophyllales group of plants. In contrast, palaeobotanical affinities of pollen grains are linked with the Filicales, Cordaitales and Glossopteridales group of plants.

## Keywords

Carboniferous, Devonian, Lipak Formation, palynology, Spiti, Tethyan Himalaya

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