

# Marine and non-marine palynomorphs from the Ordovician sequence of Takche Formation, Spiti, India

HUSAIN SHABBAR<sup>1,2</sup>, SUYASH GUPTA<sup>1</sup>, ANJU SAXENA<sup>1</sup>  AND KAMAL JEET SINGH<sup>1</sup>

## Abstract

The palynological investigation of a sequence of the Takche Formation (Middle Ordovician–Early Silurian), Spiti region in the Tethyan Himalaya, reveals new perspectives into Ordovician micro-faunal and floral diversity, palaeoenvironments, biostratigraphy and the likely signatures about early land plants within Gondwana. The recovered palynomorph assemblage is rich in marine forms such as chitinozoans, acritarchs, melanosclerites, and scolecodonts, along with non-marine palynomorphs, which comprises possible cryptospores and phytodebris. The chitinozoan assemblage comprises genera- *Belonechitina*, *Baltochitina*, *Eisenackitina* and *Euconochitina*. Acritarch assemblage is characterised by *Baltisphaeridium*, *Orthosphaeridium*, *Stelliferidium*, *Dactylofusa*, *Leiosphaeridia*, *Lophosphaeridium* and *Focusphaera*. Scolecodonts' assemblage is dominated by simple jaw elements, associated with ctenognath- and placognath-type apparatuses, of which placognath are common. The melanosclerites assemblage includes *Mirachitina*, *Melanoporella*, *Eichbaumia*, *Melanorhachis*, and *Melanosteus*. The non-marine palynomorphs of the putative cryptospore assemblage show semblance with the taxa *Chelinospora*, *Didymospora*, *Laevolancis*, *Rugosphaera*, *Dyadospora* and *Segestrespora*. Although preservation is generally poor and thermal maturity is high, the presence of diagnostic taxa across multiple palynological groups permits robust palaeobiological and palaeoenvironmental interpretations. The abundance of marine forms clearly reflects deposition in a distal shallow marine setting, removed from significant terrestrial influence. These findings are consistent with similar studies from comparable sequences in the region and elsewhere along the northern Gondwana. The present study not only enhances our understanding of the Ordovician biodiversity in India but also paves the way to further explore and enrich the global narrative of early plant evolution and palaeobiogeographic connectivity during the early phases of life on land from the Indian subcontinent.

## Keywords

Acritarchs, chitinozoans, ?cryptospore, India, Ordovician, scolecodonts

## INTRODUCTION

The Ordovician Period represents a pivotal phase in Earth's history, characterised by the rapid diversification of marine life and the emergence of the earliest terrestrial plants.

While much of the research has been focused on the Great Ordovician Biodiversification Event (GOBE) through the study of macrofossil records; organic-walled microfossils, especially palynomorphs such as acritarchs, chitinozoans and possible cryptospores, are proving equally vital for

<sup>1</sup>Birbal Sahni Institute of Palaeosciences, Lucknow, Uttar Pradesh, India<sup>2</sup>Department of Geology, Parul Institute of Applied Sciences, Parul University, Vadodara, Gujarat, India**Corresponding author:** Anju Saxena.

E-mail: anju\_saxena@bsip.res.in

**Journal of the Palaeontological Society of India (2025): 1–16**

Copyright © The Authors 2025

Article reuse guidelines: [in.sagepub.com/journals-permissions-india](http://in.sagepub.com/journals-permissions-india)**DOI:** 10.1177/05529360251378254[journals.sagepub.com/home/jpi](http://journals.sagepub.com/home/jpi)**Submitted:** 17 April 2025**Accepted:** 28 June 2025**Handling Editor:** Mukund Sharma **Sage** JPSI

Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>) which permits non-Commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the Sage and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).