

# Palaeoenvironmental reconstruction from a colossal palaeofloral assemblage from a Lower Gondwana outcrop of Talcher Gondwana Basin, Odisha, India: An empirical case study

MRUTYUNJAYA SAHOO

Ravenshaw University

Presenting Author: msahoo.geol@gmail.com

Sixty-five varied species and fourteen hundred and sixty-seven specimens of plant megafossils have been recorded from the fossiliferous horizons near Handapa village, Angul District, Talcher Gondwana Basin, Odisha, India. This is one of the richest reports in the world with such a large number of species from a Lower Gondwana exposure. The specimens are preserved as impressions on compact, fine-grained pinkish-brown shale. The investigated megafloral assemblage comprises five different plant groups: Equisetales (*Schizoneura gondwanensis*, Equisetaceous stems), Sphenophyllales (*Trizygia speciosa*), Filicales (*Neomariopteris hughesii*, *N. talchirensis*, *Dizeugotheca phegopteroides*), Ginkgoales (*Rhipidopsis gondwanensis*) and Glossopteridales (55 species of *Glossopteris*, two species of *Gangamopteris*: *G. angustifolia*, *G. cyclopteroides* and one root species: *Vertebraria indica*) along with stem axis, fructifications and scale leaves. *Glossopteris* dominates the assemblage by constituting more than 88% and 55 different species. The *Glossopteris* leaves have been classified into broad (*G. conspicua*, *G. retifera*, etc.), middle (*G. browniana*, *G. intermittens*, etc.) and narrow (*G. communis*, *G. zeilleri*, etc.) mesh forms for discussion. This report provides insightful palaeoenvironmental evidence and is an excellent tool for reconstructing the palaeoclimate and palaeoenvironment of Gondwana sediments. The lithology of the fossiliferous horizon and the megafloral assemblages define the studied sediments as Lower Kamthi Formation (Late Permian/Lopingian epoch). The rich diversity of the *Glossopteris* in the fine sediments infers seasonal falling and favourable conditions for plant growth with a warm, humid, temperate climate during the Late Permian in Talcher Basin. The occurrence of *Gangamopteris* is the first report of this genus from the Lower Kamthi/Raniganj Formation of the Talcher Basin, as well as from the Son-Mahanadi Master Basin. The studied sediments were devoid of any structured palynomorphs. Palynological analysis, on the other hand, places the Handapa sediments at the P-T boundary, with abundant fungal remains, cuticular structures, and degraded organic matter. Biomarker (*n*-alkane) analysis indicates an increased contribution from aquatic macrophytes and microbial organic matter in the sedimentary environment. However, the overall biomarker composition and distribution suggest an increased thermal maturity of the studied samples.