

Carboniferous Plant Macrofossils from the Sydney Basin: Evidence for Early Forest Ecosystem Development

Prof. Rachel L. Williams
Department of Botany, University of Melbourne

Dr. Hiroshi Yamamoto
Institute for Plant Research, Kyoto University

Dr. Pierre Dubois
Muséum National d'Histoire Naturelle, Paris

Abstract

This study investigates plant fossil evolution from Sydney Basin, Australia during the Carboniferous (320 Ma). Using comparative morphology and phylogenetic reconstruction, we analyze fossil specimens to understand evolutionary patterns and ecological relationships. Our findings provide new insights into the diversity and adaptation of ancient life forms, contributing to our understanding of paleobiological processes during this critical period in Earth's history.

Keywords: Cretaceous, Theropod, Evolution, Liaoning, Phylogeny, Dinosaur

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1. Introduction

The Carboniferous Period (359-299 Ma) marks a crucial transition in terrestrial plant evolution, witnessing the rise of the first extensive forest ecosystems. The Sydney Basin of Australia preserves exceptional plant macrofossils from this interval, providing insights into early forest community structure and the evolution of complex plant architectures.

2. Systematic Paleontology

Plant macrofossils were collected from three formations within the Sydney Basin. Morphological analysis focused on leaf architecture, reproductive structures, and growth patterns. Phylogenetic relationships were reconstructed using 156 morphological characters from seed plants, ferns, and lycophytes using maximum likelihood methods.