PALYNOLOGY OF UPPER GONDWANA DEPOSITS OF KATTARALA, PRANHITA–GODAVARI BASIN, ANDHRA PRADESH

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Abstract

Palynological assemblage recovered from the Kattarala outcrops of Gangapur Formation of Pranhita—Godavari Basin, Andhra Pradesh comprises 15 genera and 20 species referable to bryophytes, pteridophytes and gymnosperms. The stratigraphically important taxa are : *Cooksonites, Ceratosporites, Ornamentifera, Klukisporites, Impardescispora, Cicatricosisporites, Contignisporites, Crybelosporites, Araucariacites, Podocarpidites, Callialasporites, Microcachryidites* and *Psilospora*. A quantitative analysis of the microflora has revealed that the gymnospermous pollen are dominant followed by pteridophytic and bryophytic spores. The microflora of the Kattarala shows close resemblances with that of Lower Cretaceous (Neocomian-Aptian) microflora of Godavari-Krishna Basin of Andhra Pradesh and Palar and Cauvery basins of Tamil Nadu. The spore and pollen complex indicates subtropical climate with good precipitation.

Introduction

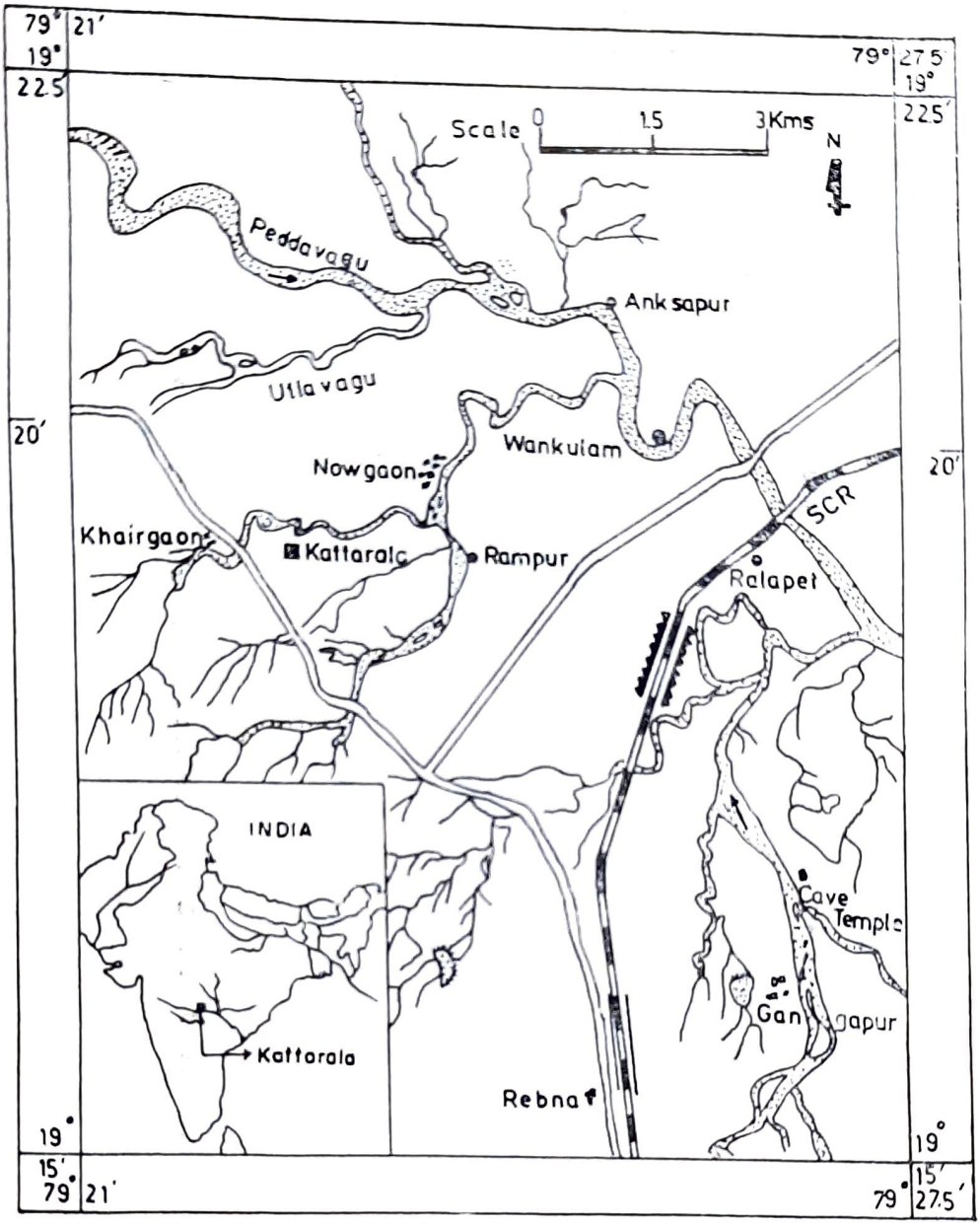
Kattarala, a new microfossil locality of Pranhita-Godavari Basin of Andhra Pradesh, lies about 2 km. southwest of Nowgaon (Toposheet No. 56 M/7:19°20′ : 79°24′, Map 1). The stratigraphy of the area was modified by Kutty (1969) who assigned Lower Cretaceous age to the Gangapur Formation. The palynoassemblage from Gangapur Formation from Wankulum and other areas (Prabhakar, 1988) supported the age of the beds as Neocomian. Carbonaceous clays are exposed along the Pedda Vagu River which were earlier mapped as part of Maleri Formation. The exact stratigraphic position of the clay beds near Kattarala is not known. However, Kutty (1969) places these beds in Gangapur Formation while others assign them to Maleri Formation. To resolve this controversy, palynological study of Kattarala outcrops was undertaken.

The rocks under investigation are exposed in a horse-shoe-like tract along Vatti Vagu (Kotharapally Vagu). The main lithology is black and grey coloured clays followed by coarse grained reddish sandstones. These are overlain by recent alluvium. The total thickness of the bed is about 12-16 m. The bed can be traced for about 6 km. along the Pedda Vagu River.

The Gangapur Formation uncorformably overlies the Kota Formation. Feistmantel (1879), Rao and Shah (1959) have recorded following genera from the clays of Kattarala (Kotharapally), viz., *Taenopteris, Cladophlebis, Gleichenites, Otozamites, Ptilophyllum, Nilssonia, Elatocladus, Torreyites, Pagiophyllum, Brachyphyllum* and *Araucarites*. The author has also collected fossil plants viz., *Cladophlebis, Gleichenites, Equisetites Otozamites, Ptilophyllum, Pterophyllum, Nilssonia, Brachyphyllum, Pagiophyllum, Elatocladus* viz., *Bairoxylon, Platyspiroroxylon, Planoxylon, Mesembrioxylon, Araucarioxylon* and *Podocarpoxylon*, etc. from Kattarala. Of these, *Elatocladus* and *Araucarioxylon* are dominant.

The palynofossils recorded from Kattarala are listed below while some well preserved and characteristic taxa have been illustrated in plate 1.

Impardecispora crassus Brenner, 1963
Klukisporites foveolatus Pocock, 1964
Cicatricosisporites australiensis (Cookson) Potonié, 1956
Ornamentifera echinata Bolkhovitina, 1966
Contignisporites glebulentus Dettmann, 1963
Contignisporites multimuratus, Dettmann, 1963



Map 1 showing fossil locality

Crybelosporites cf. *C. punctatus* Dettmann, 1963
Crassimonoletes surangei Singh, Srivastava & Roy, 1964
Cooksonites variabilis Pocock, 1962
Callialasporites trilobatus (Balme) Dev, 1961
Callialasporites segmentatus (Balme) Dev, 1961
Podocarpidites ellipticus Cookson, 1947
Microcachryidites antarcticus Cookson, 1947
Podosporites tripakshi Rao, 1943
Araucariacites australis Cookson, 1947
Cycadopites couperi (Dev) Kumar, 1973
Classopollis classoides (Pflug) Pocock & Jansonius, 1961
Classopollis glandis Ameroon, 1965

Discussion

The Kattarala microflora comprises 15 genera and 20 species referable to bryophytes, pteridophytes and gymnosperms. There are six genera of trilete spores, four genera of saccate pollen and the remaining ones are either inaperturate, monosulcate, monoporate or non-saccate pollen. 300 spore and pollen were counted in each of the 50 samples. An analysis of these counts is as follows.

Callialasporites	25 %
Araucariacites	16 %

Microcachryidites	15 %
Classopollis	10 %
Contignisporites	8 %
Podocarpidites	7 %
Cicatricosisporites	5 %
Bisaccates other than *Podocarpidites* and *Monoletes*	2 %
Cycadopites	1 %
Other trilctes	10 %

Gymnospermous pollen are the dominant element followed by pteridophytes. Of these *Callialasporites*, *Araucariacites*, *Microcachryidites* and *Classopollis* are abundant. The swamp plant belonging to (Cheirolepidaceae) represented by *Classopollis* pollen, occupies a suitable position (10%) in the assemblage. Among the triletes *Contignisporites* and *Cicatricosisporites* are fairly well represented. *Monoletes* and *Cycadopites* are poor.

Comparison

The palynoassemblage of the Kattarala beds shows similarities with some of the Neocomian-Aptian microfloras from India. These palynoassemblages are known from the Rajmahal beds (Vishnu Mittre, 1954; Sah & Jain, 1965); Jabalpur sediments (Dev, 1961; Kumar, 1973); South Rewa Gondwana Basin (Maheshwari, 1974) Katrol and Umia (Singh *et al.*, 1964); Mahanadi Basin (Maheshwari, 1975); Godavari-Krishna Basin (Rao & Venkatachala, 1971); Sharma *et al.*, 1977); Gangapur Formation (Prabhakar, 1988); Cauvery Basin (Venkatachala & Sharma, 1974) and Palar Basin (Varma & Ramanujam, 1984).

Age of the Kattarala beds

In the absence of any faunal evidence and the equivocal evidence of plant megafossils, palynology helps in dating the Kattarala beds. It should be mentioned especially that the Kattarala beds and other Indian microfloral assemblages of the Neocomian-Aptian age are characterized by the presence of important palynofossils, viz., *Cooksonites*, *Ceratosporites*, *Ornamentifera*, *Impardecispora*, *Cicatricosisporites*, *Contignisporites*, *Crybelosporites* and *Microcachryidites*. All these are marker elements of the Neocomian-Aptian sediments of widely spread segments of the Gondwanaland.

The palynoflora of the Kattarala beds is equivalent to the *Microcachrydites antarcticus* assemblage of Balme (1957, 1964) and *Dictyosporites stylolus* zone of Dettmann (1963). A significant difference between the Kattarala microflora and that of South Eastern Australia is the greater abundance of *Callialasporites* in the former. However *Microcachrydites*, *Podocarpidites* and *Classopollis* are the common in both the sediments. *Cycadopites* is poorly represented in the Kattarala beds. Therefore on the basis of the palynological evidence discussed above, it is concluded that the microflora of the Kattarala sediments is in conformity with the Lower Cretaceous (Neocomian-Aptian) in age.

Palaeoecology and depositional environment

The absence of marine phytoplankton in the Kattarala sediments and the presence of palynoflora indicates continental environment of deposition The gymnosperms represented by fewer taxa than the pteridophytes are quantitatively dominant. The palynospectrum is perhaps attributable to the prolific pollen production of these gymnosperms. The preservation of spore and pollen is uniformly good. The saccate pollen were derived from the flora growing around the depositional basin and it clearly shows that there was only short distance transport of the palynomorphs. The trilete spores of the bryophytes and pteridophytes altogether constitute lowland vegetation. The conifer pollen were probably flown into the basin from a nearby upland vegetation.

The better representation of *Classopollis* implies a fresh to brackish water, swampy environment close to the depositional site. Most earlier authors considered that the Cheirolepidaceae plants generally occupied slopes and lowlands near to the coastal region (Srivastava, 1976).

The palynoassemblage indicates subtropical, warm humid climate with reasonably good precipitation in the immediate vicinity of the depositional basin. The bryophytes and pteridophytes apparently thrived in the warm humid climate.

Acknowledgements

The author is grateful to Dr. P. Yadagiri, Senior Geologist, G.S.I., Hyderabad, for providing geological data of the area and also to Prof. C.G.K. Ramanujam, Depart-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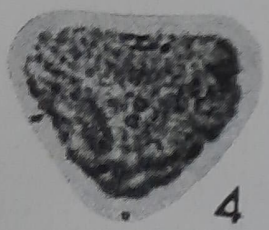
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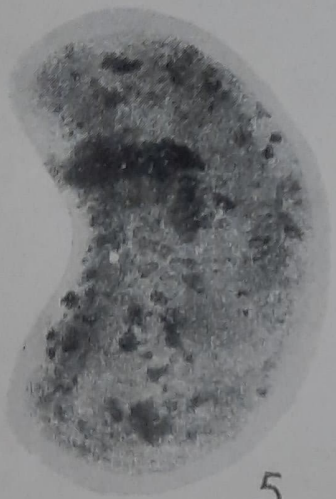
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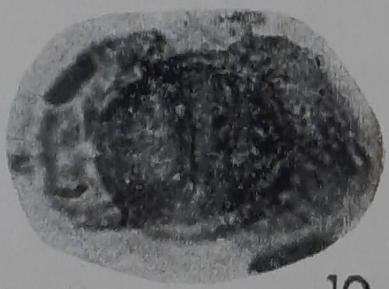
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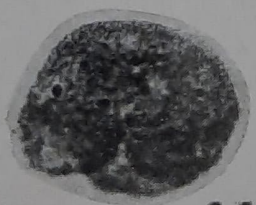
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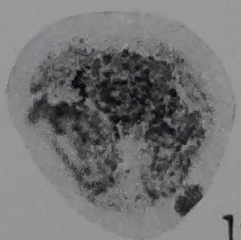
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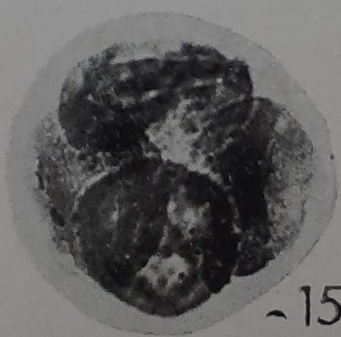
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