

# Palynostratigraphy of Lower Gondwana sediments in Chintalpudi sub-basin, Godavari Graben, Andhra Pradesh\*

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Palynological study of Lower Gondwana sediments in Chintalpudi sub-basin reveals the presence of Talchir, Karharbari and Kamthi palynofloras. The coal seam encountered between 26-81m in bore-core GAG-1 is assigned to Late Permian (Kamthi Formation-Lower Member).

**Key-words** — Palynostratigraphy, Lower Gondwana, Godavari Graben.

## INTRODUCTION

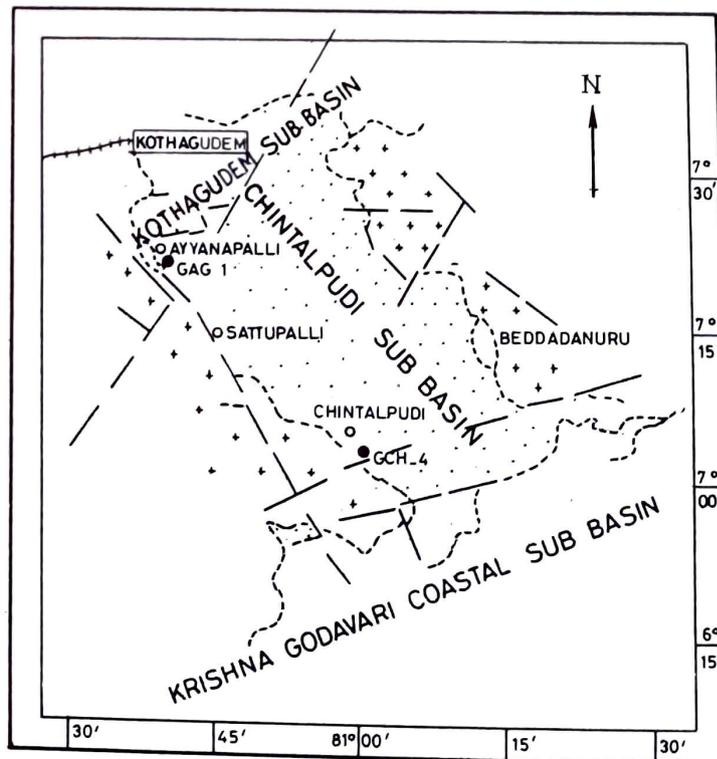
GODAVARI Graben has been subdivided into four structural sub-basins, viz., (1) Godavari sub-basin, (2) Kothagudem sub-basin, (3) Chintalpudi sub-basin and (4) Krishna-Godavari coastal sub-basin. The Chintalpudi sub-basin represents south-easterly continuation of the Kothagudem sub-basin and is located in parts of Khammam and West Godavari districts, Andhra Pradesh. To its south-east lies coastal Gondwana tract of Krishna-Godavari sub-basin.

Various bore-cores have been studied from Godavari and Kothagudem sub-basins. The present palynological study has been extended further south, i.e., in Chintalpudi sub-basin, which includes Ayyanapalli-Gompana block and Chintalpudi area. The following bore-cores have been studied, viz., GAG-1 ( $17^{\circ} 22' 50''$  N;  $80^{\circ} 40''$  E) and GCH-4 ( $17^{\circ} 03' 15''$ ) and their locations are shown in Map 1.

## LITHOSTRATIGRAPHY

The geology of Chintalpudi sub-basin was first studied by Blanford (1871, 1872). He opined that the rock unit belong to "Kamthi Sandstone". King (1881) mentioned Chintalpudi beds and Dummapet beds as two local groups and placed "Chintalpudi Sandstone" below the Dummapet sandstone. Raja Rao (1982) gave a brief geology

of Chintalpudi sub-basin according to which the sub-basin is of younger generation as evidenced by the general absence of Barakar and Barren Measures formations over a major part of the area. He mentioned that the exposures



**Map 1.** Location of bore-cores GAG-1 and GCH-4 in Chintalpudi sub-basin, Godavari Graben, Andhra Pradesh.

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**Table 1. Showing characteristic features of the assemblages demarcated in bore-core GAG-1 and GCH-4 from Chintalpudi sub-basin, Godavari Graben**

Assemblage no.	Bore-core no.	Depth in meter	Dominant genera	Sub-dominant genera	Significant genera	Palynozone
4	GAG-1	81.00-26.00	<i>Faunipollenites</i> <i>Striatopodocarpites</i>	<i>Scheuringipollenites</i> <i>Corisaccites</i> <i>Lueckisporites</i> <i>Weylandites</i> <i>Verticypollenites</i>	<i>Microbaculispora</i> <i>Microfoveolatispora</i> <i>Verrucosisporites</i> <i>Gondisporites</i> <i>Tethysispora</i> <i>Lundbladispota</i> <i>Klausipollenites</i> <i>Vitreisporites</i> <i>Falcisporites</i> <i>Lunatisporites</i> <i>Guttulapollenites</i> <i>Marsupipollenites</i> <i>Osmundacidites</i>	Kamthi (Lower Member)
3		383.90-202.60	<i>Parasaccites</i> <i>Plicatipollenites</i>	<i>Virkkipollenites</i> <i>Scheuringipollenites</i> <i>Leiosphaeridia</i> <i>Hemisphaerium</i>	<i>Jayantisporites</i> <i>Caheniasaccites</i> <i>Divarisaccus</i> <i>Faunipollenites</i> <i>Striatopodocarpites</i>	Karharbari (Upper)
2		436.00	<i>Parasaccites</i>	<i>Callumispota</i> <i>Plicatipollenites</i> <i>Virkkipollenites</i> <i>Potonieisporites</i>	<i>Faunipollenites</i> <i>Leiosphaeridia</i>	Karharbari (Lower)
1		534.00	<i>Plicatipollenites</i> <i>Parasaccites</i>	<i>Virkkipollenites</i> <i>Potonieisporites</i> <i>Vestigisporites</i> <i>Caheniasaccites</i> <i>Divarisaccus</i>	<i>Callumispota</i> <i>Jayantisporites</i>	Talchir
	GCH-4	169.00	<i>Parasaccites</i>	<i>Virkkipollenites</i> <i>Caheniasaccites</i> <i>Divarisaccus</i> <i>Plicatipollenites</i>	<i>Striatopodocarpites</i> <i>Faunipollenites</i> <i>Microbaculispora</i> <i>Callumispota</i>	Talchir

in Chintalpudi area comprise greenish clays and siltstone which may be of Talchir sequence. Recently, Lakshminarayana and Murti (1990) have revised the stratigraphic set up of this sub-basin in which Barakars are unconformably overlain by the Upper Member of the Kamthi Formation (*sensu* Ramanamurty, 1985), thus bringing a considerable gap in the stratigraphic sequence.

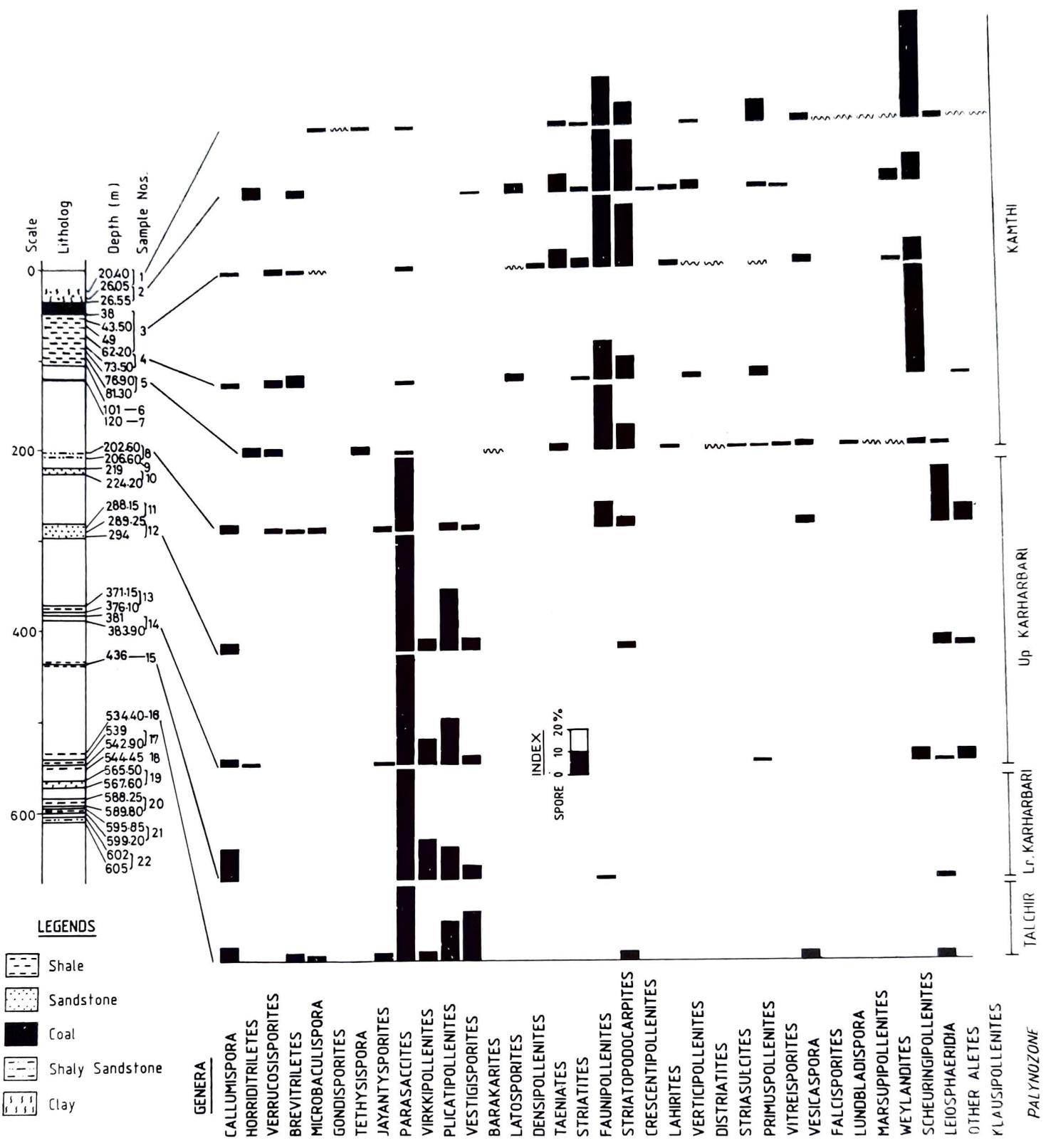
rich enough for quantitative analysis. Four distinct palynozones have been recognised on the basis of quantitative and qualitative incidences of various genera (Histogram 1). The characteristic features of various assemblages demarcated in the bore-core GAG-1 are given here in table 1, which also includes one assemblage investigated in bore-core GCH-4 from Chintalpudi area.

### PALYNOSTRATIGRAPHY

Out of 22 samples in bore-core GAG-1, 18 yielded palynofossils. However, only 14 samples of bore-core GAG-1 and a single sample of bore-core GCH-4 were

### DISCUSSION

The earlier opinion in this sub-basin was that the Kamthi Formation directly overlies the Archeans or at some places underlain by the Talchirs. Barakar and



**Histogram 1.** Percentage frequency of different genera in bore-core GAG-1, Chintalpudi sub-basin, Godavari Graben, Andhra Pradesh.

Barren Measures (Kulti) were reported to be absent except in some small patches (Raja Rao, 1982).

Palynological evidence suggests the presence of Talchir at 534 m and Karharbari sediments between 436.00-202.60 m in bore-core GAG-1. Similarly, the presence of Talchir sediments is also observed in bore-core GCH-4 at 163m. The Talchir sediments in bore-core GAG-1 are

thick and well preserved. *Gangamopteris* leaf-impressions have been observed in grey black splintery shales between 544.45-534.40 m. These splintery shales are lithologically comparable to the black needle shale of the Talchir Formation from Manendragarh (Lele & Chandra, 1972) which contain invertebrate marine fossils. They also compare with similar shales from Mohpani

Coalfield (Bharadwaj & Anand-Prakash, 1972). The presence of Karharbari sediments in bore-core GAG-1 is also distinct as described earlier. Occurrence of *Leiosphaeridia* (24%) and *Hemisphaerium* (8%) in the Upper Karharbari palynozone is significant as it shows marine influence during Karharbari sedimentation. Leiosphaerids in Karharbari Formation have also been recorded from Umaria Coalfield in Son-Graben (in Venkatachala & Tiwari, 1988). Similarly, Banerjee (1988) also interpreted marine transgression during Karharbari on the basis of the occurrence of brackish water acritarchs. Marine influence during Karharbari sedimentation in Hutar Coalfield has been suggested by Chaudhuri (1988) on the basis of sedimentary features and the presence of foraminifers.

The sediments between 202.60-81.30 m in bore-core GAG-1 have not yielded sufficient spores but whatever spore are present at 120 m suggest an affinity younger than Upper Karharbari palynozones. It needs careful palynological investigation in order to show the existence of Barakar and Barren Measures (Kulti) palynozones which holds a greater promise.

Sediments between 81-26 m have yielded well preserved spores and pollen. The presence of *Falcisporites*, *Guttulapollenites*, *Vitreisporites*, *Gondisporites*, *Tethysispora*, *Lunatisporites*, *Klausipollenites*, *Lundbladispورا*, *Marsupipollenites* and *Weylandites* (Plate 1) suggests Late Permian affinity equivalent to Raniganj palynozone though Rama Rao *et al.* (1990) have considered these sediments equivalent to Barakar Formation. The presence of younger elements recorded in this investigation indicates Late Permian aspect. Hence, it is considered here that the 30 m thick coal seam (coal+shale) recorded at 27 m show Raniganj affinity and not the Barakar.

The sediments above 26.00 m (variegated clays with black carbonaceous material) in bore-core GAG-1 are unlike Barakar and compare to variegated clays at the top of bore-core GAG-2 drilled very near to bore-core GAG-1 and indicates significant lithological variation distinctly different from the Barakar Formation. The present investigation of the bore-core GAG-1 reveals the presence of a complete lithological sequence from the Talchir to Kamthi Formations. The Talchir, Karharbari and Lower Member of the Kamthi formation, the latter containing workable coal seams, are well developed while the Barakar and Barren Measures (Kulti) formations show restricted development. Hence, it needs a careful stratigraphic investigation, lithological and palynological both.

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### REFERENCES

- Banerjee, M. 1988. Karharbari: a formation or biozone. In : Venkatachala, B.S. & Maheshwari, H.K. (eds)- *Concepts, limits and extension of the Indian Gondwana, Palaeobotanist* **36**: 37-50.
- Blanford, W.T. 1871. Note on the plant bearing sandstones of the Godavari Valley, on the southern extension of the rocks belonging to the Kamthi group to the neighbourhood of Ellore and Rajamundri and on the possible occurrence of coal in the same direction. *Rec. geol. Surv. India* **4** (2) : 49-52.
- Blanford, W.T. 1872. Description of the sandstone in the neighbourhood of the first barrier on the Godavari and in the country between

### Plate 1

(All figures are X 500)



1. *Lundbladispورا*; BSIP slide no.10625, coordinates 102.3x60.5.
2. *Klausipollenites*; BSIP slide no.10620, coordinates 54 x 99.
3. *Lunatisporites*; BSIP slide no.10624, coordinates 100 x 55.2.
4. *Lueckisporites*; BSIP slide no.10622, coordinates 15.6 x 125.
5. *Klausipollenites*; BSIP slide no.10626, coordinates 10 x 159.7.
6. *Guttulapollenites*; BSIP slide no.10627, coordinates 145.1 x 11.
7. *Guttulapollenites*; BSIP slide no.10632, coordinates 103 x 51.9.
8. *Striasulcites*; BSIP slide no.10622, coordinates 17 x 150.4.
9. *Falcisporites*; BSIP slide no.10629, coordinates 102 x 35.6.
10. *Corisaccites*; BSIP slide no.10623, coordinates 161 x 11.5.
11. *Tethysispora*; BSIP slide no.10621, coordinates 107.5 x 45.2.
12. *Lunatisporites*; BSIP slide no.10620a, coordinates 6 x 152.5.
13. *Lundbladispورا*; BSIP slide no.10624, coordinates 102.5 x 36.8.
14. *Vitreisporites*; BSIP slide no.10623, coordinates 101 x 35.2.
15. *Corisaccites*; BSIP slide no.10627, coordinates 145.5 x 5.
16. *Verticypollenites*; BSIP slide no.10628, coordinates 100.5x35.5.
17. *Weylandites*; BSIP slide no.10627, coordinates 96.4 x 55.
18. *Alete*; BSIP slide no.10629, coordinates 112 x 50.2.
19. *Tetraporina*; BSIP slide no.10630, coordinates 104 x 69.6.

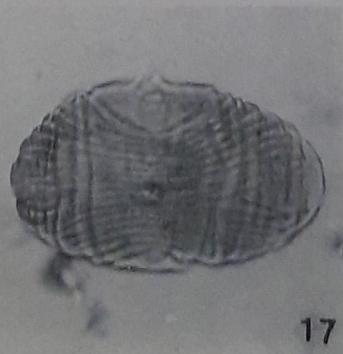
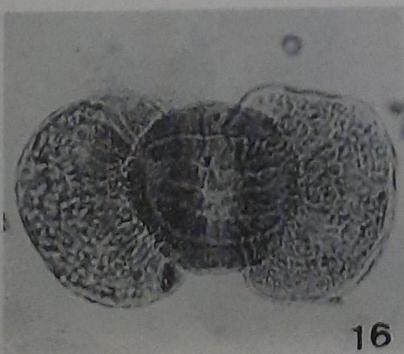
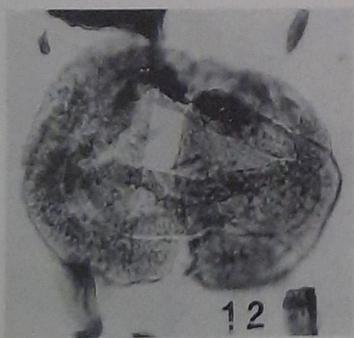
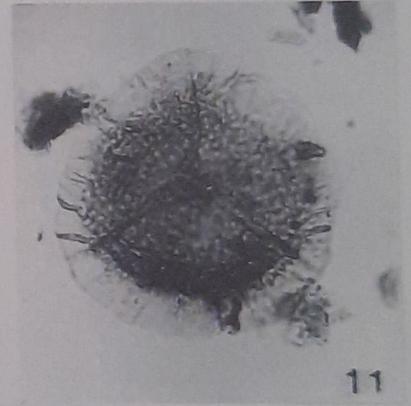
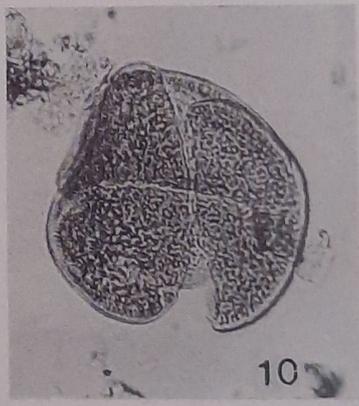
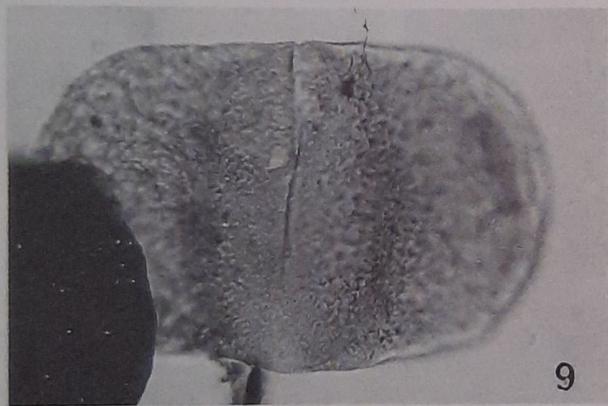
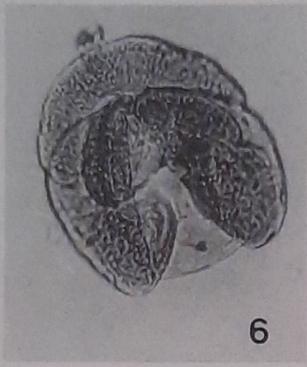
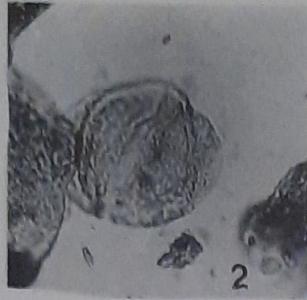
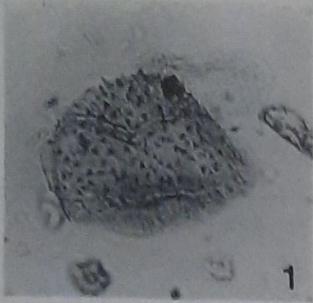


Plate 1

- the Godavari and Ellore. *Rec. geol. Surv. India* **6** (2): 23-29.
- Bharadwaj, D.C. & Anand - Prakash 1972. Geology and palynostratigraphy of Lower Gondwana formations in Mohpani Coalfield, Madhya Pradesh, India. *Geophytology* **1** (2): 103-115.
- Chaudhuri, S. 1988. Marine influence in Hutar Coalfield, Bihar. In : Venkatachala, B.S. & Maheshwari, H.K. (eds)- *Concepts, limits and extension of the Indian Gondwana*, *Palaeobotanist* **36** : 30-36.
- King, W. 1881. The geology of Pranhita-Godavari Valley. *Mem. geol. Surv. India* **18** : 115-116.
- Lakshminarayana, G. & Murti, K.S. 1990. Stratigraphy of the Gondwana formations in the Chintalpudi sub-basin, Godavari Valley, Andhra Pradesh. *J. geol. Soc. India* **36** : 13-25.
- Lele, K.M. & Chandra, A. 1972. Palynology of marine intercalations in Lower Gondwana of Madhya Pradesh. *Palaeobotanist* **19** (3): 253-262.
- Raja Rao, C.S. 1982. Coalfields of India: Coal resources of Tamil Nadu, Andhra Pradesh, Orissa and Maharashtra. *Bull. geol. Surv. India, Ser.A.*, No. **45** (2) : 9-40.
- Rama Rao, M., Lakshminarayana, G. & Ramanujam, C.G.K. 1990. Palynological dating of a coal seam in Ayyanapalam area, Khammam District, Andhra Pradesh, India. *Curr. Sci.*, **59** (10): 515-517.
- Ramanamurty, B.V. 1985. Permian lithostratigraphy of Ramagundam-Mantheni Area, Godavari Valley Coalfield, Andhra Pradesh. *Geophytology* **15** (2): 119-136.
- Venkatachala, B.S. & Tiwari, R.S. 1988. Lower Gondwana marine incursions: periods and pathways. In: Venkatachala, B.S. & Maheshwari, H.K.(eds)- *Concepts, limits and extension of the Indian Gondwana*. *Palaeobotanist* **36** : 24-29.