

# Palynology of the subsurface Early Miocene sediments in Tiruvarur District, Tamil Nadu, India

M.R. RAO

*Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.*

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The paper deals with the Early Miocene microfossils recovered from Sellur bore-hole (ME-603), Tiruvarur District, Tamil Nadu. The flora is represented by algal and fungal remains and angiosperm pollen. Pteridophytic spores are not recorded. Palynofossils belonging to low-land, freshwater swamp and coastal elements have been identified. The assemblage suggests

that the sediments are deposited in coastal deltaic environment far away from the sea.

Palynofossils have been recorded from Sellur bore-hole (ME- 603, 446.00 m depth) in Tiruvarur District, Tamil Nadu (10°46' N: 79°39' E). Altogether, 21 samples were provided by the MECL (South Zone), Hyderabad. 5 samples yielded palynofossils (1 clay and

BH. No.	Sample No.	From	To (metres)	Lithology
ME 603	1	1.00	3.00	Top soil/Sandy soil
	2	6.00	12.00	Sandy clay/pale
	3	36.00	42.00	Sandy clay/pale green
	4	48.00	52.00	Dark grey clay
	5	52.00	54.00	Clayey sandstone
	6	96.00	102.00	Clay-Variiegated
	7	108.00	114.00	Clay hard/ Silty
	8	114.00	120.00	Ferruginous sand
	9	156.00	162.00	Variiegated clay
	10	195.00	201.00	Grey clay
	11	195.00	201.00	Silty clay
	12	213.00	219.00	Sandy clay
	13	213.00	219.00	Chacholate clay
	14	252.00	258.00	Grey/silty clay
	15	288.00	294.00	Sandy clay
	16	330.00	336.00	Grey clay
	17	354.00	372.00	Ferruginous sand
	18	388.00	394.00	Lignite
	19	397.00	398.00	Lignite/clay
	20	422.00	428.00	Lignite-woody structure
	21	440.00	446.00	Lignite/contaminated lignite

Fig. 1—Table showing the details of Sellur bore-hole samples of Tiruvarur District, Tamil Nadu.

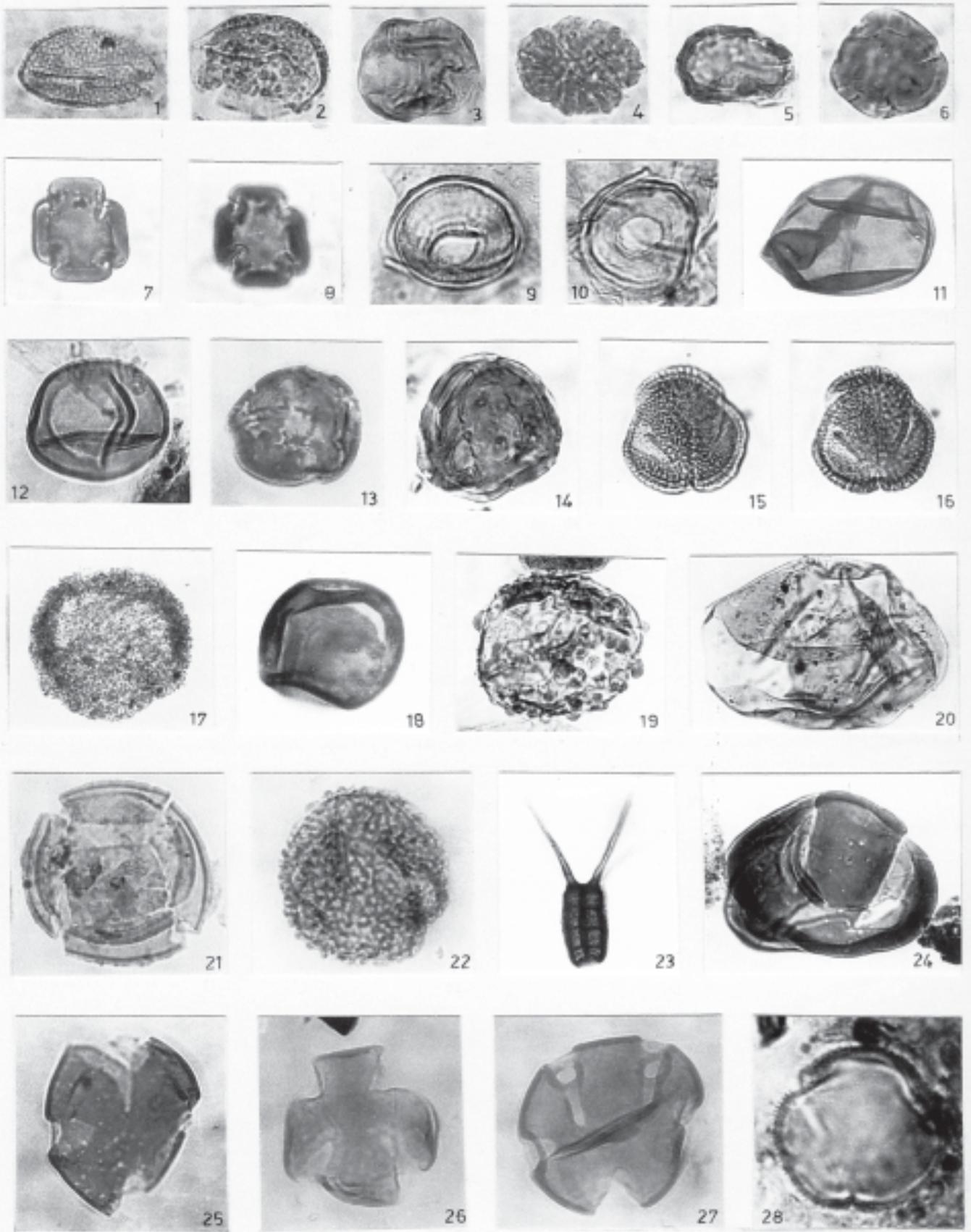


PLATE 1

4 lignite samples). The area is covered by top soil composed of sand and sandy soil. This is underlain by a sequence of alternating beds of clays and sandy clay/ferruginous sand with thick bands of lignite/lignitic clay and lignite woody structure. The lithological details of the samples are shown in Figs 1 & 2. The material, slides and negatives have been deposited in the Museum of Birbal Sahni Institute of Palaeobotany, Lucknow.

The palynofossils recovered from Sellur bore-hole (ME-603) are listed below.

#### Algal remains

*Botryococcus braunii* Blackburn & Temperley, 1936 (Pl. 1, fig. 4)

#### Fungal remains

*Phragmothyrites* sp.

*Inapertisporites kedvesii* Elsik, 1968 (Pl. 1 fig. 11).

*Inapertisporites* sp. (Pl. 1, fig. 18)

*Pluricellaesporites* sp.

*Frasnacritetrus* sp. (Pl. 1, fig. 23)

#### Angiosperm pollen

*Verrualetes excellensus* Acharya, 2000 (Pl. 1, fig. 19)

*Verrualetes* sp. (Pl. 1, fig. 2)

Inaperturate pollen Type (Pl. 1, fig. 17)

*Liliacidites padappakkarensis* Rao & Ramanujam, 1978 (Pl. 1, fig. 1)

*Palmidites* sp. (Pl.1, fig. 20)

*Verrumonocolpites* sp.

*Iridacidites warkalliensis* Ramanujam, 1987

*Lakiapollis ovatus* Venkatachala & Kar, 1969 (Pl. 1, fig. 12)

*Tricolporopilites pseudoreticulatus* Kar, 1985 (Pl. 1, fig. 22)

*T. tectatus* Singh & Misra, 1991 (Pl. 1, fig. 21)

*Retitrescolpites* sp. (Pl. 1, figs 15-16)

*Meliapollis tamilii* Navale & Misra, 1979 (Pl. 1 figs 3, 5, 13)

*M. firmus* Navale & Misra, 1979 (Pl. 1, figs 7, 8)

*M. magnus* Navale & Misra, 1979 (Pl. 1, fig. 27)

*Meliapollis navalei* Navale & Misra, 1979 (Pl. 1, figs 25-26)

*Tamilipollenites grandis* Singh & Misra, 1991 (Pl. 1, fig. 24)

*Tamilipollenites* sp. (Pl. 1, figs 6, 14)

*Cuddaloripollis simplex* Singh & Misra, 1991 (Pl. 1, fig. 28)

*Graminidites* sp. (Pl. 1, figs 9-10)

### PALYNOFLORAL ANALYSIS

The recovered palynological assemblage from the bore-hole is represented by algal and fungal remains and angiosperm pollen. The assemblage is dominated

#### PLATE 1

(All photomicrographs are enlarged ca. x 500, unless mentioned.)

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| <p>1. <i>Liliacidites padappakkarensis</i> Rao &amp; Ramanujam, 1978, Slide No. BSIP 13244 (F 22).</p> <p>2. <i>Verrualetes</i> sp. Slide No. BSIP 13245 (J 25).</p> <p>3, 5, 13. <i>Meliapollis tamilii</i> Navale &amp; Misra, 1978 Slide Nos. BSIP 13246 (S 36/1), 13245 (F 20/1), 13246 (U 42/3).</p> <p>4. <i>Botryococcus braunii</i> Blackburn &amp; Temporley, 1936 Slide No. BSIP 13247 (41/3).</p> <p>6, 14. <i>Tamilipollenites</i> sp. Slide No. BSIP, 13248 coordinates (X 19/2), 13249 (H 40/3).</p> <p>7-8. <i>Meliapollis firmus</i> Navale &amp; Misra, 1978, Slide No. BSIP 132456 (J 35).</p> <p>9-10. <i>Graminidites</i> sp. Slide Nos. BSIP 13249 (T 32), 13250 x 1000 (L 37/3).</p> <p>11. <i>Inapertisporites kedvesii</i> Sheffy &amp; Dilcher, 1971, Slide No. BSIP 13251 (K 33/3).</p> <p>12. <i>Lakiapollis ovatus</i> Venkatachala &amp; Kar, 1969, Slide No. BSIP 13252 (R 33).</p> <p>15, 16. <i>Retitrescolpites</i> sp. Slide No. BSIP, 13253 (D 21/2).</p> | <p>17. Inaperturate pollen type. Slide No. BSIP 13254 (O 27).</p> <p>18. <i>Inapertisporites</i> sp. Slide No. BSIP 13251 (Q 24/4).</p> <p>19. <i>Verrualetes excellensus</i> Acharya, 2000, Slide No. BSIP 13244 (V 16/2).</p> <p>20. <i>Palmidites</i> sp. Slide No. BSIP 13254 (M 15/1).</p> <p>21. <i>Tricolporopilites tectatus</i> Singh &amp; Misra, 1991, Slide No. BSIP 13245 (T 32/4).</p> <p>22. <i>Tpseudoreticulatus</i> Kar, 1985, Slide No. BSIP 13248.</p> <p>23. <i>Frasnacritetrus</i> sp. Slide No. BSIP 13255 (T 41).</p> <p>24. <i>Tamilipollenites grandis</i> Navale &amp; Misra, 1979, Slide No. BSIP 13247 (L 28/4).</p> <p>25-26. <i>Meliapollis navalei</i> Navale &amp; Misra, 1979, Slide Nos. BSIP 13249 (J 11), Slide No. BSIP 13256 (Q 58/1).</p> <p>27. <i>Meliapollis magnus</i> Navale &amp; Misra, 1979, Slide No. BSIP 13256 (G 41/2).</p> <p>28. <i>Cuddaloripollis simplex</i> Singh &amp; Misra, 1979, Slide No. BSIP 13257 (x1500) (S 36/2).</p> |
|--|---|

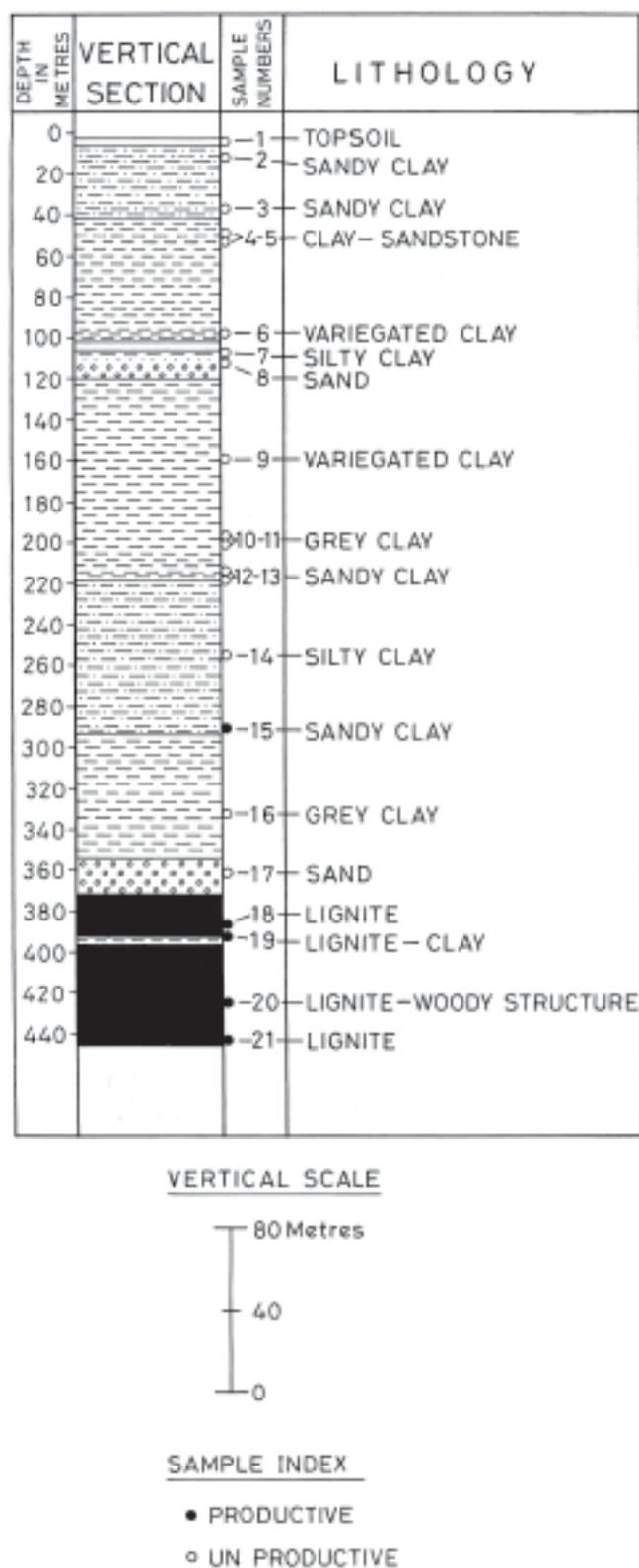


Fig. 2—Lithology of Sellur bore-hole (ME - 603), Tiruvarur District, Tamil Nadu.

by angiosperm pollen (66%) followed by algal and fungal remains (34%). Significantly, no pteridophytic spores are recovered. The palynotaxa are referable to 18 genera and 26 species consisting of algal remains (2 genera and 2 species), fungal remains (4 genera and 5 species) and angiosperm pollen (12 genera and 19 species). Comparison of the palynoassemblage recovered from the lignite overlying the clay bed reveals that spore-pollen are dominant in the lignite than the clay bed. *Meliapollis* and *Tamilipollenites* are dominant among angiosperm pollen followed by fungal remains.

The assemblage recorded (*Botryococcus*, *Inapertisporites*, *Polyadosporites*, *Palmidites*, *Iridacidites*, *Meliapollis*, *Tamilipollenites*, *Cuddaloripollis* and *Tricolporopilites*) from the depth range 294 to 440 m are usually found associated with the Early Miocene assemblages (Kar & Jain, 1981; Rao, 1990, 1995, Kerala Basin); (Navale & Misra, 1979; Ramanujam, 1966, 1987; Rao & Ramanujam, 1982; Singh & Misra, 1991, Cauvery Basin), hence this assemblage also has been confirmed as Early Miocene. The marker genera *Crassoretitriletes vanraadshooveni* (Germeraad *et al.* 1968) and *Trisyncolpites ramanujamii* (Kar, 1979) for the Oligocene sediments have not been recorded in the depth range supports the view.

The possible affinities of palynomorphs identified in the assemblage and the present day distribution of their families are: Liliaceae, Arecaceae, Iridaceae, Meliaceae, Bombacaceae and Oleaceae, of these, Meliaceae is the dominant family. In addition to these, other significant pollen genera with unknown affinity include *Tamilipollenites*, *Tricolporopilites* and *Cuddaloripollis*.

#### PALAEOCLIMATE AND ENVIRONMENT OF DEPOSITION

The assemblage belonging to different families, of these, 4 families belong to tropical-subtropical, one tropical-temperate and one cosmopolitan. The representation of Arecaceae, Liliaceae, Meliaceae Oleaceae and presence of microthyriaceous fungi

suggests a tropical-humid climate with high rainfall during the time of sedimentation.

The palynotaxa recorded from the bore-hole are referable to the floral elements of variable ecology; viz., Low-land (*Lakiapollis* and *Retitrescolpites*), freshwater swamp (*Azolla* and *Botryococcus*) and coastal elements (*Liliacidites*, *Palmidites*, and *Iridacidites*). The good representation of algal and fungal remains and grass pollen indicates that the prevailing flora was mainly of wet evergreen, open and mixed nature. The representation of *Botryococcus* colonies indicates, a fresh water environment of deposition, most probably lacustrine. This inference was corroborated by the presence of *Azolla* in the assemblage. The bore-hole was deposited in a coastal deltaic environment far away from the sea. Mangrove elements like *Nypa*, *Barringtonia*, *Avecennia*, *Lumnitzera*, *Aegialetes*, etc. which are dominant in the Neyveli and associated sediments of Cauvery Basin have not been recorded in the present assemblage supports the view.

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