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A PERMO-TRIASSIC(?) PLANT MICROFOSSIL ASSEMBLAGE FROM SRI LANKA

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Abstract

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Palynological observations on peaty and sandy clay beds of some sedimentary sequences from the Kurunegala district of Sri Lanka reveal the occurrence of plant microfossils of probable Permo-Triassic age. The microfossils are found in sediments considered to be of glacial origin deposited on the Sri Lankan fragment of the Gondwanaland.

Introduction

Geologically, nine-tenths of Sri Lanka consist of metasedimentary and igneous rocks which form part of the South Indian shield, one of the ancient and stable parts of the earth's crust. The rest of the island, mainly the northwestern portion, is formed of Mesozoic (Jurassic), Tertiary (Miocene) and Quaternary sedimentary formations.

The Precambrian crystalline rocks occur mostly in the central part of the country and they make up a complex of granulites, schists, gneisses, migmatites and granites. These rocks can be sub-divided as (a) the Highland series, (b) the Southwestern Group and (c) the Vijayan Complex (Cooray, 1978).

The Highland Series is composed of the Khondalite Group of metamorphosed sediments and charnockites which occur in a broad belt running across the centre of the island from southwest to northeast covering the whole of the central hill country of Sri Lanka. The Southwestern Group, found in the coastal belt of the southwest sector of the island consists of metasediments and charnockites similar to those of the Highland Series. The Vijayan Complex formed mainly of gneisses and granites, occupies the lowlands on the northwest and southeast of the country.

Some restricted occurrences of Mesozoic rocks mainly sandstones, shales and mudstones of Jurassic age have been reported at Tabbowa and Andigama being preserved in basins faulted into the Precambrian of the Vijayan Series. The base of the Jurassic sequences has not yet been identified, but a major unconformity is thought to lie between it and the underlying crystalline basement.

A considerable portion of the northwestern coastal belt is covered by Tertiary sedimentary rocks — the Jaffna Limestone of Miocene age interbedded with calcareous sands and muds. The Miocene rocks, like the Jurassic, rest

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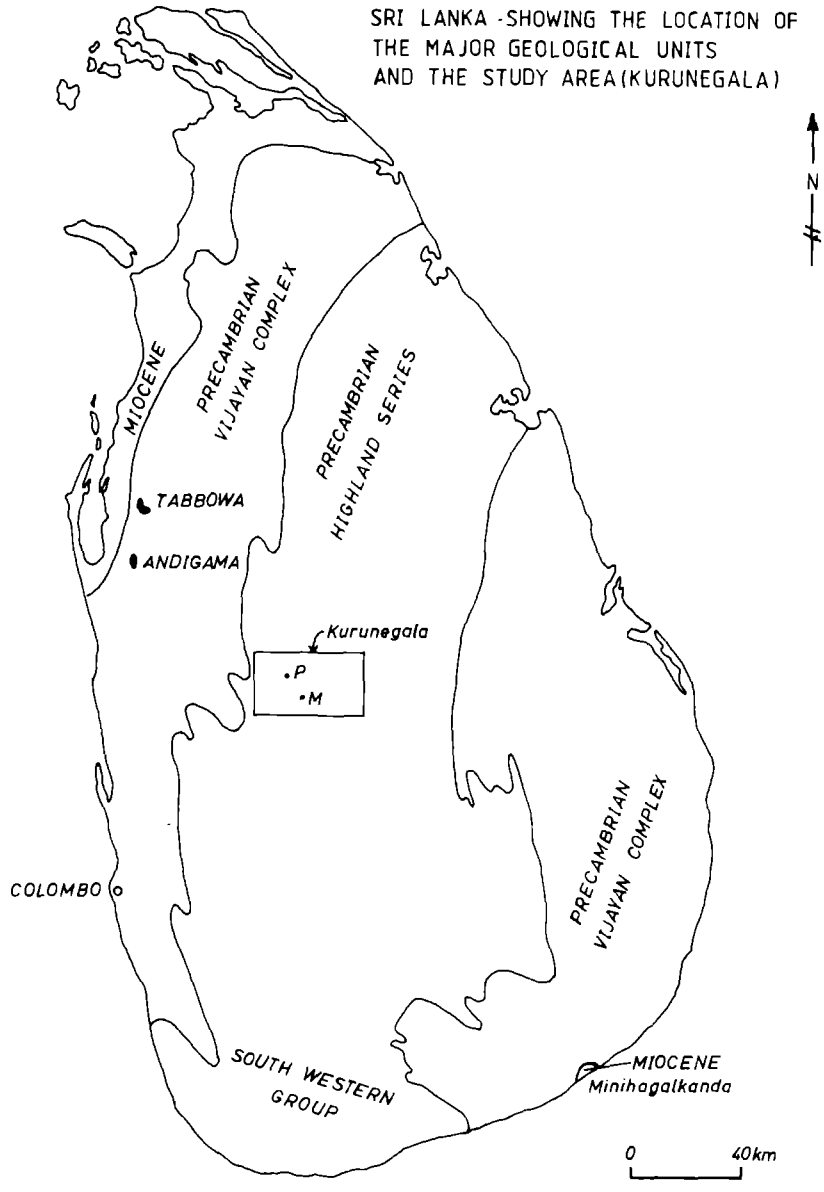


Fig.1. Map of Sri Lanka showing the general geology and the area of study at Kurunegala. The locations of the stratigraphic sections studied are given by M = Metibokka and P = Pussella. The dark patches at Tabbowa and Andigama are Jurassic outcrops.

unconformably on the Precambrian basement. A smaller outcrop of Miocene rocks (mainly sandstones) occurs in the southeast of the island at Minihagalkanda.

Source of samples studied

In the lowland plains of the West central part of the island in the Kurunegala district sequences of sediments of the order of a few meters are observed. In these widespread sedimentary successions overlying the Precambrian crystalline rocks, Dahanayake and Dasanayake (1981) observed varve-like rhythmites within sequences consisting of sand, clay and peaty clay in association with flat striated pentagonal pebbles of gneissic composition. A glacial origin of probable Paleozoic age was

contemplated for these sediments. Later studies of borehole data and outcrops of Kurunegala area by the authors have confirmed the existence of U-shaped valleys and sediments characteristic of glaciofluvial activity.

In this study, the writers have carried out a palynological study of some peaty and sandy clay beds selected from two sequences in the Kurunegala area at Metibokka and Pussella respectively (Fig.2a, b). The peaty clay beds occur interspersed with more coarse sandy or pebble layers. The thickness of the peaty clay beds can vary from a few mm to some metres. The studied samples were collected from peaty clay and sandy clay beds as indicated in Fig.2. Samples from five horizons yielded plant micro-fossil assemblages. The yield of palyno-fossils from the samples was not rich. Although the spores and pollen have been well preserved, they are highly oxidized perhaps due to surface weathering.

Palynological observations in clay

Since the recovery of palynotaxa is not rich, a quantitative estimation is not possible. However, qualitative analysis reveals the presence of following genera. (Plates I and II). *Callumispora* Bharadwaj and Srivastava, 1969, *Verrucosisporites* Ibrahim emend. Smith et al., 1967; *Lundbladispora* Balme emend. Playford, 1965; *Playfordiaspora* Maheshwari and Banerji, 1975; *Lunatisporites* Lesch. emend. Bhar-

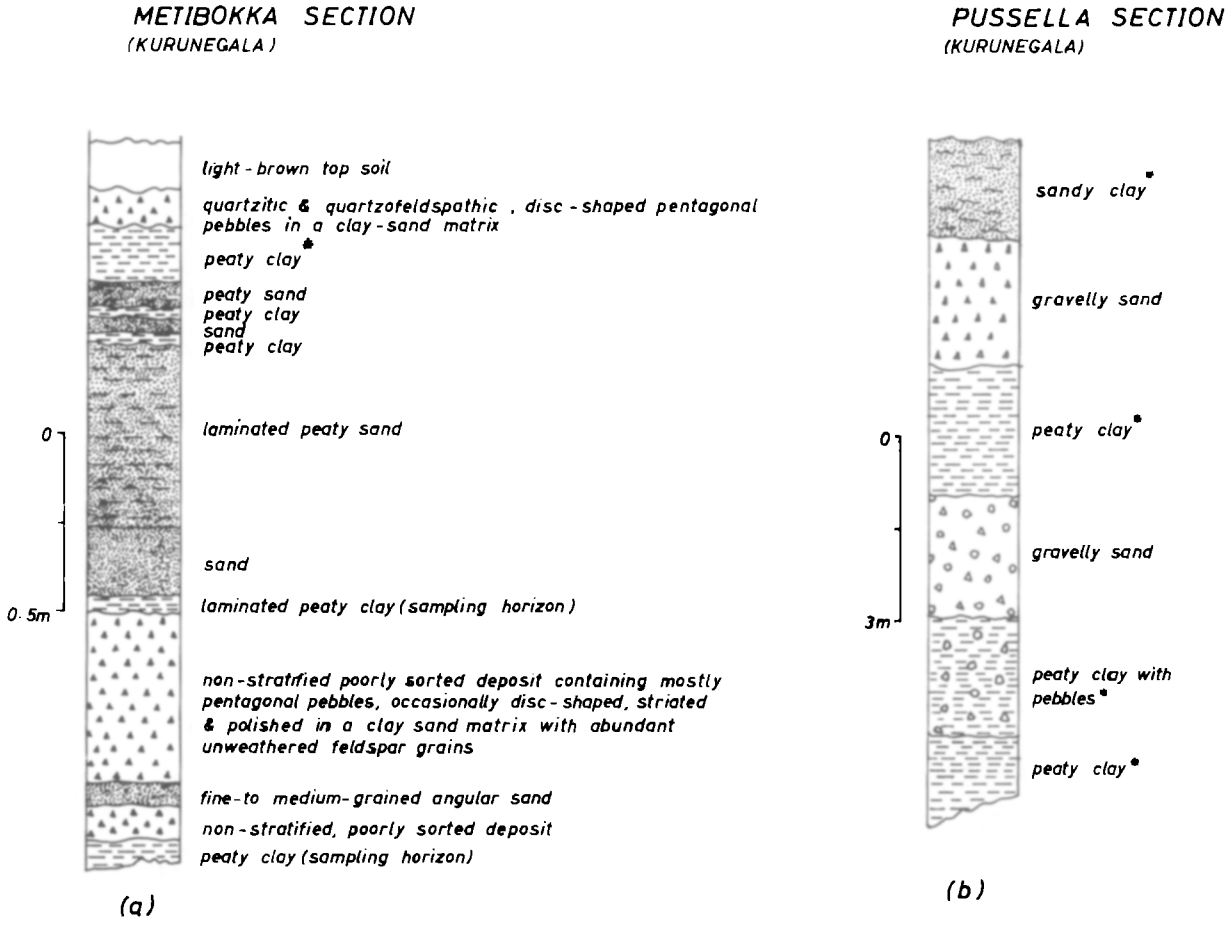
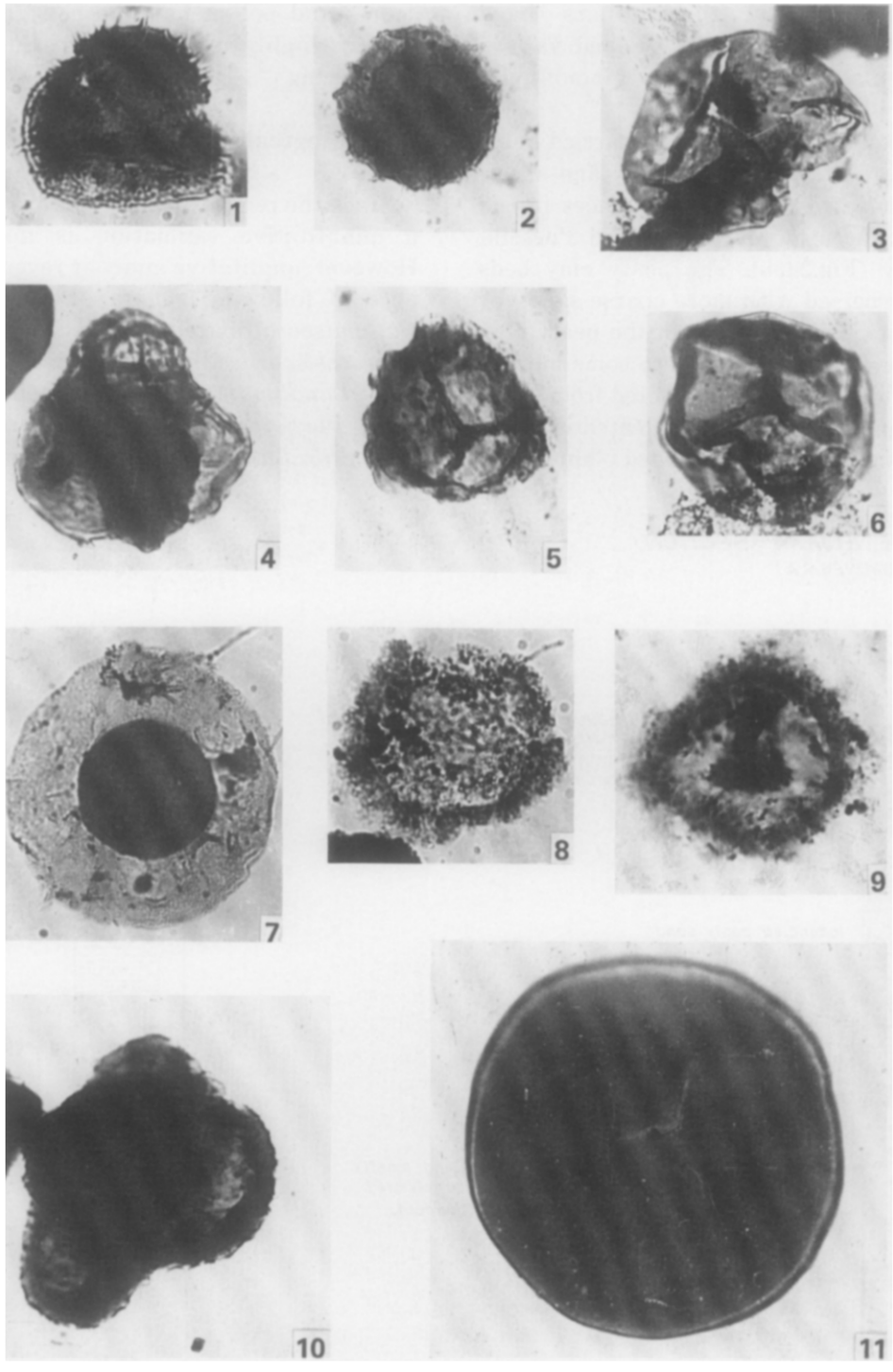


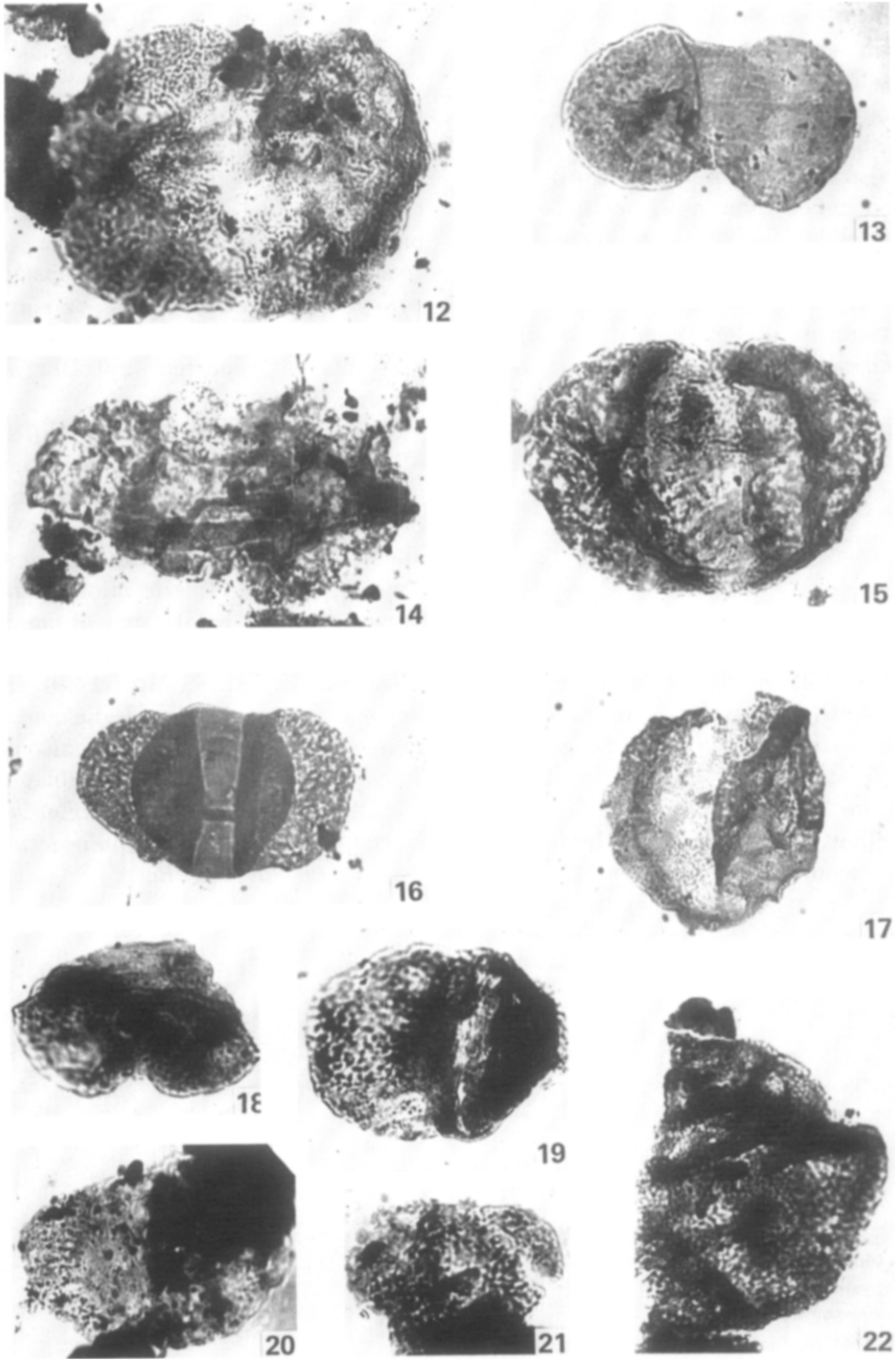
Fig.2. Stratigraphic sections at Metibokka and Pussella in Kurunegala study area showing the locations of peaty and sandy clay beds. Asterisks indicate the sampling horizons.

PLATE I



(for explanation see p.202)

PLATE II



(for explanation see p.202)

adwaj, 1974, *Striatopodocarpites* Soritsch. and Sedova emend. Bharadwaj, 1962; *Satsangisaccites* Bharadwaj and Srivastava, 1969; *Falcisporites* Lesch. emend. Klaus, 1963; *Densipollenites* Bharadwaj, 1962. Some sculptured as well as smooth alete forms have also been observed in the same assemblage. Few zonate spores are also recorded but they are highly degraded and hence their assignment to any taxa is not possible. Besides, in one sample, the assemblage is characterised by the abundance of the cavate spore *Lundbladispora* with few nonstriate disaccate pollen genera: *Klausipollenites* and *Falcisporites* The Lower Gondwana forms, such as: *Indospora*, *Gondisporites*, *Microbaculispora*, *Microfoveolatispora*, *Horriditriletes*, *Verticipollenites*, *Hindipollenites*, *Lahirites* were not observed.

Discussion

A comparison of the above assemblage clearly shows that it differs from the palyno-assemblage of Raniganj age described by Bharadwaj (1962), Bharadwaj and Salujha (1964), Tiwari and Rana (1984), Singh and Tiwari (1982) and Tiwari and Singh (1983) because of the stray occurrence of striate disaccate pollen and absence of the Lower Gondwana polymorphs cited earlier.

The assemblage of typical Raniganj age is always characterised by the dominance of striate disaccate taxa — e.g., *Striatopodocarpites*, *Faunipollenites*, *Crescentipollenites*, *Verticipollenites*, etc., significant spore genera such as: *Indospora*, *Gondisporites*, *Microfoveolatispora*, *Microbaculispora* and *Horriditriletes*. However, the overall composition of the presently described assemblage, particularly the presence of certain genera, viz., *Lundbladispora*, *Playfordiaspora*, *Lunatisporites*, *Klausipollenites* and *Falcisporites*, is significant because they indicate its affinity to early Triassic assemblages reported by Bharadwaj and Tiwari (1977).

The present assemblage also differs from the Middle Triassic assemblage reported by Tiwari and Rana (1980; 1984) from Raniganj Coalfield, India and by Goubin (1965) from Madagascar due to the absence of *Goubinispora* assemblage zone. The Late Triassic mioflora reported by Tiwari et al. (1985) from Rajmahal Basin, Maheshwari and Kumaran (1979) and Kumaran and Maheshwari (1980) from South Rewa Gondwana Basin, India and Dolby and Balme (1975) from Australia is also not comparable with the present assemblage from Sri Lanka which lacks *Infernopollenites*, *Brachysaccus*, *Staurosaccites*, *Minutosaccus*, *Convolutispora* and *Foveosporites*.

PLATE I (All photomicrographs are × 500) (see p.200)

1, 2, 5. *Lundbladispora*.
3, 6. *Callumispora*.
4, 10. Tetrads of *Lundbladispora*.
7. *Playfordiaspora*.
8, 9. Degraded zonate spores.
11. *Callumispora*.

PLATE II (All photomicrographs are × 500) (see p.201)

12. *Lunatisporites*.
13. *Crescentipollenites*.
14, 15, 18. *Striatopodocarpites*.
16. *Lunatisporites*.
17. *Alisporites*.
19. *Satsangisaccites*.
20. *Falcisporites*.
21. *Klausipollenites*.
22. *Densipollenites* (Broken specimen).

The present assemblages show the stray occurrence of the only striate disaccate pollen genus *Striatopodocarpites*, the abundance of the cavate spore *Lundbladispora* and nonstriate pollen genera *Klausipollenites* and *Falcisporites*, together with the presence of *Playfordiaspora*, *Lunatisporites*, *Satsangisaccites*, *Verrucosisporites* and *Callumispora*. Its composition thus qualifies to be a younger assemblage of the Permian palynological assemblages.

The absence of palynological taxa typical of Middle and Late Triassic assemblages quoted above is indicative of an older aspect than Middle and Late Triassic age. Hence, an Early Triassic or Permian age could be assigned to the present assemblage. Further confirmatory studies are being undertaken by us.

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