SOME PTERIDOPHYTIC REMAINS FROM THE SIVAGANGA FORMATION

D. E. P. JEYASINGH

Department of Botany, Madras Christian College, Tambaram, Madras 600 059, India

Abstract

The present paper describes three pteridophytic species, namely, *Marattiopsis macrocarpa* (Oldham & Morris) Seward & Sahni, *Cladophlebis indica* (Oldham & Morris) Sahni & Rao and *Sphenopteris* sp. for the first time from the Sivaganga Formation, Tamil Nadu.

Introduction

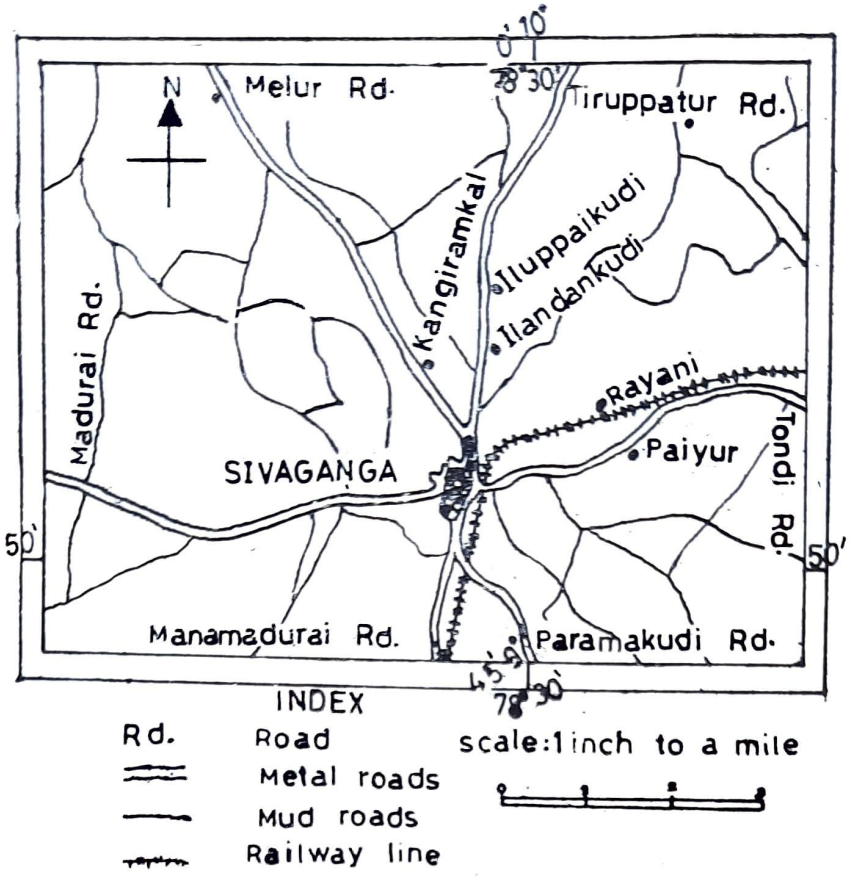
The Sivaganga beds are the southernmost extension of the Indian Gondwanas. Bruce Foote (1883) first recorded the occurrence of these sediments near the town of Sivaganga (70° 29′ : 9° 5′). Gopal mapped the area in 1951 and collected some plant fossils from these beds. The geological aspects were further dealt with by Gopal *et al.* (1957) and they reported some plant fossils from the topmost beds of the Formation, which included *Cladophlebis reversa* (Feistm.) Gopal, Jacob & Jacob, *C. lobata* (Oldham) Gopal, Jacob & Jacob, *Sphenopteris*, *Thinnfeldia*, *Taeniopteris spatulata* McClelland., *T. mcClellandii* Oldham & Morris., *T. densinervis* Feistmantel, *Ptilophyllum cutchense* Morris, *Ginkgoites crassipes* Feistmantel, *Elatocladus plana* (Feistmantel) Seward, *Brachyphyllum expansum* Schimper and *Podozamites lanceolatus* Feistmantel. These specimens are fragmentary. During several field trips from September 1983 to April 1984 many plant fossils have been collected from various localities around Sivaganga Town, i.e., Ilandankudi, Illuppaikudi, Kangiramakal, Paiyur and Rayani villages (Map 1). The plant fossils comprise ferns, pteridosperms, cycads and conifers preserved as impressions in arenaceous shales in the surface exposures, nalla cuttings and well dug-outs. Some of the ferns are described in detail in the present paper, following a brief report on *Marattiopsis* published earlier (Jeyasingh & Sudhersan, 1985). The specimens are deposited in the Laboratory of Palaeophytology, Department of Botany, Madras Christian College, Tambaram, Madras.

Description

Genus—*MARATTIOPSIS* Schimper

Marattiopsis macrocarpa (Oldham & Morris) Seward & Sahni
Pl. 1, figs. 1, 3

Description—Leaves sterile and fertile, agreeing in form and venation with each other. Largest available leaf (SGA/EKP 7) measuring about 5 cm in length and 2 cm in width. Rachis about 1 mm wide with a median groove; pinnules arising at an angle of about 60°-90°, oblong, about 8-10 mm long and 3-4 mm wide, apices bluntly rounded, margin entire, basiscopic margin decurrent. Secondary veins arising from midrib and



Map 1—Showing collection localities around Sivaganga.

forking once or sometimes remain undivided. Fertile pinnules showing synangia as elliptical depressions, with a well-marked central ridge, at the ends of lateral veins close to the pinnule margin. 7-9 synangia present on either side of midrib, each synangium showing radial ridges indicating boundaries of individual sporangia, spores not preserved.

Locality—Ilandankudi, Sivaganga Formation, Tamil Nadu.

Age—Lower Cretaceous.

Discussion—*Marattiopsis macrocarpa* has been reported from Rajmahal Hills in Bihar, Gollapalle beds in Andhra Pradesh and Athgarh Sandstone in Orissa (Feistmantel, 1877a, 1877b; Sahni & Rao, 1933, 1934; Ramanujam, 1957; Bose & Sah, 1968). Its occurrence in the southernmost exposures indicates its distribution further south in the peninsula during Cretaceous time. This genus has also been reported from the Triassic Gondwanas of India (Lele, 1962).

It has been stated that the genus *Marattiopsis* differs from the living *Marattia* only in age (Surange, 1966) and that the resemblance between the living and the fossil is very great (Sharma, 1980). It may be interesting to note that *Marattia fraxinea*, occurring in south India now, has pinnules with pointed apices and serrate margins, while *Marattiopsis macrocarpa* had pinnules with bluntly rounded apices and smooth margins. Also the pinnules of the fossil species are attached by entire base to rachis, whereas in the living species the pinnules, though having a broad base, are attached by a short stalk. The pinnules of *Marattiopsis macrocarpa* do not exceed 1 cm in length, whereas they are several centimetres long in *Marattia fraxinea*. Despite these differences, there is certainly a great

similarity in the position, shape and construction of the synangia in both the species; though in size, the synangia of *Marattia* are much larger than those of *Marattiopsis*.

Genus—*CLADOPHLEBIS* Brongniart

Cladophlebis indica (Oldham & Morris) Sahni & Rao
Pl. 1, figs. 4, 5

Description—Pinnae sterile, pinnules attached by entire base to rachis at an angle of about 50°-60°, 6-12 mm long and 3-5 wide, closely arranged, sub-opposite, elongate, ovate to lanceolate-ovate. Apex acute, sometimes bluntly rounded. Basiscopic margin sometimes slightly overlapping acroscopic margin of the pinnule below; margin almost entire. Midrib prominent, secondary veins arising at an angle of about 45° from midrib and forking once, sometimes twice.

Locality—Kangiramkal and Illandankudi, Sivaganga Formation, Tamil Nadu.

Age—Lower Cretaceous.

Genus—*SPHENOPTERIS* Brongniart

Sphenopteris sp.
Pl. 1, fig. 2

Description—Sterile fronds bipinnate, 1.5 cm wide. Pinnules alternate, membranous and lobed, lobes 4, sometimes 5, 0.6 mm wide, lobes short and obtusely pointed. Midvein distinct, giving rise to secondary veins, secondary veins forked three to four times in each lobe.

Locality—North of Kangiramkal, Sivaganga Formation, Tamil Nadu.

Age—Lower Cretaceous.

Acknowledgements

The author wishes to express gratitude to the University Grants Commission for the award of a research grant (Code no. 13527/83) for the study of Coastal Gondwanas, under which the present investigation has been carried out. Thanks are also acknowledged to Mr C. Sudhersan, for his valuable assistance in the collection of specimens.

References

Bose, M. N. & Sah, S. C. D. (1968). Some pteridophytic remains from the Rajmahal Hills, Bihar. *Palaeobotanist*, **16** : 12-28.

Feistmantel, O. (1877a). Jurassic (Liassic) flora of the Rajmahal Group in the Rajmahal Hills. *Mem. geol. Surv. India Palaeont. indica*, Ser. 2, **1**(2) : 53-163.

Feistmantel, O. (1877b). Jurassic (Liassic) flora of the Rajmahal Group from Golapilli, near Ellora, South Godavari. *Mem. geol. Surv. India Palaeont. indica*, Ser. 2, **1**(3) : 164-201.

Foote, R. B. (1883). On the geology of the Madura Trinelveli districts. *Mem. geol. Surv. India*, **20**.

Gopal, V., Jacob, C. & Jacob, K. (1957). Stratigraphy and palaeontology of the Upper Gondwana of the Ramand District on the East Coast. *Rec. geol. Surv. Indic*, **84** : 477-496.

Jeyasingh, D. E. P. & Sudhersan, C. (1985). Fertile pinnules of *Marattiopsis* Schimper from the Sivaganga beds of Ramanathapuram District, Tamil Nadu. *Curr. Sci.*, **54** : 197-199.

Lele, K. M. (1962). Studies in the Indian Middle Gondwana Flora-2. Plant fossils from South Rewa Gondwana Basin. *Palaeobotanist*, **10** : 69-82.

Ramanujam, C. G. K. (1957). On a new specimen of *Marattiopsis* from the Rajmahal Hills, Bihar. *Sci. Cult.*, **23**: 253-254.

SAHNI, B. & RAO, A. R. (1933). On some Jurassic plants from the Rajmahal Hills *Jl Asia . Soc. Bengal*, N. S., **27** : 183-208.

SAHNI, B. & RAO, A. R. (1934). *Rajmahalia paradoxa* gen. et sp. nov. and other Jurassic plants from the Rajmahal Hills. *Proc. Indian Acad. Sci.*, **1** : 259-269

SHARMA, B D. (1980). Indian Mesozoic pteridophytes, in: *Aspects of Plant Science*, Vol. 3, Ed. S. S. Bir, Today and Tomorrow's Printers and Publishers, New Delhi.

SURANGE, K. R. (1966). *Indian fossil pteridophytes*. Bot. Monograph. No. 4, C. S. I. R., New Delhi.

Explanation of Plate

Plate 1

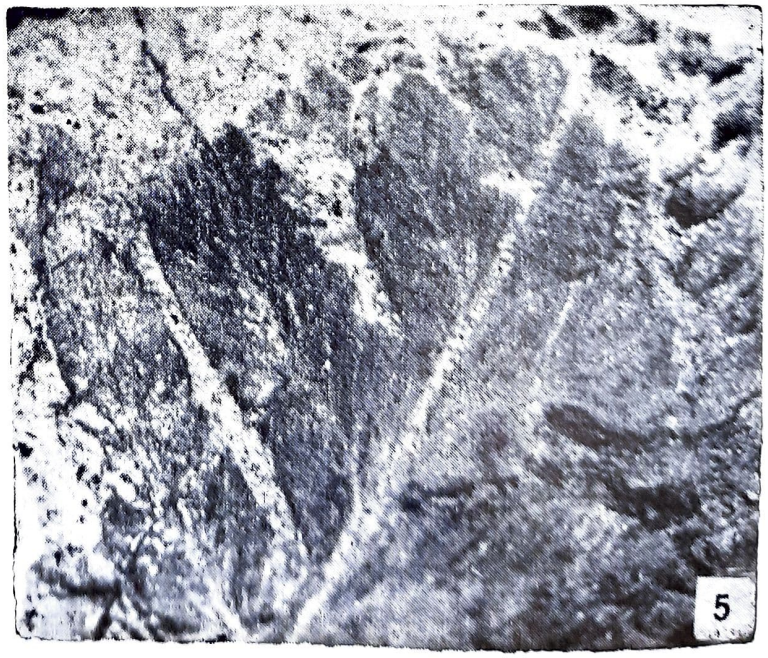
1. *Marattiopsis macrocarpa*, fertile pinnules, x 4, (SGA/EKP3).
2. *Sphenopteris* sp., pinnules showing venation, x 6.5 (SGA/ENR 24).
3. *Marattiopsis macrocarpa*, part of fertile pinnule magnified showing synangia, x 12 (SGA/EKP3).
4. *Cladophlebis indica*, part of a pinna showing pinnules with pointed apices and overlapping bases, × 3 (SGA/ENR 45).
5. *Cladophlebis indica*, pinnules not overlapping at base, x 3.5 (SGA/ENR30).


1


2


3


4


5