The Palaeobotanist, **28-29**: 324-328, 1981.

OCCURRENCE OF THE GENUS *CTENOZAMITES* IN THE JABALPUR FORMATION

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ABSTRACT

This paper records the occurrence of the genus *Ctenozamites* Nathorst represented by a new species, *C. surangei*, in the Jabalpur Formation of Imjhiri Village in the Narsinghpur District of Madhya Pradesh.

Key-words — Cycadales, *Ctenozamites*, Jabalpur Formation, Middle Jurassic (India).

सारांश

जबलपुर शैल-समूह में टीनोज़ेमाइटिस – सुखदेव एवं ज़ेबा-बानो

इस शोध-पत्र में मध्य प्रदेश के नरसिंहपुर जनपद में इमझिरी गाँव के जबलपुर शैल-समूह से टीनोज़ेमाइटिस नॅथॉर्स्ट प्रजाति का निरूपण करने वाली नवीन जाति, टी० सुरंगेयाइ की प्राप्ति का अभिलेख है।

INTRODUCTION

NEAR the deserted village of Imjhiri (22° 49′ 50″:79° 18′ 30″), about 4·8 km south-east of Bachai Village, Narsinghpur District, fossiliferous beds of the Jabalpur Formation (Satputra Basin) are exposed. These beds are composed of sandy clays and have been quarried in the past for the manufacture of potteries. During a recent visit to this area, one of us (Sukh-Dev) collected large number of fossil leaves of the genus *Ctenozamites* along with other plant remains of the flora mostly known from these beds. The flora is preserved in the form of impressions of leaves, leafy twigs and some seed-scales and wood pieces. In this paper the leaf impressions of *Ctenozamites* are described in detail.

DESCRIPTION

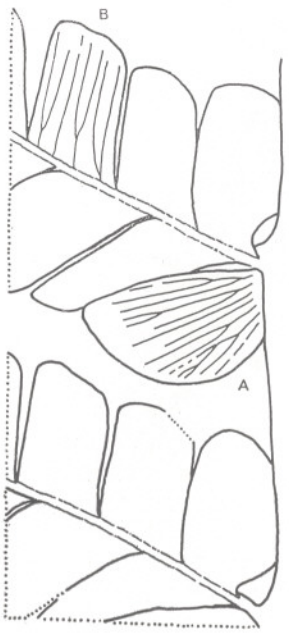
ORDER — CYCADALES

Genus — *Ctenozamites* Nathorst, 1886

Ctenozamites surangei n. sp.

Pl. 1, fig. 1; Pl. 2, figs 2-4; Text-fig. 1

Diagnosis — Leaves large, bipinnate, imparipinnate, more than 17 cm in length and 20 cm in breadth. Main rachis stout, about 5 mm wide, concave above and convex below, longitudinally ribbed. Pinnae longer in the middle region of leaf, smaller towards base and apex. Pinnae alternate to subopposite, rarely opposite, mostly making an angle of about 50°-80° (range 30° to 90° or more) to the main rachis, elongate, mostly directed forward, sometimes reflexed, broader at their base and gradually narrowing towards apex, sometimes pinnae narrow at base, broad in the middle and then becoming narrower towards apex. Pinna rachis stout, concave above and convex below, covered by pinnules to various degrees, longitudinally striated; lamina decurrent on to main rachis, one, two or three more or less triangular or obovate pinnules may occur on the main rachis between the pinnae. Pinnules on the pinnae, excepting the basal pair, rectangular, rhomboidal or triangular, slightly thick, typically 5-7×3·5-5 mm, attached at a wide angle of about 60°-70°, pinnules straight, sometimes falcate, flat or slightly convex, closely placed, sometimes contiguous or the anterior part of the lower pinnule overlapping the posterior part of the pinnule in front, bases of pinnules joined with each other by a narrow part of lamina or free, lateral margin running straight to rachis or acroscopic basal edge slightly



TEXT-FIG. 1 — *Ctenozamites surangei* n. sp.; part of a bipinnate frond, **A.** showing venation pattern in the obovate basal pair of pinnules, **B.** showing venation pattern in the rectangular, rhomboidal or triangular pinnules, specimen no. 49/2049 × 3.

rounded and basiscopic edge slightly decurrent. Rarely a few pinnules may be slightly broader towards their apex than the base. Margin entire, sometimes somewhat undulated in the apical part. Apex broadly truncate or narrowed to an obtuse end. About 5-9 veins arising from the base of pinnule, simple or forking once at various level, running more or less parallel. Basal pair of pinnules (one or both the pinnules) of each pinna usually larger than the rest, more or less obovate, few veins arising from the base, forking one to three times and spreading out in the lamina. Venation pattern of the pinnules on the main rachis similar to those of the triangular or obovate pinnules occurring on the pinnae.

Specific Name — The present species is named after Dr K. R. Surange, ex-Director, Birbal Sahni Institute of Palaeobotany.

Holotype — Specimen no. 84/2049, Birbal Sahni Institute of Palaeobotany Museum, Lucknow.

Locality — Imjhiri, about 5 km south-south-east of Bachai, Narsinghpur District, Madhya Pradesh.

Horizon & Age — Jabalpur Formation, ?Middle Jurassic.

Comparison & Discussion — About 100 specimens of *Ctenozamites surangei* were collected from Imjhiri. In none of them a forked rachis was found. The leaves are bipinnate, basal pair of pinnules of pinnae are usually larger than the rest, more or less obovate and the other pinnules are rectangular, rhomboidal or triangular. Generally the pinnules also occur on the main rachis between the pinnae. Veins in the pinnules are simple or forked once, excepting the obovate pinnules where these may fork 1 to 3 times. In the sum total of these characters *Ctenozamites surangei* stands out quite distinct amongst the other species of the genus reported so far. Amongst them, *C. surangei* resembles *C. cycadea* (Berger) Schenk (Harris, 1964) in the form of most of the pinnules, but they are smaller in size — in *C. surangei* pinnules are typically 5-7×3·5-5 mm, in *C. cycadea* they are about 20×10 mm. The venation pattern is also different in both the species, in *C. surangei* veins are simple or forked once whereas in *C. cycadea* they are forked once or twice. From the comparative account of *C. ketoviae* (Delle) Harris with *C. cycadea* given by Harris (1964, p. 90) it appears that *C. surangei* is a distinct species. In comparison to *C. leckenbyi* (Leckenby) Nathorst (Harris, 1964) the pinnules in *C. surangei* are much smaller and also differ in venation pattern. In *C. leckenbyi* the pinnules reach up to typical 3-4 cm in length and 1 cm in breadth, in *C. surangei* they are typically 5-7 mm long and 3·5-5 mm broad. In *C. leckenbyi* the veins are once or twice forked, in *C. surangei* they are simple or once forked. Similarly, the pinnules in *C. sarrani* (Zeiller) Harris are much larger in size and also differ in venation pattern. On the other hand, the pinnules in *C. wolfiana* (Gothan) Harris are longer and narrower and veins are twice forked as compared to *C. surangei*. Furthermore, the basal pair of the pinnules of pinnae in *C. surangei* are usually obovate, different from the rest in shape, size and venation pattern; and this differentiation is absent in the pinnules of the above compared

species. The other species of the genus, e.g. *C. megalostoma* Harris (1964) and *Ctenozamites* sp. A (Harris, 1964) are not fully known. In *C. megalostoma* only isolated pinnules are reported which have acute apex often with minute teeth.

Age of the Imjhiri beds — In 1964, Harris reviewed the genus *Ctenozamites*. The five satisfactorily known species are *C. cycadea*, *C. ketoviae*, *C. leckenbyi*, *C. sarrani* and *C. wolfiana* occurring in the Upper Triassic (Rhaetic) to ?Middle Jurassic formations covering Persia, Shensi (China), Caucasus (U.S.S.R.), Switzerland, France, Hungary, Germany, England and Sweden. The genus represented by a new species, *C. surangei*, is recorded here from the Jurassic beds of Imjhiri (Jabalpur Formation) in Narsinghpur District of Madhya Pradesh, India.

In addition to *Ctenozamites surangei*, the other constituents known from the Imjhiri fossil flora are *Todites indicus*, *Sphenopteris* sp., *Pterophyllum medlicottianum*, *Ptilophyllum acutifolium*, *Ctenis imjhiriensis*, *Brachyphyllum* sp., *Pagiophyllum* sp., *Desmiophyllum* sp. and *Araucarites cutchensis* (Bose & Zeba-Bano, 1979). In relative strength, ferns are scarce, cycadophytes are abundant and conifers are not common. In the relative abundance of cycadophytes and absence of the fern genera *Onychiopsis* and *Weichselia* the Imjhiri beds are older than the eastern younger formations of Sehora and Bansa of the Satpura and South Rewa basins, and therefore these beds are more akin to the western formations of the Satpura Basin. In general composition, the Imjhiri fossil flora is closer to the older flora of the Rajmahal Basin of Sakrigalighat, Bindaban, Onthea, etc. (Vishnu-Mittre, 1959; Bose, 1966) than the younger flora of this basin of Nipania. The geological age of the Imjhiri beds containing the above mentioned flora appears Middle Jurassic.

ACKNOWLEDGEMENTS

The authors are most thankful to Professor T. M. Harris and Dr M. N. Bose for the useful discussion.

REFERENCES

Bose, M. N. (1966). Fossil plant remains from the Rajmahal and Jabalpur Series in the Upper Gondwana of India, pp. 143-154 in *Symposium on Floristics and Stratigraphy of Gondwanaland.* Birbal Sahni Institute of Palaeobotany, Lucknow, India.

Bose, M. N. & Zeba-Bano (1979). On some cycadophytic leaves from the Jabalpur Series. *Palaeobotanist*, **26** (1): 1-9.

Gothan, W. (1914). Die Unter-Liassische (Rhätische) Flora der Umgegend von Nürnberg. *Abh. naturh. Ges. Nürnberg*, **19**: 91-186.

Harris, T. M. (1964). *The Yorkshire Jurassic Flora-II. Caytoniales, Cycadales & Pteridosperms.* i-viii+1-191. British Museum (Nat. Hist.), London.

Nathorst, A. G. (1878-1886). Om Floran I Skånes kolförande Bildningar, I. Floran vid Bjuf. *Sverig. geol. Unders. Afh., Stockholm* (C) **27, 33, 85**: 1-131.

Vishnu-Mittre (1959). Studies on the fossil flora of Nipania, Rajmahal Series, India. Pteridophyta, and general observations on Nipania fossil flora. *Palaeobotanist*, **7** (1): 47-66.

Zeiller, R. (1903). *Flore Fossile des Gîtes de Charbon du Tonkin*: i-viii+1-328. (Étud. Gîtes min. Fr.) Paris.

EXPLANATION OF PLATES

Plate 1

1. *Ctenozamites surangei* n. sp., holotype, no. 84/2049.× 1.

Plate 2

2. *Ctenozamites surangei* n. sp., apical part of leaf showing pinnules also on the main rachis, no. 79/ 2049.× 1.
3. *C. surangei*, part of leaf, no. 49/2049.× 1.
4. *C. surangei*, part of leaf clearly showing obovate form of the basal pair of pinnules of each pinna, no. 39/2049.× 1.

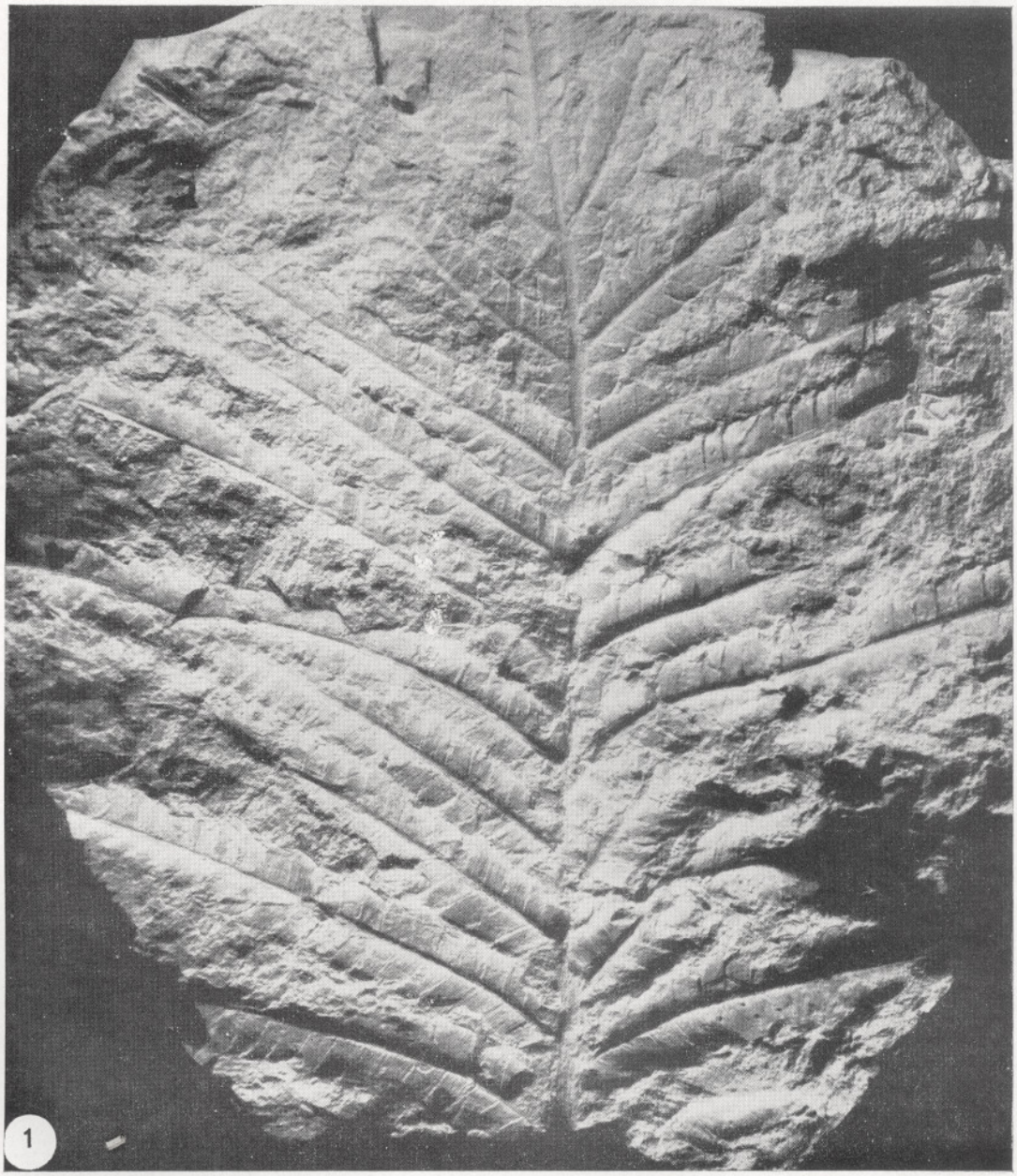


PLATE 1

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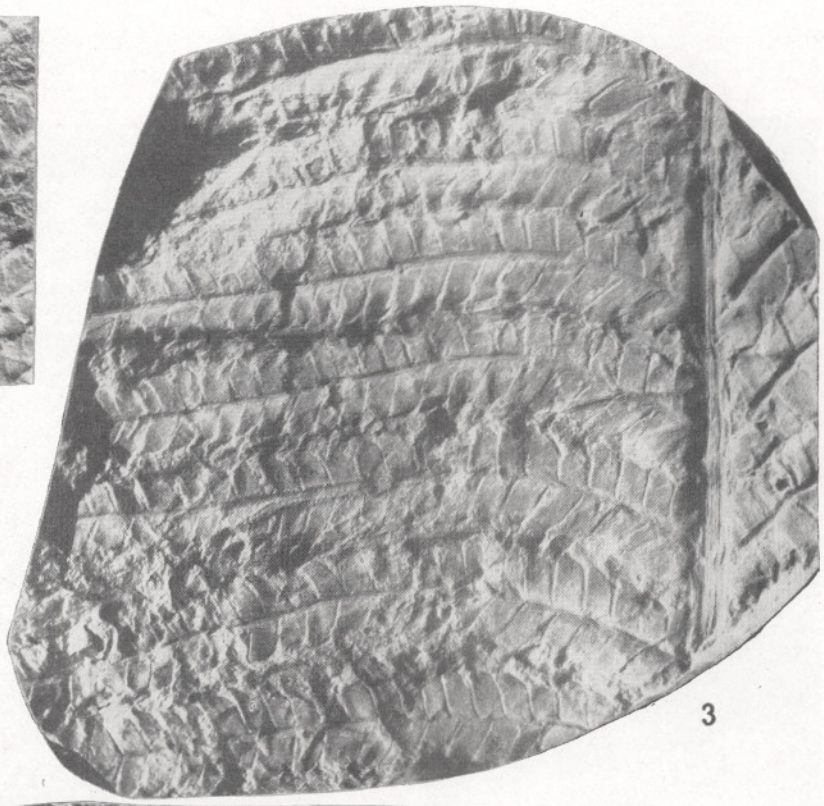

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PLATE 2