

ON SOME SPECIES OF *GINKGOITES* FROM THE JURASSIC OF THE RAJMAHAL HILLS, BIHAR

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ABSTRACT

The paper describes a number of leaf impressions referred to the genus *Ginkgoites* Seward from Sakrigalighat. The specimens, on the basis of the shape and size of the lamina, can be separated into different species. There are two chief types: (1) Leaves comparatively large, divided into four cuneate segments each of which is again partially divided. (2) Leaves small and divided into four to five linear segments which may again be divided. In both the cases the leaves possess a distinct and fairly long petiole.

INTRODUCTION

A PRELIMINARY note on the occurrence of Ginkgoales in the Rajmahal hills was recently published in *Current Science* (SAH, 1952). This described some leaf impressions of *Ginkgoites* discovered by me in December 1950 at Sakrigalighat. In 1952 I collected some more specimens from the same locality. The present paper deals with a detailed description of all the specimens so far collected. Plant fossils from Sakrigalighat were first described by Sahni and Rao (1933) and subsequently by Jacob (1938). There was no published record of Ginkgoales from the Rajmahal hills when my note (loc. cit.) was sent to the press. But I learn that in 1949 Professor K. R. Mehta of Banaras discovered Ginkgoalean leaves at Maharajpur in the Rajmahal hills.

The only *Ginkgoites* known from India are those described by Feistmantel, viz. *Ginkgoites lobata* (FEISTMANTEL, 1877), *G. crassipes* and *Ginkgoites* sp. (FEISTMANTEL, 1879). *Ginkgoites lobata* belongs to the Jabalpur group and *G. crassipes* and *Ginkgoites* sp. are found in the Raghavapuram shales and Sripermatour beds of the Madras coast. All these are of Upper Gondwana age.

The specimens described here are leaf impressions on a fragile greyish-brown shale. The impressions are stained a yellowish or reddish colour due to the presence of iron oxide in the shale. The other mineral constituents of the shale are quartz, biotite, feldspar and chlorite. The amount of silica

and iron oxide shows that the rock was originally a ferruginous sandstone.

DESCRIPTION

Ginkgoites sp. 1

Pl. 1, Figs. 1-5; Text-figs. 1-5

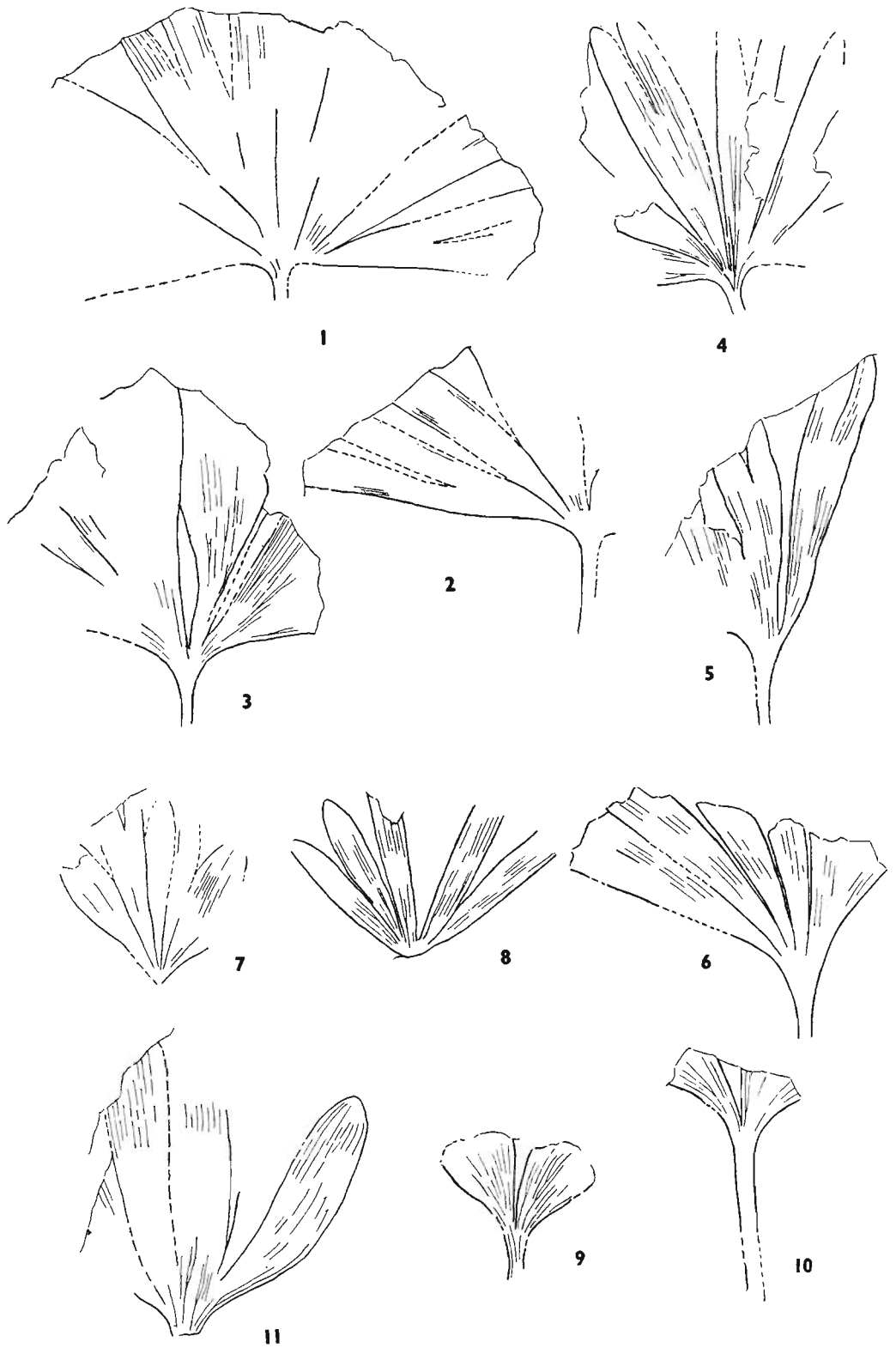
This Rajmahal species is characterized by comparatively large leaves measuring 4-5 cm. in length (excluding the petiole) and about 9 cm. in breadth (FIG. 1). The most complete specimens of this type are seen in Figs. 1 and 4.

The leaf is divided into two halves by a deep primary incision. The lamina is then further divided by incisions of somewhat less depth into (?) four major lobes, each one of which is cut by a short cleft into two or more segments. The ultimate segments gradually taper to a rounded tip (TEXT-FIG. 4). The petiole is about 2 mm. in width. Its length is not known, but in the specimens in Fig. 2 (counterpart of FIG. 1) a length of about 1.5 cm. is preserved. The venation is coarse and, where sufficiently well preserved, the frequent dichotomy of the veins is clear. In the middle part of the segments the veins are about 1 mm. apart. The petiole starts almost abruptly from the blade, the inferior margin of the leaf being straight or even concave.

There are four specimens of this type. It is possible that they may belong to more than one species, but this can only be decided if better preserved material become available.

The different specimens may now be described briefly. Specimen 1 (FIGS. 1, 2; TEXT-FIGS. 1, 2) in two counterparts shows a fan-shaped leaf with probably four major lobes. The primary incisions are clearly seen while the secondary incision is seen only in two lobes. Venation is coarse and a stout petiole is present.

Specimen 2 (FIG. 3; TEXT-FIG. 3) shows the primary incision of the lamina into two



TEXT-FIGS. 1-11

halves clearly. The venation also is fairly clear.

Specimen 3 (FIG. 4; TEXT-FIG. 4) shows the primary and the secondary clefts more clearly than the other specimens. It also shows the tips of the ultimate segments. The major lobes here seem to be narrower than in the leaves in Figs. 1 and 3. But the petiole and the base of the leaf in the two cases are very similar.

Specimen 4 (FIG. 5; TEXT-FIG. 5) from the form of its petiole and the lobes is referable to *Ginkgoites* sp. 1. The inferior margin of the leaf is not straight. The leaf does not, however, seem to be naturally expanded and the tapering is perhaps the result of lateral compression of the lamina.

All the above specimens differ from *Ginkgoites lobata* and *G. crassipes* in the division of the leaf into distinct segments. We have, however, to remember that Feistmantel's specimens are even more fragmentary than the present ones. The venation in the Rajmahal specimens is coarser, though the spacing of the veins is similar in the two cases. Although the poor preservation of the present specimens precludes a fuller comparison, they seem to me to constitute a species different from *G. lobata* and *G. crassipes*. *Ginkgoites* sp. 1 can be compared with *Ginkgoites digitata* Brongniart, a highly variable species reported from various parts of the world including Gondwanaland (see WALKOM, 1917). The varietal name *Huttoni* (SEWARD, 1919, p. 14) is used for leaves of this species characterized by deeply lobed lamina.

The four specimens described under *Ginkgoites* sp. 1 are, however, comparable to one another in their bigger size, general form, venation and in the possession of a stout petiole.

Ginkgoites sp. 2

Pl. 1, Figs. 6-8; Text-figs. 6-8

This species is characterized by leaves smaller than in *Ginkgoites* sp. 1 and possessing more linear primary segments than sp. 1. The lamina measures a little more than 3 cm. in length and the breadth is about 4 cm.

Fig. 6 shows a leaf deeply incised into five linear segments. Text-fig. 6 is a drawing of the same slightly enlarged. The leaf is not wide so that the segments are placed close together. The lamina of the upper part is not preserved. The leaf base narrows towards the petiole into which it passes gradually unlike the condition found in *Ginkgoites* sp. 1. The petiole is about 1.5 mm. broad and its full length is not known. The venation is coarse, the veins in the middle part of the segments being 0.5 mm. apart. At places they are clearly seen to be dichotomous. There is only a faint indication here of the further subdivision of the lamina.

Fig. 7 (TEXT-FIG. 7) shows another leaf divided by deep incisions into four main, closely placed and cuneate segments, each of which is again divided into two lobes by a much shorter cleft. The primary incisions reach almost to the base of the lamina, while the secondary incisions reach only about one-third that distance. The ultimate segments terminate in an acute tip. The base of the leaf is fairly narrow. The venation in this specimen is not very clear, but at places faintly reveals dichotomy of the veins.

The leaf in Fig. 8 (TEXT-FIG. 8) shows a leaf with five linear segments more widely separate. The petiole is not preserved. Venation is dichotomous.

It is even more difficult here to know whether the three specimens belong to the same species. On the whole, however, they form a group distinct from *Ginkgoites* sp. 1.

Ginkgoites sp. 3

Pl. 1, Fig. 11; Text-fig. 11

The leaf in Fig. 11 (TEXT-FIG. 11) approaches in size *Ginkgoites* sp. 1. The lobes are, however, more spatulate than wedge-shaped and possess a broadly rounded apex. There is no sign of the further division of the lobes, the venation is coarse and dichotomous, the veins being about 1 mm. apart in the middle portion of the segments. The lamina narrows downwards towards the petiole, but the petiole is not preserved.

The leaf is similar to *Ginkgoites* sp. 1 in its larger size and venation. In the form of

the segments it appears to be distinct from both *Ginkgoites* sp. 1 and 2. This specimen, at least in the form of its segments, recalls *Ginkgoites obrutochewi* Seward from the Jurassic of Chinese Dzungaria (SEWARD, 1919, FIG. 642).

Other Specimens

Pl. 1, Figs. 9, 10; Text-figs. 9, 10

Figs. 9 and 10 (TEXT-FIGS. 9, 10) show two petiolate leaves with only a little of the lamina

above the petiole preserved. In both the division into two main segments by a deep incision almost reaching the top of the petiole is seen. The venation is dichotomous and similar to *Ginkgoites* sp. 1 to which, perhaps, these fragments belong.

ACKNOWLEDGEMENTS

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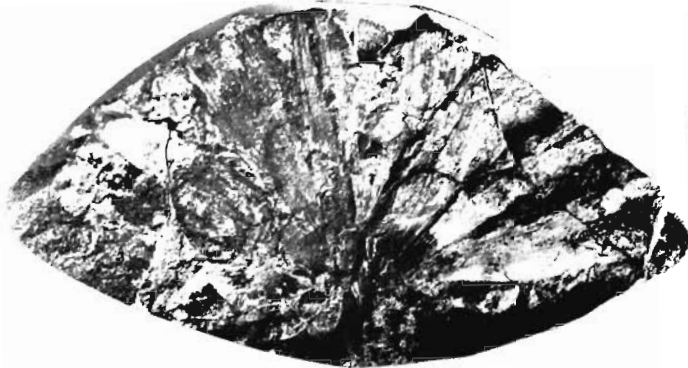
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EXPLANATION OF PLATE I

All figures natural size

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| 1. <i>Ginkgoites</i> sp. 1. No. 2044. | 6. <i>Ginkgoites</i> sp. 2. No. 2054. |
| 2. <i>Ginkgoites</i> sp. 1. Counterpart of leaf in Fig. 1. No. 2045. | 7. <i>Ginkgoites</i> sp. 2. No. 2050. |
| 3. <i>Ginkgoites</i> sp. 1. No. 2048. | 8. <i>Ginkgoites</i> sp. 2. No. 2053. |
| 4. <i>Ginkgoites</i> sp. 1. No. 2046. | 9. Leaf fragment. No. 2051. |
| 5. <i>Ginkgoites</i> sp. 1. No. 2049. | 10. Leaf with long petiole. No. 2055. |
| | 11. <i>Ginkgoites</i> sp. 3. No. 2052. |



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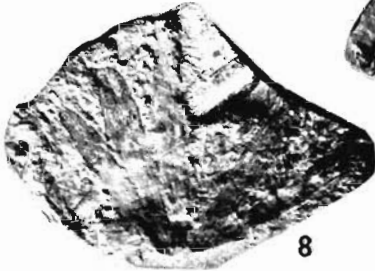
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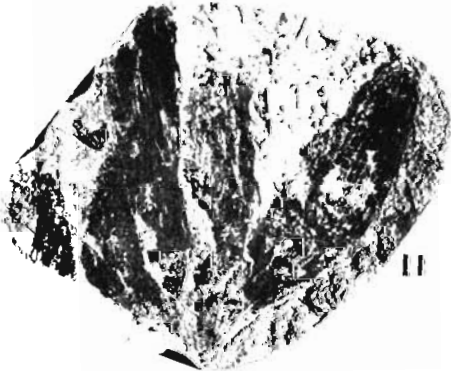
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