Handapaphyllum—a new leaf type from the Upper Permian of Orissa, India

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A new genus Handapaphyllum is established for fan-shaped, petiolate leaves having symmetrically lobed and dissected lamina with 6-8 dichotomous parallel running veins from the Kamthi Formation of Handapa, Orissa.

Key-words—Handapaphyllum, Ginkgoalean leaf, Kamthi Formation, Upper Permian (India).

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GINKGOALEAN type of leaves, although not very common, are known from the Gondwana formations of India as well as from other Gondwana countries. The Permian Gondwana forms are referred to the genus Ginkgophyllum. Earlier these forms were placed under the genus Psygmophyllum and were recorded from the extra peninsular region. The ginkgoalean leaves known from the Permian Indian peninsular region are placed under the genera Plantophyllum and Gondwanophyton.

The order Ginkgoales is represented in the Mesozoic formations of India by leaves assigned to the genera Ginkgoites and Sidhiphyllites.

MATERIAL AND LOCALITY

The solitary specimen with its counterpart comes from fossiliferous beds of Kamthi Formation exposed in the Hinjrida Ghati Section (20° 58': 84° 43') near Handapa, Dhenkanal District, Orissa and occurs on a compact buff-coloured clayey shale.

SYSTEMATIC DESCRIPTION

Handapaphyllum gen. nov.

Diagnosis—Fan-shaped, variously lobed, petiolar leaves; oppositely attached to the axis, apex broad, lobed, base cuneate, petiole narrow; veins erect, dichotomous, fanning out in the lamina without interconnections.

Type species—Handapaphyllum indicum sp. nov.

Handapaphyllum indicum sp. nov.
Pl. 1, fig. 1; Text-figs 1, 2

Diagnosis—Fan-shaped lobed petiolar leaves, lobes even, petiole long, slender, veins sparsely placed, erect and dichotomous.

Description—The specimen is 12.1 cm long. Four pairs of petiolar leaves are attached to a slender axis in an opposite manner at the nodes. It is difficult to say whether the leaves are superimposed
or not, as the exact attachment point is not seen. The leaf is 2.5 cm at the broadest, petiole narrow and 1.2 cm long, apex broad and lobed and the base is cuneate. Nearly 6-8 veins fan out into the lamina of the leaf. Each vein dichotomises several times but never anastomose.

_Holoype—Specimen no. BSIP 35932._

**COMPARISON**

Of the three genera of ginkgoolean leaves known from Permian of India, _Ginkgophyllum_ is characterised by leaves having lamina gradually passing into a narrow basal portion which is not sharply marked off as a petiole. Moreover, the lamina may have an entire or irregularly cuneate margin or it may be divided by deep sinuses into wedge shaped segments, the divisions between the lobes do not extend to the base of the lamina (Maithy, 1974).

_Handapaphyllum_ is essentially a petiolate leaf and there is no equal lobing of the lamina. Moreover, the leaves in _Ginkgophyllum_ are spirally arranged on the axis while in _Handapaphyllum_ the leaves are oppositely arranged.

Feistmantel (1881, 1886) reported _Rhipidopsis densinervis_ Feistmantel and _R ginkgoides_ Schmalhausen from the Permian Gondwana of India. The type specimen of _R ginkgoides_ is misplaced or lost from the collection of the G.S.I. According to Maithy (1974) the type specimen of _R densinervis_ is
PLATE 1
without any small petiole as reported by Feistmantel (1881) and therefore he transferred this species to the genus *Platypodium*. *Handapaphyllum* is a petioloate genus and therefore, distinctly different from *Platypodium*. Maithy (1974) instituted the genus *Gondwanophyton* for certain fan-shaped, entire leaves with broadly rounded apex and truncate base. The leaves are nonpetioloate and alternately attached to the axis. We examined all the specimens kept at BSIP and found that our specimens are quite different from *Gondwanophyton*. Although the description on the basis of which the genus *Gondwanophyton* is instituted is quite different than what is actually seen. The apex is certainly not rounded and the lamina is not continuous, on the contrary one can easily see the definite lobing of the lamina. The Mesozoic ginkgoalean leaves from India are referred to the genera *Ginkgoites* or *Ginkgo* (Sitholey & Bose, 1974). The *Handapaphyllum* leaf differs from these in overall morphography and in the manner of attachment.

The genus *Sidhiphyllites* Srivastava 1984 has a fan-shaped leaf with lamina deeply segmented, almost reaching up to the base. It has obtuse apex and entire margin. Cuticular structures of this genus are also known.

It is evident from the above comparison with the known Gondwana ginkgoalean type of forms that the newly instituted genus *Handapaphyllum* is a distinct and characteristic leaf form.

REFERENCES


