

rangium shows 225–260 distinct spore mother cells (80% of the total cells). Among these, 85% of the cells show nuclei with chromatin material (interphase) of which 40% cells show early prophase with the beginning of condensation of chromosomes (Figure 2 e). Nuclei about one-fifth of the cell diameter are consistently observed. In four cells clear metaphase stage is seen with chromosomes arranged on the equatorial plane (Figure 2 f). The actual number of chromosomes is difficult to ascertain. Nevertheless, 10–14 chromosomes could be counted. Further, scattered pollen grains, some of them in sectional view, could be seen (Figure 2 g). The pollen grains are monosulcate, boat-shaped, somewhat elliptical, 25–26  $\mu\text{m} \times 10$ –25  $\mu\text{m}$  with more or less smooth wall. The present finding of the chromosomes could be of some use to discuss the relationship of *Pentoxylon*.

*Pentoxylon* is a unique fossil gymnosperm found in the Rajmahal hills (India), Australia and New Zealand and supplements evidence of continental drift. Considering the diversified morpho-anatomical

characters of stem, leaf and male and female fructifications, it remains as an isolated gymnosperm with obscure affinities<sup>1,10</sup> that originated in the Jurassic period and became extinct in Lower Cretaceous. Further, in light of the lesser number of chromosomes observed, it appears that this plant must have had a low basic number of chromosomes like in extant members of Cycadaceae, Araucariaceae and Pinaceae<sup>11,12</sup> and remained as a least evolved gymnosperm.

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## Record of new petrified epiphyllous fungi (*Polyhyphaethyrites*) from the Deccan Intertrappean beds of Mohgaon Kalan, Madhya Pradesh, India

A petrified epiphyllous fungus with ascocarps made up of many closely placed hyphae forming radial and transverse strands was recorded from the Early Tertiary (Palaeocene) of India.

Fungi are mostly dependent on plants for their nourishment which they derive either as parasite or saprophyte. They are responsible for many plant diseases, often of serious nature. They thrive on all possible parts of plants, especially on leaves. Many fungi of the order Hemisphaeriales, class Ascomycetes flourish on the upper surface of the leaf forming a minute, flattened, dimidiate, shield-shaped ascocarp by the interconnection of the hyphae making radial and transverse strands.

The fossil ascocarps reported here are observed in randomly cut thin sections of chert along with other plant tissues collected from a village, Mohgaon Kalan (79°11'E, 22°1'N; Figure 1) and belong to the Deccan Intertrappean sediments. The chert is well exposed around the village and neighbourhood, and is rich in plant and animal fossils<sup>1–5</sup>. The geology of the Deccan Traps has been worked out by many researchers<sup>6–10</sup> and the absolute

date of the basalts varies from 67.8 to 61.6 Ma.

The ascostromatas are dimidiate and generally subcircular in shape with wavy

margin, sometimes they are oval and while broken, may be semicircular. The size is unusually larger than the other known fossil ascocarps and varies from 3.5 to

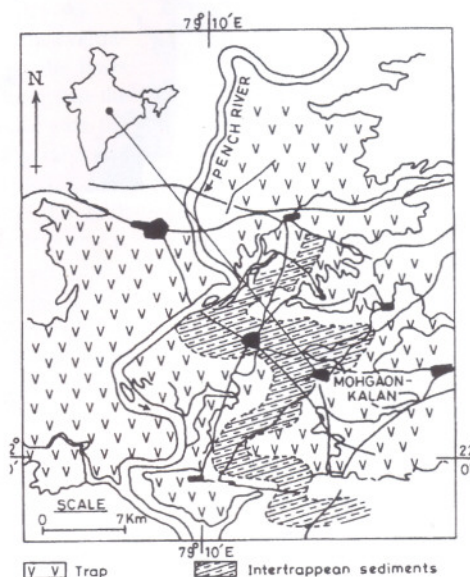
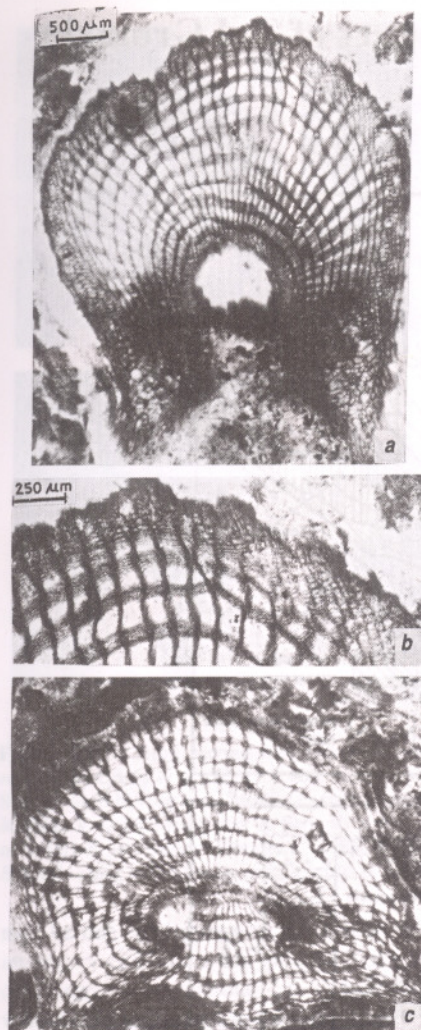


Figure 1. Map showing the location of Mohgaon Kalan from where the material was collected.



**Figure 2 a-c.** *Polyhyphaethyrites giganticus* gen. et sp. nov. *a*, Specimen with ruptured central part giving the appearance of an ostiole, ca.  $\times 20$ , paratype BSIP Museum no. 391001. *b*, Same specimen magnified to show the setae and branched radial strands, ca.  $\times 40$ . *c*, Holotype BSIP Museum no. 391002, ca.  $\times 20$ .

4.0 mm. It has no opening in the middle, but in section the middle part is ruptured occasionally giving an ostiolate appearance. The hyphae of the specimens are characteristic; 8–25 hyphae are closely placed side by side to form radial and transverse strands, which are slightly twisted and rope-like. The strands are interconnected with each other to form a net-like structure. The cellular structures seen are often branched at the margin. The free hyphae are not observed and the stroma is one-celled. The margin is generally setose and the cells are thicker with smaller meshes (Figure 2 a-c).

These specimens were compared with the extant and fossil forms; however, none was found to be similar. The asco-

carp of present-day *Microthyrium microscopium* is ostiolate and the radial and transverse strands are formed by a single hypha<sup>11</sup>. *Phragmothyrites* Edwards emend. Kar and Saxena closely resembles the present specimen in shape, dimidiate disposition and non-ostiolate condition, but the latter is easily distinguished by its bigger size range and the formation of radial and transverse strands by the juxtaposition of many hyphae<sup>12</sup>. *Parmathyrites* Jain and Gupta is also differentiated by its robustly built spinose marginal cells<sup>13</sup>. *Kutchiathyrites* Kar is readily separated by its eccentric development of the leathery ascostromata<sup>14</sup>. *Notothyrites* Cookson is distinctly ostiolate and the radial and transverse hyphae are made up of single cells<sup>15</sup>. *Palaeoasterina* Mitra, Bera and Banerjee is also ostiolate with fimbriate margin; the middle region is thickened and the transverse hyphae are ill-developed<sup>16</sup>.

Since the specimen detailed here is not similar to any of the living and fossil forms, it is placed into a new form genus, viz. *Polyhyphaethyrites* gen. nov. and a new species, i.e. *Polyhyphaethyrites giganticus* sp. nov. The generic name is derived after the multihyphal radial and transverse strands of the ascostromata and the specific name is coined after its large size (Holotype: BSIP Museum no. 391002; Locality and horizon: Mohgaon Kalan, Chhindwara District, Madhya Pradesh, Deccan Intertrappean Beds; Repository: Birbal Sahni Institute of Palaeobotany, Lucknow).

The Hemisphaeriales, also known as Microthyriales, are quite common in the Upper Cretaceous and Tertiary sediments of India<sup>17–20</sup>. The ascocarps of all these forms are mostly one-celled and the radial and transverse strands are made up of a single row of hyphae. An 'object of unknown attribution' illustrated by Sahni and Rao<sup>21</sup> (plate 4, Figure 37) from the Deccan Intertrappean beds of Sausar, Madhya Pradesh closely resembles the present genus in the presence of polyhyphal radial and transverse strands. The other fungal remains from the Deccan Intertrappeans listed by Bande *et al.*<sup>4</sup> are not comparable to the form reported here. *Polyhyphaethyrites* instituted here is the only exception where the radial and transverse strands are formed by many hyphae. Perhaps this innovation was necessary to attain the large size of the ascostromata. But this trait proved to be futile, as in the Late Tertiary sediments this genus or

other forms with multiple hyphae are not observed.

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