

RESEARCH ARTICLE

Fossil Fungi from Deccan Intertrappean Cherts of Madhya Pradesh, India

Kapgate VD

Department of Botany, D.D. Bhojar Arts & Science College, Mouda M.S. 441104, India
Email:-vdkapgate65@gmail.com

Manuscript details:	ABSTRACT
<p>Available online on http://www.ijlsci.in</p> <p>ISSN: 2320-964X (Online) ISSN: 2320-7817 (Print)</p> <p>Editor: Dr. Chavhan Arvind</p> <p>Cite this article as: Kapgate VD (2016) Fossil Fungi from Deccan Intertrappean Cherts of Madhya Pradesh, India <i>Int. J. of Life Sciences, A6:</i> 117-120.</p> <p>Acknowledgement I am thankful to Dr. M. T. Shekh & Dr. D. K. Kapgate for their fruitful suggestions for the evaluation and identification of studied specimens. I would like to acknowledge our institute Principal Dr. S.V. Khudale for their encouragement & stimulation and also thankful to all the staff members of D.D. Bhojar Arts & Science College, Mouda for their uncountable help.</p> <p>Copyright: © Author, This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>The present communication deals with the two monotypic genera of fossil fungi have been described from the Deccan Intertrappean cherts of Mohgaonkalan, Chhindwara District, (Madhya Pradesh), India. Conidia with conidiophores of Erysiphaceae, viz, <i>Erysiphacites nambudirii</i>, gen. et sp. nov., is scattered in rotten plant tissue. Fungal spore balls with Chlamydospores of Ustilaginaceae, viz, <i>Ustilagosprites mundkurii</i> gen.et sp. nov. is found in disintegrated plant tissue.</p> <p>Key words: - Deccan Intertrappean, fungi, Erysiphaceae, Ustilaginaceae, M.P, India.</p> <p>INTRODUCTION</p> <p>Fungi are an important plant community but are much less represented as fossils. The fungal remains are generally encountered in paleopalynological assemblages, petrified fossil material, coals, peats and lignite's. Various fungal forms in the forms of mycelia, sexual and asexual spores and fruiting bodies of Ascomycetes, Basidiomycetes, Phycomycetes and Deuteromycetes have been reported from Deccan Intertrap since 1942 by several authors. Jain, 1974 published a complete account on fossil fungi published till while fungal remains described here belongs to Ascomycetes & Basidiomycetes which are compare with their respective classes.</p> <p>MATERIAL AND METHOD</p> <p>The specimen of fossil fungi was collected from two different pieces of cherts, preserved in petrified forms. A serial section was taken by peel technique method and compared them to the extant genera. Identification of the collected fungi remains is based on type of spores and done with the help of relevant available references (Nambudiri and Tidwell (1977), Chitale and Yawale (1978) and the <i>Paleosystematic</i> treatment is done as below.</p> <p>RESULTS</p> <p>Only a few reports on fungal forms of Ascomycetes are known from Deccan Intertrap as Sahni and Rao (1943) reported <i>Perisporiacites varisan</i> and</p>

Palaeosordaria lagena, septate mycelium along with some fungal perithecia, suggesting their affinity with family Sordariaceae. Chitale (1950 & 1957) described four-celled fungal spore resembling *Chaetosphaerella*, named as *Chaetosphaerites mohgaoense* & spores of *Asterophyrites mohgaoense* and *Pleosporites mohgaoense*. Barlinge and Paradkar (1979) recorded *Monodictys intertrappea* of family Sphaeriaceae. All these forms are not comparable with *Erysiphacites nambudirii* present fossil fungi Nambudiri and Tidwell (1977) reported Erysiphaceous fungus of family Erysiphaceae assigned to *Erysiphacites* except in having branched mycelium.

While fossils assigned to Basidiomycetes from the Deccan Intertrap are rare and represented by a few spore types like teliospore and basidiospores viz; *Sporosporium indicum*, a fossil smut genus earlier reported by Mundkur (1942). Dwivedi (1959) reported rust fungus infecting the fruit of *Enigmocarpon parijai*, named as *Shuklania dwivedii*. Paradkar (1975) reported *Chlamydosporites gramineum*, resembling tilletia spores from monocot axis *Culmites deccanensis*. Some *Mundkurella* type of spores reported by Barlinge and Paradkar (1979). *Mundkurella mohgaoense*, Chitale and Yawale (1978) from inside a fruit *Palmocarpon intertrappea*, also *Sorosporium mohgaoense* and *Ustilago deccanii* of Ustilagineaceae form crushed tissue.

Out of these known forms *Mundkurella mohgaoense*, *Sporosporium indicum*, *Sorosporium mohgaoense* and

Ustilago deccanii comparable with present fossil *Ustilagosporites* as all are smut fungi of Ustilagineaceae. *Mundkurella mohgaoense* have heterosporous sorii containing unicellular and bicellular spores. *Sporosporium indicum* and *Ustilago deccanii* are without spore balls and cluster of spores with smooth exospore. *Sorosporium mohgaoense* with spore balls and absence of sterile hyphae more comparable with present *Ustilagosporites* but united spores with smooth exospore not assigned *Sorosporium* fully to *Ustilagosporites*.

Specimen A: - Class- Ascomycetes, Order- Erysiphales, Family-Erysiphaceae (powdery mildew), **Genus- *Erysiphacites gen. nov.***

Type species- *Erysiphacites nambudiri gen. et sp. nov.* (Pl.1, image-1-4).

Conidiophores upright, isolated, unbranched, aseptate, unicellular, 85µm long and 15µm broad, Conidia elliptical, barrel-shaped, oval to rounded, 6 to 8µm in diameter arranged in chains and groups, Conidia uninucleate, unicellular, two-layered with rounded edges, exospore thick and smooth, 1 to 2.5µm in thickness.

The conidiophores are short and conidia are in groups observed as a small rounded spot in rotten plant tissue (Pl.1 fig.1). The plant tissue is completely destroyed by the parasite and could not be seen. Parasite appears as a small patch of powdery mass. Mycelium is not

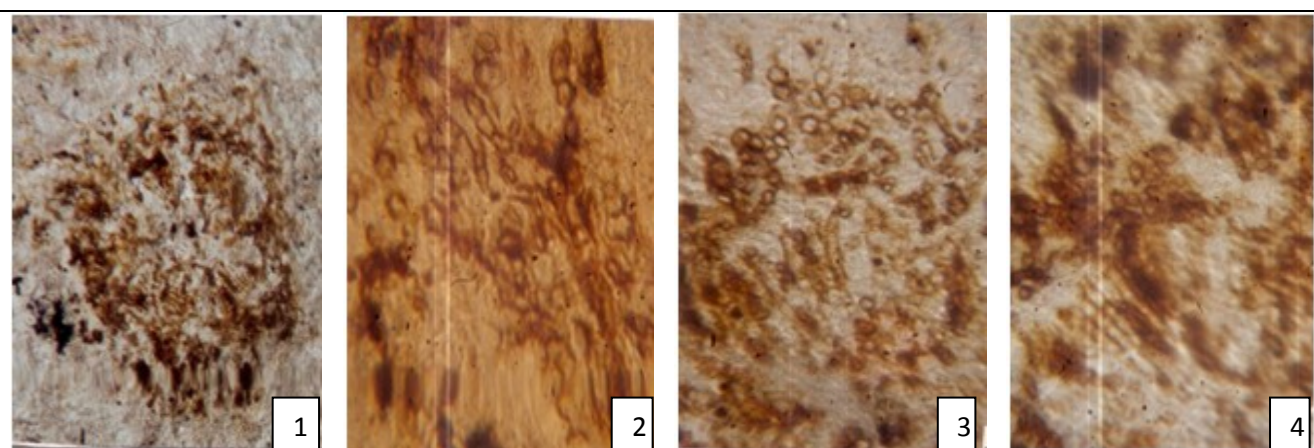


Plate 1- Images 1-4:- 1-Fungal infection of *Erysiphacites nambudirii sp. nov.* on host (distintegrated), X- 90. 2- Aseptate conidiophores (Con.ph.) with chain of conidia on their terminal ends, X- 200. 3-Large number of young conidia (Con.) forming chain and mature found in isolated form, X-210. 4-Magnified conidia & conidiophores X 260

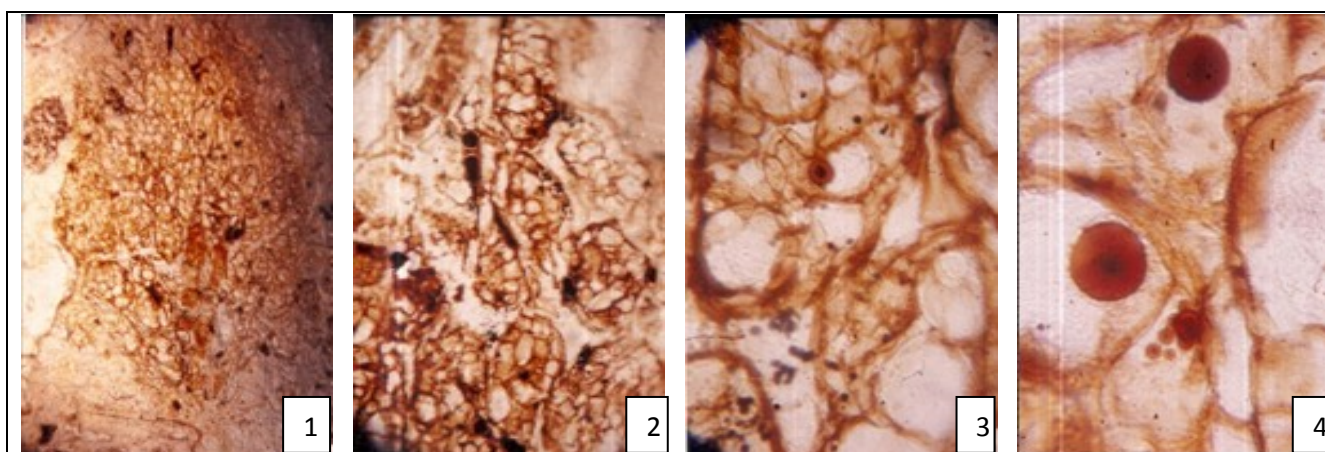


Plate 2- Images 1-4:- 1-Fungle infection of *Ustilagosporites mundukurii sp. nov.* Forming spore balls, X-90. 2-Spore balls (Sp. bl.) in enlarged view, X- 200. 3- Spore balls with Pseudoparenchyma (Psu.) and Chlamydospore (Chl.), X- 300. 4- Isolated big and group of small Chalmydospores (Chl.) with spiny Exospore. X- 450.

preserved clearly. The conidiophores are scattered without pecnidium. On the tip of conidiophores conidia are arranged in chains (Pl.1 fig.3 & 4). Each conidiophore consists of basal stalk cell and short terminal generative cell (Pl.1 fig. 2). Generative cell cuts off conidia one after the other in basipetal succession. Conidia cling together in upright chains and ripen from apex to downwards showing asexual reproduction by conidia formation (Pl.1 fig.2 & 3). The mature conidia are hyaline, one-celled spores, oval at the base while rounded at the apex.

Holotype: - Pl.1image-1-4. Slide No.1-45. Fu. A- VDK. Institute of Science, Nagpur.

Type locality: - Mohgaonkalan, Chhindwara Distirict, (Madhya Pradesh), India.

Mycelium absent, Uninucleate, unicellular chain of conidia on aseptate conidiophores found in Clavicipitaceae, Aspergillaceae and Erysiphaceae of Ascomycetes (Alexopoulos, 1956; Smith, 1949 and Subramanian, 1971). In Clavicipitaceae conidiophores are aggregated into clusters forming ascerculus. Conidiophores of Aspergillaceae are branched at their tips forming whorl of sterigmata. Erysiphaceae having isolated, unbranched, unicellular conidiophores comparable with present *Erysiphacites*. Three genera of family Erysiphaceae *Phyllactinnia*, *Sphaerotheca* and *Erysiphe*. *Phyllactinnia* and *Sphaerotheca* having elongated globular conidiophores. *Erysiphe* shows closer affinity with *Erysiphacites* because of slender conidiophores (Ainsworth, 1961).

Erysiphe includes ten species; all are cosmopolitan in distribution and are obligatory parasites on the aerial parts of a wide variety of herbaceous plants causing powdery mildew disease. *E. polygoni* on peas, *E. graminis* on cereal crops and *E. cichoracearum* on cucurbits (Gaumann, 1952; Alexopoulos, 1956).

Specimen B:

Class- Basidiomycetes, **Order-** Ustilaginales (smut fungi), **Family-** Ustilaginaceae, **Genus-** *Ustilagosporites gen. nov.*

Type species- *Ustilagosporites mundukurii gen.et sp. nov.* (P1.2 image-1-4).

Spore balls are oval shaped consisting of few chlamydospores, 38 to 40 μm long and 25 to 30 μm broad. Chlamydospores are sessile, uninucleate, unicellular, globose 9 to 22 μm in diameter. Exospores 0.55 to 0.66 μm thick with spiny ornamentation, endospore thin.

The parasite is intercellular. Fungal spore balls are found distributed irregularly in the infected parts of the host tissue. The host tissue looks as an inflorescence axis with short lobes of branches (P1.2 fig. 1). Tissue is sufficiently thick but the cells are completely disorganized by the parasite and formed pseudoparenchyma, pale-yellow in colour (Pl.2 fig.2 & 3). Spore balls are dipply buried in the host tissue and covered by sterile sheath or pseudomembrane. Sterile hyphae or mycelium are not seen inside the intercellular spaces of the host tissue. Chlamydospores

are present inside the spore balls (P1.2 fig.3 & 4). These are of two sizes. Big spores are isolated, 18 to 22 μm in diameter while small spores are in groups, 9 to 12 μm in diameter without stalk or conidiophores. Nucleus is very prominent in each spore (P1.2 fig.4).

Holotype: - P1.2image-1-4. Slide No.1-65. Fu. B- VDK. Institute of Science, Nagpur.

Type locality: - Mohgaonkalan, Chhindwara District, (Madhya Pradesh), India.

CONCLUSION

Absence of sterile hyphae, presence of spore balls and chlamydospores are 9 to 22 μm in diameter. Unicellular, uninucleate, globose, isolated and sessile chlamydospores with spiny exospores found in Ustilaginaceae of Basidiomycetes (Bessey, 1950; Sartoris, 1924). Four important genera of family Ustilaginaceae are *Tolyposporium*, *Sphacelotheca*, *Sorosporium*, and *Ustilago* (Gaumann, 1952). In *Tolyposporium*, *Sphacelotheca* and *Sorosporium*, number of chlamydospores aggregates to form spore balls where spores are in clusters with smooth exospore, while isolated chlamydospores of *Ustilago* with spiny exospore more comparable with spores of present fossil *Ustilagosporites*. *U. zaeae* and *U. tritici* (Mundkur, 1940) having globose echinulate chlamydospores, 7x15 μm in size. But absence of inter or intracellular hyphae and presence of spore balls not present assigned *Ustilagosporites* fully to *Ustilago* (*Ustilago* having smut sori), (Mundkur and Thirumalachar, 1952; Fischer and Holten, 1957).

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