



## Pollen Morphology of some Carnivorous plants from Tripura, India

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### Abstract

Pollen morphological structure of two carnivorous plant family covering four species of Tripura, India namely *Drosera burmannii* Vahl (Droseraceae) *Utricularia bifida* Linnaeus, *Utricularia ceruleaea* Linnaeus and *Utricularia gibba* Linnaeus (Lentibulariaceae) have been studied under Scanning Electron Microscope for the first time. Pollen grains of the studied four taxa varied widely among them and could be used for segregating both at generic as well as species level. Pollens of Droseraceae shed in tetrahedral tetrad condition while those of Lentibulariaceae are in monad. The exine sculpture in Droseraceae is spinulose while in Lentibulariaceae it is psilate to faintly gemmate

**Keywords:** Carnivorous, Droseraceae, Lentibulariaceae, Pollen Morphology, SEM.

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### 1. Introduction

Carnivorous plants have fascinated scientists ever since 1875<sup>1</sup>. In angiosperms, carnivorous plants have evolved in several different lineages<sup>2</sup>. Literature related to pollen morphology of carnivorous plants are rather scarce. Data on the structure and position of the apertures in *Drosera* are almost non-existent in the palynological literature. Though there are some reliable data can be found<sup>3</sup>. The apertures was considered to be proximal<sup>4,5</sup>. Early data on the structure of *Drosera* pollen can be found in cytological and embryological works<sup>6,7</sup>. The cosmopolitan Lentibulariaceae are all true carnivorous. However, genera *Utricularia* L., and *Pinguicula* L., popularly termed as, 'bladderworts' and 'butterworts' respectively are the representatives of the Family Lentibulariaceae in India. Literature related to pollen morphology of Lentibulariaceae is also rather scarce. There are few literature on the pollen morphology of the family Droseraceae<sup>8</sup> and Lentibulariaceae<sup>9</sup>. Thus the present study aims to study the pollen morphology of carnivorous species of Tripura, India using scanning electron microscopy to solve taxonomic problems.

### 2. Materials and Methods

One species of *Drosera* viz. *Drosera burmannii* Vahl (Droseraceae) and three species of *Utricularia* viz. *Utricularia bifida* Linnaeus, *Utricularia ceruleaea* Linnaeus and *Utricularia gibba* Linnaeus

(Lentibulariaceae) were collected from Tripura, India. All collected specimens were identified and deposited at the herbarium of Botany Department (TUBH), Tripura University; India. Pollen grains for Light Microscopy were prepared following the standard acetolysis method<sup>10</sup>. For SEM the pollen grains are preserved in Formalin Acetic Alcohol (FAA) at 4° C temperature. The pollen grains were prepared for light and scanning microscopy (SEM) by the standard methods<sup>10</sup>. For light microscopy, the pollen grains are mounted in glycerine –jelly and observations were made under an Olympus Microscope using a 10x eye piece. For SEM studies, pollen grains were first dried and then directly transferred with a fine needle to a metallic stub using double –sided adhesive tape and coated with gold in an IB2 ion coater. The SEM examination was carried out on a S530 Hitachi Scanning Electron Microscope, Japan at Burdwan University (USIC). The terminology used is in accordance with standard treaties<sup>10,11,12,13</sup>.

### 3. Results and Discussion

The pollen grains are isopolar in case of *Drosera* while heteropolar in case of *Utricularia* species. The pollen grains are united in monads in all case except *Drosera burmannii* Vahl (Droseraceae). An artificial key is prepared using pollen morphological character for easy identification.

1. Pollen grains shed in tetrahedral tetrads..... *Drosera burmannii*

1'. Pollen grains shed in monads....

2. Exine psilate.....

3. Pollens 4-colporate.....*Utricularia bifida*

3'. Pollens 3-zonoporate ..... *Utricularia*

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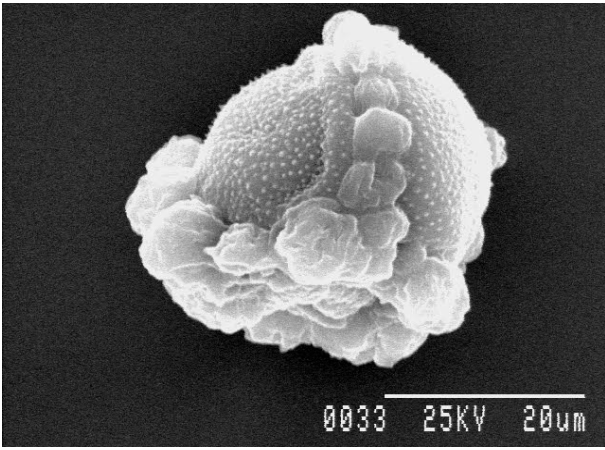


Figure I: Showing tetrad pollens of *Drosera burmannii* Vahl (Equatorial view, X2000)

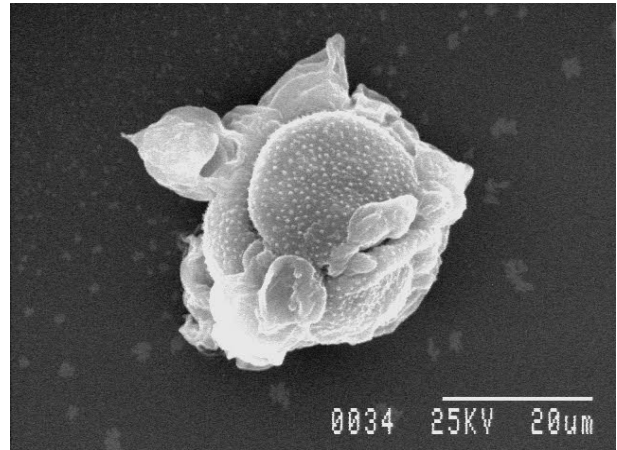


Figure II: Showing tetrad pollens of *Drosera burmannii* Vahl (Polar View, X1500)

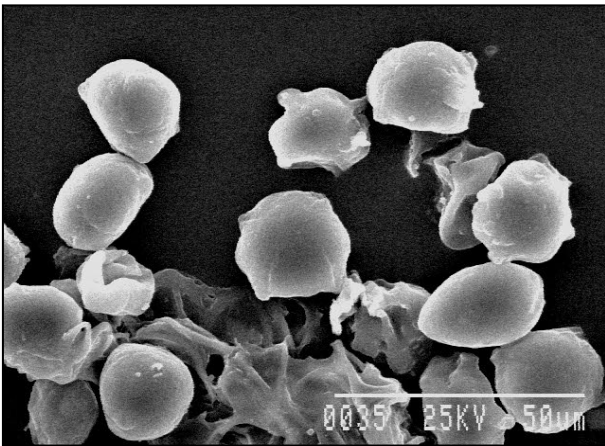


Figure III: Pollen grains of *Utricularia bifida* Linnaeus (Polar and Equatorial View, X1000)

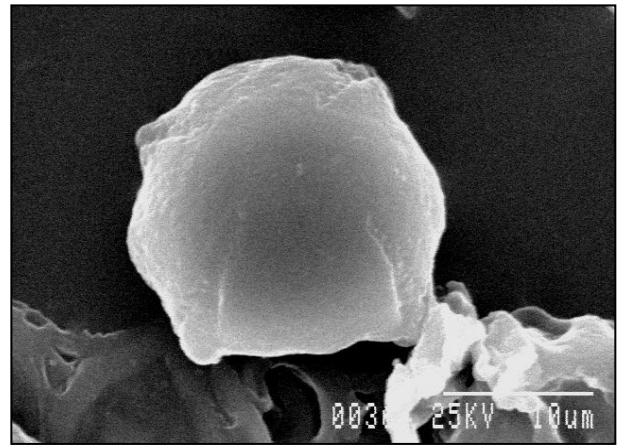


Figure IV: Showing 4-colporate pollen grains of *Utricularia bifida* Linnaeus (X3000)

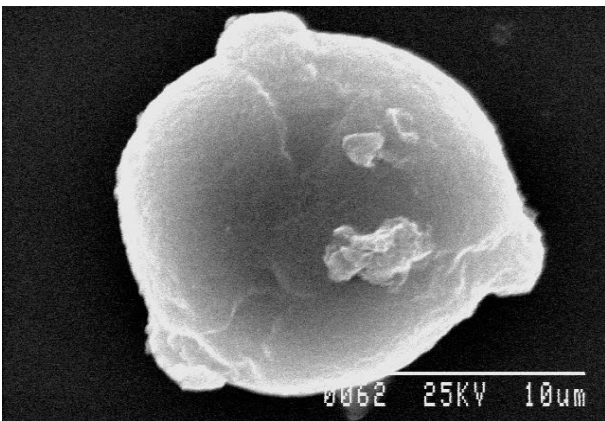


Figure V: Showing 3 zonoporate pollens of *Utricularia ceruleaea* (Polar view, X4000)



Figure VI: Spiaperturate pollens of *Utricularia gibba* with faintly gemmate exine (Equatorial view, X2000)

*ceruleaea*

2'. Exine faintly gemmates..... *Utricularia gibba*

*Drosera burmannii* Vahl (Droseraceae) [Herb No: Bhowmik & Datta, 119; Figures. I, II]

Pollen grains united in tetrahedral and in square tetrads, radially symmetrical, isopolar, Prolate, Polar axis P (44.00-) 46.2 ± 2.31 (-48.40) μm and Equatorial diameter E (22.00-) 25.08 ± 2.12 (-26.40) μm. PA/ED: 1.84; Apertures are situated proximally. Exine spinulose.

*Utricularia bifida* Linnaeus (Lentibulariaceae) [Herb No: Bhowmik & Datta, 572 Figures. III, IV]

Pollen grains in monad, radially symmetrical, heteropolar,

Prolate-spheroidal, Polar axis P (52.80-) 58.59 ± 4.31(-61.60) μm and Equatorial diameter E (54.50-) 57.76 ± 6.12 (-70.4) μm. PA/ED: 1.01; 4-colporate. Exine psilate.

*Utricularia ceruleaea* Linnaeus (Lentibulariaceae) [Herb No: Bhowmik & Datta, 571; Figures. V]

Pollen grains in monad, radially symmetrical, heteropolar, Oblate-spheroidal, Polar axis P (55.80-) 56.59 ± 4.31(-63.20) μm and Equatorial diameter E (56.50-) 58.76 ± 5.92 (-69.4) μm. PA/ED: 0.96; Pollens 3-zonoporate. Exine psilate.

*Utricularia gibba* Linnaeus (Lentibulariaceae) [Herb No: Bhowmik & Datta, 379; Figures. VI, VII]

Pollen grains in monad, radially symmetrical, heteropolar,



**Figure VII: Showing spiaperturate pollens of *Utricularia gibba* Linnaeus (Polar view, X2000)**

Oblate-spheroidal, Polar axis P (27.28-)  $30.45 \pm 6.31$  (-35.20)  $\mu\text{m}$  and Equatorial diameter E (30.08-)  $35.64 \pm 7.52$  (-39.60)  $\mu\text{m}$ . PA/ED: 0.85; Pollens spiaperturate. Exine faintly gemmate.

In *Drosera burmannii* (Droseraceae) the apertures are situated proximally, a state rarely found in the pollen of Angiospermous plants<sup>14</sup>. The pollen grains of the remaining genera of the Droseraceae differ, in regard to both the position and structure of the apertures, from the pollen grains of *Drosera*. The pollen structure is different for each of the genera in this family, showing that the family is an ancient one<sup>5</sup>. In the present study we study *Utricularia* species from three different sections viz., *Utricularia bifida* (Oligocista), *Utricularia cerulea* (Nigrescentes) and *Utricularia gibba* (Utricularia). Interestingly the pollen morphology of each section is different from the other. Such differences thus could be useful in separating the genus of *Utricularia* at generic level, species level.

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### Conflict of Interest :

Authors don't have any conflict of interest.

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