

Dermal anatomy of some species of genus *Dendrobium* Sw. from Maharashtra

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Abstract

Present paper deal with study on dermal anatomy of four species of *Dendrobium* Sw. namely - *Dendrobium microbulbon* A. Rich., *D. mabalae* Gammie., *Dendrobium ovatum* (Willd) Kranzl., and *D. barbatulum* Lindl. In present investigation it has been observed that stomata are anomocytic and flushed with the epidermis as is true in majority of orchids⁷. Trichomes were present on abaxial side of *D. microbulbon* and absent in other three species. Winter et. al,¹ and Vij et al.,⁹ had reported restricted occurrence of trichomes on the lower epidermis in orchids. All the four species showed hypostomatic condition.

Orchidaceae is one of the most highly evolved as well as most successful family of the monocots. The various morpho-taxonomical, ecological, anatomical, physiological as well as genetical peculiarities displayed by this group have focussed the attention of Orchidologists in the world. The orchids are well studied and represented in India. Kaushik² has considered the taxonomic significance of stomatal features and identified the orchids into four sub-families anomocyticeae, diacyticeae, cyclocyticeae and paracyticeae. Taxonomic importance of stomata was indicated by Mohana Rao and Khashim⁶. Mehra³ highlighted phylogenetic significance of stomatal character in Orchids. Dermal anatomy of Western Himalayan orchids is well represented by Vij and Kaur⁹. Hence the orchid systematics need a thorough revision using parameters other than exomorphic. So attempt has been made to study stomata and related features of leaf epidermis in four species of *Dendrobium* Sw. namely. *Dendrobium microbulbon* A. Rich., *Dendrobium mabalae* Gammie; *Dendrobium ovatum*

(Willd) Kranzl., and *Dendrobium barbatulum* Lindl.

Material related to the study of stomata was studied by peeling method of leaves.

Mature leaves were used to study of dermal characters. The method suggested for gasses by metcalfe⁴ and for Orchids by Williams¹⁰ was adopted in present investigation. the leaves were scrapped until only the epidermis remained. the epidermis was mounted in mounting medium (glycerine and alcohol, 1:1). The measurements were made with the help of a standardized micrometer. Scale was calculated with the help of ocular and stage micrometer. Drawings were made with the help of a camera lucida. Stomatal Index was calculated by adopting standard formula.

Dendrobium microbulbon A. Rich.

This epiphytic species is distributed throughout the Western Ghats in tropical climates, within an altitude range of 800-1500 m. It is a common epiphyte on angiospermic

plants, it is distinct in having crowded pseudobulbs, conical, 1-3 jointed and covered with a network of fibres formed by the decayed membranous sheaths.

Leaves : 2, sessile, sheathing at the base, membranous, caducous, appearing in the monsoon before the flowers, rarely with them, thin, linear-lanceolate to oblong-lanceolate, acute, single nerved 2-4 x 3-7 cm hypostomatic.

Epidermis : Cells polygonal with thin and non-sinuuous wall (32.8 - 36.9 x 24.6 28.7 μ), trichomes present; stomata flushed, anomocytic, elliptic, 45.1 x 8.2 μ guard cells, kidney shaped and longitudinally placed, stomatal opening 20.5 x 8.2 μ .

Stomatal frequency : 90.6

Stomatal index : .078

D. mabalae Gammie

An epiphytic species, distributed sparingly in the Western Ghats at an altitude of 900 m. The species with its two or four jointed pseudobulb, having network of fibres, along with two leaves and white flowers, inhabits angiospermic plants.

Leaves : Two, sessile soft membranous, linear-oblong, reaching 7.5 cm long hypostomatic .

Epidermis: Cells polygonal with thin, non-sinuuous walls, trichomes absent, 45.1 - 57.4 x 20.5 - 32.8 μ , stomata flushed, anomocytic, elliptic, 36.9 - 45.1 x 8.2 μ , guard cells kidney shaped and longitudinally placed, stomatal opening 24.6 μ x 8.2 μ

Stomatal frequency : 80

Stomatal index : .073.

D. ovatum (Willd) Kranzl.

This epiphytic species grows on angiospermic trees at 300-900 m altitude along the Western Ghats. It has tufted stems of deep muddy brown colour and ivory white flowers with a creamy centre.

Leaves : Many sessile, caducous, membranous, sheathing at the base, 5 - 11 x 1.2 -3 cm, elliptic - oblong orob long - lanceolate, acute, glabrous, many nerved, hypostomatic .

Epidermis: Cells polygonal with thin, non-sinuuous walls, 45.1 - 32.8 μ , trichomes absent, stomata flushed, anomocytic, elliptic 28.7 x 8.2 μ , guard cells, kidney shaped and longitudinally placed, stomatal opening 24.6 x 4.1 μ .

Stomatal frequency : 74.6

Stomatal index : 1203

D. barbatulum Lindl.

A beautiful species of epiphytic orchids with white and pink flowers. It inhabits angiospermic trees within an altitude range of 800 -1300 m; along the Western Ghats. The stem is swollen at the base, tapering towards the apex.

Leaves : Many, sessile, membranous, 7-10 x 1.5 cms. lanceolate, acute, deciduous, hypostomatic.

Epidermis : Cells polygonal with thin, non-sinuuous walls, 28.7 - 32.8 x 24.6 - 36.0 μ , trichomes absent, stomata flushed, anomocytic, elliptic, 28.7 x 8.2 μ , guard cells, kidney shaped

PLATE - I

PLATE - I *Dendrobium microbulbon* A. Rich. (Text fig. 1- 2)

1. Habit of a plant. 2. Inflorescence.

Dendrobium mabelae Gammie. (Text fig. 3- 4)

3. Habit of a plant. 4. Inflorescence.

PLATE - II

PLATE - II *Dendrobium ovatum* (Willd.) Kranzl. (Text fig. 1- 2)

1. Habit of a plant. 2. Inflorescence.

Dendrobium barbatulum Lindl. (Text fig. 3- 4)

3. Habit of a plant. 4. Inflorescence.

PLATE - III

PLATE - III

1. *Dendrobium microbulbon* A. Rich. Entire plant with an inflorescence.
2. *Dendrobium mabelae* Gammie. Entire plant with inflorescence.
3. *Dendrobium ovatum* (Willd.) Kranzl. Entire plant with inflorescence.
4. *Dendrobium barbatulum* Lindl. Entire plant with inflorescence.

PLATE - IV

PLATE - IV

1. Abaxial side of leaf of *Dendrobium microbulbon* A. Rich. (x 450)
2. Abaxial side of leaf of *Dendrobium mabelae* Gammie. (x 450)
3. Abaxial side of leaf of *Dendrobium ovatum* (Willd.) Kranzl. (x 450)
4. Abaxial side of leaf of *Dendrobium barbatulum* Lindl. (x 450)

and longitudinally placed, stomatal opening 24.6 x 4.1 μ .

Stomatal frequency : 117.3

Stomatal index : .120

Anomocytic stomata were observed in all the four species of *Dendrobium* Sw. Trichomes were present on abaxial side of *D. microbulbon* and absent in other three species. Withner et al.,¹¹ and Vij et al.,⁹ have reported restricted occurrence of trichomes on the lower leaf epidermis on orchids. Epidermal cells were small in *Dendrobium microbulbon* (32.8 - 36.9 x 24.6 - 28.7 μ), medium in *Dendrobium barbatulum* (28.7 - 32.8 x 24.6 - 36.9 μ) and *Dendrobium ovatum*; but large in *D. mabelae* (45.1 - 57.4 x 20.5 - 32.8 μ). Stomatal frequency ranged between 74.6 - 117.3/mm². It was highest in *Dendrobium barbatulum* and lowest in *D. ovatum*. Leaves in all the four species were uniformly hypostomatic. Leaves are similarly hypostomatic in most of the orchids^{1,5,8,10}.

These findings seem to suggest that stomatal distribution in orchid leaves is a genetic attribute whose manifestation varies with both the external (light, water) and internal (CO₂ metabolism) factors. Stomata were flushed with the epidermis as is true in majority of orchids⁷.

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