

EPIDERMAL FEATURES OF *Pteridium* SPECIES OF NAINITAL, UTTARANCHAL, INDIA**S. TIWARI^a AND P. C. MISRA^{bl}**^aDepartment of Botany, Bhawan's Mehta Degree College, Bharwari, Kausambi, Uttar Pradesh, India^bDepartment of Botany, H.N.B. Govt. P. G. College, Naini, Allahabad, Uttar Pradesh, India**ABSTRACT**

Pteridophytes is a small but most interesting group of vascular plants which attracts all classes of people from careless rural persons to professional scientists. They attract them because of their beauty and grace. The genus *Pteridium* is collected from Nainital, Uttaranchal, India. This genus is studied in great details. The epidermal details like- details of pinnae, stomatal details, spore, sinuosity and uses etc.

KEYWORDS : Triangular, Ferns, Stomata, Pteridophyta, Pinnae

The present day pteridophytes consists of more than 400 living genera and approximately about 13000 living species are (Crabbe et al., 1975 and Verma 2000).

India is represented by the rich pteridophytic vegetation and it is constituted as one of the most important group of plants in this country.

Pteridophytes are themselves characterized by their essential prerequisites like-Presence of cuticle which is meant for protection of plant body, occurrence of vascular strand for conduction of water and other solutes and presence of stomata essentially meant for ventilation purposes or exchange of gases and sporopollenized spores for continuing their reproductive generation.

The gametophyte origin of pteridophytes is from a spore, which in turn is a product of meiotic (reductional) division of spore mother cells in the sporangium. Spores are regarded as a conservative character in pteridophytes and are considered as the important tool in the classification of plants. Spores of the pteridophytes have been studied by a number of workers and these include Erdtman (1957), Lugardon (1963), Tardieu Blot (1963a), Markgra and D'Antoni (1978).

Since spores of pteridophytes has a great role in the taxonomy and in alternation of generation also. So many workers emphasized their importance as Nayar (1961), Devi (1981,1988), Verma (1966-67), Waterkeyn & Beinfait (1971).

MATERIALS AND METHODS

The material is collected from different localities of Nainital, Uttaranchal, India. The collected specimens

were dried and treated with mercuric chloride and they are deposited in the Duthie Herbarium of Botany

Department, University of Allahabad. The specimens were duly numbered. For the identification help has been taken from BSI (Central Circle Allahabad) also.

Spores were studied by Erdtman and Nair procedure. Several microchemical tests of Lignin, Cutin were made by Johnson and Foster techniques.

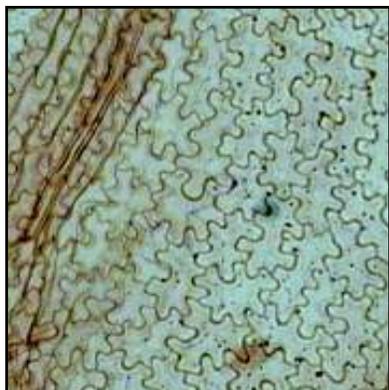
RESULTS AND DISCUSSION***Pteridium Gleditsch ex Scopoli***

Plants terrestrial, Rhizome deep underground, wide creeping, densely hairy, scales absent. Stipe long, erect, with numerous vascular bundles in horse shoe arrangement. Fronds pinnately compound, triangular in outline, coriaceous, more or less hairy. Veins free simple or forked, connected by marginal vein. Sori confluent, marginal, surrounded by a reflexed margin and a true indusium. Sporangia slender stalked. Spores tetrahedral, perispore absent.

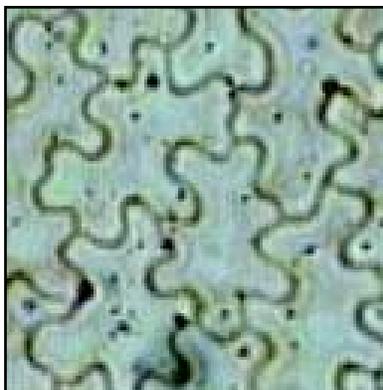
Pteridium aquilinum (L.) Kuhn.

Rhizome wide creeping, covered with silky whitish brown hairs. Stipe upto 1 m tall, solid, hairy at base, glabrous above. Fronds upto 2m tall, solid. Rachis stout, brown hairy when young, with distant opposite pinnae. Basal pinnae opposite, glabrous above, finely hairy beneath. Tertiary pinnae deeply pinnatifid at base, entire towards apex. Sori copious, continuous along margins of segments. Indusium inconspicuous, Spores trilete, non-perinuous.

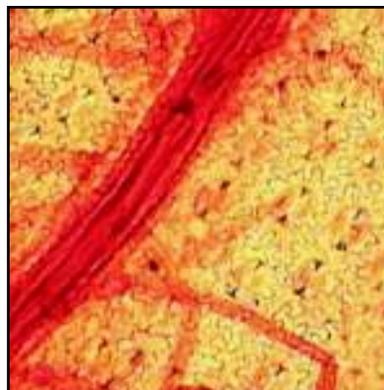
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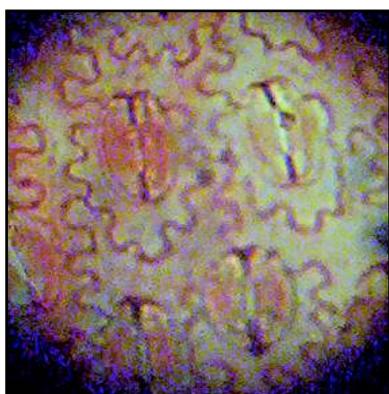
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B



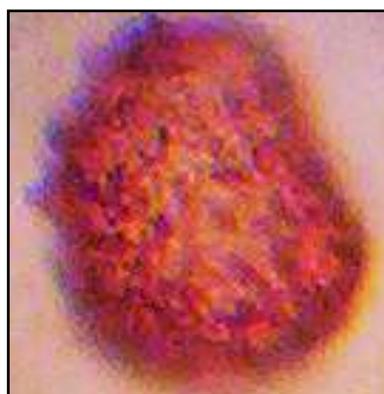
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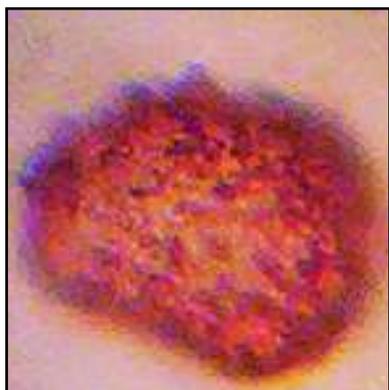
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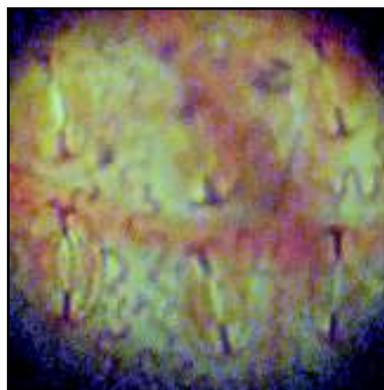
F



G



H



I

Plate :

A. Photograph of upper epidermis of pinna (10X)

B. Photograph of lower upper epidermis of pinna (40X)

C. Photograph of upper epidermis of pinnae showing trichomes along with stomata

D, I. Photograph of lower epidermis of pinnae (40X)

E, F, G, H. Different planes of spores (40X)

Epidermal Features**Pinnae**

Pinnae have open dichotomising venation pattern. Veins forked and connected by a marginal vein. Uniseriate, thin walled, multicellular trichomes present on lower surface of pinnae. Epidermal cells on both surfaces of pinnae are deeply sinuous walled and arranged in somewhat parallel to the lateral veins. Cells of upper surface are longer and broader than those of cells of lower surface (Plate 1A,B,C,D,I and Text Figure 1 D, E). Pinnae hypostomatic and stomata arranged parallel to the lateral veins. Guard cells are slightly sunken in a shallow pit and partially overlapped by neighbouring cells. Stomata appear diacytic or anomocytic being surrounded by 2-4 neighbouring cells. A thick band of lignin present at the common wall of two guard cells, on both sides (see Plate 15C,D,I and Text Fig. 15D). Development of stomata is mesoperigenous, Pteris or Lygodium type. (Pant et al., 1979-1980).

The size of epidermal cells ranges between 65-129 μm x 22-39 μm in length and breadth respectively and their frequency ranges between 280-359 and 420-518 per mm^2 on the upper and lower surface of pinnules respectively. The frequency of stomata varies from 294-434 per mm^2 with an average of 365.4 stomata per mm^2 . The size of guard cells ranges from 30-47 μm in length and 11-17 μm in breadth. Stomatal index is 43.7.

Petiole

Petiole about one meter long, elongated, cylindrical, solid, pale brown in colour. Trichomes present only at base and glabrous above. Trichomes uniseriate, thin walled and multicellular. From the base of petiole a groove arises on dorsal side which remain prominent and deep throughout. In surface view, epidermal cells shows peculiar character in the form of stomatal band. Stomata present in a band beside the groove of petiole. Epidermal cells of petiole appear narrow, elongated with thick and straight anticlinal walls while cells present in stomatal band are somewhat wavy and broader than those of other cells (Figure 1A).

Spores

Spores trilete, tetrahedral, non-perinous. Spores with equatorial collar which separates proximal and distal faces, spinous. Spore diameter ranging from 25x25-30x30 μm (Plate 1E,F,G,H and table 3).

Uses

Plants are used as bio-indicators for some heavy metals like Caesium and Stransium in United Kingdome (Tyson et al., 1990). The rhizome is reputed astringent and anthelmintic. Decoction of the rhizomes and frond is given in chronic disorders arising from obstruction of the viscera and spleen (Kirtikar and Basu, 1933).

Distribution

Plants widely distributed throughout India. In Eastern (Darjeeling, Sikkim) and western (Nainital, Mussorrie, Shimla, Dalhausie, Kula Manali) Himalayas, Central India (Pachmarhi), North-East India and South India (Western sides of Tamil Nadu, Kadaikanal, Palni-hilss etc.). Also distributed in Sri Lanka, Malay Peninsula, America, South China, Japan, Polynesia, Tropical Australia and Africa. Present collection from Nainital, Uttranchal.

Plants terrestrial. It is a thicket forming species, growing on the forest floor in exposed condition, forming patches in open fields and along road sides. These are tough plants growing in exposed as well as in shady moist places along water streams. As a result of the formation of huge thickets due to long sized fronds, other species do not grow on the ground covered by this species. This is soil binder species.

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