

EPIDERMAL FEATURES OF OSMUNDA SPECIES**SHRADDHA TIWARI^a AND P. C. MISRA^{b1}**^aDepartment of Botany, B.S. Mehta Degree College, Bharwari, Kausambi, Uttar Pradesh, India^bDepartment of Botany, Govt. P. G. College, Obra, Sonbhadra, Uttar Pradesh, India**ABSTRACT**

Surface features of stipe and pinnae of species of *Osmunda regalis* L. have been studied. The present paper deals with the anatomical details of stipe, scales, hairs, lower and upper epidermal cells of pinnae and stipe. Statistical data regarding the frequency of epidermal cells and stomata, size of guard cells and epidermal cells and stomatal index have also been studied in details. Attempt has also been made to correlate the ecology of investigated plants with their features. In the light of present work various terminologies and the stomatal types have also been discussed.

KEYWORDS : Stomata, Epidermal details, Frequency, Scales

Pteridophyta is a small but most interesting group of vascular plants which attract all classes of people from careless rural persons to professional scientists. Pteridophyta are spore bearing plants and they can be distinguished from other cryptogams by the possession of vascular tissues. Modern pteridophytes are widely distributed throughout the world especially in the tropical forests (Kaur, 1989) and play a role in maintaining the ecological balance of the area (Wang De-Qum, 1988; Punetha, 1989). Presently about 13000 species and about 410 genera of pteridophytes are reported out of which approximately 191 genera and 1000 species are reported to occur in India.

Osmunda species are classified in the family Osmundaceae. This species have rhizome erect with tufts of stipe; stipes thin and older ones brittle. Fronds dimorphic, fertile fronds wholly on the upper or middle portion forming simple or compound sporangiferous panicle. Lamina absent or reduced in fertile fronds. Fronds pinnate or bipinnate, articulated with the rachis. Venation open dichotomous, lateral veins forked and free arising from central vein. Sporangia on a short thick stalk. Annulus absent, dehiscing vertically in two equal halves by an apical slit. Spores trilete, numerous.

MATERIALS AND METHODS

The present material of *Osmunda regalis* are collected from Pachmari in M.P., India. For the epidermal studies, pieces of young as well as mature pinnae were fixed in farmer's fluid (ethyl alcohol and acetic acid 3:1) and subsequently stored in the 70% ethyl alcohol.

Epidermal peels were taken out by macerating pieces of pinnae in Schulz's fluid, using concentrated nitric acid and potassium chlorate and subsequently washing and treating with a dilute solution of ammonia (about 1%). Epidermal peels thus obtained were stained with safranin and dehydrated through usual ethyl alcohol series and subsequently mounted in euparal. Venation and general orientation of stomata and epidermal cells were investigated in transparencies made by Foster's Technique (Foster, 1966). The pinnae were cleared in 2.5% aqueous sodium hydroxide solution followed by concentrated chloral hydrate, dehydrated in the usual alcohol series and stained in 1% solution of safranin in equal parts of xylene and absolute alcohol. Then mounted in euparal. Petiolar epidermis was studied in epidermal peels which were taken out after light maceration of petiolar pieces in conc. Nitric acid and potassium chlorate and subsequently treating with dilute aqueous ammonia solution. Epidermal peels thus obtained were also dehydrated in usual alcohol series and stained with 1% safranin in equal parts of xylene and absolute alcohol. Then mounted in euparal.

For spore studies, the procedure described by Nayar (1970) was followed. Observations were made under transmitted light microscope. Spore size was observed on the basis of the mean average calculated from a minimum twenty five readings in each plane of spores and was exclusive of the perine.

The nature of various depositions and cell substances was detected by special histochemical tests performed. Presence of lignin was confirmed by occurrence of red colour after treating the lignified portions with

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phloroglucinal followed by a drop of 25% hydrochloric acid. Phloroglucinal solution was made by dissolving 1 gm phloroglucinol in 100 ml of 94% ethanol. The contents of phlobaphene was detected by their natural brown colour as suggested by Reeve (1951).

RESULTS AND DISCUSSIONS

Rhizome semi-erect, woody, covered with very thin and hard leaf bases, stipe tufted, firm, erect, usually naked and brittle at maturity. Fronds bipinnate, erect, the fertile and vegetative separated; fronds sterile below and fertile above. vegetative pinnae oblong, blunt, often unequal at the base, the edge finally serrulate, texture subcoriaceous, rachis and both sides naked. fertile pinnules cylindrical, forming a copious panicle. Sporangia are localized on various fertile parts of leaves. Veins forked near the central costa followed by repeated forkings. Spores trilete, round, exine finely spinulose. (Plate 1 - 9)

Epidermal Features

Pinnae

Pinnae have open dichotomous venation pattern. Trichomes are absent from the surface of pinnae. Epidermal

cells of both the surfaces are sinuous walled and irregularly arranged. Cells of upper epidermis are broader and less sinuous than the cells of lower epidermis (Plate 1, 2, 3, 4). stomata are confined only on lower surfaces of pinnae and are more or less parallel to the lateral veins. Stomata anomocytic, flanked by usually 4-7 neighbouring cells (Plates 3, 4, 8). Sometimes stoma with 11 surrounding cells are also seen. Development of stomata is perigenous (Pant, Nautiyal and Khare, 1980).

The size of epidermal cells ranges between 60-112 μm x 17-43 μm in length and breadth respectively and their frequency ranges from 266-392 and 266-378 per square mm on the upper and lower surfaces of pinnule respectively. The frequency of stomata varies from 42-98 per square mm with an average of 78.4 stomata per square mm. the size of guard cells ranges from 43-65 μm in length and 13-22 μm in breadth. Stomatal index is 19.1

Petiole

Petiole long, firm, erect and brittle at maturity. Scales and trichomes are absent from the surface of petiole. From the base of petiole a groove arises on adaxial side which remain prominent and deep throughout. In surface

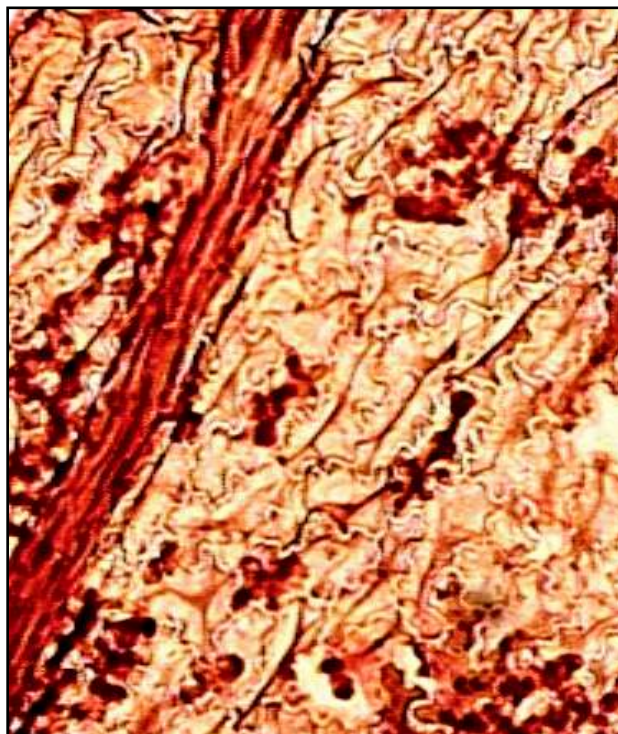


Plate 1



Plate 2

Plate 1 & 2 : Photographs of Upper Epidermis

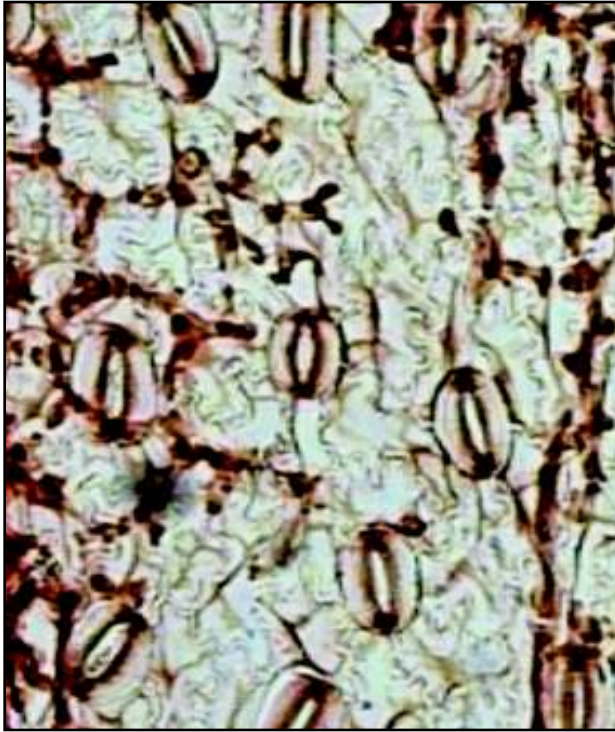


Plate 3



Plate 4

Plate 3,4 & 6 : Photographs of Lower Epidermis

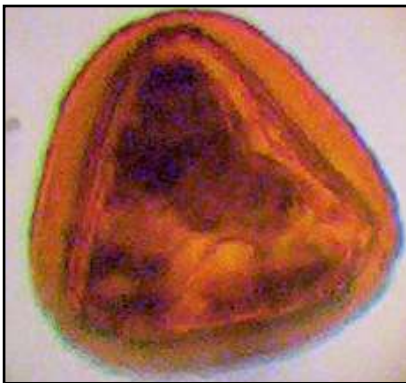


Plate 5

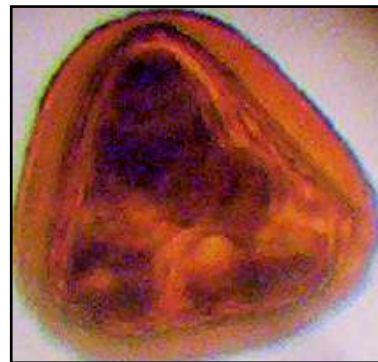


Plate 6



Plate 7

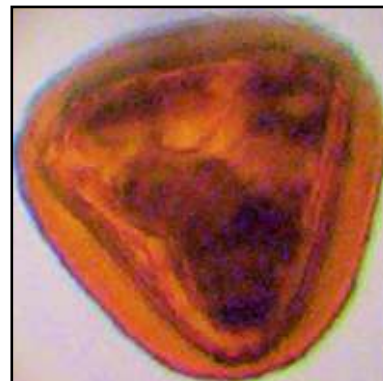


Plate 8



Plate 9

Plate 5, 7, 8 & 9 : Photographs of Spores

view, epidermal cells of petiole appear broad and elongated with straight and thick anticlinal walls. Stomata could not be observed on the petiolar surface.

Spores

Spores are globose, tetrahedral and trilete, devoid of perine and with the exine thin and prominently granulose. Spore diameter ranging from 35-37 μm (5, 6, 7, 8).

Uses

This species has great medicinal value. The plant decoction is used tonic and styptic. It is also used for rickets in England. In Guinea, an extract is prepared and used externally for rheumatism and internally for intestinal gripping (Kirtikar and Basu, 1933). The roots and the stem of *Osmunda* provide fibre which is used by orchid growers for cultivation of epiphytic orchid and other epiphytic plants as they are very resistant to decay (Shankar and Khare, 1994). Besides these uses, most of the species are grown as ornamentals for their beautiful foliage.

Distribution

Plants widely distributed in Himalayas from Kashmir to Bhutan, to eastern Himalayas, south India, common on western mountains, central and North India, Kumaon, Khasya. Also distributed in Java, North America, Ceylon, Myanmar etc. present collection has been made from Pachmari in M.P. (Central India)

Plants are terrestrial, growing along the forest margin, on moist and shady places. Very commonly growing along the shady and moist roadside and cut slopes. A very variable species, in some cases the whole fertile fronds is separated from sterile ones, while in some plants the fertile portions is terminal and contracted (Baishya and Rao, 1982).

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