

**PTERIDOPHYTES OF NEPAL: FAMILY- BLECHNACEAE****P.C. MISRA<sup>a</sup> AND SHRADDHA TIWARI<sup>b1</sup>**<sup>a</sup>Department of Botany H.N.B.Govt. P. G. College, Naini, Prayagraj, U.P., India<sup>b</sup>Department of Boatny.B.S. Mehta Degree College, Bharwari, Kausambi, U.P., India**ABSTRACT**

**This paper deals the family Blechnaceae of Nepal. Authors has collected one species of genus *Woodwardia unigenmata* (Makino)Nakai. Authors has studied their structural details, epidermal details like stomatal structures, frequency and sinuosity of upper and lower epidermis in great details. Spores sporangial and venation details are also studied in details.**

**KEYWORDS:** Stomata, Epidermal details, frequency, Spores

The family Blechnaceae (Presl) Copel includes terrestrial fern, rhizomes creeping or erect. Stipe non-articulate at the base. Fronds large, pinnatifid or pinnate, sometimes more compound, fertile and sterile fronds of same shape, texture coracious, all veins of sterile pinnae free or the veins near the costae of sterile fronds anastomosing. Fertile leaf either similar to the sterile ones or variously reduced, sometimes into narrow elongated pinnae. Sori elongate, placed near the costae of a pinnae or the costules of its lobes with indusium attached on the side of the sorus and opening inwards. The sporangia are of the typical leptosporangiate type, large and long stalked with the stalk three cell thick at the capsule base, annulus consisting of 15-30 thickened cells. The spores are monolete, commonly with an adherent or sometimes loose but scarcely wrinkled perine and smooth or granulose exine, or in some cases perineless and with verrucoid ornamentation on the exine. The spore germination is of the Vittaria type. The adult prothallus is cordate-thalloid type, symmetrical or asymmetrical, bearing unicellular papillate capitate hairs.

Pinnae have open dichotomous venation pattern. They form a special pattern before reaching to the end which gives appearance of net like. Epidermal cells on both surfaces of pinnae are sinuous walled, Pinnae are hypostomatic, stomata may be slightly sunken or may be not, stomata are surrounded by 2 to 5 neighbouring or epidermal cells. Epidermal cells sinuous walled and are more prominent on both surfaces.

**MATERIALS AND METHODS**

All the present are collected from Phoolchuki., Nepal. 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 saffranin 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 usually 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.

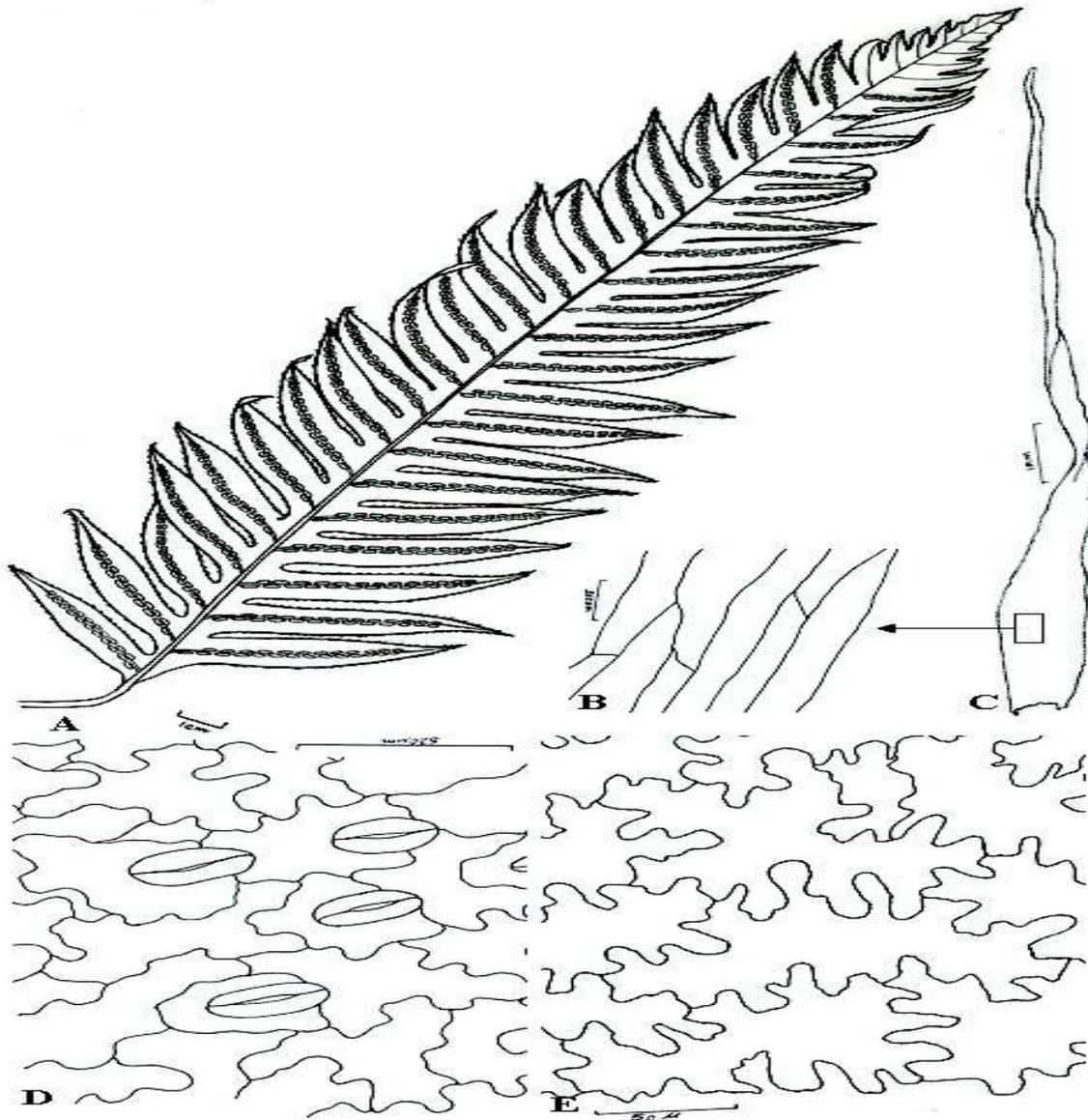
The nature of various depositions and cell substances was detected by special histochemical tests performed. Presence of lignin was confirmed by occurrence of red colour after treating the lignified portions with phloroglucinal followed by a drop of 25% hydrochloric

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acid. Phloroglucinol solution was made by dissolving 1 gm phloroglucinol in 100 ml of 94% ethanol.

## RESULTS AND DISCUSSION

*Woodwardia unigemmata* (Makino) Nakai- (Plate-1A- E)



**Figure 1: A-Diagram of plant *Woodwardia unigemmata*, B-Diagram of cell structure of scale, C-Diagram of structure of scale, D-Lower epidermal cells with stomata X 40, E-Upper epidermal cells without stomata X 40**

Plants terrestrial large fern, rhizome short, stout and strong. Rhizome is clothed with linear scales. Scales are brown, linear, large, long and thin. Cells of the scales are elongated in their shape. Fronds large, bipinnate 30-40 cm long, ovate-lanceolate, pinnae alternate, deeply pinnatifid 2-6 cm long and 0.5-1 cm broad. Pinnae are

minutely spine toothed. Sori are arranged in a oval and pouch like pocket on the both side of the mid vein to the abaxial side. Spores are 27 X 33  $\mu\text{m}$ . spores are monoletic, bilateral and perinous. Exine is granulose or minutely reticulate.

Pinnae have open dichotomous venation pattern but forming costa near to the main vein. Veins anastomosing close to the main vein forming a single series of areoles and then free to the margin. Upper epidermal cells are sinuous walled and arranged irregularly. The amplitude of sinuosity of upper epidermal cells is 32  $\mu\text{m}$  and the wavelength of sinuosity is 133  $\mu\text{m}$ . Lower epidermal cells are also very deeply sinuous walled. The amplitude of sinuosity of lower epidermal cells is 28  $\mu\text{m}$  and the wavelength of sinuosity is 91  $\mu\text{m}$ . Stomata are usually confined to the lower surface i.e. hypostomatic. Stomata is surrounded by 2 to 5 epidermal or neighboring cells.

This species is widely occurs in Pokhara and Phulchoki in Nepal, Western and Eastern Himalayas, China, Formosa, Japan, Philippines. As far as author knows only one species of *Woodwardia* i.e. *W.unigemmata* occurs in Nepal. This species has been collected from the area of Phulchoki in Nepal. It has been earlier collected by Sinha & Gurung in 1985. Unlike other ferns *Woodwardia* presents the unique arrangement of sori and venation pattern. Sori is arranged both side of the main vein and fill up into the pocket like structures. Side veins are originated from the midvein and they form costae and then the veins become dichotomous open the tip. The pinnules give the glimpse of reticulate venation pattern. According to Beddome (1883) *Woodwardia radicans* which is quite similar to that of *Woodwardia unigemmata*. Only difference is found in

*W.unigemmata* that it has linear, long type of scale while in *W.radicans* the scale is lanceolate.

#### ACKNOWLEDGEMENT

We express our deep sense of gratitude to the respective Late Dr. R.D.Dixit from B.S.I. Allahabad and Late Prof. P.K.Khare from university of Allahabad, Allahabad, for helping us in identification of species. We are grateful to Prof. D. R. Misra, university of Allahabad, Allahabad, who has given me support at every steps.

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