

TAXONOMIC STUDIES OF PTERIDOPHYTES OF UTROR VALLEY, DISTRICT SWAT, KHYBER PAKHTUNKHWA, PAKISTAN

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Abstract

In the present study, an attempt has been made to collect and identify the Pteridophytes of Utror valley, Swat. During the survey 16 Pteridophytes belonging to 10 genera and 9 families are taxonomically and ethnobotanically described. Dryopteridaceae was found as a dominant family having the largest number of species, i.e. 4 species belonging to the genus *Dryopteris*. Aspleniaceae was the second largest family in terms of number of species, i.e. 3 species belonging to the genus *Asplenium*. The families like *Adiantaceae*, *Cystopteridaceae*, *Dennstaedtiaceae*, *Polypodiaceae*, and *Thelypteridaceae* were represented by one species each, i.e. *Adiantum venustum*, *Cystopteris fragilis*, *Pteridium aquilinum*, *Polypodium vulgare*, and *Cyclosorus dentatus*, respectively. The study revealed that these ferns are used by the local community for the treatment of different health ailments.

Key words: Pteridophytes, Taxonomy, Ethnobotany, Utror valley.

Introduction

Plant taxonomy deals with the identification, naming and classification of plant species. Plant identification is accomplished either by comparison of the collected plants with the previously collected and identified plant species or with the help of manuals, books, or flora on the identification of plants. Then the valid binomials are assigned to the correctly identified plants along with their author citations. The morphological features of the plants are documented being supported by the proper photographs, figures or handdrawing. The plant is then placed in the relevant family, order, class, etc., a process called classification (Stuessy, 2008).

The sum total of plants in a definite geographical area is called the flora of that area. It may be small as that of a smaller geographical area or larger such as that of a country, of a continent or even of the whole world (Polumin & Stainton, 1984).

Pteridophytes are terrestrial plants but some species are also found in aquatic habitats. They are more abundant in moist and shady places. About 12000 Pteridophytes have been reported all around the world (Hoshizaki & Moran 2001). Pteridophytes belonging to 191 genera and 70 families have been reported from India (Dixit, 1984). They are important economically due to their high medicinal value, but in Pakistan they are threatened in this regard. In Swat valley, species diversity of pteridophytes is high but unfortunately they are neglected and threatened due to habitat loss. Many species of pteridophytes are also important due to their food and aesthetic value. Thus, Pteridophytes can be used in Tribal, Homoeopathic, Ayurvedic and Unani medicine (Vasudeva, 1999; Das, 2003). Stewart (1972) reported 133 species of ferns belonging to 41 genera and 9 families from West Pakistan and Kashmir. Nakaike & Gurung (1988) explained the distributional map of the Pteridophytes in Kathmandu, Nepal. A list of Pteridophytes along with their distribution in Pakistan

was prepared by Nakaike & Malik (1993). These included 87 species belonging to 32 genera and 20 families. Iltaf *et al.*, (2012) carried out a taxonomic study of Ferns flore of Punjab and reported 36 fern species belonging to 18 genera and 13 families. Family Dryopteridaceae was found out the largest having 7 species and 3 genera. Recently, Zayauddin (2016) reported the presence of *Salvinia molesta* in water channels, in the vicinity of Gharo Thatta, Sindh on the coastal highways of Pakistan. He declared it a pest of rice paddies and host of many species of mosquitoes.

Utror is an ever green valley situated at a distance of about 12 km from Kalam, Swat, Khyber Pakhtunkhwa. It extends from 35° 20' - 35° 48' N latitude and 72° 20' - 72° 32' E longitude in the Hindu Kush mountain ranges. Its total area is 48200 hectares, while elevation from sea level is 7,300 feet. Its mean annual summer temperature is about 16.6°C and mean annual winter temperature remains below 2°C during the months of November to February. Its total population is about 23700 and mostly the inhabitants of the area are farmers. Potato, cabbage and turnip are the main cash crops of the area. In winter most families migrate to low lying areas due to cold weather and snow fall (Anon., 2016).

Material and Methods

The present taxonomic study on Pteridophytes of Utror was conducted during 2015-2016. Frequent field visits were arranged to the resource based areas in order to identify the exact phytogeography of the selected ferns. During the field visits the plant species of Pteridophytes were photographed and collected usually at their reproductive stage. The fronds and rhizome of healthy plants were selected for collection. In some cases, when possible the whole plants were also collected. The plant parts were cut with the help of secateurs. Each part was flattened out in separate paper sheets and then pressed in a plant-pressor. The date of

collection and site number were recorded on tags which were then affixed with each of the relevant plant. The tags were then attached to each plant. The detailed description of each plant part such as size of rhizome, frond, stipe, nature of scales and sori was documented in the note book. The ethnobotanical data was collected from different age groups of the inhabitants in a separate questionnaire for each plant. The properly pressed and dried plants were mounted on herbarium sheets by using standard techniques after Lucas (1992) and then submitted to Dr. Sultan Ahmad Herbarium at GC University Lahore, Pakistan as voucher specimens. For the correct identification the available taxonomic literature on Pteridophytes was consulted (Lowe, 1872; Beddome, 1873, 1883; Copeland, 1947; Stewart, 1972; Tryon and Tryon, 1982; Nakaike and Malik, 1993; Smith, 1993; Hoshizaki and Moran, 2001; Moran, 2004; Fraser-Jenkins, 2008).

Results and Discussion

A total of 16 Pteridophytes belonging to 10 genera and 9 families were reported during the field survey of Utror valley. Dryopteridaceae was found to be the dominant family represented by 4 species belonging to the genus *Dryopteris* (*Dryopteris carthusiana*, *D. expansa*, *D. filix-mass* and *D. marginalis*). The second largest family was Aspleniaceae with 3 species belonging to the genus *Asplenium* (*Asplenium ceterach*, *A. ruta-muraria* and *A. septentrionale*). The Equisetaceae was represented by two species (*Equisetum arvense* and *E. ramosissimum*) while Pteridaceae by 2 genera with 3 species (*Pellaea nitidula*, *Pteris cretica*, *Pteris vittata*). Adiantaceae, Dennstaedtiaceae, Polypodiaceae, Cystopteridaceae and Thelypteridaceae were represented by 1 species each viz., *Adiantum venustum*, *Pteridium aquilinum*, *Polypodium vulgare* and *Cystopteris fragilis* respectively. The study revealed that these ferns are used by the local community for the treatment of different health disorders (Table 1). The morphological features supported by Fig. 3, while the ethnobotanical importance supported by Figs. 1 & 2 are given below:

1. Family: Adiantaceae

i. *Adiantum venustum* D. Don

Rhizome, long, creeping; stipes dark-purple to black, glossy, frond triangular, upto 12 inches long, 8 inch wide, hardy, 3-4 pinnate, pinnules wedge shaped, firm, margin toothed, fertile pinnules with 2 notches, rarely with 3 notches, 1 sorus in each notch; sori covered by the tip of the lobes, half-moon shaped, usually 2 per pinnule. (Voucher No. GC. Herb. Bot. 3005, Fig. 3-A).

Ethnobotanical uses: Extract of the rhizome is used for the treatment of diabetes and liver problem while fronds are used against toothache and low body temperature. The decoction is also used in scorpion bite.

2. Family: Aspleniaceae

i. *Asplenium ceterach* L.

Rhizome erect, branching, bearing a tuft of roots downward and a rosette like cluster of frond above the ground, scaly, scales clathrate; stipe green, short, both stipe and rachis possess light brown scales; frond 15 cm long, 2 cm wide, blade and stipe ratio 8:1, monomorphic; blade leathery, pinnatifid, lanceolate, upper surface dull green, lower surface covered with rust coloured sori; scales light brown, dense, entirely covering the lower surface; pinnae 6 to 12 pairs, alternate, margins entire or irregularly crenate, slightly bending upward, middle pinnae larger as compared to basal and terminal; veins visible only when scales are removed; sori linear along the vein, indusium vestigial and replaced by a tuft scales; sporangia brown at maturity. (Voucher No. GC. Herb. Bot. 3006, Fig. 3-B).

Ethnobotanical uses: The fronds of the plant are dried and grounded to make powder. The powder is then mixed with water and used for urinary problems.

ii. *Asplenium ruta-muraria* L.

Rhizome short, creeping, branched, scaly; scales dark brown, deltate, 1-3 mm long, 0.1-0.25 mm wide; fronds monomorphic, 3-12 cm long; stipe 1-5 cm long, dull, brown and scaly at the base, fading to green above; blade 2-8 cm long, 1-4 cm wide, ovate-triangular, dull, leathery, thick, glabrous, bipinnate with divided pinnules to tripinnate, ultimate pinnules undivided; pinnae 2-5 pairs, variable in shape, opposite to alternate, deltate ovate; proximal pinnules 7-30 mm long, 5-20 mm wide, incised, apex rounded; sori linear, 1-6 per pinnule, about 2 mm long; indusium translucent, attached on one side along the vein; spores monolet. (Voucher No. GC. Herb. Bot. 3007, Fig. 3-C).

Ethnobotanical uses: The fronds are boiled in water. The water is then cooled, filtered and used in the treatment of many eye complaints. The plant is also used for the treatment of cough, as a herbal remedy for rickets and to stop bleeding from small wounds.

iii. *Asplenium septentrionale* (L.) Hoffm.

Rhizome short, 1 mm in diameter, covered with scales, scales black, subulate, margins entire, 2-4 mm long; fronds grow in dense cluster, superficially resemble tufts of grasses, 4-15 cm long, monomorphic; stipe 2-8 cm long, 2-5 times larger than the blade, dark brown at the anterior part, fading to green at the posterior part; blades narrow, 0.5-4 cm long, 1-4 mm wide, glabrous, leathery, dichotomously divided; pinnae usually two, sometimes four, sharply angled at the tip; rachis green, shiny, both rachis and fronds free of scales and hairs; sori linear, 5-20 mm long, two or more per pinna, covering almost the entire pinna; indusium entire, whitish; spores monolet. (Voucher No. GC. Herb. Bot. 3008, Fig. 3-D).

Table 1. Medicinal uses of Pteridophytes at Utror Valley, Swat, Khyber Pakhtunkhwa, Pakistan.

S. No.	Family	Botanical name	Voucher No.	Part used	Local Medicinal uses
1.	Adiantaceae	<i>Adiantum venustum</i> D. Don	GC. Herb. Bot. 3005	Rhizome, Fronds	Diabetes, liver problem, toothache, coldness of body temperature, scorpion bite
		<i>Asplenium ceterach</i> L.	GC. Herb. Bot. 3006	Fronds	Urinary suppression problems
2.	Aspleniaceae	<i>Asplenium ruta-muraria</i> L.	GC. Herb. Bot. 3007	Fronds	Eye complaints, cough, rickets and to stop bleeding from small wounds
		<i>Asplenium septentrionale</i> (L.) Hoffm.	GC. Herb. Bot. 3008	Fronds	Head and chest colds
3.	Cystopteridaceae	<i>Cystopteris fragilis</i> (L.) Bernh.	GC. Herb. Bot. 3009	Fronds	Vegetable, chills, stomach disorders. The decoction of fronds is also used as a wash lotion for healing of injuries
4.	Dennstaedtiaceae	<i>Pteridium aquilinum</i> (L.) Kuhn.	GC. Herb. Bot. 3010	Fronds, Rhizome	Vegetables, as an aphrodisiac, healing of wounds, viscera and spleen disorders
		<i>Dryopteris carthusiana</i> (Vill.) H. P. Fuchs	GC. Herb. Bot. 3011	Rhizome, Fronds	Vegetable, worm excellent
		<i>Dryopteris expansa</i> (C.Presl) Fraser Jenkins & Jermy	GC. Herb. Bot. 3012	Rhizome, Fronds	Vegetables, Extract of rhizome is used for the treatment of dandruff
5.	Dryopteridaceae	<i>Dryopteris filix-mas</i> (L.) Schott	GC. Herb. Bot. 3013	Rhizome, Fronds	Vegetables. The young fronds are also added to soups. An infusion of the fronds is used as hair wash for good looking
		<i>Dryopteris marginalis</i> (L.) A. Gray	GC. Herb. Bot. 3014	Rhizome, Fronds	Worm expellant, rheumatism, toothaches
		<i>Equisetum arvense</i> L.	GC. Herb. Bot. 3015	Fronds	Anti-lice, hair tonic, swelling or inflammation of the body
6.	Equisetaceae	<i>Equisetum ramosissimum</i> Desf.	GC. Herb. Bot. 3016	Whole plant	Jaundice, urine burning, expel calculus both from the kidneys and bladder and also as a hair tonic.
7.	Polypodiaceae	<i>Polypodium vulgare</i> L.	GC. Herb. Bot. 3017	Rhizome	Jaundice, indigestion and also for appetite loss
		<i>Mildella henryi</i> (Christ) Hall & Lell.	GC. Herb. Bot. 3018	Whole plant	Heart problems
8.	Pteridaceae	<i>Pteris vittata</i> L.	GC. Herb. Bot. 3019	Whole plant	Blood purification, as antiviral, antibacterial, hypotensive, demulcent and tonic
9.	Thelypteridaceae	<i>Cyclosorus dentatus</i> (Forssk.) Ching	GC. Herb. Bot. 3020	Rhizome, Fronds	Rhizome is used as an antibacterial agent. The young circinated fronds are also used as vegetables

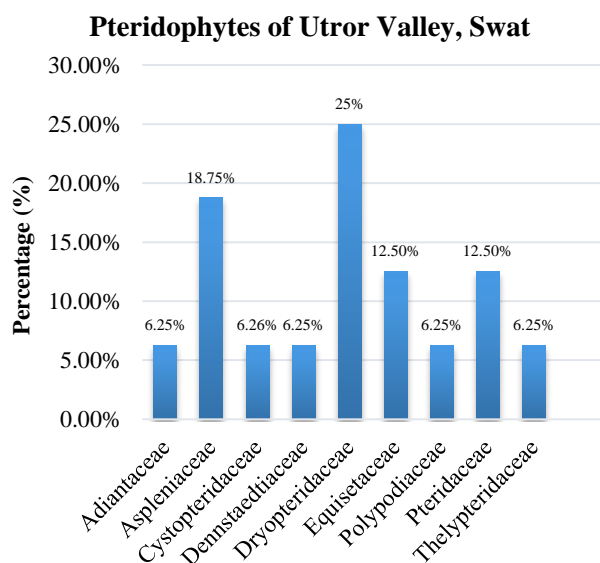


Fig. 1. Family wise percentage (%) of Pteridophytes at Utror Valley, Swat.

Ethnobotanical uses: The leaves are smoked to treat cold.

3. Family: Cystopteridaceae

i. *Cystopteris fragilis* (L.) Bernh.

Rhizome short, 1 to 2 cm in length, 0.3 to 0.5 cm in width, creeping, beset with old stipe bases, scaly, scales light brown, lanceolate, roots up to 8 cm deep in the soil; frond 15-32 cm long, glabrous, weak, monomorphic, 3-8 in number, clustered at rhizome apex; stipe 4 to 10 cm in length, swollen and red brown at the basal part, narrow and light green above, stipe and rachis grooved; blade 10-24 cm in length, 3-10 cm in width, bipinnate - pinnatifid, herbaceous, ovate-lanceolate, glabrous, light green to deep green, widest at the middle, narrower to the apex; pinnae 8-10 pairs, sub-opposite, perpendicular to the rachis, lanceolate, anadromous, widest at the base just below the middle; pinnules 6-10 pairs, sessile, sub-opposite, 0.5 to 1.2 cm in length, 0.2 to 0.6 cm in width, oblong-rhomboidal, margins serrate to dentate, cut bluntly or sharply; sori dark brown, 8-14 to a pinnule; indusium white at maturity, attached at one side, arching over sori, hood like, ovate to lanceolate; sporangia dark brown at maturity; spores with spines or prickles. (Voucher No. GC. Herb. Bot. 3009, Fig. 3-E).

Ethnobotanical uses: The frond is used as vegetable. The decoction of the whole frond is taken orally and considered best for the cure of cold and stomach disorders. The decoction is also used as a wash lotion for healing of injuries.

4. Family: Dennstaedtiaceae

i. *Pteridium aquilinum* (L.) Kuhn.

Rhizome long, subterranean, creeping, densely covered with fine brown hairs of about 5 mm long; fronds large up to 80 cm or somewhat more, the frond expand at

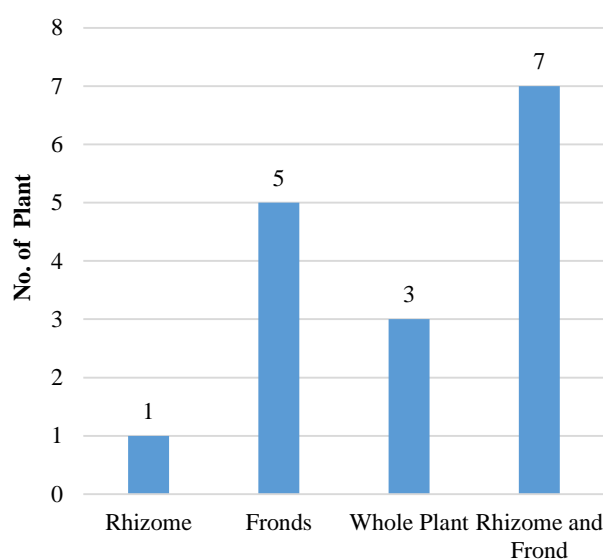


Fig. 2. Parts of the plant used for medicinal purposes.

rapid rate; blade leathery, deciduous, upto 1 to 3 feet tall; stipe usually short, harsh and wiry, erect upto 4 mm in diameter, thick, rigid, brown to black scales on hypogean part, brown to stramineous scales on epigeal part, adaxially grooved, abaxially rounded; scales linear-lanceolate narrowing higher on the stipes; rachis deflexed at the junction of stipe and first pair of pinnae; blade broadly expanded in triangular shape, tripinnate to tripinnate-pinnatifid at the base, the apex growing upto 1 m or more in length and width, herbaceous to subcoriaceous in texture, 18-30 pairs of pinnae, pinna midribs and pinnules are distally angled, (Voucher No. GC. Herb. Bot. 3010, Fig. 3-F).

Ethnobotanical uses: Young fronds are used as vegetable. The dried rhizome is powdered and mixed with other flour and used as bread. Its rhizome and the rhizome of ginger are powdered and its juice is drunk as an aphrodisiac. Rhizome when boiled in water is considered best for healing of wounds. Decoction of rhizomes and fronds is best for viscera and spleen disorders. The plants are also used as thatch for roofing.

5. Family: Dryopteridaceae

i. *Dryopteris carthusiana* (Vill.) H. P. Fuchs

Rhizome short, creeping, covered with old stipe bases; frond 30-60 cm long, monomorphic, deciduous, arching; stipe grooved, light brown, scaly at the base; blade 10-40 cm long, 6-22 cm wide, light green, ovate-lanceolate, bipinnate-pinnatifid, tripinnate at the base, lower surface scaly; scales scattered, dense at the base, 9 mm long, pale brown; pinnae 10-25 pairs, shortly stalked, alternate, lanceolate-oblong, lower pinnae largest, 5-10 cm long, pinnulae margins serrate, teeth spiny; sori small, 0.5-1 mm in diameter, in a single row between the midvein and margin; indusium reniform, gray-white; sporangia dark brown. (Voucher No. GC. Herb. Bot. 3011, Fig. 3-G).



Fig. 3. (A) *Adiantum venustum* D. Don (B) *Asplenium ceterach* L. (C) *Asplenium ruta-muraria* L. (D) *Asplenium septentrionale* (L.) Hoffm. (E) *Cystopteris fragilis* (L.) Bernh. (F) *Pteridium aquilinum* (L.) Kuhn. (G) *Dryopteris carthusiana* (Vill.) H.P. Fuchs (H) *Pellaea nitidula* (Hook.) Baker (I) *Pteris vittata* L.

Ethnobotanical uses: Both rhizome and fronds are used as vegetable. The rhizome is also used as remedy for intestinal worms. The rhizome is roasted, peeled and the inner portion is eaten. The young fronds are boiled in water and are eaten.

ii. *Dryopteris expansa* (C.Presl) Fraser Jenkins & Jermy

Rhizome stout, erect; fronds 30 to 80 cm in length, 10 to 30 cm in width, stipe 1/2 of the frond size, pale green,

base brown, scaly; blade triangular, soft green, tripinnate; pinnae 15-30 on each side, alternate, lower pinnae largest, up to 25 cm long, becoming gradually smaller at the apex; pinnules 1 to 7 cm in length, 0.4 to 1.6 cm in width at the base, smallest pinnae at the anterior; scales large, dense at the base of the frond, fewer above, lanceolate, brown, central stripes dark brown, up to 16 mm long, 6 mm wide; sori 0.5 mm-1.5 mm in diameter, indusium smaller, reniform, spores pale brown. (Voucher No. GC. Herb. Bot. 3012).

Ethnobotanical uses: Both rhizome and fronds are used as vegetables. The extract of the rhizome is applied on hairs for the treatment of dandruff.

iii. *Dryopteris filix-mas* (L.) Schott

Rhizome erect, branching, densely covered with old stipe bases; frond 20 to 80 cm in length, 10-30 cm in width, monomorphic, erect or arching; stipe grooved, less than ¼ the length of blade, both stipe and rachis densely covered with brown scales; blade bi-pinnate, widest at the middle, taper at both ends, firm, mid green; pinnae 20-30 pairs; pinnules 8-20 pairs, blunt, equally lobed all around, fully attached along the base; sori round, 5-8 in number, arranged on either side of the midrib; indusium brown, reniform; sporangia dark brown. (Voucher No. GC. Herb. Bot. 3013).

Ethnobotanical uses: Both rhizome and young fronds are used as vegetables. The young fronds are also added to soups. An infusion of the fronds is used as hair wash for good looking.

iv. *Dryopteris marginalis* (L.) A. Gray

Rhizome erect, soft, brown, scaly; frond 30 to 70 cm in length, 5 to 20 cm in width, dark green, thick, leathery, in dense tuft; stipe 6- 12 cm long, light green, both stipe and rachis grooved, scaly at the base; scales brown, linear to ovate; blade bi-pinnate, ovate-lanceolate, widest at the middle; pinnae 12-18 pairs, opposite or sub-opposite, widest at the base, narrower towards the apex; pinnules 6-10 pairs, with a distal pinnule, margins entire; sori rounded, marginal, 4-8 per pinnule; indusium smooth, kidney shaped, reniform. (Voucher No. GC. Herb. Bot. 3014).

Ethnobotanical uses: The extract of the plant is used as a worm expellant, especially for tape worms. The infusion of the rhizome is used for the treatment of rheumatism. The warm infusion when held in mouth is considered best for the treatment of toothaches.

6. Family: Equisetaceae

i. *Equisetum arvense* L.

Rhizome branched, creeping, tuberous; stem dimorphic; sterile stem hollow, jointed, erect, produce up to 20 whorls of branches, 10-60 cm long; scales like inconspicuous leaves in whorls at each node, fused into sheaths around stems and branches, green, with 10-12 blackish or brownish teeth; fertile stem 10-30 cm long, unbranched, thick, succulent, brown, sheath with 8-12 large and pointed teeth; strobilus 1-3 cm long, peduncled and blunt. (Voucher No. GC. Herb. Bot. 3015).

Ethnobotanical uses: The shoot is used as anti-lice and hair tonic. The paste of the shoot is also used to cure swelling or inflammation of the body.

ii. *Equisetum ramosissimum* Desf.

Rhizome vertical, black, deeply rooted, 3-6 mm in diameter, roots in whorls at the nodes; main stem

monomorphic, 1 to 1.5 m in length, 3 to 6 mm in diameter, dark towards the base, grooved, ridged, grooves 8-25 in number, whorl of branches at nodes; branches 10-14 in each whorl; sheath 6-8 mm long, upper portion green or brown, teeth 5-7 mm long, caducous; leaves membranous, scale like, fused into a nodal sheath, 9-11 mm long, lanceolate, shiny-black, teeth black, free, acuminate; strobili terminal length, 23 mm long, 8mm wide, oblong, apex blunt conical; sporangia, 6-8 in number, thin-walled, elongated, stalked. (Voucher No. GC. Herb. Bot. 3016).

Ethnobotanical uses: The whole plant is crushed and the juice is obtained. The litter water is added with the juice and is used for jaundice, urine burning and to expel calculus both from the kidneys and bladder. The extract of the shoot is also mixed with mustard oil and is used against lice and as a hair tonic.

7. Family: Polypodiaceae

i. *Polypodium vulgare* L.

Rhizome creeping, thick, branching, scaly, scales up to 5 mm long, pale brown, lanceolate; fronds evergreen, 10 to 30 cm in length, 4 to 7 cm in width, monomorphic, tapering to a pointed tip, cut almost to the central axis; stipe jointed at the base, triangular, straw colored, scaly, scales red-brown, peltate, up to 4 mm long; blade pinnatifid, lanceolate, glabrous, dull green, leathery or herbaceous, rachis scaly below, glabrous above; pinnae 10-20 pairs, alternate, margins entire or shallowly toothed, rarely serrate; sori in two rows, midway between midrib and margin, round, discrete, more abundant on upper pinnae, sunken into the lamina, bulging on the upper surface. (Voucher No. GC. Herb. Bot. 3017).

Ethnobotanical uses: The fresh rhizome is boiled in water. The water is then cooled and is used for jaundice, indigestion and also for appetite loss.

8. Family: Pteridaceae

i. *Pellaea nitidula* (Hook. f.) Baker

Rhizome short, ascending, sometimes with creeping branches, scaly, scales dark brown, subulate - lanceolate, numerous fibrous roots on the underside, root about 1.5-6 cm in length, densely clothed by the stipe on the upper side; frond 15-35 cm in length, broad at the basal part, tip narrow; stipe 7-20 cm in length, diameter up to 1.5 mm, dark brown to black, terete; blade 8 to 20 cm in length, 2 to 5 cm in width, dark green, ovate-lanceolate to linear - lanceolate, leathery, bipinnate, coriaceous; pinnae 3-8 pairs, sessile or sub-sessile; pinnules up to 5 pairs, distal pinnule largest, 3 cm long, 2 cm wide, margins entire; sori marginal, confluent, indusia brown, membranous. (Voucher No. GC. Herb. Bot. 3018, Fig. 3-H).

Ethnobotanical uses: It is used in combination with other plants for heart problems.

ii. *Pteris vittata* L.

Rhizome strong, creeping, scaly, rhizoids thin and abundant, tuft of fronds arise from the rhizome; scales narrow, light brown up to 5 mm long; stipes length variable, up to 20 cm long, much shorter than lamina; lower part thick, densely scaly, stramineous, higher up on stipes scales becoming narrower; fronds usually 30–80 cm long, 1-pinnate, dark green, pinnae 15-30 pairs, with a terminal pinna, size of the frond decreasing towards the base, the lowermost pinnae 2-5 cm long, while the upper pinnae 10-15 cm long; veins simple or forked once; sori marginal, indusia thin and pale. (Voucher No. GC. Herb. Bot. 3019, Fig. 3-I).

Ethnobotanical uses: Plant extract is used for blood purification, as antiviral, antibacterial, hypotensive, demulcent and tonic.

9. Family: Thelypteridaceae

i. *Cyclosorus dentatus* (Forssk.) Ching

Rhizome short, creeping, 3-5 mm in diameter; fronds dimorphic, 50-130 cm long, dark green, closely spaced, soft textured; stipe 15- 50 cm, 3-6 mm at the base, purplish brown, both stipe and rachis grooved, scaly; scales brown, hairy, linear-lanceolate; blade 25-90 cm long, 10-22 cm wide, gradually tapered to pinnatifid apex; pinnae 15-25 pairs, alternate, basal 2-4 pinnae progressively reduced, basal pinnae 4-5 cm in length, largest pinnae 8-10 cm in length, up to 1.5 cm wide, taper at the apex, 1-6 proximal pairs of pinnae reduced; pinnules 14-22 pairs, apex rounded, base united ; sori rounded, 8-14 per pinnule, medial to supramedial; indusia thin, hairy and pubescent. (Voucher No. GC. Herb. Bot. 3020).

Ethnobotanical uses: Rhizome is used as an antibacterial agent. The young circinated fronds are also used as vegetables.

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