

Medicinal ferns of North Eastern India with special reference to Arunachal Pradesh

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The Pteridophytes constitute the primitive vascular plant groups which are found scattered all over the world including India. Investigation had been made on medicinal values of higher plants but Pteridophytes are often ignored. In spite of the luxuriant growth of the plants in an around Arunachal Pradesh, North East India they had not been studied medicinally. The present study has been designed to assess the medicinal uses of 51 Pteridophyte species belongs to 28 families on the basis of field surveys and taxonomic identification of plants used by tribals of the Arunachal Pradesh of North Eastern India in their traditional methods of treatment of various diseases, and ailments like stomach disorders, poisonous bites, rheumatics cough, asthma, fever, diabetes, etc. are presented.

Keywords: Medicinal ferns, Arunachal Pradesh, North Eastern India

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In the plant world, Pteridophytes are said to be primitive vascular plants. They are found scattered all over the globe and quite many of them occur in India. However, they are not found through the country. The study of Pteridophytes which occupy a unique position between non-seed bearing and seed bearing plants is extremely fascinating from the angle of their phylogenetic and morphological characters. Pteridophytes make as important contribution to the earth's plant diversity. Being the second largest group of vascular plants, they form a significant and dominant component of many plant communities. Many ferns and fern allies growing luxuriantly on the Eastern Himalayas are threatened by continuous deforestation and frequent land slides. The Pteridophytes are known to man for more than 2000 yrs for their medicinal values. Theophrastus (327-287 BC) and Discorides (50 AD) had referred the medicinal attributes of certain ferns. Caius¹ is supposed to be the first man who has described the medicinal uses of some ferns of India. Besides Nayar² and Kaushik & Dhiman³ also reflected lights of medicinal uses of some pteridophytes of India.

Pteridophytes are used in Homeopathic, Ayurvedic, and Unani medicines, and provided insecticides, antibiotics, food and ornamentation but due to habitat destruction by man more than 10% of the 1200 fern species has become endangered. The need for the

hour is, therefore, that the habitat conservation or *in-situ* conservation of fern life to maintain the ecological balance. It has been observed that the forest play a vital role in the life and economy of the tribal people of our country. This is because of the fact that they generally depend upon the forest flora for their livelihood; collect and utilize many plants including Pteridophytes for food, fuel, fiber, oils, medicines and shelter.

The present article outlines a list of 51 medicinally useful Pteridophytes found in Arunachal Pradesh with their recent nomenclature, family and brief uses. It was during the field exploration for the last 2 yrs or so to various parts of the Arunachal Pradesh for the Pteridophytes collections and observation in various ways and in this process of coming in contact with the tribals it has become quite evident that investigation of the practical application of the study of Pteridophytes certainly yielded very interesting results.

Study area

The North eastern region of India, particularly the state of Arunachal Pradesh with an area of 83,743 km², is renowned for its biological richness. The state is located in the Eastern Himalayan Biodiversity hotspot and is also listed among the 200 globally important eco regions. The entirely area of

the state is mountainous and consists of the easternmost ranges of the Himalayas. It's bounded to China in the North, to Myanmar in the East and Bhutan in the West. Zoogeographically, Arunachal Pradesh is part of the oriental region and lies at the junction of the Indian and Indo-Chinese sub regions. The state's unique location at the Biogeographic realms further enriches the region's biodiversity⁴. The higher reaches of its mountains form the southern fringes of the Palearctic region. The climate varies from cold desert conditions on the northern facies and ranges with permanent snow to wet and humid southern slopes which receive 2500–5000 cm annual rain. The dissection of the mountain ranges by steep river gorges has presented considerable barriers to dispersal, and subsequent speciation amongst the flora and fauna. All these factors have resulted in Arunachal Pradesh being the abode of the richest assemblage of flora and fauna in India. The state is estimated to have nearly 50 % of the total flowering plant species in India⁵. It has been designated as a globally important endemic bird area, and of the about 1200 bird species in India, nearly 600 have been recorded from Arunachal Pradesh⁶. It is also home to 26 major and 100 odd minor indigenous tribal communities. These communities continue to be dependent on natural resources for food, medicine, traditional rituals and customs as well as a source of income for livelihood.

Materials and methods

The present work is mainly based on materials collected from this study area is very significant for botanical studies owing to the dominance of different tribal communities like *Apatani*, *Nyishis*, *Monpas*, *Mijis* and *Khowas*. More than 300 specimens of Pteridophyte were collected from the study area through repeated visits in different seasons in different years. In addition to investigation on taxonomic aspects, the association of Pteridophytes with the local inhabitants was also considered. For this purpose, a close relationship was built up with local knowledgeable persons and medicine men, and information was collected through interviewing them using pre-tested questionnaire, and, in some cases, through short-term participant observation. Plants were collected from the field as noted by the informants and were preserved as voucher specimens. Information on plant parts used and local uses was recorded on the labels of herbarium sheets. The identification of specimens was confirmed by

consulting available literature and specimens preserved in the herbarium (ARUN) of Botanical Survey of India, Arunachal Pradesh Regional Centre, Itanagar.

Enumerations

For the presentation of data, all the medicinally important Pteridophyte species are arranged alphabetically followed by plant family, field number and brief note on medicinal uses. At the end of each use reference to source of information is given.

Adiantum capillus veneris Linn. (Adiantaceae)

It is used as an stimulant, febrifuge, expectorant, purgative, demulcent, emollient tonic and hair tonic. It has anticancerous, hypoglycaemic, aphrodisiac, antibacterial, antifungal and antiviral properties⁷.

Adiantum lunulatum Burm. (Adiantaceae) (Fig. 7) (ARUN 22540)

It used in blood related diseases, in epileptic fits and in rabies; rhizomes prescribed for strangery and in fever due to elephantiasis. Fronds are burnt in oil and applied to itch. The decoction of leaves and roots are used for the treatment of chest complaints in Malaya².

Adiantum caudatum L. (Adiantaceae) (ARUN 22493)

It is used in skin diseases, diabetes, cough and fever^{8,9}.

Ampelopteris prolifera (Retz.) Copel. (Thelypteridaceae)

The fresh tender fronds are eaten cooked as vegetable in Arunachal Pradesh. Fronds are aperients, alterative¹⁰.

Angiopteris evecta (Forst.) Hoff. (Angiopteridaceae) (ARUN 22443)

Leaf extract is used in the treatment of dysentery and diseases of blood ulcers. Spores are said to be effective in the treatment of leprosy and other skin diseases^{11,12}.

Asplenium nidus Linn. (Aspleniaceae) (Fig. 6) (ARUN 22516)

The rootstock is considered effective against fever and elephantiasis. It is used as an emollient, in coughs and diseases of the chest. Leaf is smoked to treat colds^{13,6}.

Blechnum orientale Linn (Blechnaceae) (ARUN 22528)

Fresh fronds are used as a poultice for boils in Malaya; rhizome is used as an anthelmintic in China, as cure for intestinal wounds. Fronds are also used for urinary bladder complaints in India and Polyneisa and as a diaphoretic, aromatic and aperative in Phillipines¹⁴.

Botrychum lanuginosum Wall. ex Hook & Grev.(Botrychiaceae) (Fig. 2) (ARUN 26483)

Plant is antidysentric and antibacterial⁶.

Ceratopteris thalictroides (L).Ad. Brongn. (Parkeriaceae)

The fronds are used as poultice in skin diseases. They are reported to be toxic and styptic⁶.

Cheilanthes tenuifolia (Blume f) Sw (Cheilanthaceae) (ARUN 22701)

Tribals use the extract of rhizome and roots as a general tonic¹⁴.

Cheilanthes farinosa (Forsk.) Kaulf. (Cheilanthaceae) (ARUN 23000)

Roots are used to treat eczema and stomachache; fronds are used to treat menstrual disorders⁹.

Cibotium barometz (L.) J. Smith.(Dicksoniaceae)

Rhizomes are vermifuge, roots used as tonic and in lumbago; paleae have the property of rapidly coagulating blood and have been used as styptic¹⁴.

Thelypteris arida (D. Don) C.V. Morton. (Thelypteridaceae)

Roots are used in veterinary medicine and fronds are used as vegetable⁹.

Thelypteris parasitica (L.) Tardieu (Thelypteridaceae)

Fronds are used medicinally to treat gout and rheumatism⁹.

Cyrtomium falcatum (L. f.) Presl. (Dryopteridaceae) (ARUN 22044)

Rhizomes have anthelmintic properties and are chiefly used for expulsion of tapeworms¹⁵.

Dicranopteris linearis (N. Burm) Underw.var *normalis* Sensu Holttum (Gleicheniaceae) (ARUN 22809)

Rhizome are anthelmintic; fronds used for asthma; rachis used for making mats, chairs, seats, pouches, cape, fishing traps, baskets,belts, etc. Fronds are used as an ingredients for making local beverages²³.

Diplazium esculentum (Retz.) Sw. (Athyriaceae) (ARUN 22457)

Decotion prepared from rhizome and young leaves are used for haemophytosis and cough in Phillipines¹⁰. In Arunachal Pradesh tender fronds are sold in markets as vegetables¹⁵.

Drynaria quercifolia (L.) J. Sm. (Polypodiaceae) (ARUN 22853)

The rhizome is bitter, it is used as an antibacterial, anodyne, constipating, anti-inflammatory tonic, in the treatment of typhoid fever, phthisis, dyspepsia, cough, arthralgia, cephalalgia, diarrhoea, fould ulcers and other inflammations¹⁴. It is very specific in the treatment Migraine. The decoction of the plant is used in typhoid fever and is also used as an anthelmintic, pectoral, expectorant, tonic, dyspepsia and astringent. Fronds are useful in poulticing swellings¹⁶.

Dryopteris cochleata (Ham ex D. Don) C. Chr. (Dryopteridaceae) (Fig. 9) (ARUN 22082)

The whole plant is crushed in a bowl and the extract is given (twice a day) orally in case of snake-bite, besides, a paste of the plant is also applied on the bite wound to prevent infection. The rhizome is antibacterial and antiepileptic. The rhizome of the plant is powdered and taken with water (twice a day) in rheumatism, epilepsy and leprosy. Juice of roots (about 2 tea spoonful twice a day before meal) is given to treat amoebic dysentery^{17, 6, 18, 19}.

Dryopteis sparsa (D. Don) Kunze. (Dryopteridaceae) (ARUN 22603)

Plant is used as an anthelmintic⁹.

Equisetum ramosissimum Desf. (Equisetaceae) (ARUN 22567)

Powdered stem dissolved in water is used for enema during stomach disorders in children. Baren women drink rhizome decoction to facilitate fertilization in South Africa. Plant is known to have diuretic, haemostatic, haemorpritic, antiheumatic, antifungal and antiviral properties²⁰. A few pieces of the branches mixed with leaves of other specific plants and made into a paste is used as local application for the treatment of fracture and the dislocation of bones²¹.

Helminthostachys zeylanica (L.) Hook. (Helminthostachyaceae) (Fig. 3)

The fronds are reported to be a aperient, intoxicant, anodyne, also used in sciatica, as an antiviral,

antipyretic, anti inflammatory and intoxicant^{8,14}. The rhizome is used in dysentery, catarrh, sciatica, malaria and also as a tonic and mild aperient. A decoction of the plant is given for curing impotency and the juice of the leaves is used to relieve blisters on the tongue^{9,10}. The decoction of rhizome is used for the treatment of impotency, whooping cough, phthisis. In combination with the roots of *Chlorophytum tuberosum* and roots of *Bombax ceiba* made into a paste when applied for one month to relieve waist pain and used also as a tonic. A paste of the rhizome, curd and crushed termite is known to promote strength and vitality. The powder of the rhizome is given for spermatorrhoea and for improving memory power^{6,22}.

Hypodematium crenatum (Forssk.) Kuhn. (Dryopteridaceae) (ARUN 22343)

The plant is used to cure gynaecological disorders. There is a superstition among the tribals of Central India that the scales of the fern are useful against witchcraft or the evil eye. Rhizome is used as an antibacterial agent¹⁵.

Hypolepis punctata (Thunb.) Mett. (Hypolepidaceae) (ARUN 22896)

Fronds are used for poultice boils⁹.

Lycopodiella cernua (L.) Pic. Serm. (Lycopodiaceae) (Fig. 1) (ARUN 22521)

The decoction of the plant is given in beri beri, cough, chest complaints; embrocation of the ashes in vinegar for skin eruptions. The rhizome is used for nervous disorders, rheumatism and also given in fever and dropsy⁷.

Lycopodium pseudoclavatum Ching. (Lycopodiaceae) (ARUN 22633)

Spores are used as dusting powder, for sound experiments in physics, absorbent in excoriation of the skin, base for medicated snuff, covering pills to prevent adhesion, for dyspepsia, in constipation with flatulence, hepatic congestion and pustular skin eruptions. In homeopathy it is used against disorders of chest, urinary passage, against rheumatism, cramps and varicella. The powders are employed in fireworks, flash light on the stage, as dusting powder for sand moulds for fine casting. It contains fatty oil. The alkaloids lycopodine, clavatine and clavotoxine have been isolated²³.

Lygodium flexuosum (L.) Sw. (Lygodiaceae) (ARUN 22208)

Plant is used as an expectorant. Rhizome boiled with mustard oil locally applied to carbuncle and in the treatment of rheumatism, sprains, scabies, ulcers, eczema and coughs⁸. The aqueous extract of the rhizome is used for the treatment of gonorrhoea. The part of the rhizome is applied on piles and rhizome is also tied on the waist⁶. The plant is used to pleurisy⁹.

Lygodium microphyllum (Cav.) R. Br. (Lygodiaceae) (ARUN 26088)

Leaf decoction is given in dysentery. It is used as one of the ingredients in many lotions. Leaves are applied in the form of poultices for skin diseases and swelling. Crushed leaves are used to cure hiccup⁷.

Microsorium punctatum (L.) Copel. (Polypodiaceae) (ARUN 22579)

Leaf juice is used as a purgative, diuretic and for healing wound²⁰.

Nephrolepis auriculata (L.) Trimen (Nephrolepidaceae) (ARUN 22578)

Tubers are edible and decoction of the fresh frond given in cough²³.

Nephrolepis cordifolia (L.) Pr. (Nephrolepidaceae) (ARUN 45447)

The rhizome is reported to be antibacterial and is used in cough, rheumatism, chest congestion, nose blockage and loss of appetites. Pinnae are anti-tussive, styptic, antifungal used in coughs, wounds and for the treatment of jaundice, a decoction of the fresh frond is given as a drink⁶.

Nephrolepis biserrata (Sw.) Schoott. (Nephrolepidaceae) (Fig. 4) (ARUN 70297)

Young shoots and rhizome are eaten as vegetable²³.

Osmunda regalis L. (Osmundaceae) (ARUN 22985)

Fronds are used as tonic, styptic and also for rickets, rheumatism and for intestinal gripping¹⁴. The rhizome is used as abortifacient⁹.

Oleandra wallichii (Hook_Presl) (Oleandraceae) (Fig. 5) (ARUN 26234)

Rhizome is rejuvenating, used by the aged¹⁰.

Onychium siliculosum (Desv.) C.Chr. (Pteridiaceae)
(ARUN 22561)

Decotion of the fronds are used in dysentery⁹.

Onychium japonicum (Thunb.) Kunze (Pteridiaceae)
(ARUN 22688)

Juice of crushed leaves prevent falling of hairs¹⁴.
Leaves and rhizomes contain glycoside which yields
kaempferol and rhamnose on hydrolysis and used for
indoor decoration¹⁰.

Odontosoria chinensis (L.) J. Smith (Lindsaeaceae)
(ARUN 22525)

Leaves are used internally for chronic enteritis in
Mauritius¹⁴.

Pityrogramma calomelanos (L.) Link. (Pteridiaceae)
(ARUN 22563)

Plant decoction is used for kidney in the
Philippines, tea prepared out of frond is used as a cure
for flu, hypertension, fever and cough in Trinidad.
The rhizomes are considered anthelmintic in South
Africa. A decoction of the frond is taken for boils in
the mouth and nose. The fronds are also used for
asthma and cold and chest congestion¹⁴.

Psilotum nudum (L.) P. Beauv (Psilotaceae)

The oily spores are given to infants to arrest
diarroehea. The juice of the herb showed antibacterial
activity against *Miicrococcus pyogenes* and
Pseudomonas nerugionsa and also used as a
purgative⁷.

Pteridium revolutum (Blume) Nakai (Pteridiaceae)
(ARUN 22511)



Fig. 1—*Lycopodiella cernua* (L.) Pic. Serm; Fig. 2—*Botrychum lanuginosum* Wall. ex Hook & Grev; Fig. 3—*Helminthostachys zeylanica* (L.) Hook.; Fig. 4—*Nephrolepis biserrata* (Sw.) Schoott.; Fig. 5—*Oleandra wallichii* (Hook_Presl); Fig. 6—*Asplenium nidus* Linn.; Fig. 7—*Adiantum lunulatum* Burm.; Fig. 8—*Pteris wallichiana* J. Agardh; Fig. 9—*Dryopteris cochleata* (Ham ex D. Don) C. Chr.

Rhizome is astringent, anthelmintic and is useful in diarrhoea and for the treatment of inflammation in the gastric and intestinal mucous membranes. Decoction of rhizome and frond is given for the chronic disorders of viscera and spleen. Rhizome is boiled in oil and is made into an ointment for healing wounds. Fronds are reported to be poisonous and sometimes fatal to the grazing animals. The fern is commonly known as 'bracken fern' with varied economic uses¹⁴.

Pteris cretica L. Pteridaceae) (ARUN 22504)

The fronds are antibacterial, which are made into a paste and applied in wounds⁶.

Pteris vittata L. (Pteridaceae) (ARUN 22572)

Plant extract is used as demulcent, hypotensive, tonic, antiviral and as antibacterial⁶.

Pteris wallichiana J. Agardh (Pteridaceae) (Fig. 8) (ARUN 22569)

Fresh leaves are crushed and applied to stop bleeding and healing of wounds⁹.

Pteris ensiformis Burm. f. (Pteridaceae) (ARUN 22883)

Young fronds are eaten as a flavouring; decoction of fresh frond is given against dysentery; juice of rhizome is applied to glandular swelling of the neck⁹.

Pyrrosia adnascens (Sw.) Ching. (Polypodiaceae) (ARUN 22571)

Fronds are used medicinally to treat dysentery and burn injuries⁹.

Selaginella involvens (Sw.) Spring (Selaginellaceae) (ARUN 22589)

The ladies use powder of the spore as a substitute to vermilion powder, the 'Sindoor' in Nepali language¹⁹. Plant is considered to help to rejuvenate life, also used in the prolapse of rectum, prevents cough, bleeding piles, gravel aminorrhoea and as an antibacterial⁶.

Stenochlaena palustris (Burm. f.) Bedd. (Stenochlaenaceae) (ARUN 22844)

Fronds are antibacterial, given for the treatment of fever, skin diseases, throat and gastric ulcers. Leaves and rhizomes are used as a cooling agent and in the treatment of burns and ulcers⁶.

Thelypteris caudipinna Ching (Thelypteridaceae)

Juice of rhizome (about 3 teaspoonfull thrice a day) is given in case of fever by Nepalese¹⁹.

Tectaria coadunata (J.Sm.) C. Chr. (Dryopteridaceae) (ARUN 22543)

The plant is antibacterial, used in asthma, bronchitis, stings of honeybee⁶. Extract from fresh rhizome is used for preventing diarrhea in children in Darjeeling District. The cooked tender portion is used for the curing stomach trouble¹⁴.

Tectaria polymorpha (Wall ex Hook). Copel. (Dryopteridaceae) (ARUN 22855)

The plants are considered as anthelmintic¹⁴.

Vittaria elongata Sw. (Vittariaceae) (ARUN 22632)

Fronds are used to treat rheumatism⁹.

Conclusion

Pteridophytes make an important contribution to the earth's plant diversity. They form a significant sometimes, dominant component of many plant communities. The present study had been designed to assess the medicinal uses of 51 Pteridophyte species belongs to 28 families for different diseases, collection from the Arunachal Pradesh are presented in this paper. This information serves as a base for new compounds with active principles for phytochemical, pharmacognostical, and clinical research, indigenous people use many of the Pteridophytic medicinal plants traditionally for treating their common ailments like stomachache, diarrhea, dysentery, skin problems, etc.. The data collected show that majority of the remedies are taken orally. People use these plants in different form such as juice, extract, decoction, paste, etc. Generally the people of the study area still have a strong belief in the efficacy and success of herbal medicine. At present a number of taxa in ferns and fern allies species have been eradicated or lost due to deforestation and by setting fire to the forest in Arunachal Pradesh. It is concluded that Arunachal Pradesh is rich in wild Pteridophytes and the tribal communities in remote areas are still dependent on indigenous knowledge for health care. The existing deforestation and habitat fragmentation would pose a serious threat to the growth of wild plants. Efforts should be made to conserve them in nature so that they can be used for the benefit of human welfare.

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