Indian Journal of Traditional Knowledge
Vol. 6(4), October 2007, pp. 611-618

Medicinal pteridophytes from the Western Ghats

Benjamin A & Manickam V S*

Centre for Biodiversity and Biotechnology, St Xavier's College (Autonomous), Palayamkottai 627 002, Tamil Nadu

Email : tvl_cbbsxc@sancharnet.in

Received 2 November 2005; revised 13 June 2006

Medicinal uses of 61 pteridophyte species belongs to 31 families used by tribals of the Western Ghats of India in their traditional methods of treatment of various diseases and ailments like stomach disorders, poisonous bites, rheumatics, cough, asthma fever and diabetes, etc. are presented.

Keywords: Western Ghats, Medicinal plants, Pteridophytes
IPC Int. Cl.[8]: A61K36/00, A61P1/00, A61P1/02, A61P1/04, A61P1/08, A61P1/10, A61P1/14, A61P1/16, A61P9/14, A61P11/00, A61P11/06, A61P11/10, A61P15/00, A61P17/00, A61P19/00, A61P19/04, A61P21/00, A61P29/00, A61P31/02, A61P35/00, A61P39/02

Man has been using plants as a source of food, medicine and many other necessities of life since time immemorial. Even now the primitive tribal societies depend largely on the plant life in their surroundings. Though economic and medicinal values of higher plants, especially the angiosperms have been investigated, pteridophytes have been unfortunately ignored. Pteridophytes make as important contribution to the earth's plant diversity. Being the second largest group of vascular plants, they form a significant, dominant component of many plant communities. Many ferns and fern allies growing luxuriantly on the Western Ghats slopes are threatened by continuous deforestation and frequent land slides. Medicinal uses of some ferns and pteridophytes of India have been described[1,2]. During the field exploration of various parts of the country (Himalayas Central India and Western Ghats), pteridophytes yielded very interesting results. 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, and collect and utilize many plants including Pteridophytes for food, fuel, fiber, oils, medicine and shelter. Thus, the ethnobotanical surveys and studies were conducted in the mountainous regions of various parts of the country among the tribal communities and medicine man. Further, the information on the economic utility of this group of plants clearly indicated that the pteridophytes are of immense economic importance and there is a great need for their exploitation towards the economic utility in daily life[3-19]. The paper enumerates 61 useful pteridophytes with their distribution and uses.

Methodology

Western Ghats, a chain of mountains of 1600 km in length running parallel to the West coast of Peninsular India from the river valley in Tapti (Gujarat) to Kanyakumari (Tamil Nadu), the southern tip of the Peninsular India (Fig. 1). The region lies between 8° 20′-8°40′ North latitude 73° 77′ East longitude and is almost a narrow strip of land with an average altitude ranging from 200-1,500 m. The mountain chain is a part of the Indian plateau of Gondwana land origin. The flora of Indian plateau was subjected to different climatic stress during its passage from southern latitude (c.100 m BP) resulting in the impoverishment of its palaeotropic flora[20,36]. The biogeographical province of the Western Ghats covers 16,000 sq km^2 of which about 100,000 from mountainous terrain. The Western Ghats traverses the states of Tamil Nadu, Kerala, Karnataka, Goa, Maharastra and Southern Gujarat. The Western Ghats to a large extent presides over the ecology and biogeography of Peninsular India[22]. The mountainous chains of the Western Ghats in the states of Maharashtra are steep on the windward side and sloping towards the Deccan plateau on the leeward side, while this gradient is reversed South of the Palghat gap. The Western Ghats South of the Palghat gap are sloping towards the

*Corresponding author

Fig. 1 — Location map of the study area

windward side in Kerala and while they are steep in the leeward side of Tamil Nadu. The highest mountain peaks are Palni (1,880 m), Anaimudi (2,695 m) Agasthiyamalai (1,869 m), Doddabetta (2,637 m) and Mahabaleshwar (1,087 m).

Enumeration

Western Ghats is a natural reservoir of large number of medicinal plants. Some of the important medicinal pteridophytes (Figs 2-13) in the Western Ghats have been enumerated:

Acrostichum aureum Linn. (Pteridaceae)

Rhizome paste is applied to heal the wounds and boils. It is also used as anthelmintic, vulnery, healing inveterate ulcers, and bladder complaints in China. Fertile fronds are used for syphilitic ulcers in Borneo. Fronds are used as an antifungal agent[23].

Actinopteris radiata (Sw.) Link (Actinopteridaceae)

Plant is bitter having the properties like styptic, anthelmintic, astringent sweet, cooling, acrid and febrifuge. It is used in the treatment of severe conditions of *kapha* and *pitta*, diarrhoea, dysentery, helminthiasis, haemopstysis and fever[24].

Adiantum capillus veneris Linn. (Adiantaceae)

It is used as stimulant, febrifuge, expectorant, purgative, demulcent, emollient tonic and hair tonic. It has anticancerous, hypoglycaemic, aphrodisiac, antibacterial, antifungal and antiviral properties[25].

Adiantum caudatum Linn. (Adiantaceae)

Fronds extract is effective in wound healing[26].

Adiantum lunulatum Burm. (Adiantaceae)

Leaf and root decoction is used for the treatment of chest complaints in Malaya[2].

Adiantum poiretii Wikstr (Adiantaceae)

Leaves are used to cure coughs, fever, diabetes and skin diseases in Philippines[2].

Angiopteris evecta (Forst.) Hoff. (Angiopteridaceae)

Leaf extract is used in the treatment of dysentery. Spores are effective in the treatment of leprosy and other skin diseases[27,28].

Asplenium nidus Linn. (Aspleniaceae)

Rootstock is considered good for fever and elephantiasis. Used as an emollient, in cough and chest diseases. Leaf is smoked to cure cold[27,30].

Asplenium polydon G.Foster var *bipinnatum* (Sledge) Sledge. (Aspleniaceae)

Plant is used to promote parturition. Plant is anticancerous. The fresh crosiers paste prepared on granite is applied to the tumour[25].

Blechnum orientale Linn. (Blechnaceae)

Fresh fronds are used as poultice for boils in Malaya; used for urinary bladder complaints in India and Polynesia; diaphoretic, and aromatic in Philippines[21]. Rhizome is used as anthelmintic in China and as cure for intestinal wounds.

Botrychum lanuginosum Wall.ex Hook & Grev. (Ophioglossaceae)

Plant is antidysentric and antibacterial[30].

Ceratopteris thalictroides (L) Brongn (Parkeriaceae)

Fronds are used as poultice in skin diseases; reported to be toxic and styptic[30].

Fig.1 *Christella parasitica* (L.) Lev.

Fig.2 *Blechnum orientale* Linn.

Fig.3 *Angiopteris evecta* (Forst) Hoff.

Fig.4 *Alsophilla gigantea* (Wall. ex Hook) Holtt

Fig.5 *Actinopteris radiata* (Sw.) Link

Fig.6 *Asplenium nidus* Linn.

Fig.7 *Adiantum lunulatum* Burm.

Fig.8 *Equisetum ramosissimum* Desr.

Fig.9 *Hypodermatium crenatum* (Forsk.) Kuhn.

Fig.10 *Marattia fraxinea* Sw.

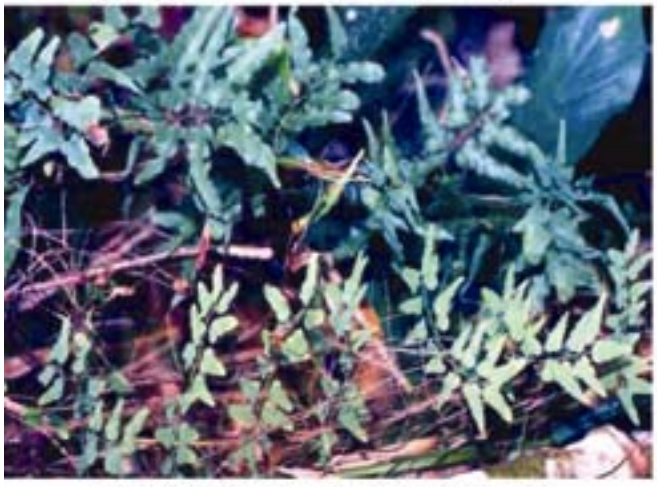

Fig.11 *Lygodium microphyllum* (Cav.) R. Br.

Fig.12 *Helminthostachys zelanica* (L.) Hook

Cheilanthes tenuifolia (Blume.f) Sw (Cheilanthaceae)

Tribals use rhizome and root extracts as a general tonic[15].

Christella parasitica (L.) Lev. (Thelypterdiaceae)

It is used in the treatment of gout and rheumatism.

Alsophlla gigantea (Wall.ex Hook) Holtt. (Cyatheaeceae)

Fronds are anti-inflammatory, rhizome is used against snakebite.

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

Rhizome is bitter, it is used as antibacterial, anodyne, constipating, antiinflammatory, tonic, in the treatment of typhoid fever, phthisis, dyspepsia, cough, arthralgia, cephalalgia, diarrhoea, ulcers and other inflammations. It is very specific in the treatment of migraine. The decoction of the plant is used in typhoid fever and is also used as anthelmintic, pectoral, expectorant, tonic, dyspepsia and astringent. Fronds are useful in poulticing swellings[21,24].

Pyrrosia heterophylla (L.) Price (Polypodiaceae)

Used as a cooling agent for the treatment of swellings, sprains, etc. and also for relieving pain[2].

Dryopteris cochleata (Ham ex D. Don) C. Chr. (Dryopterdiaceae)

Whole plant extract is given twice daily orally in case of snakebite. Plant paste is also applied on the bite wound to prevent infection. The rhizome is antibacterial and antiepileptic. A small portion of powdered rhizome is taken with water twice daily in rheumatism, epilepsy and leprosy. Root juice 92 tea spoonfuls) twice a day before meal is given to treat amoebic dysentery[30-33].

Equisetum ramosissimum Desr. (Equisetaceae)

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, antirheumatic, antifungal and antiviral properties. Paste of branches with leaves is used as local application for the treatment of fracture and the dislocation of bones[10,34].

Helminthostachys zeylanica (L.) Hook., (Ophioglossaceae)

The fronds are reported to be anodyne, antiviral, antipyretic, antiinflammatory and intoxicant. The rhizome is used in sciatica, dysentery, catarrah, sciatica, malaria and also as a tonic. Plant decoction is given for curing impotency and leaf juice is used to relieve tongue blisters. Rhizome decoction is used for the treatment of impotency, whooping cough, and phthisis. Paste of *Chlorophyum tuberosum* rhizome and *Bombax ceiba* roots is applied for one month to relieve waist pain and also used as a tonic. Rhizome paste, curd and crushed termite is known to promote strength and vitality. Rhizome powder is given for spermatorrhoea and for improving memory power[19,21,35].

Parahemionitis arifolia (Burm.) Moore (Hemionitidaceae)

The fronds are used in the treatments of aches and as a vermifuge. Crushed juice is used in burns, menstrual disorders, as antifertility and antiflatulence agent. Rhizome has antibacterial property.

Hymenophyllum javanicum Spring. (Hymenophyllaceae)

The local people smoke the dried plant mixed with garlic and onions to cure headache[25].

Hypodematium crenatum (Forssk.) Kuhn. (Dryopteridaceae)

Rhizome is used as an antibacterial agent. Leaves are used to facilitate conception in women.

Hypolepis glandulifera Brownsey et Chionnock. (Thelypteridaceae)

The fronds are used for poultice for boils in Malaysia[25].

Isoetes coramandeliana L.f. (Isoetaceae)

Plant gives out a melancholy fluid used by the Europeans in the treatment of spleen and liver diseases[10].

Leucostegia immersa (Wall. ex Hook) Presl. (Davalliaceae)

Rhizome paste is applied on boils in Nepal. Rhizome is antibacterial and is also used in constipation.

Lygodium flexusoum (L.) Sw. (Lygodiaceae)

Plant is used as expectorant. Rhizome boiled with mustard oil is locally applied to carbuncle and in the treatment of rheumatism, sprains, scabies, ulcers, eczema and coughs. Aqueous rhizome extract is used for the treatment of gonorrhea. Rhizome is applied for

piles, herpes and is also tied on the waist; plant juice (about 3 teaspoonfuls twice a day) is given to relieve fever. It is an antiovulatory and also used in the treatment of jaundice[19,21,33].

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

Leaf decoction is given in dysentery. Leaf poultices are applied for skin diseases and swelling. Crushed leaves are used to cure hiccough[25].

Marattia fraxinea Sw. (Marattiaceae)

Plant extract is used as a remedy for ankylostomiasis in Usambara and South Africa[10].

Marsilea minuta Linn. (Marsileaceae)

Plants are used in cough, spastic condition of leg, muscles, etc. and also in sedatum and insomnia. Plant is sweet, astringent, refrigerant, acrid, diuretic, emollient, anodyne, ophthalmic, constipating, expectorant, aphrodisiac, depurative and febrifuge. It is useful in psychopathy, opthalmia, strangury, diarrhoea, leprosy, skin diseases, haemorrhoids, dyspepsia and fever[24].

Microsorum punctatum (L.) Copel. (Polypodiaceae)

Leaf and juice are used as purgative, diuretic and for healing wound[10].

Nephrolepis cordifolia (L.) Pr. (Oleandraceae)

Rhizome is antibacterial and is used in cough, rheumatism, chest congestion, nose blockage and loss of appetites. Pinnae are antitussive, styptic, antifungal used in coughs, wounds and for the treatment of jaundice, fresh fronds decoction is given as a drink[30].

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

Leaves are used internally for chronic enteritis in Mauritius[21].

Oleandra musifolia (Bl.) Presl. (Oleandraceae)

A decoction of stipe is considered to be an emmenagogue; rhizome is used in snakebite in Philippines. Plant is also used as an anthelmintic[10].

Ophioglossum gramineum Willd. (Ophioglossaceae)

Plant yields a mucilaginous and astringent decoction is used in angina. The fronds are considered toxic and styptic and are used in contusions, wounds and haemorrhages. Tribals use warm rhizome decoction as a lotion for boils. It is also known to have antibacterial, anticancerous, antiseptic, detergent and vulnerary properties[25,30].

Ophioglossum reticulatum Linn. (Ophioglossaceae)

Used as a cooling agent and in the treatment of inflammations and wounds. Fronds are used as tonic and styptic. Used in contusions and haemorrages[30].

Osmunda hugeliana Presl. (Osmundaceae)

Fronds are used as tonic, styptic and also for the treatment of rickets, rheumatism and for intestinal gripping[2,21].

Phlebodium aureum (L.) J. Sm. (Polypodiaceae)

In Mexico, rhizome is used for the treatment of cough, fever and reported to be sudorific[30].

Pitryrogramma calomelanos (L.) Link. (Hemionitidaceae)

Plant decoction is used for renal disorders in the Philippines. Tea prepared out of frond is used as a cure for hypertension, fever and cough in Trinidad. Rhizomes are considered anthelmintic in South Africa. Frond decoction is taken for boils in the mouth and nose. Fronds are also used for asthma, cold and chest congestion[21].

Pleopeltis macrocarpa (Bory ex Willd.) Kaulf. (Polypodiaceae)

Decoction of fronds is used for cold, sore throat and itches in South Africa. Rhizome is used as a febrifuge and for the treatment of coughs in Mexico and Guatemala[10].

Polystichum moluscens (Bl.) T. Moore (Dryopterdiaceae)

The sporophyll extract is an antibacterial agent[30].

Polystichum squarrosum (D. Don) Fee (Dryopterdiaceae)

The sporphyll extract is used as an antibacterial agent[30].

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

Oily spores are given to infants to arrest diarrhoea. Herb juice showed antibacterial activity against *Miocrococcus pyogenes* and *Pseudomonas nerugionsa* and also used as a purgative[25].

Pteridium aquilinum (L.) Kuhn. v. Deck (Pteridiaceae)

Rhizome is astringent, anthelmintic and is useful in diarrhoea and for the treatment of inflammation in the gastric and intestinal mucous membranes. Decoction of rhizomes and fronds is given for chronic disorders of viscera and spleen. Rhizome boiled in oil and made into an ointment is used 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 uses[21].

Pteris cretica Linn. (Pteridaceae)

Fronds are antibacterial; made into a paste is applied in wounds[30].

Pteris quadiaurita Retz. (Pteridaceae)

Rhizome paste is applied to take out the pus and hasten the healing of boils.

Pteris vittata Linn. (Pteridaceae)

Plant extract is used as demulcent, hypotensive, tonic, antiviral and antibacterial[30].

Pyrrosia lanceolata (L.) Farewell (Polypodiaceae)

Plant decoction is used in South Africa for curing colds and sore throats. In Mexico, a tea prepared from the fronds is used as itch guard[25].

Salvinia molesta Mitch. (Salviniaceae)

Plant used as an antifungal agent.

Selaginella delicatula Desv. ex Poir. (Selaginellaceae)

Plant juice is antibacterial and is used for healing of wounds by the tribals at Nilambur[2].

Selaginella involvens (Sw.) Spring (Selaginellaceae)

Ladies use spore powder as a substitute to vermilion powder (*Sindoor* in Nepali language). Plant is considered to help to rejuvenate life, also used in the prolapse of rectum, prevents cough, bleeding piles, gravel amenorrhoea and as antibacterial[30,33].

Selaginella radicata (Hook. & Grev.) Spring (Selaginellaceae)

Fronds are used as antibacterial agent[30].

Sphaerostephanos unitus (L.) Holtt (Thelypteridaceae)

Rhizome extract is used as antibacterial agent[30].

Stenochlaena palustris (Burm. f.) Bedd. (Blechnaceae)

Fronds are antibacterial, given for the treatment of fever, skin diseases, throat and gastric ulcers. Leaves and rhizomes are used as cooling agent and in the treatment of burns and ulcers[30].

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

Plant is antibacterial; used in asthma, bronchitis, stings of honeybee. Fresh rhizome extract is used for preventing diarrhoea in children in Darjeeling district. Cooked tender portion is used for curing stomach trouble[21,30,33].

Tectaria wightii (Clarke) Ching (Dryopteridaceae)

Rhizome is anthelmintic[21].

Trignospora caudipinna (Ching) Sledge (Thelypteridaceae)

Rhizome juice (about 3 teaspoonfuls thrice a day) is given in case of fever by Nepalese[33].

Vittaria elongata Sw. (Vittaceae)

Tribals of Andaman Islands use leaves of this fern for the treatment of rheumatism[30].

Conclusion

Pteridophytes, 'the ferns and fern-allies' as they are called are of great medicinal values. In addition to this, quite a number of them are used as food, shelter and ornamentals. These are highly prized as foliage ornamentals due to their beauty and grace whether indoors or outdoors. Researchers have stressed the need of conservation of the various pteridophytes[37]. In Western Ghats, quite a number of taxa of ferns and fern allies recorded earlier from various regions have been eradicated or lost in the recent years. Moreover, population densities have also considerably decreased. This is primarily due to deforestation, with the result that quite a number of species have been lost and many have become endangered ones. Therefore, the exploitation of the ferns and fern allies for their economic utility including ornamental use must be done, but at the same time care should be taken for their conservation. In view of this, it is suggested that rare species of ferns and fern allies should be protected from merciless collection and destruction in the hills and cultivation & propagation of the pteridophytes be given special attention so that we are not deprived of the economic value of this unique group of plants. If these guidelines can be followed strictly and if we can maintain our biodiversity, further studies on pteridophytes can bring many more medicinally important species to light.

References

1 Caius JF, The medicinal and poisonous ferns of India, *J Bombay Nat Hist Soc*, (1935) 341-361.
2 Nair BK, Medicinal ferns of India, *Bull Nat Bot Gard*, Lucknow, 29 (1959) 1-36.
3 Bailey FM, Sporocarps and cake of *Nardoo* (*Marsilea drummondii*), *Kew Bull*, 69 (1892) 216.
4 Bancroft TL, On the habit and use of the *Nardoo* (*Marsilea drummondii*), *Proc Linn Soc*, NSW, 118 (1893) 215.
5 Benedict RC, Fern hats and fern cigars, *Amer Fern J*, 5 (1915) 7-9.
6 Good R, *Plants and Human Economics*, (Cambridge University Press, Cambridge), 1933.
7 Fosberg FR, Uses of Hawaiian ferns, *Am Fern J*, 32 (1942) 15-23.
8 Lewis W & Lewis M, *Medical Botany*, (John Wiley & Sons, New York), 1977.

9 Lloyd RM, Ethnobotanical uses of California Pteridophytes by Western Indians, *Am Fern J*, 54 (1964) 76-82.

10 May LW, The economic uses and associated folklore of ferns and fern allies, *Bot Rev*, 44(4) (1978) 491-528.

11 Morton CV, The use of climbing fern *Lygodium* in weaving, *Am Fern J*, 56 (1966) 79-81.

12 Thurston V, The Uses of Vegetable Dyes, (Dryad Press, Lewons Mard, Bristol), 1970.

13 Turner N & Bell MAM, Ethnobotany of the southern Kawakiuti Indians, *Econ Bot*, 27 (1971) 257-310.

14 Chopra RN, Nayar SL & Chopra IC, Glossary of Indian Medicinal Plants, (Publications & Information Directorate, New Delhi), 1956.

15 Dixit RD, Ferns - a much neglected group of medicinal plants – III, *J Res Indian Med*, 9(4) (1974) 59-68.

16 Kaur R, Yadav BC & Bhardwaja TN, A comparative investigation of amino acids and free praline of some Rajasthan ferns, *Bionature*, 6 (1986) 42-46.

17 Singh PK, *Azolla* fern plant as rice fertilizer and chicken feed *Kerala*, *Karshakan*, 26 (1977) 5-6.

18 Kachroo P, Handbook of Fern Gardening, (Indian Council of Agricultural Research, New Delhi), 1968.

19 Singh KK, Saha S & Maheswari JK, Ethnomedicinal uses of some ferns amongst the tribals of Uttar Pradesh, *Indian Fern J*, 6 (1989) 62-67.

20 Nayar MP, Centers of development and patterns of distribution of the family Melastomataceae in Indomalasia, *Bull Bot Surv India*, 14 (1972) 1-12.

21 Dixit RD & Vohra JN, A Dictionary of the Pteridophytes-Flora of India series-4, (Botanical Survey of India, Howrah), 1984.

22 Nayar NC & Daniel P, The floristic diversity of the Western Ghats of South India and its conservation- *A* Review, *Proc Indian Acad Sci Suppl*, 1986, 127-163.

23 Dixit RD, Selaginellaceae of India, (Bishen Singh and Mahendra Pal Singh, Dehradun), 1992.

24 Warrier PK, Nambiar VPK & Raman Kutty C, Indian Medicinal Plants, 5 Vols, (Orient Longman Ltd), 1996.

25 Manickam VS & Irudayaraj V, Pteridophytes flora of the Western Ghats of South India, (BI Publications Pvt Ltd, New Delhi), 1992.

26 Burkill IH, A Dictionary of the Economic products of the Malay Peninsula, (Government of Malaysia and Singapore), 1996.

27 Mathew PJ, Pushpangadan P & Unnithan CM, Four candidate plant species for evaluation of anticancer property from *Adian* tribals of Kerala, India, In: *Ethnobiology in Human Welfare*, by SK Jain, (Deep Publications, New Delhi), 1996, 91-92

28 Kirtkar KR & Basu BO, Indian Medicinal Plants, Vol 4, (Bishen Singh and Mahendra Pal Singh, Dehra Dun), 1935.

29 Quisumbing E, Medicinal Plants of the Philippines Manila, *Agr Nat Resour Bull*, (1951) 16.

30 Singh HB, Potential medicinal pteridophytes of India and their chemical constituents, *J Econ Tax Bot*, 23(1) (1999) 63-78.

31 Verma PK & Singh KK, Traditional phytotherapy among the *Baiga* tribe of Shadol District of Madhya Pradesh, India, *Ethnobotany*, 7 (1995) 69-73.

32 Shah NC & Singh SC, Hitherto unreported phytotherapeutical uses from tribal pockets of Madhya Pradesh, India, *Ethnobotany*, 2 (1990) 91-95.

33 Manandhar PN, Ethnobotanical observations on ferns and fern allies of Nepal, *J Econ Taxon Bot*, *Add ser*, 12 (1996) 414-422.

34 Das K, Less known uses of plants among the *Aids* of Arunachal Pradesh, *Ethnobotany*, 9 (1997) 90-93.

35 Singh KK & Maheswari JK, Folk medicinal uses of some plants among the *Tharus* of Gorakhpur district, Uttar Pradesh, India, *Ethnobotany*, 4 (1992) 39-43.

36 Raven RH & Axelord D, Angiosperm biogeography and part continental movements, *Ann Missouri Bot Gard*, 61 (1974) 529-573.

37 Bir SS, Evolutionary trends in the pteridophytic flora of India, Proc 75th Indian Sci Cong Part II, (Botany section), 1988, 1-56.