

THE PTERIDOPHYTES OF CUMBUM VALLEY AND PACHAKUMATCHI HILLS, MADURAI DISTRICT, MADRAS STATE

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ABSTRACT

The Cumbum Valley and Pachakumatchi Hills are situated to the south-west of Madurai Town and lie between 77° 12' and 77° 30' E and 9° 30' and 9° 50' N. Three seasonal explorations were conducted in the months of June 1959, October 1959 and April 1960. The Pteridophyte vegetation is rich in the Pachakumatchi Hills where the humidity is high and the altitude reaches 1600 m. A total number of 50 species representing 14 families and 35 genera were collected and enumerated. The classification of Copeland is followed. Out of the plants listed, Pteridaceae is well represented, and next in order being Aspidiaceae and Polypodiaceae (*sensu stricto*).

INTRODUCTION

The Cumbum Valley is situated to the south-west of Madurai Town in the Madurai District, Madras State. The valley is horse-shoe shaped, surrounded by hills on three sides, the Western Ghats in the west and the Varushanad and Andipatti Hills in the east and these two ranges are joined at the basin of Periyar Lake near Kumili and Thekkadi. The Pachakumatchi Hills are situated to the east of Cumbum Valley in the Varushanad and Andipatti ranges. The whole track lies between 77° 12' and 77° 30' E and 9° 30' and 9° 50' N. The altitude ranges from 300 m. to 1600 m. Three seasonal explorations were conducted in the months of June 1959, October 1959 and April 1960 and the following areas were visited: Aruna Estate, Cumbamettu, Kumili, Suranganar Falls, Suruli Falls, Thekkadi, Vannathiparai and Vellimalai.

GEOLOGY AND SOIL

The rocks are of gneissic origin and the nature of the soil in the valley at low elevations is deep sandy alluvial loam of a reddish hue. At higher elevations in the hills the soil is dark humus clay.

CLIMATE

The temperature varies from a minimum of 16°C. to a maximum of 40°C. ; the hottest part of the year being April to June. The annual rainfall ranges between 100 and 150 cm. in the valley and 125 and 200 cm. in the hills. The rainwater drains into the Periyar river which flows through the centre of the valley.

VEGETATION

The Cumbum Valley is very fertile and the plains are mostly used for the cultivation of groundnut and gingelly. The main forests are situated in the hills where

coffee and cardamom are cultivated in certain areas. The forests in the Western Ghats and Pachakumatchi Hills are of the moist evergreen type. The Vannathiparai Forests are mainly deciduous and the forests at the north-east end of Pachakumatchi Hills and Cumbamettu are of the scrub jungle type.

The Pteridophyte vegetation is comparatively rich in the Pachakumatchi Hill where the humidity is high and the altitude reaches 1600 m. A number of ferns were collected from various sholas near Kumili and Suruli Falls. Among the ferns common to this region are: *Actiniopteris dichotoma*, *Adiantum cuneatum*, *A. philippense*, *Asplenium lunulatum*, *Cheilanthes mysurensis*, *Drynaria quercifolia*, *Pityrogramma calomelanos*, *Hemionitis arifolia*, *Nephrolepis falcata*, *Pteris quadriaurita*, *Pyrrhosia acrostichoides* and *P. adnascens*. Many interesting and rare ferns were also collected from Pachakumatchi and Kumili and among them a few may be mentioned: *Angiopteris evecta*, *Antrophyum plantagineum*, *Arthropteris palisoti*, *Asplenium zenkerianum*, *Bolbitis virens*, *Cyathea latebrosa*, *Egenolfia appendiculata*, *Hymenophyllum australe*, *Lepisorus nudus*, *Leucostegia immersa*, *Microlepia platyphylla*, *M. strigosa*, *Pteris quadriaurita* var. *argentea* and *Trichomanes proliferum*.

OBSERVATIONS

A total number of 50 species representing 14 families and 35 genera were collected, studied and enumerated. The specimens were identified using the descriptions and diagrams of Beddome (1868, 1873, 1883, 1892) and comparing with the specimens in Madras Herbarium. The classification of Copeland (1947) is followed in the arrangement of families and the species are arranged under each family in alphabetical order. Nomenclature has been made up-to-date based on Holttum (1954, 1958), Ching (1936, 1938), Alston (1959) and Panigrahi and Patnaik (1961). For each species the following data

¹ Botanical Survey of India, Southern Circle, Coimbatore.

are given: distinguishing taxonomic features of the plant, locality, frequency, altitude, date of collection, field number and distribution. The distribution data and the basionyms were mainly taken from Christensen (1905-6). All the specimens are deposited in the Southern Regional Herbarium of the Botanical Survey of India, Coimbatore.

TABLE I

Family	No. of genera	No. of species
Pteridaceae	8	13
Aspidiaceae	8	12
Polypodiaceae	5	6

It will be seen from table I that out of the plants listed, Pteridaceae and Aspidiaceae are the most dominant families with the largest number of species and next in order being Polypodiaceae (*sensu stricto*).

ENUMERATION

LYCOPODIACEAE

***Lycopodium macrostachys* Hook.**

Epiphytic herb in strobili. Aruna Estate, few, 1500 m., 25-10-1959, 9522.

Distr. : India, Ceylon.

SELAGINELLACEAE

***Selaginella repanda* (Desv.) Spring**

S. plumosa Baker

Spreading herb on rocks. On the way to Kumili, common, 840 m., 14-10-1959, 8976.

Distr. : India.

MARATTIACEAE

***Angiopteris evecta* (Forst.) Hoffm.**

Polypodium evecta Forst.

Tall herb with sporangia placed in two opposite lines, distinct and separable. Beside a stream in Vellimalai, few, 1000 m., 29-4-1960, 10358.

Distr. : Tropical Africa and Asia.

***Marattia fraxinea* Sm.**

Sporangia consolidated into bivalved synangia, indistinct and inseparable. Beside a stream in Vellimalai, few, 1460 m., 23-10-1959, 9496.

Distr. : Tropical Africa, Asia and Australia.

HYMENOPHYLLACEAE

***Hymenophyllum australe* Willd.**

H. javanicum Spreng.

Epiphytic herb; stipes with broad crisped wings almost to the base; wing of the rachis also crisped;

receptacles wholly included. Beside a stream in Vellimalai, few, 1500 m., 27-4-1960, 10318.

Distr. : India, Malaysia, Australia and New Zealand.

***Trichomanes proliferum* Blume**

Fronds pinnate; sorus sunk within a sub-cylindrical, obscurely 2-lipped involucre; sporangia on exerted receptacles. Beside a stream in Vellimalai, common, 1450 m., 29-4-1960, 10361.

Distr. : Tropical Asia.

PTERIDACEAE

***Actiniopteris dichotoma* (Forsk.) Kuhn**

Acrostichum dichotomum Forsk.

Sori linear, elongate, marginal on the contracted rachiform segments. Beside a stream on Gudalur-Kumili Road, Cumbum Valley, common, 450 m., 21-6-1959, 8084.

Distr. : Tropical Asia.

***Adiantum caudatum* Linn.**

Rachis hairy throughout; pinnae almost sessile; veins raised on upper surface. Beside Gudalur-Kumili Road, Cumbum Valley, common, 500 m., 20-6-1959, 8054.

Distr. : Widely distributed in tropical Africa and Asia.

***A. cuneatum* Langsd. & Fisch.**

Sori marginal, interrupted; indusium reniform. Near Kumili Town, Kerala Border, common, 850 m., 22-6-1959, 8131.

Distr. : South America and tropical Asia.

***A. hispidulum* Sw.**

Rachis hairy; at least on the upper surface leaflets hairy; sori copious, marginal, indusiate, interrupted; involucre orbicular, hispid. Near Kumili, Kerala Border, common, 750 m., 26-6-1959, 8226.

Distr. : Tropical Africa, South India, Malaysia and tropical Australia.

***A. philippense* Linn.**

A. lunulatum Burm. f.

Fronds simply pinnate; pinnae on slender stalks; stalks 1 cm. or more long. In road-cuttings, near Kumili, common, 1000 m., 20-10-1959, 9467.

Distr. : Widespread in tropics of Old World.

***Cheilanthes mysurensis* Wall. ex Hook.**

Fronds glabrous, membranous but firm, bipinnate; lower pinnae very small, all of them oblong-ovate, sessile; pinnules or segments linear-oblong, toothed; each lobe or tooth bearing one or two suborbicular, whitish sori. Beside Gudalur-Kumili Road, Cumbum Valley, common, 500 m., 20-6-1959, 8059.

Distr. : Japan, China and tropical Asia.

Doryopteris concolor (Langsd. & Fisch.) Kuhn*Pellaea concolor* Langsd. & Fisch.

Lateral veins once forked; sori in broad marginal lines. Beside Gudalur-Kumili Road, Cumbum Valley, common, 650 m., 20-6-1959, 8073.

Distr.: Circumtropical.

Hemionitis arifolia (Burm. f.) Moore*Asplenium arifolium* Burm. f.

Fertile fronds erect, hastate on long stipes, sterile fronds ovate, cordate; sori reticulate, superficial, linear, non-indusiate. Vannathiparai, common, 600 m., 17-10-1959, 9417.

Distr.: Tropical Asia.

Microlepia platyphylla (D. Don) J. Sm.*Davallia platyphylla* D. Don

Sori placed one on each lobe of pinnae; involucre half cup-shaped. Aruna Estate, common, 1500 m., 28-4-1960, 10326.

Distr.: India and Ceylon.

M. strigosa (Thunb.) Pr.*Trichomanes strigosa* Thunb.

Indusium thin, cup-shaped, attached by base and sides. Beside Gudalur-Kumili Road, Cumbum Valley, common, 650 m., 20-6-1959, 8071.

Distr.: Japan, China, Malaysia and India.

Pityrogramma calomelanos (Linn.) Link.*Acrostichum calomelanos* Linn.*Gymnogramma calomelanos* (Linn.) Kaulf.

'Silver Fern'. Lower surface of frond bearing white, waxy powder when young; sporangia scattered. On way to Kumili, common, 750 m., 14-10-1959, 8971.

Distr.: A native of tropical America, now introduced in most parts of the tropical Old World. Not previously reported from South India.

Pteris quadriaurita Retz.

Stipes glabrous, fronds with 3-11 subopposite pairs of pinnae; veins conspicuous, usually once forked; sori linear, continuous, partial on segments, marginal indusiate. On way to Kumili, common, 890 m., 14-10-1959, 8987.

Distr.: Circumtropical.

P. quadriaurita Retz. var. *argentea* Bedd.

Broad, white bands along the centre of the pinnae; sori linear, continuous, marginal, indusiate. Beside a stream in Vellimalai, few, 1450 m., 27-4-1960, 10316.

Distr.: South India.

DAVALLIACEAE

Arthropteris palisoti (Desv.) Alston*Aspidium palisoti* Desv.*Nephrolepis ramosa* (Beauv.) Moore

Terminal pinnae similar to lateral pinnae; pinnae obliquely cuneate at base, slightly crenate or entire;

stipes articulate at base; sori near the margin. In road-cuttings near Kumili, common, 1000 m., 20-11-1959, 9466.

Distr.: Tropical Africa, Asia, Polynesia and Australia. Not reported so far from South India.

Leucostegia immersa (Wall. ex Hook.) Presl*Davallia immersa* Wall. ex Hook.

Roots borne on all sides of the rhizome; scales slender; frond 2-3 pinnate, ultimate segments obovate, lobulate, crenate or dentate; sori large, impressed; indusia attached only by a narrow base. Near Periyar Dam, Kumili, common, 980 m., 19-10-1959, 9453.

Distr.: India, China, Malaysia to Philippines.

Nephrolepis falcata (Cav.) C. Chr.*Tectaria falcata* Cav.*Nephrolepis exaltata* auct. non Schott

Holtum (1954) is of the opinion that the true *N. exaltata* is confined to tropical America and the Asian plants so far named as *N. exaltata* are really *N. falcata*.

Terrestrial or epiphytic; fronds very long, pendulous; pinnae falcate, acute at apex, margins entire, glabrous; sori marginal; indusia round with narrow sinus. Near Periyar Dam, Kumili, common, 980 m., 19-10-1959, 9452.

Distr.: Malaysia, Siam, Indo-China, India.

CYATHEACEAE

Cyathea latebrosa (Wall. ex Hook.) Copel.*Alsophila latebrosa* Wall. ex Hook.

Sori superficial, cylindrical, non-indusiate; annulus oblique-vertical. Near Manilar, few, 1000 m., 25-10-1959, 9521.

Distr.: India, Malaysia.

ASPIDIACEAE

Bolbitis virens (Wall.) Schott*Acrostichum virens* Wall.*Gymnopteris contaminans* Wall. ex Bedd.

Fertile pinnae much contracted, entire or sinuate-pinnatifid according to the form of the sterile, wholly soriferous; main veins at less than right angle to the costa, lateral veins of adjacent costules anastomosing to form 3-4 loops between costa and margin. Near Kumili, common, 900 m., 18-10-1959, 9437.

Distr.: South India, Ceylon, Burma and Philippines.

Cyclosorus extensus (Bl.) Ching*Aspidium extensum* Bl.*Nephrodium extensum* (Bl.) Baker

Rhizome erect, short-creeping with fronds close together; sori small, round, submarginal, confined to lobes of pinnae; indusium reniform. Beside Gudalur-Kumili Road, Cumbum Valley, common, 650 m., 20-6-1959, 8069.

Distr.: South India, Ceylon, Burma, South China to Philippines.

Cyclosorus parasiticus (Linn.) Farwell*Polypodium parasiticum* Linn.

Rhizome erect, with fronds close together; sori round, forming a single row on each side of the costae; pinnae not more than 2 cm. wide. Among moss in open grassy places, Vellimalai, Pachakumatchi, fairly common, 1450 m., 23-10-1959, 9497.

Distr.: Tropical and subtropical Asia.

C. unitus (Linn.) Ching*Polypodium unitum* Linn.*Nephrodium cucullatum* (Bl.) Baker*Nephrodium unitum* (Linn.) R. Br.

Rhizome wide-creeping; fronds distant; costae with copious appressed hairs beneath; pinnae close, lobed one-third down; veins 4-8 to each costule; sori median on the veins. Aruna Estate, common, 1500 m., 24-10-1959, 9504.

Distr.: Ceylon, South India, Malaysia to Philippines.

Diplazium asperum Blume*Athyrium asperum* (Bl.) Milde*Diplazium polypodioides* Blume

Frond bipinnate to tripinnatifid; veins free; scales longer than broad, with black-toothed edges; sori one to each vein on each side of the costa, but not extending to the margin. Beside Gudalur-Kumili Road, Cumbum Valley, abundant, 650 m., 20-6-1959, 8070.

Distr.: India, Siam, Malaysia to Philippines.

D. esculentum (Retz.) Sw.*Hemionitis esculentum* Retz.*Anisogonium esculentum* (Retz.) Presl

A large fern with erect stout caudex and a terminal tuft of mostly bipinnate fronds $\pm 1.0-1.5$ m. long; veins anastomosing, one to each lobe, with 5-6 oblique veinlets; sori linear, one to each venule. Near Kumili, few, 850 m., 25-6-1959, 8204.

Distr.: Tropical Asia.

D. umbrosum Willd. var. *australe* R. Br.

Fronds 3-pinnatifid. Aruna Estate, common, 1500 m., 23-10-1959, 9490.

Distr.: South India and Ceylon.

Dryopteris cochleata (D. Don) C. Chr.*Nephrodium cochleatum* D. Don*Lastrea cochleata* (D. Don) Moore

A tufted large fern with dimorphic fronds, pinnate to bipinnate, nearly glabrous; sori very large, closely packed and perfectly covering the under surface of the pinnule; indusia persistent, orbicular with sinus quite closed, glabrous. In road-cuttings in shady places, on way to Kumili, common, 900 m., 15-10-1959, 8991.

Distr.: India and Ceylon.

Egenolfia appendiculata (Willd.) J. Sm.*Acrostichum appendiculatum* Willd.*Polybotrya appendiculata* (Willd.) J. Sm.

Rhizome creeping; fronds dimorphic, the fertile

fronds tall, erect, the sterile fronds curving backwards away from them; veins in groups, 2 or 3 times forked, the acroscopic branch of the basal forking passing to the sinus tooth, the others ending near the margin. Near streams on rocky places in shades, Vellimalai, common, 1450 m., 23-10-1959, 9495.

Distr.: Ceylon, India, Siam, throughout Malaysia.

Parathyrium boryanum (Willd.) Holtt.*Aspidium boryanum* Willd.*Lastrea boryana* (Willd.) Bedd.

Rhizome erect or suberect, bearing a few tripinnatifid fronds; scales entire, much longer than broad; stipe very long; sori in a single row on each side of the pinnules near the midrib. Near streams in shade, Aruna Estate, common, 1500 m., 22-10-1959, 9476.

Distr.: Ceylon, India, South China, Malaysia and Japan.

Polystichopsis aristata (Forst.) Holtt.*Polypodium aristatum* Forst.*Lastrea aristata* (Forst.) Moore

Rhizome short, creeping or suberect; pinnae acute at apex, with stiff teeth; fronds bipinnate; indusium reniform or orbicular, attached by the sinus. Near Kumili, Kerala Border, common, 1000 m., 25-4-1960, 10301.

Distr.: India, Ceylon, Malaysia to Polynesia.

Thelypteris uliginosa (O. Ktze.) Ching*Aspidium uliginosum* O. Ktze.*Lastrea tenericaulis* Moore

Stipe stout, very long; fronds bipinnate; sori medial or terminal on the veinlets, round, with very small indusia. In open grassy places, near Periyar Dam, common, 950 m., 19-10-1959, 9451.

Distr.: India, South and South-east China, Japan, Malaysia to Australia.

BLECHNACEAE

Blechnum orientale Linn.

Veins fine and close; sori in a long continuous line close to the midrib. Plant in open places, near Kumili, Kerala Border, common, 750 m., 26-6-1959, 8224.

Distr.: Throughout the tropics of Asia and Australia.

ASPLENIACEAE

Asplenium cheilosorum O. Ktze.*A. heterocarpum* Wall. ex Hook.

Rhizome slender, creeping; fronds simply pinnate; sori short, confined to the lobes and directed upwards, distal on the veins. Beside a stream in shady places, Vellimalai, common, 1460 m., 29-4-1960, 10359.

Distr.: India, Burma, China, Malaysia to Philippines.

A. lunulatum Sw. var. *camptorachis* Bedd.

Pinnae 2 cm. long, lower ones often reduced to auricles. Aruna Estate, 1500 m., 22-10-1959, 9484.

Distr.: South India.

***Asplenium normale* D. Don**

Rhizome creeping, bearing a close group of stipes; fronds simple pinnate; veins mostly once forked; sori on middle or basal part of the veins, in two rows, some at right angles to the veins, some parallel to them or in one row, or only one to two to each pinna. In open places on rocks or moss, Vellimalai, common, 1450 m., 23-10-1959, 9498.

Distr.: East Africa, tropical Asia to Hawaii.

***A. trapeziforme* Roxb.**

A. lunulatum Sw. var. *trapeziforme* (Roxb.) Bedd.

Manton and Sledge (1954) treat this as a distinct species. They state: "Of the several tetraploid species, *A. trapeziforme* Roxb., usually cited as a variety of *A. lunulatum*, is so distinct both cytologically and morphologically that it is certainly deserving of specific rank."

Pinnae trapezoid-lanceolate, 1.5 cm. long. Aruna Estate, common, 1500 m., 22-10-1959, 9480.

Distr.: South India and Ceylon.

***A. wightianum* Wall. ex Hook.**

Sori very regular and parallel, not reaching the margin; indusium broad, pale. By the side of a stream, Vellimalai, common, 1450 m., 27-4-1960, 10315.

Distr.: South India and Ceylon.

***A. zenkerianum* O. Ktze.**

Pinnae distant, alternate; sori regular, parallel; indusium firm, broad. Vellimalai, common, 1450 m., 23-10-1959, 9492.

Distr.: South India and Ceylon.

POLYPODIACEAE

***Drynaria quercifolia* (Linn.) J. Sm.**

Polypodium quercifolium Linn.

Epiphytic on trees and rocks, foliage leaves lobed; scales soft, narrowed gradually from base to apex; sori in two regular rows between adjacent main nerves. Near Suruli Falls, common, 300 m., 24-6-1959, 8190.

Distr.: India, South China, Malaysia to tropical Australia.

***Lepisorus nudus* (Hook.) Ching**

Pleopeltis nudus Hook.

P. linearis (Thunb.) Moore

A small epiphytic herb, with creeping slender woody rhizome, closely covered with lanceolate scales with thick-walled cells; fronds linear, opaque, scattered; veins indistinct; sori covered partially with compact, peltate, long stalked, deciduous scales. Near Periyar Dam, closely adhering to rocks, common, 980 m., 19-10-1959, 9457.

Distr.: Tropical Africa, South India, Ceylon, Malaysia to Japan.

***Leptochilus decurrens* Blume**

Gymnopteris variabilis Bedd.

Epiphyte with slender creeping rhizome, bearing black lanceolate-acuminate scales; fronds simple, fertile fronds contracted, oblong-lanceolate, long stipitate, main lateral veins distant and distinct nearly to the margin. Near Suruli Falls, common, 475 m., 24-4-1960, 10288.

Distr.: South and North-east India to South China, Malaysia.

***Microsorium lucidum* (Roxb.) Copel.**

Polypodium lucidum Roxb.

Pleopeltis leiorhiza (Wall.) Moore

Pinnae narrow, lanceolate, linear, coriaceous, acuminate at apex; sori large in a single row, a little nearer to the midrib than the margin. Aruna Estate, common, 1500 m., 22-10-1959, 9483.

Distr.: India, Burma, South China.

***Pyrrosia adnascens* (Forst.) Ching**

Polypodium adnascens Forst.

Niphobolus adnascens Kaulf.

Epiphyte in exposed places on trees and rocks, with dimorphic fronds; sterile leaves much shorter and wider than the fertile; sori covered by the tomentum. On way to Kumili, common, 650 m., 23-4-1960, 10250.

Distr.: India, South China, Malaysia to Polynesia.

***P. acrostichoides* (Forst.) Ching**

Polypodium acrostichoides Forst.

Niphobolus fissus Bedd.

Sori copious, intermingled with ferruginous stellate hairs having 7 or 8 radiating branches. On way to Cumbamettu, 1000 m., 28-6-1959, 8281.

Distr.: South India, Ceylon, Malaysia to Australia.

VITTARIACEAE

***Antrophyum plantagineum* (Cav.) Kaulf.**

Hemionitis plantagineum Cav.

Sori partially reticulate, usually immersed, non-indusiate. Vellimalai, common, 1450 m., 23-10-1959, 9494.

Distr.: India and Ceylon.

***Vittaria flexuosa* Fée**

V. lineata sensu Bedd. (non Sw.)

According to Holttum (1954), *V. lineata* Sw. is a tropical American species and does not occur in Asia. The Asian plants so far called as *V. lineata* are really *V. flexuosa* Fée.

Midrib strongly raised beneath, not raised above; sori non-indusiate, continuous in a broad intra-marginal shallow furrow. Aruna Estate, common, 1500 m., 23-10-1959, 9489.

Distr.: India, South China, Siam, Indo-China, Malaya.

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