TAXONOMIC PART

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CRYPTOGAMIA FILICES. 1073

PTERIS.

* Frondibus simplicissimis.

1. PTERIS fronde simplici lanceolata subangulata glabra: lanceolata, apice frueticicante.
   *Moris. bif. 3. p. 558. Raj. suppl. 52.
   Habitat in Domingo.

2. PTERIS fronde simplici linearis integerrima longitudine lineata, nulliter frueticicante.
   558. Raj. suppl. 52.
   t. 14. f. 3.
   Habitat in Domingo.

   Lingua Cervina angulato trinatoque folio. *Plam. fil. 121.
   t. 140.
   Habitat in Domingo.

4. PTERIS fronde simplici dichotoma subitus hispidus: a- *fucata.
   picibus frueticicantibus.
   Lingua Cervina fucata. *Plam. fil. 122. t. 141.
   Habitat in America meridionali.

* Frondibus simpliciter pinnatis, compositis, oblongis.

5. PTERIS frondibus pinnatis: foliolis pinnatifidis, caud- arboreae.
   dicie arboreo aculeato.
   Filix ramosa arboreae & aculeata. *Plam. fil. 6. t. 5.
   Filix arboreae latifolia aculeata. *Plam. amer. 3. t. 3.
   Filix lineata arboreae, caudice aculeato. Pet. fil. 132. t.
   4. f. 2.
   Habitat in Martinica.

6. PTERIS frondibus pinnatis: pinnis oppositis ovato-grandifolia.
   linearibus acuminatis integerrimis.
   t. 6. f. 15.

Lingua

Plate 1. Protologue of the genus *Pteris* (Linnaeus, C. 1753. *Species Plantarum*)
Genus Description

Pteris L.

Plate 2. Lectotype of *Pteris longifolia* L. (LINN)

[Plate 1 & 2]

**Type:** *Pteris longifolia* L. (Lectotype, LINN 1246.2, digital image!).

*Campteria* C. Presl, Tent. Pterid. 146. 1836.

**Type:** *C. rottleriana* C. Presl


**Type:** *L. denticulata* (Sw.) C. Presl

*Pycnodoria* C. Presl, Epimel. Bot. 100. 1851.

**Type:** *P. opaca* (J. Sm.) C. Presl

*Heterophlebium* Fée; Gen. Fil. 139. 1852.

**Type:** *H. grandifolium* (L.) Fee

Type: *S. lidgatii* (Baker) Hilebr.


Type: *H. warneri* Rosenst.


Type: *I. hookeriana* (J. Agardh) T. G. Walker

Herbs; terrestrial. Height 15-300 cm. Rhizome erect to suberect, creeping, 2-20 cm long x 1-12 mm thick, usually cylindrical with tuft of stipes and roots, scaly. Palea pale brown to brown, 2-11 mm long, 0.3-0.8 mm wide at base, lanceolate, acuminate or acute, auriculate, middle thickened cells, periphery thin walled cells, sometimes uniformly thick walled cells, margin entire or with minute cellular projections. Stipe 6-165 cm long, 3-14 mm thick, usually green or chestnut brown, sometime carmine red or pink (live specimens) stramineous or chestnut brown (dry specimens), grooved and glabrous above, sometimes terete, and scaly below. Lamina pinnate, bipinnate or tripartite, 12-175 cm long x 20-100 cm broad, ovate, deltoid or lanceolate, herbaceous to coriaceous. Pinnae 2-22 pairs, 6-50 cm long x 0.4-6 cm broad, linear, lanceolate, or oblong, opposite to subopposite, or alternate, usually green above and pale green below, sometime white band along either side of midrib adaxially, basal pinnae bipartite, ternately divided or tripartite, terminal pinnae similar to lateral pinnae, sometimes terminal pinnae larger than lateral ones. Pinnules (ultimate segments) 7-55 pairs, 1.5-3 cm long x 3-5
mm broad, linear, lanceolate, or oblong, acute, acuminate, obtuse, or rounded, apex entire, sometimes serrate or crenate, sinus near to costa- 3 mm away from costa, 0.5-3 mm inter segmental distance. Costae usually grooved on upper surface with raised edges forming spines at base of costules and raised below, costule grooved above, glabrous or spinules at the base of veins. Veins 6 pairs to numerous, forking, usually free and ending within margin or submarginally within hydathodes, sometimes basal pair of veins united to form costal and costular areoles. Sori pale brown to dark brown, 0.2-22 cm long, linear, submarginal except at apex and base. Indusium false (inflexed segment margin), pale coloured to brown. Sporangium: capsule globose, 170-350 µm long; stalk 200-350 µm long, biseriate; annulus 12-26 celled. Paraphyses numerous, usually a row of uniform cells (uniseriate). Spores brown, 30-50 x 35-60 µm, trilette-tetrahedral, an equatorial collar-like ridge girdling the spores, usually verrucate, rugate or tuberculate sometimes bisculpate.

**Habitat:** Shows diverse habitat from humid shaded forest to fully exposed area.

**Altitude:** Sea level-2300m

**Distribution:** A pantropical genus represent in all continents except Antarctica.
**Chromosome number:** Invariably $n=29$ or multiple of this (Verma, 1959; Walker, 1962).

**Notes:** Linnaeus (1753) established the genus *Pteris* with 19 species, of which, *P. biaurita* L. and *P. vittata* L. are present in South India. Proctor (1977) designated *P. longifolia* as the Lectotype among the Linnean species based on a plant from near Port de Paix, Haiti. Detailed taxonomic history of the genus *Pteris* is provided in review of literature.
Key to the species of South Indian *Pteris*

1. Lamina regularly or irregularly pinnatifid........................................2

1. Lamina bipinnatifid or tripartite.....................................................9

2. Basal pinnae gradually reduced; pinnae base cordate; spores bispulcate
   ..............................................................................................................24. *P. vittata*

2. Basal pinnae not gradually reduced; pinnae base cuneate, decurrent or
   oblique; spores verrucate or rugate.......................................................3

3. Rhizome erect.........................................................................................4

3. Rhizome creeping....................................................................................6

4. Sterile pinnae margin distinctly serrate..............................................6. *P. cretica*

4. Sterile pinnae margin entire or undulate..............................................5

5. Pinnae apex crenate; lowest pinna bipartite; lamina ovate..22. *P. scabripes*

5. Pinnae apex entire; lowest pinna not bipartite; lamina deltoid ..............
   ..............................................................................................................17. *P. pellucida*

6. Lateral pinnae irregularly lobed (heteromorphic); pinna apex entire........
   ..............................................................................................................10. *P. heteromorpha*

6. Lateral pinnae regularly lobed; pinna apex crenate or serrate..............7

7. Pinnae decurrent to form a winged rachis; pinna apex serrate..............
   ..............................................................................................................15. *P. multifida*

7. Pinnae not decurrent; apex crenate......................................................8
8. Spores verrucate; sterile pinna glabrous; lower pinnae deeply lobed.

...........................................................................7. P. ensiformis

8. Spores rugate; sterile pinnae with setae; all pinnae bipartite except terminal one.

...........................................................................14. P. multiaurita

9. Rhizome creeping.................................................................10

9. Rhizome erect or sub erect.....................................................11

10. Costa glabrous; sinus c. 3 mm away from the costa; lamina ovate or broadly ovate; coriaceous; spores verrucate........2. P. arisanensis

10. Costa with long spinules; sinus below 1 mm away from costa; lamina lanceolate; subcoriaceous; spores rugate........21. P. reptans

11. Basal pair of pinnae tripartite; costular areoles present....23. P. tripartita

11. Basal pair of pinnae bipartite; costular areoles absent. ..................12

12. Pinnule apex entire..............................................................13

12. Pinnule apex crenate............................................................20

13. Stipe pink; pinnae and pinnule bear pinkish setae adaxially........

...........................................................................4. P. blumeana

13. Stipe green or chest nut brown; pinnae and pinnules bear pale setae or glabrous.........................................................14

14. Pinnae with white or silvery bands along midrib............1. P. argyreaa

14. Pinnae entirely green...........................................................15

15. Pinnules glabrous; costal areoles present..............................16

15. Pinnules with setae; costal areoles absent..............................17
16. Lowest pair of veins united to form triangular costal areoles; lamina subcoriaceous ........................................11. P. linearis

16. Lowest pair of veins united to form a series of irregular costal areoles;
   lamina coriaceous ...........................................3. P. biaurita

17. Lamina deltoid .................................................9. P. gongalensis

17. Lamina ovate or oblong .......................................18

18. Setae long, conspicuous on costae and costules; lamina membranaceous
   ........................................................................19. P. praetermissa

18. Setae short, inconspicuous on costae and costules; lamina subcoriaceous
   or coriaceous ......................................................19

19. Basal pinna bear two accessory pinnae basiscopically; sinus below 1 mm
   from costa .........................................................18. P. perrottetii

19. Basal pinna bear single accessory pinna basiscopically; sinus above 1 mm
   from costa .........................................................5. P. confusa

20. Spores verrucate ..................................................21

20. Spores rugate or tuberculate ...................................22

21. Stipe glabrous; lower pinnae bipartite, sori except at the pinnule
   apex .................................................................20. P. quadriaurita

21. Stipe with prominent spines; lower pinnae ternately divided; sori at the
   middle portion of pinnule ....................................12. P. longipes

22. Pinnae more than 20 pairs; spores tuberculate ..........13. P. mertensioides
22. Pinnae less than 20 pairs, spores ruagte.................................23

23. Veins ending in hydathodes submarginally; pinnules glabrous; acroscopic pinnules not reduced.........................................................8. P. geminata

23. Veins ending in margin; pinnules bear prominent setae; basal pair of pinnules reduced at acroscopic side.........................................16. P. otaria
Species Descriptions

1. Pteris argyraea T. Moore


[Fig. 3, 9A & Plate 3]

**Type:** India, Nilgiris, *Mclvor s. n.* (Holotype, K; Isotype CAL!).


**Type:** India, Annamallays, *R. H. Beddome s.n.* (Isotype, MH!).
Height 90-150 cm. Rhizome suberect, 5-6 cm long x 6-7 mm thick, cylindrical with tuft of roots, scaly. Palea light brown, c. 3 mm long, lanceolate, acuminate, auriculate, thick walled cells along centre, thin walled cells at periphery with unicellular projections. Stipe 30-90 cm long, 3-4 mm thick, green with brown patch above (fresh specimens), strameneous with brown patch above (dry specimens), chestnut brown below, grooved, scaly below. Lamina bipinnate, 25-35 cm long x 18-25 cm broad, ovate-lanceolate. Pinnae 5-7 pairs, 18-22 cm long x 2.5-3 cm broad, subopposite or alternate, lanceolate, entire, adaxially green with white stripe along either side of mid-rib, pale green abaxially, basal pinnae bipartite. Pinnules 18-24 pairs, 1.4-1.7 cm long x 5-6 mm broad, oblong, entire, obtuse-rounded, sinus c. 2 mm away from costa, 0.5-1.5 mm apart, glabrous. Costae grooved above with spines on attachment site of costules and raised below. Veins 9-15 pairs, free, forking. Sori brown, 1-1.5 cm long, submarginal except apex. Indusium false, brown, fully opened at maturity. Sporangium: capsule globose, 200-250 μm long; stalk 250-300 μm long, biseriate; annulus 19-23 celled. Paraphyses uniseriate. Spores brown, c. 30 x 45 μm, triletetrahedral, verrucate.

**Habitat:** Usually present in wet evergreen forest floors at high altitudes.

**Altitude:** 600m-2100m.

**Distribution:** Java, India (South India: Karnataka, Kerala & Tamil Nadu) and Sri Lanka.
Chromosome number: $n = 29$ (Goldblatt & Johnson, 1991); $2n=58$ (Walker, 1962).

Common name/Trivial name: Silver brake.

Economic importance: Widely cultivated as ornamental fern in many gardens.

Etymology: The specific epithet derived from a Greek word ‘argyr’, which means silver. The silver or white coloured band along either side of the midrib on adaxial surface indicates the specific epithet ‘argyracea’.

IUCN status: Least concern (LC). This is a widespread taxon present in evergreen forests at high altitude and it does not meet any criteria for Endangered, Vulnerable, etc. under IUCN red list category.

Notes: *Pteris argyracea* was described by Thomas Moore in 1859 as having introduced in Royal Botanical Garden by Messrs Veitch & Son from central India. Moore stated in the protologue that the species is present only in India. But this species is present in Java and Sri Lanka as well. But, Hieronymus (1914) was doubtful about the occurrence of this species in India.

This species is closely similar to *P. confusa* T. G. Walker in its morphology. In both species, sinus is about 2-3 mm away from costa. In some cases, *P. argyracea* may reach up to 2 m height and vigorous size (*V.K.Sreenivas 124035, CALI*). This species can easily distinguish from other
species especially from *P. confusa* by its silver band along either sides of the midrib. Fraser Jenkins (pers. Comm.) thought that the species is nothing but *P. confusa* except its silver band and need further study in this case. Beddome (1863 & 1883) described this species from South India as *P. quadriaurita* var. *argentea* (Isotype, MH!).

Rajagopal and Bhat (1998) recorded this species from Karnataka state as a rare taxon. This is an altitude specific species and the present author could collect the specimens from wet evergreen forest above 600 m only. It is also introduced in the Botanical garden (CUBG), but it can not grow as healthy as in the natural habitat. But, now *P. argyraea* is widely cultivating as ornamental plant in many gardens across the world.

**Materials examined:**

**KARNATAKA: Kodagu** (Dt.): Madikeri-Bhagamandala (alt. 900m), *V.S.Manickam 2773*; Sampage-Somerpet road (alt. 900m), *V.S.Manickam 2900*; (XCH); Valikorja (alt. 850m), *P.K.Rajagopal 722* (MGMC).

**KERALA: Idukki** (Dt.): Anamudi N.P. (alt. 1650m), *V.K.Sreenivas 113255*; Deviarmedu, PTR (alt. 1400m), *V.K.Sreenivas 124035*; Devikulam (alt. 950m), *V.K.Sreenivas 113264*; Eravikulam N.P. (alt. 1600m), *V.K.Sreenivas 124081*; Vellimala (alt. 1500m), *K.P.Rajesh 18332* (CALI); Munnar-Devikulam road (alt. 1400m), *V.S.Manickam 31426* (RHT); Anamudi hills (alt. 1600m), *V.S.Manickam 34519*; Munnar hills (alt. 1100m), *V.S.Manickam*
32235 (XCH); Munnar (alt. 1400m), N.C.Nair 40220; Peerumedu (alt. 1000m), N.C.Nair s.n. (CAL). Kannur (Dt.): Kannavam forest (alt. 800m), V.S.Manickam 3115 (XCH). Palakkad (Dt.): Silent Valley (alt. 850m), Geervarghese 17895; Walakkad SVNP (alt. 950m), V.K.Sreenivas 119239 (CALI); Kummattanthode (alt. 800m), V.S.Manickam 3259 (XCH); Aruvanpara (alt. 850m), P.Bhargavan 65593; Karivara (alt. 750m), N.C.Nair 56872; (MH, CAL). Thiruvananthapuram (Dt.): Chemunji (alt. 1300m), V.K.Sreenivas 124047; Way to Pandavanpara (alt. 1250m), V.K.Sreenivas 113273 (CALI); Ponmudi hills (alt. 800m), V.S.Manickam & K.M Mathew 33847 (XCH). Wayanad (Dt.): Chathanathode (alt. 875m) V.K.Sreenivas 113283; Pakranthalam (alt. 600m), B.K.Nayar & Geervarghese 11614; Periya (alt. 650m), B.K.Nayar & Geervarghese 11667 (CALI); Chathanathode (alt. 875m), V.S.Ramachandran 61390 (MH, CAL).

TAMIL NADU: Coimbatore (Dt.): Valparai (alt. 1300m), V.S.Manickam & K.M.Mathew 33109 (RHT); V.S.Manickam 1938 (XCH); Anamallai hills (alt. 1000m), V.S.Manickam 3404 (XCH); Anamallays (alt 1600m), R.H.Beddome s.n. (MH); Bellagi Shola (alt. 1500m), C.E.C.Fisher 358 (CAL). Dindigul (Dt.): Palamalai, Palni hills (alt. 1200m), V.S.Manickam 1896 (RHT); Kodaikanal, Palni hills (alt. 1500m), V.S.Manickam & K.M.Mathew 32562 (XCH). Kannyakumari (Dt.): Kalkulam (alt. 1200m), V.S.Manickam 31961 & 32052; Vilavancode (alt. 1200m), V.S.Manickam & K.M.Mathew 34204 (XCH); Way to Mahendragiri Peak (alt. 1275m), B.D.Sharma 40048; Upper
Kadayar (alt. 1300m), A.N.Henry & M.Chandrabose 49669 (MH). Madurai (Dt.): Vellimalai (alt. 1450m), B.V.Shetty 10316 (MH, CAL). Nilgiri (Dt.): Way to Avalanche (alt. 2000m), V.K.Sreenivas 119228 (CALI); Avalanche (alt. 2100m), V.S.Manickam 896; Coonoor (alt. 1800m), V.S.Manickam 1327; Kotagiri (alt. 1700m), V.S.Manickam 1402; Naduvattam (alt. 1900m), V.S.Manickam 596; Rock land forest (alt. 2000m), V.S.Manickam 954; (XCH); Carrington (alt. 2075m), B.V.Shetty 34343; Chemaraj estate (alt. 2000m), K.M.Sebastine 3333; Naduvattam (alt. 1825m), J.K.Ellis 34726 (MH); Old Street, Nilgiri (alt. 1850m), J.S.Gamble 13083 (CAL). Salem (Dt.): Balmadies estate, Yercaud (alt. 1667m), K.Subramanyam 6562; Ghatak 533 (MH, CAL). Tirunelveli (Dt.): Ambasamudram (alt. 1000m), V.S.Manickam 31774; Kothayar hills (alt. 1200m), V.S.Manickam 31002 (RHT); Agasthyar hills (alt. 1400m), V.S.Manickam 32428; Courtallam Hills, Thankasi (alt. 500m), V.S.Manickam 33980; Kakachi (alt. 1300m), V.S.Manickam 3330; Kalakkad hills (alt 1200m), V.S.Manickam & K.M.Mathew 34171; Thekkumalai estate (alt. 500m), V.S.Manickam 33983 (XCH); Kakachi (alt. 1700m), K.M.Sebastine 5840; Kannikatty (alt. 915m), K.C.Jacob s.n.; Sithara- Periyar (alt. 900m), A.N.Henry & M.Chandrabose 19874 (MH); Manjanamparai (alt. 1400m), A.N.Henry 16367; Nattrikal (alt. 950m), E.Hooper & M.S.Ramaswami 38635 (CAL).
Fig. 3. *Pteris argyraea* T. Moore: A-B. habit; C. palea; D. single pinna; E. sterile pinnules; F. fertile pinnules; G. sporangium; H. spore (*V.K.Sreenivas* 119239, CALI)
2. Pteris arisanensis Tagawa


[Fig. 4, 9B & Plate 4]

Type: Taiwan, Mt. Arisan, June 1914, U. Faurie 603 (Holotype, KYO, digital image!).

Height 130-160 cm. Rhizome long, creeping, 10-20 cm long x 8-10 mm thick, cylindrical with crowded stipes and roots, scaly. Palea brown, 3-4 cm long, 5-6 mm wide at base, lanceolate, acuminate, auriculate, middle thick walled cells, periphery thin walled cells with cellular projectons. Stipe 35-85 cm long, 4-6 mm thick, green (live material), stramineous (dry specimen), grooved throughout, glabrous above, scaly below. Lamina bipinnate, 35-70 cm long x 25-30 cm broad, ovate - broadly ovate, dark green above, pale green below, coriaceous. Pinnae 5-6 pairs, 20-28 cm long x 3-6 cm broad, opposite to subopposite, lanceolate, acuminate, entire, green, basal pinnae bipartite. Pinnules 24-27 pairs, 2.5-3.2 cm long x 4-6 mm broad, oblong, entire, obtuse, sinus c. 3 mm away from costa, intersegmental
Plate 3. *Pteris argyraea* T. Moore: A. habit; B. single pinna; C. sterile pinnules; D. fertile pinnules; E. rhizome; F. & G. spore ornamentation.
distance c. 2 mm apart (in fertile), below 1 mm apart (in sterile), glabrous. Costa grooved above with inconspicuous spines on the attachment site of costule and raised below. Veins 14-18 pairs free, forking, indistinct above. Sori brown, 1- 3.2 cm long, linear, submarginal except at apex, crowded. Indusium false, pale coloured, papery. Sporangium: capsule globose, 200-250 μm long; stalk 300-350 μm long, biseriate; annulus 16-18 celled. Paraphyses uniseriate. Spores pale brown, c. 35 x 40 μm, triletetrahedral, verrucate.

**Habitat:** Present in evergreen forest floors at high altitude.

**Altitude:** 1000m-1500m.

**Distribution:** India (South India: Karnataka & Kerala) and Taiwan.

**Etymology:** The specific epithet derived from the type locality ‘Mount Arisan’ in Taiwan.

**IUCN status:** Endangered (EN). This taxon is currently known from 1-2 locations in South India and meets the criteria EN B1ac(iv)+2aD under Endangered category.

**Notes:** This species is rare in South India and collected from Periyar Tiger Reserve. The south Indian species is having long rhizome, about 11-12 cm long. Fraser-Jenkins (2008a) stated that *P. arisanensis* resembles to
P. biaurita L. in its pinna lobes. Recently, Mahamuni & Dongare (2009) reported this species from Belgaum district of Karnataka.

Materials examined:

KERALA: Idukki (Dt.): Deviarmedu, PTR (alt. 1400m), V.K.Sreenivas 124030; Near Thamarai, PTR (alt. 1200m), V.K.Sreenivas 124024 (CALI).
3. *Pteris biaurita* L.


[Fig. 5, 9C & Plate 5]
Fig. 4. *Pteris arisanensis* Tagawa: A-B. habit; C. palea; D. sporangium; E. fertile pinnules; F. single pinna; G. venation; H. spore (*V.K.sreenivas 124030, CALI*)
Plate 4. *Pteris arisanensis* Tagawa: A. habit; B. single pinna; C. rhizome; D. adaxial surface of pinnules; E. fertile pinnules; F. spore.
Type: West Indies, Domingo (Lectotype, LINN 1246.19, digital image!).

*Camptera biaurita* (L.) Hook., Gen. Fil. pl 65A. 1842; Bedd., Ferns S. India
14. pl. 44. 1863 & Handb. Ferns. Brit. India 116. 1883; C. B. Clarke,


Type: India, West Bengal, Badamtan, Lebong and Darjeeling, 27 November


Height 70-110 cm. Rhizome erect to suberect, 3-5cm long x 6-10 mm
thick, cylindrical with tuft of roots, scaly. Palea brown, 2-3 mm long x 0.4-0.6
mm wide at base, lanceolate, acuminate, auriculate, central thick walled cells,
thin walled cells at periphery. Stipe 20-61 cm long, 2-3 mm thick, green
(fresh material), stramineous (dry material), grooved, glabrous above, scaly
below. Lamina bipinnate, 20-30 cm long x 12-25 cm broad, ovate-oblong,
green to pale green, coriaceous. Pinnae 5-8 pairs, 10-19 cm long x 2-3.5 cm broad, opposite or subopposite, lanceolate, entire, green above, pale green below, basal pinnae bipartite. Pinnules 15-30 pairs, 1-2 cm long x 4-7 mm broad, oblong, margin entire, apex obtuse to rounded, sinus 2-3 mm away from costa, 0.5-3 mm apart, glabrous. Costae grooved on upper side with spines on attachment site of costule, and raised below. Veins 11-20 pairs, free, forking, veins near costa united to form costal areoles along either sides of midrib. Sori brown, 1.2-1.4 cm long, submarginal except at extreme apex. Indusium false, white. Sporangium: capsule globose, 250-300 \( \mu m \) long; stalk 200-300 \( \mu m \) long, biseriate; annulus 15-20 celled. Paraphyses uniseriate. Spores brown, c. 45 x 50 \( \mu m \), triletetrahedral, verrucate.

**Habitat:** Grows in fully exposed areas as well as shaded areas. Commonly seen in road sides, earth cuttings, river banks of high ranges.

**Altitude:** 50m-2000m.

**Distribution:** Borneo, Brazil, China, India (South India: Andhra Pradesh, Karnataka, Kerala & Tamil Nadu), Java, Malaysia, South Africa and West Indies.

**Chromosome number:** \( n=58 \) (Goldblatt & Johnson, 1991).

**Common name:** Arched-veined Pteris.
Economic importance: Rhizome and sporophyll have antibacterial properties (Singh, 1999).

Etymology: The specific epithet derived from the Latin word ‘biauritus’ (= with two auricles), though many of the Pteris species are having one accessory auricle on lower pinna.

IUCN status: Least concern (LC). This is a widespread taxon present in any type of forests and it does not meet any criteria for Endangered, Vulnerable, etc. under IUCN red list category.

Notes: P. biaurita is easily distinguished by the costal areoles formed by the fusion of lowest veins on either side of the midribs of the pinna. Mickel and Smith (2004) suggests that it is closely resembles to P. quadriaurita Retz. except thesev costal areoles. However, in some cases, the veins are free or mostly free. According to Fraser-Jenkins (2008), the names P. linearis Poir. and P. nemoralis Willd. were applied to many members of P. biaurita cytological complex. He described two subspecies mainly based on venation patterns. These are (1), Pteris biaurita L. subsp. walkeriana Fras.-Jenk. & Rajkumar with veins united to form triangular shaped areoles and it is an apogamous diploid, (2), Pteris biaurita L. subsp. fornicata Fras.-Jenk. with irregularly united basal veins and which is an apogamous triploid. In south Indian P. biaurita (V.K.Sreenivas 113285, CALI), both types of venation patterns were observed in a single pinna. So it is very difficult to distinguish
the plants at subspecies level based on venation pattern. Here both subspecies are treated under the species *P. biaurita* L.

The costal areoles are also present in *P. geminata* Wall. ex J. Agardh and in *P. tripartita* Sw. *P. geminata* can be distinguished by the presence of hydathode at the vein endings and having crenate pinna apex. *P. tripartita* is having costular areoles in addition to costal areoles.

**Materials examined:**

**ANDHRA PRADESH:** Godavari (Dt.): Dumakonda (alt. 475m), G.V.Subbarao 68133A (MH). Visakhapatnam (Dt.): Anantagiri (alt. 1000m), G.V.Subbarao 32831; Galikonda (alt. 1142m), G.V.Subbarao 19610; Mettur (alt. 625m), G.V.Subbarao 29572; Sankari metta (alt. 1075m), N.P.Balakrishnan 10904 (MH); Galikonda (alt. 1100m), P.Amrutha Lakshmi 25149 (SKU).

**KARNATAKA:** Kodagu (Dt.): Near Jodhpala (alt. 610m), V.K.Sreenivas 113207; Way to Thalecauvery (alt. 915m), V.K.Sreenivas 113203 & 113209 (CALI); Bhagamandala (alt. 900m), V.S.Manickam 2681; Thalecauvery forest (alt. 1200m), V.S.Manickam 2631; (XCH); Near Abbey falls (alt. 900m), T.A.Rao & B.C.Banerjee 11354 (CAL). Chikmagaluru (Dt.): Belahanoor (alt. 900m), V.K.Sreenivas 124092 (CALI). Bababudan hills (alt. 1900m), P.K.Rajagopal 722 (MGMC). Mysore (Dt.): Mysore (alt. 750m), Wallich 129
(CAL). **Shimoga** (Dt.): Agumbe (alt. 1400m), *V.K.Sreenivas 124095* (CALI); Hulikal range (alt. 1000m), *P.K.Rajagopal 722* (MGMC).

**KERALA: Ernakulam** (Dt.): Neryamangalam (alt. 450m), *N.C.Nair 50719* (MH); *N.C.Nair 40230 & 50988* (CAL). **Idukki** (Dt.): Upper Manalar (alt. 1750m), *Jomy Augustine 12868*; Sabarigiri (alt. 600m), *B.K.Nayar & Party 10088*; Thannikudy (alt. 800m), *V.K.Sreenivas 124036*; Thekkady (alt. 720m), *K.P.Rajesh 18348*, (CALI); Peerumedu (alt. 1000m), *V.S.Manickam & K.M.Mathew 33416*; Sabarimala (alt. 500m), *V.S.Manickam & K.M.Mathew 33625* (RHT); Devikulam (alt. 1400m), *V.S.Manickam & K.M.Mathew 34613* (XCH); Munnar (alt. 1400m), *N.C.Nair & S.R.Ghosh 50762* (MH); Kumali (alt. 750m), *N.C.Nair 802*; Munnar (alt. 1400m), *N.C.Nair 50750*; Sabarimala (alt. 500m), *N.C.Nair 877*; Thankamani (alt. 860m), *N.C.Nair 40770* (CAL). **Kannur** (Dt.): Meenmutty (alt. 450m), *K.P.Rajesh & K.Satheesh Kumar 87831 & 87838* (CALI). **Kollam** (Dt.): Aryankavu hills (alt. 200m), *V.S.Manickam 32311* (XCH); Plappally (alt. 1100m), *N.C.Nair 50842* (MH); Cheenikala (alt. 350m), *Raju Antony 18668* (TBGT). **Kottayam** (Dt.): Kurisumala (alt. 1000m), *V.S.Manickam & K.M.Mathew 34559* (RHT); *V.S.Manickam 34596* (XCH); Peruvanthanam (alt. 535m), *K.Vivekanandan 22969* (MH). **Kozhikode** (Dt.): Kakkayam forest (alt. 750m), *K.Satheesh Kumar 879669* (CALI). **Palakkad** (Dt.): Kaikatty (alt 900m), *B.K.Nayar & Party 7323*; Nellyyampathi (alt. 1100m), *Geevarghese 17876*; Panthenthode (alt. 850m), *V.K.Sreenivas 124019*;
Sairendri (alt. 900m), *V.K.Sreenivas 124018;* (CALI); Silent Valley forest (alt. 850m), *V.S.Manickam 3245 (XCH)*; Padagiri (alt. 1100m), *E.Vajravelu 44761;* Walayar forest (alt. 60m), *E.Vajravelu 19052 (MH);* Kaikatty (alt. 900m), *N.C.Nair 69864 (CAL);* Muthikulum forest (alt. 850m), *E.Vajravelu 62835 (MH, CAL).* **Pathanamthitta (Dt.):** Muzhiar-Kakki road (alt. 600m), *V.S.Manickam & K.M.Mathew 33667 (XCH);* Pampanada (alt. 9m), *N.C.Nair 842 (CAL).* **Thrissur (Dt.):** Sholayar- Chalakkudy road (alt. 400m), *V.S.Manickam & K.M.Mathew 34719 (RHT); V.K.Sreenivas 119289;* Sholayar (alt. 450m), *V.K.Sreenivas 119291 (CALI);* Vazhachal (alt. 400m), *N.C.Nair & S.R.Ghosh 52071 (MH).* **Thiruvananthapuram (Dt.):** Ponmudi hills (alt. 1100m), *V.S.Manickam & K.M.Mathew 33761 (XCH);* Kellar (alt. 900m), *N.C.Nair 40048;* Ponmudi hills *N.C.Nair & S.R.Ghosh 51768 & 51828 (CAL).* **Wayanad (Dt.):** Chandanathode (alt. 650m), *V.K.Sreenivas 113285;* Edakkayil (alt. 680m), *B.K.Nayar & Geervarghese 11622;* Meppadi (alt. 800m), *Habeb 102838;* Periya (alt. 750m), *B.K.Nayar & Geervarghese 10707;* Vythiri (alt. 700m), *Geervarghese 17968 (CALI).*

**TAMIL NADU:** **Coimbatore (Dt.):** Valparai (alt. 800m), *V.S.Manickam 33040 (RHT);* Anamallai Hills (alt. 1000m), *K.M.Mathew 31602;* Shakalimudi forest (alt. 1200m), *V.S.Manickam 2188 (XCH).* Anamallys (alt. 1500m), *R.H.Beddome s.n. (MH).* **Dindigul (Dt.):** Kodaikanal (alt. 1200m), *V.S.Manickam 1694;* Srivilliputhur (alt. 700m), *V.S.Manickam 3040 (XCH).* **Kanyakumari (Dt.):** Kalkulam (alt. 1200m), *V.S.Manickam 31971;* Thovalai-
Karimani (alt. 700m), *V.S.Manickam 2540* (XCH); Kiripara- Nagercoil (alt. 200m), *N.C.Nair & S.R.Ghosh 52616B* (MH). **Nilgiri** (Dt.): Way to Avalache (alt. 2000m), *V.K.Sreenivas 124084* (CALI); Coonoor (alt.1400m), *V.S.Manickam 1223*; Devala (alt. 1200m), *V.S.Manickam 1554*; Gudallur (alt. 1000m), *V.S.Manickam 1630* (XCH). **Salem** (Dt.): Yercaud (alt. 1200m), *V.S.Manickam & K.M.Mathew 33336* (RHT); Shevarayan hills, Yercaud (alt. 1300m), *V.S.Manickam & K.M.Mathew 33269* (XCH); Near Aryanpara kovil (alt. 1000m), *N.C.Nair 74208*; Yercaud (alt. 1333m), *K.Subramanyam 7584* (MH). **Tirunelveli** (Dt.): Kothayar (alt. 450m), *P.V.Madhusoodanan & Party 44881* (CALI); Kothayar hills (alt. 1200m), *V.Irudayaraj 3503* (XCH); Courtallam hills (alt 400 m), *V.S.Manickam 33972*; Kalakkad hills (alt. 1200m), *V.S.Manickam 31242*; Sengeltheri (alt. 1000m), *V.S.Manickam 2341* (XCH). **Vellore** (Dt.): Vizhiyoor-Polur (alt. 250m), *E.Vajravelu 54591* (MH, CAL).
Fig. 5. *Pteris biaurita* L.: A-B. habit; C. palea; D. single pinna; E. fertile pinnules; F. sterile pinnules; G. sporangium; H. spore (*V.K.Sreenivas 113209, CALI*)
Plate 5. *Pteris biaurita* L.: A. habit; B. single pinna; C. sterile pinnules showing venation and costal areols; D. rhizome; E. fertile pinnules; F. spore.
4. Pteris blumeana J. Agardh


[Fig. 6, 9D & Plate 6]

**Type:** Java, *Blume s.n.* (Holotype, L, digital image!; Isotype, B, digital image!).


Type: Nepal, *Wallich 107* (Isotype, BM & US, digital image!).


Type: China, Papien river near Talan, Yunnan, 4 September 1901, *A. Henry 13222* (Holotype, B, digital image!).

Height 40-60 cm. Rhizome short, erect, 2-4 cm long x 3-4 mm thick, cylindrical with tuft of roots, scaly. Palea brown 2-3 mm long x 5-8 mm broad at base, lanceolate, acuminate, auriculate, thick walled cells at centre. Stipe 30-38 cm long, 2-3 mm thick, pink or carmine red (fresh specimens) or stamineous (on drying), grooved throughout, glabrous above, scaly below. Lamina bipinnate, 30-35 cm long x 18-25 cm broad, oblong, dark green above and pale green below, subcoriaceous. Pinnae 4-10 pairs, 10-15 cm long x 1.5-3 cm broad, opposite to subopposite, lanceolate, acuminate, green, regular arrangement, basal pinnae bipartite. Pinnules 25-36 pairs, 1.2-1.6 cm long x 2-4 mm broad, oblong, margin entire, obtuse, sinus near to costa, c. 1 mm apart, pink spinules on distal part of segment, regular arrangement of segments. Veins 8-14 pairs, free, forking (half the way). Costa grooved above with spines near the attachment of costule, and raised below. Sori brown,
0.7-1.1 cm long, submarginal except at extreme apex. Indusium false, pale white. Sporangium: capsule globose, 170-200 μm long; stalk 200-250 μm long, biseriate; annulus 18-20 celled. Paraphyses uniseriate. Spores brown, c. 35 x 40 μm, trilete-tetrahedral, verrucate.

**Habitat:** This is a rare species seen in earth cuttings and rock crevices in shady forests.

**Altitude:** 400m-2000m.

**Distribution:** India (South India: Kerala & Karnataka), Java, Myanmar, Singapore, Vietnam and Thailand.

**Economic importance:** This species can cultivated as ornamental fern due to its splendid beauty.

**Etymology:** The specific epithet is derived from the German-Dutch Botanist Carl Ludwig Blume, who first described this species as *Pteris normalis* Blume in 1830. But, David Don described yet another species with same name in 1825, so it became illegitimate. So, J. Agardh (1839) chose the specific epithet in honour of Blume.

**IUCN status:** Vulnerable (VU). This species is known to occur in limited localities and the population size and occurrence are also fluctuating. This taxon meets criteria VU B1ac(i)C under Vulnerable category.
(XCH); Madikeri (alt. 850m), C.A.Barber 386 (MH); P.K.Rajagopal 760 (MGMC).

**KERALA**: Kannur (Dt.): Way to Meenmutty (alt. 350m), V.K.Sreenivas 124060; K.P.Rajesh & K.Satheesh Kumar 87839 (CALI). Idukki (Dt.): Deviar medu (alt. 1500m), Jomy Agustine 13251; Eravikulam N.P. (alt. 1450m), V.K.Sreenivas 124080 (CALI); Thekkadi-Munnar Road (alt. 1300m), V.S.Manickam 32169 (RHT); Aruvikad forest-Munnar (alt. 1500m), V.S.Manickam 32273 (XCH); Poonkavanan-Sabarimala (alt. 1200m), N.C.Nair 70201; Sabarimala slope (alt. 650m), B.D.Sharma 42062; Uppupara (alt. 1000m), K.V.Vivekanandand 45366 (MH). Palakkad (Dt.): Parambikulam (alt. 750m), Varghese 17885 (CALI); Pothumala-Karappara (alt. 1100m), N.C.Nair 69623 (MH). Pathanamthitta (Dt.): Karimalakovil (alt. 800m), B.K.Nayar & Pankaj 7373 (CALI). Thiruvananthapuram (Dt.): Ponmudi (alt. 1100m), N.C.Nair & S.R.Ghosh 52601 (CALI). Wayanad (Dt.): Vythiri (alt. 700m), K.V.Sankar 8821 (CALI).

**TAMIL NADU**: Coimbatore (Dt.): Akamalai forest- Valparai (alt. 1700m), V.S.Manickam 2126; Valparai (alt. 1700m), V.S.Manickam 1915 & 3029 (XCH); Sholayar (alt. 1100m), K.M.Sebastine 17294 (MH); Kannyakumari (Dt.): Balmore hills (alt. 700m), V.S.Manickam 2520 (XCH). Nilgiri (Dt.): Gudallur (alt. 1600m), V.S.Manickam 1506 (XCH).
Notes: Agardh (1839) described this species from Java. This is a little known and misunderstood species and a number of names have been applied to the *P. blumeana* in India. *P. aspericaulis* Wall. ex J. Agardh and *P. roseolilacina* Hieron. are two widely used names for this species. *P. blumeana* is characterized by the pinkish stipe, non mucronulate, obtuse and narrow pinnules. The sinus is almost reaching to costae and the inter-segmental distance is about 2-3 mm. It has prominent and pale setae at the distal end of the pinnules.

Nair and Ghosh (1977) reported this species as *P. roseolilacina* from Ponmudi Hills (*N.C.Nair 52601, CALI*). Subsequently, Manickam and Iru dayaraj (1992) reported it as *P. aspericaulis* (*V.S.Manickam 2667 & 2705, 32273, XCH!*) from Western Ghats. Rajagopal and Bhat (1998) also reported this species as *P. aspericaulis* (*P.K.Rajagopal 760, MGMC!*) from Karnataka. But critical examination on these specimens revealed that all the specimens belong to *P. blumeana*.

*P. aspericaulis* has scabrous stipe and mucronulate pinnule apex, where as *P. roseolilacina* has glabrous stipe and obtuse pinnule apex. Inter-segmental distance is less in both species compared to *P. blumeana*.

**Materials examined:**

**KARNATAKA**: Kodagu (Dt.): Thalecauvery (alt. 1200m), *V.K.Sreenivas 113206 (CALI)*; Bhagamandala (alt. 900m), *V.S.Manickam 2667 & 2705*
Fraser-Jenkins, C. R. 2008b. Endemics and pseudoendemics in relation to
distribution patterns of Indian Pteridophytes. *Indian Fern J.* 25: 1-45.

Little known and misunderstood species of *Pteris* L. (Pteridaceae) in
India. *Kew Bull.*

diterpenoids and sesquiterpenoids from *Pteris multifida*. *J. Nat. Prod.*
71: 227-231.


Ghatak, J. 1977. Biosystematic survey of Pteridophyta from Shevaroy Hills,
South India. *Nucleus* 20: 105-108.


flora of Eastern India*, Flora of India Ser. 4. Botanical Survey of India,
Howrah.
Fig. 6. *Pteris blumeana* J. Agardh: A-B. habit; C. paelea; D. single pinna; E. sporangium; F. spore; G. fertile pinnules; H. sterile pinnules (*V.K. Sreenivas 124060, CALI)*.
Plate 6. *Pteris blumeana* J. Agardh: A. habit; B. rhizome; C. fertile pinnules; D. spore; E. sterile pinnules; F. single pinna.
5. *Pteris confusa* T.G. Walker

*P. confusa* T. G. Walker, Kew Bull. 14: 329. fig. 5, 5a., pl. 5. fig. B, J. 1960;


R. D. Dixit, Cens. Indian Pterid. 69. 1984; S. M. Vasudeva &
A. Singla, Asp. Plant Sci. 13: 332. fig. 16. 1991; N. C. Nair et al.,
Ghats 80. pl. 57. 1992; Subh. Chandra, Ferns India 35. 2000;

Rajkumar & Manickam, Indian Fern J. 18: 83. 2000; Manickam &
2003; Pullaiah et al., Pterid. Andhra Pradesh 52. fig. 17. 2003;


[Fig. 7, 9E & Plate 7, 8]

**Type:** Sri Lanka, Adam's Peak, 9 March 1954, *T. G. Walker T736* (Holotype,
BM, digital image!).

Height 60-90 cm. Rhizome erect with tuft of stipes, 4-6 cm long, 1-10
mm thick, cylindrical, scaly. Palea brown, 2-3 mm long, lanceolate,
acuminate, auriculate, thick walled cells along centre, thin walled cells at
periphery. Stipe 40-50 cm long, 3-4 mm thick, green (fresh specimens) or
stramineous (dry specimens) above, chestnut below, grooved, scaly below.
Lamina bipinnate, 30-41 cm long x 20-30 cm broad, ovate, coriaceous. Pinnae
2-6 pairs, 14-18 cm long x 3-5 cm broad, opposite or subopposite, lanceolate, acuminate, green, basal pinnae bipartite. Pinnules 18-23 pairs, 1.8-2.2 cm long x 0.3-0.5 cm broad, oblong, margin entire, apex obtuse, sinus c. 2 mm away from costa, 1.5-3 mm apart, glabrous. Costae grooved with spines near the attachment site of costule, and raised below. Veins 15-16 pairs, free, forking, distinct above and below. Sori dark brown, 2.5-2.8 cm long, submarginal except at extreme apex. Indusium false, pale coloured. Sporangium: capsule globose, 220-250 µm long; stalk 330-350 µm long, biseriate; annulus 18-21 celled. Paraphyses uniseriate, 7-celled. Spores brown, c. 40 x 45 µm, trilete-tetrahedral, verrucate, abortive and misshapen spores are intermixed with normal spores.

**Habitat:** A common fern found in forests and territorial areas.

**Altitude:** 100m-2000m.

**Distribution:** India (South India: Andhra Pradesh, Karnataka, Kerala & Tamil Nadu) and SriLanka.

**Chromosome number:** n=58 (Manickam & Rajkumar, 1999); 2n=58 (Walker, 1958).

**Etymology:** Walker (1960) stated in the protologue that “source of confusion in the past in gross morphology” and so the specific epithet was derived from the confusion existing in the correct identification of the species.
IUCN status: Least concern (LC). This species commonly occurs in South India and it does not meet any criteria for Endangered, Vulnerable, etc. under IUCN red list category.

Notes: *Pteris confusa* is a member of *P. quadriaurita* complex, and was described by T. G. Walker (1956) from Sri Lanka and indicated that this is probably endemic to Sri Lanka and an extension to Southern India. It is closely related to *P. quadriaurita* Retz. except crenate pinnule apex and the juvenile stage is characterized by the fronds with white mottling.

*P. confusa* can cross with *P. multiaurita* J. Agardh or *P. quadriaurita* to form a series of morphologically different fertile hybrids, which was nicely illustrated by Walker (1958).

Rajkumar and Manickam (2000) observed the absence of auricles (accessory pinnae) in *P. confusa* from Western Ghats.

Materials examined:

ANDHRA PRADESH: Chittoor (Dt.): Talakona forest (alt. 450m), *V.K.Sreenivas 127803* (CALI); Kailashkona, *A.Ahmad 12855*; Talakona (alt. 400m), *A.M.Reddy 26456* (SKU). **Visakhapatnam** (Dt.): Galikonda (alt. 1200m), *P.Amrutha Lakshmi 25149* (CAL).

KARNATAKA: Chikmagaluru (Dt.): Belahanur (alt. 900m), *V.K.Sreenivas 124091* (CALI). **Kodagu** (Dt.): Thalecauvery (alt. 915m), *V.K.Sreenivas...*
113202 (CALI); Sampage estate (alt. 700m), V.S.Manickam 2814 (XCH).

Shimoga (Dt.): Jog falls (alt. 1500m), K.Satheesh Kumar 120829 (CALI).

KERALA: Ernakulam (Dt.): Neryamangalam (alt. 450m), N.C.Nair & S.R.Ghosh 50711 (CALI). Idukki (Dt.): Amarachola (alt. 1950m), V.K.Sreenivas 113260 (CALI); Way to Kumali (alt. 890m), K.Subramanyam 8987 (MH); Kumali (alt. 750m), N.C.Nair 40463; Kuttikanam (alt. 1050m), N.C.Nair 40192; Thankamani (alt. 860m), N.C.Nair 40417 (CALI).

Kozhikode (Dt.): Kakkayam forest (alt. 750m), V.K.Sreenivas 113289 (CALI). Palakkad (Dt.): Karappara (alt. 950m), N.C.Nair 69844 (MH); Way to Sispara (alt. 1750m), V.K.Sreenivas 119249; Near Walakkad Camp shed (alt. 1300m), V.K.Sreenivas 124002 (CALI); Valiyaparithode (alt. 850m), N.C.Nair 65494 (CALI). Thiruvananthapuram (Dt.): Agasthyamala (alt. 1350m), V.K.Sreenivas 113266 & 113275 (CALI); Chemunji (alt. 1100m), M.Mohanam 61872 (MH); Ponmudi hills (alt. 1100m), N.C.Nair 51749 (CALI); Chemunji (alt. 1100m), Raju Antony 47225 (TBGT). Wayanad (Dt.): Chandanathode (alt. 650m), V.K.Sreenivas 113286; Chembra peak (alt. 1800m), V.K.Sreenivas 113278 (CALI); Kuppadi-S. Bathery (alt. 900m), J.L.Ellis 18533 (MH).

TAMIL NADU: Coimbatore (Dt.): Valparai (alt. 500m), V.S.Manickam 34330 (XCH). Dindigul (Dt.): Kodaikanal (alt. 1250m), Habeeb 102907 (CALI). Palni hills (alt. 1200m), V.S.Manickam 1687; Shenbaganur-
6. *Pteris cretica* L.


[Fig. 8, 9F & Plate 9]

**Type:** Greece, Creta (Lectotype, LINN 1246.7, digital image!).

*Pycnodoria cretica* (L.) Small, Ferns Florida 91. 1931.
Plate 7. Holotype of *Pteris confusa* T. G. Walker (BM)
Fig. 7. *Pteris confusa* T. G. Walker: A-B. habit; C. palea; D. single pinna; E. fertile pinnules; F. sterile pinnules; G. sporangium; H. spore (V.K.Sreenivas113260, CALI)
Plate 8. *Pteris confusa* T.G.Walker: A. habit; B. single pinna; C. rhizome; D. adaxial view of pinnules; E. fertile pinnules; F. spore.
Height up to 100 cm. Rhizome erect, 6-9 cm long, 5-8 mm thick, cylindrical with tuft of roots, scaly. Palea dark brown, 3-4 mm long, 0.5 mm wide at base, lanceolate, entire, acute, auriculate, uniformly thick walled cells. Stipe 45-60 cm long, 2-3 mm thick, green (fresh materials) or stramineous (dry materials) above, chestnut below, shiny, grooved, glabrous. Lamina pinnate, 30-40 cm long x 15-25 cm broad, ovate-lanceolate, green, coriaceous. Pinnae dimorphic, fertile one is narrower than sterile one, 5-6 pairs, 18-22 cm long x 1.7-2 cm broad (sterile), 12-20 cm long x 6-7 cm broad (fertile), opposite-subopposite, lanceolate, acuminate, cuneate, margin distinctly serrate, bipartite, glabrous. Costae grooved above, raised below, glabrous. Veins numerous, free, forking at the base of midrib. Sori brown, 10-17 cm long, submarginal except at apex. Indusium false, brown. Sporangium: capsule globose, 200-250 μm long; stalk 200-300 μm long, biseriate, annulus 17-20 celled. Paraphyses uniseriate. Spores brown, c. 45 x 55 μm, triletetrahedral, verrucate.

**Habitat**: A rare species present only in moist evergreen forest above 1300m.

**Altitude**: 1300m-2100m.

**Distribution**: Australia, China, India (South India: Tamil Nadu), Islands of Mediterranean Sea, Japan, Madagascar, Nepal, North and South America, Philippines and Taiwan.

**Chromosome number**: n= 87 (Irudayaraj & Manickam, 1987).
**Common name:** Cretan Brake.

**Economic importance:** Fronds used as antibacterial agent (Singh, 1999).

**Etymology:** the specific epithet derived from its type locality ‘Crete’, an Island in Greece.

**IUCN status:** Endangered (EN). This taxon is currently known from Nilgiri Hills, Palni Hills and Shevaroy Hills in South India and prefer moist high altitude habitat. It meets the criteria EN B1ac(ii)+2a under Endangered category.

**Notes:** Linnaeus (1753) described this species based on specimens from Crete and Elba Islands of Mediterranean Sea. Margin and apex of sterile pinnae and sterile portion of fertile pinnae are distinctly serrate in this species.

This is a rare species present in wet evergreen forests above 1300m. In south India, *P. cretica* is present in forests of Dindigul, Nilgiri and Salem districts of Tamil Nadu.

Punetha *et al.* (2007) discussed the unusual frond of *P. cretica*, in which one side of rachis bear sterile pinnae and other side is having fertile pinnae.
Materials examined:

TAMIL NADU: Dindigul (Dt): Bear Shola-Kodaikanal (alt. 2300m), V.S.Manickam 187 (RHT); Gundur shola (alt. 2100m), V.S.Manickam & K.M.Mathew 32597 (RHT, XCH); Palni hills-Kodaikanal (alt. 2250m), V.S.Manickam & K.M.Mathew (XCH). Nilgiri (Dt): Way to Avalanche (alt. 2100m), V.K.Sreenivas 119231 & 124083; Avalanche-Ooty (alt. 2100m), Santhosh Nampy 48812; Habeeb 102844 (CALI); Avalanche forest (alt. 2100m), V.S.Manickam 892; Coonoor (alt. 1300m), V.S.Manickam 1318; Dodabetta road (alt. 2250m), V.S.Manickam 397; Kotagiri- Ooty (alt. 2100m), V.S.Manickam 726; Near Parson Valley (alt. 2300m), V.S.Manickam 298; Pykara (alt. 2000m), V.S.Manickam 0041; Rockland forest (alt. 2100m), V.S.Manickam 944; Thalakunda (alt.2300m), V.S.Manickam 0043 (XCH); Bikkapattimundu (alt. 1950m), G.V.Subbarao 40486; Bison swamp (alt. 2300m), B.V.Shetty 34191; Doddabetta (alt. 2250m), M.K.Janarthanam 83020; Hosakkadi (alt. 2030m), J.L.Ellis 34478; Kotagiri- Ooty road (alt. 2000m), B.D.Deb 31538 & E.Vajravelu 35189 (MH); Ooty (alt. 2000m), C.B.Clarke 11492A; H.C.Levinge s.n.; G.King s.n. (CAL). Salem (Dt): Brooklyn (alt. 1587m), K.Subramanyam 6566; Shevaroy hills (alt. 1300m), Ghatak s.n. (CAL).
Pteris cretica var. albolineata Hook.


Height up to 50 cm. Rhizome short, creeping, 4-5 cm long, 4-6 mm thick, cylindrical with tuft of shoots, scaly. Scales brown, 1.5-2 mm long, 0.4-0.5 mm wide at base, lanceolate, entire, acuminate, auriculate, uniformly thick walled cells. Stipe 12-20 cm long, 1-2 mm thick, green, stramineous (dry specimens) above, chestnut below, shiny, grooved, glabrous. Lamina pinnate, 12-20 cm long x 5-8 cm broad, ovate-lanceolate, green, subcoriaceous. Pinnae dimorphic, 1-2 pairs, 4-7 cm long x 1-1.5 cm broad (sterile), opposite, ovate-oblóng, cuneate, acute-acuminate, margin distinctly serrate, glabrous, green above with white band along either side of midrib, basal pair bipartite, Costa grooved above, raised below. Veins numerous, free, forking.

Habitat: Seen as cultivated fern in Gardens.

Altitude: Sea level-700m.

Distribution: England, India (South India: Kerala) and Indonesia.

Chromosome number: n= 87 (Walker, 1962).
Fig. 8. *Pteris cretica* L.: A-B. habit; C. pinna apex; D. palea; E. fertile pinna; F. sporangium; G. portion of fertile pinna enlarged; H. sterile pinna; I. a portion of sterile pinna; J. spore (*V.K.Sreenivas 119231, CALI*).
Plate 9. *Pteris cretica* L.: A. habit; B. rhizome; C. a portion of sterile pinna; D. a portion of fertile pinna; E. pinna apex; F. single pinna; G. spore.
Fig. 9. Distribution of the genus *Pteris* in South India: A. *P. argyraea*; B. *P. arisanensis*; C. *P. biaurita*; D. *P. blumeana*; E. *P. confusa*; F. *P. cretica*. 
Common name: White striped Brake.

Economic importance: This variety is cultivated as an ornamental fern.

Note: This fern was collected from Gurukula Botanical Sanctuary, Periya, Wayanad. Fertile specimens are not available for the present study.

Materials examined:

KERALA: Wayanad (Dt.): Gurukula Botanical Sanctuary, Periya (alt. 700m), V.K.Sreenivas 119220 (CALI).
7. Pteris ensiformis Burm.f.


[Fig. 10, 16A & Plate 11]

**Type:** Philippines, Luzon, *Cumming 410* (Isotype, CAL!; Isotype, K & Z, digital image!).

Height 30-45 cm. Rhizome short, creeping, 3-5 cm long, 2-4 mm thick, cylindrical, scaly. Palea brown, 2-3 mm long, 0.4-0.6 mm wide at base, lanceolate, acuminate, entire, thick walled cells. Stipe 10-15 cm long, 2-3 cm thick, dark green (live specimens) or stramineous (dry specimens), quadrangular, slightly grooved, glabrous above, scaly below. Lamina pinnate, dimorphic, 15-25 cm long x 10-16 cm broad, ovate to deltoid, membranaceous. Pinnae 3-5 pairs, terminal pinnae larger than lateral pinnae; lateral pinnae 9-10 cm long x 4-5 mm broad (fertile), 7-9 cm long x 2-3 mm (sterile), opposite or subopposite, lanceolate-ensiformis, apex acute-acuminate, crenate-crenulate, green above, pale green below, pinna more or less adnate to rachis, lower pinnae deeply lobed, ovate, lobes up to 5 pairs, glabrous. Costa grooved above and below, glabrous. Veins numerous, free, and forking. Sori brown 2.5-8.5 cm long, submarginal except at base and apex. Indusium false, white. Sporangium: capsule globose, 300-350µm long; stalk 200-250 µm, biseriate; annulus 17-20 celled. Paraphyses uniseriate. Spores brown, c. 45 x 50µm, triletetrahedral, verrucate.

**Habitat:** Usually seen in fully shaded areas to partially shaded areas of forests.

**Altitude:** 350m-2000m.

**Distribution:** Australia, Borneo, China, India (South India: Andhra Pradesh, Kerala & Tamil Nadu), Malaysia, Philippines and Sri Lanka.

Common name: Sword Brake.

Economic importance: Fronds are astringent, and decoction is anti-dysenteric. Rhizome juice is used in glandular swelling (Singh, 1999; Ghosh et al., 2004). This species is also cultivated as ornamental fern.

Etymology: The specific epithet derived from the Latin word ‘ensiformis’ (= sword like). Its sword shaped pinnae gave the specific epithet.

IUCN status: Endangered (EN). This taxon is currently known from 3-4 locations in South India. But it is cultivated as an ornamental plant in many gardens as well as houses due to its charming frond architecture. This taxon meets the criteria EN B1a2ac(iv)D under endangered category.

Notes: Agardh (1839) reported this species from Travancore and Cochin of South India as P. crenata Sw. Manickam et al. (2004a), reported this species from Kanyakumari district of Tamil Nadu as a new distributional record, but no voucher specimen is available at XCH.

Materials examined:

ANDHRA PRADESH: Visakhapatnam (Dt.): Minumuluru (alt. 1000m), G.V.Subbarao 30060 (MH).
KERALA: Thiruvananthapuram (Dt.): Nedumangadu (alt. 350m),
V.K.Sreenivas 124058; TBGRI Fern House (alt. 550m), V.K.Sreenivas
124056 (CAL). Trivandrum-1 (alt. 125m), M.Mohan 52786 (MH, CAL);
Trivandrum Zoo (alt. 125m), M.Mohan 63365 (MH). Wayanad (Dt.):
Gurukula Botanical Sanctuary, Periya (Cult.) (alt. 700m), V.K.Sreenivas
113299 (CAL).

TAMIL NADU: Nilgiri (Dt.): Nilgiri hills (alt. 2000m), G.King s.n. (CAL).
Pteris ensiformis var. victoriae Baker


[Plate 12]

Height 50-65 cm. Rhizome short, creeping, 5-6 cm long, 3-4 mm thick, cylindrical, scaly. Palea pale brown, 2-3 mm long, 0.4-0.5 mm wide at base, lanceolate, entire, apex acuminate, auriculate, thick walled cells. Stipe 20-25 cm long, 1-2 mm thick, stramineous, chest nut at extreme base, quadrangular, slightly grooved, glabrous above, scaly below. Lamina pinnate, dimorphic, 30-40 cm long x 20-25 cm broad, ovate, membranaceous, fertile one narrower than sterile one. Pinnae 3-4 pairs, subopposite, terminal pinnae larger than lateral ones; lateral pinnae 14-16 cm long x 4-5 mm broad, lanceolate (fertile), 3-6 cm long x 5-9 mm (sterile), apex acute-acuminate, serrulate, glabrous, lower pinnae deeply lobed, lobes up to 5 pairs, green above with white band along either side of midrib, pale green below. Costae grooved above and raised below, glabrous. Veins numerous, free, forking. Sori brown 10-12 cm long, linear, submarginal except base and apex. Indusium false, white. Sporangium: capsule globose, 200-300 μm long; stalk, 200-250 μm, biseriate; annulus 20-22 celled. Paraphyses uniseriate. Spores brown, c. 35 x 40μm, triletetraehedral, abortive and misshapen spores.
Fig. 10. *Pteris ensiformis* Burm. f.: A. habit; B. spore; C. sporangium; D. palea; E. a portion of fertile pinna; F. sterile pinna (*V.K.Sreenivas124058, CALI*).
Plate 11. *Pteris ensiformis* Burm. f.: A. habit; B. rhizome; C. single pinna with accessory pinna; D. pinna apex; E. a portion of fertile pinna; F. sterile pinna; G. spore.
**Habitat:** Usually seen as a cultivated plant in gardens.

**Altitude:** Sea level-1100m.

**Distribution:** Australia, China, England, India (South India: Karnataka and Kerala), Java, Malaysia, Philippines and Polynesia.

**Chromosome number:** 2n= 87 (Jha & Sinha, 1987).

**Economic importance:** Cultivated as an ornamental fern.

**Etymology:** This variety named after the Queen Victoria of England.

**Materials examined:**

**KARNATAKA:** Dakshina Kannada (Dt.): Mangalore University Garden (alt. sea level), *P.K.Rajagopal s.n.* (MGMC).

**KERALA:** Malappuram (Dt.): Calicut University Campus (alt. 50m), *V.K.Sreenivas 124074* (CAL). Kottayam (Dt.): Changanassery (alt. 30m), *N.C.Nair 833* (CAL). Pathanamthitta (Dt.): Pampanada (alt. 600m), *N.C.Nair 855* (CAL). Thiruvananthapuaram (Dt.): Rest house garden-Ponmudi (alt. 1050m), *N.C.Nair 51046* (CAL).
8. *Pteris geminata* Wall. ex J. Agardh


[Fig. 11, 16B & Plate 13]

**Type:** Nepal, *Wallich 2180* (CAL!; CALI, Microfishe!).

*Campteria kleiniana* C. Presl, Tent. t 5, f 19. 1836; Bedd., Handb. Ferns. Brit. India, 116. fig. 60. 1883.

*C. anamallayensis* Bedd., Ferns S. India 14. pl. 45. 1863.

**Type:** India, Anamallays, *Beddome s.n.* (Isotype, MH!).


Plate 12. *Pteris ensiformis* var. *victoriae* Baker: A. habit; B. a portion of fertile pinna; C. fertile pinna; D. rhizome; E. sterile pinna; F. spore.
Height 60-70 cm. Rhizome erect to suberect, 4-6 cm long x 4-6 cm thick, cylindrical with tuft of stipes, scaly. Palea light brown, 3-5 mm long, 0.4-0.6 mm wide at base, lanceolate, entire, acuminated, auriculate, thin uniformly. Stipe 45-55 cm long, 3-6 mm thick, green (fresh specimens) or stramineous (dry materials) above and chestnut below, grooved throughout, glabrous above, scaly below. Lamina bipinnate, 35-45 cm long x 25-30 cm broad, ovate, basal pair bipartite, herbaceous (thin). Pinnae 5-7 pairs, 20-25 cm long x 4-6 cm broad, opposite, ovate, acute, basal pinna bipartite, green, and glabrous. Pinnules 16-23 pairs, 30-50 cm long x 3-9 mm broad, oblong, acute, crenate (sterile), only apex is crenate in fertile ones, sinus c. 3 mm away from costa, 2 mm apart, glabrous. Costae grooved above with short inconspicuous spines at the near the base of costules, and raised below. Veins 13-16 pairs, free, forking, distinct, lower pair of veins form costal areoles along midrib, veins ending submarginally in hydathodes. Sori brown, linear, crowded, 1.2-2 cm long, submarginal except at base and apex. Indusium false, brown at maturity. Sporangium: capsule globose, 200 μm long; stalk 250 μm long, biseriate; annulus 18-22 celled. Paraphyses uniseriate. Spores brown, c. 45 x 50 μm, trilete-tetrahedral, rugate.

**Habitat:** A rare species present only in moist evergreen forests at higher altitude.

**Altitude:** 800m-2300m.
**Distribution:** Australia, China, India (South India: Kerala & Tamil Nadu) and Japan.

**Etymology:** The specific epithet derived from a Latin word ‘geminatus’ (= paired). Its lower pinnae bear paired auricles (accessory pinnae) and hence the name geminata.

**IUCN status:** Endangered (EN). This taxon is present in Silent Valley National Park and Periyar Tiger reserve of Kerala, and Anamalay hills, Nilgiri hills and Kalakkad hills of Tamil Nadu. The population is also very narrow when compared with other species of *Pteris*. It meets the criteria EN B1ac(ii,iv)+2aD under Endangered category.

**Notes:** Wallich (1828) catalogued this species from ‘India orientalis’ without description, later Agardh (1839) validly published this species. *P. geminata* Wall. ex J. Agardh is characterized by its veins ending in hydathodes (not reaching in the margin). The sterile pinnule and apex of the fertile pinnule is crenate and lower pair of veins united to form costal areoles along midrib.

Nair and Bhargavan (1985) reported this species from Silent Valley National Park as a new record to Kerala. But subsequent expedition for collecting the same species to that area was not fruitful. *P. geminata* has been reported from Palakkad and Idukki district of Kerala, and Coimbatore, Nilgiri and Tirunelveli districts of Tamil Nadu so far. The population of this species
is very narrow and Chandra et al., (2008) included this species in ‘At Risk’ category.

*P. geminata* is related to *P. biaurita* L. in having costal areoles along the midrib of pinnae. But, other morphological characters such as margin, vein endings, texture differ with *P. biaurita*.

**Materials examined:**

**KERALA:** Palakkad (Dt.): Panthenthode SVNP (alt. 800m), B.K.Nayar & Party 10683 (CALI); N.C.Nair 56857 (MH). Idukki (Dt.): Near Injippara-PTR (alt. 900m), V.K.Sreenivas 124025; Upper Manalar-PTR (alt. 1750m), Jomy Augustine 13228; Thamara-PTR (alt. 1100m), K.P.Rajesh 18322; Vellimala-PTR (alt. 1500m), K.P.Rajesh 62892 (CALI).

**TAMIL NADU:** Coimbatore (Dt.): Sholayar-Anamalai (alt. 800m), V.S.Manickam 34698 (XCH); Anamallay (alt. 1500m), R.H.Beddome s.n.; Varadimalai-Bolempetti hills (alt. 1350m), C.E.C.Fisher 2748 (CAL). Nilgiri (Dt.): Ell hills (alt. 2300m), V.Irudayaraj 0026 (XCH). Tirunelveli (Dt.): Kalakkad hills (alt 1200m), V.S.Manickam 31274; Sengeltheri (alt. 1000m), V.S.Manickam & K.M.Mathew 34068 (RHT, XCH); Kakachi forest (alt. 1250m), V.S.Manickam 2379 (XCH).
9. *Pteris gongalensis* T.G. Walker


[Fig. 12, 16C & Plate 14, 15]

**Type:** Sri Lanka, Gongala Hills, March 1954, *T.G.Walker T756* (Holotype, BM, digital image!).

Height 30-40 cm. Rhizome short, suberect, 2.5-4 cm long, 4-6 mm thick, cylindrical with tuft of roots, scaly. Palea brown, c. 3 mm long, lanceolate, acuminate, auriculate, central thick walled cells and outer thin walled cells with cellular projections. Stipe 16-25 cm long, 2-3 mm thick, green (fresh specimens) or stramineous (dry specimens), grooved, scaly below. Lamina bipinnate, 20-22 cm long x 18-20 cm broad, deltoid, subcoriaceous. Pinnae 3-4 pairs, 6-11 cm long x 2-3 cm broad, lanceolate, opposite or subopposite, green, basal pairs bipartite. Pinnules 13-16 pairs,
Fig. 11. *Pteris geminata* Wall. ex J. Agardh: A-B. habit; C. spore; D. sporangium; E. palea; F. pinna; G. fertile pinnules; H. sterile pinnules (*V.K.Sreenivas124025*, CALI).
Plate 13. *Pteris geminata* Wall. ex J. Agardh: A. habit; B. rhizome; C. single pinna; D. sterile pinnules; E. fertile pinnule; F. sterile pinna; G. fertile pinna; H. spore.
1-1.5 cm long x 4-5 mm broad, oblong, entire, acute, sinus c. 1 mm away from costa, c. 1 mm apart, inconspicuous spirules present. Costae grooved above with conspicuous spines, and raised below. Veins 10-13 pairs, free, forking. Sori brown, 8-12 mm long, submarginal except at base and apex. Indusium false, brown at maturity. Sporangium: capsule globose, 200-250 μm long; stalk 150-200 μm long, biseriate; annulus 16-18 celled. Paraphyses uniseriate. Spores brown, c. 40 x 45 μm, triletetrahedral, verrucate.

**Habitat:** Seen in fully exposed or partially exposed areas.

**Altitude:** 10m-1200m.

**Distribution:** India (South India: Andhra Pradesh, Kerala & Tamil Nadu) and Sri Lanka.

**Chromosome number:** n= 87 (Walker, 1962).

**Etymology:** Specific epithet derived from the type locality ‘Gongala Hills’, in Sri Lanka.

**IUCN status:** Vulnerable (VU). The distribution of this taxon is narrow in South India and it meets the criteria VU B1a2ac(iv) under Vulnerable category.

**Notes:** Walker (1960) described this species from Gongala Hills, Sri Lanka as a member of *Pteris quadriaurita* group. *P. gongalensis* is characterized by its deltoid lamina, inconspicuous spinules and regular arrangement of pinnae.
Moreover, this species is smaller than other members of *P. quadriaurita* complex. Walker described this species as endemic to Sri Lanka; however, Nair and Ghosh (1974) reported it from Kerala.

**Materials examined:**

**ANDHRA PRADESH:** Chittoor (Dt.): Japalathir dam site (alt. 1100m), 
*K.Subramanyam* 7865 (MH).

**KERALA:** Idukki (Dt.): Thankamani (alt. 800m), *N.C.Nair* 40755 (CAL).

Malappuram (Dt.): C.U. campus (alt. 50m), *M.P.Ravindra Kumar* 24712 (CALI). Palakkad (Dt.): Kariyilathode (alt. 526m), *V.K.Sreenivas* 113227; Panthenthode (alt. 800m), *V.K.Sreenivas* 119268 (CALI). Pathanamthitta (Dt.): Vennikulam (alt. 100m), *N.C.Nair & S.R.Ghosh* 50845 (CAL). Wayanad (Dt.): Tirunelly (alt. 800m), *V.K.Sreenivas & V.P.Thomas* 119280 (CALI).

**TAMIL NADU:** Tirunelveli (Dt.): Sengaltheri-Natrikkal (alt. 1200m), 
*V.S.Manickam* 2432 (XCH); Kannikatty (alt. 830m), *K.M.Sebastine* 9621 (MH).
10. Pteris heteromorpha Fee


[Fig. 13, 16D & Plate 16]

**Type:** Philippines, Luzon, *Cumming 409* (Holotype, K, digital image!; Isotype, CAL!; Z, digital image!).


*syn. nov.*

**Type:** India, Bombay Presidency, Savantwadi, *M.R.Almeida 1272* (Holotype, BLAT).
Fig. 12. *Pteris gongalensis* T. G. Walker: A. habit; B. spore; C. sporangium; D. palea; E. single pinna; F. fertile pinnules; G. sterile pinnules (*V.K.Sreenivas 113227, CALI*).
Plate 15. *Pteris gongalensis* T. G. Walker: A. habit; B. single pinna; C. fertile pinnules; D. sterile pinnules; E. rhizome; F. spore.
Height 30-50 cm. Rhizome short, creeping, 3-5 cm long x 3-5 mm thick, cylindrical, scaly. Palea brown, 3-5 mm long, 0.5-0.6 mm broad at base, lanceolate, acuminate, auriculate at base, thick walled central cells and outer thin walled cells. Stipe 20-22 cm long, 2-3 mm thick, green (fresh specimen) or stramineous (dry material), chestnut at extreme base, grooved throughout except extreme base, glabrous, shining. Lamina pinnate, 20-25 cm long x 15-18 cm broad, ovate, green, subcoriaceous. Pinnae 4-5 pairs, 7-15 cm long x 2.2-2.8 cm broad, heteromorphic, opposite, lower pairs petiolate, upper pair adnate to rachis, lanceolate (generally), green, acute (rarely apiculate), entire (rarely wavy), glabrous, pinnae laterally lobed (4-9 pairs) at base, lobes oblong, obtuse, 9-10 cm long x 2.5-3 cm broad (in some cases very short lobes are present), terminal pinna large and base lobed. Costae grooved above and raised below, glabrous, shining. Veins numerous, free, forking near costa. Sori brown, linear, 6-8 mm long, submarginal except at base and apex. Indusium false, light brown at maturity. Sporangium: capsule globose, 200-250 μm long; stalk 300-350 μm long, biseriate; annulus 15-17 celled. Paraphyses uniseriate. Spores brown, c. 50 x 60 μm, trilete-tetrahedral, rugate, broad equatorial ridge.

**Habitat:** Seen in evergreen forests.

**Altitude:** 400-900m.
**Distribution:** India (South India: Andhra Pradesh, Karnataka & Kerala), Myanmar and Philippines.

**Etymology:** The specific epithet was derived from a Latin word 'heteromorphus' (= having organs of varying forms). Here morphology of pinnae is varying or heteromorphic.

**IUCN status:** Endangered (EN). This taxon is currently known from 3-4 locations in south India and meets the criteria EN B1ac(i)+2aD under endangered category.

**Notes:** *P. heteromorpha* Fee was described based on the specimens from Luzon, Philippines. As species name indicates, the plant is characterized by its irregularly lobed pinnae. The type specimens have apiculate or sub apiculate pinnae, though the south Indian specimens have no clear apiculation and are having acute to obtuse pinnae apex. But rarely sub apiculate pinnae are also observed.

Beddome (1883) considered this species is a variety of *P. cretica* L. *viz.*, *P. cretica* var. *heteromorpha* Bedd. Bole and Almeida (1977) described *P. almeidiana* as a new species from Bombay Presidency, based on the specimens from Savantwadi (*M.R. Almeida 1272*, BLAT). Fraser Jenkins (1997) equated *P. almeidiana* to *P. otaria* Bedd. after examining the type specimens. But, from the illustrations and descriptions in the protologue, it is evident that *P. almeidiana* is a synonym of *P. heteromorpha.*
Nair and Ghosh (1978) reported this species from Orissa as a new record to India. Manickam et al. (2005), and Manickam and Benniamin (2007) reported *P. heteromorpha* from Andhra Pradesh and Karnataka respectively. Antony (2009) recorded it from Palakkad district as a new distributional record from Kerala, though Sworrupanandhan (*Sworrupanandhan 446, CALI*) collected this species from Kulathupuzha of Kollam district in 1982.

Most of the South Indian authors were reported *P. heteromorpha* Fee with erect rhizome, though their illustrations are of creeping rhizome. During the present study, the specimens collected from the Shendurney Wildlife Sanctuary (*V.K.Sreenivas 124070, CALI*) are having short creeping rhizome.

This is a rare species and its population and distribution were also narrow. Chandra et al. (2008), included this species in “Near Threatened” category.

**Materials examined:**

**KERALA:** Kollam (Dt.): Kattilappara, SWLS (alt. 350m), *V.K.Sreenivas 124070*; Kulathupuzha (alt. 450m), *K.Sworrupanandhan 446 (CALI)*; Palakkad (Dt.): Dhoni hills (alt. 500m), *Raju Antony 29879 (TBGT)*.

**ORISSA:** Malkangiri (Dt.): Govindappally-Khairput, *N.C.Nair & S.R.Ghosh 51171 & 51234 (CAL)*.
Fig. 13. *Pteris heteromorpha* Fee: A. habit; B. palea; C. a portion of fertile pinna; D. a single pinna; E. pinna apex; F. sporangium; G. spore (*V.K.Sreenivas 124070, CALI)*.
Plate 16. *Pteris heteromorpha* Fee: A. habit; B. single pinna; C. a portion of fertile pinna; D. pinna apex; E. rhizome; F. spore.


[Fig. 14, 16E & Plate 17]

**Type:** Mauritius Islands, *Commerson s.n.* (Isotype, P, digital image!).


Height up to 160 cm. Rhizome short, erect to suberect, 5-6 cm long, 4-5 mm thick, scaly. Palea brown, 2-3 cm long, 0.3-0.4 mm broad at base, linear- lanceolate, acuminate, auriculate, inner thick walled cells and outer thin walled cells with multicellular projections. Stipe 50-70 cm long, 4-6 mm thick, stramineous above and chestnut on extreme base, grooved throughout, glabrous. Lamina bipinnate, 40-60 cm long x 20-30 cm broad, oblong-
lanceolate, green above, obscure green below, subcoraceous. Pinnae 7-9 pairs, 18-28 cm long x 3-5 cm broad, opposite- subopposite, lanceolate, basal pinnae bipartite, pinna-apex elongated, 5-7 cm. Pinnules 25-32 pairs, 1.5-2.5 cm long x 4-5 mm broad, linear-oblong, obtuse-acute, entire, sinus c. 2 mm away from costae, 2-3 mm apart, glabrous. Costae grooved above with spines, raised and polished below. Veins 12-16 pairs, free, forking, lower pair form triangular costal arch. Sori brown, 1.2-1.6 cm long, linear, submarginal except at apex, base not joined. Indusium false, pale brown. Sporangium: capsule globose, 250-300 μm long; stalk 300-350 μm long, biseriate; annulus 14-16 celled. Paraphyses uniseriate. Spores brown, c. 50 x 55 μm, trilette-tetrahedral, verrucate.

**Habitat:** Grows in shady forest areas, usually near stream banks.

**Altitude:** 350m-1200m.

**Distribution:** Africa, China, India (South India: Kerala & Tamil Nadu), Myanmar and Mauritius.

**Chromosome number:** n= 58 (Manton & Sledge, 1954).

**Etymology:** The specific epithet derived from a Latin word ‘linearis’ (= linear). The linear shape of pinnules gives the name linearis.

**IUCN status:** Vulnerable (VU). The distribution of this taxon is narrow in South India and meets the criteria VU B1a2ac(i)C under Vulnerable category.
Notes: Poiret described this species based on Commerson’s specimens from Mauritius Islands. *P. linearis* is closely related to *P. biaurita* in having similar morphology of pinnae, except costal areoles in *P. biaurita*. In *P. linearis* pinnules are linear and lower pair of veins united to form triangular costal arch. This species is also characterized by its wide inter segmental distance.

Materials examined:

**ANDHRA PRADESH:** Chittoor (Dt.): Talakona forest (alt. 500m), *V.K.Sreenivas 127805* (CALI); Akash ganga-Thirumala (alt. 600m), *A.Ahmad 12814* (SKU). Vizianagaram (Dt.): Galikonda, *A.Ahmad 12896* (SKU).

**KERALA:** Kannur (Dt.): Ambayathode (alt. 550m), *V.S.Ramachandran 59152*; Kottiyoor (alt. 225), *V.J.Nair 59803* (MH, CAL). Palakkad (Dt.): Nilikkal SVNP (alt. 900m), *V.K.Sreenivas 124012*; Thothanparakuzhi, PWLS (alt. 750m), *V.K.Sreenivas 113234* (CALI). Thrissur (Dt.): Athirappally (alt. 350m), *V.K.Sreenivas 119288* (CALI).

**TAMIL NADU:** Coimbatore (Dt.): Anamalai Hills, Valparai (alt. 500m), *V.S.Manickam & K.M.Mathew 34330* (XCH). Tirunelveli (Dt.): Sengeltheri (alt. 1200m), *V.S.Manickam & K.M.Mathew 34132* (RHT, XCH); *V.S.Manickam 2429* (XCH).
Fig. 14. *Pteris linearis* Poir.: A-B. habit; C. palea; D. a single pinna; E. sporangium; F. spore; G. fertile pinnules; H. sterile pinnules (V.K. Sreenivas 113234, CALI).
Plate 17. *Pteris linearis* Poir.: A. habit; B. single pinna; C. sterile pinnules; D. fertile pinnules; E. rhizome; F. spore.
12. Pteris longipes D. Don


[Fig. 15, 16F & Plate 18]

**Type:** Nepal, *Wallich s.n.* (Lectotype, BM, digital image!).

Height up to 100 cm. Rhizome short, erect with tuft of roots, 2-3 cm long x 1-2 mm thick, scaly. Palea brown, 2-3 mm long, 0.3-0.4 mm wide at base, lanceolate, acuminate, auriculate, entire, thick walled cells. Stipe 25-45 cm long, 1-2 mm thick, green (fresh material) or stramineous (dry material), chestnut at extreme base, grooved, glabrous above, scaly below; spines at the attachment site of pinnae to stipe, spines 1-2 mm long. Lamina bipinnate, 35-40 cm long x 25-30 cm broad, ovate or broadly ovate, green, basal pair ternately divided, subcoriaceous. Pinnae 10-16 pairs, 7-10 cm long x 1.5-2.5 cm broad, opposite or subopposite, oblong-lanceolate, 7-12 pairs of accessory pinnae on lower ternately divided pinna. Pinnules 13-18 pairs, 9-12 mm long x 3-4 mm broad, oblong, obtuse, margin entire, apex crenate, sinus up to costa, 0.5-1 cm apart, prominent spinules on costule. Costae grooved above with conspicuous spines at the attachment site of costule, and raised below. Veins 6-8 pairs, free, forking. Sori brown, 2-3 mm long, submarginal except at base and apex (confined to the middle portion). Indusium false, brown. Sporangium: capsule globose, 200-250 μm long; stalk 300-350 μm long, biseriate; annulus 15-18 celled. Paraphyses uniseriate. Spore brown, c. 40 x 45 μm, triletetrahedral, verrucate.

**Habitat:** In shaded floors of evergreen forests.

**Altitude:** 600m-1500m.
**Distribution:** India (South India: Karnataka, Kerala & Tamil Nadu), Java, Nepal, New Guinea, Philippines, Sri Lanka and Taiwan.

**Chromosome number:** n= 58 (Manickam & Irudayaraj, 1988).

**Economic importance:** Leaf extract is orally given for sore throat (Karuppusamy *et al.*, 2001) and its sporophylls are antibacterial (Singh, 1999).

**Etymology:** The specific epithet derived from a Latin word ‘longipes’ (= long stipe).

**IUCN status:** Least concern (LC). This is a widespread taxon present in evergreen forest at high altitude and it does not meet any criteria for Endangered, Vulnerable, etc. under IUCN red list category.

**Notes:** Don (1825) described this species based on the specimens from Nepal. *P. longipes* is characterized by its ternately divided basal pinnae, lesser number of veins, and the sori usually confined to the middle portion of the pinnules.

This is a common species in Silent Valley National Park and present in high altitudes, and called ‘Kadavalai’ in Tamil language (Karuppusamy, 2001).
Materials examined:

KARNATAKA: Kodagu (Dt.): Sampage-Madikeri road side (alt. 900m), V.S.Manickam 2872 (XCH). Shimoga (Dt.): Agumbe (alt. 850m), Santhosh Nampy 48830 (CALI); P.K.Rajagopal 16 (MGMC).

KERALA: Idukki(Dt.): Anjuruli (alt. 800m), K.P.Rajesh 70116; Mlappara PTR (alt. 900m) K.P.Rajesh 70032; Palkulam mudi (alt. 1300m), Jomy Augustine 12855 (CALI); Eravikulam (alt. 1600m), V.S.Manickam & K.M.Mathew 34512 (RHT); Uppupara (alt. 1200m), N.C.Nair 70199 (MH, CAL); Peerumedu (alt. 1300m), A.Meebold 908; Thekkady (alt. 750m), N.C.Nair 40500 (CAL). Palakkad (Dt.): Kummattanthode (alt. 825m), V.K.Sreenivas 119255; Nellyampathi (alt. 1100m), Geevarghese 17873; Poopara, PWLS (alt. 1100m), V.K.Sreenivas & A.J.Roby 119215; Sairendri (alt. 900m), V.K.Sreenivas 124021; Silent Valley NP (alt. 900m), Geevarghese 4109, B.K.Nayar 10011, B.K.Nayar & P.V.Madhusoodanan 21336; Siruvani (alt. 600m), Sworrupanadhan 29464; Walakkad-Sispara path (alt. 1000m), V.K.Sreenivas 119240 (CALI); Kummattanthode (alt. 800m), V.S.Manickam 3281 (XCH); Aruvanpara (alt. 850m), N.C.Nair 69174; Kanhirappuzha dam site (alt. 1000m), E.Vajravelu 46261; Karapara (alt. 950m), N.C.Nair 69846; Muthikulam (alt. 850m), E.Vajravelu 62931; Panthenthode (alt. 800m), N.C.Nair 50648; (MH); Poochaphara (alt. 1200m), J.N.Vohra 58417; Silent Valley dam site (alt. 925m), P.Bhargavan 65706
(CAL); Karimala PWLS (alt. 1000m), *P. Sujanapal 30930* (KFRI). **Thiruvananthapuram** (Dt.): Chemunji (alt. 1000m), *Raju Antony 26830* (TBGT). **Thrissur** (Dt.): Sholayar dam site (alt. 450m), *V.S.Manickam & K.M.Mathew 34696* (RHT); *N.C.Nair & S.R.Ghosh 51046* (MH). **Wayanad** (Dt.): Cherunelly (alt. 700m), *B.K.Nayar 7354*; Pakranthalam (alt. 650m), *B.K.Nayar & Geevarghese 11642* (CALI); Brahmagiri (alt. 950m), *V.S.Ramachandran 62701* (MH, CAL); Chandanathode (alt. 700m), *M.Kumar & S. Stephen 6750* (KFRI).

**Tamil Nadu: Coimbatore** (Dt.): Anakunthy shola-Top slip (alt. 700m), *V.S.Manickam & K.M.Mathew 34636*; Pettimudi path (alt. 1600m), *V.S.Manickam & K.M.Mathew 34530* (RHT); Valparai (alt. 1800m), *V.S.Manickam 3033* (XCH); Anamallay's, *R.H.Beddome s.n.* (MH). **Nilgiri** (Dt.): Gudallur (alt. 1300m), *V.S.Manickam 1529*; Keelenadukani (alt. 1300m), *V.S.Manickam 1514* (XCH); Devala (alt. 1200m), *H.C.Levinge s.n.* (CAL).
Fig. 15. *Pteris longipes* D. Don: A-B. habit; C. a single pinna; D. spore; E. sporangium; F. palea; G. fertile pinnules; H. sterile pinnules (*V.K.Sreenivas 124021*, CALI).
Plate 18. *Pteris longipes* D. Don: A. habit; B. single pinna; C. sterile pinnules; D. fertile pinnules; E. rhizome; F. spore.
Fig. 16. Distribution of the genus *Pteris* in South India: A. *P. ensiformis*; B. *P. geminata*; C. *P. gongalensis*; D. *P. heteromorpha*; E. *P. linearis*; F. *P. longipes*.
13. Pteris mertensioides Willd.


[Fig. 17, 23A & Plate 19]

**Type:** Indonesia, Ambonia, *Ventenat s.n.* (Holotype, B, digital image!).


**Type:** Philippines, Luzon, *Cuming 103* (Holotype, K, digital image!; Isotype-CAL!).
Height 250-300 cm. Rhizome erect, 5-7 cm long x 6-12 mm thick, cylindrical with tuft of roots, scaly. Palea light brown, 7-11 mm long, 0.5-0.6 mm wide at base, linear-lanceolate, acute, auriculate, thick walled cells. Stipe 100-110 cm long, 1-1.4 cm thick, chestnut brown, grooved throughout, densely scaly below, hard. Lamina bipinnate, 160-175 cm long x 80-100 cm broad, ovate, upper surface green, lower pale green, membranaceous (thin). Pinna 20-25 pairs, 40-50 cm long x 5-6 cm broad, alternate, linear-lanceolate, acute, basal pinnae bipartite, glabrous. Pinnules 45-55 pairs, 2-3 cm long x 4-5 mm broad, oblong, acute, margin crenate, only apex crenate in fertile ones, sinus up to costa, 2-3 mm apart, triangular sinus, glabrous. Costae deeply grooved above and its ridges form a flap along either side, and raised below. Veins 15-20 pairs, free, forking. Sori brown, 2.2-2.8 cm long, linear, submarginal except at apex. Indusium false, pale white. Sporangium: capsule globose, 200-250 μm long; stalk 250-300 μm long, biseriate; annulus 16-18 celled. Paraphyses uniseriate. Spores pale brown, c. 35 x 40 μm, trilete-tetrahedral, tuberculate, broad equatorial flange girdling the spore.

**Habitat:** A rare and elegant species present in shady evergreen forests.

**Altitude:** 400m-1300m.

**Distribution:** India (South India: Kerala & Tamil Nadu), Malaya, Myanmar, Polynesia, Siam, Sri Lanka and Thailand.

**Etymology:** The specific epithet derived from a Dutch word ‘Mertensienartiger’.
**IUCN status:** Endangered (EN). This taxon is currently known from 2-3 locations in South India and meets the criteria EN B1ac(ii)2ac(iii) under Endangered category.

**Notes:** *P. mertensioides* was first reported from India by Beddome in 1863 as *P. patens* Hook. This species is one of the largest *Pteris* in South India and attain up to 3.0 m height. It is characterized by its broad equatorial ridge girdling the spore, triangular sinus, and characteristic smell of crushed pinnae. It is rare species confined to Thrissur and Kollam districts of Kerala, and Nilgiri district of Tamil Nadu in India. Chandra *et al.* (2008), included it in ‘At Risk’ category.

**Materials examined:**

**KERALA: Kollam** (Dt.): Umayur (alt. 650m), *N.C.Nair 50906* (MH, CAL).  
Thrissur (Dt.): Sholayar (alt. 400m), *V.K.Sreenivas 119294* (CAL); Near Ambalappara dam (alt. 600m), *V.S.Manickam & K.M.Mathew 34739*;  
Valparai-Chalakkudi road (alt. 500m), *K.M.Mathew 31611* (RHT);  
Mukundapuram (alt. 800m), *V.S.Manickam 34739* (XCH); Sholayar (alt. 400m), *N.C.Nair & S.R.Ghosh 51060* (CAL); Vazhchal (alt. 450m),  

**TAMIL NADU: Nilgiri** (Dt.): Keelenadukani forest, Gudallur (alt. 1300m),  
*V.S.Manickam 1518* (XCH).
Fig. 17. *Pteris mertensioides* Willd.: A-B. habit; C. palea; D. sporangium; E. a single pinna; F. spore; G. fertile pinnules; H. sterile pinnules (*V.K.Sreenivas 119294, CALI)*.
Plate 19. *Pteris mertensioides* Willd.: A. habit; B. single pinna; C. fertile pinnules; D. sterile pinnules; E. single frond; F. rhizome; G. spore.
14. *Pteris multiaurita* J. Agardh


[Fig. 18, 23B & Plate 20]

**Type:** Sri Lanka, *Macrae s.n. & Emerson s.n.* (Syntype, E, digital image!).

Height up to 120 cm. Rhizome short, creeping, 4-7 cm long, 4-5 mm thick, cylindrical with tuft of roots, scaly. Palea dark brown, 2-3 mm long, 0.4-0.5 mm wide at base, lanceolate, acuminate, auriculate, central thick walled cells, outer thin walled cells with cellular projections. Stipe 40-50 cm long, 2-4 mm thick, green (live plants) or stramineous (dry specimens) above, chestnut below, shining, grooved, glabrous. Lamina pinnate, 35-50 cm long x 20-30 cm broad, ovate or oblong, green, leathery. Pinnae dimorphic, fertile one is narrower than sterile one, 8-12 pairs, 5-15 cm long x 5-7 mm broad (sterile), 12-18 cm long x 7-9 mm broad (fertile), subopposite, lanceolate,
acuminate, cuneate, apex crenate, all are bipartite, glabrous (fertile). Costae grooved above with spines on sterile segment and raised below. Veins numerous, free, forking near midrib. Sori brown, 10-15 cm long, linear, submarginal except apex. Indusium false, pale coloured. Sporangium: capsule globose, 250-300 μm long; stalk 250-300 μm long, biseriate; annulus 17-20 celled. Paraphyses uniseriate. Spores brown, c. 35 x 40 μm, triletetrahedral, rugate.

**Habitat:** Seen in shady areas of evergreen forests.

**Altitude:** 100m-2100m.

**Distribution:** India (South India: Kerala & Tamil Nadu) and Sri Lanka.

**Chromosome number:** n= 29 (Irudayaraj & Manickam, 1987).

**Etymology:** The specific epithet is derived from two Latin words ‘multi’ (=many) and ‘aurita’ (=auricles). The name given to this fern was due to the many auricled or many accessory pinnae condition.

**IUCN status:** Vulnerable (VU). The distribution of this taxon is narrow (8-9 locations) in South India and meets the criteria VU B1a2ac(i)C under Vulnerable category.

**Notes:** *P. multiaurita* was described by Agardh (1839) based on the specimens collected from Sri Lanka by Macrae and Emerson s.n. He also mentioned distribution of this species in Nilgiri in the protologue.
*P. multiaurita* is characterized by its many auricled pinnae and setae on sterile pinnae. Walker (1960) considered this fern is member of *P. quadriaurita* complex, being its freely hybridizing nature with other members of this complex. Fraser-Jenkins (1997) considered *P. silentvalliensis* Ghosh & Ghosh is a synonym of *P. multiaurita*, but recently, Fraser-Jenkins (2008a) corrected the mistakes and included the former as a synonym of *P. scabripes* Wall. ex J. Agardh.

**Materials examined:**

**KERALA:** Palakkad (Dt.): Kaikatty (alt. 900m), B.K.Nayar s.n. (CALI). Malappuram (Dt.): B.K.Nayar, P.V.Madhusoodanan & M.J.Molly 29601 (Cult.) (CALI). Kollam (Dt.): Kattilappara, SWLS (alt. 350m), V.K.Sreenivas 124065; Kulathupuzha-Cheenikala (alt. 400m), K.Sworrupanandhan 475 (CALI); Umayur (alt. 700m), N.C.Nair 50886 (MH, CAL); Aryankavu (alt. 200m), N.C.Nair & S.R.Ghosh 50694; Kulathupuzha (alt. 400m), N.C.Nair & S.R.Ghosh 50657 (CAL). Pathanamthitta (Dt.): Vennikkulam (alt. 100m), N.C.Nair & S.R.Ghosh 50840 (CAL). Thiruvananthapuram (Dt.): Kallar-Ponmudi (alt. 750m), N.C.Nair 51064 (MH, CAL); M.Mohan 65190 (CAL).

**TAMIL NADU:** Dindigul (Dt.): Palni Hills (alt. 2100m), Francis s.n. (CALI). Kanyakumari (Dt.): Balmore Hills (alt. 600m), V.S.Manickam & K.M.Mathew 35261; Perunchani rubber estate (alt. 300m),
V.S.Manickam12679 (XCH); Kiripara (alt. 300m), N.C.Nair & S.R.Ghosh 52659; Kodayar-Nagercoil (alt. 250m), N.C.Nair & S.R.Ghosh 51796 (CAL).

Tirunelveli (Dt.): Kannikatty-Korayan road (alt. 600m), V.S.Manickam 32540 (RHT, XCH); Way to Injikuzhi (alt. 500m), V.S.Manickam & K.M.Mathew 35212 (XCH).
Fig. 18. *Pteris multiaurita* J. Agardh: A-B. habit; C. spore; D. sporangium; E. palea; F. a portion of sterile pinna; G. fertile pinna apex; H. sterile pinna apex (*V.K. Sreenivas 124065, CALI*).
Plate 20. *Pteris multiaurita* J. Agardh: A. habit; B. single pinna; C. a portion of sterile pinna; D. a portion of fertile pinna; E. rhizome; F. pinna apex; G. spore.
15. Pteris multifida Poir.


[Fig. 19, 23C & Plate 21]

Type: France, a specimen of unknown origin in cultivation at the Jardin du Museum d’histoire naturelle de Paris (Holotype, P; Photo, BM).


_Pycnodoria multifida_ (Poir.) Small, Ferns S. E. States (Small) 104, 468. 1932.

Height 15-30 cm. Rhizome short, creeping, 2-3 cm long, 5-6 cm thick, cylindrical with tuft of roots, scaly. Palea brown, c. 2 mm long, lanceolate,
acute, entire, thick walled cells only. Stipe 6-8 cm long, 1-2 mm thick, green (fresh material) or strameneous (dry material) above, chestnut brown at base, grooved, glabrous above, scaly below. Lamina pinnate, dimorphic, fertile fronds 25-32 cm height, sterile frond 12-20 cm height, ovate, green. Pinnae 2-3 pairs, opposite, lanceolate, terminal pinna larger than lateral pinnae, terminal pinna 15-16 cm long x 6-8 mm broad, lateral pinna 6-9 cm long x 4-5 mm broad (fertile), 5-6 cm long x 4-5 mm broad (sterile), margin wavy or serrate, apex acute-acuminate, serrate or serrulate, glabrous, thin, papyraceous, pinna decurrent to form a winged rachis, lower pinnae multifidus. Costae grooved above and below, glabrous. Veins numerous, free, forking. Sori brown, linear, 12-14 cm long (terminal), 3-4.5 cm long (lateral pinna), submarginal except base and apex. Indusium false, white. Sporangium: capsule globose, 250-300 μm long; stalk 300-325 μm long, biseriate; annulus 17-18 celled. Paraphyses uniseriate. Spores brown, c. 40 x 45 μm, trilete-tetrahedral, misshapen spores, rugate ornamentation.

**Habitat:** Grows in walls of wells, brick walls, and rocky edges, *etc.*

**Altitude:** Sea level (± 5m).

**Distribution:** China, India (South India: Kerala), Japan, Korea, Sri Lanka and Taiwan.

**Chromosome number:** n= 58 (Walker, 1956).
**Common name:** Spider brake.

**Economic importance:** Decoction of rhizome and fronds used in the treatment of dysentery and paste made from roasted frond and rhizome applied to skin diseases (Ghosh et al., 2004). This species is also widely cultivated as ornamental fern in many gardens.

**Etymology:** The specific epithet derived from a Latin word ‘multifidus’ (= cleft into many parts). As the name indicates, basal portion of the pinna is lobed.

**IUCN status:** Critically Endangered (CR). This taxon is currently known from a single locality (Kozhikode) in South India and meets the criteria CR B1ab(ii)+2aD under Critically Endangered category.

**Notes:** Poiret described this species based on the plant cultivated in Paris Museum and is characterized by its multifid pinnae and the pinnae adnated to the stipe to form a winged rachis. These plants were under cultivation in many countries and escaped from the cultivation and naturalized elsewhere in the world. Spicular veins or false veins are present closely along with true veins or inter venal areas on the pinna (Wagner, 1978).

Singh (1989) reported *P. multifida* Poir. from Muradabad, Uttar Pradesh for the first record from India, and subsequently Ghosh et al. (2004),
mentioned its occurrence in West Bengal. Sreenivas and Madhusoodanan (2010b) reported this species for first time from Peninsular India.

*P. multifida* is thought to be native to China and Japan and subsequently escaped from the cultivation and spread outside its native range.

**Materials examined:**

**KERALA:** Kozhikode (Dt.): Puthiyara (alt. 5m), *V.K.Sreenivas 119237* (CALI).

**WEST BENGAL:** Howrah (Dt.): Indian Botanical Garden (alt. sea level), *A.Biswas 68702* (CAL).
Fig. 19. *Pteris multifida* Poir.: A. habit; B. sporangium; C. spore; D. palea; E. a portion of fertile pinna (*V.K.Sreenivas 119237*, CALI).
Plate 21. *Pteris multifida* Poir.: A. habit; B. single frond; C. pinna apex; D. winged rachis; E. a portion of fertile pinna; F. rhizome; G. spore.


[Fig. 20, 23D & Plate 22]

**Type:** India, Nilgiri, Pantaloor, *Beddome s.n.* (Holotype, K).


Height 76-80 cm. Rhizome short, suberect, 3-5 cm long, 2-3 mm thick, cylindrical, scaly. Palea dark brown, 1-2 mm long, lanceolate, acuminate, auriculate, thick walled central cells, thin walled outer cells with cellular projections. Stipe 30-40 cm long, 3-4 mm thick, green (fresh specimens) or stramineous (dry specimens), grooved, glabrous. Lamina bipinnate, 30-38 cm long x 10-16 cm broad, lanceolate, green, subcoriaceous. Pinnae 6-8 pairs, 8-11 cm long x 2-3 cm broad, opposite or subopposite, lanceolate, green,
basal pair bipartite. Pinnules 7-12 pairs, 1-2 cm long x 3-4 mm broad, oblong, margin entire, apex crenate, sinus c. 1 mm from costae, c. 1.5 mm apart, basal pinnules reduced at acroscopic side, spinules along the costule. Costae grooved above with spines at the base of attachment site of costule, and raised below. Veins 10-16 pairs, free, forking, forking twice at reduced pinnae. Sori brown, linear, 1-1.5 cm long, submarginal except base and apex. Indusium false, pale white. Sporangium: capsule globose, 200-250 μm long; stalk 150-200μm long, biseriate; annulus 18-20 celled. Paraphyses uniseriate. Spores brown, c. 30 x 35 μm, trilete-tetrahedral, rugate.

**Habitat:** Fully exposed area as well as partially exposed areas such as earth cuttings, forest floors, *etc.*

**Altitude:** 10m-1000m.

**Distribution:** India and Sri Lanka (South India: Kerala and Tamil Nadu).

**Chromosome number:** n= 29 (Abraham *et al.*, 1962).

**IUCN status:** Least concern (LC). This is a widespread taxon present in evergreen and deciduous forests in South India and it does not meet any criteria for Endangered, Vulnerable, *etc.* under IUCN red list category.

**Notes:** Beddome (1863) described this species from Pantaloor, (now it is in Tamil Nadu), India. Later Beddome (1883) downgraded this species to a
variety, *viz. P. quadriaurita* var. *ludens*. Thwaites (1864) equated this species to *P. quadriaurita* Retz.

*P. otaria* is characterized by its abortive acroscopic pinnules and crenate apex. Walker (1958) carried out a series of experiments on the hybridization between the members of *P. quadriaurita* complex. He considered *P. otaria* is a fertile hybrid between *P. quadriaurita* and *P. multiaurita* J. Agardh. Abraham *et al.* (1962), of the opinion that it is a distinct taxon. Fraser Jenkins (1997) also commented that ‘*P. otaria* occurs widely and independently, reproduce itself and has a distinct mixed ecology. It behaves as a species in its own right’. Nair and Ghosh (1974) considered that this is a hybrid and very common in Kerala because of the human interference in the ecological preferences of parent species. One specimen in CAL (*N.C. Nair 50884*) shows a gradation of morphology between *P. multiaurita* and *P. quadriaurita*.

Beddome (1863) reported *Pteris semipinnata* L. from Travancore hills of South India, in which, acroscopic pinnules are completely absent. No subsequent authors are able to collect this species from South India or no materials from South India are available in CAL, CALI, KFRI, M GMC, MH, RHT, SKU, XCH and TBGT herbaria. So it might me Regionally Extinct.
Materials examined:

KERALA: Kollam (Dt.): Kattilappara (alt. 350m), V.K.Sreenivas 124071; Palaruvi (alt. 500m), Habeeb 120974 (CALI); Thenmala (alt. 400m), V.S.Manickam & K.M.Mathew 33701 (RHT, XCH); Achan Kovil (alt. 350m), C.N.Mohanand 61286; Aryankavu (alt. 200m), N.C.Nair & S.R.Ghosh 50673; Umayur-Kulathupuzha (alt. 700m), N.C.Nair 50881(MH); Kottarakara (alt.100m), N.C.Nair & S.R.Ghosh 50941 (MH, CAL); Palaruvi (alt. 500m), N.C.Nair & S.R.Ghosh 51981; Punural (alt. 300m), N.C.Nair & S.R.Ghosh 50884 (CAL). Kottayam (Dt.): Near Kanhirappally (alt. 50m), V.S.Manickam 33522 (XCH). Pathanamthitta (Dt.): Moozhiyar-Kakki road (alt. 600m), V.S.Manickam & K.M.Mathew 33650; Vadaserikara, Sabarimala Hills (alt. 100m), V.S.Manickam & K.M.Mathew 33606 (RHT, XCH); Angadi-Ranni (alt. 350m), N.C.Nair 50705; Vennikkulam (alt. 100m), N.C.Nair & S.R.Ghosh 50827 (CAL). Thrissur (Dt.): Athirappally (alt. 350m), V.K.Sreenivas 119286 (CALI). Thiruvananthapuram (Dt.): Way to Athirumala (alt. 700m), V.K.Sreenivas 124039; Ponmudi (alt. 1000m), V.K.Sreenivas 124051 (CALI); Ponmudi hills (alt. 1100m), V.S.Manickam & K.M.Mathew 33719 (RHT); Ponmudi (alt. 1100m), N.C.Nair & S.R.Ghosh 51767 (MH, CAL); Neyyattinkara (alt. 45m), N.C.Nair & S.R.Ghosh 51793 (CAL).
TAMIL NADU: Kannyakumari (Dt.): Balmore Hills (alt. 600m),
V.S.Manickam 14724; Mahendragiri (alt. 400m), V.S.Manickam 2591 (XCH);
Kirippara (alt. 150m), N.C.Nair & S.R.Ghosh 51931 (CAL). Tirunelveli
(Dt.): Kannikatty (alt. 700m), K.M.Sebastine 8477 (MH, CAL).
Fig. 20. *Pteris otaria* Bedd.: A-B. habit; C. a single pinna; D. palea; E. sporangium; F. spore; G. fertile pinnules; H. sterile pinnules (*V.K.Sreenivas 124039, CALI*).
Plate 22. *Pteris otaria* Bedd.: A. habit; B. single pinna; C. sterile pinnules; D. fertile pinnules; E. rhizome; F. spore.
17. Pteris pellucida C. Presl


[Fig. 21, 23E & Plate 23]

**Type:** Philippines, Luzon, *Haenke 118* (Holotype, PRC; Isotype, K, digital image!).

**Type:** Indonesia, *Anonymous s.n.* (Holotype, L; Isotype, K, digital images!).

Height up to 70 cm. Rhizome short, erect, 3-4 cm long, 4-5 mm thick, cylindrical with tuft of roots, scaly. Palea brown, c. 3 mm long, 0.4-0.5 mm wide at base, lanceolate, acuminate, auriculate, inner thick walled cells and outer thin walled cells. Stipe 20-35 cm long, 2-4 mm thick, green (live materials) or stramineous (dry materials) with chestnut patches, shiny, grooved, glabrous above, scaly below. Lamina pinnate, 20-30 cm long x 15-25 cm broad, deltoid, green, coriaceous. Pinnae 3-4 pairs, 15-20 cm long x 2-2.5 cm broad (sterile), 24-28 cm long x 2.5-3.5 cm broad (fertile), opposite or subopposite, lanceolate, terminal pinna larger than lateral ones, entire, apex acuminate, glabrous, pinnae base adnate to stipe, basal pair not bipartite, green. Costae deeply grooved above, raised below. Veins numerous, free, forking invisible in some cases. Sori brown, linear, 17-22 cm long, submarginal except at base and apex. Indusium false, brown. Sporangium: globose, capsule 200-250 µm long; stalk 200-300 µm long, biseriate; annulus 16-20 celled. Paraphyses uniseriate. Spores brown, c. 30 x 35 µm, triletetrahedral, verrucate.

**Habitat:** Seen in fully exposed as well as shaded forest areas.
Altitude: 50m-1500m.

Distribution: China, Japan, India (South India: Andhra Pradesh, Karnataka, Kerala & Tamil Nadu), Myanmar and Thailand.

Chromosome Number: n= 29 (Kuriachan, 1968).

Etymology: Specific epithet derived from a Latin word ‘pellucidus’ (translucent but, not hyaline). Its pinnae are translucent.

IUCN status: Least concern (LC). A commonly occurred taxon in South India and it does not meet any criteria for Endangered, Vulnerable, etc. under IUCN red list category.

Notes: Presl described this species based on the specimen from Luzon (Haenke 118). Beddome (1863) suspected this is a variety of P. cretica L. Nayar and Geevarghese (1993) reported P. venulosa Blume from Silent Valley National Park (B.K.Nair, 7320; Geevarghese 4005 & 17823, CALI) in error for P. pellucida. This species is resembles to P. venulosa Blume and P. venusta Kunze in its pinnae arrangements, but, pinnae are adnated to the stipe to form a wing and apex is crenate in the case of P. venulosa and P. venusta.

P. pellucida is characterized by its entire or undulate pinna and apex. It shows variations in the lower pinnae, sometimes which are bipartite or otherwise not bipartite. Some specimens collected from Silent Valley have
bipartite basal pinna and these are large plants compared to specimens collected from other areas of South India.

Materials examined:

ANDHRA PRADESH: Chitoor (Dt.): Talakona forest (alt. 650m), G.V.Subbarao 46956 (MH, CAL); East Godavari (Dt.): Dummakonda forest (alt. 425), G.V.Subbarao 68632; Kutravada (alt. 600m), G.V.Subbarao 27283; Talepally (alt. 520), N.Rama Rao & D.N.Narasimhan 84373 (MH); Ethakonda (alt. 900m), V.Narayanaswami 592 (CAL); Maridimilli, A.Ahmad & T.Pullaiyah 12871; Rampa water falls, A.Ahmad 12878; Tiger Camp, P.Amrutha Lakshmi 25197 (SKU). Srikakulam (Dt.): Salur forest (alt. 700m), N.P.Balakrishnan 1123 (CAL). Visakhapatnam (Dt.): Mettur (alt. 625m), G.V.Subbarao 29573; Pungagiri top (alt. 200m), G.V.Subbarao 32781; Venkachinta gedda (alt. 1025), G.V.Subbarao 47346 (MH); Minumuluru (alt. 1025m), G.V.Subbarao 47346 (CAL); Lankapakalu, P.Amrutha Lakshmi 26201 (SKU). Vizianagaram (Dt.): Sujankota (alt. 850m), P.Amrutha Lakshmi 25160 (CAL, SKU).

KARNATAKA: Chikmagaluru (Dt.): Belahanur (alt. 900m), V.K.Sreenivas 124094 (CALI). Kodagu (Dt.): Appagala (alt. 750m), V.K.Sreenivas 113213 (CALI); Bhagamandala (alt. 1000m), V.S.Manickam 2717; Sampie Ghat (alt. 900m), V.S.Manickam 2885 (XCH); Hoddur, P.K.Rajagopal s.n.; Madikeri (alt. 850m), P.K.Rajagopal 116 (MGMC). North Kannada (Dt.):
Kaiga (alt. 1300m), P.K.Rajagopal 157 (MGMC). Shimoga (Dt.): Jog falls-
Upper region (alt. 1500m), P.V.Madhusoodanan 39824 (CALI); Hulikal (alt.
1350m), P.K.Rajagopal 394; Kudachadri hills (alt. 1250m), P.K.Rajagopal
161 (MGMC).

KERALA: Idukki (Dt.): Anjilathandu (alt. 740m), V.K.Sreenivas 113244,
Madakkanam (alt. 900m) K.P.Rajesh 70102; Thekkady (alt. 720m),
K.P.Rajesh 18346 (CALI); Kozhikkanam (alt. 950m), V.S.Manickam &
K.M.Mathew 34283; Peerumedu (alt. 1000m), V.S.Manickam & K.M.Mathew
33418 (XCH); Thankamani (alt. 800m), N.C.Nair 70751 (CAL). Kannur
(Dt.): Meenmutty (alt. 450m), K.P.Rajesh & K.Satheesh Kumar 87837
(CALI); Ambayathode (alt. 550), V.S.Ramachandran 59153 (MH, CAL).
Kasargode (Dt.): Meloth (alt. 500m), V.J.Nair 73816 (MH, CAL). Kollam
(Dt.): Palaruvi (alt. 500m), N.Rama Rao 1757 (CAL). Kozhikode (Dt.):
Kakkayam forest (alt. 720m), V.K.Sreenivas 113296; Peruvannamuzhi (alt.
350m), V.K.Sreenivas 119284, Adoor Varghese 29453 (CALI). Malappuram
(Dt.): C. U. Campus (alt. 50m), P.V.Madhusoodanan & M.J.Molly 21268
(CALI). Palakkad (Dt.): Irumbakam Chola, Santhosh Nampy & A.K.Pradeep
44837; Kaikatty (alt. 900m), B.K.Nayar & Pankaj 7320; Kanhirapuzha (alt.
600m), Geevarghese 4005 & Santhosh Nampy 43795; Kiliparakunnu-
Parambikulam (alt. 800m), V.K.Sreenivas 119214; Nellyampathi (alt. 1100m),
Geevarghese 17823; Panthenthode (alt. 850m), V.K.Sreenivas 119264; Pezha-
Parambikulam (alt. 950m), V.K.Sreenivas 119208; Thothanparakuzhi (alt.
750m), V.K.Sreenivas 113220 (CALI); Nellyampathi (alt. 1100m), N.C.Nair 69646 (MH); Ayyappan kovil (alt. 900m), E.Vajravelu 49710; Mukkali (alt. 700m), J.N.Vohra & R.K.Ghosh 58426; Mundampathy forest (alt. 525m), N.C.Nair 64642 (CAL); Nelliampathy (alt. 850m), C.C.Joy & S.Stephen 7233; Near Pathrakadavu (alt. 750m), S.Stephen & C.C.Joy 7503 (KFRI).

Thrissur (Dt.): Athirappally (alt. 350m), V.K.Sreenivas 119287 (CALI); Vazhachal (alt. 400m), N.C.Nair & S.R.Ghosh 51005 (CAL).

Thiruvananthapuaram (Dt.): Agasthyamala (alt. 1150m), V.K.Sreenivas 113277 & 124042 (CALI); Ponmudi hills (alt. 800m), V.S.Manickam & K.M.Mathew 33854 (XCH); Ponmudi hills (alt. 1000m), N.C.Nair & S.R.Ghosh 52603 (MH). Chemunji (alt. 950m), Raju Antony 5429 (TBGT).

Wayanad (Dt.): Thirunelly (alt. 850m), V.K.Sreenivas & V.P.Thomas 119281, Tholpetty (alt. 920m) Manju C.Nair 70290 (CALI); Kuppadi (alt. 900m), J.L.Ellis 18529 (MH).

TAMIL NADU: Coimbatore (Dt.): Anakunthi shola (alt. 700m), V.S.Manickam & K.M.Mathew 34637; Karyan Shola (alt. 750m), K.M.Mathew 31532; Top slip- Karyan shola (alt. 750m), V.S.Manickam & K.M.Mathew 34627; Sholayar (alt. 800m), V.S.Manickam & K.M.Mathew 34649 (RHT); Valparai (alt. 700m), V.S.Manickam 2059; Varagalur, Pollachi (alt. 800m), V.S.Manickam & K.M.Mathew 34649 (XCH); Ganaikundhi shola (alt. 750m), J.Joseph 13811; Karyan Shola (alt. 760m), V.Narayanaswami 5353; Muthukulam-Siruvani (alt. 900m), K.Subramannyam 5911 (MH).
Kannyakumari (Dt.): Bafield, Thovalai (alt. 600m), *V.S.Manickam* 2553; Balmore shola (alt. 700m), *V.S.Manickam* 2525 (XCH); Kalikisan river-Belford (alt. 700m), *A.N.Henry* 48149; Lower Kodayar (alt. 600m), *A.N.Henry* 61524 (MH). Nilgiri (Dt.): Bospara forest area (alt. 1000m), *V.S.Manickam* 1579; Gudallur (alt. 1300m), *V.S.Manickam* 1586; *V.S.Manickam* 1609 (XCH); Devala-Pandalur (alt. 925), *E.Vajravelu* 43481 (MH). Salem (Dt.): Pongal Kovil shola, Kolli hills (alt. 1200m), *V.S.Manickam & K.M.Mathew* 33161 (XCH). Vellore (Dt.): Erikkampally, Jaradi hills (alt. 980m), *M.B.Viswanathan* 1040 (MH, CAL).


[Fig. 22, 23F & Plate 24]

Type: India, Nilgiri, *Perrotet 1476* (Holotype, B, digital image!).


Type: India, Nilgiris, *Hooker & Thomson s.n.* (Holotype, B, digital image!).

Height up to 125 cm. Rhizome short, erect, 4-5 cm long x 1-2 cm thick, cylindrical with tuft of roots, scaly. Palea dark brown, 2-3 mm long, 0.3-0.4 mm broad at base, lanceolate, acute, central thick walled cells, thin walled cells at periphery with multicellular projections. Stipe 60-70 cm long, 4-5 mm thick, green (live materials) or stramineous (dry materials) above and chestnut below, grooved throughout, scaly below. Lamina bipinnate, 60-70 cm long x 20-30 cm broad, ovate or lanceolate, obscure green, coriaceous. Pinnae 8-12 pairs, 15-16 cm long x 3.5-5.5 cm broad, opposite to subopposite,
Fig. 21. *Pteris pellucida* C. Presl: A-B. habit; C. spore; D. sporangium; E. palea; F. a portion of fertile pinna; G. single pinna; H. pinna apex (*V.K.Sreenivas 119208, CALI)*.
Plate 23. *Pteris pellucida* C. Presl: A. habit; B. single pinna; C. pinna apex; D. a portion of sterile pinna; E. a portion of fertile pinna; F. rhizome; G. spore.
lanceolate, acuminate, entire, elongated pinna-apex, pale green, basal pair bipartite or with more than one accessory pinna. Pinnules 24-28 pairs, 2.5-3.8 cm long x 4-6 mm broad, oblong, margin entire, apex acute, sinus below 1 mm from costa, 2-4 mm apart, spinules (inconspicuous) on costule at distal end. Costae grooved above with inconspicuous spines, and raised below. Veins 16-18 pairs, free, forking, distinct. Sori brown, linear, c. 2 cm long, submarginal except at base and apex. Indusium false, white. Sporangium: capsule globose, 200-250 μm long; stalk 300-320 μm long, biseriate; annulus 17-18 celled. Paraphyses uniseriate. Spores brown, c. 45 x 50 μm, triletetrahedral, verrucate.

**Habitat:** Seen in evergreen forest, usually near stream sides or marshy areas.

**Altitude:** 600-2100m.

**Distribution:** This species is endemic to South India (South India: Kerala and Tamil Nadu).

**Etymology:** The specific epithet given after a French Botanist Perrottet, who collected the specimens from Nilgiris, India.

**IUCN status:** Vulnerable (VU). This is an endemic species and the distribution is confined to South India. This taxon meets the criteria VU B1a2ac(iv)C under Vulnerable category.
Notes: Hieronymus (1914b) described this species based on the specimens sent by G. Perrottet from Nilgiris, South India. This species is endemic to South India and frequently occur in Nilgiri Hills. He also described *P. perrottetii var. brevilaciniata* based on the specimens from Nilgiri by Hooker and Thomson. But studies on the type specimens revealed that this variety is only a smaller plant of *P. perrottetii*, though Fraser-Jenkins (2008a) equated it with *P. praetemissa* T. G. Walker. *P. perrottetii* Hieron. is characterized by its large size and narrow, linear pinnules and its intersegmental distance. The lower pair of pinnae usually bears two accessory pinnae. Fraser-Jenkins (2008b) included this species in endemic category.

Materials examined:

**KERALA: Idukki** (Dt.): Amarachola (alt. 1950m), *V.K.Sreenivas 113256*; Anamudi N.P. (alt. 2000m), *V.K.Sreenivas 113252*; Near Deviarmedu (alt. 1300m), *V.K.Sreenivas 124027*; Noorupara (alt. 700m), *V.K.Sreenivas 113240*; Pampadam shola N.P. (alt. 2100m), *V.K.Sreenivas 113250* (CALI); Thekkadi hills (alt. 900m), *V.S.Manickam 32168* (XCH); Mlappara (alt. 900m), *N.C.Nair 69896* (MH, CAL); Munnar (alt. 1400m), *N.C.Nair & S.R.Ghosh 50756* (MH); Devikulam (alt. 1650m), *N.C.Nair 40209* (CAL). **Palakkad** (Dt.): Valiyaparathode (alt. 850m), *P.Bhargavan 65636* (MH).

**TAMIL NADU: Coimbatore** (Dt.): Slope of Konamalai (alt. 695m), *C.P.Sreemadhavan 572A* (MH). **Dindigul** (Dt.): Kodaikanal (alt. 1300m),
B.K.Nayar & Unnikrishnan Nayar 2607 (CALI); Monica forest- Kodaikanal (alt. 1650m), V.S.Manickam & K.M.Matthew 32698; Panalways (alt. 1300m), V.S.Manickam 3629 & 34984; Perumal malai-Palni Hills (alt. 1700m), V.S.Manickam & K.M.Matthew 32796; Sahyapuram forest (alt. 1700m), V.S.Manickam & K.M.Matthew 32737; Tiger Shola (alt. 1700m), V.S.Manickam & K.M.Matthew 32560 (XCH); Sirimalai (alt. 1075m), M.Chandrasekhar 54275 (MH). Nilgiri (Dt.): Way to Avalanche (alt. 2100m), V.K.Sreenivas 119223 & 119230 (CALI); Avalanche area (alt. 2100m), V.S.Manickam 890; Coonoor (alt. 1700m), V.S.Manickam 1087; Governor shola (alt. 2200m), V.S.Manickam 679; Rockland forest (alt. 2000m), V.S.Manickam 941 (XCH); Bangitapol- Sispara (alt. 2225m), B.V.Shetty 34167; Near Gundvada river-Kodanad RF (alt. 1800m), E.Vairavelu 36809; Loz falls- Coonoor (alt. 1500m), B.D.Sharma 40305; Naduvattam (alt. 2000m), N.P.Balakrishnan 9697 (MH). Ramanathapuram (Dt.): Mudaliaruthu (alt. 1300m), N.C.Nair 61028 (MH, CAL). Salem (Dt.): Shevaroy Bauxite hills (alt. 1530m), A.V.N.Rao 26780; Yercaud (alt. 1350m), K.C.Jacob 18074 (MH); Balmadies estate, Yercaud (alt. 1663m), Ghatak 40 (CAL).
19. *Pteris praetermissa* T. G. Walker


[Fig. 24, 30A & Plate 25, 26]

**Type:** Sri Lanka, forest near Le Vallon Tea Estate, 9 February 1954, *T.G. Walker T343* (Holotype, BM, digital image!).


**Type:** India, Kerala, Ponmudi, *N.C.Nair 51744A* (Holotype, CAL!); *N.C.Nair 51744B-C* (Isotype, CAL!).

Fig. 22. *Pteris perrottetii* Hieron.: A-B. habit; C. palea; D. spore; E. sporangium; F. fertile pinnules; G. a single pinna; H. sterile pinnules (*V.K.Sreenivas 113256, CALI)*.
Plate 24. *Pteris perrottetii* Hieron.: A. habit; B. sterile pinnules; C. fertile pinnules; D. single pinna; E. rhizome; F. spore.
Fig. 23. Distribution of the genus *Pteris* in South India: 
A. *P. mertensioides*; B. *P. multiaurita*; C. *P. multifida*; D. *P. otaria*; 
E. *P. pellucida*; F. *P. perrottetii*. 
Type: India, Karnataka, Devigar-Nagarigar path, Manickam 2942 (Holotype, XCH!); Tamil Nadu, Maramalai hills, Rajkumar 3715 (Paratype, XCH!).

Height 40-45 cm. Rhizome short, suberect, 2-3 cm long x 5-6 mm thick, cylindrical with tuft of roots, scaly. Palea brown, c. 3 mm long, c. 0.5 mm wide at base, lanceolate, acuminate, auriculate, dark brown along centre, margin with cellular projections. Stipe 25-50 cm long, 2-2.5 mm thick, green or stramineous (dry specimens) above and chestnut below, grooved, scaly below. Lamina bipinnate, 20-35 cm long x 18-25 cm broad, ovate, obscure green, herbaceous (thin). Pinnae 4-6 pairs, 7-15 cm long x 2.2-2.8 cm broad, subopposite, lanceolate, acuminate, entire, pale green, basal pair bipartite. Pinnules 15-23 pairs, 1-1.3 cm long x 2-3 mm broad, oblong, margin entire, apex obtuse, sinus below 1 mm from costa, c. 1.5 mm apart, long conspicuous spinules on costule. Costae grooved above with conspicuous spines at the attachment site of costule, and raised below. Veins 11-15 pairs, free, forking. Sori brown, 6-8 mm long, linear, submarginal except at base and apex. Indusium false, pale brown. Sporangium: capsule globose, 200 μm long, stalk 250 μm long, biseriate; annulus 16-18 celled. Paraphyses uniseriate. Spores pale brown, c. 35 x 40 μm, triletet-tetrahedral, verrucate.

Habitat: Present both in exposed and shaded forests.
Altitude: Sea level-2100m.

Distribution: India (South India: Karnataka, Kerala & Tamil Nadu) and Sri-Lanka.


Etymology: Specific epithet derived from a Latin word ‘praetermissus’ (= overlooked or neglected).

IUCN status: Least concerned (LC). This species occurs widely in forests as well as non-forest areas of South India. It does not meet any criteria for Endangered, Vulnerable, etc. under IUCN red list category.

Notes: Walker (1960) described this species from Sri Lanka as a member of *P. quadriaurita* complex and mentioned it was endemic to Sri Lanka. Later, Nair and Ghosh (1974) reported this species from Kerala. Rajkumar (2002) also reported it from Tamil Nadu.

*P. praetermissa* is a common species in South India and is characterized by long, conspicuous spines on costae and costules. The sinus is almost to the costa and the texture is membranaceous. It is a sexual diploid and frequently misidentified as *P. quadriaurita* Retz. in many Indian herbaria.

Nair and Ghosh (1976) described *P. furunculata* from Ponmudi hills in error for *P. praetermissa*. According to them, this species is closely resembles to *P. confusa* except caducous spinules at the sinus of pinnules and well
marked furunculae on mature pinnae. These caducous spinules are rarely seen in the type specimens and the furunculae are also present in many other species. The present author could not collect this species, with prescribed characters, from the type locality (Ponmudi Hills) and treat the *P. furunculata* Nair & Ghosh is a synonym of *P. praetermissa*. Fraser-Jenkins (1997) equated this species with *P. gongalensis* T. G. Walker, and he considered these laminar furunculae are inconstant and not permanent. Later, Fraser-Jenkins (2008a) used *P. furunculata* is a synonym of *P. praetermissa*.

Rajkumar (2005) described another species *P. manickamii* from South India. He also pointed out that *P. manickamii* is closely related to *P. confusa* except the reduced base of pinnae. He indicated that the type has 20-25 pairs of pinnae, but it was found that the types bear only 10-11 pairs of pinnae. Of course, the basal part of each pinna or basal pinnules aborted on either side. But, *P. manickamii* is treated as a synonym of *P. praetermissa* due to its overall similarities of the specimens (*Manickam 2942 & Rajkumar 3715, XCH*) except the basal reduced pinnules.

**Materials examined:**

**KARNATAKA:** Chikmagaluru (Dt.): Belahanur (alt. 900m), *V.K.Sreenivas 124093* (CALI). **Kodagu** (Dt.): Appagala (alt. 315m), *V.K.Sreenivas 113214 & 113215* (CALI); Sampage Ghats (alt. 700m), *C.A.Barber 2234* (MH). **Mysore** (Dt.): Gopalaswami hills-Bandipur (alt. 1600m), *B.D.Naithani 23221*
(MH). **Shimoga** (Dt.): Kudachadri (alt. 1300m), *P.K.Rajagopal s.n.*  
(MGMC). **Uduppi** (Dt.): Paniyadi (alt. sea level), *P.K.Rajagopal 267*  
(MGMC).

**KERALA:** **Idukki** (Dt.): Karivanoda (alt. 730m), *V.K.Sreenivas 113245*;  
Maniyarkutti (alt. 750m), *V.K.Sreenivas 113229, 113231 & 113232* (CALI);  
Pooyamkutty (alt. 800m), *P.Bhargavan 90046* (MH); Sabarimala (alt. 630m),  
*N.C.Nair 885* (CAL). **Kollam** (Dt.): Nedumpoyil (alt. 550m),  
*V.S.Ramachandran 64077* (MH, CAL). **Kottayam** (Dt.): Perunna (alt. 30m),  
*N.C.Nair 40268* (CAL). **Palakkad** (Dt.): Dhoni Hills (alt. 500m), *K.R.Leena 45125*;  
Kalakidannal PWLS (alt. 560m), *V.K.Sreenivas 119212*;  
Kiliparakunnu PWLS (alt.600m), *V.K.Sreenivas 119213*; Madathara PWLS  
(alt. 700m), *V.K.Sreenivas 113226*; Pezha, PWLS (alt. 970m), *V.K.Sreenivas 119201*;  
Way to Sispara (alt. 1500m), *V.K.Sreenivas 124008 & 124009* (CALI);  
Mundapathy forest (alt. 525m), *N.C.Nair 64635* (MH); Karappara  
dam site (alt. 950m), *N.C.Nair 69844* (CAL). **Pathanamthitta** (Dt.):  
Kunnunthananam-Thiruvalla (alt. 9m), *N.C.Nair & S.R.Ghosh 50812* (CAL).  
**Thiruvananthapuram** (Dt.): Agasthyamala (alt. 1100m), *V.K.Sreenivas 113272*;  
Way to Athirumala (alt. 700m), *V.K.Sreenivas 124040 & 124043* (CALI). **Wayanad** (Dt.): Chandanathode (alt. 650m), *V.K.Sreenivas 113288*;  
Chembra peak (alt. 1800m), *V.K.Sreenivas 113280*; Thirunelli (alt. 900m),  
TAMIL NADU: Coimbatore (Dt.): Siruvani (alt. 900m), \textit{B.D.Dev 31085} (MH). Nilgiri (Dt.): Way to Avalanche (alt. 2100m), \textit{V.K.Sreenivas 119229} (CALI). Salem (Dt.): Shevaroyan temple area (alt. 1800m), \textit{N.C.Nair 74218} (MH).
20. Pteris quadriaurita Retz.


[Fig. 25, 30B & Plate 27, 28]

**Type:** Sri Lanka, *Koenig s.n.* (Lectotype, LD, digital image!).

Plate 25. Holotype of *Pteris praetermissa* T. G. Walker (BM)
Fig. 24. *Pteris praetermissa* T.G.Walker: A-B. habit; C. spore; D. sporangium; E. single pinna; F. palea; G. fertile pinnules; H. sterile pinnules (*V.K.Sreenivas 119212, CALI)*.
Plate 26. *Pteris praetermissa* T. G. Walker: A. habit; B. single pinna; C. sterile pinnules; D. fertile pinnules; E. rhizome; F. spore.

Height up to 100 cm. Rhizome short, suberect, 4-5 cm long x 4-6 cm thick, cylindrical with tuft of roots, scaly. Palea brown 2-3 mm long x 0.5-0.6 mm broad at base, lanceolate, acumin ate, auriculate at base, thick cells at centre, thin cells at periphery with cellular projections. Stipe 40-55 cm long, 2-4 mm thick, green (fresh specimens) or stramineous (dry specimens) with brown paches, chestnut coloured below, shining, grooved throughout, glabrous. Lamina bipinnate, 30-50 cm long x 25-30 cm broad, ovate-lanceolate, green above and pale green below, subcoriaceous. Pinnae 6-8 pairs, 18-28 cm long x 4-6 cm broad, opposite to subopposite, lanceolate, acumin ate, basal pinnae bipartite. Pinnules 20-25 pairs, 2-4 cm long x 4-6 cm broad, oblong, margin entire, obtuse- rounded, apex crenate, sinus c. 1 mm away from costa, 2-3 mm apart, spinules along costule (conspicuous on live specimen). Costae grooved above with spines, and raised below. Veins 15-17 pairs, free, forking. Sori brown, 2-2.5cm long, linear, submarginal except at extreme apex, not fused at base. Indusium false, pale coloured. Sporangium: capsule globose, 250-300 μm long; stalk 200-300 μm long, biseriate; annulus 18-20 celled. Paraphyses uniseriate. Spores brown, c. 45 x 50 μm, triletetraehedral, verrucate.
**Habitat:** Fully shaded places near stream banks in evergreen forests.

**Altitude:** Sea level-400m.

**Distribution:** India (South India: Kerala) and Sri Lanka.

**Chromosome number:** n= 29 (Walker, 1962).

**Etymology:** The specific epithet derived from a Latin word ‘quadri’ (= four) and ‘aurita’ (= auricle or accessory pinnae). Though the name indicated the four accessory pinnae, the plant contains only two accessory pinnae in the type.

**IUCN status:** Critically endangered (CR). This taxon is currently known from a single locality (Shendurney Wildlife Sanctuary) in South India and meets the criteria CR B1ab(ii)+2aD under Critically Endangered category.

**Notes:** Retzius (1791) described this species based on the specimen sent from Sri Lanka by Koenig. This species is characterized by crenate pinnule apex and prominent spines on costa and irregularly on costules (*Koening s.n. LD1*).

The name *P. quadriaurita* has been indiscriminately applied a wide range of morphologically similar species in India. Most of the specimens deposited in various Indian herbaria are probably the members of *P. quadriaurita* complex, mainly *P. confusa* T. G. Walker and *P. praetermissa* T. G. Walker.
This species freely hybridize with *P. multiaurita* J. Agardh to produce fertile hybrids, some times these hybrids are also having a range of morphology. This had been clearly illustrated by Walker (1958) in his classical paper.

Several authors were over recorded this species from various localities, but the *P.quadriaurita* Retz. (*s. str.*) present only in South India and Sri Lanka. Chandra *et al.* (2008), included this species in ‘Near Threatened’ category.

**Materials examined:**

**KERALA:** Kollam (Dt.): Shendurney WLS (alt. 400m), *V.K.Sreenivas 124068* (CALI).
Plate 27. Lectotype of *Pteris quadriaurita* Retz. (LD)
Fig. 25. *Pteris quadriaurita* Retz.: A-B. habit; C. palea; D. sporangium; E. spore; F. a single pinna; G. fertile pinnules; H. sterile pinnules (V.K.Sreenivas124068, CALI).
Plate 28. *Pteris quadriaurita* Retz.: A. habit; B. single pinna; C. fertile pinnules; D. adaxial surface of pinnules; E. rhizome; F. spore.
21. *Pteris reptans* T. G. Walker


[Fig 26, 30C & Plate 29, 30]

**Type:** Sri Lanka, Haputale Reserve forest, 25 February 1954, *T. G. Walker T607* (Holotype, BM, digital image!; Isoparatype, US, digital image!).

Height up to 130 cm. Rhizome creeping, 10-11 cm long, 4-6 cm thick, cylindrical, scaly. Palea brown, 2-3 cm long, 0.3-0.4 mm broad at base, linear-lanceolate, acuminate, truncate, inner thick walled cells and outer thin walled cells with cellular projections. Stipe 60-70 cm long, 2-4 mm thick, green (fresh materials) or stramineous (dry materials) above and chestnut on extreme base, grooved throughout, scaly below. Lamina bipinnate, 50-70 cm long x 25-30 cm broad, lanceolate, green above, obscure green below, subcoriaceous. Pinnae 12-14 pairs, 15-20 cm long x 2.3-3.5 cm broad, lanceolate, opposite- subopposite in lower pairs, distinctly alternate on upper pairs, pinna-apex 6-8 cm long, basal pinnae bipartite. Pinnules 18-28 pairs, 1.5-2 cm long x 3-4 cm broad, sinus c. 1 mm away from costa, 1-2 mm apart, oblong, obtuse, entire, spinules on central parts of costule (inconspicuous). Costae grooved with single spines on adaxial surface, raised and polished below. Veins 11-16 pairs, free, forking, prominent on both sides. Sori brown, 12-16 mm long, linear, submarginal except apex, base not joined. Indusium false, pale coloured. Sporangium: capsule globose, 200-250 µm long; stalk 250-300 µm long, biseriate; annulus 16-17 celled. Paraphyses uniseriate. Spores brown, c. 40 x 45 µm, triletetrahedral, rugate.
Habitat: Seen along stream sides in evergreen forests.

Altitude: 400m.

Distribution: India (South India: Kerala) and Sri Lanka.


Etymology: The specific epithet derived from its creeping rhizome (‘reptans’).

IUCN status: Critically endangered (CR). This taxon is currently known from a single location (Shendurney Wildlife Sanctuary) in South India and meets the criteria CR B1ab(ii)+2aD under Critically Endangered category.

Notes: Walker (1960) described this species from Sri Lanka as an endemic to Sri Lanka, and is a sexual diploid.

This species is included in the P. quadriaurita complex and is characterized by its creeping rhizome, sinus up to costa, and inconspicuous spinules on costa and costules.

Sreenivas and Madhusoodanan (in press) reported it from Shendurney Wildlife sanctuary, Kollam as a new record to India.

Material examined:

KERALA: Kollam (Dt.): Shendurney WLS (alt. 400m), V.K.Sreenivas 124067 (CALI).
22. Pteris scabripes Wall. ex J. Agardh


[Fig. 27, 30D & Plate 31]

**Type:** Malaya, Penang Hills, *Wallich 94* (Holotype, CAL!; Isotype, K, digital image!; US, digital image!).


**Type:** India, Kerala, Silent Valley, Way to Kunthipuzha river, *Vohra & Ghosh 56301* (Holotype & Isotype, CAL!).
Plate 29. Holotype of *Pteris reptans* T. G. Walker (BM)
Fig. 26. *Pteris reptans* T. G. Walker: A-B. habit; C. single pinna; D. sporangium; E. spore; F. palea; G. fertile pinnules; H. sterile pinnules (*V.K.Sreenivas 124067, CALI*).
Plate 30. *Pteris reptans* T. G. Walker: A. habit; B. single pinna; C. rhizome; D. adaxial view of pinnules; E. fertile pinnules; F. spore.
Height 50-90 cm. Rhizome short, erect, 2-4 cm long x 1-2 cm thick, cylindrical with tuft of roots, scaly. Palea brown, 2-3 mm long, 0.4-0.6 mm wide at base, linear-lanceolate, acuminate, auriculate, entire, thick walled cells. Stipe 25-50 cm long, 2-3 mm thick, stramineous or chestnut, shining, grooved above, terete below, glabrous. Lamina pinnate, 15-35 cm long x 10-20 cm broad, ovate or broadly ovate, dark green, subcoriaceous. Pinnae terminal one larger than lateral ones, 3-9 pairs, 10-25 cm long x 9-12 mm broad, opposite or subopposite, linear-lanceolate, acute or acuminate, cuneate, petiolate, entire, apex crenate, basal pair bipartite, glabrous, dark green above, pale green below. Costae grooved above and raised below, glabrous. Veins numerous, free, forking. Sori brown, 12-23.5 cm long, linear, submarginal except at base and apex. Indusium false, brown. Sporangium: capsule globose, 300-350 μm long; stalk 200-250 μm long, biseriate; annulus 18-22 celled, dorsal. Paraphyses uniseriate. Spores brown, c. 50 x 55 μm, triletetrahedral, verrucate.

**Habitat:** In shaded areas of the evergreen forests.

**Altitude:** 800m-2000m.

**Distribution:** China, India (South India: Karnataka, Kerala & Tamil Nadu), Malaysia, Myanmar and Thailand.

**Chromosome number:** n= 29 (Manickam & Irudayaraj, 1988).
**Etymology:** The specific epithet derived from its scabrous stipe (*scabrous* (Latin) = rough).

**IUCN status:** Least concern (LC). It does not meet any criteria for Endangered, Vulnerable, *etc.* under IUCN red list category.

**Notes:** *P. scabripes* was first catalogued by Wallich in 1828 from Penang Hills, in Malaysia without description. Agardh (1839) provided description and validly published it. Ghosh (1984) reported this species from India for the first time.

This species is characterized by scabrous, chestnut brown and elongated frond axis (stipe).

*P. scabripes* is very common in Silent Valley National Park, Palakkad. Ghosh and Ghosh (1982) described *P. silentvalliensis* (as ‘silent-valliensis’) based on the specimens from Silent Valley. According to them, this species is closely related to *P. cretica* L. except entire sterile frond and less number of pinnae. They were also related to this species with *P. multiaurita* J. Agardh, but differ in once forking veins and erect rhizome. Fraser-Jenkins (1997) considered that *P. silentvalliensis* Ghosh & Ghosh is a synonym of *P. multiaurita* J. Agardh, but later Fraser-Jenkins (2008a) re-identified it as *P. scabripes* Wall. ex J. Agardh.
Recently, the present author collected specimens from Silent Valley Nation Park (type locality), and studied these specimens and type specimens deposited in CAL! (Vohra & Ghosh 56301). It is found that the specimen is nothing but *P. scabripes* and the type specimens of *P. scabripes* (from Penang, *Wallich 94*, K!) is exactly matching with that of specimens from Silent Valley. Ghosh and Ghosh might be unaware of *P. scabripes* at the time of their publication.

Nair and Bhargavan (1981a) recorded *P. dactyлина* Hook. from Panthenthode, Silent Valley National Park in error for *P. scabripes*. *P. dactyлина* is a high altitude plant occurring in Himalaya. The specimen in MH (*N.C.Nair 65447*) has no crenate margin as in *P. dactyлина*. However, the duplicate specimen at CAL is larger and is much more obviously *P. scabripes*.

Malaysian plants of *P. scabripes* have regular teeth on sterile apex and fewer pairs of pinnae. Moreover, the sterile fronds rarely have more than two pairs of pinnae and the fertile pinnae are widely spaced (Holttum, 1968).

**Material examined:**

**KARNATAKA: Chikmagaluru** (Dt.): Bababudan Hills (alt. 1200m), *P.K.Rajagopal 543* (MGMC).
KERALA: Kottayam (Dt.): Kurisumala hills (alt. 1200m), V.S.Manickam & K.M.Mathew 34604 (XCH). Palakkad (Dt.): Anguinda (alt. 2200m), V.K.Sreenivas 119275; Nilikkal SVNP (alt. 900m), V.K.Sreenivas 124014; Panthenthode SVNP (alt. 800m), V.K.Sreenivas 119261, 119269 & 119270; B.K.Nayar & Geevarghese 10682; Poochapara SVNP (alt. 950m), V.K.Sreenivas 119250 & 119260; Sairendri SVNP (alt. 900m), V.K.Sreenivas 124023; Silent Valley (alt. 850m), Geevarghese 4111, P.V.Madhusoodanan 1808, B.K.Nayar & P.V.Madhusoodanan 21358; Near Sispara SVNP (alt. 2000m), V.K.Sreenivas 119238; Walakkad-Sispara path SVNP (alt. 1600m), V.K.Sreenivas 124004, 124005, 124007, 1240016 & 124044 (CALI); Kummattanthode (alt. 800m), V.S.Manickam 3272 (XCH); Kunthipuzha river side (alt. 825m), N.C.Nair 56678; Panthenthode (alt.800m), N.C.Nair 56644 (MH); Silent Valley (alt. 800m), N.C.Nair 65447 (CAL). Idukki (Dt.): Arjunan kotta, PTR (alt. 1000m), Jomy Augustine 12887; Ezhanakuzhi (alt. 1300m), Jomy Augustine 12897 (CALI); Munnar hills (alt. 1300m), V.S.Manickam 32219 (RHT); Devikulam (alt. 1300m), V.S.Manickam 31447; Eravikulam-Pettimudi road (alt.1600m), V.S.Manickam & K.M.Mathew 34524 (XCH). Thiruvananthapuram (Dt.): Chemunji (alt. 1000m), V.K.Sreenivas 124044 (CALI); Raju Antony 58172 (TBGT).

TAMIL NADU: Coimbatore (Dt): Valparai- Idliar path (alt. 1000m), V.S.Manickam & K.M.Mathew 34363 (RHT); Attakatti forest area (alt. 850m), V.S.Manickam & K.M.Mathew 34341; Shekelmudi forest (alt.
1200m), *V.S.Manickam 2212* (XCH); Andiparai sholai (alt. 1166m), *J.Joseph 13219* (MH, CAL). **Dindigul** (Dt.): Palni hills (alt. 2050m), *V.S.Manickam & K.M.Mathew 32833* (XCH). **Kannyakumari** (Dt.): Selvamkoopu (alt. 1300m), *A.N.Henry 70363* (MH). **Tirunelveli** (Dt.): Kothayar (alt. 1300m), *P.V.Madhusoodanan 4487* (CALI); Kothayar (alt. 1300m), *V.S.Manickam 32118* (RHT), *V.S.Manickam 34220, V.S.Manickam & K.M.Mathew 34769* (XCH); Manjanamparai (alt. 1400m), *A.N.Henry 16369* (CAL).
23. Pteris tripartita Sw.


[Fig. 28, 30E & Plate 32]

**Type:** Indonesia, Java, *Thunberg 24968* (Holotype, UPS, digital image!).


**Type:** Réunion, Grand Brûlé, *Bory de St. Vincent s.n.* (Holotype, P, digital image!).

*Litobrochicia tripartita* (Sw.) C. Presl, Tent. Pter. 150. 1836; Bedd., Ferns S. India t. 220. 1863.
Fig. 27. *Pteris scabripes* Wall. ex J. Agardh: A-B. habit; C. spore; D. sporangium; E. a single pinna; F. palea; G. a portion of fertile pinna; H. sterile pinna apex (*V.K. Sreenivas 119238, CALI*).
Plate 31. *Pteris scabripes* Wall. ex J. Agardh: A. habit; B. single pinna; C. a portion of fertile pinna; D. pinna apex; E. a portion of sterile pinna; F. rhizome; G. spore.

Height up to 300 cm. Rhizome erect, 8-12 cm long, 1-1.4 mm thick, cylindrical with tufts of roots, scaly. Palea pale brown, 2-3 mm long, 0.3-0.4 mm broad at base, lanceolate, acute, auriculate, uniformly thin walled cells. Stipe 150-165 cm long, 1-1.5 cm thick, chestnut brown, grooved throughout, glabrous. Lamina compoundly bipinnate, basal pair tripartite, 100-125 cm long x 70-90 cm broad, ovate, green, subcoraceous. Pinnae 15-20 pairs, 10-20 cm long x 3-4 cm broad, opposite- subopposite, lanceolate, pinna-apex 3-4 cm. Pinnules 12-22 pairs, 1.5-2.0 cm long x 4-5 mm broad, oblong, obtuse, apex crenate, sinus c. 3 mm away from costae, 3-4 mm apart, glabrous. Costae grooved above with spines, raised and polished below. Veins 10-14 pairs, united at the base to form costal and costular aereoles. Sori brown, 1-1.6 cm long, linear, submarginal except at apex. Indusium false, white. Sporangium: capsule globose, 200-250 μm long; stalk 250-300 μm long, biseriate; annulus 25-26 celled. Paraphyses uniseriate. Spores brown, c. 30 x 40 μm, triletetrahedral, verrucate.

**Habitat:** Grows in evergreen and shola forests near stream banks.

**Altitude:** Above 2000m.
**Distribution:** Australia, China, Fiji, India (South India: Tamil Nadu), Indonesia, Java, Malaysia, Philippines, Sri Lanka, Thailand, Tropical Africa and Vietnam.

**Chromosome number:** n= 58; 2n= 116 (Goldblatt & Johnson, 1991).

**Common name:** Trisect brake or Giant brake.

**Economic importance:** Widely cultivated as ornamental fern.

**Etymology:** Specific epithet from the Latin *tri* - (three-) and *partire* (to divide), in reference to the frond which has 2 basal branches, each of those side-branches dividing again, giving a 5-branched frond (in large fronds often further divided).

**IUCN status:** Critically Endangered (CR). This taxon is currently known from a single location (Azhalarkovil forest) in South India and meets the criteria CR B1ab(ii)+2aD under Critically Endangered category.

**Notes:** Swartz described this species based on the specimens from Java (*Thunberg 24968, UPS*). Beddome (1863) recorded this species from South India as *Litobrochia tripartita* (Sw.) C. Presl. Recently Manickam et al. (2004b), reported this species as *P. wallichiana* J. Agardh from Madurai district of Tamil Nadu. But, Fraser-Jenkins (2008a) determined it as *P. tripartita* Sw.
This species is characterized by the partition of fronds, *i.e.*, divided into three major branches at the base and the presence costal and costular areoles on pinnae.

In South India, this species is rare and only reported from Azhalarkovil forest in Madurai district of Tamil Nadu. Chandra *et al.* (2008), included this species in ‘At Risk’ category.

*P. tripartita* is closely related to *P. wallichiana* J. Agardh, a Himalayan species, except the later has only costal areoles and all other veinlets are free. Chandra and Khare (1995) reported the occurrence of foliar buds at the tip of the frond.

**Materials examined:**

**TAMIL NADU: Madurai** (Dt.): Azhalarkovil forest (alt. 2100m), *N.Siva & V.K.Sreenivas 127801* (CALI).
24. *Pteris vittata* L.


[Fig. 29, 3OF & Plate 33]
Fig. 28. *Pteris tripartita* Sw.: A-B. habit; C. spore; D. sporangium; E. palea; F. fertile pinnules; G. sterile pinnules; H. a single pinna (*N.Siva & V.K.Sreenivas 127801, CALI*).
Plate 32. *Pteris tripartita* Sw.: A. habit; B. frond showing tripartite division; C. rhizome; D. single pinna; E. fertile pinnules; F. venation; G. spore; H. sterile pinnules.
**Type:** China, *Osbeck s.n.* (Lectotype, LINN 1246.3, digital image!).


Height 45-120 cm. Rhizome short, creeping, 4-5 cm long, 4-5 mm cylindrical with tuft of roots, scaly. Palea pale brown, 3-4 mm long x 0.4-0.5 mm wide at base, lanceolate, entire, apex acuminate, thick walled cells. Stipe 6-15 cm long, 4-5 mm thick, green (fresh specimens) or sramineous (dry specimens) above, light brown at base, grooved and glabrous above, rounded and densely scaly (white to pale brown) below. Lamina pinnate, 45-90 cm long x 6-40 cm broad, obovate, green, subcoriaceous. Pinnae 10-28 pairs, 5-25 cm long x 5-9 mm broad, opposite or subopposite, sessile, linear-lanceolate, entire, acute, base cordate, margin and apex crenate or crenulate except soral region, pinnae gradually reduces towards base, not bipartite at base, green. Costae grooved above, raised below, glabrous. Veins numerous, free, forking, slightly visible. Sori pale brown, 5-7 cm long, linear, submarginal except at apex and base, crowded. Indusium false, pale coloured. Sporangium: capsule globose, 250-300 μm long; stalk 200-250 μm, biseriate; annulus 12-22 celled. Paraphyses uniseriate. Spores brown, c. 50 x 55 μm triletet-tetrahedral, bispulate.
**Habitat:** Grows in partially exposed areas such as road sides, earth cuttings, walls of old buildings, *etc.*

**Altitude:** Sea level-1500m.

**Distribution:** Cameroon, China, Ghana, India (South India: Andhra Pradesh, Karnataka, Kerala & Tamil Nadu), Nepal, New Guinea and Philippines.

**Chromosome number:** *n* = 58 (Irudyaraj & Manickam, 1987).

**Common name:** Chinese brake.

**Economic importance:** *P. vittata* is considered as an experimental plant in heavy metal accumulation studies. This is also widely cultivated as ornamental plants in many gardens. Tannins and phenolic acids were isolated from this species and the plant is used as demulcent, tonic, antiviral and antibacterial agent (Vasudeva, 1999; Karuppusamy, 2001).

**IUCN status:** Least concerned (LC). This is a widely distributed taxon in South India and it does not meet any criteria for Endangered, Vulnerable, *etc.* under IUCN red list category.

**Notes:** Linnaeus (1753) described this species based on Osbeck’s collections from China.

*P. vittata* as confused with *P. longifolia* L., a tropical American species. Hieronymus (1914a) clearly pointed out the differences between
P. vittata and P. longifolia as follows: P. vittata never shows an articulation at the bases of the short petioles of lateral pinnae, but the petioles of the lateral pinnae run down forming more or less an edge on the rachis. Since articulation is not present, the lateral pinnae are also never shed in P. vittata. The lateral pinnae do not stick out horizontally from the rachis, but are mostly directed upwards in a more or less acute angle. In P. vittata, the sterile pinnae or sterile portion of the fertile pinnae are always distinctly crenate or crenulate at margin, though teeths are small in some cases, whereas in P. longifolia, the sterile pinna margin is always serrate. In P. vittata, the lower pinnae considerably reduced than the rest of pinnae. Jarrett (1968) also emphasize the articulation on the stipe is a distinguishing character of P. longifolia.

Srivasthava et al. (2007), found that the only tetraploid form of Pteris vittata L. is present in India, though a gradation of cytotypes (2x to 6x) had been reported over several years from India.


P. vittata subsp. vittata has an erect frond and the terminal pinna is larger than that of other subspecies, where as P. vittata subsp. emodi has pendent frond and smaller terminal pinna. Both subspecies are tetraploid sexual
plants, but the *P. vittata* subsp. *vermae* is sexual diploid plant. Subsequent explorations by Srivasthava to the type localities did not able to collect the mentioned specimens. Moreover, she pointed out that the demarcation of *P. vittata* at subspecies level is complicated because this species shows a range of morphological variations.

In South India, the plants become erect when it grows on floors and pendent when it is growing on walls of old buildings. Moreover the terminal pinna is also showing morphological variations as larger or smaller. So here it is treated as a distinct species.

**Materials examined:**

**ANDHRA PRADESH**: Anantapur (Dt.): Yadiki forest (alt. 350m), *T. Pullaiah & N. Yesoda 1118* (MH, SKU). Chittoor (Dt.): Papavinasanam-Thirumala (alt. 600m), *A.Ahmad 12808, A.M.Reddy 26487* (SKU). Kurnool (Dt.): Rangapuram R.F., *R.R.V.Raju 2332*; Sunnipenta, *R.R.V.Raju 2332* (SKU). Srikakulam (Dt.): Gummada (alt. 475m), *G.V.Subbarao 62434* (MH, CAL). Vizianagaram (Dt.): Sujankota (alt. 850m), *G.V.Subbarao 19748* (MH), *P.Amrutha Lakshmi 25161* (CAL, SKU); Galikonda (alt. 1100m), *A.Ahmad 12887* (SKU).

**KARNATAKA**: Kodagu (Dt.): Madikeri (alt. 850m), *P.V.Madhusoodanan 39834*; Near Thalecauvery (alt. 915m), *V.K.Sreenivas 113205* (CALI); Madikeri-Siddapour road side (alt. 1100m), *V.S.Manickam 2624* (XCH); Madikeri (alt. 850m), *P.K.Rajagopal 210* (MGMC). Mysore (Dt.): Gundelpet
(alt. 675m), *B.D.Naithani 21251* (MH). **Shimoga** (Dt.): Agumbe (alt. 850m), *P.V.Madhusoodanan 39844*; Jog falls (alt. 1500m), *P.V.Madhusoodanan 39827* (CALI). **Uduppi** (Dt.): Near Srikrishna Temple, Thandelpett (alt. 50m) *V.K.Sreenivas 124067* (CALI); Bailoor (alt. 150m), *P.K.Rajagopal 210* (MGMC).

**KERALA:** **Kannur** (Dt.): Kannur st. fort (alt. 5m), *P.V.Madhusoodanan & Sworrupanandhan 27432* (CALI). **Kozhikode** (Dt.): Bank Road, Kozhilode city (alt. 5m), *V.K.Sreenivas 124086*; Meppayyur (alt. 100m), *Ibrahim 18863*; Vengoli peak, *B.K.Nayar & S.Pankaj 7389* (CALI). **Malappuram** (Dt.): Kohinoor (alt. 50m), *V.K.Sreenivas 119236* (CALI). **Palakkad** (Dt.): Walayar dam site (alt. 600m), *E.Vajravelu 19067* (MH). **Thiruvananthapuram** (Dt.): Vithura (alt. 350m), *V.K.Sreenivas 124057* (CALI).

**TAMIL NADU:** **Coimbatore** (Dt.): Azhiar dam site- Valparai (alt. 1500m), *V.S.Manickam 3293* (XCH); Vadakkumalai (alt. 950m), *M.V.Viswanathan 716* (MH). **Madurai** (Dt.): Combai river bed (alt. 333m), *K.M.Sebastine 12980* (MH, CAL). **Nilgiri** (Dt.): Bandi Shola (alt. 1500m), *V.S.Manickam 1070* (XCH); Mettupalayam (alt. 850m), *E.Vajravelu 38352* (MH). **Salem** (Dt.): Shevroy hills (alt. 1300m), *Ghatak 276* (CAL). **Tirunelveli** (Dt.): Kothayar (alt. 1200.m), *P.V.Madhusoodanan & P.J.Sevichan 44878* (CALI); Kothayar hills (alt. 1250m), *V.S.Manickam 31070 & 31072* (RHT); Ambasamudram (alt. 400m), *V.S.Manickam 15587*; Kakachi (alt. 1500m), *V.S.Manickam 3331*; Mundanthurai (alt. 600m), *V.S.Manickam 13063* (XCH).