

LINDSAEOID FERNS OF BANGLADESH

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Abstract

The paper deals with two genera of the family Lindsaeaceae, namely, *Lindsaea* (with 4 species, *L. ensifolia*, *L. odorata*, *L. lucida* and *L. doryphora*) and *Sphenomeris* (with only *S. chinensis*) from Bangladesh.

Introduction

The members of the fern family Lindsaeaceae are quite diversified in the Old World than in the New World, and the genus *Lindsaea* is the largest one having ca. 150 pantropic and sub-tropic species (Kramer 1968, 1971, 1972). Prain (1903) recorded only two species *L. cultrata* Sw. (= *L. odorata* Roxb. ex Griff.) and *L. ensifolia* Sw. from Chittagong. Dixit (1984) recorded three species, e.g., *L. ensifolia* Sw., *L. lucida* Bl. and *L. odorata* Roxb. ex Griff. from Bangladesh. Later on Mirza and Rahman (1997) recorded *L. ensifolia* and *L. odorata* from Bangladesh.

Another genus of the family *Sphenomeris* Maxon is also distributed in the tropics of both the hemispheres and in the northern subtropical regions, and is represented by 11 species of which six are restricted within small areas (Kramer, *l.c.*). In Bangladesh it is represented by only one species *S. chinensis* (L.) Maxon (Mirza and Rahman 1977, Pasha and Chakraborty 1982).

Previously the Lindsaeoid ferns were considered under Davallioid ferns (Dixit and Ghosh 1983). Ching (1940) proposed the name Lindsaeaceae as a separate family, which was validated by Pichi Sermolli (1970) by providing Latin description (Dixit and Ghosh *l.c.*). In the present paper *Lindsaea* and *Sphenomeris* are considered under the family Lindsaeaceae and the work of Pichi Sermolli (*l.c.*), Kramer (*l.c.*) and Dixit and Ghosh (*l.c.*) are followed.

The present work was based on the materials deposited at the Bangladesh National Herbarium (DACB), Kew Herbarium (K) and also in the Central National Herbarium, India (CAL), to evaluate the members of the family Lindsaeaceae in Bangladesh. The study reveals that in Bangladesh the above mentioned two genera are present, and the genus *Lindsaea* Dryand ex Smith is represented by four species, namely, *L. ensifolia*, *L. odorata*, *L. lucida* and *L. doryphora* ; and the genus *Sphenomeris* is represented by only one species, *S. chinensis*.

The taxonomic description with keys to the genera and species, illustrations, specimens examined, distribution, short notes and proposal for present conservation measures are given below.

Lindsaeaceae Pichi Sermolli, Webbia 25: 246 (1970).

Typically terrestrial or rarely epiphytic ferns of moderate size with creeping rhizome. Fronds pinnate or bipinnate, lamina pinnately divided, sometimes decomposed; veins often free or in some cases anastomosing to form oblique areoles. Sori marginal or terminal.

Key to the genera

Pinnae dimidiate, almost equal in size, sori marginal on 1-8 veins

Lindsaea

Pinnae finely dissected, sori at the apices on 1-3 veins

Sphenomeris

Lindsaea Dryand ex J. E. Sm., Mem. Acad. Roy. Sci. Turin 5: 413. t. 9 (4) (1793).

Rhizome creeping or climbing. Stipes slender, grooved on the adaxial surface. Fronds pinnate or bipinnate. Pinnae or pinnules, semi-crescent-shaped, trapezoid or parallelogram-shaped, the upper and outer edges soriferous; soriferous edges entire or lobbed; lower edge always strongly thickened towards the base and decurrent upon the raised edge of the rachis; inner edge (acrosopic basal edge) always thin and close to the rachis, uppermost leaflets gradually or abruptly reduced. Venation of leaflets repeatedly dichotomous with no distinct midrib. Sori submarginal, linear. Sporangia with slightly oblique annulus. Spores pale, tetrahedral, minutely warty.

Key to the species

1. Fronds simple pinnate

2. Pinnules 1-5 pairs, about 25-60 cm. long, margin entire

L. ensifolia

2. Pinnules 20-30 pairs, 1.5-3.5 cm. long

3. Pinnules half crescent-shaped

L. odorata

3. Pinnules quadrangular in shape

L. lucida

1. Fronds bi-pinnate and pinnules round trapeziform in shape

L. doryphora

1. *Lindsaea doryphora* Kramer, Blumea 15 : 566 (1968); Flora Malesiana Ser 11 vol. 3: 227 (1971). *L. scandens* Hooker var. *terrestris* Holttum, Rev. Fl. Mal 2 : 327 (1954), *nom. invalid.* (not typified); *L. lancea* or *L. trapeziformis* auctt. *quad specimina asiatica.* **(Plate 1)**

Type: ALSTON 13358, Permating, S. of Kwala Kwajan, Kalimantan, Borneo (U; Dup. in BM).

Rhizome rather short creeping, 1.5-2 mm thick; scales medium brown, very narrowly triangular, to 1.5-2 mm long. Stipe slightly apart from each other. Fronds bipinnate about 25-35 cm long, with 5-7 branches. Pinnules usually 20-25 pairs to a side, with a long crenulate apex, subcontiguous, chartaceous, olive-green when dry, having a metallic sheen, somewhat variable in shape, if large, spreading or slightly decurved, not rarely with concave lower margin, 2.5-3 times as long as wide; if smaller similar or rounded-trapeziform, 2-2.5 times as long as wide; largest pinnules about 25 by 8 mm, but more often about 10-25 by 4-6 mm., upper margin of the outward increasingly convex, a

distinct outer margin hardly developed. Sterile pinnae margin shallowly crenate towards the apex of the pinnule. Upper pinnules simple pinnate. Veins immersed, rather close, free, mostly twice forked. Sori occupying all vein-ends of a pinnule or only the inner ones, continuous; indusium pale to dark, entire. Spores pale brownish, oval in shape.

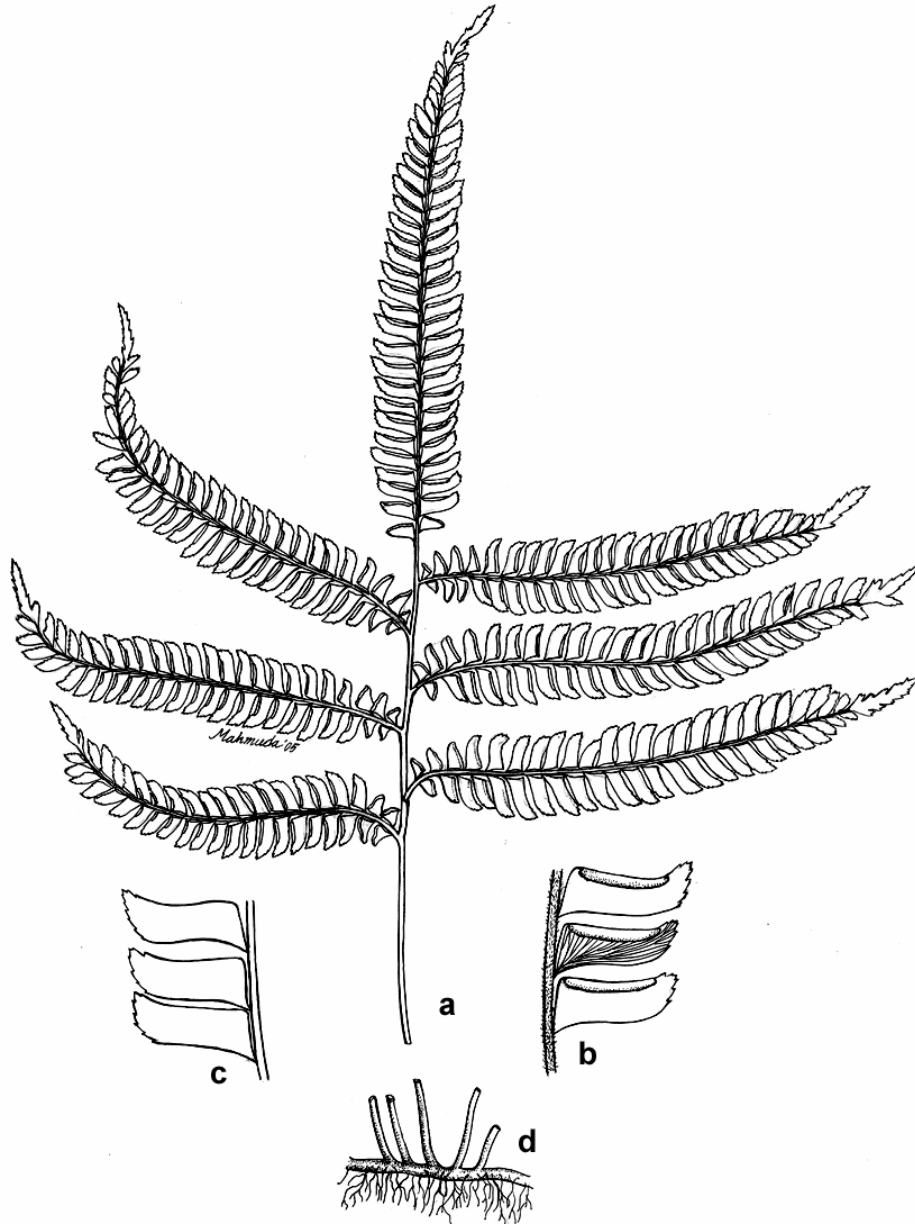


Plate 1. *Lindsaea doryphora* Kramer a. Habit ($\times 0.67$); b. pinnule enlarged, showing arrangement of the sori and venation ($\times 2$). c. sterile pinnae ($\times 2$). d. rhizome ($\times 67$).

Specimen examined: **Chittagong:** Chittagong town, (15.7.2003), Momtaz Mahal Mirza Mm. 342 (DACB).

Distribution: Indonesia, Malay Peninsula, Thailand, Singapore, and the Philippines.

L. doryphora is reported for the first time from Bangladesh. It was collected from Chittagong, growing on a hill slope. It is also a rare taxon, and thus attempt should be made to collect it further and *ex-situ* conservation measure may be undertaken.

2. **Lindsaea ensifolia** Sw. in Schrad. J. Bot. 1800 (2): 77 (1801). *Schizoloma ensifolia* (Sw.) J.Sm. in Hook., Journ. Bot. 3: 414 (1841). **(Plate 2)**

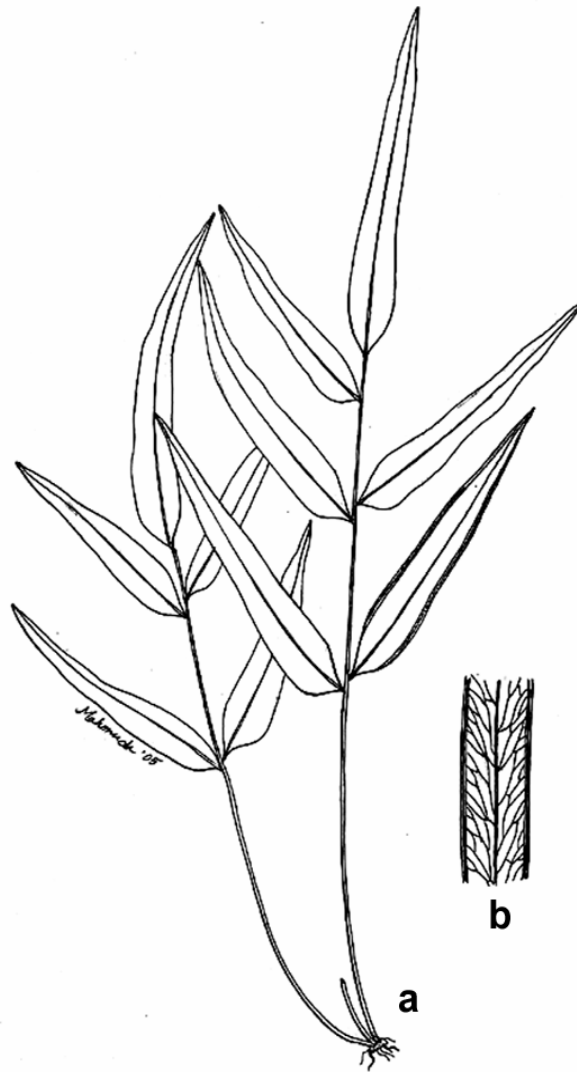


Plate 2. *Lindsaea ensifolia* Sw. a. Habit ($\times 0.5$); b. pinnule enlarged, showing arrangement of the sori and venation ($\times 2.25$).

Rhizome short-creeping. Stipes pale, or dark purplish when old, to about 35 cm. long, grooved. Fronds long simple pinnate, 1-5 pairs of pinnules, about 30 cm. long and 1.5 cm broad. Texture of the lamina firm straw colour when mature, very variable in length and width, about 10-20 cm. long and 0.4-2.0 cm. wide, sessile or with a short-winged stalked, narrowly lanceolate with a cuneate base and somewhat acuminate apex. Sori continuous along the edge of the pinnae, the indusium firm, entire, almost reaching the edge of the lamina.

Specimens examined: **Chittagong:** Chittagong, (6.5.1851) Hooker & Thomson 299/C (K); Khagera, (March 1880), Gamble 7909 (K); Chittagong town, (13.7.2004), Momtaz Mahal Mirza, Mm 426 (DACB). **Maulvi Bazar:** Bangladesh Tea Research Institute (BTRI) campus, (19.5.2005), Momtaz Mahal Mirza, Mm 542 (DACB). **Panchagarh:** Giragoa, (Simatha fari), (16.7.2005), Momtaz Mahal Mirza, Mm 641 (DACB).

Distribution: Africa, Australia, China, Hawaii, throughout India, Malay Peninsula, Malesian Islands, Myanmar, New Guinea, New Caledonia, and Sri Lanka.

From the present study it is revealed that *Lindsaea ensifolia* is locally abundant in open places in low lands in Bangladesh. The taxon is being destroyed by the grazing animals as well as by the habitat destruction. Therefore, both *in-situ* and *ex-situ* conservation measures should be undertaken.

3. *Lindsaea lucida* Bl., Enum. PL. Jav. : 216 (1828) ; Holtt. Gard. Bull.s.s. 9: 131; *L. lobbiana* Hk. Spec. Fil. 1. 205. t. 62c (1846); Holttum, Rev. Fl. Malaya 2 : 328 (1954). (Plate 3)

Rhizome short, creeping. Stipe dark brown about 30-40 cm. long. Fronds simple pinnate, 25-30 pairs of pinnae on each side. Pinnules .5- 1.5 cm. long and 1.5-2.5 cm. broad almost round to quadrangular in shape. The basal pinnae somewhat reduced and more widely spaced, the apical ones rather abruptly reduced, texture thin. Veins distinct. Lower edge nearly straight; upper edge usually with 3-4 shallow lobes separated by narrow sinus, each lobe with concave edge bearing single sorus. Sori slightly elongated narrow in shape.

Specimen examined: **Chittagong** : Kasalong, (22.2.1876) J.L. Lister (CAL).

Distribution: Bhutan, China, India, Malay Peninsula, Malesian Islands, Myanmar, New Guinea, Philippines and Thailand.

L. lucida is rare in Bangladesh. There was only one collection made by J.L. Lister some 130 years ago in 1876 from Chittagong Hill Tracts that has been housed at the Central National Herbarium (CAL). Intensive search should be made to relocate the species, and if the plants are located, then attempt should be made to conserve it through *in-situ* and *ex-situ* methods.

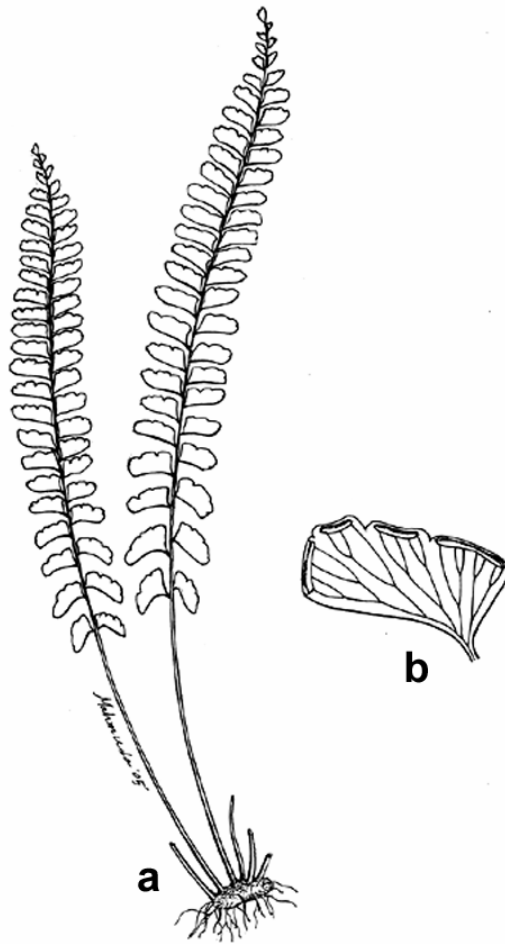


Plate 3. *Lindsaea lucida* Bl. a. Habit ($\times 0.75$); b. pinnule enlarged, showing arrangement of the sori and venation ($\times 2$).

4. *Lindsaea odorata* Roxb. ex Griff. in Calc. Journ. Nat. Hist. 4:511 (1844). *Lindsaea cultrata* auct.: Bedd., Ferns S. India 7: t. 23 (1864). (Plate 4)

Rhizome short-creeping. Stipes apart from each other, nearly black when old, shining at the maturity, about 3-18 cm. long. Fronds simple pinnate, to about 20 cm. long, 15-25 pairs pinnae on each side, Pinnae 1.5-2.5 cm. long, 1.00-2.00 cm broad, the pinnae distinctly spaced, those a little above the base largest, the upper ones gradually reduced, the apical one very small. Pinnae half crescent-shaped; lower edge curved toward its distal end; upper edge shallowly lobed; lobes usually 3 or 4 in number. Sori marginal on each lobe.

Specimen examined: **Sylhet** : Griffith *s.n.* [Type. (K)].

Distribution: Africa, Australia, China, Hawaii, India, Malesian Islands, Malay Peninsula, Moluccas, Myanmar, New Guinea, New Caledonia, Philippines and Sri Lanka.

L. odorata is rare in Bangladesh. It was collected only once from Sylhet by Griffith, which is a type specimen housed at Kew herbarium (K). The type locality and neighbouring areas need to be thoroughly explored for this species. Once it is relocated then efforts should be undertaken for both *in-situ* and *ex-situ* conservation. In addition, steps must be taken to promote to protect its habitats.

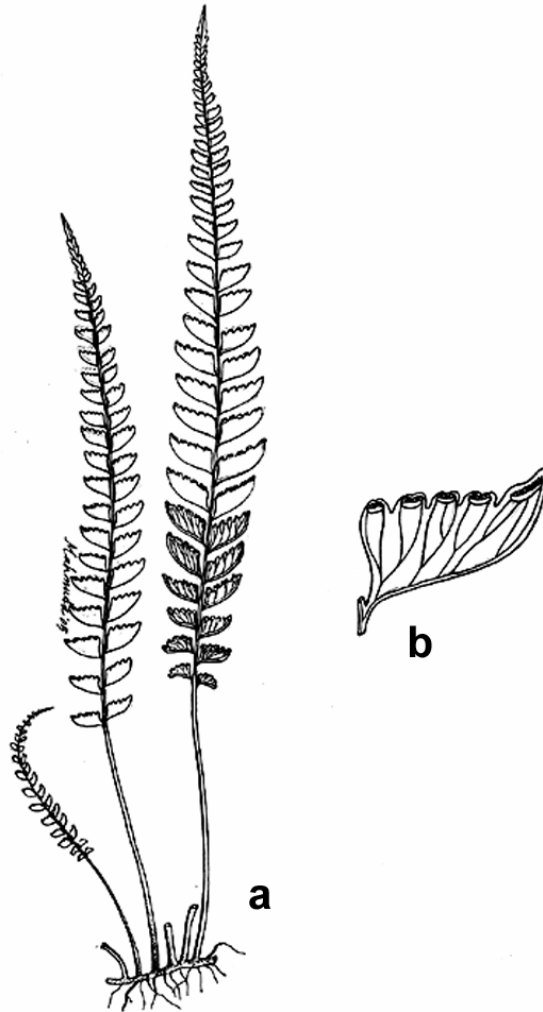


Plate 4. *Lindsaea odorata*, Roxb. ex Griff. a. Habit ($\times 0.15$); b. pinnule enlarged, showing arrangement of the sori and venation ($\times 2$).

Sphenomeris Maxon in J. Wash. Acad. Sci. 3: 144 (1993).

A terrestrial fern. Rhizome short-creeping. Stipes tufted, grooved on the adaxial surface, Fronds erect of limited growth, finely dissected, glabrous, lobes having a single vein or once or twice forked, free at the end; midrib of pinnules grooved. Sori marginal and terminal on the vein. Spores bilateral, non-perinous.

Sphenomeris chinensis (L.) Maxon in Journ. Wash. Acad. Sc. 3: 144 (1913).

Rhizome short-creeping. Stipes 6-20 cm. long, strong, erect, polished, naked, dark brown, grooved on the adaxial side. Fronds 15-45 cm. long, 2-15 cm. broad; lamina tripinnate-quadrripinnatifid, lanceolate to almost ovate in outline, lower pinnae reduced, shape deltoid, texture thin but firm; each lobe with one or two veins only, their apices joined by a sorus or each bearing a separate sorus. Spores monolete, bilateral.

Specimens examined: **Sylhet:** Sylhet town, (1829) Wallich 245 (K); **Maulvi Bazar:** Madhabkundu, (20.5.2005) Momtaz Mahal Mirza, Mm 585 (DACB); **Panchagarh:** Tetulia town, (17.7.2005), Momtaz Mahal Mirza, Mm 657(DACB).

Distribution: African Islands, China, Fiji, India, Japan, Malay Peninsula, Polynesia, and Sri Lanka.

S. chinensis is fairly common in the country and also found to grow for sale as an ornamental pot plant for its beautiful fronds.

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