

Morphotaxonomy of *Fossombronia* Raddi (Metzgeriales) from Nilgiri hills (India)

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Abstract: Alam A (2014): Morphotaxonomy of *Fossombronia* Raddi (Metzgeriales) from Nilgiri hills (India). *Frahmia* 7:1-12.

The present study is intended primarily to report the diversity of genus *Fossombronia* Raddi in Nilgiri hills (India). Only 4 species, *Fossombronia cristula* Austin, *F. himalayensis* Kashyap, *F. pusilla* (L.) Dumort., and *F. wondraczekii* (Corda) Dumort. ex Lindb. have been collected during the recent investigation. Earlier describe species, *F. foreaui* Udar et Srivastava, from these hills was not found in the few recent collections hence its details is not included in this study.

1. Introduction

Nilgiri hills being a component of biodiversity hot spot, is a habitat of immense life forms including bryophytes. Bryophytes have a great variety in Nilgiri hills which includes mosses, liverworts and hornworts. The exploration of bryophytes in this region is always interesting and gives amazing results to the bryologists. Many species have been reported new to India and world as well from these hills (Alam, 2008; Alam and Srivastava, 2012). However, generally corticolous forms of liverworts have been highlighted by the various bryologists in past. Very little work has been done in terms of terricolous liverworts (Srivastava and Alam, 2002; Alam and Srivastava, 2009; Alam, 2009; 2011; Alam et al., 2009) therefore, the present study is about morphotaxonomic details of genus *Fossombronia* Raddi which is somewhat neglected terricolous form under order Metzgeriales. It was studied long ago by Srivastava and Udar (1975) and since then no recent update is been available. However, this genus is very frequent in distribution (Verma et al., 2013) occupying relatively harsh macro and microclimate in Nilgiri hills in comparison to other genera of Metzgeriales. Hence an attempt is being made to study its current morphology in this work.

A key is also given here for easy and proper identification of species:

KEY TO THE SPECIES OF *FOSSOMBRONIA* IN NILGIRI HILLS

1. Plants monoicous 2
1. Plants dioicous *F. pusilla*.
2. Distal face of the spore with lamellae usually broken and irregularly disposed not forming regular reticulations, spines & perispore inconspicuous at the periphery *F. himalayensis*
2. Distal face of the spore with continuous and regularly disposed lamellae generally forming reticulations on the whole surface, or no reticulations, spines & perispore conspicuous at the periphery 3

3. Spines and perispore inconspicuous or absent at the equator of the spore *F. foreaui*¹
 3. Spores and perispore conspicuous at the equator of the spore 4
 4. Leaves convoluted and aggregated towards the apex, with lamellae more or less parallel oriented and furcated at the equator of the spore with conspicuous spines and perispore *F. wondraczekii*
 4. Leaves usually flat or sometimes slightly undulate at margin, and lamellae forming reticulations over the distal face, spines and perispore conspicuous at the equator of spore *F. cristula*

2. Materials and Methods

Study area

Nilgiri hills range is situated at 10°1'–11°45' N latitude, 76°–77°15' E longitude, and about 1200–2500 m altitude spread over an expanse of 2600 km², it is India's oldest 'Biosphere Reserve'. The geography and climate of the region make the area an important centre for diversification of the species.

The present study was carried out from January 2001 to June 2009. Several collections were made during this period and on the basis of those collections and field observations four taxa of this genus are found. Collections have been made following standard field methods. The identification has been made by comparing type material and consulting relevant literature. Nomenclature is updated following Brummitt and Powell (1992). All the specimens have been deposited at Lucknow University Hepatic Herbarium (LWU).

3. Morphotaxonomic observations

Fossombronia pusilla (L.) Dumort.

Fossombronia pusilla (L.) Dumort., *Rec.d'Obs. Jungerm.*, p.11 (1835); Srivastava *et* Udar, *Nova Hedwigia*, 26: 808 (1975).-*Jungermannia pusilla* Linn. *Spec. Pl.*, p. 1136 (1753).

(Plate: 1, Figs.: 1-17)

Plants delicate, green, growing on moist soils and exposed rocks. Stem 6–12.5 mm long, dichotomously branched, dorsally flattened, ventrally convex with tufts of purple rhizoids; apex not tuberous, internal cells of the stem parenchymatous, thin walled, middle cells sometimes contain mycorrhiza. Leaves simple, succubous, oblong quadrate, obliquely inserted on the stem in two lateral rows, usually broader than long, margin highly undulate and irregularly lobed, unistratose throughout except at the base where more than one cell thick, cells thin walled, apical marginal cells 28.8–91.2 μm x 16.7–86.0 μm, the basal marginal cells 57.6–163.2 x 14.4–28.8 μm, and the middle cells 86.4–192.0 (230.0) x 38.4–81.6 (96.0) μm. Pseudoperianth campanulate or inverted bell shaped, margin lobed and highly undulate, open on one side by means of the longitudinal incision up to the base; calyptra thin and delicate, often thick at the base. Seta elongated, capsule spherical, dark brown at maturity, exserted, dehiscence irregular, capsule wall bistratose, cells of the outer layer thick walled and without any thickening band, cells of the inner layer in surface view with incomplete, rarely complete fibrous thickening bands. Spores dark brown to reddish brown, tetrahedral, 38.4–43.6 (–48.0) μm in diam., proximal face have few, relatively thick and high lamellae, irregularly placed in the middle. The triradiate mark is not prominent, distal face with high and thick lamellae projecting at the periphery into 14–18 spines, lamellae not forming reticulations, proximal face with small broken lamellae, perispore well developed but incomplete. Elaters 67.2–144.0 μm long, 9.6–16.84 μm broad in the middle, usually bispirate rarely trispirate, yellowish brown, loosely twisted.

Sexuality: Dioicous (Srivastava and Udar, 1975).

Type Locality: - England (Srivastava and Udar, 1975).

¹ *F. foreaui* not collected in recent collections, hence describe in brief

Ecology: Grows in moist and shady places on rocks and soil covered rocks along with grasses.

Range: Africa, America, Asia, Europe.

Distribution in India: South India: Tamil Nadu- Nilgiri Hills [Ootacamund (Government Botanical Garden, Sholur)].

Characteristics of species: 1. Dioicous, 2. Tubers absent, 3. Spores 38.4-43.6 (-48.0) μm in diameter, lamellae scarce and distantly placed, perispore well developed but incomplete, spines 14-18 at the periphery, 4. Inner layer cells of the capsule wall usually with incomplete thickening (rarely complete) bands in surface view.

Specimens examined:

South India: Tamil Nadu- Nilgiri hills –Ootacamund (Sholur); ca. 2200-2300 m, Date: 02.10.2002, Legit.: P.K. Verma and Afroz Alam; 16293/2002, 16297/2002 (LWU)

***Fossombronia himalayensis* Kashyap**

Fossombronia himalayensis Kashyap, *New Phytol.* Vol. XIV, p.4 (1915); Srivastava *et* Udar, *Nova Hedwigia*, 26: (1975); *Fossombronia levieri* Steph., *Sp. Hep.* Vol. p.74 (1917).

(Plate: 2, Figs.: 1-20)

Plants green, growing on moist soils and soil covered rocks, upto 7.0 mm long. Stem 553 x 711 μm across diameter, prostrate, dichotomously branched, often with apical tubers, dorsally flattened, cells 47.4-63.2 x 45.0-67.5 μm , ventrally convex with simple vinous purple rhizoids; internal cells parenchymatous, thin walled, sometimes central cells contain fungal hyphae or mycorrhiza. Leaves 1.2-2.2 mm long and 1.2-1.8 mm wide, simple, quadrate, succubous, more or less flat and obliquely inserted on the stem in two lateral rows, irregularly lobed, wavy at the margins, unistratose, cells thin walled, apical marginal cells 13.5-22.5 x 18.2-31.5 μm , middle cells 45.0-90.0 x 19.2-45.0 μm , basal cells 85.5-99.0 x 45.0-50.0 μm . Monoicous, antheridia yellowish, globose and shortly stalked, scattered dorsally on the stem usually near the insertion of leaves, male bracts larger than leaves with 3-4 stalked antheridia. Archegonia lie dorsal on the stem, solitary, near the base of the leaves, female bracts not seen. Pseudoperianth campanulate or inverted bell shaped, plicate, usually open on one side by means of the longitudinal incision up to the base; calyptra delicate and thin, generally thick at the base. Capsule spherical, dark brown, exserted with a short seta (seta 225 x 225 μm across diameter), dehiscence irregular, capsule wall bistratose, cells of the outer layer thick walled without thickening bands, cells of the inner layer in surface view with incomplete or complete fibrous thickening bands. Spores dark brown, 36.0 x 45.0 μm in diam., without conspicuous perispore, spines not sharply defined, proximal face have minute broken lamellae, triradiate mark somewhat prominent, distal face with high and thick lamellae usually broken and irregularly disposed, forked towards the margin, hardly anastomosing to form a single reticulation. Elaters 55.0-175.0 μm long, 6.8 -10.4 μm broad in the middle, usually 2-4 spirate, sometime more than 4 spirate also, spirals pale yellow or less pigmented and loosely twisted.

Type Locality: India (Kashyap, 1915).

Ecology: Grows usually on moist and shady places, rarely on exposed rocks and soil covered rocks associated with other taxa.

Range: Endemic to India.

Distribution in India: Eastern Himalayas: West Bengal – Darjeeling; Western Himalayas: Bhowali, Kumaon, Mussoorie; Central India: Madhya Pradesh–Panchgani; South India: Karnataka - Bangalore; Mahabaleshwar; Nilgiri hills [Gudalur (Cherambadi), Mukhurthy National Park, Ootacamund (Pykara)], Palni hills (Kodaikanal).

Characteristics of Species: 1. Monoicous 2. Stem tuberous at the apex, 3. Spores 36.0-45.0 μm in diam., without distinct perispore and spines at the periphery, proximal face have minute broken lamellae, triradiate mark somewhat prominent, distal face lamellate, lamellae broken and irregularly arranged, hardly anastomosing to form a single reticulation, 4. Elaters well developed 2-4(-5) spirate, spirals loosely twisted.

Specimens examined:

* Hepaticae Selectae et Criticae edidit Verdoorn. Series VII(1934) cf. Ann. Bryologici vol.VII. 337 *Fossombronia himalayensis* Kash. ab auctore communicata India, Himalaya Occ. Mussoorie, ad rupes humosas, Skiophila, gregaria vel sporsa, ca. 2100m, leg. B.R. Vashist VII, 1932, Comm. et det. S.R. Kashyap.

South India- Tamil Nadu: Nilgiri Hills- Ootacamund (Pykara); ca 1900-2100m; 09.10.2000; S. C. Srivastava and Party; 12680/2000 (LWU). Gudulur (Cherambadi); ca 1100-1200 m; 29.09.2002; P.K.Verma and Afroz Alam; 16113/2002, 16117/2002, 16119/2002, 16120/2002, 16125/2002, 16127/2002 (LWU). On way to Mukhurthy National Park; ca. 2133-2250 m; 01.10.2002; P.K.Verma and Afroz Alam; 16234/2002 (LWU).

***Fossombronia foreau* Udar et S. C. Srivast.**

Fossombronia foreau Udar et S. C. Srivast., *Nova Hedwigia* 47: 463-468, (1973); S. C. Srivast. et Udar, *Nova Hedwigia*, 26: 811(1975).

Type Locality: India.

Sexuality: Monoicous.

Ecology: Plants grows on moist soils on rocks in pure growth or sometimes associated other species of *Fossombronia*.

Range: Endemic to India.

Distribution in India: South India: Tamil Nadu.

Characteristics of species: 1. Monoicous, 2. Leaves highly undulate, 3. Spores reticulate, spines and perispore inconspicuous or absent at the equator of the spore, 4. Elaters highly reduced sometimes bicelled.

Specimens examined:

South India: Tamil Nadu, ca. 2200-2300m, Date: 04.01.1966, Legit.: R. Udar & S.C. Srivastava; (CSIR No. 38F/66) (LWU).

***Fossombronia wondraczekii* (Corda) Dumort. ex. Lindenb.**

Fossombronia wondraczekii (Corda) Dumort. ex Lindenb. *Rec. d'Obs.* P.11 (1835); Srivastava et Udar, *Nova Hedwigia*, 26: 8-- (1975); *Fossombronia wondraczekii* (Corda) Dumort. ex Lindb.; Stotler et al, *The Bryologist* 106 (1): 130-142 (2003).

(Plate: 3, Figs.: 1-19)

Plants yellowish- green to green, growing on moist soils and exposed rocks. Stem 4-10mm long, dichotomously branched, often thickened towards the apex, dorsally flattened, ventrally convex with hyaline or light yellow dense rhizoids; internal cells of the stem parenchymatous, thin walled, larger towards periphery, smaller in the centre, sometimes containing mycorrhiza. Leaves simple, succubous, closely arranged towards the apex, margin highly undulate and irregularly lobed, each lobe with a mucilage papillae at the apex, unistratose throughout except the base where more than one cell thick, cells polygonal, thin walled, apical marginal cells 19.2-48 x 38.4-96.0 µm, sub marginal cells 24.0-48.0 x 33.6-67.2 µm and the basal marginal cells 19.2-28.8 x 57.6-115.2 µm, and the middle cells 38.4-67.2 x 48.0-172.8 µm. Pseudoperianth campanulate or inverted bell shaped, open on one side by means of the longitudinal incision up to the base; calyptra thin and delicate, generally thick at the base. Seta elongated, capsule spherical, blackish-brown dark brown on maturation, exserted, dehiscence irregular, capsule wall bistratose, cells of the outer layer thin walled and without any thickening band, cells of the inner layer in surface view with incomplete fibrous thickening bands. Spores dark brown, tetrahedral, 43.2-58.0 µm in diam., proximal face have many small, thick and high lamellae, triradiate mark is not prominent, distal face with high and thick, usually parallel lamellae, sometimes anastomosing to form 1-2 reticulations, with prominent perispore and conspicuous spines at the equator. Elaters 56.6-182.4 µm long, 8.16-15.84 µm broad in the middle, usually 2-3 (-4) spirate, yellowish brown, sometime branched, end obtuse, spirals deeply pigmented and compactly twisted.

Type Locality: Czechoslovakia - Near Prague (Schuster, 1992).

Range: India and widely distributed in Europe.

Ecology: Grows normally in dense patches on moist and exposed rocks and soil covered rocks along with other terrestrial mosses.

Distribution in India: Eastern Himalayas: West Bengal- Darjeeling. South India: Maharashtra: Mahabaleshwar; Tamil Nadu- Nilgiri Hills [Ootacamund (Dodabetta, Pykara water fall), Coonoor (Aruvankadu, on way to Kundah, on way to Love Dale, on way to Mettupalayam), Gudulur (Cherambadi, Pandalur, Yellamalai).

Characteristics of species: 1. Monoicous, 2. Plants small with tuberous apex, 3. Leaves convoluted and aggregated towards the apex, 4. Spores 43.2-58.0 μ in diameter, with well-developed perispore and spines, reticulation generally absent, rarely 1-2 in some spores, elaters robust and well developed, 2-3 spirate, spirals pigmented.

Specimens examined:

South India: Tamil Nadu- Nilgiri hills – Ootacamund (Dodabetta) ca. 2200-2600 m; 08.10.2000; Leg.: S.C.Srivastava and Party; 12442/2000 (LWU). Coonoor (On way to Kundah); ca. 2100m; 27.11.2002; Legit. P.K.Verma and Afroz Alam; 14404/2001, 14408/2001, 14410/2001, 14416-17/2001, 14423/2001, 14441/2001, 14443/2001 (LWU). Ootacamund (Pykara water fall); ca. 2100 m; 28.11.2002; Legit. P.K.Verma and Afroz Alam; 14472/2001, 14488/2001(LWU). Coonoor (On way to Love Dale); ca. 2000 m; 30.11.2001; Legit. P.K.Verma and Afroz Alam; 14597/2001, 14609/2001(LWU). On way to Mettupalayam; ca. 1600-1800m; 03.12.2001; P.K.Verma and Afroz Alam; 14774/2001, 14777/2001, 14788/2001(LWU). Aruvankadu; ca. 1900m; 03.12.2001; P.K.Verma and Afroz Alam; 14795/2001, 14798/2001, 14800/2001, 14800/2001, 14803/2001, 14810/2001, 14812/2001, (LWU). Gudulur (Pandalur); ca 1100-1200 m; 28.092002; P.K.Verma and Afroz Alam; 16058/2001(LWU). Cherambadi; 28.092002; P.K.Verma and Afroz Alam; 16077/2002, 16081/2002, 16086/2001(LWU). Yellamalai; ca. 1200m; 29.092002; P.K.Verma and Afroz Alam; 16119/2002 (LWU).

***Fossombronia cristula* Austin**

Fossombronia cristula Austin, *Proc. Phila. Acad. Sci.* 21 (1869); Srivastava *et* Udar, *Nova Hedwigia*, 26: 808 (1975).

(Plate: 4, Figs.: 1-18; Plate: 5, Figs.: 1, 2)

Plants 5.0- 7.0 mm long and 1.0-1.5 mm wide, green, dorsally flattened, ventrally convex with simple dense, purple rhizoids. Stem about 10-11 cells across diameter, 2-4 times dichotomously branched, branches upto 2-4 mm long, prostrate or somewhat ascending towards the apex, internal cells parenchymatous, thin walled, larger towards periphery, smaller in the middle usually containing fungal hyphae or mycorrhiza. Leaves simple, quadrate, succubous, more or less flat and obliquely inserted on the stem in two lateral rows, anterior margin decurrent and wavy, somewhat irregularly lobed, each lobe with mucilage papilla at the apex; unistratose except at the base, where more than one cell thick (2-3 cells), cells polygonal, thin walled, apical marginal cells 28.8-86.4 x 14.4-38.4 μ m, sub marginal cells 24.0-86.4 x 28.8-38.4 μ m, and the middle cells 38.4-106.4 x 19.2-57.6 μ m. Archegonia naked, pink, scattered on the dorsal surface of the stem, solitary near the base of the leaves, bracts not seen, sometimes along with antheridia near the apex. Pseudoperianth campanulate or inverted bell shaped, plicate, margins slightly undulate or wavy, usually open on one side by means of the longitudinal incision up to the base; calyptra delicate and thin, generally thick at the base; unistratose, cells thin walled. Sporophyte differentiated into foot, seta and capsule. Capsule spherical with a short seta, dark brown on maturation, exserted, dehiscence irregular by the separation of apical portion, capsule wall bistratose, cells of outer layer thin walled, angular, without thickening bands, cells of inner layer in surface view with well developed incomplete, or complete (semiannular) thickening bands. Spores dark brown to yellowish brown, 43.2-57.6 (60.48) μ m in diameter, proximal face with small broken lamellae, distal face with lamellae forming 5-7 reticulations (mesh), across diameter, perispore and spines very prominent,

12-21 (25) projecting at the equator (Srivastava, 1984). Elaters highly reduced and inadequately developed, 24-115.2µm long, 9.6-17.28 µm broad in the middle, usually arched, sometimes branched with annular or rarely unispiral thickening band, spirals less pigmented or pale yellow.

SEM of Spores: Spores under SEM shows distal face with thick, large and branched lamellae, forming mesh like reticulations (Plate- 5; Figs.: 1, 2).

Sexuality: Monoicous (Srivastava and Udar, 1975).

Type Loc.: United State of America - New Jersey (Batsto) (Srivastava and Udar, 1975, Udar and Srivastava, 1969).

Ecology: Grows in moist conditions, usually on wet and damp soil or soil covered rocks along with grasses, moss and other liverworts like *Cephaloziella* sp. etc.

Range: Asia: India, Japan, Taiwan; North America: United State of America (New Jersey, California, Texas) (Schuster, 1992).

Distribution in India: Eastern Himalayas: West Bengal- Darjeeling (Mangpoo). South India: Tamil Nadu- Palni hills: Kodaikanal, Nilgiri hills –[Coonoor (Bandishola), Gudulur (Cherambadi, Devala, Pandalur), Kotagiri, Ootacamund] (see also Srivastava and Udar, 1975a).

Characteristics of species: 1. Monoicous, 2. Leaves flat, slightly wavy at the margin, 3. Spores 43.2-57.6 (60.48) µm in diam. 5-6 (-7) meshes across, with well developed perispore, 12-20 spines prominently projecting at the equator, proximal face with small broken lamellae, 4. Elaters highly reduced and inadequately developed.

Specimens examined:

South India: Tamil Nadu: Nilgiri Hills- Gudulur (Devala); ca 1100-1200 m; 27.092002; P.K.Verma and Afroz Alam; 16014/2002, 16027/2002, 16031/2002, 16033/2002, 16034-37/2002 (LWU). Gudulur (Pandalur); ca 1100-1200 m; 27.092002; P.K.Verma and Afroz Alam; 16077/2002, 16081/2002, 16119/2002, 16120/2002, 16125/2002 (LWU). Gudulur (Cherambadi); ca 1100-1200 m; 29.092002; P.K.Verma and Afroz Alam; 16108 /2002 (LWU).

4. Discussion

Fossombronia pusilla (L.) Dumort. occurs at many sites in Nilgiri hills besides other parts of the world and has been worked out in detail. It is closely related to *F. himalayensis* and *F. wondraczekii* but differs significantly in sporoderm architecture (Srivastava and Udar, 1975; 1979). *Fossombronia himalayensis* Kashyap is very common in western Himalayas and at some places in Nilgiri hills. This species frequently forms tubers and some of the cells in the central region of the tubers contain fungal hyphae (Kashyap, 1915) but there is no definite mycorrhizal zone (Srivastava and Udar, 1975). This species is monoicous and resembles *F. lamellate* Steph., in the formation of tubers, but differs in sporoderm architecture. *Fossombronia wondraczekii* is widely distributed in India (in western Himalaya and South India; Nilgiri and Palni hills) and elsewhere (Srivastava and Udar, 1975). *Fossombronia cristula* was reported for the first time from the Indian subcontinent by Udar and Srivastava (1969). The plants of this species are largest among the Indian species of *Fossombronia*, and are remarkable in having highly reduced elaters and complete reticulation over the distal face of spores. In the present study this species has been collected from very few patches in Nilgiri hills, however, it was earlier reported to occur abundantly along the, hence has become rather rare in the region. *Fossombronia foreau* described in detail by Udar and Srivastava (1973) as new to science from Tamil Nadu, south India, after that it is never been collected from the locality in number of collections and presently it is not occurring in the region, therefore a short description is given in present work.

5. Acknowledgments

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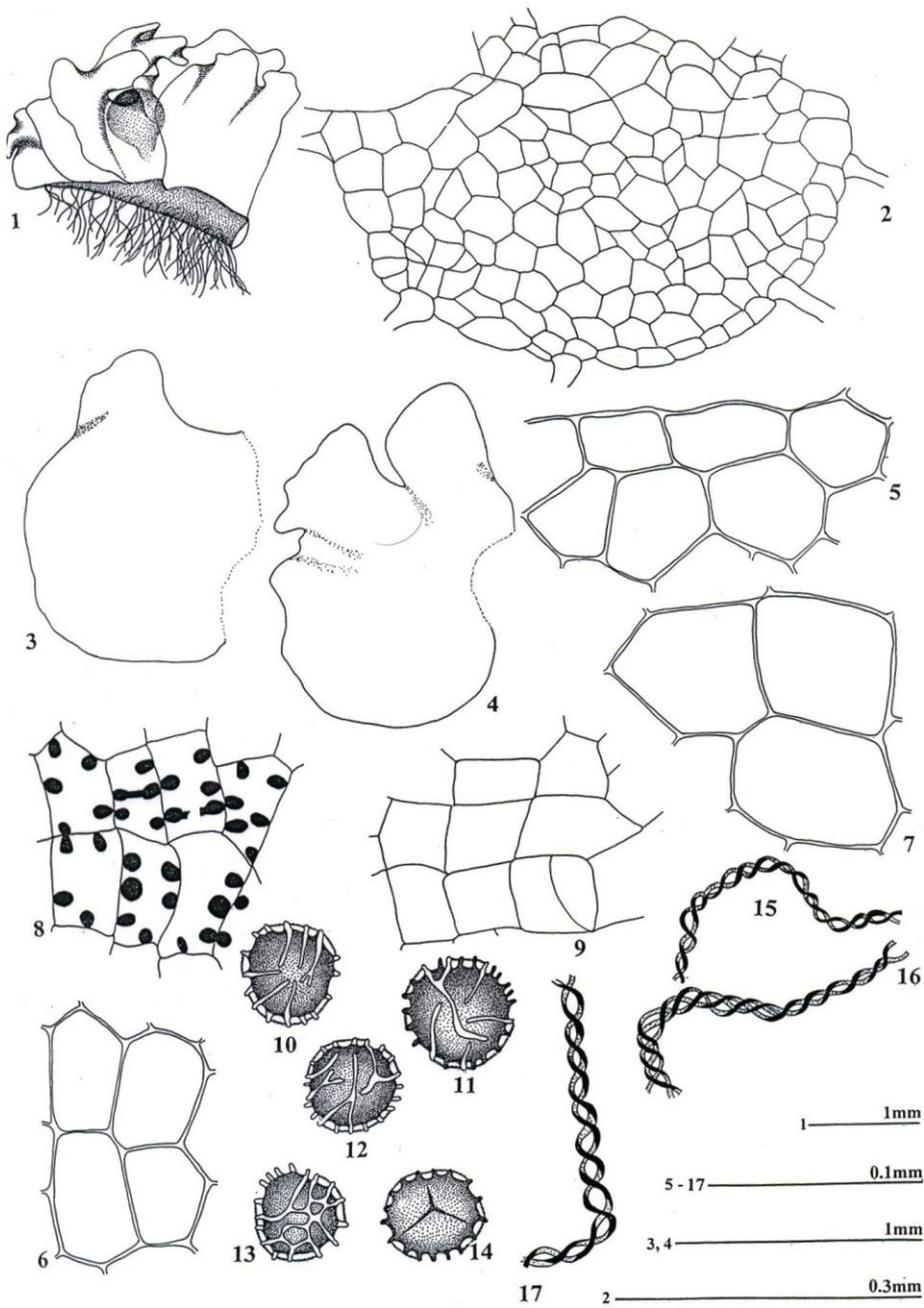


Plate: 1. *Fossombronina pusilla* (L.) Dumort., **Figs. 1-17.** 1. Female plant (dorsal view), 2. T.S. of axis, 3-4. Leaves, 5. Apical cells of leaf, 6. Median cells of leaf, 7. Basal cells of leaf, 8. Inner layer cells of capsule wall, 9. Outer layer cells of capsule wall, 10-13. Spores (distal view), 14. Spore (proximal view), 15-17. Elaters with annular bands. (Figures drawn from LWU- 16293/2002)

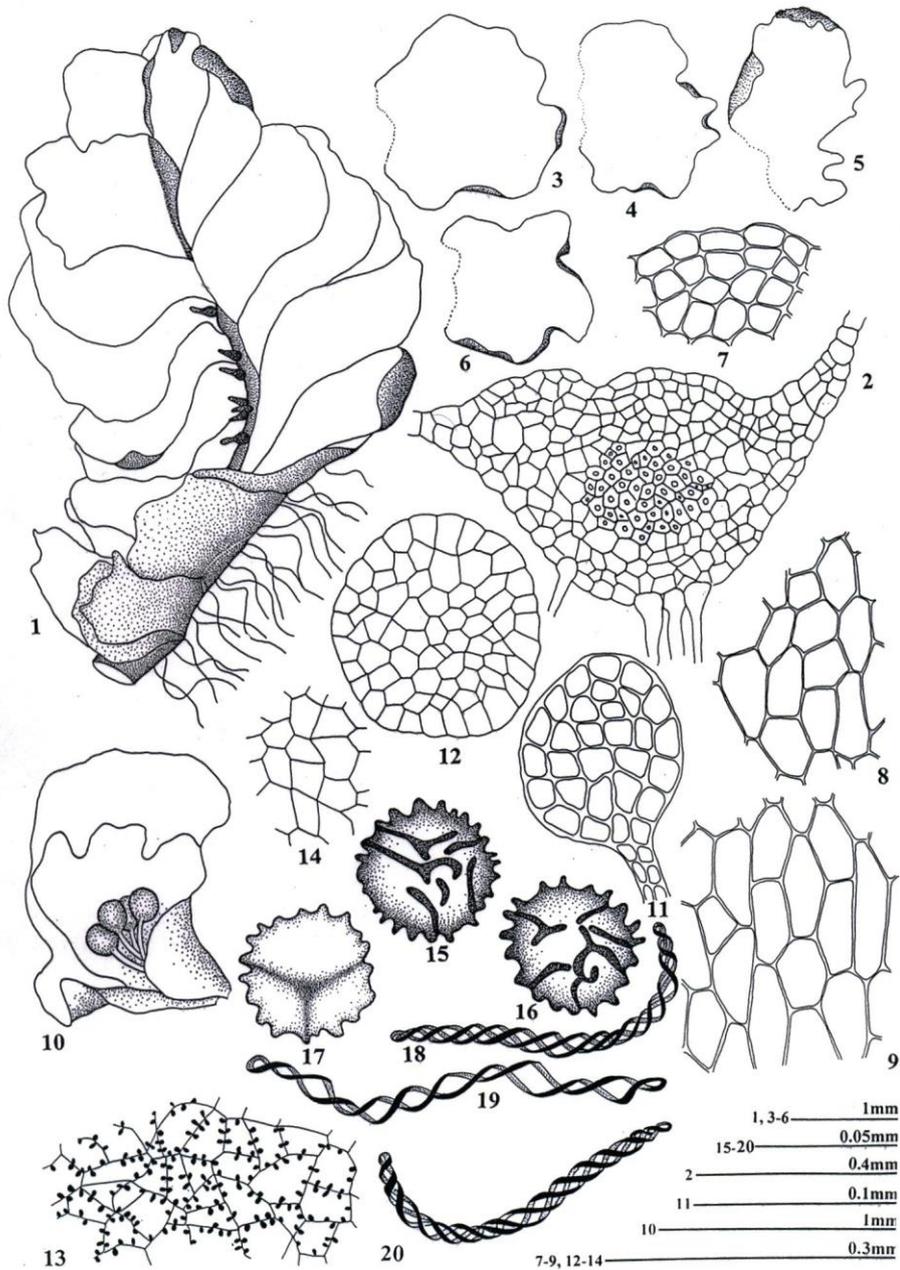


Plate: 2. *Fossombronia himalayensis* Kashyap, Figs. 1-20. 1. Plant (dorsal view), 2. T.S. of axis (showing mycorrhizal area), 3-6. Leaves, 7. Apical cells of leaf, 8. Median cells of leaf, 9. Basal cells of leaf, 10. Male bract with antheridia, 11. Antheridium (enlarged), 12. T. S. of seta, 13. Inner layer cells of capsule wall. 14. Outer layer cells of capsule wall, 15-16. Spores (distal view), 17. Spore (proximal view), 18. Elaters (trispirate), 19-20. Elaters (bispirate). (Figures drawn from LWU- 16127/2002).

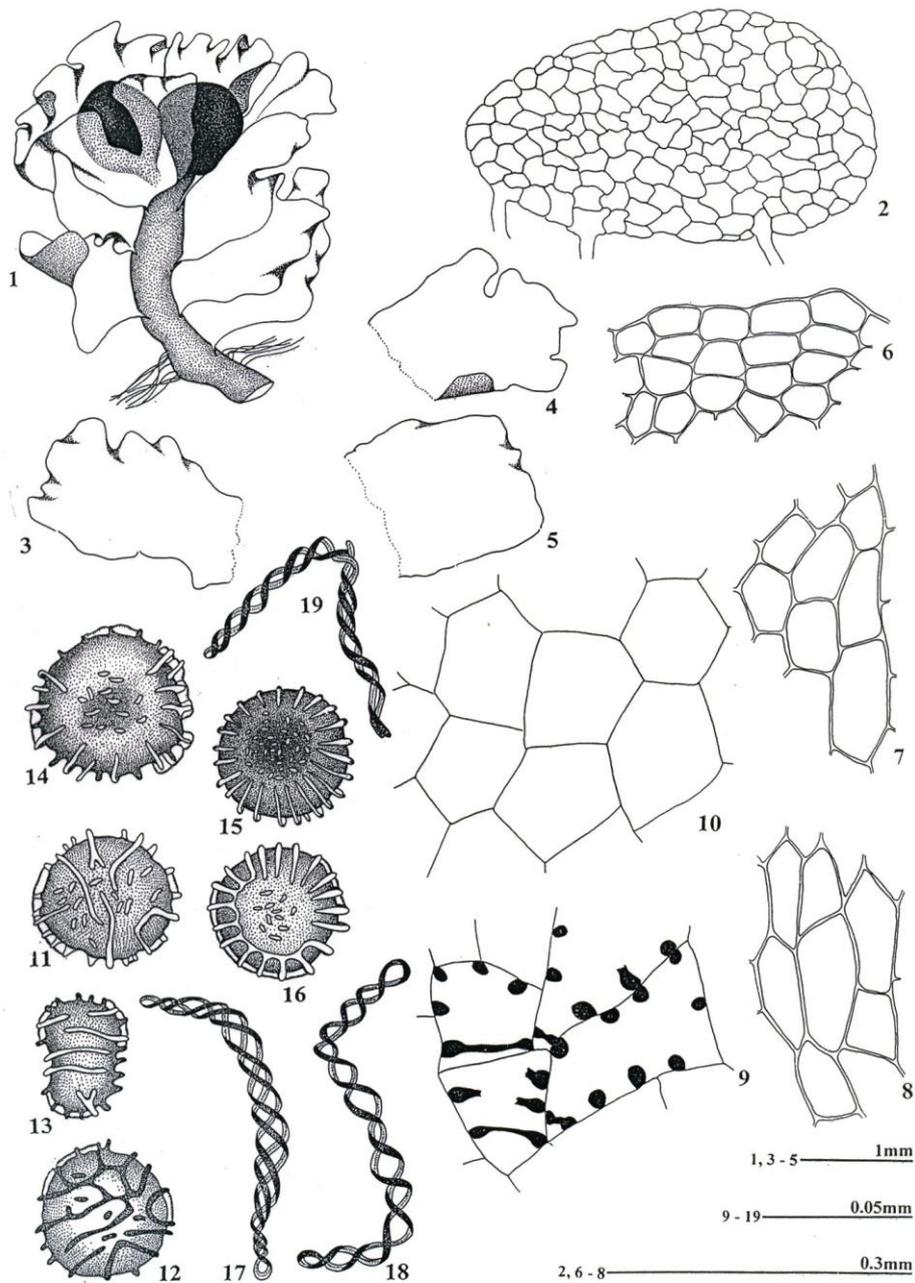


Plate: 3. *Fossombronia wondraczekii* (Corda) Dumort. ex Lindb., Figs. 1-19.: 1. Female Plant (dorsal view), 2. T.S. of axis, 3-5. Leaves, 6. Apical cells of leaf, 7. Median cells of leaf, 8. Basal cells of leaf, 9. Outer layer cells of capsule wall. 10. Inner layer cells of capsule wall, 11,12. Spores (Distal view), 13. Spores (lateral view) 14-16 Spores (Proximal view)., 17-19. Elaters with annular bands. (Figures drawn from LWU- 12442/2000).

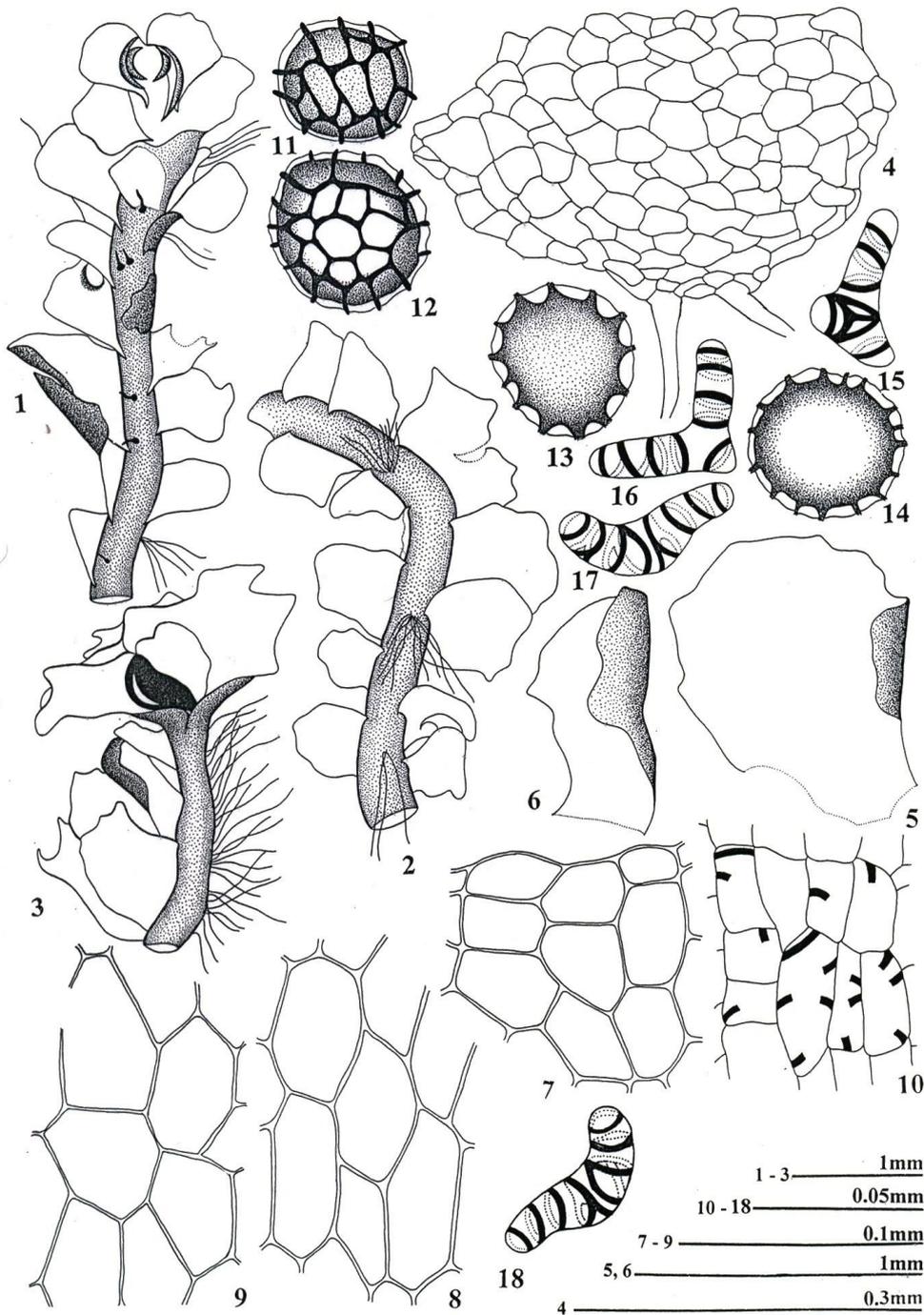


Plate: 4. *Fossombronia cristula* Austin, Figs. 1-18. 1. Female plant (dorsal view), 2. Plant (Ventral view) 3. Female plant, 4. T.S. of axis, 5-6. Leaves, 7. Apical cells of leaf, 8. Median cells of leaf, 9. Outer layer cells of capsule wall, 10. Inner layer cells of capsule wall. 11-12. Spores (Dorsal view), 13-14. Spores (Proximal view), 15-16 Branched elaters, 17,18. Elaters with annular bands. (Figures drawn from LWU- 16125/2002).

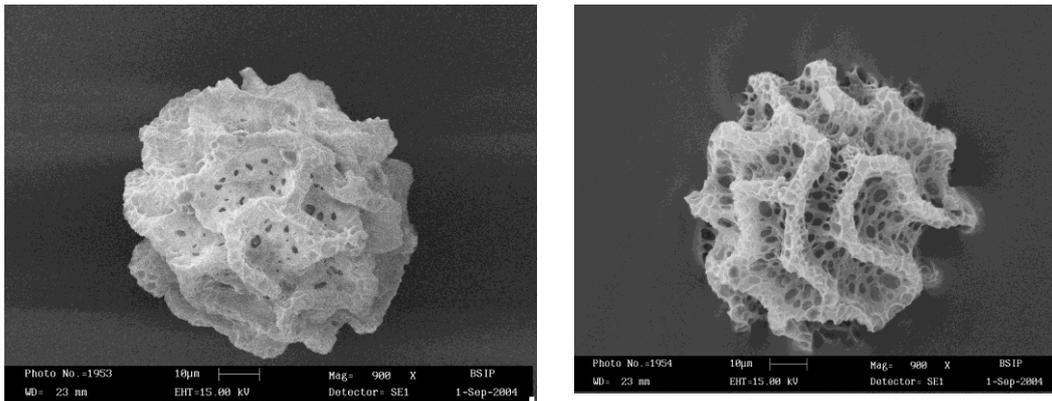


Plate- 5. Figs.: 1-2. 1. *Fossombronina cristula* (distal view), 2. *Fossombronina cristula* (proximal view).