# FAMILY CEPHALOZIELLACEAE IN SOUTH INDIA

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**Abstract**

The family Cephaloziellaceae is represented in South India by two genera, viz., *Cephaloziella* (Spruce) Schiffn. and *Cylindrocolea* Schust. It is significant that *Cephaloziella kiaerii* (Aust.) Arnell is the only species of the genus *Cephaloziella* occurring in Nilgiris, Palni hills and Western Ghats of South India, whereas *Cylindrocolea tagawae* (Kitag.) Schust. is the only species of the genus *Cylindrocolea* which is being recorded for the first time from this area. Both the taxa show trans-oceanic disjunct distribution in Palaeotropics.

## Introduction

In recent years considerable work has been carried out on Himalayan Cephaloziellaceae (Hattori, 1966; Kitagawa, 1969; Udar & Kumar, 1980, 1982, 1982a; Udar & Nath, 1976) and in the present state of our knowledge there are 7 species and 1 variety. The taxa of Central India and South India, however, have never been investigated adequately. Recently the authors made several collections from these territories which revealed that the number of the taxa of the genus *Cephaloziella* gradually decreases from Himalayas to Central and South India as only *C. herzogiana* (Pande & Srivastava) Udar & Kumar and *C. kiaerii* (Aust.) Arnell occur respectively in Central India and the vast South Indian territory. The genus *Cylindrocolea* has been recently discovered in Indian bryoflora from Shillong and so far only one species, viz., *C. reticulata* Udar & Kumar had been known (Udar & Kumar, 1982a). A second species *C. tagawae* (Kitag.) Schust., has been recorded and described by us with illustrations (Udar & Kumar, 1983) from Pachmarhi, Central India, which is new to the Indian bryoflora. The species has also recently been discovered in a recent collection from Kerala extending its present range of distribution within the country.

Our understanding of *Cephaloziella kiaerii* is incomplete and thus full taxonomic details have been provided in this paper. The extent of ecological variations noticed in the South Indian populations of *Cylindrocolea tegawae* have also been given in this paper

## Key to the South Indian taxa of the Family Cephaloziellaceae

1. Leaves inserted on stem not leaving a wide leaf-free gutter dorsally..... *Cephaloziella : C. kiaerii*
1. Leaves inserted on stem leaving a wide leaf-free gutter dorsally..... *Cylindrocolea : C. tagawae*

## Taxonomic Description

1. *Cephaloziella kiaerii* (Aust.) Arnell. *Bot. Not.* 319 (1952).

Syn. : *Cephalozia andreana* St., Spec. Hepat. 6; 434 (1924). *Cephaloziella willisana* (St.) Kitagawa. *J. Hattori bot. Lab.*, 32 : 295 (1939).

Text-Figs. 1-32

Plants delicate, prostrate, light green, sometimes brown, up to 15 mm long; stem 6-8 cells across, 55-90 μm in diameter, cortical and medullary regions indistinct, peripheral cells rather small, 5-13×7-13 μm, central cells larger, 7-15×7-18 μm, uniformly thin-walled ; branching abundant, ventral, flagelliferous branches present. Rhizoids few, scattered at basal part of stem on ventral surface, or on flagelliferous branch. Leaves distant to contiguous, spreading, normally subtransversely to rarely slightly obliquely inserted, 130-225 μm long, 120-210 μm broad, bifid, sinus descending up to 2/3 of leaf length, wide, acute, lobes subequal to unequal, acute-subacute, margin normally entire, cells at margin 7-12×4-10 μm, middle and basal cells 7-18×4-11 μm, walls slightly thick, surface smooth or verrucose. Oil-bodies 1-5 per cell of leaf, absent in few cells, spherical to ovoid, 2-4 μm in diameter, faintly segmented. Underleaves absent. Monoecious. Male inflorescence terminal to intercalary on main shoot or on branches, male bracts up to 7 pairs, closely arranged, enclosing single large antheridium, margin dentate, sometimes entire. Female inflorescence terminal on short, rarely on long, ventral branch, bracts 1-2 pairs with 1-2 bracteole, bifid, apex acute, margin dentate to denticulate, sinus descending up to 1/2 of their length, first pair of bracts and bracteole considerably larger than cauline leaves and fused with each other. Perianth cylindrical-fusiform (ovoid at younger stage) excerted beyond the female bracts, 0.6-1.5 mm long, 0.28-0.40 mm broad, 5(-6) plicate up to 3/4 of perianth length, apex narrowed, mouth cells considerably elongated, thick-walled, 31-55×5-9 μm, median cells 7-21×5-9 μm. Seta with 4 rows of smaller cells encircled by 4 rows of larger bulging cells, sometimes peripheral cells with chloroplasts. Capsule ovoid, bistratose; outer layer with subquadrate to elongated cells having 1-5 nodular thickenings on radial wall and 0-3 on transverse wall; inner layer with elongated cells having 0-6 nodular thickenings on radial and 0-2 on transverse wall, partially extended on inner tangential wall. Spores reddish brown, papillate-vermiculate, 7-11 μm in diameter. Elaters bispiral throughout, 150-210 (-260) μm long, 7-9 μm broad. Asexual reproduction occasionally by (1-) 2-celled gemmae.

*Specimens examined*—LWU 62/66, 66/66, 229/66, 1416/66, Loc.: Kodaikanal, alt. ca 1200 m, Date : January 1, 1966; LWU 345/72, 121 s/72, 122 s/72, 175 s/72, Loc.: Avalanche, alt. ca 2439 m, Date : January 2, 1972, Coll. : R. Udar & party. LWU 4651/81, 4685/81, 4686/81, Loc. : Mercara, alt. ca 700 m, Date : May 1, 1981, Coll. : D. Kumar, A. Kumar & U. S. Awasthi, LWU 5099/81, 5109/81, 5112/81, Loc. : Partabgarh near Mahabaleshwar, alt. .ca 1000 m, Date : September 27, 1981; LWU 5677/82, 5681/82, 5740/82, Loc. : Silent Valley at Palghat, alt. ca 1000 m, Date : September 23, 1982; LWU 5754/82, 5817/82, Loc. : Munnar, alt. ca 1800 m, Date : September 23, 1982; LWU 6005/82, Loc. : Lakkidi, alt. ca 712 m, Date : September 25, 1982; LWU 6044/82, 6084/82, Loc. : Vagavurrai, alt. ca 1907 m, Date : September 25, 1982. LWU 6479/82, Loc. : Ponmudi, alt. ca 1100 m, Date : October 2, 1982. Coll. : R. Udar & party. Det. : R. Udar & A. Kumar.

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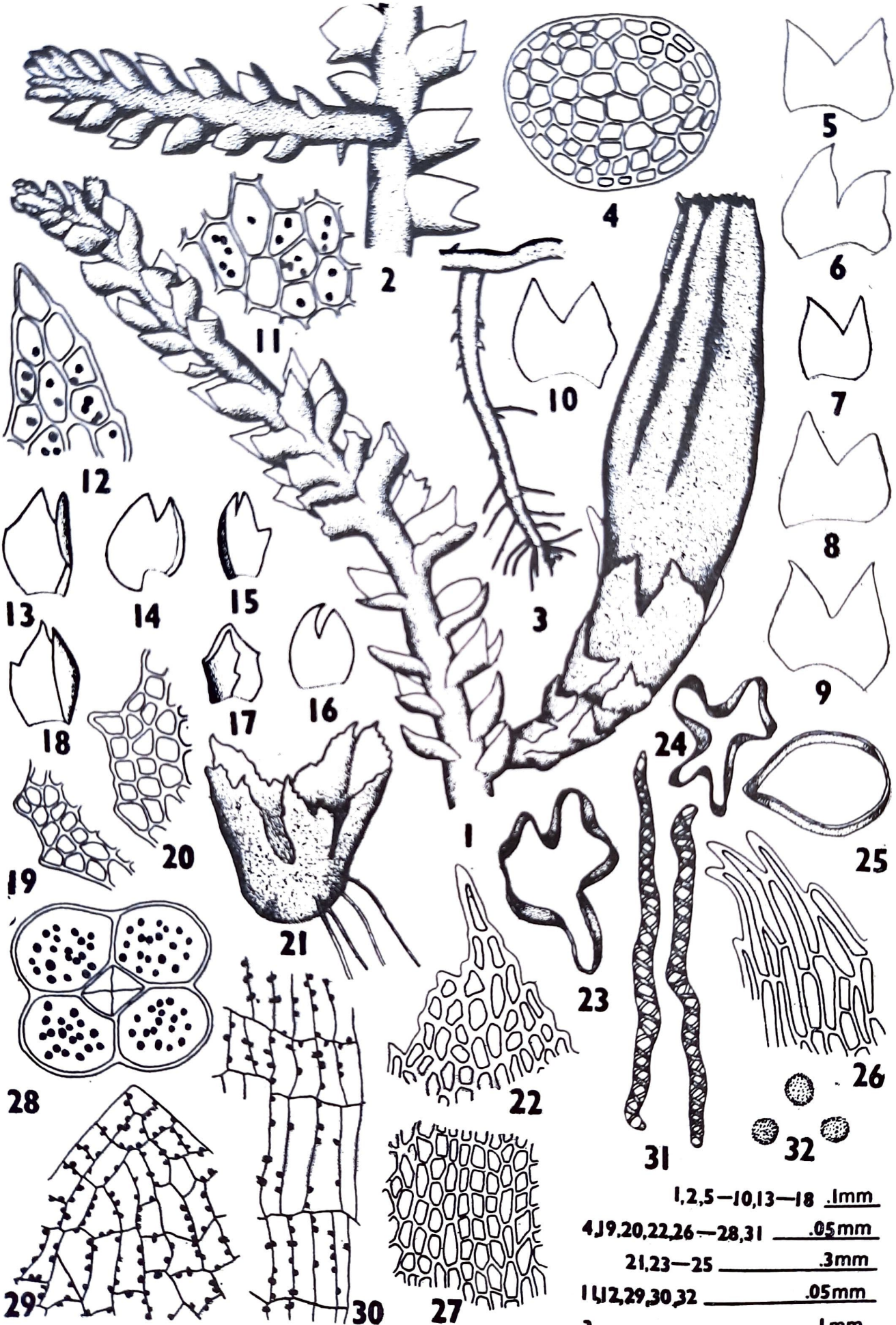
Text-figs. 1-32 —*Cephaloziella kiaerii* (Aust.) Arnell 1. A portion of monoecious plant with female inflorescence on short ventral branch and inercalary male inflorescence on main stem, 2. A portion of main stem with ventral branch, 3. A flagellum, 4. T. S. of main stem, 5-10. Leaves, 11, 12. Cells with oil-bodies, 13-18. Male bracts, 19, 20. Margins of male bracts, 21. A complete set of bracts and bracteole, 22. A portion of female bract, 23-25. T. S. of perianths at different level, 26. Cells at mouth of perianth, 27. Cells at middle region of perianth, 28. T. S. of young seta showing chloroplasts in peripheral cells, 29. Outer layer fo capsule wall, 30. Inner layer of capsule wall, 31. Elaters, 32. Spores.




Text-Figs. 1-32.

*Habitat*—*C. kiaerii* grows in association of *Anthoceros* sp., *Asterella* sp., *Cyathodium aureonitens* (Mitt.) Schiffn., *Fossombronia* sp., *Jungermannia* c.f. *Pfleidereri* Amak. & Vana, *J. tetragona* Lindenb., *J. truncta* Nees and *Radula* sp. or occasionally in pure population on moist soil surface at road sides.

*Range*—Africa, Ceylon, China, India (Partabgarh near Mahabaleshwar in Maharashtra; Mercara in Karnataka; Avalanche, Kodaikanal, Madura (Stephani, 1924) in Tamil Nadu ; Lakkidi, Munnar, Ponmudi, Silent Valley at Palghat, Vagavurrai in Kerala), Java, Malaya, New Caledonia, Thailand.

*Other specimens examined*—*Cephaloziella willisana* (St.) Kitag. M. T. & N. K. T. 1919, Loc. : Mr. Phu Luang, alt. 1500 m, Thailand, Det. : Kitagawa.

The Indian plants are variable in texture, leaf insertion and in shape of perianth. The plants are basically delicate more so when growing in association with other bryophytes, but those growing in pure population are rather robust. The leaves show malleability in their insertion as they may be subtransverse to oblique. Besides, the shape of perianth also varies according to its maturity. The mature perianth is cylindrical and considerably exserted beyond the female bracts (Text-fig. 1) but younger populations show ovoid perianths only partly exserted. The asexual reproduction by 2-celled gemmae, commonly found in Thailand plants (Kitagawa, 1969), are rare in the Indian populations.

2. *Cylindrocolea tagawae* (Kitag.) Schust., Nova Hedwigia 22: 174 (1971). *Proc. Indian Acad. Sci* (*Plant Sci.*), 92 : 1-4 (1983).

Udar and Kumar (1983) reported this plant from Pachmarhi, Madhya Pradesh, as a new record in the Indian bryoflora. The plants did not show the presence of androecial branches possibly due to paucity of adequate material. Also the plants were somewhat a: typical in having ovate-oblong perianth and lesser contracted mouth. The South Indian plants are more robust, with far more pronounced dorsi-ventrality of the flat axis. They are clearly monoecious. The male inflorescence, being terminal or intercalary, has up to 6 pairs of male bracts which are more or less similar to vegetative leaves, and the perianth occurs on a separate branch of the axis and conforms to the Isotype in being oblong with considerably contracted mouth.

*Specimen examined*—LWU 6485/85, Loc. : Kerala, Ponmudi alt. ca. 1100 m, Date : October 2, 1982, Coll. : R. Udar & party, Det. : R. Udar & A. Kumar.

*Habitat*—*C. tagawae* grows in association with *Jackiella ceylanica* Schiffn. ex St. and male plants of a *Jungermannia* sp. over shady and moist soil surface at road sides.

*Range*—India (Pachmarhi, Madhya Pradesh; Ponmudi, Kerala), Thailand.

*Other specimen examined*—Isotype : *Cephaloziella tagawae* Kitag. M. T. & N. K. T. 1433, Loc. : Mt. Phu Luang, alt. ca 1100 m, Thailand, Det. : Kitagawa.

## Acknowledgements

We are grateful to Dr. N. Kitagawa for sending the authentic specimens relevant to our work and to the Department of Science and Technology (SERC), Government of India for financial assistance.

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