



Rediscovery of two *Pyxine* (Physciaceae) species from the Western Ghats

The lichen genus *Pyxine* was established by Elias Fries in 1825 and it is a prominent member of the family Physciaceae (Nayaka *et al.*, 2013). The genus *Pyxine* is mainly pantropical to subtropical with several species extending into temperate or oceanic regions, and comprises ca. 65 species (Elix, 2009). Index Fungorum (www.indexfungorum.org) holds a total of 162 records for *Pyxine*, which include 96 species and several infra-specific taxa. However, many taxa in that list need validation (e.g., *P. consocians* Vain. is mentioned as synonym of *P. subcinerea* Stirt.) (Nayaka *et al.*, 2013). In India, the genus harbors about 26 species, of which 10 are recorded for Kerala (Awasthi, 2007). *Pyxine* is characterized by dorsiventral, appressed, foliose thalli with linear radiating lobes, anatomically heteromerous, paraplectenchymatous upper cortex, white or yellow medulla, fibrous lower cortex, laminal apothecia with thalline or pseudothalline margin, epithecium K+ violet-purple, dark brown hypothecium, generally two-celled, mischoblastiomorphic brown spores, and simple paraphyses. This genus shows close affinity with *Dirinaria* (Tuck.) E.G. Clem., but can clearly be distinguished by the absence of rhizines (placodioid condition), persistent thalline margin of apothecium, K- epithecium and the medullary chemistry. Molecular phylogenetic studies have shown that there is a close relationship between these two genera but they are clearly separated as distinct lineages (Helms *et al.*, 2003). *Pyxine* is also related to the two crustose genera *Buellia* De Not. and *Rinodina* (Arc.) Gray based on the dark brown hypothecium and brown septate spores, and is likely to have evolved from them by an elaboration and modification of the thallus (Awasthi, 1980). A detailed account on the general morphology of the thallus and apothecia of *Pyxine* had been published by Malme (1897)

and Stirton (1898), and further notable contributions also have been made by Imshaug (1957), and Swinscow & Krog (1975 a & b). In the latter, considerable stress has been laid on the lichen products (lichexanthone, lichen acids, terpenes, etc.) and their use in the delimitation of the species. Kashiwadani (1977 a, b, c) has studied the Japanese and New Guinea taxa of *Pyxine*. All these accounts helped much in the identification and phytogeography of the Indian taxa.

During recent explorations to Idukki and Thrissur districts in Kerala, *Pyxine austroindica* and *P. keralensis* were collected. These two endemic and little known species had previously been known from single gatherings. *Pyxine austroindica* was first collected from Quilon (Kollam) in 1953 by O. A. Hoeg and *P. keralensis* was collected by K. P. Singh in 1973 from Piravam Road, Ernakulam. The present collections therefore represent a rediscovery of these species, from other than the type localities, after a gap of 53 and 33 years, respectively.

Pyxine austroindica D. D. Awasthi,
 Phytomorphology 30: 364. 1980.
 (Fig. 1)

Thallus corticolous, to 2–3 cm across, glaucous grey to yellowish grey, closely appressed to substratum; **lobes** compact in central part and discrete at periphery, 0.5–1.0 mm wide, slightly convex in older parts and plane in younger parts, faintly diffused pruinose in apical region; **maculae** laminal and marginal, linear, later fissured to become pseudocyphellae; lower side black with short, black rhizines. **Thallus** isidiate; isidia laminal, dense, short, simple, nodular to clavate, apically brown-black. Thallus 200–240 µm thick, upper cortex 26–30 µm thick, paraplectenchymatous; algal stratum 30–34 µm thick, **alga** green, cells 7–9 µm in size; **medulla** yellow to yellowish orange in upper part and white in lower part; lower cortex

prosoplectenchymatous, rhizinate, rhizines short, black. **Apothecia** not seen. Thallus K+ yellow, UV- (lichexanthone absent); medulla K-, C-, P-. TLC: slight trace of atranorin and a terpene (purplish spot at Rf class 6).

Pyxine austroindica and *P. physciaeformis* (Malme) Imshaug are close to each other, but the latter is distinguished by the presence of lichexanthone (cortex UV+ yellow) (Awasthi, 2007).

Specimen examined: INDIA. Kerala, Idukki: Anchurly, Periyar Tiger Reserve, Thekkadi, 23 Mar 2006, H. Biju 06-008381 (LWG, TBGT 366).



Figure 1: *Pyxine austroindica*

Distribution and Ecology: The species is endemic to India. It is associated with some crustose lichens viz. *Chiodecton leptosporum* Müll. Arg., *Cryptothecia lunulata* (Zahlbr.) Makhija & Patw., *Porina interstes* (Nyl.) Harm., and *Strigula smaragdula* Fr., few foliose lichens, e.g. *Candelaria concolor* (Dicks.) Stein, *Coccocarpia palmicola* (Spreng.) Arv. & D. J. Galloway, *Heterodermia diademata* (Taylor) Awasthi, *Heterodermia boryi* (Fée) Kr. P. Singh & S.R. Singh, *Parmotrema hababianum* (Gyeln.) Hale & *Physcia dimidiata* (Arn.) Nyl., and a few fruticose lichens *Ramalina conduplicans* Vain. and *Ramalina nervulosa* (Müll. Arg.) Abbayes.

Pyxine keralensis D. D. Awasthi,
Phytomorphology, 30: 372. 1980.

Pyxine isidiolenta R.W. Rogers, *Australian Journal of Botany*, 34: 142. 1986. (Fig. 2)

Thallus corticolous, ca. 1–2 cm across, loosely appressed to substratum, yellowish to pale grey; lobes linear, discrete to imbricate, 0.5–1.0 mm wide, plane, smooth, epruinose; **maculae** faint or absent; **pseudocyphellae** present in the axils of lobes; lower side brown black with short rhizines. Thallus isidiate; isidia mostly laminal, slender, cylindrical, simple to rarely branched, 0.2–0.4 mm long and 45–90 µm thick. **Thallus** ca. 140 µm thick, upper cortex paraplectenchymatous, 25–30 µm thick; **algal** cells green in 20–35 µm thick stratum; medulla pale yellow; medullary hyphae thickened in the subalgal zone; lower cortex short rhizinate, 10–18 µm thick. **Apothecia** not seen. Thallus K-, UV- (lichexanthone absent). TLC: Traces of atranorin, and terpenes (purplish spot at Rf class 7 and yellowish spot at Rf class 4–5).

Pyxine keralensis is closely allied to *P. cylindrica* Kashiw. as indicated by its filiform isidia, but the latter has laminal maculae and norstictic acid in the medulla (Awasthi, 2007).

Specimen examined: INDIA. Kerala, Thrissur: Vazhachal Range, alt. 300 m, 27 Sep 2006, H. Biju 06-008391 (LWG, TBGT 1044).

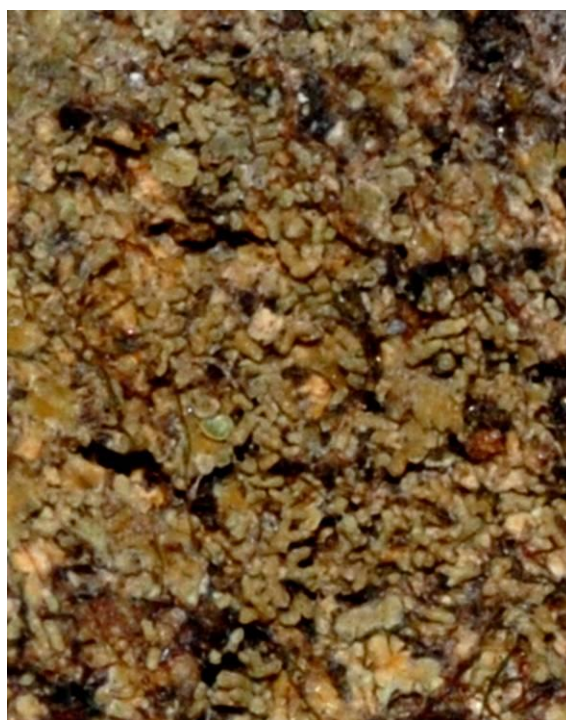


Figure 2: *Pyxine keralensis*

Distribution and Ecology: The species is endemic to Kerala. It is associated with some crustose lichens viz. *Chiodecton leptosporum*, *Cryptothecia dissimilis* Makhija & Patw., *C. nilghiriensis* Patw. & Makhija, *Pertusaria punctata* Nyl. and *Thelotrema kamatii* (Patw. & C.R. Kulk.) Hale and two squamulose lichens, e.g., *Phyllopsora corallina* (Eschw.) Müll. Arg. and *P. parvifolia* (Pers.) Müll. Arg. at an altitude of 300 m.

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