Lichen genus *Pyrenula* from India

V. *Pyrenula approximans* spore type

With one Figure and one Plate

**Summary**

Six species of the genus *Pyrenula* having *P. approximans* type of spores are described. Except *P. nodulata* (STIRTON) ZAHLBR., all the five species are new records for Indian lichen flora. *P. subacutalis* UPRETI, is described as a new species.

**Introduction**

In course of taxonomic enumeration of genus *Pyrenula* from India, the author has communicated three papers, each dealing with a group of species possessing one, out of seven spore types found in the genus. Thus, the present communication, the fourth in series, concerns the taxa of *Pyrenula* that are characterized by *P. approximans* type of spores. In this type of spores, the middle chambers are lens shaped or almost spherical. The apical chambers are more or less longitudinally oriented rendering the spore wall thin at apices or even causing it to protrude a little, producing papillate condition (Fig. 1.7a, b; Plate, Fig. 7).

So far only one species i.e. *P. kurzii* SINGH et UPRETI, pertaining to this group of spores has been reported from India (SINGH and UPRETI 1987). A key for identification of all the species belonging to this group of taxa is provided, which is based on the author’s own investigations of specimens or as the protologues of species, that have not been available for study. The chemotaxonomy does not figure in this treatment as no lichen substance was detected by TLC and microcrystallography in any of the species.

**Key to species**

1a. Thallus pseudocyphellate ........................................ (1) *P. circumfinens* VAINIO
1b. Thallus not pseudocyphellate ........................................ 2
2a. Spores 6-locular ......................................................... *P. bicuspidata* MUELL. ARG.
2b. Spores 4-locular ......................................................... 3
3a. Ascus 4-spored ........................................................... *P. subpraehelicata* MUELL. ARG.
3b. Ascus 8-spored ........................................................... 4
4a. Ascosporcs columellate ................................................ *P. finitima* MUELL. ARG.
4b. Ascosporcs not columellate ........................................... 5
5a. Centrum with oil globules ........................................ 6
5b. Centrum without oil globules ................................ 11
6a. Spores 30–60 μm long ........................................ (3) P. kurzii SINGH et UPRETI
6b. Spores up to 28 μm long ........................................ 7
7a. Centrum I– .......................................................... 8
7b. Centrum I+ blue or blue green ................................. 10
8a. Oil globules present only at apex, near ostiole of centrum  P. actualis R. C. HARRIS
8b. Oil globules present from apex to base of the centrum ...... 9
9a. Ascocarps always naked, hypothallus like a black border line P. marsalenensis VAINIO
9b. Ascocarps mostly covered with corticiform layer of thallus, hypothallus indistinct ........................................
10a. Thallus UV–, spores citriformis (2) P. citriformis R. C. HARRIS
10b. Thallus UV+, pores oblong-ellipsoid .......................... P. pseudobufonia R. C. HARRIS
11a. Centrum I– .......................................................... 8
11b. Centrum I+ .......................................................... 12
12a. Peridium spreading laterally ................................. (5) P. oxysporiza (MUELL. AGR.) ZAHLBR.
12b. Peridium not spreading laterally .............................. 13
13a. Ascocarps always naked .............................. P. approximans (KREMPELH.) MUELL. ARG.
13b. Ascocarps covered with corticiform layer of thallus ...... 14
14a. Thallus yellow-brown, ascocarps 0.3–0.5 mm in diam., spores 25–29 × 9–11 μm ... (4) P. nodulata (STIRTON) ZAHLBR.
14b. Thallus white, ascocarps 0.5–0.8 mm in diam., spores 15–19 × 9–11 μm .......... P. plittii R. C. HARRIS

Description of the species


Fig. 1.1., 1.7a; Plate, Fig. 1

Thallus greenish grey-glaucescent, slightly verruculose, pseudocyphellate, shining, hypothallus indistinct.

Ascocarps solitary, 0.25–0.35 mm in diam., 250–400 μm high, hemispherical, completely embedded in thallus or area around ostioles black, shining; ostioles indistinct; peridium globose, not spreading laterally; centrum I–, with oil globules; ascus cylindrical, 8-spored, 95–110 × 15–18 μm; spores uniseriate-irregularly arranged, brown, 4-locular, ellipsoid, 15–25 × 7–10 μm.

Remarks: It is the only taxon under this spore type, having pseudocyphellate thallus and completely embedded ascocarps. In embedded condition of ascocarp, this taxon is close to P. nodulata, but the latter species has centrum without oil globules and with abundant colourless crystals in peridium.

Specimen examined: India; Assam, no precise locality, G. Watt s.n. (BM?).


Fig. 1.2., 1.7b; Plate, Fig. 2

Thallus endophloedal, brownish yellow-brown, smooth, not pseudocyphellate, hypothallus indistinct.

Ascocarps solitary, 0.8–1.0 mm in diam., 300–450 μm high, conical-hemispherical, nacked, dull black; ostioles plain, whitish; peridium slightly laterally spreading, conical, very thin or indistinct at base; centrum I+ blue, with abundant oil globules; ascus 8-spored, 80–100 × 15–18 μm; spores uni or biseriate, brown, 4-locular, oblong-oval (citriform), 16–22 × 6–9 μm.

Remarks: HARRIS (1989) distinguished this taxon from other related species as “Pyrenula citriformis” belongs in the same group as P.
D. K. Upreti, Lichen genus *Pyrenula*

**Figs. 1, 2, 3, 4, 6**

**Fig. 5**

**Fig. 7**

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V.S. ascocarp: 1 - *P. circuminfers* Vainio; 2 - *P. citriformis* Harris; 3 - *P. kurzii* Singh et Upreti; 4 - *P. nodulata* (Stirton) Zahlbr.; 5 - *P. oxyspora* (Muell. Arg.) Zahlbr.; 6 - *P. subacutalis* Upreti

Spores - *P. approximans* type: 7a - oblong-ellipsoid, 7b - citriform

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*pseudobufonia* R. C. Harris, *P. cocoae* Muell. Arg. and *P. plitzii* Harris. The variation in ascospores between them is very slight ... ... Their recognition as species is supported by differences in distribution ... ... As far as I know *P. citriformis* is a coastal plain endemic from New Jersey South". Similarly our specimen has also reported from coastal regions of Kerala and the anatomical and morphological characters very well resemble with *P. citriformis*.

Specimen examined: Kerala, Idukki district, Myladumpara, Govt. Cardamum farm.
indistinct, plain; peridium convex-conical, with abundant colourless crystals, not spreading laterally; centrum I-, without oil globules; asci clavate, 8-spored, 85 - 105 x 20 - 24 μm; spores uni or biseriate in ascus, brown, 4-locular, oblong-ellipsoid to sometimes citriform, 25 - 29 x 10 - 12 μm.

Remarks: The taxon is close to *P. plittii* HARRIS but the latter species has white thallus somewhat bigger (0.5 - 0.8 mm) ascocarps and smaller (15 - 19 x 9 - 11 μm) spores. The spore shape of *P. nodulata* is sometimes citriform more or less similar to *P. citriforis* but the centrum in the latter species has oil globules and I+ blue reaction.

Specimen examined: India: Assam, (no precise locality), G. Watt. s.n. (BM).


Fig. 1.5, 1.7a; Plate, Figs. 5, 7

Thallus endophloedal, grey to dark brown, smooth, not pseudocyphellate, hypothallus indistinct.

Ascocarps solitary, or 2 - 3 aggregated, 0.6 - 1.5 mm (2.0 mm) in diameter, 500 - 750 μm high; depressed conical-convex, covered with corticiform layer of thallus, dull black; ostioles indistinct; peridium spreading laterally, conical, thin or indistinct at base; centrum I-, without oil globules; asci clavate-cylindrical, 8-spored, 60 - 100 x 12 - 15 μm; spores uni-biseriate in ascus, brown, 4-locular, oblong-ellipsoid, 25 - 30 x 7 - 10 μm.

Remarks: *P. oxysporizna* is close to *P. approximans* (KREMPELH.) MUELL. ARG., but the latter has smaller ascocarps measuring 0.4 - 0.6 mm in diam. and are not laterally spreading.

Specimen examined: Arunachal Pradesh: West Kameng, Tipi Rest House, 530 m, on bark, 17. 4. 1982, SINGH 1088 (CAL); Kerala, Idukki district, Myladumpara, Govt. Cardamum Farm, alt. 1050 m, on bark, 1. 3. 1984, UPRETI L87123 (LWG).

*P. kurzii* A. SINGH et UPRETI, Geophytology, 17 (1): 81. 1987. Type: India; South Andaman Island, Mt. Harriot, Kurz 4143 (CAL!).

Fig. 1.3, 1.7a; Plate, Figs. 3, 7

Thallus epiphloedal, yellowish brown, areolate-verruculose, shining, not pseudocyphellate, hypothallus indistinct.

Ascocarps solitary, 0.6 - 1.0 mm in diam., 300 - 500 μm high, globose-hemispherical, covered with corticiform layer of thallus, dull black; ostioles indistinct to slightly umbonate; peridium globose, slightly spreading laterally; centrum I-, with abundant oil globules; asci clavate-cylindrical, 8-spored, 60 - 100 x 12 - 15 μm; spores uni-biseriate in ascus, brown, 4-locular, oblong-ellipsoid, 25 - 30 x 7 - 10 μm.

Remarks: In the type material (Kurz 4143 CAL) of *P. kurzii*, SINGH et UPRETI described the spore size as 35 - 50 x 13 - 18 μm. The two specimens described under this taxon, have spore size ranging from 25 - 30 x 7 - 10 μm but the areolate-verruculose thallus, covered ascocarps, globose peridium, I- reaction of centrum with abundant oil globules, are characters, very much similar to *P. kurzii*.

Specimen examined: Kerala, Idukki district, Myladumpara, Govt. Cardamum Farm, 1050 m, on bark, 1. 3. 1984, UPRETI L87142 (LWG); Orissa, Ganjam district, Berhampur University Campus, near Guest house, on bark of *Grewia* tree, 1. 3. 1986, AWASTHI et al. 86-042 (LWU).


Fig. 1.4., 1.7a, b; Plate, Figs. 4, 7

Thallus endophloedal, yellow to brown, smooth, not pseudocyphellate, hypothallus like a black border line.

Ascocarps solitary, 0.3 - 0.5 mm in diam., 200 - 400 μm high, convex-immersed, only a small, dull black area around ostiole emerging, covered with corticiform layer of thallus; ostiole indistinct, plain; peridium convex-conical, with abundant colourless crystals, not spreading laterally; centrum I-, without oil globules; asci clavate, 8-spored, 85 - 105 x 20 - 24 μm; spores uni or biseriate in ascus, brown, 4-locular, oblong-ellipsoid to sometimes citriform, 25 - 29 x 10 - 12 μm.

Remarks: The taxon is close to *P. plittii* HARRIS but the latter species has white thallus somewhat bigger (0.5 - 0.8 mm) ascocarps and smaller (15 - 19 x 9 - 11 μm) spores. The spore shape of *P. nodulata* is sometimes citriform more or less similar to *P. citriforis* but the centrum in the latter species has oil globules and I+ blue reaction.

Specimen examined: India: Assam, (no precise locality), G. Watt. s.n. (BM).


Fig. 1.5, 1.7a; Plate, Figs. 5, 7

Thallus endophloedal, grey to dark brown, smooth, not pseudocyphellate, hypothallus indistinct.

Ascocarps solitary, or 2 - 3 aggregated, 0.6 - 1.5 mm (2.0 mm) in diameter, 500 - 750 μm high; depressed conical-convex, covered with corticiform layer of thallus, dull black; ostioles indistinct; peridium spreading laterally, conical, thin or indistinct at base; centrum I-, without oil globules; asci cylindrical, 8-spored, 90 - 130 x 12 - 16 μm; spores uniseriate in ascus, brown, 4-locular, oblong-ellipsoid, 20 - 25 x 9 - 11 μm.

Remarks: *P. oxysporiza* is close to *P. approximans* (KREMPELH.) MUELL. ARG., but the latter has smaller ascocarps measuring 0.4 - 0.6 mm in diam. and are not laterally spreading.

Specimen examined: Arunachal Pradesh: West Kameng, Tipi Rest House, 530 m, on bark, 17. 4. 1982, SINGH 1088 (CAL); Kerala, Idukki district; Myladumpara, Govt. Cardamum Farm, alt. 1050 m, on bark, 1. 3. 1984, UPRETI L87123 (LWG).

Extra Indian specimen examined: Australia, Trinity bay, North Queensland, leg? s.n.(G).
6. *P. subacutalis* **UPRETI** sp. nov.

Thallus endophloeoed, radio-fuscous-lutescenti-fuscens, laevigatus. Ascocarps 0.5–0.8 mm diam., depressoconical vel semiglobose, thallo obductas, peridium anguloso-productum; centrum oleoso-inspersus, I—, asci subcylindri, 8-spori, sporae oblong-ellipsoideae, vel citri formae, 17–22 μm longae, 7–10 μm crassae.

Hojotype: India; Goa, Mollem, Forest Guest House, on *Croton* bark, 15. 3. 1983. SINGH and **UPRETI** L11422 (LWG)

Fig. 1.6., 1.17a; Plate, Figs. 6, 7

Thallus endophloeoal, dull brown to dark brown, smooth, not pseudocyphellate, hypothallus indistinct.

Ascocarps solitary or 2–3 aggregated, 0.5–0.8 mm in diam., 300–350 μm high, depressed conical to semiglobose, covered with corticiform layer of thallus, sometimes area around ostioles naked and shining; ostioles indistinct to slightly depressed, whitish; peridium conical, laterally spreading; centrum I—, with abundant oil globules; asci clavate, 8-spored, 80–110 x 12–16 μm; spores mostly biseriate in ascus, brown, 4-locular, oblong-ellisipoie, 17–22 x 7–10 μm.

Remarks: The new taxon is close to *P. acutah* R. C. **HARRIS**, in ascocarp and spore shape and size, I— reaction and presence of oil globules in centrum, but the latter species has oil globules at apex near ostioles and centrum uninspersed below. *P. approximans* (KREMPHEL) **MUELL. ARG.** also resembles *P. subacutalis* in size and shape of ascocarps but the centrum in *P. approximans* not inspersed with oil globules.

Additional specimens examined: Goa, Valpoi, Joradey Forest, on bark of small bushes, 13. 3. 1983, SINGH and **UPRETI** L11409/A (LWG), Valpoi Forest Guest House, on bark of small bushes, 14. 3. 1983, SINGH and **UPRETI** L11417 (LWG); Mollem, Forest Guest House, on bark of *Croton*, 15. 3. 1983, SINGH and **UPRETI** L11421, L11423 (LWG); Karnataka, Jog Falls, alt. 570 m, on bark, 19. 3. 1983, **UPRETI** L11484 (LWG); Orissa, Ganjam district; foot hill of Mahendragiri, Burukhat area, on bark, 4. 3. 1986, AWASTHI et al. 86–193 (LWU).

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References


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