

# Taxonomic Notes on Pyrenocarpous Lichens in Japan (3). *Pyrenula concatervans* (Nyl.) R. C. Harris (Pyrenulaceae) New for Japan

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**Abstract** *Pyrenula concatervans* (Nyl.) R. C. Harris (lichenized Ascomycota, Melanommatales, Pyrenulaceae) is reported as new for Japan. It was collected on the trunk of an evergreen hardwood, *Daphniphyllum teijsmanii* in the warm temperate zone, Chiba-ken, central Japan. It is typical of this species by having a brownish crustose thallus, UV-, with white dots, well-developed chondroid cortex, solitary perithecioid ascomata with apical ostioles, black perithecial walls with colorless crystals, hymenium lacking oil droplets and I & KI+ reddish, ascospores 8/ascus, 20-32 × 10-15 μm, brown, parallel 4-loculate, with central locules in side view rhomboid, with endlocules in side view triangular with a side facing spore apex, distoseptate, having an indistinct brownish euseptum in each distoseptum, and overmatured degenerating ascospores having red locules. A description and figures are provided on the basis of the Japanese material.

**Key words:** lichens, lichenized Ascomycota, Melanommatales, Pyrenulaceae, *Pyrenula*, Taxonomy, Japan.

*Pyrenula* A. Massal. is a pyrenocarpous crustose lichen genus growing on bark of trees, distributed mainly in the tropics. In Japan, this genus has so far been investigated in a limited extent with records of 16 species (Asahina, 1931; Kashiwadani, 1989; Kurokawa, 1955; Kurokawa and Nakanishi, 1971; Sato, 1964). During the course of my taxonomic study on pyrenocarpous lichens in Japan, however, another species of *Pyrenula* was recently found among specimens collected in Chiba-ken on the Pacific side of Honshu, central Japan. As the result of my examination in detail, it was identified as *Pyrenula concatervans* (Nyl.) R. C. Harris in Tucker & R. C. Harris which has not been reported from Japan previously. In this paper, taxonomic notes are made for this species, with a description, figures etc. on the basis of the Japanese material.

## Materials and Methods

Description of external morphology is based on air-dried material observed under a dissecting stereoscope. Sections were made with a razor blade under the stereoscope,

mounted in lactophenol cotton-blue (LPCB), and used for anatomical description under microscope (Nikon optiphot UW) except for the color description which was based on the GAW (glycerol : ethanol : water = 1 : 1 : 1) preparations. For observing asci in more detail, sections of perithecia were mounted in Congo Red and gently squashed. The I and KI tests were made on sections of perithecia by using a diluted Lugol's solution and 10% aqueous solution of KOH. The UV test was conducted for the intact air-dried specimen with the Spectroline EN-140 I/J (Spectronics Corp.). Specimen used in this study is deposited in the herbarium of Natural History Museum and Institute, Chiba (CBM).

## Taxonomy

*Pyrenula concatervans* (Nyl.) R. C. Harris  
in Tucker & R. C. Harris  
(Figs. 1 & 2)

*Pyrenula concatervans* (Nyl.) R. C. Harris in Tucker and R. C. Harris, *Bryologist* 83: 15 (1980). = *Verrucaria concatervans* Nyl., *Lichenes Japoniae*: 109 (1890).

*External morphology.* Thallus epiphloeodal,

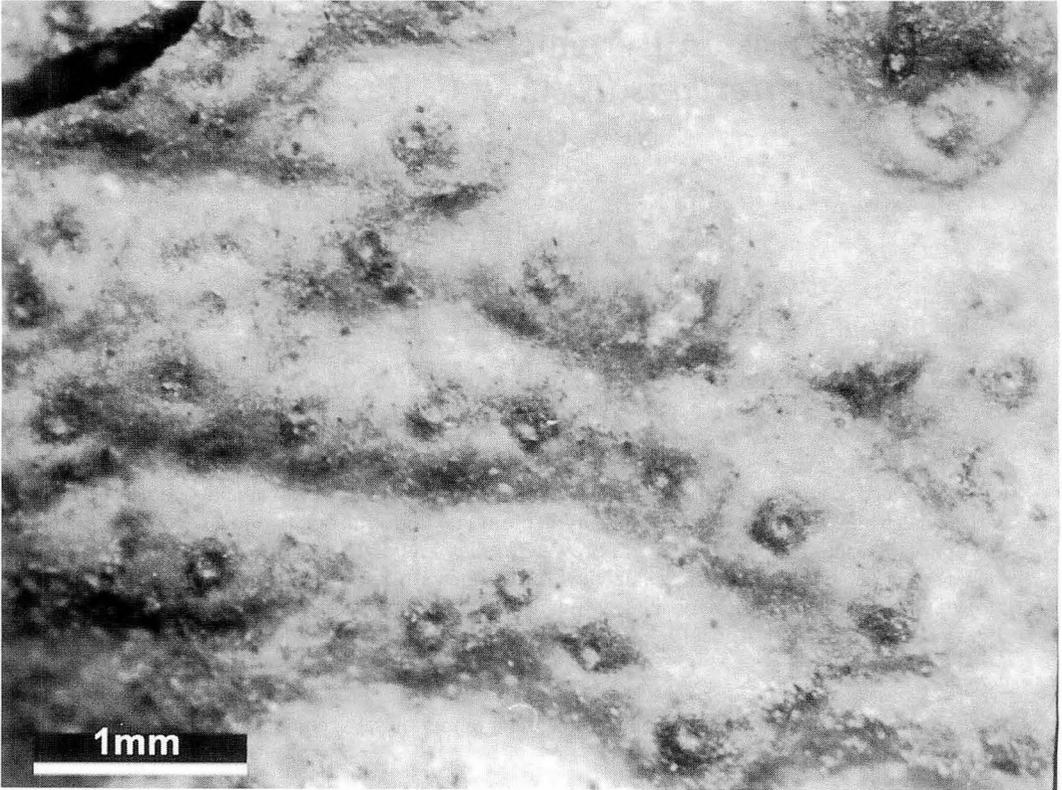


Fig. 1. Habit of *Pyrenula concatervans*. (Kawana 98082306; air-dried material)

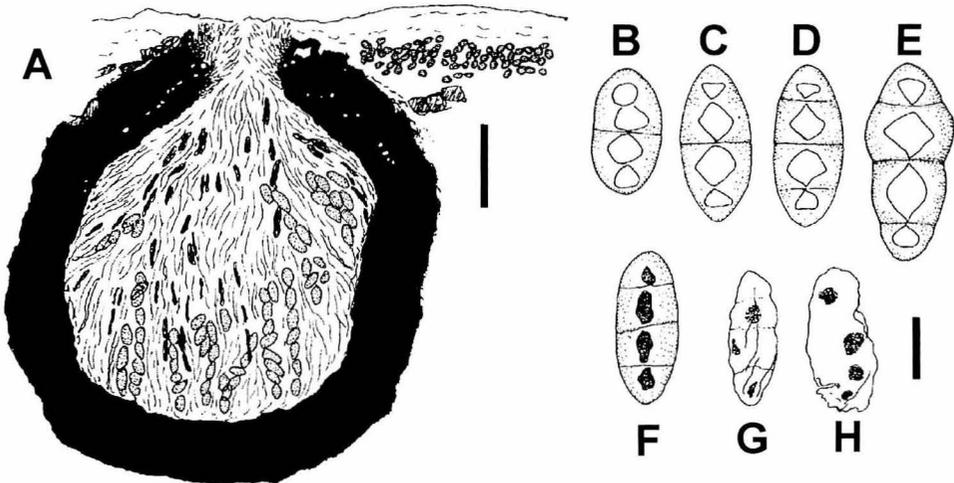


Fig. 2. Anatomy of *Pyrenula concatervans*. A, vertical section of perithecium; B-E, mature ascospores; F-H, overmatured ascospores. (A-H, Kawana 98082306). Scales: A, 100  $\mu$ m; B-H, 10  $\mu$ m.

crustose, following surface of substratum, smooth, uncracked or slightly cracked, grayish brown, somewhat glossy or almost dull,

epruinose, with whitish dots (mostly 0.01-0.015 mm diam., scattered,  $\pm$  indistinct), lacking a prominent hypothallus. Perithecia

abundant, first solitary, but later  $\pm$ crowded, immersed in flat thallus or in verrucae (first solitary and 0.6–0.9 mm diam., becoming aggregated), simple, with blackish top (0.2–0.4 mm diam., almost flat or slightly convex) depressed at apical ostioles (usually pale and semipellucid, sometimes whitish, ca. 0.1 mm diam.). Pycnidia not seen.

*Anatomy.* Cortex prominent, usually 20–50  $\mu$ m thick, colorless, chondroid. Phycobiont *Trentepohlia*  $\pm$  in chains in medulla. Perithecia subglobose, 400–700  $\mu$ m high  $\times$  350–600  $\mu$ m wide. Perithecial wall almost even in thickness, 40–100  $\mu$ m thick, black, with colorless crystals (distinct only in thin sections),  $\pm$  with fragments of substratal bark, lacking distinct clypeus. Periphyses not prominent, mostly unbranched, 10–15  $\mu$ m long. Hymenium lacking oil-droplets, I & KI+ reddish in parts; paraphyses unbranched, septate, tapering towards apices, ca. 1.5  $\mu$ m diam. Asci cylindrical or clavate, 70–105  $\times$  ca. 15  $\mu$ m, with well developed tholus and narrow cylindrical ocular chamber. Ascospores 8/ascus, oval or ellipsoidal, 20–32  $\times$  10–15  $\mu$ m, brown, parallel 4-loculate, distoseptate, having indistinct brownish euseptum in each distoseptum,  $\pm$  constricted at septa, lacking epispore; central locules in side view rhomboid or somewhat roundish; end locules in side view triangular with a side facing spore apex or roundish, much smaller than central locules; overmatured degenerating ascospores reddish brown for outer walls and eusepta, with red locules.

*Distribution.* Pantropical; Chiba-ken on the Pacific side of Honshu, central Japan. —New for Japan.

*Habitat and Ecology.* Corticolous. —The only known specimen from Japan was collected on trunk of evergreen hardwood, *Daphniphyllum teijsmannii* Zoll. ex Kurz in the precinct of a shrine in the warm temperate zone.

*Remarks.* *Pyrenula concatervans* (Nyl.) R. C. Harris is characterized by the following characters (Aptroot *et al.*, 1997; Harris, 1989, 1995): thallus greenish to brownish, UV–, with prominent cortex, with whitish dots; ascوماتа with apical ostiole, simple; ascospores transversely septate only, 4- or 6-loculate, ellipsoidal or fusiform, lacking ap-

pendages, over 21  $\mu$ m long, overmatured ascospores having red contents. The specimen from Japan in question is typical of this species by having these diagnostic characters.

According to Harris (1989), ascospores of *Pyrenula concatervans* are variable, “either predominantly 4-celled or predominantly 6-celled, in 6-celled forms several cells may be divided lengthwise.” He also noted, in his joint paper (Tucker and Harris, 1980), that the 6-celled form is uncommon in North America. In the Japanese material of this species, ascospores are constantly 4-loculate.

*Pyrenula concatervans* is a distinct species by reddish contents in overmatured ascospores (Tucker and Harris, 1980). In the ascospores when just overmature, unidentified red pigments are homogeneously present in the lumina, suggesting its soluble condition (Fig. 2A). Red pigmented portions may persist even after septa of the ascospores have disappeared (Fig. 2H). It is not clear whether they are enveloped by a membrane. In this species, in addition, outer walls and eusepta become reddish when the ascospores are overmatured.

*Specimen examined.* JAPAN. Honshu. Chiba-ken. Awa-gun, Kyonan-machi, Iwaifukuro, Sengen Shrine, 50 m elev., on trunk of *Daphniphyllum teijsmannii*, T. Kawana 98082306 (CBM-FL-11914).

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日本産被果地衣類分類ノート (3).  
日本新産の *Pyrenula concatervans*  
(Nyl.) R. C. Harris in Tucker &  
R. C. Harris

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サネゴケ科の *Pyrenula concatervans* (Nyl.) R. C. Harris in Tucker & R. C. Harris を日本新産として報告する。産地は千葉県南部で、ヒメユズリハの樹幹に着生していたもの。問題の標本は、以下のとおり本種の典型的な特徴を示す：痂状の地衣体は褐色で、UV-，白点を散布し、皮層がよく発達する；被子器は単一で、孔口は頂生；被子器壁は黒色で無色の結晶を含む；子囊層は油滴を欠き、I (および KI) + 赤；子囊胞子は 1 子囊中 8 個，20-32×10-15 μm，褐色で、通常 4 室，中央の 2 室は側面観が幅広い菱形で、両端の 2 室はこれらより明らかに小さく、側面観が三角形で一辺が胞子頂端を向く；隔壁は distoseptate で内部に褐色の euseptum を生ずる；子囊胞子が古くなると室内に赤色々素を含む。