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Thelenella luridella (Lichenized Ascomycota, Thelenellaceae), Newly Found in Japan

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Abstract *Thelenella luridella* (Nyl.) Mayrh. is reported as new for Japan, as the first member of this genus. It was found on seaside rocks in the splash zone in Miyagi-ken, northern Honshu, and on Haha-jima Island of the Ogasawara Islands. It has been previously known mainly from the tropics and subtropics in the world, and this is the first record in eastern Asia. A description and figures are provided for *T. luridella* on the basis of the Japanese materials.

Key words: lichens, lichenized Ascomycota, Thelenellaceae, *Thelenella luridella*, taxonomy, distribution, Japan, Ogasawara Islands, saxicolous, maritime.

The lichen genus *Thelenella* Nyl. of Thelenellaceae is characterized by a crustose thallus with well-developed epinecral layer, perithecioid ascomata, bitunicate and non-amyloid asci, submuriform to muriform, thin-walled ascospores, branched and net-like "paraphyses", "periphysoids", Trebouxioid green algae as phycobiont, and pycnidia of the *Roccella*-type (in the sense of Vobis, 1980) with filiform pycnoconidia (Mayrhofer, 1987). This genus is represented by 17 species, which are saxicolous, corticolous or foliicolous, and are distributed mainly in the tropics to subtropics (Mayrhofer, 1987). In Japan, *Thelenella* has not been recorded; however, three specimens of this genus were recently collected during my field trips to northern Honshu for a taxonomical and ecological study on maritime lichens in Japan. Careful examination in detail has revealed that all the specimens belong to *T. luridella* (Nyl.) Mayrh. In addition, a single specimen of this species was found among the lichen collection from the Ogasawara Islands, south of Tokyo. In this paper, it is reported as new for Japan, and descriptions and figures are provided on the basis of these Japanese materials.

Materials and Methods

Descriptions of external morphology are based on air-dried material observed under a dissecting stereomicroscope. Sections were made with a razor blade under a dissecting stereoscope, mounted in lactophenol cotton-blue (LPCB), and used for anatomical description except for the color description which was based on the GAW (glycerol : ethanol : water = 1 : 1 : 1) preparations. For observing ascus, ascospores, conidia, and conidiophores in more detail, sections of apothecia or pycnidia were mounted in 10% aqueous solution of KOH, squashed gently, and the mounting medium was replaced by water, ethanol, and finally LPCB. These LPCB preparations were used for the line drawings. The I and KI tests were conducted on sections of apothecia by using a diluted Lugol's solution and/or 10% aqueous solution of KOH. Specimens used in this study are deposited in the herbarium of Natural History Museum and Institute, Chiba (CBM).

Thelenella luridella (Nyl.) Mayrh.

(Figs. 1–4)

Thelenella luridella (Nyl.) Mayrh., Bibliotheca Lichenologica 26: 45 (1987). =*Verrucaria luridella* Nyl., Mém. Soc. Acad. Maine Loire 4: 41 (1858). =*Polyblastia luridella* (Nyl.) Vain., Acta Soc. Fauna Fl. Fenn. 7(2): 217 (1890). =*Microglaena luridella* (Nyl.) Zahlbr., Cat. Lich. Univ. 1: 192 (1921).

External Morphology. Thallus epilithic, gray to gray-brown, smooth, ±glossy, continuous or ±rimulose, thin, lacking prominent hypothallus. Perithecia immersed in

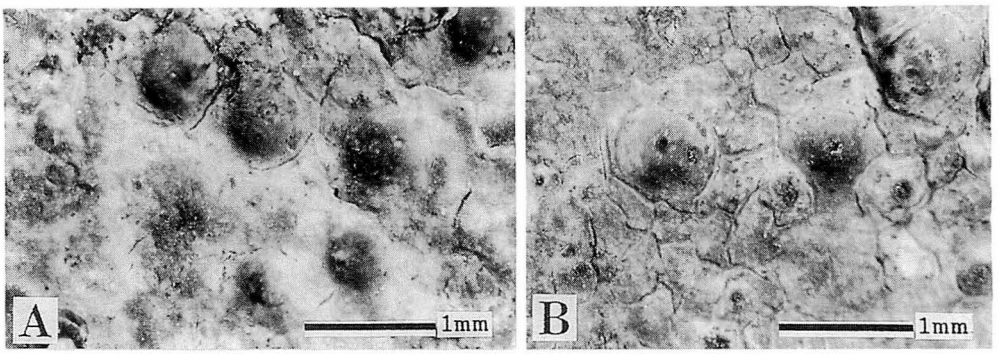

Fig. 1. Habit of *Thelenella luridella*. A, perithecia with rather indistinct ostioles; B, perithecia with prominent black ostioles. (A, Harada 17638; B, Harada 17545).

thalline warts; the warts 0.3–0.7 mm across, usually with 1 (rarely 2) perithecium, dome-shaped or almost hemispherical, sometimes conical, ±darker than surrounding thallus, dark brownish gray around ostioles and ±in the upper parts, ±round at the apices, ± depressed at ±black round ostioles (or with ±fissured margins). Pycnidia immersed in thalline warts; the warts resembling those with perithecia, 0.3–0.5 mm across, ±conical or dome-shaped.

Anatomy. Thallus I−, KI−, mostly composed of spherical hyphae (ca. 5 μm diam., or ±oblong), partly of linear hyphae especially in basal parts; phycobiont of Trebouxioid green algae mostly 7–10 μm diam., usually in clusters; epinecral layer well-developed, ca. 20 μm thick, colorless, composed of horizontally flattened hyphal remnants. Perithecia widely oval to widely obpyriform, 350–400 μm high, 400–450 μm wide, lacking involucrellum; exciple usually grayish to brownish in the upper parts, hyaline below, ca.30 μm thick in sides, ca. 50 μm thick at base; subhymenium ±concave above, 20–30 μm thick at base. Hymenium 250–280 μm high×300–320 μm wide, I−, KI− (hym. gelatin, asci and ascospores I−, KI−). Pseudoparaphyses branched and anastomosing, even in thickness (ca. 1 μm). Asci clavate, fissitunicate; endotunica universally thick, lacking prominent ocular chamber. Ascospores (24–) 30–45 (–49) × 11–21 μm, ellipsoidal to oval, colorless, muriform, lacking perispore. Pycnidia of *Roccella*-type usually unilocular (sometimes semi-plurilocular and tending to be cerebriform) with ellipsoidal to oval cavity, ±greyish around ostioles, colorless below; pycnoconidia filiform, hyaline, ± curved, falcate or sigmoid, (15–)20–25(–30) μm long, ca. 0.5 μm wide.

Distribution. Asia (Japan, India, Socotra Islands), Africa, C & S America, New Zealand (Mayrhofer, 1987); Ogasawara Islands and northern Japan (Miyagi-ken on the Pacific side of Honshu). —All the localities known before this study are situated between the Tropic of Cancer and the Tropic of Capricorn, with a single exception at ca. 45°S from New Zealand (Mayrhofer, 1987). The known distribution range of this species extends north to ca. 39°N, at this time.

Habitat. On ±vertical faces of rocks at sheltered sites in the splash zone. —All the previous reports of this species are based on saxicolous materials (Mayrhofer, 1987), and this seems to be the first report of its occurrence in the splash zone.

Remarks. Among saxicolous species of the genus *Thelenella*, the present species is characterized by (1) perithecia immersed in dome-shaped to hemispherical thalline warts, (2) ascospores muriform, colorless, narrow (<21 μm), ellipsoidal to oval, (3) perithecia jacking prominent involucrellum, (4) medulla I−, and (5) pycnidia with filiform conidia (15–23 μm long).

In this time, a description and figure of pycnidia is provided at the first time for *Thelenella luridella*. Pycnidia of this species are fundamentally the same in external morphology and anatomy as those of *Thelenella* described by Mayrhofer (1987): pycnidia immersed in thallus, with dark-pigmented pun-

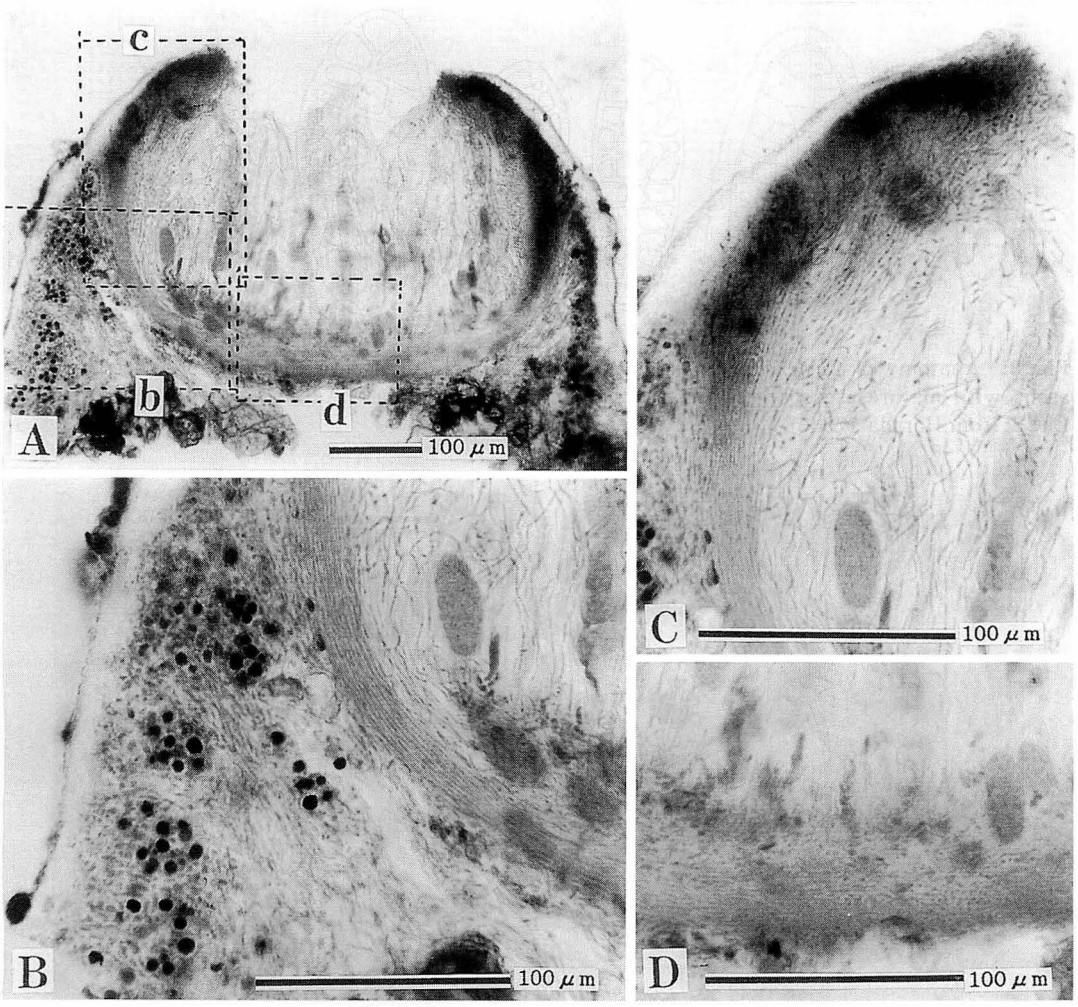

Fig. 2. Vertical section of perithecium in *Thelenella luridella*. A, the whole view of perithecium in thalline wart; B, perithecium at base and surrounding thallus, showing well-developed epinecral layer; C, perithecial walls in the upper part and hymenium, showing hamathecium in a network connected to the lateral and upper parts of exciple; D, exciple at base. (A–D, from a single section in LPCB, from Harada 17545; the rectangulars b, c and d in A correspond to the areas shown by B, C and D, respectively).

ctiform ostioles, unilocular, oval, belonging to the *Roccella*-type in the sense of Vobis (1980); conidia filiform, slightly curved, acrogenous on relatively long conidiogenous cells. However, some pycnidia of the Japanese materials tend to be plurilocular and slightly cerebriform as shown in Fig. 4.

In *Thelenella luridella*, the hyphae between asci are branched and anastomosing to form a network (Fig. 2C). It suggests that the hamathecium belongs to either pseudoparaphyses or paraphysoids rather than paraphyses. A figure (Abb. 51) in Mayrhofer (1987) indicates the hamathecium originated above the asci, so that it should be considered as pseudoparaphyses by definition (Eriksson, 1981). In addition, the hyphae of the hamathecium near the ostiole are indistinguishable from the remainder hamathecium (Fig. 2C), thus those should be considered as pseudoparaphyses, too.

Among pyrenocarpous lichens known from Japan, this species most resembles some species of *Porina* and *Strigula aquatica* H.

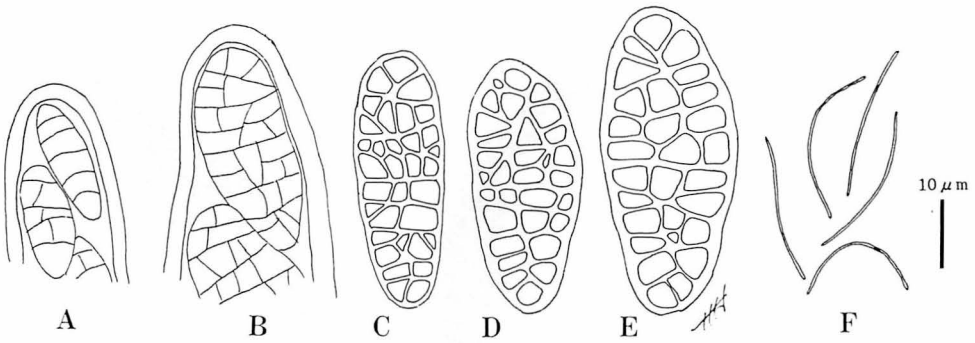

Fig. 3. Anatomy of *Thelenella luridella*. A–B, tips of asci (A, ascus with premature ascospores; B, ascus with mature ascospores); C–E, ascospores; F, pycnoconidia. (A–F, squashed preparations in LPCB, from Harada 17545).

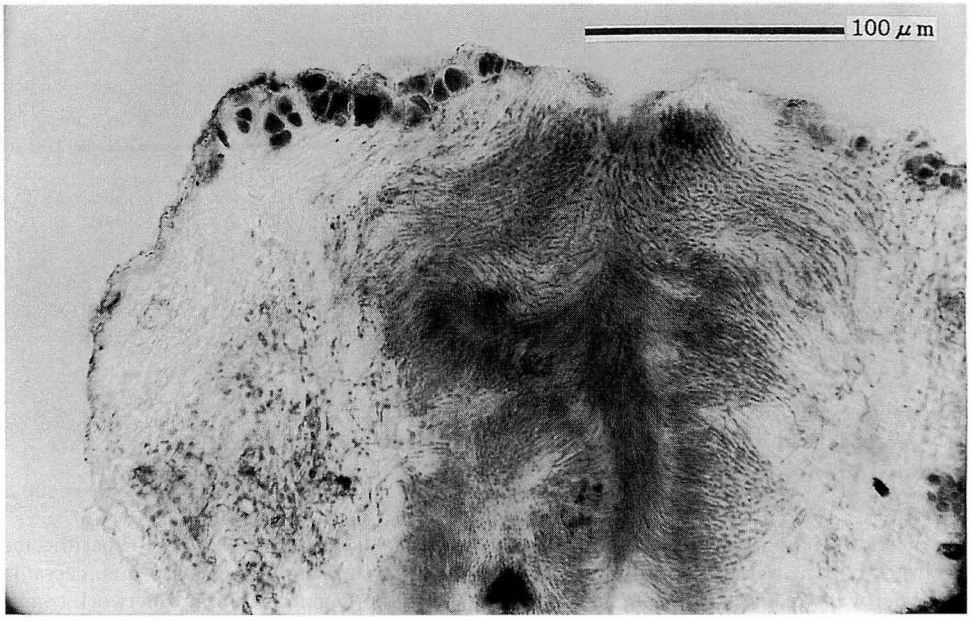

Fig. 4. Pycnidium of *Thelenella luridella*. (Vertical section in LPCB, from Harada 17545).

Harada in external morphology. However, they obviously differ in anatomy. *Porina* has thin-walled asci, simple paraphyses, and *Trentepohlia*-phycobiont (McCarthy, 1993; Purvis *et al.*, 1992; etc.). *Strigula aquatica* has asci with a prominent ocular chamber, simple paraphyses, *Trentepohlia*-phycobiont, and transversely septate ascospores (Harada, 1998). *Strigula*, in addition, produces ellipsoidal to bacilliform macroconidia and/or microconidia in pycnidia (Coppins, 1988; Harada, 1995), although those have not been discovered for *S. aquatica*.

Specimens examined. JAPAN. Honshu. Miyagi-ken. Motoyoshi-gun, Karakuwa-cho, Osaki, 38°52′ N, 141°40′ E, 1 m alt., on basaltic rocks in splash zone, Harada 17510 (CBM-FL-9358); Motoyoshi-gun, Utatsu-cho, Utatsu-zaki Point, 38°41′ N, 141°34′ E, 3 m alt., on rocks in splash zone, Harada 17545 (CBM-FL-9393); Monou-gun, Kahoku-cho, Onosaki, 38°33′ N, 141°28′ E, 1 m alt., on basaltic rocks in splash zone, Harada 17638 (CBM-FL-9500). Ogasawara Islands. Hahajima Island, Kita-kou, 26°42′ N, 142°08′ E, 5 m alt., on seashore rocks, Harada 10265

(CBM-FL-1316).

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References

Coppins, B. J. 1988. Notes on the genus *Arthopyrenia* in the British Isles. Lichenologist 20: 305–325.

Eriksson, O. 1981. The families of bitunicate ascomycetes. Opera Botanica (60): 1–220.

Harada, H. 1995. *Strigula nipponica* Harada sp. nov. (Lichenes, Strigulaceae) from Chiba-ken, central Japan. Nova Hedwigia 60(3–4): 487–491.

Harada, H. 1998. *Strigula aquatica* (Lichenes, Arthopyreniaceae), a new saxicolous pyrenolichen from Japan. Nova Hedwigia 66: 419–423.

Mayrhofer, H. 1987. Monographie der Flechtengattung Thelenella. Bibl. Lichenol. 26: 1–106, 10 pls.

McCarthy, P. M. 1993. Saxicolous species of *Porina* Müll. Arg. (Trichotheliaceae) in the southern Hemisphere. Bibl. Lichenol. 52: 1–134.

Purvis, O. W., B. J. Coppins, D. L. Hawksworth, P. W. James and D. M. Moore (eds.). 1992. The lichen flora of Great Britain and Ireland. 710 pp. Natural History Museum Publications and The British Lichen Society, London.

Vobis, G. 1980. Bau und Entwicklung der Flechten-Pycnidien und ihrer Conidien. Bibl. Lichenol. 14: 1–141, 47 pls.

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日本初記録の地衣類 *Thelenella luridella*

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世界の主として熱帯から亜熱帯にかけて分布記録があった *Thelenella luridella* (Nyl.) Mayrh. を日本初記録として報告する．本報は東アジアにおける本種の初記録にあたる．宮城県の海岸3地点と小笠原諸島母島の1地点において，いずれも飛沫帯で発見されたもので，このような環境下で本種の生育が確認されたのは初めてのことである．本種は以下の形質により日本産の地衣類の中で特徴づけられる：(1) 岩上生，(2) 地衣体は痂状で，灰色から灰褐色，無色の顕著な epinecral layer を有す，(3) 共生藻は Trebouxioid の緑藻，(4) 被子器は地衣体に埋没し全体がほぼ半球形に膨らむ，(5) 擬側糸を有す，(6) 子嚢は2重壁で先端部に ocular chamber を欠き，I−，(7) 子嚢胞子は石垣状多室で無色，(8) 粉子器は *Roccella* 型で糸状の粉子を生ずる．