

Two New Species of Gyalectoid Lichens from East Asia

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Abstract Two species of gyalectoid lichens are described as new : *Gyalidea japonica* Harada et Vězda (Solorinellaceae) from Japan, and *Gyalideopsis formosana* Harada et Vězda (Gomphillaceae) from Taiwan.

Key words : Lichenes, taxonomy, Solorinellaceae, Gomphillaceae, *Gyalidea*, *Gyalideopsis*.

Recently H. Harada, one of the authors, collected two species of the epilithic crustose lichens that have not been reported from East Asia, with one species from central Japan and the other from Taiwan. The species from Japan was determined to be a member of the genus *Gyalidea* by virtue of having the following diagnostic characters of this genus : (1) apothecia gyalectoid ; (2) hymenium

non-amyloid ; (3) paraphyses almost simple ; (4) spores submuriform to muriform. The species from Taiwan resembles *Gyalidea* but was demonstrated to be a species of *Gyalideopsis* because it has (1) more or less branched and anastomosing paraphyses and (2) fissitunicate asci. These two species are distinguishable from all the known species of these genera, and are, therefore, de-

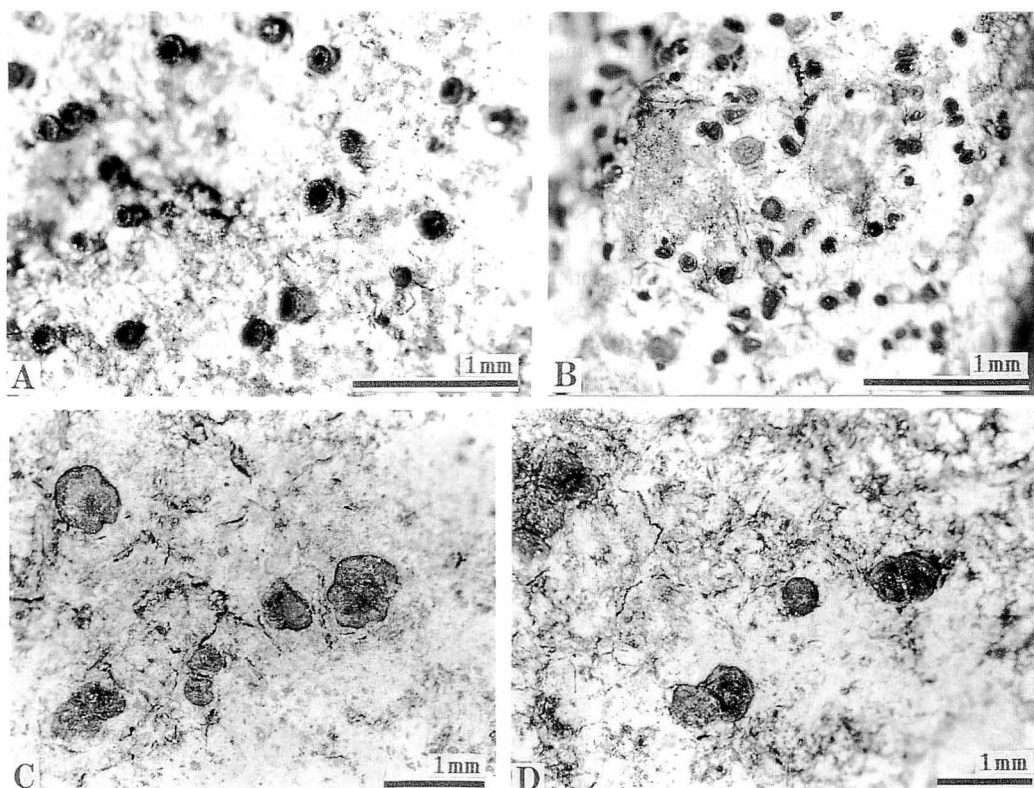


Fig. 1. Habit of *Gyalidea japonica* and *Gyalideopsis formosana*. A-B, *Gyalidea japonica* (A, holotype ; B, Harada 9357). C-D, *Gyalideopsis formosana* (holotype).

scribed here as new species, *Gyalidea japonica* Harada et Vězda and *Gyalideopsis formosana* Harada et Vězda respectively.

***Gyalidea japonica* Harada et Vězda sp. nov.
(Solorinellaceae)**

(Figs. 1A & B, 2A, 3)

Thallus epilithicus, crustaceus, tenuis. Apothecia 0.1–0.3 mm lata. Discus concavus vel planus, fuscus. Excipulum fuscum in peripheria. Asci 4–8 spori. Sporae ellipsoidae vel fusiformes, submuriformes, $15\text{--}20 \times 7\text{--}9 \mu\text{m}$.

Typus. Japan, Honshu, Shizuoka-ken, Ogasa-gun, Hamaoka-chō, Hiki, Kami, 50 m alt., on pebble, 2 June 1989, coll. H. Harada no. 9289 (Natural History Museum and Institute, Chiba-holotypus).

External Morphology. Thallus crustose, about 1 cm across, quite indistinct, thin, very pale gray, dull. Hypothallus not seen. Apothecia 0.1–0.3 mm across, up to 0.15 mm high, round, sessile, constricted at the base. Disk depressed, more or less concave, dark brown, epruinose, smooth, dull, up to 0.25 mm across. Margin of apothecia concolorous with disk in the upper part, paler and sometimes pale brown in the lower part due to the presence of thin thalline cover, dull or a little glossy. Pycnidia not found.

Anatomy. Thallus almost hyaline, up to $100 \mu\text{m}$ thick. Phycobiont protococcoid. Apothecia lecideine. Exciple moderately dark brown in the outer part, paler and almost hyaline in the inner part, about $30 \mu\text{m}$ thick in the upper part, prosoplectenchymatous, gelatinized. Hypothecium

hyaline. Subhymenium hyaline, $10\text{--}15 \mu\text{m}$ thick. Hymenium more or less brown only in the uppermost part, hyaline in the remainder, $65\text{--}85 \mu\text{m}$ high. Paraphyses almost simple, very sparsely anastomosing, $0.5\text{--}1 \mu\text{m}$ thick, but more or less clavate and about $2 \mu\text{m}$ thick at the apices. Ascus clavate, $60\text{--}80 \times 10\text{--}15 \mu\text{m}$, with apparent apical plug. Spores 4 to 8 in one ascus, submuriform, ellipsoidal, $15\text{--}20 \times 7\text{--}9 \mu\text{m}$.

Iodine reactions. Apothecia (incl. hymenium and asci) and thallus I–.

Habitat. Three specimens of this species have been found at two closely located sites in the warm temperate zone in central Japan on the Pacific side. Two specimens, including the type, were collected on steep slopes of a road-cut at somewhat shaded and rather sunny sites by roads through a laurel-leaved forest; the other at an open and extremely sunny site in tea plantations. In all cases the lichens were growing on small pebbles, which may be considered as too unstable for most epilithic lichens to inhabit. Very small thalli and tiny apothecia of this species may be beneficial for living and maturing on such unstable substrates within a limited time. This species seems to be one of the pioneer lichens.

Range. Japan (Honshu).

Additional specimens examined. Japan, Honshu, Shizuoka-ken, Haibara-gun, Sagara-chō, Ochii, 50 m alt., on pebbles around a tea plantation, coll. H. Harada no. 9357; Shizuoka-ken, Ogasa-gun, Hamaoka-chō, Hiki, Kami, 50 m alt., on pebbles, coll. H. Harada no. 10226 (these two specimens are deposited in the herbarium of the Natural History

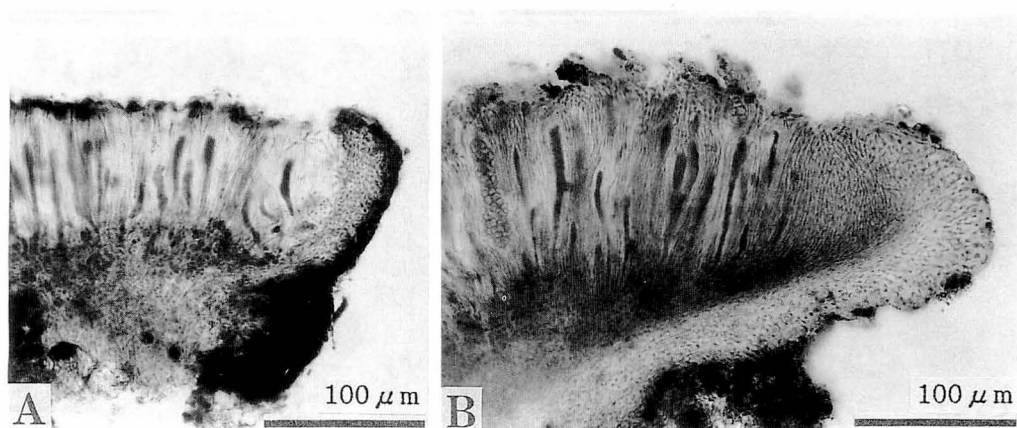


Fig. 2. Exciples of *Gyalidea japonica* and *Gyalideopsis formosana* in vertical section (in lactophenol cotton-blue). A, *Gyalidea japonica* (holotype). B, *Gyalideopsis formosana* (holotype).

Museum and Institute, Chiba).

Remarks. In having epilithic habit and brownish apothecia, this species resembles the following five species: *Gyalidea lecideopsis* (Massal.) Lett. ex Vězda (1966), *G. diaphana* (Koerb.) Vězda (1978), *G. fritzei* (Stein) Vězda (1966), *G. costaricensis* Vězda et Haf. (ined.), and *G. saxicola* (Groenh.) Vězda (ined.). *G. lecideopsis* is distinct from the present new species by growing on calcareous rocks. *G. japonica* is dissimilar to the other four species in (1) form of spores, (2) size of apothecia, and (3) thickness of hymenium. The second and the third species differ from this new species in spore forms: only transversely septate in *G. diaphana* and strongly muriform in *G. fritzei* in contrast to *G. japonica* with weakly muriform or submuriform spores. *G. japonica* is distinguishable from the last two species by the smaller diameter of apothecia: up to 0.25 mm across in *G. japonica*, but 0.25–0.4 mm in *G. costaricensis* and 0.7–0.8 mm in *G. saxicola*. They are also different in the thickness of hymenium: 60–85 μm in *G. japonica*, 90–95 μm in *G. saxicola* and about 150 μm in *G. costaricensis*.

***Gyalideopsis formosana* Harada et Vězda sp. nov.**
(Gomphillaceae)

(Figs. 1C & D, 2B, 4)

Thallus epilithicus, crustaceus, glaber vel plus minusve rimosus. Apothecia 0.25–0.8 mm lata, tunica thalli destituta. Discus palidofuscus vel carneus. Ex-cipulum hyalinum, 20–30 μm latum. Asci 4–8 spori. Sporae ellipsoidae vel fusiformes, submuriformes, 21–27 $\times$ 9–14 μm .

Typus. Taiwan, Keelung City, Nuan-nuan, 50 m alt., on rock at the edge of stream, 21 Nov. 1989, coll. H. Harada no. 10217 (TNS-holotypus).

External morphology. Thallus crustose, almost entirely continuous or slightly rimose, smooth, pale greenish gray, dull, frequently reaching 5 cm in diameter. Hypothallus not seen. Apothecia round when young, becoming lobed or aggregated when old, usually sessile and constricted at the base, but sometimes slightly immersed, 0.25–0.8 mm across, usually up to 0.1 mm high. Disk pale brown, sometimes nearly flesh-colored, slightly concave when young, usually almost flat but sometimes slightly concave or moderately convex when old, smooth, dull. Margin of apothecia somewhat prominent, concolorous with or more or less darker than the disk, smooth, dull. Pycnidia not found.

Anatomy. Thallus almost hyaline, undiffer-

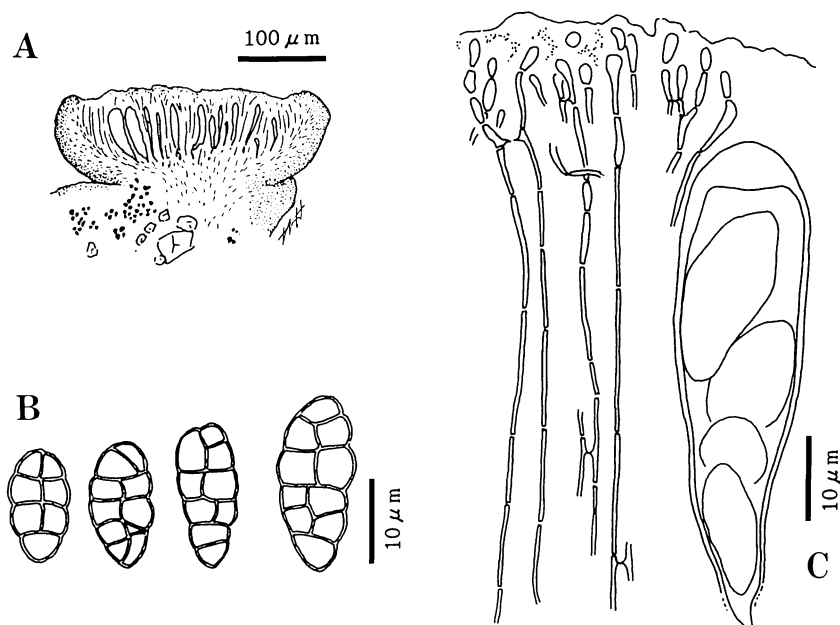


Fig. 3. Anatomy of *Gyalidea japonica* (holotype). A, vertical section of apothecium. B, spores. C, paraphyses and ascus with spores (A, C, sections in lactophenol cotton-blue; B, squashed preparation in lactophenol cotton-blue).

entiated into layers, about $100\text{ }\mu\text{m}$ thick or more (the lower limit unclear). Phycobiont protococoid, almost universally and densely distributed, or in dense clusters, $5\text{--}10\text{ }\mu\text{m}$ across. Apothecia lecideine. Exciple almost hyaline, or very pale brown in the periphery, more or less slightly thicker in the middle part, $20\text{--}30\text{ }\mu\text{m}$ thick; the hyphae embedded in gelatinous matrix. Hypothecium hyaline. Subhymenium hardly distinguishable from the hypothecium. Hymenium hyaline, $80\text{--}120\text{ }\mu\text{m}$ thick. Paraphyses sparsely branched and anastomosing, more or less clavate at the apices; the lumina ca $1\text{ }\mu\text{m}$ wide, but ca $2\text{ }\mu\text{m}$ wide at the apices. Ascus clavate, $70\text{--}100\times 15\text{--}20\text{ }\mu\text{m}$, with apical plug. Spores $4\text{--}8$ in one ascus, submuriform, ellipsoidal, $21\text{--}27\times 9\text{--}14\text{ }\mu\text{m}$, with gelatinous hyaline outer walls (1 to $2\text{ }\mu\text{m}$ thick).

Iodine reactions. Apothecia (incl. hymenium and asci) and thallus I⁻.

Habitat. At the type locality this species grows on a soft rock in a stream bed in the subtropics, associated with species of *Verrucaria*, *Trapelia* etc.

Range. Taiwan (Keelung).

Remarks. This species resembles the following

five species by having submuriform or weakly muriform spores and epilithic or terricolous habit among the previously known species of *Gyalideopsis*: (two epilithic species) *G. lithophila* Thor et Vězda (1984) and *G. modesta* Vězda et Poelt (1973); (three terricolous species) *G. athalloides* (Nyl.) Vězda (1972), *G. robusta* Kalb et Vězda (1988), and *G. solorinellaeformis* Vězda (1972). The present new species can be distinguished from them by the following characters: (1) size of spores, (2) size and (3) form of apothecia. The first two species apparently differ from the present species by having smaller spores: $12\text{--}15\times 4.5\text{--}5.5\text{ }\mu\text{m}$ in *G. aterrima* Vězda et Poelt 1973, $12\text{--}15\times 6\text{--}10\text{ }\mu\text{m}$ in *G. modesta* Vězda et Poelt 1973, compared to $21\text{--}27\times 9\text{--}14\text{ }\mu\text{m}$ in *G. formosana*. *G. athalloides*, *G. robusta*, and *G. solorinellaeformis* have spores of the same size class as the present new species. However, *G. athalloides* and *G. solorinellaeformis* have larger apothecia than *G. formosana*: $0.8\text{--}1.2\text{ mm}$ across in the first species and $1.0\text{--}1.2\text{ mm}$ in the second in contrast to $0.5\text{--}0.8\text{ mm}$ of *G. formosana*. Although their apothecia are similar in size, there is a remarkable difference in shapes of these organs between *G. formosana* and

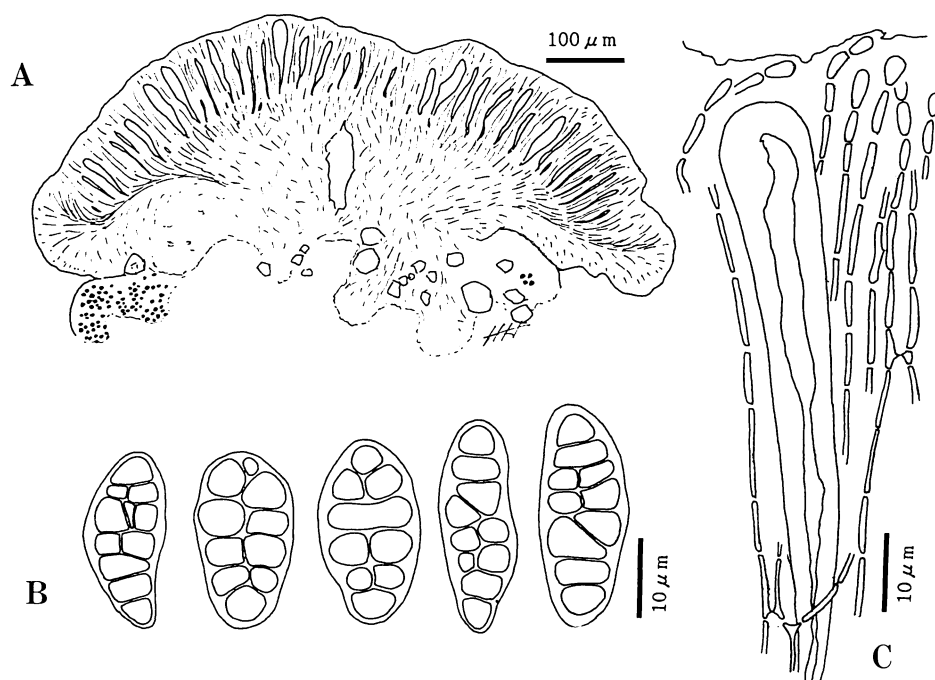


Fig. 4. Anatomy of *Gyalideopsis formosana* (holotype). A, vertical section of apothecium. B, spores. C, paraphyses and young ascus (A, C, sections in lactophenol cotton-blue; B, squashed preparation in lactophenol cotton-blue).

G. robusta. They are constricted at the base and elongated to almost stipitate in *G. robusta* but partly immersed to sessile in *G. formosana*.

Acknowledgments

We wish to express our sincere thanks to Dr. T. L. Esslinger of North Dakota State University, U. S. A. for checking the English text.

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東アジア産の地衣類 2 新種の記載

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チェコスロヴァキア

東アジア産の地衣類 2 新種を記載した。どちらも、レキデア型の子器と非アミロイドの子嚢層によって特徴づけられる、gyalectoid と称される痂状地衣である。一方の種は、側糸が単一で、子嚢が一重壁、胞子が石垣状多室であることから *Gyalidea* 属 (Solorinellaceae) の一種であり、しかも褐色の子器を持ち、岩上生であることから、*Gyalidea costaricensis*, *G. diaphana*, *G. fritzei*, *G. lecideopsis*, *G. saxicola* の 5 種に似ている。しかし、胞子の形、子器の大きさ、子嚢層の厚さなどの差異が明瞭なので、新種コザラゴケ (*Gyalidea japonica* Harada et Vězda) とした。本種は静岡県南部の、茶畑の周りと林道脇の切り通しで採集された。小石上という非常に不安定な基物上に生育していたので、パイオニア的な種と想像される。なお、コザラゴケ属 (新称、*Gyalidea*) は日本からは従来知られていなかった。他方の種は、コザラゴケ属によく似るが、子嚢が二重壁であることから *Gyalideopsis* 属 (Gomphillaceae) の一種であり、しかも胞子の室数が少なく、岩上生ないし地上生であることから *Gyalideopsis athaloides*, *G. lithophila*, *G. modesta*, *G. robusta*, *G. solerinellaeformis* の 5 種に似ている。しかし、胞子の大きさ、子器の大きさや形によって明らかに区別できるので、新種 *Gyalideopsis formosana* Harada et Vězda とした。台湾北部の河川上流部の河床で、普段は水没しない柔らかい岩盤上に生育していた。