

Japanese Species of *Parmelia* Ach. (sens. str.),
Parmeliaceae (2)

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In the second report of this series, subgenus *Nipponoparmelia*, which is characterized by punctate pseudocyphellae, is proposed. Three Asian species, *P. isidioclada*, *P. laevior*, and *P. pseudolaevior*, are accommodated to the new subgenus. Morphological features, chemical ingredients, geographical distributions, etc. of the species of subgenus *Nipponoparmelia* are discussed. *Parmelia isidioclada* is characterized by isidial soredia, *P. laevior* is distinguished by the lack of asexual propagules, and *P. pseudolaevior* is characterized by numerous marginal lobules.

(Continued from J. Jpn. Bot. 69: 61–68, 1994)

Taxonomic treatment

Subgenus ***Nipponoparmelia*** Kurok., subgen. nov.

Subgeneri Parmeliae similis sed pseudocyphellae marginalia, punctiformes.

Type species: *Parmelia laevior* Nyl.

Thallus foliose, lobes subirregular to sublinear, 1–5 mm wide, margins more or less rolled upwards, pseudocyphellae marginal, punctiform, lower surface black, usually with whitish or pale brownish narrow peripheral zone, rhizines simple to furcate. Apothecia more or less stipitate, asci clavate or subclavate, 8-spored, spores simple, colorless, 6–10×12–17 μm .

The subgenus *Nipponoparmelia* forms a morphologically and chemically homogenous group. Morphologically it is characterized by punctiform pseudocyphellae. The punctiform pseudocyphellae are similar to those of *Punctelia* and *Flavopunctelia* of the Parmeliaceae, since they do not have the persistent epicortex roof and do not form angular or linear aggregates of pores as discussed before. They are marginal on lobes and lobules in the present subgenus,

whereas they are laminal in *Punctelia* and *Flavopunctelia*. Chemically, all species of the subgenus *Nipponoparmelia* produce atranorin and salazinic acid, both of which are also common in the subgenus *Parmelia*. Thus present subgenus can be considered to be morphologically related to *Punctelia* and *Flavopunctelia* and chemically to subgenus *Parmelia* of the genus *Parmelia*. In the present paper, the subgenus *Nipponoparmelia* is retained in the genus *Parmelia*, following Hale's treatment (Hale 1987) of three Asian species of the present subgenus.

Some other morphological features are commonly observed in species of the new subgenus, for example, lobes rolled upwards at the margins, often with whitish or pale brownish peripheral zone on lower surface, more or less stipitate apothecia, etc. Asci are clavate to subclavate and spores are 7–10×14–17 μm in size.

At present, only three species can be accommodated to the present subgenus. Although a few specimens of the subgenus have been collected in Siberia,

Korea, or Taiwan, these three species are principally restricted to Japan, where they are very common and even weedy.

Parmelia isidioclada Vainio in Bot. Mag. Tokyo 35: 48. 1921. Type collection. Prov. Mimasaka, Japan, Yasuda 210 (lectotype in TUR).

Parmelia yasudae Räs. in J. Jpn. Bot. 16: 84. 1940. Type collection. Prov. Iyo, Japan, Yasuda 656 (lectotype in H).

Thallus adnate on bark of trees or rarely on rocks, greenish mineral gray, lobes subirregular, continuous or more or less divaricate, 1–3 mm wide, margins often rolled upward, upper surface shiny but sometimes white pruinose near the apices, punctate-pseudocyphellate along the margins, pseudocyphellae small and inconspicuous, less than 0.1 mm in diameter, soon becoming granular-isidiate and giving rise to dense, branched cylindrical to a little dorsiventral,

eventually coralloid-isidioid growths to 1 mm high, isidia apically crumbling and subsorediate with age; medulla white; lower surface black often with a pale or brownish narrow peripheral zone, moderately to densely rhizinate, the rhizines simple or furcate, 1–2.5 mm long. Apothecia rare, more or less stipitate, 3–10 mm in diameter, amphithecium foveolate, granular-isidiate, disc brown, hymenium 50–60 μm high, asci clavate, spores 7–10 \times 14–17 μm .

Chemistry. Atranorin, chloroatranorin (+ or –), salazinic acid, gyrophoric acid (minor) and traces of consalazinic, protocetraric, and 4-O-methylgyrophoric acids.

Distribution. Northern Kanto District of Honshu (Prov. Hitachi) to Taiwan.

This species (Fig. 4) resembles *P. laevior*, because they both have marginal punctate pseudocyphellae (Fig. 3). It is, however, clearly distinguished from the latter by having pseudocyphellae soon producing

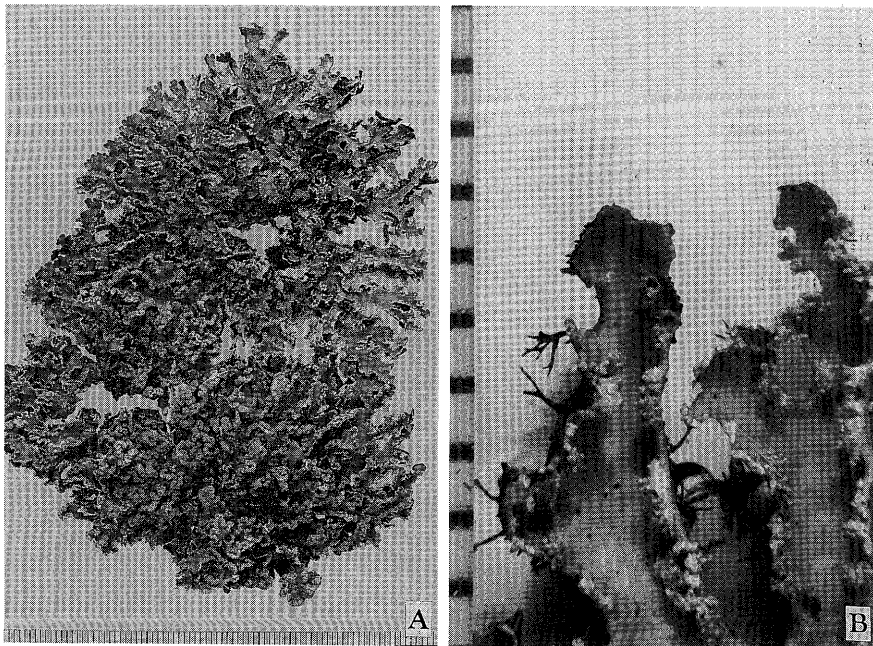


Fig. 4. *Parmelia isidioclada* (S. Kurokawa 68004). A: Thallus. B: Lobes, showing isidia apically crumbling and subsorediate. Scale indicates mm.

granular-isidioid outgrowths which are giving rise coralloid isidia apically crumbling and subsorediate (Fig. 4B) with age.

Thirty-one specimens, including type collections, of this species collected in Japan have been examined. They were collected on trunks of various trees or rarely on rocks such as stone-fences and tomb-stones in lowland, where it must be a common species. The distribution areas of the present species have been widely urbanized or much air-polluted in recent years and at present this species appears to be rather rare in Japan. In Taiwan, it is apparently very rare having been known from only one locality (Taitung Pref.: Mt. Wunitoparu, elevation about 1900 m, S. Kurokawa 2587). This is the new record of the species in Taiwan.

On TLC, gyrophoric acid was demonstrated in all specimens examined (including a specimen from Taiwan). It is associated with trace or a little amount of 4-O-methylgyrophoric acid. Even though detailed location of gyrophoric acid in the thalli has not been studied yet, gyrophoric acid is probably located in the cortex as in the case of *P. shinanoana* (Kurokawa and Takahashi 1970). A trace of consalazinic acid seems to be always associated with salazinic acid, and a trace of protocetraric acid may be demonstrated on TLC plates in most specimens.

Parmelia isidioclada resembles *P. fraudans* (Nyl.) Nyl., a well-known Europe-American species. These two species have similar granular isidia, which give rise coralloid-isidioid growths. However, they are clearly distinguished by the nature of pseudocyphellae; pseudocyphellae are punctate in *P. isidioclada*, whilst they are angular or linear in *P. fraudans*. *P. fraudans* is not known from Japan.

In 1987, Hale reduced *P. psoromoides* Räs. as a synonym of *P. isidioclada*. Although the lectotype of *P. psoromoides* is a rather small specimen, no punctate pseudocyphella is present but subcontinuous marginal pseudocyphellae are found in it. Thus, Kurokawa (1993) considered *P. psoromoides* to be conspecific

with *P. sectilis* Hale, the former having the priority, and classified it under subgenus *Parmelia*. As discussed by Kurokawa (1993), large spores reported by Hale (1987) for *P. isidioclada* were obviously based on the original description of *P. psoromoides* by Räsänen (1949).

Parmelia laevior Nyl., Lich. Jap. 28, 1890. Type collection. Itchigome, (Mt. Fuji), Japan, Almquist s. n. (lectotype in H, Nyl. Herb. 34857).

Parmelia laevior f. *denigrata* Hue in Nouv. Arch. Mus. Paris, ser. 3, 1: 166. 1899. Type collection. Onikobe, (Prov. Mutsu), Japan, Faurie 305 (lectotype in PC and isolectotype in KYO).

Parmelia petrophila Vainio in Bot. Mag. Tokyo 35: 48. 1921. Type collection. Prov. Kii, Japan, Yasuda 193 (lectotype in TUR, Vain. Herb. 2933).

Parmelia hakonensis Zahlbr., Bot. Mag. Tokyo 41: 348. 1927 – *Parmelia laevior* f. *hakonensis* (Zahlbr.) Asah. in Lich. Jap. 2: 112. 1952. Type collection. Hakone, Prov. Sagami, Japan, Yamashita 13 (lectotype in W and isolectotype in TNS).

Parmelia ontakensis Asah. in J. Jpn. Bot. 29: 323. 1954. Type collection. Mt. Ontake, Hidaguchi 6-gome, Prov. Hida, Japan, Y. Asahina 54819 (lectotype in TNS and isolectotype in US).

Thallus adnate to loosely adnate on trunk or twigs of trees and less commonly on stones, dark greenish to whitish mineral gray, 7–12(–15) cm broad, lobes subirregular, contiguous to subimbricate, sometimes more or less ascending towards the apices, margins sinuate and rolled upwards, 1–5 mm wide, with no isidia and soredia, apically more or less rotund, upper surface shiny, rarely foveolate, hardly cracked even on older lobes, pseudocyphellae punctate, marginal, rather conspicuous but less than 0.3×0.6 mm in size; medulla white; lower surface black, often with pale brownish marginal zone, moderately to densely rhizinate, the rhizines simple or furcate, 0.5–2 mm long. Pycnidia common, conidia cylindrical to weakly

bifusiform, 5–6 μm long. Apothecia common, more or less stipitate, 5–12(–20) mm in diameter, amphithecium more or less foveolate, pseudocyphellate, pseudocyphellae punctate, more or less elevated, disc brown to dark brown, radially split with age, asci subclavate, spores 6–9 \times 12–16 μm .

Chemistry. Atranorin, chloroatranorin, salazinic acid, and traces of consalazinic and protocetraric acids.

Distribution. Japan (Hokkaido through Kyushu), Taiwan, and Siberia (Hale 1987).

Parmelia laevior is characterized by marginal punctate pseudocyphellae (Fig. 3B), shiny and smooth upper surface, and simple to furcate rhizines. It is rather variable in adnation, shape and size of lobes, and color of the thalli. When it grows on twigs of trees, lobes are usually less than 3 mm wide and are subsacceding, suberect, or even erect. The name *P. hakonensis* was given to them. The present species is clearly distinguished from other species of the subgenus *Nipponoparmelia* by the lack of marginal lobules and soredial isidia.

Parmelia laevior is one of the commonest lichens and a weedy species in montane and subalpine areas in Japan. It is common on trunks of deciduous trees such as *Alnus tinctoria*, *Tilia japonica*, etc. as well as of subalpine conifers such as *Abies sachalinensis* and *Picea yezoensis* in Hokkaido. In Honshu or main island of Japan, it is also common on *Alnus tinctoria* and *Tilia japonica* as well as on *Acer* spp., *Betula* spp., *Carpinus* spp., *Fagus crenata*, *Fraxinus* spp., *Magnolia* spp., *Quercus* spp., *Sorbus* spp., etc. in montane deciduous forests and on trunks of *Abies veitchii*, *Larix leptolepis*, *Picea yezoensis*, *Tsuga diversifolia*, etc. in subalpine conifer forests. Number of specimens have been also collected on trunks of *Pinus thunbergii* along the coast in north-eastern Japan. This species is apparently widely distributed from the coast to subalpine areas 2300–2500 m above the sea level in central Japan.

Zahlbruckner (1933) reported this species from Taiwan. However, the specimen (Asahina 405), on which his report was based, is now identified with *P. adaugescens*. Hale (1987) reported the occurrence of this species in Taiwan and Siberia. Unfortunately, however, no specimen collected outside of Japan has been examined.

Through the present study, 272 additional specimens have been examined. They are preserved in TNS and some duplicates are distributed to H, MEL, and US.

Exsiccata examined. Kurokawa, Lich. Rar. Crit. Exs., no. 183.

Parmelia pseudolaevior Asah. in J. Jpn. Bot. 26: 331. 1951. Type collection. Sengenjinja, Prov. Suruga, Japan, Y. Asahina s. n. (lectotype in TNS and isolectotype in US).

Thallus adnate on bark of trees or rarely on rocks, rather brittle, pale greenish to brownish mineral gray, often more than 15 cm broad, lobes subirregular, contiguous to imbricate, more or less foveolate on the surface, margins rolled upward, 1.5–3 mm wide, with numerous marginal lobules, the lobules suberect to erect, dorsiventral, often with brownish tinge on the apices, well branched and often less than 0.2 mm wide and more than 4 mm long, rarely with a few rhizines below, pseudocyphellae marginal on lobes and lobules and very rarely formed on the ridges on the surface, punctate, 0.1–0.4 mm in diameter; medulla white; lower surface black with rather conspicuous whitish or pale brownish marginal zone, moderately rhizinate, the rhizines mostly simple and rarely furcate, mostly less than 1 mm long. Pycnidia not seen. Apothecia rare, more or less stipitate, 1–8(–11) mm in diameter, dentate or lobulate along the margin, amphithecium smooth, pseudocyphellate, pseudocyphellae punctate, more or less elevated, disc buff brown to dark brown, radially split with age, hymenium 60–75 μm high, asci subclavate, 26–28 \times 64–68 μm , spores 10–12 \times 15–



Fig. 5. Part of lectotype of *P. pseudolaevior*, showing dorsiventral lobules. Scale indicates mm.

17 μm .

Chemistry. Atranorin, chloroatranorin, salazinic acid and traces of consalazinic and protocetraric acids.

Distribution. Hokkaido to Yakushima Island (located south of Kyushu) and Korea.

This species is closely related to *P. laevior*, from which it is clearly distinguished by the numerous subsacceding to suberect lobules formed on margin (Fig. 5) and less commonly on the surface of lobes. It is apparently the lobulate morphotype of *P. laevior*, which has a similar distribution range in eastern Asia.

黒川 道：ウメノキゴケ科カラクサゴケ属の日本産の種(2)

日本産カラクサゴケ属の研究の第2報として subgenus *Nipponoparmelia* (テリハゴケ亜属) を提唱した。テリハゴケ亜属は白点状の擬盃点を葉縁につける共通の特徴があり、また葉縁がやや反卷して裏面に類白色ないし淡褐色の仮根をつけた

Hale (1987) reported spores of the present species to be $6-9 \times 10-15 \mu\text{m}$, which almost agrees with the size reported by Asahina (1951). Spores of *P. pseudolaevior* are often poorly developed and are a little smaller than mature ones. Mature spores found in Kurokawa 56555 (Prov. Awa, Mt. Kiyosumi) were $10-12 \times 15-17 \mu\text{m}$ in size.

Parmelia pseudolaevior is one of the commonest species of the genus in Japan, having been collected through Hokkaido to Yakushima Island in Kyushu. It is rather common on trunks of *Cryptomeria japonica* and various deciduous trees and rarely over mosses on tomb stones or on rocks in lowland to montane areas. It has been also collected on trunks of subalpine conifers such as *Tsuga diversifolia*, *Abies veitchii*, *A. sachalinensis*, etc. It has been once collected in Korea (Mt. Diamond in northern Korea, Y. Asahina s. n.).

Through the present study, 76 specimens of the species, including the lectotype, have been examined.

Exsiccata examined. S. Kurokawa, Lich. Rar. Crit. Exs., no. 34.

References

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 Räsänen V. 1949. Lichenes novi IV. Arch. Soc. Zool. Bot. Fennicae 'Vanamo' **3**: 78-89.
 Zahlbruckner A. 1933. Flechten in Insel Formosa. Fedde Repert. **33**: 22-68.

い裸出部があり、子器はやや有柄、胞子嚢がこん棒状である点も共通している。この亜属は日本を中心とする東アジアの特産で、*P. isidioclada* (ヤスダゴケ 新称)、*P. laevior* (テリハゴケ 新称)、*P. pseudolaevior* (チヂレテリハゴケ 新称) の3

種を含んでいる。それぞれ、顆粒状の裂芽をもつ、無性生殖器官をもたない、葉縁が裂芽状に細裂することで区別される。なお、本属の地衣には従来〇〇ウメノキゴケの和名が慣用されてきたが、ウ

メノキゴケ属 (*Parmotrema*) 所属の地衣との混乱を避けるため、本論文ではいくつかの和名を変更することを提案する。