

Contributions to the Lichen Flora of the Mariana Islands, Micronesia (1). Genus *Endocarpon* Hedw. (Verrucariaceae)

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Abstract Two species of the lichen genus *Endocarpon* are first determined among the collection made during the expedition to the Mariana Islands, Micronesia in 1992. They are *E. neopallidulum* Harada and *E. superpositum* Harada. A description and figures are provided on the basis of those specimens.

Key words: lichens, Verrucariaceae, *Endocarpon*, Micronesia, Mariana Islands, flora.

In 1992, the Biological Expedition to the northern Mariana Islands was conducted by the Natural History Museum and Institute, Chiba, in cooperation both with the Department of Natural Resources, the Commonwealth of the northern Mariana Islands, and the Marine Laboratory of Guam University (Asakura *et al.*, 1994). During this expedition, several specimens of *Endocarpon* were collected and reported as unidentified in a preliminary list of the lichens (Harada, 1994). My recent study revealed that they belong either to *E. neopallidulum* or *E. superpositum*, both of which were previously known only from Japan. In this paper, a description and figures are provided for each of these species on the basis of specimens from the Marianas.

Material and Methods

Air-dried herbarium specimens deposited in Natural History Museum and Institute, Chiba (CBM) were examined. For external morphology, air-dried material was observed \pm under a dissecting stereoscope. Lactophenol cotton-blue (abbreviated as LPCB) preparations were used for anatomical observations, but descriptions of color were taken from GAW (glycerol:ethanol:water = 1:1:1) preparations.

The Species

1. *Endocarpon neopallidulum* Harada (Fig. 1A)

Nova Hedwigia 56: 340 (1993). Type: Japan, Honshu, Chiba-ken, Harada 9225 (CBM—holotype!).

External Morphology. Thallus squamulose, composed of loosely aggregated squamules, usually up to 3 cm in diameter; squamules usually lobate, or simple, attached to the substratum only with the central part, 1–5 mm in diameter; lobes rotund, 0.25–0.5(–0.7) mm wide, discrete, contiguous or slightly overlapping, ascending; upper surface gray to brown, slightly glossy, smooth, somewhat concave to slightly convex; lower surface \pm with rhizohyphae, lacking rhizines, pale brown or whitish in ascending parts, almost black in attaching parts. Perithecia laminal, common, immersed in the thallus, usually projecting on the lower surface of thallus. Pycnidia laminal, common, immersed in the thallus, indistinct.

Anatomy. Thallus 100–160 μ m thick. Upper cortex 15–30 μ m thick, brown in the uppermost part, hyaline in the remainder, eu- to subparaplectenchymatous, lacking epinecral layer; lumina of hyphae more or less in vertical rows, 4–8 μ m in diameter, smaller in the lower parts; walls of hyphae thin, 0.5–1 μ m thick, but about 2 μ m thick in the uppermost

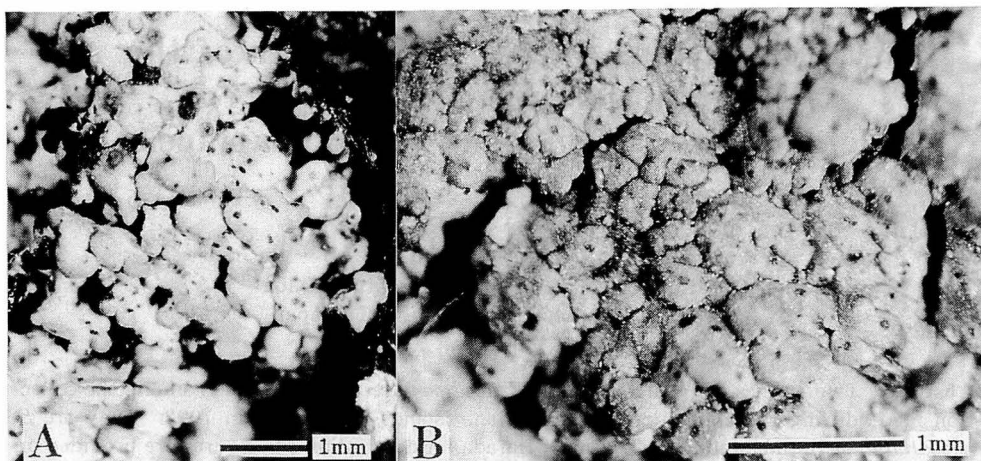


Fig. 1. Habit of *Endocarpon* from Mariana Islands. A, *E. neopallidulum*. B, *E. superpositum*. (A, Harada 13043; B, Harada 12848. A–B, air-dried material).

part of the layer. Algal layer ca. $50\ \mu\text{m}$ thick, subparaplectenchymatous in the upper part of the layer; phycobiont cells more or less spherical, in small clusters or solitary, more or less in vertical rows. Medulla up to $25\text{--}30\ \mu\text{m}$ thick, composed of spherical cells and \pm filamentous hyphae; spherical hyphal cells $5\text{--}7\ \mu\text{m}$ wide; filamentous hyphae usually $2.5\ \mu\text{m}$ thick. Lower cortex ca. $15\ \mu\text{m}$ thick, weakly differentiated from medulla, composed of spherical hyphal cells, dark brown to almost black; lumina of hyphae $2.5\text{--}5\ \mu\text{m}$ wide; walls of hyphae about $1\ \mu\text{m}$ thick. Perithecia almost spherical to doliform, $250\text{--}320\ \mu\text{m}$ high, $250\text{--}290\ \mu\text{m}$ wide; exciple brown (dark brown to almost black, but very pale brown when young), ca. $25\ \mu\text{m}$ thick in sides; subhymenium ca. $15\ \mu\text{m}$ thick; periphyses $20\text{--}45\ \mu\text{m}$ long; hymenium $200\text{--}250\ \mu\text{m}$ high, $170\text{--}190\ \mu\text{m}$ wide; hymenial algae spherical, $3\text{--}4\ \mu\text{m}$ across; asci clavate, ca. $70 \times 15\ \mu\text{m}$; spores 2 in each ascus, hyaline to very pale brown, muriform, ellipsoidal or oblong to bacilliform, $26\text{--}49 \times 10\text{--}14\ \mu\text{m}$. Pycnidia of the *Staurothele*-type; pycnoconidia bacilliform, ca. $4 \times 1\ \mu\text{m}$.

Distribution. Known from Mariana Islands and Japan (Honshu).

Habitat. On volcanic rocks or thin humus and mosses on limestone, at sunny place or in partial shade. On Anatahan Island, it was found on rocks in coastal forest of *Cocos nucifera*.

Specimens examined. MICRONESIA. Ma-

riana Islands. Alamagan Isl. (SW side), 80 m alt., Harada 12924. Anatahan Isl. (SW side), 5 m alt., Harada 12456. Saipan Isl., Mt. Takpochao, 430 m alt., Harada 12333; 440 m alt., Harada 13043.

Remarks. The specimen of *Endocarpon neopallidulum* Harada from Anatahan slightly differs from those in Japan (Harada, 1993) by having a thinner upper cortex with smaller cells. The upper surface of the lobes is mostly brown rather than grayish in the former specimen, whereas that of the latter is usually being pale grayish brown. These differences are presumably due to more intensive sunlight at the growing site for the former specimen on Anatahan.

One of the specimens from Saipan (Harada no. 13043) resembles *E. ramulosum* Harada in having repeatedly branched lobes, the medulla mostly composed of filamentous hyphae, and in growing in a calcareous habitat. However, it is obviously distinguished from that species by narrower lobes ($0.25\text{--}0.5\ \text{mm}$ wide; $0.5\text{--}1\ \text{mm}$ wide in *E. ramulosum*).

2. *Endocarpon superpositum* Harada (Fig. 1B)

Nova Hedwigia 56: 351 (1993). Type: Japan, Honshu, Chiba-ken, Harada 9347a (CBM—holotype!).

External Morphology. Thallus squamulose, composed of tightly aggregated and frequently inseparable squamules, forming a mat up to 5 cm in diameter; squamules

lobate, but simple and round only when young, usually adnate, but sometimes tightly attached to the substratum only at the basal ends; lobes linear, 0.2–0.4 mm wide, overlapping or contiguous, imbricate when squamules crowded; upper surface grayish brown, uniform in color including the marginal parts, a little glossy to dull, smooth; lower surface pale brown only near the apical lobes, almost black near the central parts, with inconspicuous rhizohyphae in the black parts, lacking rhizines. Perithecia laminal, common, immersed in the thallus. Pycnidia laminal, common, immersed in the thallus, indistinct.

Anatomy. Thallus 100–150 μm thick. Upper cortex 10–30 μm thick, \pm an epinecral layer (hyaline, ca. 5 μm thick), brown in the uppermost part, hyaline in the remaining part, weakly differentiated from algal layer, sub- to euparaplectenchymatous; lumina of hyphae usually 3–5 μm across; walls of hyphae 1–2 μm thick in the upper part, up to 1 μm thick in the lower part. Algal layer 40–70 μm thick. Medulla up to 50 μm thick, composed of spherical hyphal cells; lumina of hyphae 3–6 μm wide; walls of hyphae ca. 1 μm thick. Lower cortex ca. 10 μm thick, brown or hyaline, weakly differentiated from medulla, more or less paraplectenchymatous but usually very loose. Perithecia pyriform or ovoid to almost spherical, 240–330 μm high, 240–270 μm wide; exciple pale to dark brown, 20–30 μm thick in the sides and bottom; subhymenium 15–20 μm thick; periphyses 20–40 μm long; hymenium 170–240 μm wide, 180–240 μm high; hymenial algae spherical, usually 2.5–4 μm across; asci clavate, ca. 75 \times 15 μm ; spores 2 in each ascus, almost hyaline, muriform, ellipsoidal or oblong to bacilliform, 24–36 \times 12–14 μm . Pycnidia of *Staurothele*-type; pycnoconidia bacilliform, 4–5 \times ca. 1 μm .

Distribution. Mariana Islands and Japan (Honshu).

Habitat. On dry volcanic rocks near the base of cliff without forest cover.

Specimens examined. MICRONESIA. Mariana Islands, Uracas Isl., Harada 12847 & 12848.

Remarks. The specimens from the Marianas slightly differ from the Japanese speci-

mens by \pm having epinecral layer. It is perhaps due to more intensive sunlight at the growing site on Uracas.

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マリアナ諸島の地衣類について (1).

Endocarpon Hedw. (アナイボゴケ科)

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千葉県立中央博物館が中心となって1992年に挙行了した北マリアナの生物相調査 (Asakura *et al.*, 1994) とそれに伴うグァム島とサイパン島での調査により、約900点の地衣類標本が得られ、その資料を基にした仮目録を既に発表した (Harada, 1994)。その中で未決着であった分類群については更に分類学的検討を継続中であるが、今回 *Endocarpon* 属に関しては一応の結論を得ることができた。本報ではマリアナ産として、従来は日本だけから知られていた *Endocarpon neopallidulum* Harada と *E. superpositum* Harada の2種を報告し、マリアナ産に基づく記載と図を示し、ノートを付した。