

Lichens of Mt. Hikosan and Its Adjacent Area, Kyushu, Japan

By

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柏谷 博之* · 大村 嘉人** · 梅津 幸雄*** : 英彦山及びその周辺地域の地衣類

Mt. Hikosan lies northeast Kyushu, being located between Ohita and Fukuoka Prefectures and is included in the Yaba-Hita-Hikosan Quasi-national Park. It is composed of several mountain peaks, Mt. Minamidake (1200 m), Mt. Nakadake (1180 m) and Mt. Kitadake (1192 m), which stretches from east to west. Mt. Inugadake (1131 m) is located ca. 7 km northeast of Mt. Hikosan via Notohge Pass (Fig. 1). The basal rock is andesitic agglomerate throughout the area.

The vegetation of Mt. Hikosan and its adjacent area was summarized by Ohuchi (1975) and Kanzaki (1975). It varies mainly according to altitude. The base of the mountain (300-650 m) is largely covered with secondary forests of *Quercus*, *Pinus* and *Castanopsis* or plantation of *Cryptomeria japonica* or *Chamaecyparis obtusa*. The famous Yabakei Gorge is located on the southern foot of Mt. Hikosan. The gorge has exposed rocks or cliffs, which provides favorite habitat for saxicolous lichens. In the precinct of Hikosan shrine at Hikosan town (ca. 700 m), a row of old *Cryptomeria* is found. Plantations of *Cryptomeria* and *Chamaecyparis* forests in immature stage (less than 50 years) are also common on every slopes of the present area. At higher elevations (900-1100 m), *Fagus* forest, dominated by *F. crenata*, *Quercus crispula* and *Acer mono*, is also common. However, the old-growth *Cryptomeria* forest located western slope of Mt. Nakadake (900-1000 m) was completely destroyed by a typhoon in 1991.

Lichen flora of Mt. Hikosan and its adjacent area was studied by Ohuchi (1963-1973) who reported ca. 130 macrolichens. Omura *et al.* (1955) investigated epiphyte communities including lichens in beach forests of Mt. Hikosan. However, no voucher specimens were cited in their reports and it is impossible to criticize them. Lichens of the present area have been also collected by Japanese lichenologists, and they have in part been reported in monographic works of lichens found in Japan (Asahina 1950, 1952; Nakanishi 1966; Oshio 1968, Yoshimura 1971, etc.).

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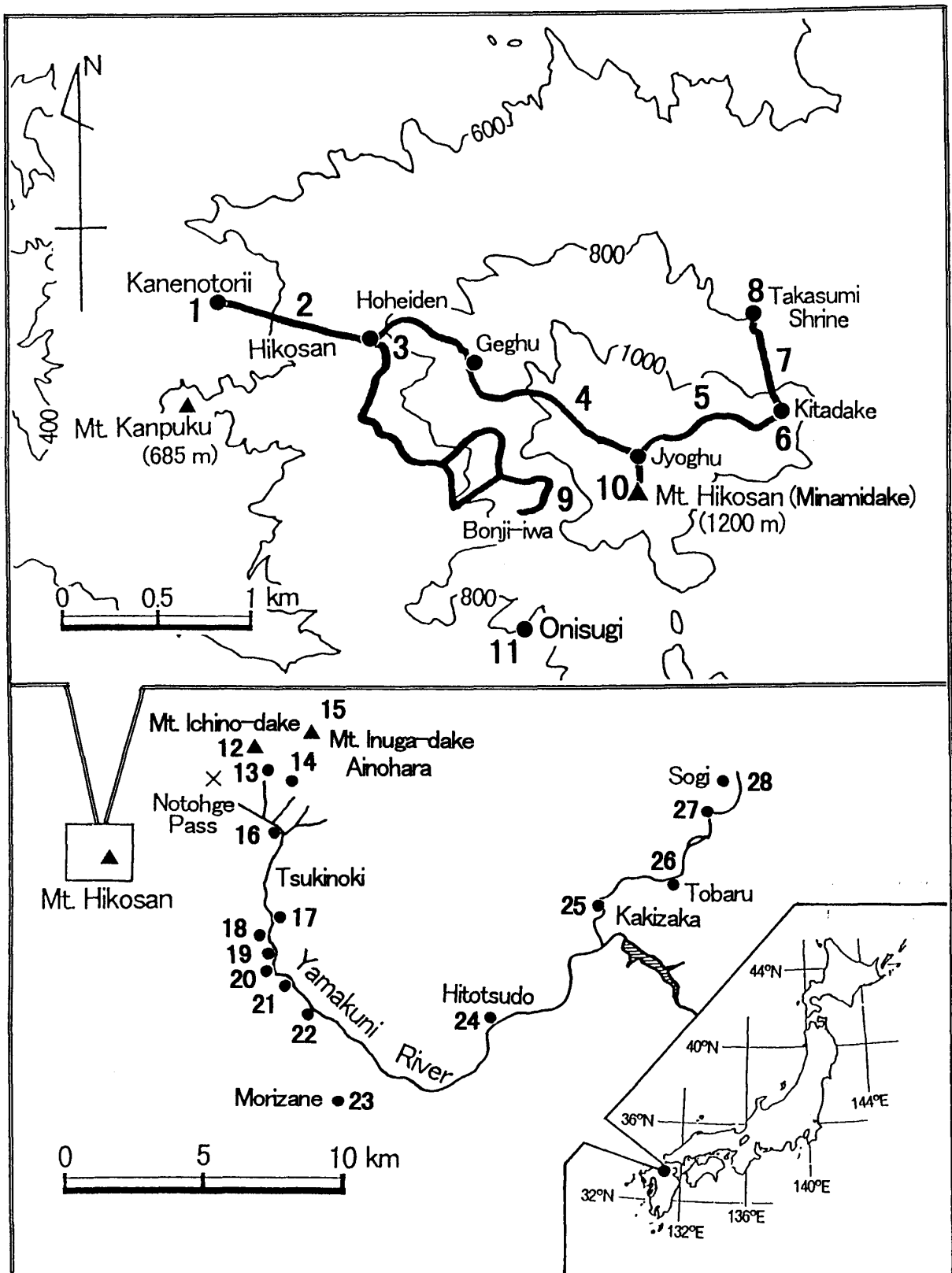


Fig. 1. Mt. Hikosan and its adjacent area showing collection sites (solid circles) and route of the investigation (thick lines).

Materials and Methods

In October-December in 1996 and March in 1997, the authors carried out field surveys of lichens on Mt. Hikosan and its adjacent areas under the project of Natural History Researches of the Western Chugoku and Northern Kyushu Regions organized by the National Science Museum, Tokyo. Collections of lichens were made along mountain trails and road crossing in this area and in the Yabakei Gorge located south of Mt. Hikosan. The collection sites of the present study are shown in Fig. 1. Ca. 650 specimens of lichens were collected through the survey and the results of the taxonomic studies are presented in this paper. All the specimens examined are kept in the herbarium of the National Science Museum, Tokyo (TNS). In addition, specimens from the present area preserved in TNS are also studied. Most specimens of *Bacidia*, *Biatora*, *Buellia*, *Caloplaca*, *Chiodecton*, *Diploschistes*, *Enterographa*, *Gomphila*, *Gyalecta*, *Hymenelia*, *Lecanora* (except for *L. subfusca* group), *Leproloma*, *Leptotrema*, *Protoblastenia*, *Psoroma*, *Pyrenula* (except for *P. japonica*), *Rinodina*, *Thelidium* and *Thelotrema* are excluded from the present study, as further taxonomic revisions are required for identification of the Japanese species of these genera. Chemistry of specimens was studied by means of thin layer chromatography (Culberson & Johnson, 1982) or microcrystal tests if necessary. Only the solvent B system was employed for TLC tests. Sections of apothecia and thalli for anatomical studies were cut by hand-razor and mounted in GAW or lactophenol cotton-blue solution. The ascus structure was examined using by Lugol's iodine solution (Purvis *et al.*, 1992).

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Results

Explanation of collection sites

The abbreviations of collection sites are listed below. Numbers in parenthesis after the abbreviations coincide with numerals shown in Fig. 1.

Ainohara I (13): Prov. Bungo (Pref. Ohita): En route from Ainohara to Keyamura, Tsukinoki, Yamakuni-cho, Shimoge-gun. Elevation about 700 m. March 2, 1997. Coll.: Y. Ohmura.

Ainohara II (14): Prov. Bungo (Pref. Ohita): En route from Ainohara to Keyamura, Tsukinoki, Yamakuni-cho, Shimoge-gun. Elevation about 700-800 m. March 2, 1997. Coll.: Y. Ohmura.

Bonji-iwa (9): Prov. Buzen (Pref. Fukuoka): Bonji-iwa, SW slope of Mt. Hikosan, Soeda-cho, Tagawa-gun. Elevation 850-900 m. October 9, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Hikosan (2): Prov. Buzen (Pref. Fukuoka): Hikosan, Soeda-cho, Tagawa-gun. Elevation about 700-750 m. July 5, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Hitotsudo (24): Prov. Bungo (Pref. Ohita): Hitotsudo, Miyazono, Yabakei-cho, Shimoge-gun.

March 2, 1977. Coll.: Y. Ohmura.

Hoheiden (3): Prov. Buzen (Pref. Fukuoka): Around Hoheiden, Hikosan, Soeda-cho, Tagawa-gun. Elevation about 730 m. October 9, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Ikoinomori (23): Prov. Bungo (Pref. Ohita): Ikoinomori campsite, Morizane, Yamakuni-cho, Shimoge-gun. Elevation about 400 m. March 2, 1997. Coll.: Y. Ohmura.

Inugadake (15): Prov. Buzen (Pref. Fukuoka): Mt. Inugadake, Yabakei-cho, Shimoge-gun. Elevation 950-1100 m. October 13, 1996. Coll.: Y. Umezu.

Jyoghu (4): Prov. Buzen (Pref. Fukuoka): En route from Jyoghu shrine to Geghu shrine, Mt. Hikosan, Soeda-cho, Tagawa-gun. Elevation 740-1020 m. October 8, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Kakizaka (25): Prov. Bungo (Pref. Ohita): Kakizaka, Yabakei-cho, Shimoge-gun. Elevation about 110 m. March 3, 1997. Coll.: Y. Ohmura.

Kanenotorii (1): Prov. Buzen (Pref. Fukuoka): Kanenotorii, Hikosan, Soeda-cho, Tagawagun. Elevation about 550 m. October 9, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Kitadake (6): Prov. Buzen (Pref. Fukuoka): Kitadake, Mt. Hikosan, Soeda-cho, Tagawa-gun. Elevation 1010-1190 m. October 8, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Kitadake-Johghu (5): Prov. Buzen (Pref. Fukuoka): En route from Kitadake to Hikosan shrine (Jyoghu shrine), Mt. Hikosan, Soeda-cho, Tagawa-gun. Elevation 1190-1220 m. October 8, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Kosedo (19): Prov. Bungo (Pref. Ohita): Kosedo, Kusamoto, Yamakuni-cho, Shimoge-gun. Elevation about 300 m. March 3, 1997. Coll.: Y. Ohmura; November 10, 1996. Coll.: Y. Umezu.

Minamidake (10): Prov. Buzen (Pref. Fukuoka): Minamidake, Mt. Hikosan, Soeda-cho, Tagawa-gun. Elevation 900-1190 m. October 26, 1996. Coll.: Y. Umezu.

Notohge (12): Prov. Bungo (Pref. Ohita): En route from Notohge Pass to Mt. Ichino-dake, Yamakuni-cho, Shimoge-gun. Elevation 720-910 m. October 10, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Ohmagari I (20): Prov. Bungo (Pref. Ohita): Ohmagari, Kusamoto, Yamakuni-cho, Shimoge-gun. Elevation about 290 m. March 3, 1997. Coll.: Y. Ohmura.

Ohmagari II (21): Prov. Bungo (Pref. Ohita): Ohmagari, Kusamoto, Yamakuni-cho, Shimoge-gun. Elevation about 290 m. March 3, 1997. Coll.: Y. Ohmura.

Onisugi (11): Onisugi, Mt. Hikosan, Soeda-cho, Tagawa-gun. Elevation about 800 m. March 27, 1997. Coll.: Y. Umezu.

Oushi (16): Prov. Bungo (Pref. Ohita): Oushi, Tsukinoki, Yamakuni-cho, Shimoge-gun. Elevation about 430 m. March 2, 1997. Coll.: Y. Ohmura.

Sarutobi (22): Prov. Bungo (Pref. Ohita): Yabakei-Sarutobi, Yamakuni-cho, Shimoge-gun. Elevation about 280 m. March 4, 1997. Coll.: Y. Ohmura.

Shingai I (17): Prov. Bungo (Pref. Ohita): Shingai, Tsukinoki, Yamakuni-cho, Shimoge-gun. Elevation about 330 m. March 2, 1997. Coll.: Y. Ohmura.

Shingai II (18): Prov. Bungo (Pref. Ohita): Shingai, Tsukinoki, Yamakuni-cho, Shimoge-gun. Elevation about 330 m. March 3, 1997. Coll.: Y. Ohmura.

Sogi I (27): Prov. Bungo (Pref. Ohita): Sogi, Honyabakei-cho, Shimoge-gun. Elevation about 70 m. March 1, 1997. Coll.: Y. Ohmura.

Sogi II (28): Prov. Bungo (Pref. Ohita): Sogi, Honyabakei-cho, Shimoge-gun. Elevation about

80 m. March 1, 1997. Coll.: Y. Ohmura.

Takasumi (8): Prov. Buzen (Pref. Fukuoka): Takasumi shrine, Mt. Hikosan, Soeda-cho, Tagawa-gun. Elevation about 800 m. October 8, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Takasumi-Kitadake (7): Prov. Buzen (Pref. Fukuoka): En route from Takasumi shrine to Kitadake, Mt. Hikosan, Soeda-cho, Tagawa-gun. Elevation 850-950 m. October 8, 1996. Coll.: H. Kashiwadani & Y. Umezu.

Tobaru (26): Prov. Bungo (Pref. Ohita): Tobaru, Yabakei-cho, Shimoge-gun. Elevation about 80 m. March 3, 1997. Coll.: Y. Ohmura.

Lichen flora of Mt. Hikosan and the adjacent area

A total of 169 lichen taxa are reported from Mt. Hikosan and the adjacent area in the present study. Most of them are commonly found in mountain-side of Honshu to Kyushu or in lowland of west to south Japan. However, *Anthracothecium laevigatum*, *Hymenelia lacustris*, *Psora rubiformella* and *Psorula rufonigra* are the second records for the species in Japan. In addition, the following seven species are new to Kyushu; *Brigantiaea purpuratum*, *Hypotrachyna pseudosinuosa*, *Lecanora iseana*, *Placynthiella uliginosa*, *Ramalina kurokawae*, *Thyrea hondoana* and *Trapelia coarctata*. *Hypotrachyna nodakensis* and *H. revoluta*, which are known as rare species in Japan, are also found in the present area.

The lichen flora of the present area varies mainly in accordance with the vegetation. Species characteristically or commonly found in each vegetation are as follows;

Deciduous broad-leaved forest dominated by *Fagus crenata*. Most of the species found in the present area are also common in broad-leaved deciduous forests in other areas from Hokkaido to Kyushu. However, fruticose lichens such as *Usnea* and *Ramalina* are very rare in the present area: *Agonimiella pacifica*, *Anzia opuntiella*, *Brigantiaea ferruginea*, *Cetrariastrum cirrhatum*, *Cetrelia japonica*, *Collema complanatum*, *Graphina inabensis*, *G. undulata*, *Graphis cognata*, *G. proserpens*, *G. rikuzensis*, *Lecanora iseana*, *Lobaria adscripturiens*, *L. fuscotomentosa*, *Ochrolechia akagiensis*, *Pannaria lepidella*, *Parmelia marmorophylla*, *P. subdivaricata*, *Pertusaria commutata*, *P. laeviganda*, *P. mendax*, *P. quartans*, *P. subobductans*, *P. velata*, *Phaeographis asteriformis*, *Phaeophyscia pyrrophora*, *Pyrenula japonica*, *Pyxine limbulata* and *Ramalina conduplicans*.

Exposed outcrops of andesitic agglomerate around Bonji-iwa at elevations 800 to 900 m. Rock surfaces in exposed condition are mainly covered with *Aspicilia* and *Phylliscum*. In rather shaded and more humid condition, however, foliose and fruticose lichens such as *Anzia*, *Cetrelia*, *Heterodermia*, *Myelochroa*, *Parmelia*, *Parmelinella* and *Usnea* are commonly found together with *Candelariella* and *Diploschistes*, species commonly found are as follows: *Anzia opuntiella*, *Candelariella vitellina*, *Cetrelia japonica*, *Diploschistes* sp., *Heterodermia microphylla*, *Myelochroa entotheiochroa*, *Parmelia fertilis*, *P. pseudolaevior*, *Parmelinella wallichiana*, *Pertusaria quartans*, *Phylliscum japonicum*, *Ramalina kurokawae*, *R. yasudae*, *Stereocaulon exutum* and *Usnea rubicunda*.

Narrow ridges of the mountains usually with small outcrops. These areas are windy and in rather drier condition and species of *Cladonia*, *Pertusaria*, *Rimelia* and *Myelochroa* are common, species commonly found are as follows: *Anaptychia palmulata*, *Cetrelia japonica*, *Cladia aggregata*, *Cladonia crispata*, *C. furcata*, *C. krempehuberi*, *C. rangiferina*, *Pertusaria quartans*, *P. subfallens*, *Rimelia clavulifera* and *Myelochroa entotheiochroa*.

Exposed rocks along river at elevation below 300 m: *Dermatocarpon miniatum*, *Ephebe*

japonicum, *Myelochroa leucotylica*, *Ochrolechia parellula*, *Phaeophyscia hispidula*, *Psora rubiformella*, *Psorula rufonigra*, *Pyxine endochrysin*, *Thyrea hondoana*, *Usnea baileyi*, *U. pectinata*, *Xanthoparmelia claviculata*, *X. conspersa* and *X. coreana*.

Plantation of *Cryptomeria japonica* and *Chamaecyparis obtusa* at elevations 700 to 1100 m: *Chiodecton japonicum*, *Cladonia macilenta*, *C. squamosa*, *Lepraria* sp., *Micarea prasina* and *Sphaerophorus meiophorus*.

Plantation of *Prunus yedoensis* around parking area at elevation about 700 m: *Agonimiella pacifica*, *Caloplaca* sp., *Cetrelia braunsiana*, *Cladonia ramulosa*, *C. squamosa*, *Coccocarpia erythroxyli*, *C. porinopsis*, *Flavoparmelia caperata*, *Hypotrachyna revoluta*, *Ochrolechia yasudae*, *Parmelia fertilis*, *Parmelinopsis spumosa*, *Parmotrema tinctorum*, *Phaeographis asteriformis*, *Phaeophyscia rubropulchra*, *Physciella melanchra*, *Punctelia rudecta*, *Rimelia clavulifera* and *Usnea rubicunda*.

Stone works or concrete along road; *Candelaria concolor*, *Candelariella vitellina*, *Collema subflaccidum*, *Endocarpon petrolepideum* and *Physciella melanchra*.

List of lichens

1) **Agonimiella pacifica** Harada; common on barks of *Fagus*, *Fraxinus* and *Quercus*, rarely on rock. Kitadake-Johghu: HK (39821) & YU. Kitadake-Johghu: HK (39766) & YU. Takasumi-Kitadake: HK (39724) & YU. Hikosan: HK (39867) & YU.

2) **Anaptychia palmulata** (Michx.) Vain.; abundant on barks and on rocks. Hikosan: HK (40035) & YU. Notohge: HK (39990) & YU. Takasumi-Kitadake: HK (39705 & 39725) & YU.

3) **Anthracotheicum asahinae** Kashiw. & Kurok.; rare, collected only at one locality where it grows on barks of *Acer mono*. Takasumi-Kitadake: HK (39711) & YU.

4) **A. japonicum** Kashiw. & Kurok.; common on barks of deciduous trees especially on *Acer* and *Carpinus*. Notohge: HK (40015) & YU. Takasumi-Kitadake: HK (39704) & YU.

5) **A. laevigatum** Müll. Arg.; rare, collected at only one locality in the present area where it grows on barks of *Tsuga sieboldii*. This has been known only from the type locality (Shikoku. Prov. Tosa, M. Miyoshi 136, G!) and this is the second locality for this species in Japan. Ainohara II: YO 2940.

6) **Anzia opuntiella** Müll. Arg.; common on barks of *Acer*, *Carpinus* and *Fagus*, rarely on rocks. Bonji-iwa: HK (39920) & YU. Kitadake-Johghu: HK (39777) & YU. Notohge: HK (39946, 39748 & 39953) & YU.

7) **Brigantiaea ferruginea** (Müll. Arg.) Kashiw.; occasional over mosses on bark of *Fagus* and *Quercus*. Kitadake-Jyoghu: HK 39747 & YU.

8) **B. purpuratum** (Zahlbr.) R. Sant. & Hafellner. This species is endemic to Japan, having been reported from Hokkaido to Shikoku (Kurokawa & Kashiwadani, 1977). The distribution now includes Kyushu. In the present survey, it was collected at only one locality where it grows on barks of *Carpinus*. Notohge: HK (40042) & YU.

9) **Caloplaca flavorubescens** (Huds.) J. R. Laundon; occasional on bark of *Fagus* and *Acer*. Takasumi-Kitadake: HK 39710 & YU.

10) **Candelaria concolor** (Dickson) B. Stein; common on barks or on rocks with mosses by roads. Hikosan: HK (39852) & YU. Kanenotorii: HK (39889) & YU.

11) **Candelariella vitellina** (Hoffm.) Müll. Arg.; Bonji-iwa: HK (39902) & YU.

- 12) **Cetrariastrum cirrhatum** (E. Fries) Hale; rare, collected at only one locality. Kitadake-Johghu: HK (39829) & YU.
- 13) **Cetrelia braunsiana** (Müll. Arg.) W. Culb. & C. Culb.; common on barks and on rocks. Bonji-iwa: HK (39915) & YU. Hikosan: HK (39847 c, 40031) & YU. Jyoghu: HK (39795) & YU. Kitadake: HK (39740) & YU. Notohge: HK (40008, 40009 & 40026) & YU. Sarutobi: YO 3006. Takasumi-Kitadake: HK (39705) & YU.
- 14) **C. japonica** (Müll. Arg.) W. Culb. & C. Culb.; common on barks of *Acer*, *Carpinus* and *Fagus*, rarely on rocks. Bonji: HK (39915) & YU. Jyoghu: HK (39795) & YU. Kitadake: HK (39746) & YU. Notohge: HK (40026) & YU. Takasumi-Kitadake: HK (39705) & YU.
- 15) **Chaenotheca brunneola** (Ach.) Müll. Arg.; rare, collected at only one locality in the present area where it grows on weathered barks of *Pinus densiflora*. Bonji-iwa: HK (39894) & YU.
- 16) **Chiodecton japonicum** Zahlbr.; common on barks of *Cryptomeria japonica*. Hikosan: HK (39838) & YU. Takasumi: HK (39690) & YU.
- 17) **Cladia aggregata** (Sw.) Nyl.; occasional on rocks with humus or on soil along the ridge from Notohge Pass to Mt. Inugadake. Notohge: HK (39980 b) & YU.
- 18) **Cladonia caespiticia** (Pers.) Flörke; occasional on barks of *Prunus yezoensis*. Jyoghu: HK (39790) & YU.
- 19) **C. crispata** (Ach.) Flot.; occasional on rocks with humus or on soil along the ridge from Notohge Pass to Mt. Inugadake. Notohge: HK (39950 & 39980) & YU.
- 20) **C. furcata** (Huds.) Schaer.; common on tree bases or on soil with humus along trail. Kitadake: HK (39733) & YU. Notohge: HK (39951) & YU.
- 21) **C. humilis** (With) J. R. Laundon; common on rocks in exposed condition. Bonji-iwa: HK (39918) & YU. Hikosan: HK (39871) & YU. Notohge: HK (40005) & YU. Sarutobi: YO 3008. Takasumi: HK (39684) & YU. Ohmagari II: YO 2982.
- 22) **C. krempehuberi** Vain.; locally abundant on exposed rocks, often forming large colonies on rocks. Notohge: HK (39979, 399696 & 40006) & YU. Oushi: YO 2959.
- 23) **C. macilenta** Hoffm.; common on barks of weathered woods or on barks of *Cryptomeria japonica*. Kitadake-Johghu: HK (39756) & YU. Ainohara I: YO 2931.
- 24) **C. ochrochlora** Flörke; common on rock with mosses and barks, especially on *Quercus* and *Cryptomeria*. Notohge : HK (39950 b, 39984 & 39988) & YU. Hikosan: HK (39873) & YU. Kitadake-Johghu: HK (39749, 39752 & 39776) & YU. Ohmagari II: YO 2986.
- 25) **C. pleurota** (Flörke) Schaer.; occasional on rocks with mosses. Kitadake-Johghu: HK (39818) & YU.
- 26) **C. polycarpoides** Nyl.; occasional on rocks with humus. Notohge: HK (39952) & YU. Tobaru: YO 2997.
- 27) **C. ramulosa** (With.) J. R. Laundon; common on soil, rocks, and on barks. Hikosan: HK (39855, 39872 & 39952) & YU. Bonji-iwa: HK (39916) & YU. Notohge: HK (40007) & YU. Ohmagari II: YO 2983. Takasumi: HK (39683 & 39698) & YU.
- 28) **C. rangiferina** (L.) Web.; occasional on soil with humus. Kakizaka: YO 2996. Inugadake: YU 333.
- 29) **C. scabriuscula** (Delise) Nyl.; occasional on soil with humus. Ohmagari II: YO 2985.
- 30) **C. squamosa** (Scop.) Hoffm.; common on barks or on soils with humus, especially on barks of *Cryptomeria japonica*. Jyoghu: HK (39785 & 39788) & YU. Takasumi: HK (39682) &

YU.

- 31) **Coccocarpia erythroxyli** (Spreng.) Swinscow & Krog; occasional on barks. Hikosan: HK (39854) & YU. Sarutobi: YO 3009.
- 32) **C. palmicola** (Spreng.) Arv. & D. Galloway; occasional on barks or on rocks. Notohge: HK (39975) & YU. Oushi: rocks YO 2956.
- 33) **Coccotrema porinopsis** (Nyl.) Imshaug; occasional on barks of *Prunus*. Jyoghu: HK (39784) & YU.
- 34) **Collema complanatum** Hue; common on rocks and on barks of *Acer*. Hikosan: HK (39875 & 40038) & YU. Inugadake: YU 314.
- 35) **C. leptaleum** Tuck.; common on rock along stream, rarely on barks. Hikosan: HK (39850 & 39868) & YU. Shingai: YO 2961.
- 36) **C. subflaccidum** Degel.; common on rocks and barks with mosses. Hikosan: HK (39869 & 40036) & YU. Kanenotorii: HK (39892) & YU. Kitadake-Johghu: HK (39824) & YU. Takasumi-Kitadake: HK (39721) & YU.
- 37) **Dermatocarpon miniatum** (L.) Mann.; commonly found on rocks along Yamakuni river at lower elevation. Kosedo: YO 2975. Shingai: YO 2964.
- 38) **Dimerella lutea** (Dicks.) Trevis.; occasional on barks in shaded condition. Kosedo: YU 356. Shingai II: YO 2969
- 39) **Endocarpon japonicum** Harada; common on rocks along river. Shingai: YO 2962.
- 40) **E. petrolepideum** (Nyl.) Nyl. ex Hue; common on manmade substrata such as concrete and stone works along road and on rocks along river. Shingai: YU 360.
- 41) **Ephebe japonica** Asahina & Henssen; common on exposed rocks along river. Kosedo: YO 2976. Kakizaka: YO 2987. Shingai: YU 367.
- 42) **Flavoparmelia caperata** (L.) Hale; common on barks or on rocks. Hikosan: HK (39845 & 39883) & YU.
- 43) **Fuscidea verruciformis** Mas. Inoue; common on twigs of trees. Jigoku: YO 3105. Notohge: HK (39942 & 39972) & YU.
- 44) **Graphina deserpens** (Vain.) Zahlbr.; rare, collected at only one locality where it grows on trunk base of *Quercus crispula*. Inugadake: YU 321.
- 45) **G. inabensis** (Vain.) Zahlbr.; common on barks, especially on *Acer*, *Carpinus* and *Ilex*. Aino-hara II: YO 2941 & 2946. Inugadake: YU 326. Takasumi-Kitadake: HK (39702 & 40037) & YU. Notohge: HK (39962 & 39993) & YU.
- 46) **G. undulata** Müll. Arg.; rare, collected at only one locality, where it grows on *Acer mono*. Kitadake-Johghu: HK (39781) & YU.
- 47) **Graphis anfractuosa** Eschw.; occasional on barks of *Quercus acutissima* and *Pinus densiflora*. Bonji-iwa: HK (39908) & YU. Notohge: HK (39929) & YU.
- 48) **G. cervina** Müll. Arg.; occasional on rocks along river at lower elevation. Kosedo: YO 2972 & 2973.
- 49) **G. cognata** Müll. Arg.; common on trunks and twigs of *Fagus crenata* and *Quercus crispula* at elevations between 1100 to 1360 m. Kitadake-Johghu: HK (40039) & YU.
- 50) **G. connectans** Zahlbr.; common on twigs of trees. Aino-hara II: YO 2952. Bonji-iwa: HK (39903 & 39905) & YU. Notohge: HK (40014) & YU.
- 51) **G. dupaxana** Vain.; rare, collected at only one locality where it grows on bark of *Quercus*

acuta. Notohge: HK (39928) & YU.

52) **G. intricata** Fée; common on bark. Notohge: HK (39928 b) & YU.

53) **G. proserpens** Vain.; one of the most common species of the genus *Graphis* in this area where it grows on trunks and twigs of trees from base to the top of the mountain. Jyoghu: HK (39787) & YU. Hikosan: HK (39858) & YU. Kitadake: HK (39703) & YU. Kitadake-Johghu: HK (39772 & 39816) & YU. Sarutobi: YO 3003. Takasumi-Notohge: HK (39940 & 40013) & YU.

54) **G. rikuzensis** (Vain.) M. Nakan.; common on bark, especially on *Acer* and *Carpinus* at elevations higher than 700 m. Kitadake: HK (39730) & YU.

55) **G. scripta** (L.) Ach.; occasional on barks. Notohge: HK (39954) & YU.

56) **Gymnoderma insulare** Yoshim. & Sharp. In 1962, Kurokawa once collected this species from Mt. Hikosan where it grew on barks of *Cryptomeria japonica* together with *Leprocaulon arbuscula* (Nyl.) Nyl. (S. Kurokawa 62456, TNS). The habitat, however, was completely destroyed by typhoon in 1991. Therefore, the species is thought to be extinct in the present area.

57) **Haematomma ochrophaeum** (Tuck.) A. Massal.; occasional, restricted to open barks of *Cryptomeria japonica*. Takasumi: HK (39691) & YU.

58) **Heterodermia hypoleuca** (Muhl.) Trevis. Although this species was not found through the present survey, it was collected twice from the area. Specimens examined. Mt. Hikosan, S. Kurokawa 62495 (TNS) & M. Omura 962 (TNS).

59) **Heterodermia isidiophora** (Vain.) D. D. Awasthi; common on barks or on rocks at elevations between 700 to 900 m. Notohge: HK (39956) & YU. Hikosan: HK (39853) & YU.

60) **H. japonica** (Sato) Swinscow & Krog; occasional on barks and on rocks at elevations between 700 to 900 m. Hikosan: HK (40033) & YU. Notohge: HK (39981) & YU.

61) **H. microphylla** (Kurok.) Skorepa; common on barks and rocks at elevation higher than 700 m. Bonji-iwa: HK (39917) & YU. Hikosan: HK (39842 & 39861) & YU. Kitadake-Johghu: HK (39751) & YU. Notohge: HK (39943 & 39987) & YU. Takasumi-Kitadake: HK (39723) & YU.

62) **H. obscurata** (Nyl.) Trevis.; occasional on barks and rocks from the base to the top of the mountain. Kitadake-Johghu: HK (39750) & YU.

63) **Hymenelia lacustris** (With.) M. Choisy; common on exposed rocks along trail. Although this species is widely distributed in temperate to cool regions in the Northern Hemisphere (Poelt & Vezda, 1981; Egan, 1987), it has been only reported from Mt. Fuji in Japan by Nylander (1890) under the name *Lecanora lacustris* (With.) Nyl. This is the second locality for this species in Japan. Although this species usually grows on rocks along stream, it was found on rocks near the ridge where it seems to be often drained after rain. Kitadake-Jyoghu: HK (39769) & YU. Notohge: HK (39970) & YU.

64) **Hypotrachyna koyaensis** (Asahina) Hale; occasional, restricted to twigs of trees exposed to windy condition. Notohge: HK (40010 & 40025) & YU.

65) **H. nodakensis** (Asahina) Hale; this species seems to be rather rare in Japan, having been reported from Nippara, Motohakone, Mt. Koya, Mt. Takao and Mt. Unzen (Asahina, 1959; Kashiwadani *et al.*, 1995). In the present survey, it was collected at two localities where it grew on bark of *Tsuga* and on twigs of *Euonymus*. Notohge: HK (39939) & YU. Kitadake-Johghu: HK (39763) & YU.

66) **H. osseoalbida** (Vain.) Y. S. Park & Hale; common on barks and rocks. Bonji-iwa: HK

(39896 & 39904) & YU. Takasumi: HK (39695) & YU.

67) **H. pseudosinuosa** (Asahina) Hale. Although this species has been reported only from five localities in Honshu (Nagano Prefecture to Hyogo Prefecture, Asahina, 1952), Japan, it was found on bark of *Sorbus japonica* at elevations between 720 to 910 m. According to recent collections in TNS, this species seems to be widely distributed in lowland to mountain regions from central Honshu to Shikoku and Kyushu. Notohge: HK (39931) & YU. Additional specimens examined. Honshu. Prov. Shinano: Kawagishi-mura, Suwa-gun, M. Takahashi s.n. (TNS). Prov. Mino: Sekigahara, Y. Asahina s.n. (TNS). Prov. Yamashiro: Mt. Hiei, Y. Asahina 41918 (TNS). Prov. Ohmi: Mt. Ibuki, Y. Asahina s.n. (TNS). Prov. Settsu: Y. Asahina s.n. (TNS). Prov. Ise: Gozaisho-dake, Y. Asahina s.n. (TNS); Yachi, Misugi-mura, Ichishi-gun, H. Kashiwadani 13236 (TNS). Prov. Kii: Mt. Koya, S. Kurokawa 60234 (TNS). Prov. Aki: Mt. Misen, Miyajima Island, S. Kurokawa 64404 (TNS). Shikoku. Prov. Awa: Mt. Kenzan, F. Fujikawa s.n. (TNS). Prov. Tosa: Kajigamori, Nagaoka-gun, S. Kurokawa 72286 (TNS). Kyushu. Prov. Bungo: S of Ohita city, S. Kurokawa 74001 (TNS). Prov. Hyuga: Sjoratpro-cho, Ebino-city, H. Shibuichi 9537 (TNS). Prov. Hizen: Mt. Unzen, Minamitakagi-gun, Y. Asahina & M. Togashi (TNS).

68) **H. revoluta** (Flörke) Hale; rare, collected at Hikosan and near Takasumi shrine where it grows on bark of *Prunus yedoensis* by road at elevation 700 to 950 m in the present area. Since Asahina (1953) first reported this species from Hakone, central Honshu, it has been collected in several localities from central Honshu to Kyushu (Kashiwadani, 1985) in Japan. This is the third locality for the specie in Kyushu where it was collected in Mt. Taradake (Kurokawa 62592, TNS) and Sakurajima (Faurie 3040, KYO). Hikosan: HK (39849 b) & YU. Takasumi-Kitadake: HK (39879) & YU.

69) **Lecanora chionocarpa** Hue; occasional on bark. Kanenotorii: YU 388.

70) **L. cinereofusca** H. Magn.; common on barks of trees and shrubs, especially on *Acer*, *Carpinus* and *Fraxinus*. As reported by Kashiwadani *et al.* (1996) and Ohmura & Kashiwadani (1997), four of five specimens examined contain atranorin and placodialic acid as major chemical substances. However, one specimen (no. 39815) lacks placodialic acid. No morphological difference was found among them. Kitadake: HK (39734 & 39735) & YU. Kitadake-Jyoghu: HK (39768 & 39815) & YU. Takasumi-Kitadake: HK (39881) & YU.

71) **L. imshaugii** Brodo; one of the most common species of the corticolous species of the genus *Lecanora* in the present area, being found on twigs and barks of trees. Ainohara II: YO 2942 & 2949. Kitadake-Johghu: HK (39814) & YU. Takasumi-Kitadake: HK (39709 & 39714) & YU.

72) **L. iseana** Räsänen. This species is endemic to Japan, having been reported from seven localities in Honshu (Miyawaki, 1985). The distribution range now includes Kyushu. In the present area, it was collected on barks of *Acer rufinerve* and *Fraxinus platypoda* at two localities elevations between 1020 to 1220 m. Plants from the present area contain atranorin and galactinuillin which was reported as "Lecanora-3" by Miyawaki (1985). Inugadake: YU 289. Kitadake: HK (39736) & YU. Kitadake-Johghu: HK (39814) & YU. Minamidake: YU 284.

73) **L. yasudae** Zahlbr.; common on barks, especially on *Acer*, *Alnus* and *Fagus*. Inugadake: YU 330.

74) **Lecidella elaeochroma** (Ach.) M. Choisy; occasional on bark and twigs. Kitadake: HK (39738) & YU.

75) **Leprocaulon arbuscula** (Nyl.) Nyl.; occasional on rocks in shaded condition. Bonji-iwa:

HK (39897) & YU. Hikosan: HK (39860) & YU. Takasumi-Kitadake: HK (39706) & YU.

76) **Leptogium moluccanum** (Pers.) Vain.; locally abundant, especially on rocks along river. Oushi: YO 2955.

77) **L. moluccanum** (Pers.) Vain. var. **myriophyllum** (Müll. Arg.) Asahina; common on rocks with mosses. Hikosan: HK (39851) & YU. Kanenotorii: HK (39891) & YU. Notohge: HK (39986) & YU.

78) **L. pedicellatum** M. Jørg.; occasional on barks or on rocks. Kanenotorii: HK (39890) & YU. Kosedo: YO 2974.

79) **Lobaria adscripturiens** (Nyl.) Hue; occasional on barks of *Fagus* and *Acer*. Kitadake-Johghu: HK (39753) & YU.

80) **L. discolor** (Bory) Hue; occasional on barks of *Fagus* and *Acer*. Kitadake-Johghu: HK (39819) & YU.

81) **L. fuscotomentosa** Yoshim.; occasional on barks. Kitadake-Johghu: HK (39766) & YU.

82) **L. isidiosa** (Müll. Arg.) Vain.; occasional on barks of *Fagus* and *Acer* in the *Fagus crenata* forest. Inugadake: YU 339. Kitadake-Johghu: HK (39817) & YU.

83) **L. spathulata** (Inumaru) Yoshim.; common on barks and rocks with mosses. Hikosan: HK (39863) & YU. Notohge: HK (39999) & YU.

84) **Megalospora tuberculosa** (Fée) Sipman; occasional on barks. Inugadake: YU 310. Kitadake: HK (39741) & YU.

85) **Menegazzia terebrata** (Hoffm.) A. Massal.; common on barks. Hikosan: HK (40034) & YU. Kitadake-Johghu: HK (39778) & YU. Notohge: HK (39949 & 39985) & YU. Takasumi: HK (39699) & YU.

86) **Micarea prasina** Fr.; common on barks of *Cryptomeria japonica* in shaded condition. Bonji-iwa: HK (39906) & YU. Jyoghu: HK (39792) & YU. Kitadake-Johghu: HK (39757) & YU. Minamidake: YU 282. Notohge: HK (39942) & YU.

87) **Myelochroa entotheiochroa** (Hue) Elix & Hale; common on barks or on rocks throughout the area. Bonji-iwa: HK (39924) & YU. Hikosan: HK (39862) & YU. Notohge: HK (39945) & YU.

88) **M. irrugans** (Nyl.) Elix & Hale; common on barks of trees. Ainohara II: YO 2938. Hikosan: HK (40032) & YU. Notohge: HK (40002) & YU. Takasumi-Kitadake: HK (39712) & YU.

89) **M. leucotyiza** (Nyl.) Elix & Hale; common on barks and on rocks in shaded condition. Hikosan: HK (39866 & 39874) & YU. Kanenotorii: HK (39886) & YU. Sarutobi: YO 3007.

90) **Nephroma helveticum** Ach.; rare, found at only one locality where it grows on barks of *Prunus yedoensis* in small park. Hikosan: HK (40029) & YU.

91) **Normandina pulchella** (Bory.) Nyl.; common on mossy barks or on mosses on rock. Sarutobi: YO 3001.

92) **Ocellularia bicavata** (Nyl.) Müll. Arg.; occasional on barks. Inugadake: YU 327.

93) **Ochrolechia akagiensis** Yasuda; occasional on barks. Inugadake: YU 304. Kitadake-Johghu: HK (39745) & YU. Takasumi-Kitadake: HK (39718) & YU.

94) **O. parellula** (Müll. Arg.) Zahlbr.; occasional on exposed rocks. Notohge: HK (39933) & YU. Oushi: YO 2954.

95) **O. trochophora** (Vain.) Oshio; common on barks. Inugadake: YU 288. Notohge: HK

(39947) & YU. Takasumi-Kitadake: HK (39707) & YU.

96) **O. yasudae** Vain.; common on barks or on rocks with mosses. Hikosan : HK (39841) & YU. Ohmagari II: YO 2980. Takasumi-Kitadake: HK (39880) & YU.

97) **Pannaria lepidella** (Räs.) Kurok.; occasional on barks. Kitadake-Johghu: HK (39765 & 40040) & YU.

98) **P. lurida** (Mont.) Nyl.; occasional on barks at elevations higher than 900 m. Takasumi-Kitadake: HK (40041) & YU.

99) **Parmelia fertilis** Müll. Arg.; occasional on barks or on rocks at elevation higher than 700m. Bonji-iwa: HK (39913) & YU. Notohge: HK (40022) & YU.

100) **P. laevior** Nyl.; common on barks, rarely on rocks at elevations higher than 900 m. Inugadake: YU 287. Kitadake-Johghu: HK (39744 & 39820) & YU. Takasumi-Kitadake: HK (39834) & YU.

101) **P. marmorophylla** Kurok.; locally abundant around Mt. Kitadake where it grows on *Carpinus japonica* and *Fagus crenata*. Kitadake-Johghu: HK (39755) & YU.

102) **P. praesquarrosa** Kurok.; occasional on barks of *Fraxinus* and *Quercus* at elevations higher than 900 m. Takasumi-Kitadake: HK (39835) & YU.

103) **P. pseudolaevior** Asahina; rare, but locally abundant around Bonji-iwa rock. Bonji-iwa: HK (39914) & YU.

104) **P. shinanoana** Asahina; occasional on exposed rocks. Mt. Hikosan, S. Kurokawa 62477 (TNS).

105) **Parmelinella wallichiana** (Taylor) Elix & Hale; rare, collected on barks of *Quercus acutissima* at one locality around Notohge Pass. Bonji-iwa: HK (39925) & YU. Notohge: HK (39968) & YU.

106) **Parmelinopsis minarum** (Vain.) Elix & Hale; common on barks. Ainohara II: YO 2951a. Notohge: HK (39926 & 39938) & YU. Ohmagari II : YO 2984. Takasumi: HK (39688 & 39696) & YU. Takasumi-Kitadake: HK (39878) & YU.

107) **P. spumosa** (Asahina) Elix & Hale; common on barks. Ainohara II: YO 2951 b. Hikosan: HK (39847 e) & YU. Notohge: HK (39932) & YU.

108) **Parmotrema tinctorum** (Nyl.) Hale; common on barks or on rocks. Hikosan: HK (39882) & YU. Jyoghu: HK (39796) & YU.

109) **Peltigera degenii** Gyeln.; occasional on rocks. Hikosan: HK (39864) & YU. Jyoghu: HK (39793) & YU.

110) **P. dolichorrhiza** (Nyl.) Nyl.; rare, collected at only one locality. Takasumi-Kitadake: HK (39715) & YU.

111) **P. elisabethae** Gyeln.; occasional on soil. Ainohara I: YO 2933.

112) **P. polydactyla** (Neck.) Hoffm.; occasional on soil. Ohmagari I: YO 2978.

113) **P. pruinosa** (Gyeln.) Inumaru; on soil rich in humus or on rocks. Shingai: YU 363.

114) **Pertusaria commutata** Müll. Arg.; common on barks. Kitadake-Johghu: HK (39764 & 39779) & YU. Notohge: HK (39937) & YU.

115) **P. corallina** (L.) Arnold; common on barks. This species is easily distinguished from other Japanese species of the genus *Pertusaria* by the presence of coralloid isidia and by the production of stictic and norstictic acids. Notohge: HK (39983) & YU.

116) **P. laeviganda** Nyl.; common on barks at elevations higher than 700 m. All specimens

examined show UV+ brick orange reaction and contain stictic acid and 4,5-dichlororolichexanthone. Kitadake-Jyoghu: HK (39810) & YU. Inugadake-Ichinodake: YU 293. Notohge-Ichinodake HK (39948) & YU. Takasumi-Kitadake: HK (40037) & YU.

117) **P. mendax** Müll. Arg.; common on barks. Inugadake: YU 302 & 306. Kitadake: HK (39727) & YU. Kitadake-Johghu: HK (39767 & 39808) & YU. Kosedo: YU 352. Notohge: HK (39963) & YU.

118) **P. multipuncta** (Turn.) Nyl.; common on barks. All specimens examined show negative reactions with C, P and K and contain fatty acid or undetermined substances. Inugadake: YU 300. Notohge: HK (39997) & YU. Takasumi-Kitadake: HK (39717) & YU.

119) **P. pertusa** (L.) Tuck.; occasional on barks. Inugadake: YU 305 b. Ohmagari II: YO 2979.

120) **P. quartans** Nyl.; occasional, over mosses on rocks. Bonji-iwa: HK (39923) & YU. Notohge: HK (39991) & YU. Kanenotorii: YU 388 b.

121) **P. subfallens** Vain.; common on barks, twigs and on rocks. Inugadake YU 301. Notohge: HK (40012) & YU. Jyoghu: HK (39797) & YU. Notohge: HK (40017) & YU.

122) **P. sublaeviganda** Nyl.; rare, collected at only one locality. Kitadake: HK (39739) & YU.

123) **P. subobductans** Nyl.; common on barks. This species very much resembles *P. mendax* and can be only distinguished by the presence or absence of perlatolic acid (Oshio, 1981). However, specimens of the two species in the present area show no morphological or ecological differences. Inugadake: YU 305. Kitadake-Johghu: HK (39810 b) & YU. Takasumi-Kitadake: HK (39708) & YU.

124) **P. velata** (Turner) Nyl.; occasional on barks and on rocks. Inugadake: YU 299. Jyoghu: HK (39791) & YU. Kitadake-Johghu: HK (39828) & YU.

125) **Phaeographis asteriformis** (Zahlbr.) M. Nakan.; occasional on *Fagus* and *Acer* at elevations higher than 700 m. Ainohara II: YO 2947. Hikosan: HK (39848). Kitadake-Johghu: HK (39758) & YU.

126) **P. exaltata** Müll. Arg.; common on deciduous trees such as *Fagus*, *Styrax* and *Zelkova* from base to the top of the mountain. Hikosan: HK (40030) & YU. Kitadake: HK (39728 & 39731) & YU. Kitadake-Johghu: HK (39765) & YU. Notohge: HK (39930) & YU. Sarutobi: YO 3002 & 3010.

127) **Phaeophyscia hispidula** (Ach.) Moberg; common on barks or on rocks with mosses along trail. Hikosan: HK (39839) & YU. Kanenotorii: HK (39887) & YU. Sogi II: YO 2925. Tobaru: YO 2998 & 2999.

128) **P. pyrrophora** (Poelt) Kashiw.; occasional on barks of deciduous trees, rarely on rocks. Hikosan: HK (39865) & YU. Takasumi-Kitadake: HK (39713) & YU.

129) **Phyllicum japonicum** Zahlbr.; rare, restricted to exposed rocks along ridge, locally abundant around the Bonji-iwa rock. Bonji-iwa: HK (39909 & 39910) & YU.

130) **Physciella melanchra** (Hue) Essl.; common on rocks, barks and concrete along road. Hikosan: HK (39849 a) & YU.

131) **Pilophorus clavatus** Th. Fr.; occasional on rock in shaded condition along trail in the mountain and locally abundant on rocks along river. Inugadake: YU 328. Takasumi: HK (39701) & YU. Oushi: YO 2953.

132) **Placynthiella uliginosa** (Schrad.) Coppins & P. James; rare, on soil along river at lower

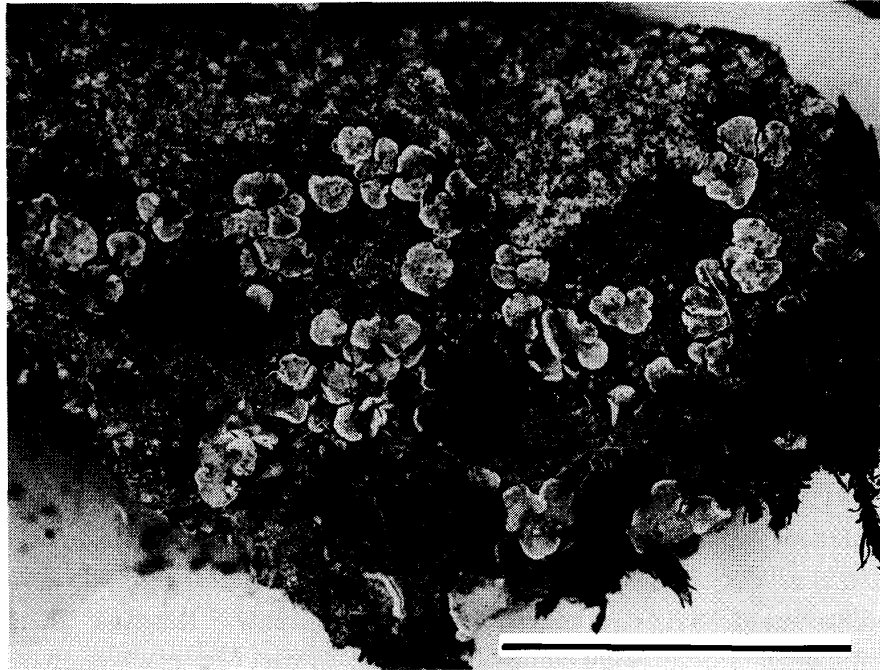


Fig. 2. *Psora rubiformella* (Zahlbr.) Gotth. Schneid., Y. Ohmura 2990 (TNS). Scale bar = 1 cm.

elevations. Although this species is widely distributed in the Northern Hemisphere, it has been only reported from Hokkaido (Ohmura and Kashiwadani, 1997) and Honshu (Inoue & Moon, 1995; Kashiwadani *et al.* 1996) in Japan. New to Kyushu. Kakizaka: YO 2992.

133) ***Porpidia albocaerulescens*** (Wulfen) Hertel & Knoph; common on rocks by road and also in forest in rather shaded condition. Inugadake: YU 309. Kitadake-Johghu: HK (39823) & YU.

134) ***Psora rubiformella*** (Zahlbr.) Gotth. Schneid. (Fig. 2).

This species was once reported from Nagasaki in Kyushu (Nylander, 1890) under the name of *Lecidea subrubiformis* Nyl. This is the second locality for the species in Japan. In the present survey, it was found on exposed rocks along the Yamakuni river where it grows together with *Grimmia pilifera* P.Beauv., *Endocarpon* and *Staurothele*.

At present, three species of *Psora*, *P. rubiformis* (Ach.) Hooker, *P. nipponica* (Zahlbr.) Gotth. Schneid. and *P. rubiformella* (Zahlbr.) Gotth. Schneid., are known in Japan (Inoue, 1988 b). Although they have similar thallus with brownish black apothecia, they are easily recognized by their chemistry; *P. rubiformis* contains no lichen substance, *P. nipponica* contains gyrophoric acid (C+ red) and *P. rubiformella* contains bourgeanic acid. Kakizaka: YO 2990.

135) ***Psorula rufonigra*** (Tuck.) Gotth. Schneid.; rare, but locally abundant on rocks along river. Kakizaka. YO 2993. Sogi II: YO 2924.

The present species was described as *Lecidea asahinae* by Zahlbruckner (1927) (Type collection: Japan, Prov. Shinano, Kiso, Agematsu, Y. Asahina s.n., isotype in TNS!), and it has not been reported from Japan ever since. In 1979, however, Schneider reduced it a synonym of *Psorula rufonigra*. *P. rufonigra* and *Psora rubiformella* seems to share similar habit on rocks along stream.

However, it is clearly distinguished from the latter species by the dark brown, irregularly branched thalli with black lower surface and black apothecia (K-). In contrast, *P. rubiformella* has greenish

gray, single-lobed thalli with white lower surfaces and orange brown apothecia (K+ purple) owing to production of anthraquinones. This species seems to be widely distributed from central Honshu to Kyushu in Japan. Additional specimens examined. Japan. Honshu. Prov. Musashi: Nagatoro, Chichibu-gun, Y. Asahina 3 (TNS). Prov. Izu: Mt. Shiroyama, Ohito, Tagata-gun, Y. Asahina & A. Yamamoto s.n. (TNS); Shuzenji, Tagata-gun, Y. Asahina 153 (TNS). Prov. Shinano: Nishikomagatake, Y. Asahina 114 (TNS). Prov. Settsu: Tada Shrine, Tada-mura, Kawabe-gun, M. Togashi s.n. (TNS). Shikoku. Prov. Awa: Anabuki, Mima-gun, F. Fujikawa s.n. (TNS).

- 136) **Punctelia borreri** (Sm.) Hale; common on barks and on rocks throughout the area. Ainohara I: YO 2932.
- 137) **P. rudecta** (Ach.) Krog; common on barks and on rocks throughout the area. Hikosan: HK (39857 & 39846) & YU.
- 138) **Pyrenula japonica** Kurok.; occasional on bark at elevations higher than ca. 700 m. Ainohara II: YO 2939.
- 139) **Pyxine endochrysin** Nyl.; occasional on rocks at elevations below 300 m. Sogi I: YO 2927.
- 140) **P. limbulata** Müll. Arg.; occasional on barks at elevations higher than ca. 700 m. Hikosan: HK (39856) & YU. Notohge: HK (39998) & YU.
- 141) **P. subcinerea** Stirt.; rare, collected at only one locality near Kanenotorii where it grows on trunks of *Machilus thunbergii*. Kanenotorii: HK (39888) & YU.
- 142) **Ramalina conduplicans** Vain.; rare, collected at one locality near Notohge Pass where it grows on twigs of *Carpinus laxiflora*. Notohge: HK (39949) & YU.
- 143) **R. kurokawae** Kashiw.; locally abundant on outcrops around Bonji-iwa. When Kashiwadani (1996) described this species, he reported it from Hokkaido to Shikoku in Japan. The distribution now includes Kyushu. In the present area, it is locally abundant on rocks around the Bonji-iwa area where it grows together with *R. yasudae*. It resembles *R. litoralis* Asahina, in having similar nodulate branches with terminal isidiate soredia. However, it can be distinguished from the latter by the fistulate thallus containing evernic and obtusatic acids. Bonji-iwa: HK (39899) & YU.
- 144) **R. peruviana** Ach.; locally abundant but restricted around Hitotsudo where it grows on stone works in precinct of small shrine. Hitotsudo: YO 2967.
- 145) **R. yasudae** Räs.; locally abundant on rocks along road or on exposed rocks in Hikosan town and Bonji-iwa. Bonji-iwa: HK (39895 & 39898) & YU.
- 146) **Rimelia clavulifera** (Räsänen) Kurok.; common on rocks and on barks throughout the present area. Hikosan: HK (39844) & YU. Notohge: HK (39989) & YU.
- 147) **R. reticulata** (Tayl.) Hale & A. Flechter; rare, collected on barks of *Quercus acutissima*. Notohge: HK (40011) & YU.
- 148) **Sphaerophorus meiophorus** (Nyl.) Vain.; rare, collected at only one locality in precinct of Takasumi shrine where it grows on barks of *Cryptomeria japonica*. Takasumi: HK (39686) & YU.
- 149) **Stereocaulon commixtum** (Asahina) Asahina; rare. *S. commixtum* usually grows on rocks along river which are easily submerged in flood. The plant from the present area is, however, collected on rocks near the summit of Mt. Hikosan where the rocks seems to be steeped in rain. Kitadake-Johghu: HK (39762) & YU.
- 150) **S. exutum** Nyl.; occasional on rocks. Bonji-iwa: HK (39922) & YU. Kitadake-Johghu:

HK (39761) & YU.

151) **S. japonicum** Th. Fr.; common on rocks throughout the area. Ainohara I: YO 2930. Notohge: HK (39978) & YU. Takasumi: HK (39685) & YU.

152) **S. pileatum** Ach.; rare, collected only near the summit of Mt. Hikosan. Takasumi-Kitadake: HK (39822) & YU.

153) **S. sorediiferum** Hue; rare, found on rocks in rather shaded condition along trail from Takasumi shrine to the summit of Mt. Hikosan. Takasumi: HK (39681) & YU. Kitadake-Johghu: HK (39825) & YU.

154) **S. vesuvianum** Pers.; rare, collected at only one locality. Inugadake: YU 336.

155) **Strigula elegans** (Fée) Müll. Arg.; locally abundant on leaves of *Camellia japonica* or on evergreen broad-leaved trees at elevations lower than 300 m. Ohmagari: YO 2977.

156) **Tephromela atra** (Huds.) Hafellner; common on barks or on rocks. Notohge: HK (40018) & YU. Kosedo: YU 353.

157) **Thyrea hondoana** Zahlbr.; locally abundant on rocks along the Yamakuni river. This species has been reported from Prefectures Miyagi, Nagano, Aichi and Kochi (Asahina, 1931; Yoshimura, 1974). New to Kyushu. Kosedo: YO 2971.

158) **Trapelia coarctata** (Sm.) M. Choisy in Werner; rare, collected at one locality at Kosedo where it grows on exposed rocks along river. Inoue (1988 a) reported common occurrence of this species from Hokkaido to Honshu. However, the distribution now extends to Kyushu. Kosedo: YU 358.

159) **Tricharia albostrigosa** R. Sant.; common on leaves of *Sasa*. Onisugi: YU 394.

160) **Usnea aciculifera** Vain.; common on barks especially on *Prunus* and *Quercus*. Ikoinomori: YO 2965 & 2966.

161) **U. baileyi** (Stirt.) Zahlbr.; rare, collected at only one locality where it grows on exposed rocks along river. Oushi: YO 2958.

162) **U. confusa** Asahina; rare, collected at only one locality where it grows on barks of *Cryptomeria japonica*. Shingai II: YO 2968.

163) **U. diffracta** Vain.; rare, found at only one locality where it forms a small colony on exposed rocks. Notohge: HK (39947 b) & YU.

164) **U. pectinata** Taylor; rare, collected at only one locality where it grows on top of large rock along river. Kakizaka: YO (2988 & 2989) & YU.

165) **U. rubicunda** Stirt.; occasional on rocks and on barks. This species has been known by Japanese lichenologists as *U. rubescens* Stirt. which was reduced to a synonym of the present species by James (1979). Bonji-iwa: HK (39919) & YU. Notohge: HK (39976) & YU. Oushi: YO 2957.

166) **Xanthoparmelia claviculata** Kurok.; locally abundant on rocks along Yamakuni river. Sogi II: YO 2928.

167) **X. conspersa** (Ach.) Hale; locally abundant but restricted in lower elevations below ca. 330 m. Shingai: YU 350.

168) **X. coreana** (Gyeln.) Hale; common on rocks in exposed condition. Sogi II: YO 2926.

169) **Xanthoria mandschurica** (Zahlbr.) Asahina; locally abundant on exposed rocks. Sogi I: YO 2921.

要 約

英彦山の地衣類は、葉状—樹枝状地衣を中心に、大内（1963-1973）により約 130 種類が報告されている。しかし、これらの報告には引用標本が記載されていないために、報告された種類を分類学的に再検討することはできない。一方、国内でモノグラフ的研究が進んでいるウメノキゴケ属 (*Parmelia*, 広義)、カブトゴケ属 (*Lobaria*)、トリハダゴケ属 (*Pertusaria*)、ハナゴケ属 (*Cladonia*, 広義) モジゴケ科 (*Graphidaceae*)、などでは、同地域で採集された標本がしばしば引用されている。しかし、地衣類の総合的な研究はこれまでに実施されていない。

本論文では主として筆者らにより、1996-1997 年に採集された標本約 650 点をもとに、169 種類の地衣類を報告した。このうちの大多数は日本各地に普通に分布するものであるが、中には植物分類地理学上興味あるものも含まれている。すなわち *Anthracotheceum laevigatum* Müll. Arg., *Hymenelia lacustris* (With.) M. Choisy, *Psora rubiformella* (Zahlbr.) Gotth. Schneid., *Psorula rufonigra* (Zahlbr.) Gotth. Schneid. は日本では第二の報告である。以下これらについて述べる。

Anthracotheceum laevigatum (ナメラニキビゴケ, 新称): 本種はこれまでに高知県から採集された基準標本が知られているだけで、その後の記録はない。今回の調査では、相ノ原 (海拔 700 m) のツガ樹幹上に生育するのが見つかった。

Hymenelia lacustris (イワアバタゴケ, 新称): *Hymeneliaceae* (イワアバタゴケ科, 新称) に属する固着地衣類で *Aspicilia* や *Ionopsis* に近縁である。本種は北半球に広く分布するが、日本からはこれまでに Nylander (1890) が富士山から *Lecanora laucstris* (With.) Nyl. として報告した記録があるだけである。本種は雨水がよく流れるような岩上や小川の近くを好んで生育する。地衣体は痂状で淡褐色—黄褐色、平滑で地衣体に埋没した子器を沢山つける。共生藻は緑藻、子器はレカノラ型、側糸は基部で互いに密着するが、上部では所々で融合する。子嚢は棍棒状で 8 個の無色、単室、楕円形の胞子を作る。地衣成分は含まない。

Psora rubiformella (サイゴクタテゴケ, 新称): 本種は、Nylander (1890) が富士山の標本を元に *Lecidea subrubiformis* Nyl. として発表したもので、Schneider (1979) の研究により両者が同一種であることが明らかになった。日本産の *Psora* (タテゴケ属, 新称) としては、本種のほかに *P. rubiformis* (Ach.) Hooker と *P. nipponica* (Zahlbr.) Gotth. Schneid. の 2 種が報告されている (Inoue, 1988 b)。これらは黒褐色のレキデア型の子器と黒褐色—淡褐色の単葉の地衣体を持つ点で似ているが、含有成分を調べると簡単に区別できる。すなわち、*P. rubiformis* は地衣成分を含まないのに対し、*P. nipponica* はジロフォル酸を、*P. rubiformella* はボウルゲアン酸 (bourgeanic acid) を含むので区別できる。*P. rubiformella* は現在のところ、長崎県と大分県でしか見つかっていない。

Psorula rufonigra (モクズゴケモドキ, 新称): 本種は、Zahlbruckner (1927) が朝比奈泰彦採集の木曾上松 (現在は長野県木曾郡上松) の標本をもとに *Lecidea asahinae* Zahlbr. として発表したものであるが、Schneider (1979) が *Psorula* に移し *P. rufonigra* の異名とした。Zahlbruckner の報告以来、本種に関する報告は皆無であったが、今回の調査で本種が山国川沿いの河岸上に多数生育するのが見つかった。地衣体は鱗片状で幅 0.2-0.3 mm ほどの中央部が凹んだ小裂片からなり、表面は汚れた褐色、裏面は黒色で中央部よりにやや藍色かかった繊維状の仮根をつける。子器は黒色、*Lecidella* 型 (Inoue, 1982) で子嚢上層は藍色、子嚢下層はよく発達して扇状となる。胞子は無色楕円形、1-2 室で $14 \times 4.8 \mu\text{m}$ である。日本では本州中部以南—九州に分布する。

また、*Brigantiaea purpuratum*, *Hypotrachyna pseudosinuosa*, *Lecanora iseana*, *Placynthiella uliginosa*, *Ramalina kurokawae*, *Thyrea hondoana*, *Trapelia coarctata* は九州新産種である。さらに、日本産地衣類の中でもこれまでの産地が数カ所程度しか知られていない稀種が見つかった例として *Hypotrachyna nodakensis* (Asahina) Hale と *H. revoluta* (Flörke) Hale がある。

英彦山とその周辺地域の地衣類相を概観すると、出現する種は樹木の垂直分布に伴って概ね次のように特徴づけられる。

海拔 900 m 以上のブナ林：日本各地のブナ帯に出現する種と一致しているが、サルオガセ属、カタチゴケ属のような樹枝状地衣類の生育はほとんど見られない他、大型葉状地衣類の生育も極めて貧弱である。主な種：*Agonimiella pacifica*, *Anzia opuntiella*, *Brigantiaea ferruginea*, *Collema complanatum*, *Cetrelia japonica*, *Cetrariastrum cirrhatum*, *Graphina inabensis*, *G. undulata*, *Graphis cognata*, *G. proserpens*, *G. rikuzensis*, *Lecanora iseana*, *Lobaria adscripturiens*, *L. fuscotomentosa*, *Ochrolechia akagiensis*, *Pannaria lepidella*, *Parmelia marmorophylla*, *P. subdivaricata*, *Pertusaria commutata*, *P. laeviganda*, *P. mendax*, *P. quartans*, *P. subobductans*, *P. velata*, *Phaeographis asteriformis*, *Phaeophyscia pyrrophora*, *Pyrenula japonica*, *Pyxine limbulata*, *Ramalina conduplicans*.

梵字岩（海拔 800-900 m）付近に見られる集塊岩の路頭：乾燥した路頭は地衣類で覆われていることが多い。路頭基部やや日陰になるところでは、*Anzia*, *Cetrelia*, *Myelochroa*, *Parmelinella* などの大型葉状地衣が多く、路頭先端で日当たりがよく乾燥する場所では *Aspicilia*, *Phylliscum* などごく限られた種が生育する。主な種：*Anzia opuntiella*, *Aspicilia*, *Candelariella vitellina*, *Cetrelia japonica*, *Diploschistes* sp., *Heterodermia microphylla*, *Myelochroa entothoichroa*, *Parmelia fertilis*, *P. pseudolaevior*, *Parmelinella wallichiana*, *Pertusaria quartans*, *Phylliscum japonicum*, *Ramalina kurokawae*, *R. yasudae*, *Stereocaulon exutum*, *Usnea rubicunda*.

野峠—犬ヶ岳に至る小規模の路頭が点在する尾根筋：樹高が低く風当たりが強いためハナゴケ属や岩上にも生育できる種が多く見られるのが特徴である。主な種：*Anaptychia palmulata*, *Cetrelia japonica*, *Cladia aggregata*, *Cladonia crispata*, *C. furcata*, *C. krempelhuberi*, *C. rangiferina*, *Pertusaria quartans*, *P. subfallens*, *Rimelia clavulifera*, *Myelochroa entothoichroa*, *Usnea diffracta*.

耶馬溪及び山国川に沿った河岸岩上（海拔約 300 m）：日当たりがよく、川の飛沫がかかる山国川に沿った河岸の岩上および岸壁は下にあげた地衣類の良好な生育環境を提供する。主な種：*Cladonia rangiferina*, *Dermatocarpon miniatum*, *Ephebe japonicum*, *Myelochroa leucotylyza*, *Ochrolechia parellula*, *Phaeophyscia hispidula*, *Psora rubiformella*, *Psorula rufonigra*, *Pyxine endochrysin*, *Thyrea hondoana*, *Usnea baileyi*, *U. pectinata*, *Xanthoparmelia claviculata*, *X. conspersa*, *X. coreana*.

スギ、ヒノキの植林：地衣類の生育は非常に貧弱で、*Micarea* や *Lepraria* のように日陰を好む種以外は種数も少ない。陽地性のハナゴケ類は木漏れ日の当たるスギやヒノキの根元に限って生育するのが普通である。主な種：*Chiodecton japonicum*, *Cladonia macilentata*, *C. squamosa*, *Lepraria* sp., *Micarea prasina*, *Sphaerophorus meiophorus*.

英彦山町に点在する駐車場周辺のソメイヨシノ樹幹（海拔約 700 m）：明らかに人工的な環境ではあるが、地衣類の生育は旺盛である。特に日本では稀種である *Hypotrachyna revoluta* が少量ではあるが生育するのが注目される。主な種：*Agonimiella pacifica*, *Caloplaca* sp., *Cetrelia braunsiana*, *Cladonia ramulosa*, *C. squamosa*, *Coccocarpia erythroxyli*, *C. porinopsis*, *Flavoparmelia caperata*, *Hypotrachyna revoluta*, *Ochrolechia yasudae*, *Parmelia fertilis*, *Parmelinopsis spumosa*, *Parmotrema tinctorum*, *Phaeographis asteriformis*, *Phaeophyscia rubropulchra*, *Physciella melanchra*, *Punctelia rudecta*, *Rimelia clavulifera*, *Usnea rubicunda*.

車道に沿ったコンクリート壁及び民家の石垣（海拔 300-700 m）：低地から 700 m 付近まで、出現する種に大きな変化がない。主な種：*Candelaria concolor*, *Candelariella vitellina*, *Collema subflaccidum*, *Endocarpon petrolepideum*, *Physciella melanchra*.

かつて英彦山から報告のある種のうち今回の調査で発見できなかったものには次のようなものがある：*Gymnoderma insulare*, *Heterodermia hypoleuca*, *Sticta nylanderiana*, *Umbilicaria esculenta*. *Gymnoderma insulare* は絶滅危惧種に含まれる種であるが、生育場所であるスギの古木が台風により破

壊されたため英彦山では絶滅した可能性が高い。

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