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Lichen Flora of Amami and Ryukyu Islands, Japan (1)*

Masami SATO**

佐藤正己：奄美および琉球列島の地衣フロラ（第1報）

The lichen flora of Japan Proper and Taiwan (Formosa) is studied already for a long time by foreign and Japanese lichenologists. However, our knowledge of the lichen flora of Amami and Ryukyu Islands which are situated just between Japan Archipelago and Taiwan is very poor, and these islands are still "*terra incognita pro lichenes*".

In the former lichenological papers written by foreign lichenologists we can find sometimes "Loochoo" or "Liukiu" and "Ryukyu", but nearly all of them indicate Island Yakushima or Amami Islands which belong to Kagoshima Prefecture. In this paper, Ryukyu Islands means the area of former Okinawa Prefecture before World War II, and now reigned by the U. S. Civil Administration of the Ryukyu Islands.

Before the war, Mr. Tetsuro KANASHIRO (former name of Tetsuo AMANO) made a small collection of lichen together with his large collection of spermatophytes of Ryukyu Islands and sent the lichen specimens to the writer for identification. After the war, Mr. AMANO came back from China to Okinawa and continued the collection of lichens together with other higher plants and sent the duplicate specimens of lichen to the writer. These specimens, however, were kept in the herbarium of Ibaraki University undetermined by the writer for a long time.

At the end of 1969, the writer got a chance to make lichen hunting trip to Ryukyu Islands under the financial support of the Ministry of Education. He could collect lichen specimens by himself in Island Miyako and Ishigaki during a few days, and later in Island Okinawa for a week under the guidance of Mr. AMANO together with Mr. S. TAMAKI and Mr. K. KAMURA of Ryukyu University. The itinerary for the writer's trip was as follows:

Dec. 16, 1969=Mito to Tokyo (Haneda). 17=Haneda to Isl. Okinawa (Naha). 18=Naha to Isl. Miyako (Hirara). 19=Hirara to Isl. Ishigaki (Ishigaki). 20=Ishigaki to Isl. Taketomi, back to Ishigaki, to Isl. Okinawa (Naha). 21-22=Naha and its vicinity. 23=Naha

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to Nago, Nago to Mt. Katsuu, back to Nago. 24=Nago to Mt. Tanyu, Taminato-Otaki (Oogimi-son), Kesaji and Hentona. 25=Hentona to Mt. Yonaha, Yona, back to Hentona. 26=Hentona to Meijiyama Botanic Garden, Onna and Naha. 27-28=Naha and its vicinity. 29=Naha to Tokyo (Haneda) and Mito.

After the lichen hunting trip with the writer in 1969, Mr. AMANO continued the collection of lichen in Isl. Okinawa and Ishigaki, and sent many duplicate specimens to the writer. Besides these specimens, the writer has a small collection of lichen made by the late Takashi NAITO of Kagoshima University in the summer of 1938 at the central and northern part of Isl. Okinawa under the guidance of Mr. AMANO.

Among these specimens, there are sterile or imperfect ones and a lot of specimens are still kept undetermined. The writer is much obliged to Dr. Minoru NAKANISHI for the identification of the specimens of Graphidaceae. Dr. Masayoshi OSHIO and Dr. Isao YOSHIMURA cooperated the identification of the specimens of Pertusariaceae and the genus *Lobaria*, respectively, and the writer wishes to express his sincere appreciation to them. Appreciation should be extended to Prof. emer. Y. ASAHINA of the University of Tokyo and Dr. Syo KUROKAWA of the National Science Museum, Tokyo for their invaluable suggestions throughout the study. The writer's sincere thanks are expressed to Mr. AMANO who gave his valuable lichen collection of Amami and Ryukyu Islands to the writer.

Names of localities. It is very difficult for visiting botanists to read the names of localities in Amami and Ryukyu Islands, so the writer enumerates them both in Roman and Chinese letters.

A) **Amami Islands** (奄美列島)

Isl. Oshima (奄美大島): Mt. Yuwan (湯灣岳) 694m, Kudadon (管鈍), Sumiyo (住用), Nishikata-mura (西方村), Higyan (ヒギャン).

Isl. Ukeshima (請島): Ikeji (池地).

Isl. Kakeroma (加計呂麻島): Mt. Yumishi (弓師岳) 314m, Mt. Hyo (俵岳).

Isl. Tokunoshima (徳之島): Mt. Amagi (天城山) 533m, Mt. Inokawa (井之川岳), Mt. Tanpatsu (丹発山) 443m.

B) **Ryukyu Islands** (琉球列島)

Isl. Okinawa (沖縄島): Kunigami-son (国頭村); Aha (安波), Benoki (辺野木), Hedo (辺土), Mt. Hedo (辺土岳) 246m, Yona (与那), Mt. Iyu (伊湯岳) 454m, Mt. Yonaha (与那覇岳) 498m. Oogimi-son (大宜味村): Nuuha (饒波), Taminato-Otaki (田港御嶽) or Taminato-Ogan (田港御拝). Higashi-son (東村): Gesashi or Kesaji (慶佐次). Haneji-son* (羽地村): Mt. Tanyu or Tanio (多野岳) 390m, Mt. Genka (源河山). Nakijin-son (今帰仁村): Amesoko or Amisoko (天底). Motobu-cho (本部町): Mt. Katsuu (嘉津字岳) 460m. Nago-cho* (名護町): Mt. Nago (名護岳) 338m, Mt. Henoko (辺野古岳), Yoriaibaru (寄合原). Onna-son (恩納村): Mt. Onna (恩納岳) 375m. Nakagusuku-son (中城村): Nakagusuku-jyo (中城城). Haeburu-son (南風原村): Oona (大名). Misato-son (美里村): Hiratabaru (平田原). Naha-shi (那覇市): Hantagawa (繁多川),

Maaji (真地), Syuri (首里). Itoman-cho (糸満町): Mabuni (摩文仁).

* Three years ago Nago-shi was established including former Nago-cho, Kushi-son (久志), Haneji-son, Yagachi-son and Yabu-son (屋部).

Isl. Yagachi (屋我地島): Yagachi-son (屋我地村).

Isl. Kume (久米島): Mt. Ara (阿良岳) 237m, Gushikawa (具志川).

Isl. Miyako (宮古島): Hirara-shi (平良市), Gusukube-cho (城辺町).

Isl. Ishigaki (石垣島): Mt. Banna (バンナ岳) 231m, Mt. Omoto (オモト岳) 525m, Mt. Nosoko (野底岳) 282m, Yonehara (米原).

Isl. Iriomote (西表島): Mt. Goza (ゴザ) 420m, Yassa Gorge (ヤッサの谷).

A. HYMENOLICHENES

1. Fam. Dictyonemataceae

1) **Dictyonema membranaceum** C. AG. ASAHINA in Journ. Jap. Bot. 20: 236 (1944).

Loc. On the ground. Isl. Okinawa: Haneji (ASAHINA, l. c.).

Distr. Japan (Shikoku, Ryukyu), Taiwan, Philippines and Marianas.

2) **Dictyonema thelephora** ZAHLBR. ASAHINA in Journ. Jap. Bot. 20: 235 (1944). SATO in Bull. Fac. Lib. Art., Ibaraki Univ., Nat. Sci. 7: 68 (1957).

Dictyonema sericeum BERK. SATO in Journ. Jap. Bot. 14: 424 (1938).

Loc. On mosses on the ground or rocks. Isl. Amami-Oshima: Mt. Yuwan (no. 3515).

Isl. Okinawa: Mt. Yonaha (no. 3514), Mt. Katsuu (no. 4061).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Yakushima, Amami, Ryukyu, Ogasawara), Taiwan, China Proper and tropical regions.

B. ASCOLICHENES

1. Fam. Graphidaceae

The asterisk (*) at the top of the scientific name indicates that the species is newly added to the lichen flora of Ryukyu Islands.

I. *Graphis* (ADANS.) MÜLL. ARG.

1) **Graphis anfractuosa** ESCHW. NAKANISHI, l. c., p. 77 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, l. c.).

Isl. Ishigaki: Nosoko (NAKANISHI, l. c.). Isl. Iriomote: Mt. Goza (NAKANISHI, l. c.).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Amami, Ryukyu) and all over the world, especially in the tropics.

2) * **Graphis awaensis** VAIN. NAKANISHI, l. c., p. 71 (1966).

Loc. On the bark of trees or on rocks. Isl. Oshima: Sumiyo (NAKANISHI, l. c.). Isl. Kakeroma: at 50m above sea level (NAKANISHI, l. c.).

Isl. Okinawa: Mt. Katsuu (no. 4244).

Distr. Japan (Shikoku, Kyusyu, Yakushima, Amami, Ryukyu).

3) * **Graphis caesiella** VAIN., *Etud. Lich. Bresil* 2: 122 (1890).

Loc. On the bark of trees. Isl. Okinawa: Maaji (no. 4164, on *Elaeocarpus sylvestris* POIR.), Syuri (no. 4183, on *E. sylvestris* POIR.) and Hantagawa (no. 4263) in Naha; Oona in Haebaru-son (no. 4194, on *Macaranga tanarius* MÜLL. ARG.). Isl. Miyako: Gusukube-cho (no. 4262, on *Distylium racemosum* SIEB. et ZUCC.).

Distr. Japan (Ryukyu, Ogasawara) and Brasil.

4) * **Graphis cervina** MÜLL. ARG. NAKANISHI, 1. c., p. 72 (1966).

Loc. On granitic rocks. Isl. Ishigaki: Nosoko (no. 4264).

Distr. Japan (Honsyu, Shikoku, Yakushima, Ryukyu) and China,

5) * **Graphis cinerea** (ZAHLEBR.) NAKANISHI, 1. c., p. 63 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, 1. c.).

Isl. Okinawa: Mt. Katsuu (no. 4114, on *Raphiolepis umbellata* MAKINO), Mt. Yonaha (no. 4098).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Yakushima, Amami, Ryukyu) and China.

6) **Graphis desquamescens** (FÉE) HALE et WIRTH. NAKANISHI, 1. c., p. 75 (1966).

Loc. On the bark of trees. Isl. Kume: Gushikawa (NAKANISHI, 1. c.).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Ryukyu), Taiwan, China, N. and S. America.

7) * **Graphis dupaxana** VAIN. NAKANISHI, 1. c., p. 58 (1966).

Loc. On the bark of trees. Oshima: Kudadon (NAKANISHI, 1. c.).

Isl. Okinawa: at 240 m above sea-level (NAKANISHI, 1. c.). Isl. Okinawa: Mt. Katsuu (no. 3841, on *Fraxinus formosanus* HAYATA), Mt. Tanyu (no. 4061), Haneji-son (no. 4269, on *Alnus formosana* MAKINO).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Yakushima, Amami, Ryukyu), Philippines and Java.

8) * **Graphis duplicata** ACH., *Synops. Lich.*: 81 (1814).

Loc. On the bark of trees. Isl. Okinawa: Mabuni (no. 4166, on *Pongamia pinnata* PIER.).

Distr. Japan (Ryukyu) and throughout the tropics.

This is the new addition to the lichen flora of Japan.

9) * **Graphis elegans** ACH., *Synops. Lich.*: 85 (1814). NYL., *Lich. Jap.*: 86 (1890).

Loc. On the bark of trees. Isl. Okinawa: Nuuha in Oogimi-son (no. 4182, on *Ficus septica* BURM. f.), Nakagusuku-jyo (no. 4331, on *Mallotus philippinensis* MÜLL. ARG.).

Distr. Japan (Honsyu, Ryukyu), Europe and New Zealand.

10) * **Graphis handelii** ZAHLEBR. NAKANISHI, 1. c., p. 68 (1966).

Loc. On the bark of trees. Isl. Oshima: Sumiyo (NAKANISHI, l. c.).
Isl. Kakeroma: at 80m above sea-level (NAKANISHI, l. c.). Isl. Miyako: Near
the Agric. High School (no. 4173, on *Morus australis* POIR.), Gusukube-cho (no.
4172, on *Erythrine variegata* var. *orientalis* MERR.).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Tanegashima, Amami, Ryukyu) and
China.

11) * **Graphis intricata** FÉE. NAKANISHI, l. c., p. 74 (1966).

Loc. On the bark of trees. Isl. Kakeroma: Mt. Yumishi (NAKANISHI, l. c.).
Isl. Tokunoshima: Inokawa (NAKANISHI, l. c.). Isl. Okinawa: Hantagawa in
Naha-shi (no. 4175), Amesoko in Nakijin-son (no. 4150).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Yakushima, Amami, Ryukyu, Ogasawara)
and widely in the tropics.

12) * **Graphis javanica** ZAHLBR. in Annal. Cryptog. Exot. 1: 131 (1928).

Loc. On the bark of trees. Isl. Okinawa: Nakagusuku-jyo (no. 4297, on *Ardisia
sieboldii* MIQ.; no. 4298, on *Cinnamomum japonicum* SIEB.), Nuuha in Oogimi-son
(no. 4299, on *Distylium racemosum* SIEB. et ZUCC.)

Distr. Japan (Ryukyu) and Java.

This species is new to the Japanese lichen flora.

13) * **Graphis leptocarpa** FÉE, Essai Cryptog. Ecorc. Offic.: 36 (1824).

Loc. On the bark of trees. Isl. Okinawa: Benoki in Kunigami-son (no. 4250).

Distr. Japan (Hokkaido, Honsyu, Shikoku, Kyusyu, Ryukyu) and tropical
regions.

14) * **Graphis lineola** ACH., Lichenogr. Univ.: 264 (1810).

Loc. On the bark of trees. Isl. Okinawa: Oona in Haebaru-son (no. 4184, on
Ficus virgata REINW.), Syuri in Naha-shi (no. 4185, on *Cinnamomum japonicum*
SIEB.).

Distr. Japan (Ryukyu) and tropical regions of the world.

This is the new record to the lichen flora of Japan.

15) **Graphis meridionalis** NAKAHISHI, l. c., p. 75 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, l. c.),
Nishikata-mura (NAKANISHI, l. c.). Isl. Kakeroma: at 50 m above sea level
(NAKANISHI, l. c.). Isl. Okinawa: Mt. Yonaha (no. 4022), Kunigami-son
(NAKANISHI, l. c.), Mt. Nago (NAKANISHI l. c.). Isl. Ishigaki: Mt. Banna
(NAKANISHI, l. c.).

Distr. Japan (Shikoku, Kyusyu, Yakushima, Amami, Ryukyu).

This species is endemic of the subtropical regions of Japan.

16) **Graphis oshioi** NAKANISHI, l. c., p. 60 (1966).

Loc. On the rotten tree trunks Isl. Kakeroma: at 80 m above sea level
(NAKANISHI, l. c.). Isl. Ukeshima: at 310m above sea level (NAKANISHI, l. c.).
Isl. Okinawa: Mt. Yonaha (no. 4048), Hentona (NAKANISHI, l. c.).

Distr. Japan (Shikoku, Kyusyu, Yakushima, Amami, Ryukyu).

This species is also endemic of subtropical regions of Japan as preceding species.

17) * **Graphis proserpens** VAIN. NAKANISHI, l. c., p. 57 (1966).

Loc. On rotten tree trunk. Isl. Oshima: Mt. Yuwan (NAKANISHI, l. c.).

Isl. Kakeroma: (NAKANISHI, l. c.). Isl. Okinawa: Mt. Yonaha (no. 4069).

Distr. Japan (Hokkaido, Honsyu, Shikoku, Kyusyu, Amami, Ryukyu), China and Borneo.

18) * **Graphis scripta** (L.) ACH. sensu lat. NAKANISHI, l. c., p. 69 (1966).

Loc. On the bark of trees. Isl. Okinawa: Mt. Katsuu (no. 3844, on *Euonymus tanakae* MAXIM.; no. 4057, on *Rhaphiolepis umbellata* MAKINO), Mt. Tanyu (no. 4055), Nakagusuku-jyo (no. 4295, on *Viburnum odoratissima* var. *awabuki* K.

KOCH), Hiratabaru in Misato-son (no. 4335, on *Symplocos okinawensis* MATSUM.),

Mt. Genka in Hanji-son (no. 4341, on *Styrax japonicum* SIEB. et ZUCC.),

Yoriaibaru in Nago-cho (no. 4342, on *Myrica rubra* SIEB. et ZUCC.).

Distr. Japan (Hokkaido, Honsyu, Shikoku, Kyusyu, Ryukyu), Taiwan, China and all over the temperate zone of northern hemisphere.

19) * **Graphis striatula** (ACH.) SPRGL., Syst. Veget. 4 (1): 250 (1827).

Loc. On the bark of trees. Isl. Okinawa: Mt. Yonaha (no. 4091), Mt. Tanyu (no. 4266).

Distr. Japan (Ryukyu) and tropical regions of the world.

This is the new addition to the lichen flora of Japan.

20) **Graphis tenella** ACH. NAKANISHI, l. c., p. 65 (1966).

Loc. On the bark of trees. Isl. Oshima: Higyan (NAKANISHI, l. c.). Isl. Kakeroma (NAKANISHI, l. c.).

Distr. Japan (Hokkaido, Honsyu, Shikoku, Amami, Ogasawara), China and throughout the world especially in the tropics.

21) **Graphis spp.**

The writer has several specimens belonging to the genus *Graphis*, however, identification of them is impossible at present. They are as follows; Isl. Okinawa: Syuri in Naha-shi (no. 4193, on *Elaeocarpus sylvestris* POIR.), Nakagusuku-jyo (no. 4294, on *Mallotus philippensis* MÜLL. ARG.), Hiratabaru in Misato-son (no. 4336 and no. 4337, on *Schima liukiuensis* NAKAI; no. 4338, on *Myrica rubra* SIEB. et ZUCC.).

II. *Phaeographis* MÜLL. ARG.

1) * **Phaeographis fuscodisca** NAKANISHI, l. c., p. 84 (1966).

Loc. On the bark of trees or on rocks. Isl. Oshima: Sumiyo (NAKANISHI, l. c.). Isl. Ishigaki: Mt. Omoto (no. 4265, on granitic rock).

Distr. Japan (Kyusyu, Tanegashima, Amami, Ryukyu, Ogasawara).

2) * **Phaeographis passaniae** (VAIN.) ZAHLBR. NAKANISHI, l. c., p. 85 (1966).

Loc. On the bark of trees. Isl. Okinawa: Haneji in Nago-shi (no. 4268, on *Alnus formosana* MAKINO).

Distr. Japan (Honsyu, Shikoku, Ryukyu).

According to Dr. NAKANISHI, l. c. this species is hitherto found only in two localities in Honsyu and Shikoku, however, its range is now spread far southwards untill Ryukyu Islands.

3) * **Phaeographis vicarians** (VAIN.) NAKANISHI, l. c., p. 88 (1966).

Loc. On the bark of trees. Isl. Okinawa: Nakagusuku-jyo (no. 4333, on *Fraxiuns insularis* HEMSL.), Mt. Katsuu (no. 4253).

Distr. Japan (Honsyu, Ryukyu, Ogasawara).

III. **Graphina** MÜLL. ARG.

1) **Graphina inabensis** (VAIN.) ZAHLBR, NAKANISHI, l. c., p. 94 (1966).

Loc. On the bark of trees. Isl. Oshima: Higyan (NAKANISHI, l. c.), Mt. Yuwan (NAKANISHI, l. c.). Isl. Kakeroma: at 50 m above sea level (NAKANISHI, l. c.). Isl. Okinawa: Taminato-Otaki in Ogimi-son (no. 4112, on *Ardisia sieboldii* MIQ.). Isl. Ishigaki: Mt. Nosoko (NAKANISHI, l. c.).

Distr. Japan (Hokkaido, Honsyu, Shikoku, Kyusyu, Yakushima, Amami, Ryukyu).

2) * **Graphina japonica** MÜLL. ARG. NAKANISHI, l. c., p. 89 (1966).

Loc. On the bark of trees. Isl. Okinawa: Mt. Yonaha (no. 4045 & 4047).

Distr. Japan (Shikoku, Kyusyu, Yakushima, Ryukyu) and Taiwan.

3) * **Graphina mendex** (NYL.) MÜLL. ARG. in Rev. Mycol. 10: 177 (1888).

Loc. On the bark of trees. Isl. Okinawa: Nakagusuku-jyo (no. 4296, on *Macaranga tanarius* MÜLL. ARG.).

Distr. Japan (Ryukyu, Ogasawara) and tropical regions.

4) * **Graphina subcrispa** HORIKAWA et NAKANISHI, l. c., p. 97 (1966).

Loc. On the bark of trees. Isl. Ishigaki: Nosoko (no. 4261), Mt. Omoto (no. 4171, on *Quercus miyagii* KOIDZ.).

Distr. Japan (Shikoku, Tanegashima, Yakushima, Ryukyu).

This species is endemic of southern Japan, but is not found in Kyusyu proper.

5) **Graphina soozana** ZAHLBR. NAKANISHI, l. c., p. 97 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, l. c.).

Isl. Okinawa: Mt. Nago (NAKANISHI, l. c.), Nakagusuku (NAKANISHI, l. c.).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Yakushima, Amami, Ryukyu) and Taiwan.

6) **Graphina subplicaris** ZAHLBR. NAKANISHI, l. c., p. 89 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, l. c.). Isl. Kakeroma: at 50 m above sea level (NAKANISHI, l. c.). Isl. Kume: Mt. Ara (NAKANISHI, l. c.).

Distr. Japan (Kyusyu, Yakushima, Amami, Ryukyu) and Taiwan.

7) **Graphina symplocorum** ZAHLBR. NAKANISHI, 1. c., p. 92 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, 1. c.).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Amami) and China.

8) **Graphina undulata** MÜLL. ARG. NAKANISHI, 1. c., p. 95 (1966).

Loc. On the bark of trees. Isl. Okinawa: Nakagusuku (NAKANISHI, 1. c.).

Isl. Ishigaki: Mt. Nosoko (NAKANISHI, 1. c.).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Yakushima, Ryukyu).

IV. **Phaeographina** MÜLL. ARG.

1) **Phaeographina macrospora** (ZAHLBR.) NAKANISHI, 1. c., p. 101 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, 1. c.). Isl. Kakeroma: Mt. Yumishi (NAKANISHI, 1. c.). Isl. Okinawa: Mt. Hedoishi in Kunigami-son (NAKANISHI, 1. c.).

Distr. Japan (Amami, Ryukyu) and Taiwan.

2) * **Phaeographina micromma** ZAHLBR. in FEDDE, Repert. 31: 219 (1933).

Loc. On the bark of trees. Isl. Okinawa: Syuri in Naha-shi (no. 4189, on *Cinnamomum japonicum* SIEB.; no. 4191 on *Citrus*; no. 4190, on *Elaeocarpus japonicus* SIEB. et ZUCC.), Nuuha in Oogimi-son (no. 4187, on *Distylium racemosum* SIEB. et ZUCC.).

Distr. Ryukyu and Taiwan.

This species was known only from the type locality (Rengechi, Taiwan), but is now added to the lichen flora of Japan.

3) **Phaeographina montagnei** (v. d. BOSCH) MÜLL. ARG. NAKANISHI, 1. c., p. 101 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Hyo (NAKANISHI, 1. c.).

Distr. Japan (Honsyu, Shikoku, Kyusyu, Amami), Taiwan and tropical regions of Eastern Asia.

4) **Phaeographina pyrrhochroa** (MONT. et v. d. BOSCH) ZAHLBR. NAKANISHI, 1. c., p. 103 (1966).

Loc. On the bark of trees. Isl. Tokunoshima: Mt. Inokawa (NAKANISHI, 1. c.).

Isl. Okinawa: Mt. Yonaha (no. 4051, on *Symplocos liukiensis* MATSUM.; no. 4129, on *Rhaphiolepis umbellata* MAKINO), Mt. Nago (NAKANISHI, 1. c.). Isl.

Ishigaki: Mt. Banna (NAKANISHI, 1. c.). Isl. Kume: Mt. Ara (NAKANISHI, 1. c.).

Isl. Iriomote: Yassa Gorge (NAKANISHI, 1. c.).

Distr. Japan (Shikoku, Kyusyu, Yakushima, Amami, Ryukyu), Taiwan, Java and Brasil.

5) * **Phaeographina quassiaecola** (FÉE) MÜLL. ARG. NAKANISHI, 1. c., p. 99 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, 1. c.), Higyan (NAKANISHI, 1. c.). Isl. Ukeshima: at 300 m above sea level (NAKANISHI,

1. c.). Isl. Okinawa: Haneji in Nago-shi (no. 4267, on *Ligstrum obtusifolium* SIEB. et ZUCC.), Nuuha in Oogimi-son (no. 4186, on *Styrax japonicum* SIEB. et ZUCC.; no. 4188, on *Citrus*; no. 4334, on *Ficus miyagii* KOIDZ.), Nakagusuku-jyo (no. 4293, on *Picrasma quassioides* BENN; no. 4330, on *Mallotus philippensis* MÜLL. ARG.).

Distr. Japan (Shikoku, Kyusyu, Amami, Ryukyu), Taiwan and tropical regions.

V. *Glyphis* ACH.

Glyphis cicatricosa ACH. (NAKANISHI, 1. c., p. 104, 1966) is found in the tropical regions throughout the world including Japan (Honsyu, Kyusyu, Yakushima, Ogasawara), Taiwan and China Proper, but we can not yet collect this species in Amami and Ryukyu Islands.

VI. *Sarcographa* FÉE

1) * *Sarcographa* sp.

Loc. On the bark of trees. Isl. Okinawa: Mt. Yonaha (no. 4124).

Sarcographa melanocarpa ZAHLBR. and *S. tricola* MÜLL. ARG. are reported from Ogasawara (Bonin) Islands, but the specimen collected in Isl. Okinawa by the writer is much different from these two species.

VII. *Melaspilea* NYL.

1) *Melaspilea gemella* NYL. NAKANISHI, 1. c., p. 106 (1966).

Loc. On the bark of trees. Isl. Oshima: Mt. Yuwan (NAKANISHI, 1. c.).

Distr. Japan (Honsyu, Amami) and tropical regions all over the world.

This species is very rarely found in Japan, and only three localities are known at present.

Table 1. Range of the Japanese species of Graphidaceae
(Endemic species of Japan are indicated by asterisk)

Regions Speces	Regions										
	Hokkaido	Honsyu	Shikoku	Kyusyu	Yaku - Tane	A m a i	Ryukyu	Ogasawara	Taiwan	China	Other regions
Graphis											
-anfractuosa	•	• ○	• ○	• ○	•	• ○	• ○	•	•	•	• ○
-aperiens*		○	○	○		○	○				○
-awaensis*			○	○	○	○	○				
-caesiella	•	•	•	•	•	•	• ○	○	•	•	• ○
-cervina	•	• ○	• ○	•	• ○	•	• ○		•	• ○	•
-cinerea	•	○	○	○	○	○	○			○	•
-cognata*	○	○	○	○						○	
-desquamescens	•	○	○	○					○	○	• ○
-dupaxana		○	○	○	○	○	○		•	•	• ○
-duplicata											• ○
-elegans											• ○
-handelii	•	• ○	• ○	• ○	• ○	• ○	• ○			○	•
-intricata		○	○	○	○	○	○	○	•		• ○
-javanica								○			• ○
-leptocarpa	○	○	○	○	•	•	•	•	•	•	• ○
-lineola											• ○
-meridionalis*			○	○	○	○	○				• ○
-oshioi*			○	○	○	○	○				• ○
-proserpens	○	○	○	○	•	○	○	•	•	○	• ○
-rikuzensis*	○	○	○	○	•	○	○	•	•	○	• ○
-scripta	○	○	○	○	•	•	•	•	○	○	• ○
-striatula							○				• ○
-tenella	○	○	○	○		○		○		○	• ○
-turbulenta								○			• ○
Phaeographis											
-asteriformis*	•	• ○	• ○	• ○	•	•	•	•	•	•	• ○
-dendritica	○	○	○	○				○	•	○	• ○
-exaltata		○	○	○							• ○
-fuscodisca*				○	○	○	○	○	•		• ○
-passaniae*		○	○				○				• ○

Regions Species	Hokkaido	Honsyu	Shikoku	Kyusyu	Yaku - Tane	Amami	Ryukyu	Ogasawara	Taiwan	China	Other regions
-polymorpha*		○	○	○	○						
-pruinosa*		○									
-vicarians*		○					○				
-yakushimensis*					○			○			
Graphina											
-amicta*								○			
-hunanensis		○								○	
-inabensis*	○	○	○	○	○	○	○				
-japonica			○	○	○		○		○		
-kousyuensis*		○									
-mendex								○			
-soozana		○	○	○	○	○	○		○		○
-subcrispa*			○		○		○				
-subplicaris				○	○	○	○		○		
-symplocorum		○	○	○		○				○	
-undulata*		○	○	○	○						
Phaeographina											
-macrospora						○	○		○		
-micromma							○		○		
-montagnei		○	○	○		○			○		○
-pyrrhochroa			○	○	○	○	○		○		○
-quassiaecola			○	○		○	○		○		○
Glyphis											
-cicatricosa		○		○	○			○	○	○	○
Sarcographa											
-melanocarpa								○	○		
-tricosa				○	○			○			○
-sp.							○				
Melaspilea											
-gemella		○				○					○

Phytogeographical comment on the Graphidaceae flora of Amami and Ryukyu Islands

As is shown in Table 1, among 54 species of Japanese Graphidaceae 38 species (70.4%) are found in Amami-Ryukyu region, while only 8 species (14.8%) in Hokkaido, 30 species (55.6%) in Honsyu, 31 species (57.4%) in Shikoku, 35 species (64.8%) in Kyusyu including Isl. Yakushima and Tanegashima, 20 species (37.0%) in Isl. Yakushima and Tanegashima, 12 species (22.2%) in Ogasawara Islands are recorded, so we can recognize that this region is very rich in the number of Graphidaceae species.

Among 38 species found in Amami-Ryukyu region, 9 species such as *Graphis caesiella*, *G. duplicata*, *G. elegans*, *G. javanica*, *G. lineola* and *G. striatula*, *Phaeographina macrospora* and *P. micromma*, and *Sarcographa* sp. are not found in the north out of this region. Another 9 species such as *Graphis awaensis*, *G. meridionalis* and *G. oshioi*, *Phaeographis fuscodisca*, *P. passaniae* and *P. vicarians*, *Graphina inabensis*, *G. subcrispa* and *G. undulata* are not found in the south out of this region. Therefore, 18 species are limited their distribution by Amami-Ryukyu region.

No endemic species is reported from Amami and Ryukyu Islands, but we can find rich flora of the family Graphidaceae composed of both tropical and temperate elements.

The Graphidaceae flora of Amami and Ryukyu Islands has deep affinity with that of Taiwan, and 10 species such as *Graphis desquamescens*, *G. scripta*, *Graphina japonica*, *G. soozana* and *G. subplicaris*, *Phaeographina macrocarpa*, *P. micromma*, *P. montagnei*, *P. pyrrochroa* and *P. quassiaecola* are common in both regions, but Taiwan must be separated from other regions because of the high value (55.2%) of endemic coefficient. Among 29 species hitherto reported from Taiwan, 16 species are endemic, therefore, the endemic coefficient of Taiwan is

$$\frac{16}{29} \times 100 = 55.2 \%$$

12 species of Graphidaceae are reported from Ogasawara (Bonin) Islands (cf. SATO, 1971) and 38 species found in Amami and Ryukyu Islands, but only 5 species are common in both regions so these two regions should be separated from each other based on the Graphidaceae flora.

It is very difficult to divide Japan into distinct floral regions, because of its environmental factors are intricately interwoven. As the representative example of phytogeographical division of Japan based on the spermatophytes and pteridophytes, the writer shows here two schemes proposed by Prof. H. HARA (1959) and Prof. F. MAEKAWA (1961) of the University of Tokyo.

H. HARA (1959)

1) Hokkaido Floral Region

F. MAEKAWA (1961)

1) Ezo-Mutsu Floral Region

- | | |
|--|-------------------------------|
| 2) Hokuriku Floral Region | 2) Japan Sea Floral Region |
| 3) Kanto Floral Region | 3) Kanto Floral Region |
| 4) Central Honsyu Mountain Floral Region | 4) Fossa Magna Floral Region |
| 5) Western Japan Floral Region | 6) Atetsu Floral Region |
| 6) Ryukyu Floral Region | 5) So-Haya-Ki Floral Region |
| 7) Ogasawara Floral Region | 8) Ryukyu-Amami Floral Region |
| | 7) Ogasawara Floral Region |

The phytogeographical division of Japan Proper based on spermatophytes and pteridophytes can not be adopted to lichen flora, but Ryukyu Floral Region and Ogasawara Floral Region are adoptable to lichen flora. Ryukyu or Ryukyu-Amami Floral Region is limited by WATASE's line in the north and separated from Taiwan by Minami-Sakishima line and KANO's line in the south and west.

References

- ASAHINA, Y. (1944): Hymenolichenes aus Japan, in Lichenologische Notizen 36 (Journ. Jap. Bot. 20: 233-237).
- KUROKAWA, S. (1964): Noteworthy lichens collected by Dr. M. TAGAWA and Dr. K. IWATSUKI on the Amami Islands, Japan (Ann. Rep. Noto Mar. Lab. 4: 73-78).
- (1969): Lichens of Chichijima Island of the Bonin Islands collected by Dr. H. INOUE (Bull. Nat. Sci. Mus. 12: 685-692, pl. 1-3).
- NAKANISHI, M. (1966): Taxonomical studies on the family Graphidaceae of Japan (Journ. Sci. Hiroshima Univ. ser. B, div. Bot. 11: 51-126).
- SATO, M. (1938): Localities of *Dictyonema sericeum* BERK. and *D. sp.* (Journ. Jap. Bot. 14: 424-425).
- (1957): *Dictyonema thelephora* ZAHLBR. in SATO: Range of the Japanese Lichens, 2 (Bull. Fac. Lib. Arts, Ibaraki Univ., Nat. Sci. 7: 68-69).
- (1971): Lichens of Ogasawara (Bonin) Islands, Japan, 1 (Misc. Bryol. et Lichenol. 6: 4-7).

Explanation of Plates 1 ~ 3

Plate 1. Fig.1. *Graphis awaensis* (no. 4244), Fig.2. *Graphis cervina* (no. 4264), Fig.3. *Graphis cinerea* (no. 4116), Fig. 4. *Graphis dupaxana* (no. 4269), Fig. 5. *Graphis duplicata* (no. 4166), Fig.6. *Graphis elegans* (no. 4331), Fig.7. *Graphis handelii* (no. 4172), Fig.8 *Graphis intricata* (no. 4175). All figures are $\times 3$.

Plate 2. Fig.9. *Graphis javanica* (no. 4297), Fig.10. *Graphis leptocarpa* (no. 4250), Fig. 11. *Graphis scripta* (no. 4235), Fig. 12. *Graphis meridionalis* (no. 4022), Fig.13. *Graphis lineola* (no. 4185), Fig.14. *Phaeographis passaniae* (no. 4368), Fig.15. *Phaeographis fuscodisca* (no. 4265), Fig.16. *Phaeographis vicarians* (no. 4253). All figures are $\times 3$.

Plate 3. Fig.17. *Graphina japonica* (no. 4047), Fig.18. *Graphina mendex* (no. 4296), Fig. 19. *Graphina subcrispa* (no.4171), All figures are $\times 3$. Fig.20. *Phaeographina micromma* (no. 4192), Fig.22. *Sarcographa sp.* (no. 4124). All figures are $\times 3$.





