
ACTA
PHYTOTAXONOMICA ET GEOBOTANICA
 植物分類及植物地理

Vol. IV.

Dec. 1935

No. 4

Hamaspora of Japan

By

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Since the genus *Hamaspora*, having as its type species, *Hamaspora longissima* (THÜM.), was first established by KÖRNICKE in 1877, six species of the genus have been described up to the present time. Among them, the following four species, *Hamaspora acutissima* SYD., *H. Rubi-Sieboldii* (KAWAGOE) DIET., *H. benguetensis* SYD. and *H. Hashiokai* HIRATS. f. have been found from our country. Besides them, a new species, *Hamaspora taiwaniana* HIRATS. f. et HASHIOKA is now newly made known to the scientific world by the writer. Therefore, the total number of species found in our country is five. Among these species, *Hamaspora acutissima* is common to the Philippines, Java, India (?) and Australia (Queensland), *Hamaspora benguetensis* to the Philippines, while the remaining three species, *Hamaspora Rubi-Sieboldii*, *H. Hashiokai* and *H. taiwaniana* are endemic to Japan.

The writer is under obligation to Mr. Yoshio HASHIOKA for his kindness in sending him many valuable specimens.

Hamaspora KÖRNICKE in Hedwigia XVI, p. 23, 1877; CUNNINGHAM in Transact. New Zealand Inst. LV, p. 21, 1924; The rust fungi of New Zealand, p. 121, 1931; DIETEL in ENGLER-PRANTL, Natürl. Pflanzenfam. II. Aufl. VI, p. 61, 1928; DOIDGE in Bothalia II, p. 8, 1926; SYDOW, Monogr. Ured. III, p. 77, 1912.

Syn. *Phragmidium* LINK sect. *Hamaspora* (KORN.) SACCARDO, Syll. Fung. VII, p. 750, 1888.

Hamasporella v. HÖHNEL in Zeitschr. f. Gärung. I, p. 226, 1912.

Key to the Japanese species

Teleutospores 2–3-septate with uniformly thin walls. Uredospores obovate, ellipsoidal or oblong, $30\text{--}40 \times 18\text{--}25 \mu$ epispore thickened at apex ($5\text{--}7.5 \mu$).

1. *Hamaspora Hashiokai* HIRATSUKA, f.

Teleutospores 3–5-septate (mostly 4-septate).

Teleutospores with uniformly thin walls. Paraphyses in uredosori well developed. Uredospores broadly ellipsoidal, obovate or oblong, $20\text{--}30 \times 12\text{--}20 \mu$.

2. *Hamaspora Rubi-Sieboldii* (KAWAGOE) DIETEL

Teleutospores with apex tapering to a fine sharp point, thickened up to 40μ .

Paraphyses in uredosori well developed. Uredospores subglobose, obovate or ellipsoidal, $18\text{--}21 \times 14\text{--}18 \mu$.

3. *Hamaspora benguetensis* SYDOW

Paraphyses in uredosori absent. Uredospores subglobose, broadly ellipsoidal or obovate, $18\text{--}27 \times 14\text{--}21 \mu$.

4. *Hamaspora acutissima* SYDOW

Teleutospores 4–8-septate with apex tapering to a fine sharp point, thickened up to 20μ . Uredospores still unknown.

5. *Hamaspora taiwaniana* HIRATSUKA, f. et HASHIOKA

1. *Hamaspora Hashiokai* HIRATSUKA, f. in HIRATSUKA, f. & HASHIOKA in Bot. Mag. Tokyo, XLIX, p. 521, 1935.

Hab. On *Rubus Lambertianus* SER. subsp. *xanthoneurus* FOCKE (*Shimabara-ichigo*).

Formosa: – Prov. Taihoku: Mt. Nankotaizan (Kiretto) (July 27, 1934, Y. HASHIOKA, type!); Mt. Taihei (Aug., 1928, S. SUZUKI).

Distribution. Japan (*Formosa*).

Especially in general characters of the teleutostage, this endemic species closely resembles *Hamaspora longissima* (THÜM.) KÖRN. But they can be distinguished from each other by the size and thickness of the uredospores. In *Hamaspora longissima* the uredospore is globose, subglobose or ellipsoidal, measuring $20\text{--}27 \times 18\text{--}23 \mu$, with uniformly thickened walls ($2\text{--}3 \mu$), while in our species it is obovate, ellipsoidal or oblong, measur-

ing 30-40 × 18-25 μ , and its apex is thickened (up to 7.5 μ).

2. ***Hamasporea Rubi-Sieboldii*** (KAWAGOE) DIETEL in Ann. Myc. XX, p. 293, 1922. (YOSHINAGA & HIRATSUKA, f. in Bot. Mag. Tokyo, XLIV, p. 650, 1930).

Syn. *Phragmidium Rubi-Sieboldii* KAWAGOE in Bull. Kagoshima Imp. Coll. Agric. & Forestr. I, p. 20 & 1 pl., 1915; SACCARDO, Syll. Fung. XXIII, p. 825; TANAKA in Mycologia XI, p. 152, 1919.

Exsiccati. SYDOW, Fung. exot. exs. no. 480.

Hab. On *Rubus Sieboldii* Bl. (*Horoku-ichigo*).

Shikoku :- Prov. Tosa : Cape Muroto (April 7, 1920 & Jan., 1921, T. YOSHINAGA); Heshima (Dec., 1934, M. KAMIMURA); Ônogô-mura (Jan., 1925, T. YOSHINAGA); Cape Gyôtô (Nov., 1907, K. OGAWA & Jan., 1908, T. YOSHINAGA); Kure-machi (Dec. 31, 1933, A. ÔYAMA).

Kiushu :- Prov. Satsuma : Toso near Kagoshima (May 2, 1912, K. TOYOHIRA (*type!*) & Nov. 16, 1920, S. KAWAGOE).

Distribution. Japan (*Shikoku* & *Kiushu*).

The present fungus was first described by S. KAWAGOE in 1915 as *Phragmidium Rubi-Sieboldii* KAWAGOE based upon specimens of its teleuto-stage on *Rubus Sieboldii* which were collected at Toso near Kagoshima, Satsuma Province. In 1922, DIETEL examined specimens of its uredo- and teleutostages on the same plant which were sent from T. YOSHINAGA, and he regarded it as a species of *Hamasporea*.

The present species seems to have a narrow range of distribution. The writer has examined only specimens which were collected in the two provinces of southern Japan: Tosa (*Shikoku*) and Satsuma (*Kiushu*).

3. ***Hamasporea benguetensis*** SYDOW in SYDOW & PETRAK in Ann. Myc. XXIX, p. 158, 1931. (HIRATSUKA, f. & HASHIOKA in Bot. Mag. Tokyo, XLIX, p. 521, 1935).

Hab. On *Rubus pectinellus* MAXIM. var. *triloba* KOIDZ. (*Mitsumata-fuyunichigo*).

Formosa :- Prov. Taihoku : Mt. Nankotaizan (Kirettoi) (July 28, 1934, Y. HASHIOKA); Mt. Taihei (Toganoo) (Aug. 7, 1928, S. SUZUKI). Prov. Shinchiku : Mt. Izawa (Taiha Mts.) (July 17, 1935, Y. HASHIOKA). Prov. Tainan : Mt. Arisan (Nimandaira) (July 7, 1933, Y. HASHIOKA).

Distribution. Philippines and Japan (*Formosa*).

The present species was first described by H. SYDOW in 1931 based upon specimens on *Rubus pectinellus* MAXIM. (*type host!*) and *R. ellipticus* SM. which were collected in the province of Benguet, the Philippines. In 1935, the writer and HASHIOKA also recorded it from Japan based upon specimens on *Rubus pectinellus* var. *triloba* KOIDZ. which were collected by

the latter author in Formosa.

From the related species, *Hamasporea acutissima* SYD., this fungus may easily be distinguished by the presence of well-developed paraphyses in uredosori and by the smaller uredospores.

4. *Hamasporea acutissima* SYDOW, Monogr. Ured. III, p. 80 & pl. IV, fig. 41, 1912; SACCARDO, Syll. Fung. XXIII, p. 818. (HIRATSUKA, f. & HASHIOKA in Bot. Mag. Tokyo, XLVIII, p. 236, 1934; SAWADA, Descript. Cat. Formosan Fung. I, p. 380, 1919; SYDOW in Ann. Myc. XII, p. 108, 1914).

Hab. On *Rubus calycinioides* HAYATA (*Hime-fuyūichigo*).

Formosa :- Prov. Shinchiku : Mt. Izawa (Taiha Mts.) (July 14, 1935, Y. HASHIOKA).

On *Rubus formosensis* O. KUNTZE (*Tegata-ichigo*).

Formosa :- Prov. Taihoku : Doba (July 28, 1934, Y. HASHIOKA); Shikikun (July 13, 1929, S. SUZUKI). Prov. Shinchiku : Tamuradai (July 13, 1935, Y. HASHIOKA); Shakarō (July 19, 1935, Y. HASHIOKA).

On *Rubus laciniato-stipulatus* HAYATA (*Keori-ichigo*).

Formosa :- Prov. Taihoku : Doba (July 26, 1934, Y. HASHIOKA). Prov. Taichū : Gojyō (Nov. 2, 1932, Y. HASHIOKA).

On *Rubus nantoensis* HAYATA (*Nanto-ichigo*).

Formosa :- Prov. Taichū : Mt. Buizan (Jan. 1, 1911, E. MATSUDA); Suirikō (Y. FUJIKURO).

On *Rubus* sp.

Formosa :- Prov. Taihoku : Giran (R. SUZUKI).

Distribution. Philippines, Java, Australia (Queensland), India (?) and Japan (*Formosa*).

In 1914, the SYDOW identified with the present species the following two rust specimens from Formosa; one of them on *Rubus* sp. was collected by R. SUZUKI at Giran, Taihoku Province and the other was found on *Rubus nantoensis* by Y. FUJIKURO at Suirikō (Nantō), Taichū Province. It is the first record of *Hamasporea* in our country. Recently, the writer and HASHIOKA also recorded the present fungus on *Rubus laciniato-stipulatus* from Formosa. Moreover, the writer also identified the fungi on *Rubus calycinioides* HAYATA and *R. formosensis* O. KUNTZE which were collected in Formosa with the present species. These two plants are new host plants for this species.

In 1914, FUJIKURO (1) identified a rust fungus on *Rubus taiwanianus*

(1) Transact. Nat. Hist. Soc. Formosa, no. 19, p. 8, 1914.

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MATSUM. (*Taiwan-ichigo*) which was collected by him at Shinchiku (prov. Shinchiku), Formosa with the African species, *Hamasporea longissima* (THÜM.) KORN. Although that specimen has never been examined, the writer considers that it might be *Hamasporea acutissima*, not *H. longissima*.

Hamasporea longissima was also recorded by MASSEE (1) based upon a specimen on *Rubus* sp. from India. According to the SYDOWS (2), this Indian specimen bears only uredospores, and its identification is doubtful. They think that it is probably identical with *Hamasporea acutissima*.

For long years, this species had been confused with the African species, *Hamasporea longissima* (THÜM.) KÖRN., from which it distinctly differs by the large number of teleutospores, the thickened apex of teleutospores (up to $40\ \mu$) and other aspects.

It is very closely related to *Hamasporea australis* CUNNINGHAM. According to CUNNINGHAM, the teleutospore pedicels of *Hamasporea acutissima*

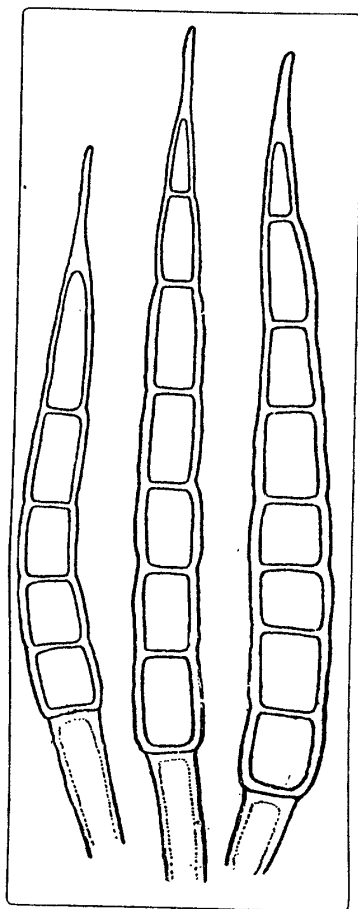
are thickened basally, whereas in *Hamasporea australis* they taper to a fine point. Moreover, he considered that uredosori are wanting in the latter species, while they are present in the former. The writer thinks that it is necessary to make further studies on *Hamasporea australis*.

The present species also closely resembles *Hamasporea benguetensis* SYD., especially in the essential characters of teleutospores, but it differs from the latter species by the characters of uredostage, as already mentioned.

5. *Hamasporea taiwaniana* HIRATSUKA, f. et HASHIOKA, nov. spec.

Soris teleutosporiferis hypophyllis, caespitosis, filiformibus, usque 1 cm longis, flavidis; teleutosporis cylindraxis, 5-8-septatis, plerumque 5-7-septatis, ad septa non vel leniter constrictis, cellula superiore longissima acutata membrana ibique incrassata et quasi apiculum proprium hyalinum acutum usque $20\ \mu$ longum formante, levibus, flavidis, $150-240 \times 14-18\ \mu$ quaque cellula poro germinationis unico praedita; pedicello longissimo, $8-14\ \mu$ crasso, hyalino. (Text-fig. 1)

Hab. On *Rubus Kawakamii* HAYATA (*Takasago-kawaba-ichigo*).



Text-fig. 1. Teleutospores of *Hamasporea taiwaniana* HIRATSUKA, f. et HASHIOKA on *Rubus Kawakamii* HAYATA.

(1) *Grevillea* XXI, p. 1-6, 1892.

(2) *Monogr. Ured.* III, p. 80, 1912.

Formosa :- Prov. Tainan : Mt. Arisan (Numanohira) (July 12, 1933, Y. HASHIOKA); Prov. Shinchiku : Mt. Izawa (Taiha Mts.) (July 18, 1935, Y. HASHIOKA, *type*!).

Distribution. Japan (*Formosa*).

The present species is very characteristic and unlike any other so far described. It differs from the other species of this genus by much longer teleutospores and the larger number of teleutospore-septa. There is at present no uredostage of this fungus known.

Undetermined or doubtful species

1. *Hamasporea daitonensis* FUJIKURO in IDETA, Suppl. Handb. plant diseases in Japan, p. 541, 1926 (*nomen nudum*). On *Rubus* sp. *Formosa* (Y. FUJIKURO). The writer has never been examined this specimen.

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Fungus index

- Hamasporea acutissima* SYD. (4) *Rubus calycinioides* HAYATA
R. formosensis O. KUNTZE
R. laciniato-stipulatus HAYATA
R. nantoensis HAYATA
R. sp.
- H. benguetensis* SYD. (3) *R. pectinellus* MAXIM. var. *triloba*
 KOIDZ.
- H. Hashiokai* HIRATS. f. (1) *R. Lambertianus* SER. subsp.
xanthoneurus FOCKE
- H. Rubi-Sieboldii* (KAWAGOE) DIET. (2) *R. Sieboldii* BL.
- H. taiwaniana* HIRATS. f. et HASHIOKA
 (5) *R. Kawakamii* HAYATA

Host index

- Rubus calycinioides* HAYATA *Hamasporea acutissima* SYD. (4)
R. formosensis O. KUNTZE *H. acutissima* SYD. (4)
R. Kawakamii HAYATA *H. taiwaniana* HIRATS. f. et
 HASHIOKA (5)

