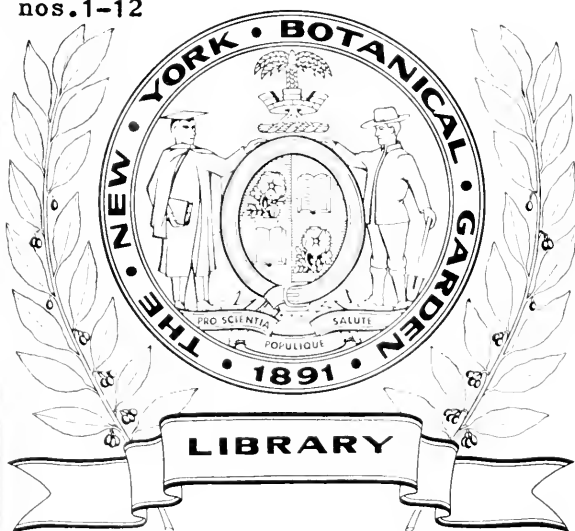




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NEW JAPANESE FUNGI
NOTES AND TRANSLATIONS—I

TYŌZABŪRO TANAKA

Reprinted from MYCOLOGIA, Vol. IX, No. 3, May, 1917

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Nov. 1-12

NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—I

TYÔZABÛRO TANAKA

This is the first of a series of papers prepared for the purpose of supplying prompt and full information regarding newly discovered Japanese fungi that have been described only in Japanese. Descriptions of new species of fungi, many of them of great economic importance, are appearing in many different publications in Japan, some of them difficult to obtain in the United States. New species which are published in Latin, English, or other European language will be merely cited if referred to at all. It is hoped that the information here presented will prove of interest and value to American and European mycologists and plant pathologists.

There are two lists of Japanese fungi published twelve and thirteen years ago, both including all species known from Japan at the time, one by Prof. J. Matsumura, *Index plantarum japonicarum*, Vol. 1. Cryptogamae (Fungi pp. 127-184) 8°, Tokyo Mar. 1904, giving an alphabetical list of species with synonymy, host plants and localities all in Latin; the other by Prof. M. Shirai, *A List of Japanese Fungi hitherto known*, 8°, Tokyo Nov. 1905, 156 pp., giving an alphabetical list of species with synonymy in Latin and the host plants in Japanese characters only. Localities are not given. The more important fungi causing plant diseases in Japan are treated by Prof. A. Ideta, *Handbook of the Plant Diseases of Japan*, 4 ed. 4°, Tokyo 1909-1911, 1104 pp. A 17-page index gives the Latin names of the fungi treated. Prof. Ideta is now writing a supplement bringing this work up to date.

VALSA (EUVALSA) PAULOWNIAE Miyabe and Hemmi, sp. nov. in *Byôchû-gai Zasshi* (Journal of Plant Protection) 3^o: 681-686; 1 pl. Sept., 1916. (Japanese.)

This fungus attacks the Paulownia tree first on the twigs and

then spreads over the branches, finally covering the entire tree down to the roots. The infection occurs in winter and early spring, mostly on the wounded or dead part of shoots, which gradually become rough, dry and brown, and finally crack with irregular elevated spots appearing on the surface—the stromata of the fungus. Loose mycelia from the stroma connect the tissues of the host and the fungus bodies. The pycnidia first appear on the stromata as depressed globular flasks, $1.5 \times .6$ mm., with colorless, obtuse, slightly curved pycnospores $2.85-8.75 \times 0.88-1.75 \mu$ on short, branched conidiophores. The perithecia, arranged at the bottom of stroma, 15-16 in one group, are flask-shaped with long necks about twice or three times the length of the perithecial body which measures $150-300 \mu$ in diameter; asci very fragile, soon disappearing, cylindric or clavate, more or less curved, sessile or very short stalked, $32-52 \times 8-10 \mu$ octospored; ascospores generally in two rows, occasionally irregular or one row, cylindric, obtuse, curved, smooth, hyaline, very slightly pale brownish when mature, $10-18 \times 2-4 \mu$, germinating in 20-21 hours, either in distilled water or on culture media.

This "Tachigare" or dieback disease first appeared in Hokkaidô about 1910 and seriously damaged Paulownia, first in 1913 and 1914 when many old trees were killed. In 1915 the disease spread all over Hokkaidô, and in one case about 3,000 trees at the same place were attacked.

For its prevention the trunks of the trees should be wrapped with straw in winter so as to prevent freezing or wounding. Bordeaux mixture should be used as a spray on the trees in early spring.

OPHIOCHAETA GRAMINIS (Sacc.) K. Hara n. comb. in Byôchûgai Zasshi (Journ. of Plant Protection) 3⁵: 342-345. May, 1916. (Japanese.)

This fungus, commonly called *Ophiobolus graminis*, is known as a cause of foot-rot of wheat and barley in France, Belgium, Germany, and Japan. The author discovered a similar disease on rice-plant caused by the same fungus which he proposes to transfer to Saccardo's genus *Ophiochaeta*, on account of the existence of bristle hairs on the perithecium. In the case of the fungus attacking the rice-plants the perithecia are somewhat smaller, *i. e.*, $240-480 \mu$ diameter, and the ostiolum $12-280 \mu$ in length and $7-8 \mu$ across, but the asci and ascospores are nearly the same as described from other plants, *i. e.*, asci $80-120 \times 8.5-16 \mu$ and ascospores $27.1-104 \times 3.2-4 \mu$.

The author suggests four important factors in preventing the disease: (1) Selection of a resistant variety; (2) necessity of avoiding the use of too much nitrogen fertilizers; (3) not allowing too much water on the field; and finally (4) application of stable manure instead of mulching the field.

MARSONIA CARTHAMI T. Fukui sp. nov. in *Nōgaku Kwaihō* (Journ. of the Scientific Agricultural Society) No. 166, pp. 381-383, fig. 6. T. 5, vi. June, 1916. (Japanese.)

Spots ochre-brown, few, 1-10 rarely more, orbicular, elliptical or irregular, never angular, varying in size, the largest 10×6 mm., sometimes confluent, forming still larger spots, margin definite, raised, punctate with acervuli; acervuli subepidermal, scattered, brownish; conidiophores hyaline or pale yellowish, $20 \times 3 \mu$; conidia hyaline or pale yellowish-brown, elliptic, ends acute especially the base, giving a fusiform appearance, contents granular at maturity, 1-septate, constricted at the septum, $10-25 \times 4-6 \mu$, average $20 \times 5 \mu$.

On living leaves of young plants of *Carthamus tinctorius* L. (Compositae) called in Japan *Benibana* (*Hung-hua*, in Chinese) found at the experiment farm of Shidzuoka-ken Agr. Experiment Station, Abegun, Shidzuoka-ken, Japan: Sept. (?), 1916.

MYCOSPHAERELLA HORDICOLA Hara sp. nov., ex Tsuruda, Shōitsu in *Byōchū-gai Zasshi* (Journ. of Plant Protection) 3⁷: 532. July, 1916. (Japanese.)

Perithecia small, black, globular, $297 \times 212 \mu$ or $255 \times 212 \mu$ (figures doubtful); asci irregularly cylindrical or sometimes conical, octosporous; spores hyaline, fusiform, blunt at both ends, $7-15 \times 2.7-3.5 \mu$, two-celled, contents granular. On the blades and culms of wheat, barley, and naked barley.

Differs from *Sphaerella bacicola* B. Frank which grows on rye and has perithecia with rosy interior and constricted elliptical spores which measure $10-12 \mu$. This sp. is also distinct from *Mycosphaerella Hordei* Karst which has straight, elliptical or fusiform constricted spores, $18-24 \times 6-8 \mu$.

Distribution: Shidzuoka-ken, Suntō-gun, Kanaoka-mura, May 24, 1916, S. Tsuruda; Agehara-mura, May 3, 1916, S. Tsuruda; Ukishima-mura, May 11, 1913, S. Tsuruda; Fuji-gun, Obuchi-mura, June 22, 1915, Takimura Nōkwai (Agr. Soc. of Takimura).

mura); Inasa-gun, Inoya-mura, April 13, 1914, S. Tsuruda; Aratama-mura, May, 1914, T. Okada.

New Japanese name of the disease: Mugi no Kangare-byô (Culm-rot disease of barley and wheat).

Local name of the disease: Mugi no Tachigare (Foot-rot or stem-rot of barley and wheat); Kuse (Bad-habit).

Notes: A barley variety "Dobu" seems resistant to the disease; on the other hand the variety "Oku-mikawa" is very susceptible. The disease is much less injurious when seeds are sown earlier than the usual planting time. The disease becomes virulent when nitrogenous fertilizers are used too freely. Phosphate is effective in strengthening the growth of the culm to withstand the disease. Lime, sulphur-flower, and Bordeaux mixture all lessen the damage done by this fungus.

SCORIAS CAPITATA K. Sawada sp. nov. in Nôjishikenjô Tokubetsu Hôkoku (Special Report, Agr. Exp. Station) Taiwan (Formosa), No. 11, pp. 123-124, pl. 4, fig. 19-23. T. 4, ii, Feb., 1915. (Japanese.)

Mycelia covering the upper surface of the leaves of *Thea sinensis* as a black mass, sometimes covering the lower surface and even the twigs, presenting a conspicuously rough or fuzzy appearance, which is caused by bundles of hyphae and slender perithecia which stand upright. Hyphae catenulate, soot color, $2.5-5\mu$ across; hyphae bundles (perithecial stalks) soot color, once or twice branched, of various forms but usually conical, cylindrical, fusiform or elliptical, frequently two joined together at the lower half, $110-247 \times 52-75\mu$, apically constricted terminated by perithecia; perithecia black, nearly ovate or orbicular, $60-83 \times 50-78\mu$, containing numerous asci; asci clavate, obtuse, hyaline, $30-35 \times 9-12\mu$, with 6-8 spores; spores fusiform to clavate-fusiform, obtuse at both ends, hyaline, 3-septate, $10-11.5 \times 3-3.5\mu$.

Type locality: Taihokuchô Chônaiho-shô, Formosa. Dec. 12, 1907. Y. Fujikuro.

ZUKALIA THEAE K. Sawada sp. nov. in Nôjishikenjô Tokubetsu Hôkoku (Special Report Agr. Exp. Station) Taiwan (Formosa) No. 11, p. 122, pl. 4, figs. 10-13. T. 4, ii, Feb., 1915. (Japanese.)

Perithecia black, globose, $67-135\mu$ in diameter; subiculum black.

hyphae filiform, at first pale, later brownish, branched, septate, 3-6 μ across; asci many, surrounded by 6-8 dark brown, blunt, 5-6-septate setae, 70-100 \times 4 μ ; asci 8-spored, hyaline, clavate, fusiform, 68-90 \times 13-16 μ ; spores hyaline, obovate elliptic to clavate, 3-septate, 17-23 \times 6-7 μ .

On leaves and twigs of *Thea sinensis*.

Type locality: Shinchiku-chō, Sanshaka, Formosa, May 10, 1910, K. Sawada.

PESTALOZZIA THEAE K. Sawada sp. nov. in Nōjishikenjō Tokubetsu Hōkoku (Special Report Agr. Exp. Sta.), Taiwan (Formosa), No. 11, p. 113, pl. 4, figs. 7-9. T. 4, ii, Feb., 1915. (Japanese.)

Spots punctate with acervuli; acervuli at first subepidermal, later erumpent, finally exposed; mycelium penetrating the host, hyaline, branching, 2.5-3 μ in diam., mycelial tissue thin but composed of tightly woven hyphae; conidiophores caespitose, simple, short, filiform, 4-9 \times 1 μ , fugacious; conidia fusiform, 4-septate, slightly constricted, 3 inner cells dark brown, 16-21 μ , basal and apical cells hyaline, 4-6 μ , setae 3-4, 28-36 \times 1-2 μ , slightly swollen at the apex, hyaline.

On leaves of *Thea sinensis*. Diseased spots brown when young, when mature gray with brown margin, usually 1 cm. in diam., sometimes covering half of a leaf. Acervuli always appear on the concentric zone as black dots, but when they occur on the under surface of leaves, the zones are not always distinct and the dots are very few.

Type localities: Taihokuchō Zuihō, Jul. 4, 1909, Y. Fujikuro; Taihokuchō Kusshaku, Jul. 14, 1908, Y. Fujikuro; Taihokuchō Mokusaku, Sept. 30, 1908, Y. Fujikuro; Taihokuchō Shinten, Jul. 15, 1908, Y. Fujikuro; Taihokuchō, Rigyokutsu, Jul. 13, 1908, Y. Fujikuro; Taihokuchō, Hokuseiko, Jul. 9, 1907, R. Suzuki; Taihokuchō Chōnaiho, Dec. 19, 1908, K. Sawada; Nov. 30, 1909, Y. Fujikuro, May 4, 1910, K. Sawada; Tōenchō Kessishō, Aug. 21, 1908, K. Sawada & Y. Fujikuro; Tōenchō Dōraken, Aug. 21, 1908, K. Sawada & Y. Fujikuro; Tōenchō Anheichin, Aug. 20, 1908, K. Sawada & Y. Fujikuro; Shinchikuchō Shimpō, May 6, 1910, Y. Fujikuro; Akōchō Kōkō, Jul. 8, 1910, K. Sawada.

SCLEROTINIA FAGOPYRI S. Hori sp. nov. in Byôchû-gai Zasshi (Journ. Plant Protection) 3³: 171-175. Mar. 1916. (Japanese.)

Sclerotia orbicular, ellipsoid, oblong or ovoid, 2-3 × 2-4 mm., surface black, inner tissue rose colored; apothecia one or two from a sclerotium, cinnamon-brown, 3 mm. in diam., somewhat cupulate, stipitate, stipes 3-5 mm. in length; asci cylindrical, slightly curved, 135-155 × 9-11 μ; ascospores eight, obliquely monostichous, 11-14 × 6-8 μ, guttulate near each end; paraphyses filiform or clavate, slightly longer than the asci, 2-2.5 μ in diam., 2-4 (usually 2-3) septate.

The sclerotia form inside of the seeds of *Fagopyrum esculentum* and probably germinate twice a year. The diseased seeds sink in brine of 1.12 to 1.20 sp. gr., while healthy seeds float. They alone should be planted.

BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.

NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—II

TYÔZABURÔ TANAKA

Reprinted from MYCOLOGIA, Vol. IX, No. 4, July, 1917

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NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—II

TYŌZABURŌ TANAKA

PHYTOPHTHORA ALLII K. Sawada sp. nov. in Nōji Shikenzō Tokubetsu Hōkoku (Special Report Agric. Exper. Station), Taiwan (Formosa), No. 11, p. 59-60, pl. 1-2. T. 4, iii, Mar. 1915.

Forming a cottony white mycelial mass on diseased portions of leaves of *Allium fistulosum*. Hyphae filiform, hyaline, thin-walled, with granular contents, continuous when young but always septate when old, much branched, 3-8 μ across, penetrating the cell walls of the host tissues. Haustoria not observed. Conidiophores appear through stomata of the host or sometimes break through the epidermal tissue, mostly accompanied by hyphae: conidiophores filiform, fine, single or branching pseudo-dichotomously or rather irregularly ramose, 140-480 \times 4-6 μ ; conidia terminal, globular, ovoid, obovoid or lemon-shaped, hyaline, apically mamillate with a hemispherical papillum 5-10 μ high, 40-74 \times 30-50 μ , averaging 49.4 \times 36.5 μ , with or without a thickened septum at the base; falling off not rarely with a portion of persistent conidiophore at the end, producing 15-60 zoospores or germinating with germ tube.

Oogonia formations were observed in cultures on media made of bean agar-agar, and lima bean agar-agar. Oogonia spherical, thin-walled, diam. 17-26 μ (average 20.7 μ), containing one oospore; oospores spherical, colorless or pale-honey-yellow, diam. 14-23 μ (averaging 16.9 μ), walls 0.5-1.5 μ thick. Antheridia surrounding tightly the stalk of oogonia then becoming attached close to the wall of oogonia at the lower portion not far from the juncture of the stalk, usually round to obovoid, 8-18 \times 10-14 μ .

Para-sitic on the leaves and flower stalks of *Allium fistulosum*.

Type locality: Taihoku-chō Chōnaihō-shō, Taiwan (Formosa), collected by K. Sawada, Feb. 17, 1913 and July 3, 1913.

Illustrations: 45 black and white lithographic figures showing detailed structure of the fungus.

An attempt to inoculate the ordinary onion (*Allium Cepa*) with this fungus was not successful, so it seems that the infection is

limited to the Japanese welsh onion (*Allium fistulosum*); the only plant susceptible to the disease in inoculation tests was *Epiphyllum truncatum* (*Cactaceae*). The disease is not at present widely distributed and the injury not very serious. It is desirable to eradicate it before it spreads to other localities.

The paper gives a review of the genus *Phytophthora* and allied genera; the following species are discussed:

Phytophthora cactorum (C. et L.) Schroet., *P. cactorum* (C. et L.) Schroet. var. *Arceae* Colem., *P. colocasiae* Rac., *P. faberi* Maubl., *P. infestans* (Mont.) de Bary, *P. nicotianae* Breda de Haan, *P. parasitica* Dast, *P. Phascoli* Thaxt., *P. Syringae* Kleb., *P. Thalictri* Wils. et Davis, *Kawakamia Cyperi* (Miy. et Ideta) Miyabe, *Pythiacystis citrophthora* Smith.

PHYTOPHTHORA MELONGENAE K. Sawada sp. nov. in Nôji Shikenjô Tokubetsu Hôkoku (Special Report Agric. Exper. Station), Taiwan (Formosa) No. 11, p. 77-79, pl. 3. T. 4, iii, Mar. 1915.

Hyphae intercellular in the host tissue or freely penetrating the cell wall, much branched, not septate in juvenile stage, but septate when mature; aerial hyphae mostly not branching, usually attaining a considerable length, nearly uniform in diameter, the base always irregularly twisted, swelled or short-branched, and very characteristic; diam. of hyphae 4-8 μ ; haustoria none. Conidiophores hardly distinguishable from aerial hyphae, filiform, delicate, very much elongated, the shortest measuring 80 μ in length, 3-5 μ across; conidia spherical, broad-oval or oval, 24-72 \times 20-48 μ , average 42.4 \times 33.9 μ , with apical hemispherical papillae 3-5 μ high, producing several to 40 zoospores; zoospores ovoid or ellipsoid, 10-11 \times 8 μ , with 2 cilia; chlamydospores yellowish-brown, spherical, 25-42 μ in diam.; oogonia formed in cultures on bean agar-agar medium, spherical, 18-23 \times 20-24 μ , containing one oospore; oospore spherical, walls 2 μ thick, colorless to very pale yellowish-brown, diameter 17-21 μ . Antheridia not formed on the same hyphae that bear the oogonia but on the end of other hyphae, surrounding tightly the oogonial stalk and attached to the wall of oogonia at the juncture with the stalk, oblate spheroidal or nearly spherical, 10-14 \times 12-16 μ .

Parasitic on the fruit of *Solanum Melongena* (Egg plant).

Type locality: Taihoku-chô, Chônaiho-shô, Taiwan (Formosa), June 18, 1914, July 10, 1914, and Sept. 6, 1914.

Illustrations: 24 black and white lithographic figures showing detailed structure of fungus.

Not only the Formosan white egg plant but all other Japanese varieties are susceptible to this disease and in one case 60 to 70 per cent. of the crop was lost. Inoculation tests proved that other solanaceous plants are susceptible and such plants as tobacco, tomato and even Irish potato were attacked. Among plants belonging to other families, figs, *Areca Catechu*, and *Hibiscus esculentum* were counted as susceptible hosts, and in a lesser degree *Epiphyllum truncatum* and *Ricinus communis*.

ZUKALIA NANTOENSIS K. Sawada sp. nov. in Nôji Shikenjô Tokubetsu Hôkoku (Special Report Agric. Exper. Station), Taiwan (Formosa), No. 11, p. 123, pl. 4, figs. 14-18. T. 4, iii, Mar. 1915.

Epiphyllous, sometimes also hypophyllous, lichenous, spreading over an area 2-5 mm. across, tightly coalescent; hyphae fuliginous, thick-walled, 8μ across, septate and sparsely furnished with hyphopodia, oblong bodies with rounded end usually on a stalk 18-25 μ long. Pycnidia and perithecia grow on the mycelial layer, both orbicular black bodies, mostly sessile, sometimes on stalks 18-25 μ long; pycnidia 63-95 μ . containing numerous pycnospores; pycnospores pale-brown, ellipsoid to oblong, glabrous, unicellate, bi-nucleate, $6-8 \times 3-4\mu$; perithecia 132-180 μ in diameter, with numerous asci; asci oblong-clavate, ovoid-oblong, with short stipules, hyaline, $33-49 \times 10-12\mu$, containing 8 spores; ascospores oblong to short clavate, septate at the middle, colorless, blunt or obtuse at both ends, $9-13 \times 3.5-5\mu$.

On leaves of *Thea sinensis*.

Type localities: Nantô-chô, Gyochi, Taiwan (Formosa), Oct. 30, 1907, Suzuki, Rikiji; Nantô-chô Shinjô, Taiwan (Formosa), Oct. 17, 1913, Fujikuro, Yosaburô.

This fungus causes the Susu-byô (Sooty mould disease) of tea in Formosa, mostly occurring with *Zukalia Theae* K. Sawada, *Scorias capitata* K. Sawada, and *Capnodium Footii* Berk. et Desm.

MASSARIA PHORCIOIDES I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report, Imperial Sericultural Experiment Station), Tôkyô, Japan. 1st: 316, pl. 16, figs. 4-5. T. 5, xii, Dec. 1916.

Perithecia scattered over the twigs forming black spots, the diseased cortex of the twig being very easily separated from the wood. Perithecia hypoepidermal, opening with ostiola, consisting of pseudo-parenchymatous tissue, black, spherical or ellipsoid, $250-300\mu$ in diameter and $200-250\mu$ in height, containing few asci; asci clavate to elliptic, $110-140 \times 35-42\mu$, short stipitate, with 8 biseriolate spores, paraphysate; ascospores fusiform, dark-yellowish-brown, 1-septate and 3-5 nucleate at first, then 4, rarely 3-5 septate, constricted only at the middle septum first formed, $45-52 \times 19-22\mu$, covered with a gelatinous envelope; paraphyses filiform, stout, with granular contents.

On twigs of *Morus alba*, possibly parasitic (common).

Type localities: Gifu-ken (prefecture) Kaidzu-gun Kaisai-mura, Mar. 1909, I. Miyake; Fukui-ken (prefecture) Tsuruga, Mar. 1909, K. Hara; Fukushima-ken (prefecture) Fukushima-shi and Yamagata-ken (pref.) Yamagata-shi, Mar. 1915, I. Miyake; Akita-ken (pref.) Akita-shi, and Ôtate-chô, Iwate-ken (pref.) Fukuoka-chô, and Kyôto-fu (pref.) Ayabe-chô, Apr., 1915, I. Miyake.

Distribution: China, Japan.

Illustrations: 2 black and white lithographic figures showing perithecium and ascospores.

At the side close to the perithecia, a conidial form usually occurs which consists of rosy-colored, caespitose conidiophores and spherical or short elliptical hyaline conidia. The relation between this form and the ascogenous form here described has not yet been studied. The characteristic perithecial position of this fungus can be seen with the naked eye if we examine carefully the blackened discoidal surface of the diseased spot on which a highly darkened spot at the central part is to be observed which represents the perithecial body underlying the epidermal tissue.

MASSARIA MORI. I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report, Imperial Sericultural Experiment Station). Tôkyô, Japan. 1^o: 319, pl. 17, figs. 12, 13, 14. T. 5, xii, Dec. 1916. (Japanese.)

Perithecia covered by epidermis which is pierced by shortly projecting ostiola, scattered or 2-3 together, mostly surrounded by black hyphal substance pseudo-parenchymatous in appearance, globoid or ellipsoid, $400-600\mu$ in diam.; perithecial walls consist-

ascospores biseriate, nearly fusoid, somewhat acute but considerably thickened at one end, 3-septate, constricted at the middle septum first formed but not at others, first nucleate with few large hyaline globules, then coarsely guttulate with yellowish-brown homogeneous contents, and finally opaque with blackish-brown fine granules, $55-70 \times 18-23 \mu$, covered by a gelatinous envelope; paraphyses forked, $2.5-3.0 \mu$ across, colorless and far longer than the asci.

On twigs of *Morus alba*.

Type localities: Akita-ken (prefecture) Yuzawa-chô, Mar., 1915, I. Miyake; Kyôtô-fu (pref.) Ayabe-chô, Apr., 1915, I. Miyake.

Illustrations: 3 black and white lithographic figures showing detailed structure.

BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.

NEW JAPANESE FUNGI

TYÔZABURÔ TANAKA

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NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—III

TYÔZABURÔ TANAKA

MASSARIA MORICOLA I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical report of the Imperial Sericultural Experiment Station), Tôkyô, Japan. 1^o: 318, pl. 16, figs. 6, 7, 8. T. 5, xii, Dec. 1916. (Japanese.)

Perithecia thickly scattered, subepidermal, penetrating the epidermis with elongated ostiola, spherical or ellipsoidal, 300-400 μ in diam., 280-372 μ in height, the inside of ostiolum and adjacent area covered by short periphysatic hairs, containing few asci; asci cylindrical or ovoid, short stipitate, 140-200 \times 37-46 μ , paraphysate; ascospores biseriata or irregular, hyaline and unicellular at juvenile stage but quickly developing into 4-celled dark-colored mature spores, the contents of which are first characteristically represented by comparatively large shiny oil globules, soon disappearing and replaced by granular protoplasm scarcely permitting the light to pass through, 52-65 \times 13-17 μ , cylindrical, not constricted at the septum; gelatinous envelope none.

On twigs of *Morus alba* (common).

Type localities: Gifu-ken (prefecture), Kaidzu-gun Kaisai-mura, Mar. 1909, I. Miyake; Fukui-ken (pref.) Ôno-gun and Hida-no-kuni (Gifu prefecture) Mashita-gun, Shimohara-mura, Mar. 1909, K. Hara; Nagano-ken (pref.) Shino-ina-gun, May, 1910, I. Miyake; Tôkyô-fu (pref.) Nakano-chô Jan. 1915, I. Miyake; Tochigi-ken (pref.) Utsunomiya-shi and Fukushima-ken (pref.) Fukushima-shi, Mar. 1915, I. Miyake; Kyôto-fu (pref.) Ayabe-chô, Apr. 1915, I. Miyake.

Illustrations: 3 black and white lithographic figures showing detailed structure of the fungus.

The juvenile ascospores very much resemble those belonging to other genera, but close examination of mature spores will show the characteristics of the genus *Massaria*.

MASSARIA JAPONICA I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical report of the Imperial Sericultural Experiment Station), Tôkyô, Japan. 1⁵: 319, pl. 16, figs. 9, 10, 11. T. 5, xii, Dec. 1916. (Japanese.)

Perithecia gregarious, subepidermal, with ostiola erumpent, elliptical, 400–500 μ across and 250–320 μ high; perithecial walls pseudo-parenchymatous, 70–100 μ thick, black, walls and bottom surrounding inner space consisting of nearly colorless and sub-transparent cells; asci cylindrical, 130–160 \times 20–25 μ , octosporous, paraphysate; ascospores dark ink-colored, 4-celled, conspicuously constricted at the middle septum, occasionally but not distinguishably so at the other septa, containing one large oil globule in each cell, 30–35 \times 9–11 μ ; gelatinous envelope none; paraphyses filiform, about 1 μ thick, abundant, exceeding asci in length.

On twigs of *Morus alba* (not common).

Type localities: Gifu-ken (prefecture) Ena-gun Kashimo-mura, Mar. 1909, K. Hara; Iwate-ken (pref.) Hanamaki-chô, Apr. 1915, I. Miyake.

Illustrations: 3 black and white lithographic figures showing detailed structure.

Easily distinguished under the microscope from other related species by having the inner layers of the perithecial walls nearly colorless and sub-transparent.

KEY TO THE FOUR SPECIES OF MASSARIA ABOVE DESCRIBED¹

- (A) Ascospores with gelatinous envelope.
 (a) Ascospores 3–5, usually 4-septate.....*M. phorcioides*.
 (b) Ascospores 3-septate*M. Mori*.
 (B) Ascospores without gelatinous envelope.
 (a) Ascospores not constricted at the middle septum.....*M. moricola*.
 (b) Ascospores constricted at the middle septum.....*M. japonica*.

Three species of *Massaria* are already known to be parasitic or saprophytic on *Morus alba*, but all can be distinguished in some way from these four new species.

Massaria epiluca B. and C. is characterized by having asco-

¹ For descriptions of *M. phorcioides* and *M. Mori*, see the second article of this series.

In the description of *M. Mori*, the two following lines were unfortunately omitted in the final printing:

ing of black pseudo-parenchymatous tissue; asci cylindric, shortly pedicelled, 140–160 \times 40–50 μ , octosporous, paraphysate;

spores with smaller terminal cells; *M. Antoniae* Far., which is related to our *M. phorcioides* by its ascospores having a large number of cells, can be distinguished by 6- (rarely 7-8) celled spores, instead of 4- (rarely 6-7) celled as in the latter species. *Massaria olivacco-hirta* Cooke is rather doubtful but may differ in the color and form of ascospores.

MYCOSPHAERELLA HORII K. Hara sp. nov. in Nippon Engei Zasshi (Journ. of Hort. Soc. Japan), 29³: 10, illus. (p. 9, figs. 1-6). T. 6, iii, Mar. 1917. (Japanese.)

Spots irregularly orbicular, about 3-6 mm. across, reddish-brown and frequently changing to gray when mature; margin definite, raised, blackish-brown, punctated with black, minute perithecia; perithecia gregarious or scattered, punctiform, at first immersed then partly erumpent, black, globose or elliptico-globose, 60-100 μ ; perithecial walls pseudo-parenchymatous, cells rather indefinite, about 3-8 μ across, blackish-brown, carbonaceous; ostiola slightly raised, warty or short papillate with openings about 5-7 μ across; asci caespitose, clavate-cylindrical or oblong-ovoid, obtuse, stipitate, octosporous, 30-40 \times 7-10 μ ; ascospores biseriate or inordinate, oblong-ovoid, uniseptate, not usually constricted; terminal cell slightly wider and much rounded at the apex; basal cell rather acuminate toward the base though not pointed at the end and nearly as round as the apex, colorless and hyaline, 9-12.5 \times 2.5-3 μ .

On leaves of *Citrus*.

Type locality: Hamana-mura, Inasa-gun, Shidzuoka-ken, Japan, June, 1914, Katarô, Shimidzu.

Japanese name of disease: Kasshoku Ko-maruboshibyô (small, brown, round-spot disease).

Illustrations: 6 text figures showing detailed structure of the fungus.

Dr. Shôtarô Hori, in Engei no Tomo (Friend of Horticulture) 9⁷: 40-45, Tôkyô, July, 1913, considers the cause of this disease to be *Phyllosticta curvarispora* Hori sp. nov. As no description of the fungus was given there or elsewhere, there is no way to determine whether this imperfect fungus is a form of *Mycosphaerella Horii*, but the existence of such relationship is suggested as very possible since many species of these two genera are known to be related. The fungus mostly attacks navel and Unshû (Satsuma) oranges, according to Dr. Hori.

Phyllosticta citricola Hori ex K. Hara in Nippon Engei Zasshi (Journ. of Hort. Soc. Japan), 29³: 11, illus. (p. 9, figs. 7-9). T. 6, iii, Mar. 1917. (Japanese.) First published by Hori as *Phyllosticta citricola* Hori sp. nov. in Engei no Tome (Friend of Horticulture), 9⁷: 627, T. 2, vii, July, 1913, but with no description of the fungus, symptoms alone being given.

Pycnidia punctiform, black, first immersed then slightly raised and disclosing the upper end, gregarious or scattered, globose or depressed-globose, 100-130 μ in diam.; perithecial walls membranaceous, cells about 4-7 μ , dark-brown, carbonaceous; ostiola terminal, papillate or even; openings round, about 10-12 μ across; pycnospores globose, ovoid, or short-ellipsoid, 1-nucleate at the middle and very much granulated all over, colorless and hyaline, 6-11 \times 6-9 μ ; the spore mass does not seem to form the thread-like protrusion covered with mucilaginous matter.

On leaves of *Citrus*.

Type locality: Toyoda-mura, Abe-gun, Shidzuoka-ken, coll. by Okada, July 6, 1914.

Japanese name of disease: Kasshoku Ô-maruboshiyô (large, brown, round-spot disease).

This disease is reported to have caused great injury to Natsudaidai (Japanese summer orange) in the province of Toyoda-gun, Hiroshima-ken, and also in Abe-gun, Shidzuoka-ken. Hori reported it as also attacking the Unshû (Satsuma) orange.

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NEW JAPANESE FUNGI
NOTES AND TRANSLATIONS—IV

TYÓZABURŌ TANAKA

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NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—IV

TYŌZABURŌ TANAKA

BOTRYTIS LILIORUM Y. Fujikuro sp. nov. in *Shokubutsu-gaku Zasshi* (Bot. Mag.) Tōkyō, 28²²⁰: 228-230, 1 fig. T. 3, v, May, 1914.

Mycelia hyaline, branching, 3-12 μ across, septate and granulate inside; conidiophores projecting from the stomata of the host; solitary or two together, dark-brown in color, gradually paler toward the outer ends and nearly hyaline at the tips, 490-780 \times 16-21 μ , provided with 3-4 deciduous branchlets, which are sometimes dichotomously divided at the ends; conidia 4-6 to a branchlet, pale-gray, smooth, ovoid, broadly ovoid, or nearly spherical, sometimes irregularly shaped, 28-37 \times 21-31 μ , averaging 32 \times 27 μ , with granules 2-3 μ , germinating at the apex or lateral surface with 1-2 germination tubes 6-9 μ diam.

On *Lilium longiflorum* Thumb.

Type locality: Taikazeiho, Taihoku-chō, Formosa (Agr. Exp Sta. farm).

Illustrations: One halftone text-figure showing hyphae, conidiophores, and conidia.

The author compared this fungus with others of the same genus, reported as attacking the lily plant (*Botrytis canescens* and the *Botrytis* form of *Sclerotinia parasitica*), but could not find any similarity, so he described it as a new species.

Discovered by the author at the experiment farm of the Taiwan (Formosa) agricultural experiment station, among plants sent from Luchū Island. The disease, according to the author's statement, is as bad as any other three lily diseases ever found in Japan. It affects the plant mostly on the leaves, first appearing as small spots about 1 mm. diam., immediately spreading all over the surface, causing the total decay of the host plant. The

reproductive organs of the fungus appear on the decayed portion of the plant, giving it an appearance of powdery, fine fur.

PHYLLOSTICTA (PHOMA) KUWACOLĀ K. Hara sp. nov. in Dainippon Sanshi Kwaihō (Journ. Sericultural Association of Japan), Tōkyō, 26²⁰⁴: 390-391, T. 6, v, May 1917. (Japanese.)

Spots amphigenous, first minute (the size of *Sesamum* seeds), brownish, then increasing in size to 6-12 mm. diam., circular or polygonal, sometimes irregular, rufous, finally cinereous with concentric zones and determinate margins, punctate with minute black dots, mostly appearing on the upper surface of the spots; pycnidia sphaeroid or depressed sphaeroid, at first buried in the matrix, finally sub-emergent, dark-brown, 60-100 μ diam.; wall fungoid-parenchymatous, cells 5-10 μ diam.; ostiola slightly prominent or mammillate, later perforate; pycnosporos numerous, ellipsoid, ovoid, cylindric or sub-fusoid, both ends rounded, nucleate at both ends but sometimes not, hyaline, 4-6 \times 2-3 μ ; sterigmata obsolete.

On living leaves, shoots and twigs of *Morus alba*.

Localities: Mino (Gifu-ken) and adjacent prefectures—the annual damage seems to be considerable.

The spots appear on the leaves and then gradually dry up, becoming lacerate in dry weather and rotting in rainy weather. When they appear on the margins of leaves, very frequently semi-circular holes are made; when two or more are formed close together they coalesce, becoming irregular spots which sometimes occupy considerable space on the leaf and cause the entire blade to decay. Young twigs are also attacked and quickly change to a brownish color and die, showing minute black pustules over the surface. Hard twigs when attacked by the fungus display rufous spots which later become blackish and sink considerably below the level, showing much roughness and cracking on the surface and finally causing the death of the upper part of the twig.

New Japanese name of the disease: Kuwa no Rinmonbyō (circle blotch of mulberry).

Phoma Mororum Berl. is the nearest to this species, but the pycnosporos in the former species are curved while in *P. Kuwa-*

cola they are straight, and the details of pycnidial structure differ greatly in the two species.

SEPTOBASIDIUM ACACIAE Sawada sp. nov., in Nōji Shikenjō Tokubetsu Hōkoku (Special Report, Agr. Exp. Station) Taiwan (Formosa), no. 2: 103-104, pls. 11, 12. M. 44, xi, Nov. 1911. (Japanese.)

Mycelial strands (pilea) filamentous, rigid, tightly adhering to the bark, effused, 10 cm. across, 70-180 μ thick; surface smooth, brown or tobacco-brown when dry, brunnescous when wet; margin grayish-white; hyphae yellowish-brown when mature, branched, septate, 3 μ in diam.; protobasidia appearing on superficial hyphae, spherical, colorless, finely guttulate, subsessile, 9-15 μ across; basidia rising from protobasidia, easily detached, cylindric, subacute above and truncate below, straight or slightly curved, hyaline, 1-5-septate, 52-81 \times 4-6 μ ; sterigmata from each cell of basidia, 4-12 μ long; basidiospore hyaline, oblong to oblong-obovoid, curved, 18-22 \times 3-6 μ , germinating with short tubes carrying sporidia of about the same appearance as basidiospores measuring 11-15 \times 3-5 μ .

On trunks and twigs of *Acacia Richii*.

Type locality: Taihokuchō Shakukō, Formosa, Sept. 26, 1910, K. Sawada and Y. Fujikuro; l. c. Oct. 7, 1910, Y. Fujikuro.

Additional hosts and localities: On *Glochidion obovatum* (Euphorbiaceae), Agr. Exp. Station ground, Taihoku-chō Taikazeiho, Formosa, Oct. 7, 1910, Y. Fujikuro; on *Citrus* sp. Taihoku-chō Kūrun, Mar. 28, 1911, K. Sawada.

Illustrations: One halftone plate showing diseased twigs of *Acacia* and *Glochidion*; one black and white lithographic plate with 16 figures showing detailed structure of the fungus.

NOTE: It has been further reported by K. Sawada (in Nōji Shikenjō Tokubetsu Hōkoku, Taiwan, No. 11, Feb. 1915) that this fungus also occurs in Formosa on *Prunus Persica* (peach), *Prunus salicina* (plum), *Thea sinensis* (tea plant), *Salix glandulosa* var. *Warburgii*, and *Melia Azedarach*.

The affection is closely related to the attack of scale insects, and in many cases the dead insects were found embedded in the mycelial strands. The fungus sometimes kills *Acacia* trees

as was discovered by a forest inspector, so immediate treatment is desirable.

For the purpose of washing off the fungus, concentrated wood-ash solution (30-50 per cent.) is recommended.

CERCOSPORA PINI-DENSIFLORAE Hori et Nambu sp. nov. ex Viscount N. Nambu in *Byôchû-gai Zasshi* (Journ. Plant Protection, Tôkyô, 5⁵: 353-354. T. 6, v, May 1917. (Japanese.)

Acervuli punctiform, minute, black; conidiophores projecting from stromata, grouped, dark-brown, about 44μ high, 4.4μ across; conidia filiform or long-obelavate, slightly curved or straight, pale-yellow, 4-5-, sometimes 6-septate, $41.49-50.7 \times 1.23-4.6\mu$.

Hyphae pale-amber, intercellular; spots yellowish-brown, usually occurring on the upper half of the leaf; disease first starts from the upper part of the plant, gradually coming down, finally causing the death of all that portion of the plant above ground.

On leaves of young plants of *Pinus densiflora*.

Type locality: Nursery of Makago, Kagoshima-ken, Major Forest Office, September 20, 1915.

A great many young plants, mostly two years old, were fatally injured in the nursery above mentioned, which is located in the southern part of Kyûshû Island. The occurrence of this disease so far as reported seems to be only local but it seems likely to prove dangerous if it is not controlled by treatment of seedlings with Bordeaux mixture, as suggested by the writer.

HELICOBASIDIUM TANAKAE Miyabe, ex K. Sawada in *Shokubutsugaku Zasshi* (Bot. Mag.) Tôkyô, 26²⁰⁴: 102-105, 2 figs., M. 45, iv, Apr. 1912 (Japanese); in J. Matsumura, *Index Plantarum Japonicarum* (Teikoku Shokubutsu Meikwan) 1: 146, Mar. 1904. (Nom. nud.).

Styphinella Tanakae Miyabe, in K. Saida, *Naigwai Futsû Shokubutsushi* (Common flora of Japan and Foreign Lands) 1: 315, Aug. 1910 (Nom. nud.)

Septobasidium sp. M. Shirai in *Saikin Shokubutsu Byôrigaku* (Latest Plant Pathology), 3d ed., p. 356, Aug. 1907.

Mycelial strands (pilea) epigenous on trunks and twigs, first circular then increasing the area irregularly, often attaining 10 cm. diam., flat, lichenous, 1 mm. thick, surface velvety, brownish, pale-purplish-brown, or dark-brown, with very narrow thin margin grayish in color; hyphae branching, amber-colored, septate, thick-walled, granulate, in continuous row, $3-5\ \mu$ across; protobasidia not formed; basidia consisting of free branched ends of surface hyphae swollen and more or less club-shaped, first unicellular, hyaline and very granulate but at maturity sub-fusoid, 2-4-septate, straight or curved, $49-65 \times 8-9\ \mu$, producing sterigmata on each cell; sterigmata apical in the terminal cell, lateral in others, long, curved, comparatively large, $35-63 \times 3.5-4\ \mu$; sporidia terminal on each sterigma, hyaline, unicellular, long-falcate, obtuse, $27-40 \times 4-6\ \mu$, germinating to form hyphae.

On trunks and twigs of *Morus*, *Salix*, *Vitis*, *Juglans*, *Xanthoxylum*, *Prunus Mume*, *Prunus donarium*, *Prunus salicina*, *Prunus Armeniaca* var. *Ansu*, *Pyrus Malus*, *Pyrus sinensis*, *Ribes Grossularia*, *Kerria japonica*, *Thea sinensis*, *Paulownia tomentosa*, *Firmiana plataniifolia*, and *Pittosporum undulatum*.

Distribution: Japan, very common.

Most Japanese authorities who have described this species have confounded it with *Septobasidium pedicellatum* (Schw.) Pat. but the true *S. pedicellatum* was first discovered in Formosa by Mr. Sawada (Bot. Mag., Tōkyō, 26^{mo}: 307-311, Japanese) where *Helicobasidium Tanakae* does not occur. *Septobasidium pedicellatum* seems to attack only the mulberry tree and differs in having chestnut-brown hyphae $3.5\ \mu$ across, forming an ocher-brown pileus (never purplish), and in the formation of strongly curved basidia, $24-48 \times 6-8.5\ \mu$, which develop from spherical protobasidia.

NOTE: For an account of the occurrence of *Septobasidium pedicellatum* in Honshū (Main Island), we are indebted to Prof. A. Yasuda, who reported it from Kōzuke-no-kuni (Prefecture Gumma-ken) Setagun (Bot. Mag. Tōkyō, 28^{mo}: 447, Nov. 1914, Japanese). Hara later states that it occurs commonly in the main island (Dainippon Sanshi Kwaihō, Journ. Seric. Assoc. Japan, 25^{mo}: 713, Sept. 1916). It has also been collected by Miyake at a place near Tōkyō (Sangyō Shikenjō Hōkoku I: 333, Dec. 1916), and recently T. Watanabe reports that it is *S. pedicel-*

latum, not *Helicobasidium Tanakae*, which occurs on mulberry trees in the vicinity of Tōkyō (Sangyō Shimpō, Journ. of the Silk Industry, Tōkyō, 25²⁸⁷: 88, Feb. 1917).

The last paper mentioned gives an interesting account of the parasitic nature of both species, not merely epiphytically covering the surface of the host as reported before. The hyphae, rather finer, measuring 3μ across, almost colorless, attack the outer layer of phelloderm, entering mostly through complementary cells of lenticels, and there making conspicuous intracellular development, which is shown by penetrated cell-walls and well-nourished hyphae containing plenty of oil globules.

NOTHIOPATELLA MORICOLA I. Miyake sp. nov. in Sangyō Shikenjō Hōkoku (Technical Rept. Imperial Sericultural Exp. Station) Tōkyō, Japan, 1²: 344, pl. 17, figs. 15, 16, T. 5, xii, Dec. 1916. (Japanese.)

Pycnidia hypo-epidermal, conoid-pustulate, later erumpent, irregular, black; walls indefinitely pseudo-parenchymatous, not evidently differentiated from the matrix, forming pseudostromata, multilocular; ostiola simple, opening at the elevated portion of the pycnidia; conidia usually ellipsoid, rarely ovoid or elongate, nucleate with a comparatively large, greenish, oil-globule at each end, first colorless and hyaline, later olivaceous, unicellular, $2.7-3.8 \times 1.5-2.5\mu$; conidiophores covering the whole inner surface of pycnidia, abundant, hyaline, filiform, $10-14 \times 1\mu$.

On twigs of *Morus alba*.

Type locality: Iwate-ken, Morioka-shi, Apr. 5, 1915. I. Miyake.

Illustrations: Two lithographic figures showing pycnidium and conidia.

USTULINA MORI K. Hara sp. nov. in Dainippon Sanshi Kwaihō (Journ. of Sericultural Association, Japan), 26³⁰⁴: 380. May 1917. (Japanese.)

Stromata superficial, effused, 1-4 cm. in diam., 2-3 mm. thick, first carnose, later rigid, lacquer-black or dusky-black, whitish inside, sometimes more or less repand, surface uneven, punctate with black dots, margin more or less rounded; perithecia immersed, seriatly closely aggregated near the surface, ovoid, large,

1-1.2 mm., with punctiform ostiola, perforate; asci cylindric or clavate, rounded above, long-pedicellate below, 110-140 μ ; 10-12 μ , octosporous, paraphysate; ascospores monostichous, ovoid, ellipsoid, or indefinitely fusoid, blunt, continuous, 1-2 nucleate, dark-colored, 7-10 \times 4-5 μ ; paraphyses filiform, simple, longer than asci, 1-1.5 μ across.

On trunks of *Morus alba*.

Type locality: Mino (Gifu-ken prefecture), Kawakami-mura, April, 1913, K. Hara.

Differs from *Ustilina microspora* in the shape and dimensions of ascospores.

VALSA PAULOWNIAE Miyabe et Hemmi.

Besides the description in Japanese translated in *Mycologia* for May, 1917, two other descriptions of the fungus have been published by one of the authors, Dr. Hemmi. All three descriptions are marked "n. sp." The first article to be published with the original description of the fungus (in English) appeared in Sapporo Hakubutsu Gakukwai Kwaihō (Transactions of the Sapporo Natural History Society), 6²: 133-158, text-figs. 1-4, issued July 31, 1916. This article gives a full account in Japanese of the disease caused by this fungus and compares it with other similar diseases. The third and last of these articles is published in English in the *Shokubutsu-gaku Zasshi* (Botanical Magazine) Tōkyō, 36³⁹⁷: 304-313, text-figs. 1-4, issued Sept. 20, 1916. This article also gives a description of *Valsa Paulowniae* n. sp. in English. One of the figures (Fig. 4) in each of these articles gives the detailed microscopic structure of the fungus. The other three figures show effects of the fungus on Paulownia trees. Dr. Hemmi notes that the fungus was first collected in Aomori-ken in N. Honshū in August, 1903, by Mr. T. Nakamura and reported then as causing a very destructive disease of the "Kiri" tree. All three articles are of importance in throwing light on a very dangerous *Paulownia* disease of Japan which is analogous to chestnut blight in America, both in its swift destructive action and in causing the loss of timber much valued for cabinet-making.

NEW JAPANESE FUNGI

TYÔZABURÔ TANAKA

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NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—V

TYÔZABURÔ TANAKA

PHYSALOSPORA MINUTA I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report of the Imperial Sericultural Experiment Station), Tôkyô, Japan. 1⁵: 314, pl. 16, figs. 1-3, T. 5, xii, Dec. 1916. (Japanese.)

Perithecia sunk in the matrix, with ostiola erumpent, ellipsoid or globose, 150-200 μ in diam. and nearly 125 μ in height; perithecial wall black, pseudo-parenchymatous; ostiola 45-50 μ long, about 40 μ across; asci clavate-cylindric, thick-walled above, 60-70 \times 13-18 μ , paraphysate, octosporous; paraphyses filiform, abundant, forming thick periphysatic tissue; ascospores sub-biseriate, fusoid or ellipsoid, obtuse, minutely granulate, 18-22 \times 8-9 μ .

On living twigs of *Morus alba*.

Type localities: Gifu-ken, Kaidzu-gun, Shiroyama-mura, Mar. 1909, I. Miyake; Fukui-ken, Mar. 1909, K. Hara; Kyôto-fu, Ayabe-chô, Apr. 26, 1915, I. Miyake.

Illustrations: Three lithographic figures showing detailed structure of the fungus.

Mostly appears in presence of *Macrophoma minuta* Berl. the pycnidia of which are surrounded by blackened hyphae commonly known as subiculum, which occur simultaneously with the formation of perithecia of the present species. Symptoms of the two are identical, shown by minute, gregarious, elevated spots covering certain areas of the twigs. As to the evidence of genetic relationship between the two, since no ascogenous form of the former species has been reported, the new name is given as above.

ASCOCHYTA MORI I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Imperial Sericultural Experiment Station, Technical Report), 1⁵: 345, Pl. 17, figs. 17-18, T. 5, xii, Dec. 1916. (Japanese.)

Pycnidia ellipsoid or conoid, immersed, later erumpent, with single, apical ostiolum, $160\ \mu$ across; ostiola papillate, dark-bordered; perithecial wall pseudo-parenchymatous, not very thick, paler inside, increasingly dark outwards; mycelia surrounding perithecial wall dark-colored, mixing with colorless ones which predominate farthest from pycnidia; pycnosporos mostly elliptic, frequently cylindric with blunt ends, or ovoid, septate at the middle, not constricted, $9-11 \times 3.5-40\ \mu$, walls colorless, protoplasm pale-greenish, usually not conspicuously granulate but rarely one-nucleate in each cell; pedicel colorless and hyaline, short.

On branches of *Morus alba*.

Type localities: Fukui-ken prefecture, Japan, March, 1909, K. Hara; Idu-no-kuni, Shidzuoka-ken, Japan, Apr., 1909, I. Miyake.

Illustrations: Two black and white lithographic figures showing pycnidium and pycnosporos.

Ascochyta moricola Berl. differs from this species in having dark-colored fusoid pycnosporos pointed at both ends, and constricted at the septum.

Note: As the name *Ascochyta mori* has already been used by R. Maire (Ann. Myc. **11**⁴: 354, Aug. 1913), I propose a new name, *Ascochyta Miyakei* for this species.

STAGNOSPORA MORI I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku

(Technical Report, Imperial Sericultural Experiment Station), Tôkyô, Japan. **1**⁵: 348, pl. 17, figs. 22, 23. T. 4, xii, Dec. 1916. Japanese.)

Pycnidia sub-epidermal, walls of thick pseudo-parenchymatous tissue, dark-brown, ellipsoid or globoid, erumpent with short papilliform openings, $130-160 \times 120-150\ \mu$; ostiola black and darker than the pycnidial wall; pycnosporos cylindric, slightly curved, sometimes inequilateral, rounded at both ends, 3-septate, one septum formed earlier, more or less constricted, colorless, hyaline, granulate, germinating from either end or from both at the same time: $21-26 \times 6-9\ \mu$; pedicel short, small; paraphyses filiform, straight or slightly curved and twisted, the innermost the longest, shortening toward the opening.

Illustrations: Two black and white lithographic figures showing pycnidium and pycnosporos.

On twigs of *Morus alba*.

Type locality: Yamagata-ken (prefecture) Yonezawa-shi, Mar. 1915, I. Miyake.

It is often observed that the fungus causes the host tissues to disintegrate and usually only bast fibers are left unattacked.

ROBILLARDA MORI I. Miyake sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report of the Imperial Sericultural Experiment Station), 1⁵: 346, pl. 17, fig. 19. T. 4, xii, Dec. 1916. (Japanese.)

Pycnidia hypo-epidermal, later erumpent with a single ostiolum, black, globose or ellipsoid, 200μ across; ostiola papillate, short and small; pycnosporos cylindrical, $15-18 \times 2.5-3\mu$; more or less thickened at the middle portion, slightly rounded at the base, and rather pointed at the apex, straight or slightly curved, colorless to pale-greenish, septate at the middle, not constricted, with 3-4 bristles at the end; bristles equal in length.

On dead branches of *Morus alba* (rare).

Type locality: Fukui-ken prefecture, Japan, March, 1909, K. Hara.

Differs from *R. Cavarae* Tognin, which has pycnosporos with long pedicels measuring $40-50\mu$; and from *R. Celtidis* Scalia, characterized by having paraphyses $40-45\mu$ long.

CYTODIPLOSPORA MORI I. Miyake, sp. nov. in Sangyô Shikenjô Hôkoku (Technical Report, Imperial Sericultural Experiment Station), Tôkyô, Japan. 1⁵: 347, pl. 17, figs. 20-21. T. 5, xii, Dec. 1916. (Japanese.)

Stromata scattered or gregarious, black, hemispherically elevated above, then disclosed, rupturing the epidermis, $1\frac{1}{2}-2\frac{2}{3}$ mm. in diam., round or ellipsoid, pseudo-parenchymatous; pycnidia 4-5, sometimes more than 10 in one stroma, globose or ellipsoid, with short, flat ostiola; pycnidial wall made up of finely and densely fasciated hyphae, colorless inside; pycnosporos colorless, hyaline or pale-greenish, guttulate, cylindrical with round ends, ellipsoid or ovoid, even, sometimes irregular, straight or curved, uniseptate, septa centric or eccentric, constricted or not constricted, variable in size, $6-15 \times 3-5\mu$.

On living twigs of *Morus alba*.

Type locality: Tôkyô-fu (prefecture) Nakano-chô, May, 1915, I. Miyake.

Illustrations: Two black and white lithographic figures showing pycnidia and pycnospores.

Found nowhere else, parasitic; mycelium intercellular and with haustoria entering the host cells.

DIMEROSPORIUM MORI Y. Endô sp. nov. in Dainippon Sanshi Kwaishô (Journal of the Sericultural Association of Japan), 26⁰³: 300, fig. B on p. 288, Apr. 1, 1917. (Japanese.)

Perithecia large, ellipsoid, 110–120 μ high, 130–140 μ across, without appendages, dark-brown; perithecial wall consisting of large cells containing several oil globules in each cell; asci numerous, clavate, thin-walled, 60–70 \times 12–15 μ , 8-spored; ascospores almost definitely biseriata, oblong, subacute at both ends, 7–8 \times 5–7 μ , yellowish-brown, uniseptate, with 1–2 shining oil globules in each cell.

Epiphytic on leaves of *Morus alba* (mostly on variety *Nezumi-gaeshi*), occurring with a species of *Meliola*. Catenulate hyphae, unicellular microconidia, multicellular macroconidia, gemmae, spermogonia, and pycnidia were observed, but it was not determined to which species they belong.

Locality: Ueda, Chiisagata-gun, Nagano-ken, Japan, nursery ground of Ueda Sericultural College, and mulberry fields of Tokida section east of the college grounds.

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NEW JAPANESE FUNGI

TYÔZABURÔ TANAKA

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NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—VI

TYÔZABURÔ TANAKA

UNCINULA CURVISPORA K. Hara sp. nov. (in litt.).

Uncinula septata Salm. var. *curvispora* K. Hara var. nov. in
Dainippon Sanrin Kwaihô (Journ. Forestry Assoc. Japan)
Tôkyô, 392: 62. T. 4, vii Jul. 1915. (Japanese.)

Spots obsolete, hypophyllous; mycelia spreading in thin film-like overgrowth, fugacious; perithecia punctiform, scattered, flat-discoidal or conspicuously compressed into scale form, 170–220 μ (aver. 200 μ) diam., black; perithecial wall membranaceous, cells small and irregular, sometimes more or less radiating, 4–8 μ wide; appendages numerous, 200–300 altogether, filiform, simple, smooth, thin-walled, 35–200 μ long, 4–11 septate throughout, the basal half yellowish-brown, 6–7 μ across, gradually narrowed toward the apex, 2–2.5 μ across near the hyaline ends, apex coiled spirally; asci 3–5 to one perithecium, ellipsoid or ovoid, rounded at the apex, beaked, below, walls rather thick but brittle, 65–75 \times 37–50 μ ; ascospores 4–5, ellipsoid, ovoid, or ovoid-reniform, both ends rounded, yellowish, unicellular, granular inside, 28–35 \times 12–15 rarely 45 \times 18 μ .

On *Fagus sylvatica* var. *Sieboldi*.

Locality and distribution: Not given.

Notes: In a letter from Mr. Hara, received shortly before by the writer, a very peculiar habit of this fungus is described, which caused him to determine to raise this as a species. He found that the perithecia at maturity behaved always to turn over on their heads holding the substratum with their appendages exactly like the perithecia of *Phyllactinia corylea* do with the second appendages. He proposes a new subgenus *Asterothecia* to which the species belong, characterized by another noteworthy peculiar form of flattened perithecia.

UNCINULA GEXICULATA Gerard var. *carpenticola* K. Hara var. nov.
in Dainippon Sanrin Kwaihô (Journ. Forestry Assoc. Japan)
Tôkyô, no. 392, p. 62, 63, 1 text fig. on p. 64 (to the right) T.
4, vii, Jul. 1915. (Japanese.)

Amphigenous; mycelia persistent or evanescent, thin, filmy; hyphae filamentous, colorless, branching, septate, $3-4\mu$ across; perithecia gregarious or scattered, spheroid or depressed-spheroid, $70-100\mu$ diam.; perithecial walls membranaceous, dark-brown, composed of cells $10-18\mu$ wide; appendages $16-20$ altogether, delicate, filiform, straight or inflexed about the middle, continuous, glabrous, equally thickened, spirally helicoid at the apex, $150-440 \times 6-7\mu$; asci $6-8$ in one perithecium, ellipsoid or ovoid, unicellular, hyaline, one or two nucleate at the middle, $15-20 \times 9-11\mu$.

On *Carpinus* sp.

Locality and distribution: Not given.

Figures (woodcut) give the shape of appendages.

Differs from the type by having (1) amphigenous and much smaller perithecia, (2) very long appendages measuring 1.5 to 4 times as long as the perithecium and in numbers and dimensions of asci and a-cosporos.

UNCINULA NECATOR (Schw.) Burr. var. *Actinidiac* K. Hara comb. nov. in Dainippon Sainin Kwaihô (Journ. Forestry Assoc. Japan) Tôkyô, no. 392, p. 63-64, 1 text fig. on p. 64 (middle). T. 4, vii, Jul. 1915. (Japanese.)

U. Actinidiac Miyabe ex Salm. Monogr. Eris. 101. 1900 (nom. nud.).

Spots amphigenous, white or cinereous, irregular, somewhat pulverulent; mycelia thin, effused, persistent or evanescent; hyphae filamentous, branched, septate, $3-4\mu$ diam.; perithecia amphigenous, scattered or gregarious, spheroid or complanate-spheroid, $80-120\mu$, average 100μ diam.; cells forming perithecial wall $10-20\mu$, rarely 23μ wide, dark-brown; appendages $10-23$, linear, simple or rarely forked, $3-7$ septate or continuous, colorless above, usually $6-8\mu$ across, strongly helicoid at the apex, swollen at the base with diam. $9-13\mu$, total length $100-250\mu$, commonly, 200μ ; asci $4-6$, ovoid, ellipsoid or spheroid, beakless or occasionally beaked, $50-60 \times 35-40\mu$, spherical ones 50μ diam.; ascospores $4-6$, hyaline, ellipsoid or ovoid, $18-23 \times 10-13\mu$.

On *Actinidia polygama* and *Actinidia Kolomikta*.

Locality and distribution: Not given.

Illustrations (woodcut) gives appendages, ascus, and ascospores. In comparison, several appendages of *U. necator* from wine grape are figured to the left hand.

Note: Salmon states that the occurrence of this fungus on *Actinidia* in Japan suggests that native locality of grape mildew disease in the Orient (Monogr. Erisiph. 1909, p. 101), but Hara considers there is evidently a considerable morphological difference between this and the typical *U. necator*, the former being characterized by short, stout, subrigid appendages, with distinct swollen bases, and by typically beakless asci.

MICROSPIHAERA ALNI (Wallr.) Salm. forma *Quercus-glanduliferae* K. Hara forma nov. in Dainippon Sanrin Kwaiho (Journ. Forestry Assoc. Japan) Tôkyô, 392: 64 Jul. 1915. (Japanese.)
Appendages once branch dichotomously about the middle. Other characters same as type.

On *Quercus glandulifera*.

Locality and distribution not given.

MACROPHOMA CORCHORI Sawada sp. nov. in Taiwan Nôjihô (Formosan Agric. Review) Taihoku, 120: 868-871. T. 5, xi, Nov. 1916. (Japanese.)

Spots indefinite; mycelia corticolous or lignicolous, occasionally formed in medulla, colorless; hyphae aseptate, branching, 3-8 μ across, freely passing through the host cells; pycnidia subepidermal, punctiform, black, with ostiola erumpent, spheroid, depressed-spheroid or ovoid, often sub-confluent, 68-225 \times 80-275 μ ; cells forming perithecial wall multiserial, black; ostiola with round openings 15 μ in diam.; conidiophores numerous, densely coarctate, cylindrical, somewhat tapering toward the apex, simple, straight or slightly curved, continuous, hyaline, 10-14 \times 2.5-3.5 μ , terminated by a single pycnospore; pycnospores ovoid-oblong, oblong-ellipsoid or short-clavate, rounded at the apex, obtuse at the base, straight or slightly curved, smooth, unicellular, finely guttulate, hyaline, 16-32 \times 7-10 μ .

On *Corchorus capsularis* (jute).

Locality: Formosa (widely distributed).

Notes: The diseases of jute have not yet been well studied by pathologists even though the plant is so important as a source of textile fiber. Sawada states that this dieback disease is one of the most devastating jute diseases in Formosa and the annual loss is sometimes recorded as 30-40% of the total crop. The only remedy for this is said to be to avoid an insufficient supply of potash in the soil, and Bordeaux mixture was shown to be no protection against the disease.

Sawada gives (on p. 864) five more species of fungi attacking the jute plant in Formosa, among which two are new, that is, *Phyllosticta Corchori* Sawada sp. nov., *Hymenula nigra* Sawada sp. nov., *Hypochnus centrifugus* (Lév.) Tul., *Sphaerotheca fuliginosa* (Schlecht) Pollacci, and *Rhizoctonia Solani* Kuehn.

PERONOSPORA CHENOPODII-FICIFOLII Sawada sp. nov. in Taiwan, Sôtokufu Nôji Shikenjô (Agr. Exp. Sta. Formosa) Circular. Publication No. 101, p. 9-10, 15, figs. 6-10, June, 1916 (Japanese): in Taiwan Nôjihô (The Formosan Agr. Review) No. 155, p. 29, 32, figs. 6-10. June 20, 1916. (Japanese.)

Hypophyllous, forming a pale-purplish-gray growth on the under surface of leaves, discoloration rather prominent, pale-yellow, round or irregular, about 1-27 mm. in diam., sometimes covering entire under surface; hyphae intercellular, colorless, aseptate, 7-12 μ across haustoria simple or branched at the tips, mostly more or less spiral, 10-20 \times 3-4 μ ; conidiospores caespitose from stromata, 240-500 \times 8-14.4 μ , 3-6 rarely 7-times dichotomously branching, all branches extremely curved, average of main stem and branches first to fifth orders measuring respectively 310.4 \times 10.5, 33.9 \times 6.5, 27.6 \times 5.9, 24.1 \times 4.5, 16.4 \times 3.8, and 10.2 \times 3.4 μ ; conidia oblong or somewhat ellipsoid, papillate at the basal ends, fuliginous or cinereous, 26-36 \times 17-25 (average 30.6 \times 20.9), germinate with germ tubes; germ tubes not conspicuously swollen at the base, 4-7 μ .

Oögonial stage not known.

On *Chenopodium ficifolium*, parasitic, Taiwan (Formosa), common.

PERONOSPORA EFFUSA (Grev.) Ces. var. *minor* Casp.) on *Spinacia oleracea* (spinach: Hôrensô in Japanese) and *Peronospora Chenopodii* Casp. (= *p. effusa* var. *major* Casp.) on *Chenopodium album* are also studied, and inoculation experiments proved the independence of all of these three species. Morphologically, this species differs from *P. effusa* in having (1) spots more intensely colored, (2) hyphae in host tissues thicker with more or less spiral haustoria, (3) curved branches of conidiophore much longer in every respect, (4) papillate conidia more intensely colored, and much longer, (5) germ tubes not conspicuously swollen at the base; from *P. chenopodii* in having (1) more loose and less branching conidiophores, the main stems of which appear more slender, (2) conidia much longer, mostly oblong,

The present idea regarding the omnivorous nature of peronosporaceous fungi will have to be greatly altered, as is proved in this case by inoculation experiments which show an entire lack of relationship among species occurring on closely related host plants, even growing in the same field. Sawada also succeeded in making the following three independent species from what has been known as the lettuce downy mildew fungus, *Bremia Lactucae*, which attacks 66 species belonging to 24 genera so far as has been described.

(1) *BREMIA SONCHII* K. Sawada sp. nov. in *Shokubutsugaku Zasshi* (Botan. Magaz.) Tōkyō, 28³²⁶: 86-83. Text fig. 2. Feb., 1914. (Japanese.)

Follicolous or cuticulous; spots small, polygonal, rarely cover entire surface in lower leaves; aërial hyphae usually scanty, arachnoid when appearing on lower leaves; intercellular hyphae hyaline, continuous, finally granulate, 8-17 μ ; haustoria spherical, occasionally obovoid or subclavate, 11-24 \times 7-13 μ ; conidiophores caespitous from stomata, whole length 230-560 μ , upper half 3-6 times dichotomously branching, the dimension of main stem, and branches of first to fourth orders respectively measuring 286 \times 9, 74 \times 8, 65 \times 6, 52 \times 4, 43 \times 3.5 μ , basal portion of main stem somewhat swelling, each branch rather slender, curved, rarely 1-septate throughout the conidiophore, swellings of terminal branches spherical, 2-6 sterigmate, sterigmata 4-7 \times 2.5-3 μ , terminated by single standing conidia; conidia mostly globose, occasionally obovoid, flat-papillate above, small-pedicellate below, containing protoplasm highly reflecting light, 17-24 \times 13-21 μ , germinate in 2 hours; germ tubes 3.5-6 μ diam., varying in thickness through the growth.

On *Sonchus oleraceus*.

Locality: Taiwan (Formosa). Common.

Illustration: One woodcut figure showing conidiophore, haustoria and conidia.

Inoculation result is only positive on above plant, negative on *Crepis japonica*, *Lactuca debilis*, *Lactuca laciniata*, *Lactuca scariola* var. *sativa* (Lettuce), *Arctium Lappa*, *Hemistepta carthamoides*, *Sonchus oleraceus*, and *Taraxacum platycarpum*.

Chief morphological difference from *B. Lactucae* lies in (1) the situation of lowest branch of conidiophore nearly at the

middle, not at one-third or one-fifth of the whole length as in *B. Lactucae*, (2) the form of disk of terminal branches of conidiophore nearly spherical instead of disk-shaped.

(2) *BREMIA SAUSSUREAE* Sawada sp. nov. l. c. p. 80-83. Text fig. 2.

Foliicolous; spots pale-yellowish, polygonal, about 15 mm. broad, forming a dense white growth on the under surface of leaves; intercellular hyphae running through mesophyll tissues, granulate, 8-17 μ across; haustoria ovoid, obovoid, or irregular, 14-27 \times 5-14 μ ; conidiophore single or caespitose from stomata, very long, 270-1021 μ , 3-6 dichotomously branching, branches all short and stout, the dimension of main stem and branches of first to fourth orders measuring respectively 622 \times 10, 57 \times 8, 37 \times 7, 28 \times 5, 18 \times 4 μ , septate (usually 5-6), swellings of terminal branches 4-6 sterigmate, sterigmata 6-10 \times 3 μ , terminated by single standing conidia; conidia conspicuously large, broadly ellipsoid to elongate-oblong, flat-papillate above, pedicellate below, granulate, 24-57 \times 18-28 μ , hyaline, germinate in 2 hours, germ tubes 4.5-7 μ across, not uniform in diameter.

On *Hemistepta carthamoides* (= *Saussurea affinis* not Spreng.).

Locality: Taiwan (Formosa). Common.

Illustration: One woodcut text figure showing conidiophore, conidia, and haustoria.

Inoculation experiment negative on *Crepis japonica*, *Sanchus oleraceus*, *Lactuca debilis*, *Lactuca scariola* var. *sativa*, *Lactuca laciniata*, *Arctium Lappa*, and *Taraxacum platycarpum*.

(3) *BREMIA OVATA* Sawada sp. nov. l. c. p. 83-84. Text fig. 3.

Hyphae 7 μ across; conidiophores caespitose, total length almost 1 mm., 3-8 times dichotomously branching, usually 7-8 septate, main stem comparatively long, branches short, average dimension of main stem and branches of first to fifth orders measuring respectively 591 \times 8, 55 \times 6, 52 \times 5, 44 \times 3.5, 24 \times 3, 13 \times 3 μ ; swelling a terminal branch spherical or top-shaped, 3-7 sterigmate; sterigma 6-8 μ long; conidia ovoid or oblong-ovoid, minutely pedicellate below, apical papilla obsolete, 14-18 \times 10-13 μ , hyaline, granulate, germinate with germ tubes; germ tubes 3.5-4 μ across, nearly uniform in thickness.

On *Crepis japonica*, occurring with *Protomyces Inouyei* P. Henn.

Locality: Taiwan (Formosa). Rare.

Illustration: One woodcut text figure showing conidiophore and conidia.

Sufficient material was not secured to make inoculation experiments. The species is characterized by the very short terminal branch of the conidiophore, the long main stem, ovoid conidia, and uniform growth of germ tubes.

HELICOBASIDIUM MOMPA N. Tanaka forma *macrosporum* K.

Hara form. nov. in Dainippon Sanshi Kwaihō (Journ. Seric. Assoc. Japan) Tōkyō, 26^{nos}: 725. T. 6. ix. Sept., 1917. (Japanese.)

Sporidia oblong-ovoid, straight or curved, rounded at the apex, gradually pointing toward the base, $15-25 \times 6-8 \mu$, average $18 \times 7 \mu$.

On *Morus*.

Locality: Not given.

This form is to be distinguished from the typical "Mompa" fungus, which has much smaller sporidia, measuring $10-15 \times 5-7 \mu$. (N. Tanaka, in Journ. Coll. Sci., Tōkyō, 4¹: 194. 1891.)

On account of the absence of protobasidia, the species belongs to *Helicobasidium* instead of to *Septobasidium*, to which it was transferred by Raciborski in 1909 (Bull. Int. Ac. Sci. Cracovie; Math.-Nat., Ann. 1909: 365).

BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.



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NEW JAPANESE FUNGI

TYÔZABURÔ TANAKA

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NOTES AND TRANSLATIONS—VII

TYÔZABURÔ TANAKA

DIDYMELLA MORI K. Hara sp. nov. in Dainippon Sanshi Kwaiho (Journ. Sericultural Association of Japan), 26^{sup}: 388, 1 text cut. May, 1917. (Japanese.)

Spots inconspicuous; perithecia scattered, punctiform, black, covered by the epidermis which is raised and finally pierced, globose or depressed globose, 200–250 μ high, 250–300 μ in diam.; perithecial wall thick, fungoid-parenchymatous, black, cells not definitely distinguished; asci cylindrical or long clavate, rounded above, attenuate to short sterigmata below, 70–80 μ \times 5–8 μ , octosporous, paraphysate; ascospores obliquely monostichous, fusoid, ellipsoid or sub-ovoid, slightly narrowed at both ends, uniseptate at the middle, more or less constricted, 2–3-nucleate in the young stage, homogenous at maturity, colorless, 12–15 \times 5–6 μ ; paraphyses filiform, longer than asci, 4 μ across.

Illustrations: One text cut with four figures showing spots, perithecium, asci, and ascospores.

On twigs of *Morus alba*.

Type locality: Mino (Gifu-ken Prefecture) Kawakami-mura, Oct., 1915, K. Hara.

MYCOSPHLHERELLA COLACASIAE K. Hara sp. nov. in Byôchû-gai Zasshi (Journ. Plant Protection), Tôkyô, 5⁵: 355–356. May, 1917. (Japanese.)

Perithecia scattered, punctiform, immersed, later erumpent, globose or depressed globose, 60–120 μ diam., black; perithecial wall fungoid-parenchymatous, dark-brown, cells 5–13 μ across; ostiola terminal, verruciform or papilliform, often not prominent, simply perforated, openings comparatively large, 25–30 μ across; asci cylindrical or clavate, inconspicuously pointed above or more generally rounded, attenuate below, pedicellate, 45–70 μ \times 8.5–10 μ , octosporous; ascospores biseriata, fusoid, more or less excentrically uniseptate, constricted, upper cell broader and

shorter, pointed, lower cell sometimes attenuate, mostly rounded, 2-nucleate in each cell, $13-17 \times 4-5 \mu$, hyaline, colorless.

On leaves of *Colocasia antiquorum*.

Type locality: Not given. Probably Main Island (Honshū), Japan.

Spots solitary or confluent, at first round, testaceous brown, 1.5 mm. across, finally increasing to 6-30 mm., concentrically zoned and more or less sunken from the surface level, with dark brown margin and broad surrounding area of the same color; perithecia appear on the upper surface of the spots. When the diseased spots reach full maturity they can be seen from the lower surface of the leaf and appear light brownish with dark green margin.

The disease is frequently observed when the host plants are cultivated in damp soil and the first symptoms show during the hottest season. The disease greatly decreases the crop as the tubers cannot grow to the usual size.

For protection against this disease Bordeaux mixture should be used twice or three times in early summer, and if the diseased leaves can be found they should be carefully collected and buried underground with lime. Also avoid cultivation on low, damp soil.

VALSA MALI Miyabe et Yamada ex M. Miura in Nōji Shiken Seiseki (Agricultural Experiment Station Bulletin) Aomori-ken, Japan, No. 15: 117-141. *pls.* 1-5, T. 4, ix, Nov., 1915. (Japanese.)

Hyphae septate, hyaline or very pale olivaceous, intercellular, $2-4 \mu$ across; stromata cortical, punctiform or wart-like, of various sizes (1-3 mm. diam. in cultures), no definite border to the host substratum, black, hyphae slate-black to black; pycnidia deeply immersed at the center of a stroma, flask-shaped, opening with a slender canal-like neck, $80-200 \mu$ diam., circumscribed by black walls; pycnosporos expelled as thread-like buff tendrils which at maturity are readily disseminated by water; cylindrical or allantoid, obtuse at both ends, $7-10 \times 1-1.5 \mu$, homogeneous inside, hyaline; perithecia circinate surrounding the pycnidial cavity, flask-shaped, long-necked, with black walls, of various sizes, $100-250 \mu$ diam.; asci numerous, clavate, often pedicellate, $20-30 \times 5-8 \mu$, hyaline, octosporous, paraphysate; ascospores cylindrical, slightly curved, continuous, nearly as large as pycnidia, hyaline, agranulate.

On apple, causing a somewhat destructive blight disease, called "Furanbyô" in Japanese. The disease first appears on the surface of branches as brownish spots with irregular or nearly oblong circumference, slightly elevated from healthy portion, then gradually drying out, inconsiderably sunken, more or less darkened, and cracking on the outer surface, finally disclosing the pustules which are scattered over the diseased surface. No secretion of liquid was observed, which is usual in case of fire-blight (Hiyakebyô) caused by *Bacillus amylovorus* also known in northern Japan.

Type locality: Not given. Distribution: Northern part of Honshû and Hokkaidô.

The name, *Falsa Mali*, first appeared in a list of important fruit diseases of North Island compiled by Sapporo Agricultural College, which was exhibited at the Fifth Industrial Exposition held at Osaka during 1903-04 ("Sapporo Nôgakkô Hen, Hokkaidô Jûyô Kwaju Byôgai" n. d., printed before April 1, 1903), later described by Y. Takahashi and H. Okamoto in Hokkaidô Nôji Shikenjo Ithô (Circular of the Hokkaidô Agr. Exp. Sta.) No. 5: 39-41, fig. 18, published March, 1908. A more detailed account of the fungus was given by Dr. A. Ideta in his *Nippon Shokubutsu Byôrigaku* (Handbook of the Plant Diseases in Japan) ed. 4, pt. 1 (1909), pp. 295-297, where the original drawing of Prof. G. Yamada is first printed and the dimensions of ascospores are given as $8 \times 1.5 \mu$. Cultural tests were recently reported by Dr. T. Henmi in *Trans. Sapporo Nat. Hist. Soc.*, 6²: 146-152 (July, 1916), and in *Journ. Tôhoku Imp. Univ., Coll. of Agric.*, 7¹: 277-287 (Aug., 1916), where the activity of the growth is stated to be remarkably accelerated by an addition of 0.1-0.2 per cent. pyrotannic acid or 0.8 per cent. citric acid to the culture medium.

DIAPORTHE MALI Miura sp. nov. in *Nôji Shiken Seiseki* (Agr. Exp. Sta., Bull.) Aomori-ken, Japan. No. 15: 77-116, *pls.* 2, 3, 5, T. 4, ix, Nov., 1915. (Japanese.)

Pomiticulous, caulicolous, often foliicolous; mature spots on fruits 2-8 mm. diam., size not increasing further under natural conditions, round, solitary or irregularly coalescent, more or less

sunken, usually deeper in color than the healthy part, changing the underlying tissue to brown or dark-brown, tissue becoming spongy, imparting slightly bitter taste; hyphae intercellular, septate, $2-5\ \mu$ diam., readily producing chlamydospores and cylindrospores in culture; chlamydospores (formed in culture) catenulate, cinereous or greenish, thick-walled, conspicuously constricted at the junction, numerous granulate, $10-14 \times 5-8\ \mu$; cylindrospores (formed in culture from fruit spot) straight or curved, tapering toward the apex, pale pinkish-brown in mass, colorless or indistinctly greenish when observed alone, $2-7$ -septate, occasionally constricted at septum, $38-70 \times 3-3.5\ \mu$, those obtained from leaves in culture measuring $32-80 \times 3-4\ \mu$; pycnidia, formed as brownish black spots on the surface of entirely decayed fruit, numerous, irregular or often growing in concentric zones, afterwards covered by white or pale olivaceous-white cottony hyphae, semi-spherical, $70-220 \times 70-130\ \mu$, at full maturity exuding from the central opening, a pinkish-brown semi-liquid substance composed of two kinds of pycnosporos, characteristic of the genus *Phomopsis*: conidiospores $15-18 \times 2-3\ \mu$; Phoma-spore ellipsoidal, pointed rather distinctly at both ends, continuous, hyaline, guttulate at both ends, $7-9 \times 3-4\ \mu$; Septoria-spore filiform, slightly curved either near the apex or at the middle, continuous, hyaline, $24-32 \times 1-3\ \mu$; stromata formed in culture and on decayed twigs placed on culture media, irregular, black outside, white inside, $3-7$ mm. diam., producing flat, central *Phomopsis* pycnidia of about $1-1.5$ mm. diam., and a certain number of surrounding *Diaperthe* perithecia with protruding ostiola visible to the naked eye; perithecia (observed on twigs above mentioned) spheroidal or oblate-spheroidal, $300-450\ \mu$ diam., with intensely black outer wall and light-brown inner wall; ostiola rather long, conspicuously hairy near the end, with projecting hyphae; asci fusoid, obtuse above, inconspicuously pedicellate below, $45-52 \times 5-10\ \mu$, octosporous, aparaphysate; ascospores biseriate, fusoid, both ends obtuse, one-septate, constricted, 2-nucleate in each cell, hyaline, $11-13 \times 3.5-4.5\ \mu$.

Leaf-spots occur as pale discolored areas of $1-2$ cm. diam., usually producing leaf-curl and final defoliation during the summer, showing under microscope mycelial development through the tissue. Young shoots as well as bearing twigs also show irregular brownish infection at the point about six inches from the end, gradually drying and cracking the surface, finally causing death of the tip of the shoot.

On fruit, leaf and twig of apple.

Locality: Northern Japan (very common).

Illustration: Two collotype plates showing infections of twigs and fruits of apple, one lithographic plate giving detailed structure of the fungus in various stages.

Note: The fruit spot of apple (*Heikica no Hantenbyô* in Japanese) here described is very widely distributed throughout the territory, most frequently occurring on Jonathan apple, the spotted fruit of which is almost considered as characteristic of the variety. Though closely resembling *Phoma Pomi* Pass. in the cylindrospore formation, the *Phomopsis* stage is entirely different from that, indicating a common identity with *Phomopsis Mali* Rob. which is reported as occurring only on twigs and not on fruits. The discovery of the ascogenous form in culture enabled the investigator to prove these observed forms stages of *Diaporthe*. "Diaportheose" is proposed as the new English name for this disease.

THRAGMIDIUM RUBI-SIEBOLDII Kawagoe sp. nov. in Kagoshima Kôtô Nôrin Gakkô Gakujutsu Hôkoku (Bull., Kagoshima Imp. Coll. Agr. and Forest.), Kagoshima, no. 1: 201-203, 1 pl. T. 5, iii, Mar., 1916. (Japanese.)

III. Telia hypophyllous, elongated, orange yellow, quite conspicuous macroscopically as silky protrusions of veins through lacerately ruptured epidermis, discoloration of the upper surface being brownish, the margin of which is rather indefinite; hyphae bundles projecting from cortical as well as bast portion of substrata attain to 2,200 μ in whole length when measured with teliospore bundles; teliospores elongate-lanceolate with conspicuously long pedicels, mostly 5-celled, gradually narrowed and sharply pointed at the apex, 136-224 \times 15.6 μ , the terminal cell occupying nearly one half of total length, slightly constricted at the septum, membrane smooth, equally thick, hyaline, 2 μ across, contents granular, mixed with oil globules, orange yellow; pedicels very long, average 2,000 μ in length, membrane thicker than that of spore, measuring 3 μ across, smooth and hyaline, contents also hyaline.

On leaves of *Rubus Sieboldii*.

Type locality: Toso, Nakagôriu-mura, Kagoshima-gun, Kagoshima-ken. (K. Toyohira, May, 1911.)

Illustration: One lithographic plate with a photograph of affected leaf. Teliospores and a magnified cross section of telia are given.

The fungus, discovered only in the place above mentioned, is of doubtful importance so long as the connections with other forms remain obsolete. The fungus occurs on the plant about the beginning of May and lasts until the end of June.

POLYPORUS PUBERTATIS Yasuda sp. nov. in Shokubutsugaku Zasshi (Botan. Magaz.) Tôkyô, 30³⁵¹: 66, Mar., 1916 (Japanese); l. c. 31³⁶²: 54, Feb., 1917 (nom. nud.).

Pilei firmly suberose, sessile, dimidiate, margin semi-circular, cross-section triangular, thick, 7.5-8 × 3-4 × 2-3 cm., light; surface even, minutely velvety with soft fuzzy hairs, azonate, sub-fuscous; context sub-fuscous, thick; tubes long, about 0.5-1 cm., thick-walled, pinkish; mouths small, rotund; spores numerous, ellipsoid, smooth, 5 × 3 μ.

On wood bark.

Type locality: Miyagi-mura Kashiwagura, Seta-gun, Kôdzukenokuni (Gunma-ken prefecture), collected by Jûgorô Tsunoda.

Japanese name: Hônen-take.

Notes: In the latter article this fungus is placed under Sect. 4. *Fusci*, c. "Hymenium ohne Zystiden; Sporen gefärbt."

NEOTTIOSPORA THEAE Sawada sp. nov. in Nôji Shikenjô Tokubetsu Hôkoku (Special report, Agr. Exp. Station) Taiwan (Formosa), No. 11: 113, pl. 1, figs. 30-31, T. 4, ii, Feb., 1915. (Japanese.)

Spots epiphyllous, irregular, cinereous to brown, sparingly dotted with black, minute fruiting bodies, margin definite, elevated, purplish-black; pycnidia subepidermal, black, depressed globose to spheroid, 84-93 × 108-135 μ, erumpent with ostiola; pycnospores cylindrical, both ends rounded or obtuse, 12-14 × 3 μ, unicellular, hyaline, ciliate at one end; setae filamentous, 9-11 μ long.

On leaves of *Thea sinensis*. Occurring rarely on mature leaves in Formosa and seems to cause no serious damage.

Type locality: Shinchikuchô Nanshō, May 3, 1910. Y. Fujikuro.

Illustrations: Two black and white lithographic figures.

PESTALOZZIA GOSYPII Hori sp. nov. ex S. Tsuruda, in *Byōchū-gai Zasshi* (Journ. Plant Protection) 4³: 27-28, T. 6, iii, Mar., 1917. (Japanese.)

Spot ochraceous-brown, about 16 mm. diam. with irregularly zoned fuliginous margin; acervuli punctate at the middle part of the spot, first covered by epidermis, then erumpent, black, 212-255 μ broad; conidiophores hyaline, 2-4 \times 0.6-0.9 μ ; conidia clavate, thickened at the apex, gradually narrowed toward the base, 5-celled, terminal and basal cells hyaline, 3 inner cells fulvous, the middle cell most strongly darkened (18-27 \times 4-8 μ); setae 2-3, slightly swollen at the apex, hyaline, 6-16 \times 1.6 μ .

On leaves of *Gossypium herbaceum*.

Type locality: Shidzuoka-ken (prefecture) Ogasa-gun Hiki-mura, Dec. 10, 1916, S. Tsuruda.

Japanese name of the disease: Sōmen no Hanmonbyō (Leaf-blotch of cotton).

The disease caused a little damage on the upland cotton in the Shidzuoka prefecture during the wet harvest season of 1916 but has never been reported from any other cotton-growing sections of Japan or Chōsen (Korea). It is very easily distinguished from ordinary "Hantenbyō" (Leaf-spot disease, caused by *Cercospora gossypina* Cke.) by its reddish-buffy-brown spots which, in the latter species, present a grayish-brown portion less conspicuously dotted in the center with acervuli.

The dimensions of the conidia, which are omitted in the original publication, were obtained by communication with the original author, Mr. Tsuruda, who, to our greatest regret, died a few days before the reply containing this information reached the writer of this review.

BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.

NEW JAPANESE FUNGI

TYÔZABURÔ TANAKA

[Reprinted from MYCOLOGIA, Vol. XII., No. 1, January, 1920.]

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NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—VIII

TYÔZABURÔ TANAKA

- PHYTOPHTHORA CARICA (Hara) Hori ex K. Sawada in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. of Formosan Nat. Hist. Soc.) no. 26: 174-179. T. 5, xi, Nov. 1916. (Japanese.)
- Kawakamia Carica* Hara, Nôgyôkoku (Country of Agriculture) 9³: 24-27. Mar. 1915; in Nippon Engei Zasshi (Journ. Hort. Soc., Japan) 30⁴: 20-22. Apr. 1918.
- Phytophthora Fici* Hori, Byôchû-gai Zasshi (Journ. Plant Prot.) 2¹¹: 930-932. Nov. 1915.
- Phytophthora Carica* (Hara) Hori in Byôchû-gai Zasshi (Journ. Plant Prot.) 2¹²: 1015-1017. Dec. 1915.
- Phytophthora Carica* Hara, K. Hara's Kwaju Byôgairon (A Discourse on Fruit Diseases) p. 431-436. Nov. 1916.
- Phytophthora* sp. Moeller in Bot. Mittheil. a. d. Tropen 9:3. 1901 (ex Sawada); Wilson in Mycologia 4²: 77. 1914. (ex Sawada).

Aërial hyphae branching, thin-walled, continuous or septate at maturity, hyaline, 3-10 μ across; conidiophores solitary or fasciculate, much resembling aërial hyphae, simple or branching directly below the conidium, or irregularly forked, continuous or rarely septate, 36-480 μ long, seldom attaining to 1,000 μ , 3.5-4.5 μ across; conidia pyriform, oblong, ellipsoid, ovoid, or fusoid, bearing a distinct papilla 4-8 μ long, thin-walled, finely granulate, hyaline, 26-112 \times 16-45 μ , wall contiguous to the end of conidiophores, often thickened, falling off at times with a part of conidiophore, germinating in water with germ tube or liberating zoöspores after 35 minutes; zoöspores several dozen from one conidia, ovoid or ellipsoid, ciliate at both ends, 12 \times 8 μ , later transforming themselves into transparent, spherical resting-spores of 9-12 μ in diam., which also soon germinate with germ tube 3-4 μ across; germ tubes of conidia protrude usually from apical

papilla but occasionally from other part much branched, 4-10 μ across, often terminated by acrogenous secondary spore of the shape of conidia, otherwise a globe, which germinates with germ tube or produces zoöspores on germination; chlamydospores formed in the host tissue at ends of endogenous hyphae, seldom formed on conidiophores, globose, ochraceous, 15-49 μ , commonly 40-45 μ , wall at first thin, later thickened to measure 2 μ across; oögonia and oöspore yet unknown.

On *Ficus Carica*, causing white-rot (*Shiro-kusare* in Japanese) of fruits.

Type localities: Komaba, Tôkyô, College of Agriculture grounds, on "White Genoa," Sept. 1909, S. Kawagoe & K. Hara (ex Hara); Gunma-ken Agricultural Experiment Station grounds, on "Black California," Sept. 1915 (ex Hori).

Distribution: Taiwan (Formosa), also occurring on "Black California" (ex Sawada).

Hara states (in Kwaju Byôgairon p. 432) the disease commences in August or September. The fruit becomes darker in color and water-logged in appearance and is followed by immediate liquefaction and decay. The affection is at first limited to a small sunken area, but soon spreads over the entire fruit, developing in a few days a thick cottony cover of mycelium on its surface. A disagreeable odor usually accompanies the decay. The surface of rotten fruits remaining on the twig is white and longitudinally wrinkled in the dried condition.

Illustrations: Hara's Kwaju Byôgairon (p. 433) gives 8 wood-cut figures illustrating the details of the fungus.

Notes: According to Hara's point of view, the genus *Kawakamia* ought to have its conidiophores unbranched or at least not branching immediately below the conidia (Hara '18 p. 22. See above). This distinction, however, is very uncertain and unreliable, as irregular branching of conidiophores is often observed in well established species of *Phytophthora*, e. g. *P. omnivora*. Sawada, dwelling upon *Kawakamia Cypri* (Publication no. 102 of Agric. Exp. Stat., Taiwan, p. 10-18. June, 1916), rightly pointed out that the most important difference of *Kawakamia* from *Phytophthora* consists in having (1) well-developed haustoria and (2) its antheridia not tightly surrounding the oögonial

stalk, but simply attaching to the wall of oogonia at an arbitrary point, and (3) in its obligate parasitic nature. The conidium of *Kawakamia* is often reported to bear a collar cell at the basal end, but Sawada found this as a mere thickening of the wall, which is more prominent in *Kawakamia* than in *Phytophthora*.

CAPNODIUM TANAKAE Shirai and Hara sp. nov. in K. Hara's Kwaju Byôgairon (A discourse on fruit diseases) p. 239-242. T. 5, xi, Nov. 1916. (Japanese.)

Perithecia cylindric, simple or branched, with enlarged spherical apex containing asci, wall fungoid-parenchymatous in texture; asci clavate, tapering at both ends when fully matured, 6-8-spored, $30-45 \times 10-12 \mu$; ascospores oblong or fusoid, not acutely pointed at both ends but rather blunt, 3-septate, fuscous, $10-15 \times 4-5 \mu$.

Saprophytic on fruits of *Citrus grandis* (pummelo), forming irregular patches of thin felt of dirty blackish color, which only reflect the light slightly. In culture, hyphae and a form of conidia developed, which are not sufficiently worked out to prove whether they belong to a generation of this species or something else. Hyphae thus formed are at first whitish, then turn to the characteristic sooty color, plentiful, branching, septate, 3-5 μ across; upright hyphae resume a rôle of conidiophores, producing catenulate conidia at the end; conidia ellipsoid or ovoid, both ends rounded, smooth, continuous, $10-17 \times 5-7 \mu$.

The crust is distinctly lighter in color than that of *Capnodium salicinum* and lacks the luster almost entirely. Microscopic characters are also distinct. No species resembling this has hitherto been described.

Illustrations: One woodcut and 1 black and white half-tone figure showing the details of the fungus.

Note: The type material was collected by Tanaka at Kajiya, Yoshihama-mura, Kanagaa-ken, Nov. 7, 1909.

GLOEOSPORIUM FOLIICOLUM Nishida sp. nov. in T. Nishida's Shinpen Kankitsu no Byôgai to Yobôhō (A new discourse on citrus diseases and their protective measures) Tôkyô, p. 111-115. T. 3, xi, Nov. 1914. (Japanese.)

Glocosporium citricolum Hori in Kwaju (Fruit Tree) no. 123: 21. June, 1913; in Engei no Tomo (Friend of Horticulture) 9⁷: 627. Jul. 1913; in S. Hori's Shokubutsu Byôgai Kôwa (Lectures on plant diseases) 2: 113-114. Nov. 1916. *not* Masee.

Acervuli plentifully formed on upper surface of fallen leaves, also appearing in less amount on lower surface, scattered or more or less loosely gregarious, first subepidermal, later erumpent and raised, light reddish-brown, about 120 μ in diam., also occurring on young twigs and on fruits; conidiophores densely fasciculate, cylindric, subacutely tapering toward the apex, 2-3-septate, branching, hyaline, 36-48 \times 4-5 μ , terminated by conidia; conidia cylindric, not curved, rounded at the apex, bluntly pointed at the base, hyaline, sparingly nucleate, 14-20 \times 4-6 μ , germinating from either end.

On *Citrus* spp. particularly on Navel orange, Satsuma (*Citrus nobilis* var. *Unshiu*), and Natsu-daidai (Japanese summer orange resembling grape-fruit).

Localities: Prefectures Wakayama, Hiroshima; Islands Kyûshû, Taiwan.

Spots first appear on leaves in spring and summer as cloud-like irregular patches of somewhat dark color, which are indefinitely margined from the healthy part. Such leaves soon lose their vigor and defoliation immediately follows. Minute pinkish pustules then appear plentifully on the surface of fallen leaves. New shoots and fresh tips of the twig are also attacked, causing immediate change of color to yellowish-brown and finally to black, resulting in the entire death of that portion. On fruit, brownish spots are commonly met with, which soon develop pinkish pustules on the surface as in the case of the leaf.

Illustrations: 1 photograph (halftone) of badly damaged Satsuma plant at Wakayama prefecture (in 1911), and 1 woodcut showing a diseased leaf, conidiospores and conidia (both in Nishida l. c.).

Notes: In above cited literature Hori insists on the similarity of this fungus to *Glocosporium citricolum* Masee, though it seems rather distinct in having branched conidiophores. Hemmi recently pointed out the parasitic nature of this fungus in Sapporo Nôrin Gakkwaihô (Journ. Soc. Agric. & Forestry, Sap-

poro) 10¹⁶: 230-282. Oct. 1918, while Sawada (in Taiwan Agr. Exp. Stat. Public. No. 100: 4. June 1916) and Hara (Discourse on fruit diseases p. 284. 1916) maintain their opinion that this is saprophytic. The disease is now widely spread all over Japan and Formosa causing annually somewhat notable damage to various kinds of Citrus, especially to Satsuma orange. Protective measures are also studied by local agricultural experiment stations, for instance Wakayama-ken prefectural station (see Progress Report for Fiscal Year Taishō 3, 1914, etc., etc.). *DACTYLARIA PANICI-PALUDOSI* Sawada sp. nov. in Taiwan Haku-butso Gakkwai Kwaihō (Journ. of Formosan Nat. Hist. Soc.), no. 22: 78-80. T. 4, xii, Dec. 1915. (Japanese).

Foliicolous: spots at first orbicular, later forming fusiform areas of $5-23 \times 2-4$ mm., olivaceous-brown, then producing a gray or dark-colored, dusty substance which covers the lower surface, finally changing from the middle, into straw color; conidiophores fasciculate, simple or occasionally branched; curved near the apex, 1-3-septate, cinereous, $80-160 \times 4-5 \mu$, bearing a few conidia, not more than 10; conidia oblong-ovoid to obelavate, obtuse at the apex, rounded or rostrate at the base, 2-septate, slightly constricted, hyaline or cinereous, $17-26 \times 8.5-12 \mu$, average $22 \times 10.2 \mu$, germinating in water in two hours, germ tube long, 2μ in diam., never producing chlamydospores.

On living leaves of *Panicum paludosum*.

Type localities: Chōnaihoshō, Taihoku-chō, Taiwan, Apr. 5 & Oct. 25, 1907, Suzuki; Aug. 13 & Nov. 16, 1908, Fujikuro; June 19, 1909, Sawada; Oct. 6, 1909, Fujikuro; May 16, 1910, Sawada; Sept. 23, 1910 & July 6, 1911, Fujikuro; Sept. 4, 1911, June 20, July 15, Aug. 7, 1914, & Nov. 21, 1915, Sawada: Kyūkō, Shinchiku-chō, Oct. 10, 1915, Sawada: Taichū, Taichū-chō, Oct. 11, 1913, Fujikuro; June 1, 1907, Suzuki: Tōseikaku, Taihoku-chō, June 3, 1907, Suzuki: Rinkiho, Kagi-chō, May 27, 1907, Suzuki: Kōshiken, Tainan-chō, Nov. 8, 1909, Sawada: Bokusekikaku, Kwarenkō-chō, May 12, 1909, & May 30, 1911, Sawada.

Notes: Differs from rice blast fungus in its short and broad conidia which usually have marked elongation of rostra at the base, and also producing no chlamydospore on germination. This fungus is unable to infect the rice plant by inoculation, just as rice

blast fungus does no injury to *Panicum paludosum*. Similar relation was also found true in case of the Dactylaria of *Panicum sanguinale*.

In a later article (Nôji Shikenjô Tokubetsu Hôkoku—Special Bull., Agr. Exp. Stat.—Taiwan, no. 16: 65–66. June 1917). Sawada revised the diagnosis in following points:

Young round spots measure 2–3 mm. in diam.; conidiophores slightly swollen near the base, bearing 1–10 conidia on alternately inflected apices, brownish-gray, decreasing in intensity toward the apex; conidia pyriform or elongated-pyriform, with collar cell of 1.7–2 μ diam., 17–28 \times 8.5–12 μ average 22.5 \times 10.2 μ , terminal cell 4–11 μ average 7.4 μ , central cell 5–8.5 μ average 7 μ , basal cell 6–10 μ , average 8.1 μ ; diameter of germ tube 3–3.5 μ .

Two additional plates (black and white lithograph) illustrate conidiophores, conidia and the germination of conidia, and one woodcut figure (on p. 20) gives general appearance of an affected leaf.

DACTYLARIA LEERSIAE Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. of Formosan Nat. Hist. Soc.), no. 27/28: 252–253. T. 5, xii, Dec. 1916. (Japanese.)

Follicolous; spots usually orbicular, 2–3 mm. in diam., or nearly fusiform, 5 \times 2 mm., straw-colored at center, brown on margin; conidiophores fasciculate or solitary, simple, 2–3-septate, a little swollen near the base, alternately inflected at the apex, brownish-gray at the lower part, gradually becoming lighter toward the apex, 48–88 \times 4–5 μ ; conidia short-conic to elongate-conic, 2-septate, not constricted, rounded at the base which ends with a collar cell of 1.2–1.8 μ in diam., hyaline, 20–35 \times 7–10 μ , average 27 \times 8.6 μ , apical cell 6–13 μ , average 8.7 μ , central cell 7–12 μ , average 8.2 μ , basal cell 7–12 μ , average 9 μ , basal cell not sinuate toward the papilla; germ tubes 3–4 μ diam., septate, bearing acrogenous chlamydospores, chlamydospores cinereous, 9.5–12 \times 9–10 μ .

On living leaves of *Leersia hexandra*.

Type localities: Chônaihoshô, Taihoku-chô, Taiwan, July 3, 1914, and Apr. 15, Dec. 4, 1915, and Aug. 18, 1916. Sawada: Shirin, Taihoku-chô, Sept. 23, 1916, Sawada.

Notes: Almost similar to rice blast fungus, only differing in (1) smaller collar cells which are attached to non-attenuated

base of conidia, (2) much larger chlamydospores, (3) less richly formed aerial hyphae in culture, and (4) when observed in culture distinctly more slender conidia with narrow basal cells. Hyphae of this species do not develop on bouillon-agar prepared with the extract of *Panicum paludosum*, while the rice blast fungus does very well on that medium. Inoculation failed on rice plant, just as the rice blast fungus has not been successfully transferred to *Leersia hexandra*.

Redescribing this species in Nôji Shikenjô Tokubetsu Hôkoku (Spec. Bull., Agr. Exp. Stat.), Taiwan, no. 16: 65 (June 1917), Sawada states that the spots are at first orbicular, 1-3 mm. in diam., then becoming angular, finally resuming fusiform shape. Illustration in black and white lithograph shows conidiophores, conidia, and germination of conidia in detail. Leaf spots are also shown in a text figure appearing on p. 21.

DACTYLARIA COSTI Sawada sp. nov. in Nôji Shikenjô Tokubetsu Hôkoku (Special Bull., Agr. Exp. Stat.), Taiwan, no. 16: 24-25, 66-67. T. 6, vi. June 1917. (Japanese.)

Spots usually occurring on leaves: small, orbicular, never becoming fusiform, 1-1.5 mm. in diam.; conidiophores fasciculate or solitary, simple, generally 2-3-septate, slightly swollen near the base, brownish-gray, becoming lighter toward the apex; conidia elongate-pyriform to clavate-fusoid, 2-septate, not constricted, both ends obtuse, often rounded at the base, with small collar cell of 1.5-1.7 μ in diam., hyaline, 20-30 \times 7.5-10 μ average 24 \times 8.6 μ , apical cell 8.5-12 μ , average 10.6 μ , other cells practically in equal length, basal cell not attenuated toward the papilla.

On living leaves of *Costus speciosus*.

Type locality: Chûho, Kagi-chô, Taiwan, Oct. 15, 1913, T. Kawakami.

Illustrations: One text figure (on p. 24) showing leaf spots, and one black and white lithographic plate giving detailed figures of conidia.

Note: In an elaborate article of Y. Nishikado in Ohara Nôgyô Kenkyûsho Hôkoku (Report of the Ohara Agricultural Institute) 12: 171-218, Dec. 1917, two more species of blast fungi found on *Setaria* spp. and on *Zingiber* spp. are described which are determined as spp. nov., *Piricularia Setariae* and *P. Zingibi-*

beri respectively. It seems more likely that all these blast fungi belong to *Piricularia* rather than *Dactylaria*, as they are provided with solitary conidia which are produced at the end of more or less elongate, spike-like conidiophores, which can never be termed capitate, as was pointed out by Nishikado (l. c., p. 210). S. Ito, therefore, suggested the new combination of Sawada's three new species as *Piricularia Paniculadosi*, *Piricularia Leersiae*, and *Piricularia Costi* (Bot. Mag., Tôkyô 32³⁸²: 307-308. Japanese. Oct. 1918).

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TYŌZABURŌ TANAKA

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NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—IX

TYÔZABURÔ TANAKA

HELMINTHOSPORIUM PAPAVERI K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. of Formosan Nat. Hist. Soc.) No. 31: 129, T. 6, xii, Dec., 1917, and in Bull. No. 128, Agric. Exp. Stat., Gov't of Formosa, "Taiwan ni okeru Keshi Byôgai Chôsa" (Diseases of poppy in Formosa) by K. Sawada, pp. 20-22, T. 7, vi, June, 1918. (Japanese.)

Conidiophores fasciculate or solitary, copiously branched, cylindric, many septate, yellowish-brown, 86-130 x 6-7 μ , terminating with a single conidium, after its abstriction a second conidium is formed; conidia cylindric, both ends blunt, 3-10 septate, constricted, yellowish-brown, 22-112 x 7-11 μ .

Parasitic on leaves, stems, peduncles and fruits of *Papaver somniferum*.

On leaves, spots are large, irregular, brown and pierced at the center when fully matured. On stems, the lesions causing rot are brown, and, when they are formed at the lower part, cause wilting of the whole plant; the decay soon appears at the petiole of leaves turning them to a dirty yellowish-brown color. The stem tissues, including cortex, are entirely disorganized and dead; at a certain stage a gray mould is found on the decayed surface. The appearance on the peduncles is similar to that on the stems. When the fruits are attacked the spots are orbicular, yellowish-brown or brown bordered with a blackish-brown periphery, and later develop gray mould from the center, which occasionally appears in concentric zones. No sound seed is produced from the diseased fruits. It is one of the most dangerous diseases of cultivated poppies in Formosa.

Type localities: Taihoku-chô Taihoku, Apr. 25, 1917, Funabiki; Taihoku-chô, Chônaihoshô, Apr. 21, 1917, K. Sawada.

Notes: Additional localities are recorded from Taichû-chô Koroton, June 8, 1918, K. Sawada; Nantô-chô Nantô, June 6, 1918, K. Sawada; Kagichô Chikutôki, Apr. 3, 1918, K. Sawada. (See second paper, p. 21.) After inoculation tests, the damping-off of poppy seedlings is proved to have been caused by the same fungus. This trouble was found by the author in nurseries of southern Formosa.

FUSICLADIUM THEAE K. Hara sp. nov. in Chagyôkawi (Tea Journal) 14⁴: 16-17, 1 pl. T. 8, iv, Apr., 1919. (Japanese.)

Acervuli amphigenous, velvety, black; conidiophores filiform, straight or curved, thickened at the base, continuous to 3-septate, brownish at the lower part, light colored and often crooked at the upper part $40-70 \times 4-5 \mu$; conidia terminal, occasionally arising from the crooked edges of conidiophores, cylindric or oblongovate, uniseptate almost at the middle, usually not constricted though sometimes constricted, blunt at the apex, somewhat pointed at the base, straight or curved, colorless or flavescent, $15-28 \times 5-6 \mu$.

On leaves of *Thea sinensis*.

Type locality: Shidzuoka-ken Iwara-gun Kjiro-chô, Nov. 27, 1918, K. Hara.

Illustrations: 2 black and white halftone figures (figs. 8 and 9) showing tufts of conidiophores and conidia.

No *Fusicladium* has been reported on tea plant. This species is distinct from all known species by its almost colorless conidia.

MYCOSPHAERELLA THEAE K. Hara sp. nov. in Chagyôkwai (Tea Journal) 14⁵: 9-10, 1 pl., T. 8, v, May, 1919. (Japanese.)

Spots orbicular or irregularly roundish, 3-4 mm. in diam., finally confluent, forming large irregular lesions, at first dark-brown, later becoming cinereous; perithecia epigenous, immersed, later with ostiola erumpent, gregarious, minutely punctiform, black, globose or depressed globose, $50-150 \mu$ in diam.; well carbonaceous, fungoid-parenchymatous, dark-colored, composed of polygonal cells, $3-8 \mu$ across; ostiola papillate or wart-like, with orbicular openings $10-13 \mu$ across; asci tufted, cylindric clavate or oblongovoid, rounded at the apex, pedicellate at the base, octosporous, $30-42 \times 6-8 \mu$; ascospores biseriate, oblong-ovoid or cylindric, both ends subobtuse, uniseptate, not constricted, cells unequal, upper ones being slightly shorter and broader, lower

ones much longer and narrower, every cell binucleate at first, later becoming homogenous, hyaline, $10-13 \times 2-2.5 \mu$.

Parasitic on leaves of *Thea sinensis*.

Type locality: Gifu-ken Ena-gun Kawaue-mura, Apr., 1918, K. Hara.

Illustrations: 4 black and white half-tone figures (figs. 5-6) showing spots, perithecia, asci and ascospores.

It differs from *Mycosphaerella punctiformis* in mode of occurrence and in detailed characters of ascospores.

Spots first appear on the surface of leaves as small, round, dark-colored areas of 1 mm. across, which enlarge gradually forming irregular patches of 3-4 mm. in diam., and later becoming confluent forming large irregular dead areas extending towards the leaf margin. Such areas are dark-colored brownish-gray and develop abundant black minute specks on the upper surface, while the lower surface of the leaf remains a dark-brown color.

MYCOSPHAERELLA IKEDAI K. Hara sp. nov. in Chagyōkwai (Tea Journal) 14⁵: 10, 1 pl., T. 8, v, May, 1919. (Japanese.)

Perithecia amphigenous or more frequently hypogenous, gregarious or scattered, immersed, globose or depressed globose, apically ostiolate $50-80 \mu$ in diam., wall parenchymatous, consisting of polygonal cells $5-8 \mu$ in diam. across, carbonaceous ostiola papillate or simple, with round openings of $10-12 \mu$ across, asci obovoid or oblong, rounded at the apex, pedicellate at the base or sessile, octosporous, $40-45 \times 8-12 \mu$, ascospores 3-stichous or irregularly polyseriate, oblong-ovoid or cylindric, uniseptate, much constricted, cells unequal, upper ones mostly shorter and broader while lower ones are just opposite, at first granulate, later homogenous, colorless and hyaline, $13.2-16 \times 5-5.5 \mu$.

Saprophytic on leaves of *Thea sinensis*.

Type locality: Shidzuoka-ken Inasa-gun Idaira-mura, Sept., 1918, K. Hara.

Illustrations: 2 black and white half-tone figures (figs. 9 and 10) showing asci and ascospores.

M. Ikedai K. Hara differs from the former species in the shape of the asci, arrangement, shape and size of the ascospores. It is

named in honor of Isaji Ikeda, President of the Prefectural Agricultural Society, under whom the investigations were made.

MELIOLA CITRICOLA K. Hara sp. nov. in Shidzuoka-ken Nôkwaishô (Journ. Agric. Soc., Shidzuoka Prefecture) No. 263: 8-9, 1 pl., T. 8, viii, Aug., 1919. (Japanese.)

Young hyphae filiform, delicate, branching, septate, colorless or light colored, $2.5-3\mu$ across, mature hyphae thick, branching, septate, constricted at septa, often catenulate and easily detached, dark-brown, sometimes nucleate, $4-7\mu$ thick, detached cells (chlamydospores) ellipsoid or subglobose, $8-15 \times 4-7\mu$; conidia of *Triposporium* type astellate with 3-4 arms, arms thick at the base, tapering towards the apex and ending in a sharp point, 2-4 septate, $40-60\mu$, perithecia globose or depressed globose, $200-230\mu$ across, wall naked, fungoid-parenchymatous, carbonaceous, brittle, dark-brown, cells $6-12\mu$ across; ostiola apical, not projecting, with orbicular opening of $15-20\mu$ across, asci obovate globose or ellipsoid, rounded at the apex, pedicellate at the base, thick walled, octosporous, aparaphysate, $40-70 \times 30-40\mu$, ascospores ellipsoid ovoid or subfusoid, tapering towards rounded ends, straight or curved, 6-7 transversely septate, often with longitudinal septa, hyaline, $28-45 \times 7-12\mu$.

Epiphytic on leaves, branches and fruits of *Citrus* spp.

This species appears mostly on the upper surface of leaves producing black or dark gray irregular patches which finally enlarge forming a thick incrustation all over the leaf surface. When fully matured the surface becomes velvety and spotted with minute black bodies and at this stage the black mass begins to peel off from the substratum.

Type locality: Shidzuoka-ken Agricultural Experiment Station, Apr. 25, 1919, K. Hara.

Illustrations: 3 figures (figs. 12-14) in 1 black and white half-tone plate, showing perithecia, asci and ascospores.

It differs from *Limacinia theae* P. & H. Sydow & Butl. (Ann. Mycol. 9: 346) in the tapering and curved ascospores, intertwining hyphae without bristles, and in the absence of a particular pyrenidial form. *Meliola penzigi* Sacc. resembles the present species in having naked perithecia, but the former is characterized by colored biseriate ascospores having 3 transverse and 1-2 longitudinal septa, while the latter is distinguished by heaping

non-seriate ascospores ellipsoid in shape and usually 7-septate, in size three times as large as the former. *Meliola camelliae* and *Meliola citri* do not agree with the present species in their bristled perithecia and in the size and shape of the ascospores.

GLOEOSPORIUM CARTHAMI Hori & Hemmi comb. nov. in Byôchûgai Zasshi (Journ. Plant Prot.) 6³: 189, T. 8, iii, March, 1919. (Japanese.)

Marsonia carthami Fukui, ex Tanaka in Mycologia 9³: 169, 1917.

Hemmi points out that the fungus has typically 1-celled ascospores, and should correctly be placed under *Glocosporium* (subgen. *Colletotrichum*). In a later publication of the same author (Annals of the Phytopath. Soc. of Japan, 1²: 1-11, March, issued June, 1919) the detailed characters of this fungus are thoroughly given in German. The disease was reported from Sapporo and Hyôgo, and is pretty serious in early summer months. The temperature relations of the development of this fungus are also given by Hemmi in Sapporo Nôrin Gakkwai-hô 10¹⁷: 40, 49-52, Dec., 1918.

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WASHINGTON, D. C.

NEW JAPANESE FUNGI
NOTES AND TRANSLATIONS—X

TYÔZABURÔ TANAKA

[Reprinted from MYCOLOGIA, Vol. XIII, No. 6, November, 1921.]

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NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—X

TYŌZABURŌ TANAKA

HYPODERMOUSIS THEAE: K. Hara sp. nov. in Chagyokai (Tea Journal) 14⁷: 13-14. T. 8, vii, July, 1919. (Japanese.)

Caulicolons, spots orbicular or irregular, large, light reddish-brown; perithecia superficial, scattered or gregarious, flat, orbicular, elliptical or oblong, simply elongated or slightly curved, black or lacquer-black, later lacerate from the middle giving a somewhat hoary appearance, usually veiled with epidermal tissue of the host, 400-700 μ broad, 130-150 μ high, length irregular, wall black, parenchymatous, 40-50 μ thick; asci clavate, oblong-ovoid or short-cylindrical, rounded at the apex, pedicellate at the base, 50-66 \times 20-23 μ , paraphysate, octosporous; paraphyses filiform, not forked, equal to or slightly longer than the asci, 1-1.5 μ across; ascospores oblong-ovoid, oblong or pyriform, both ends rounded, multinucleate, 4-6-septate, hyaline, 18-23 \times 6-7.5 μ .

Parasitic on the trunks and branches of *Thea sinensis*.

Type localities: Shizuoka-ken Hamana-gun Hikuma-mura, Nov. 12, 1918 (K. Hara); Shizuoka-ken Abe-gun Chiyoda-mura, Dec. 6, 1918. (K. Hara.)

Spots occur on the woody part of the tea-plant as light reddish-brown, round or irregular patches at least 5 cm. in diameter. Such spots increase their size in various directions, often running together in large irregular patches entirely surrounding the branches. Black perithecial bodies appear on the diseased spots as scattered or crowded minute dots of 0.5 mm. to 1.0 mm. across. The infected branches die out in a short time.

The Japanese name of the disease: Chajin no Kasshoku Azabyō. (Brown spot of the tea-plant.)

Illustrations: One half-tone plate showing the diseased spot, cross-section of a perithecium, asci (with a paraphysis) and ascospores. (Figs. 1, 5, 6 and 8.)

STAGNOSPORA THEAE K. Hara sp. nov. in Chagyôkai (Tea Journal) 14⁷: 14-15. T. 8, vii, July, 1919. (Japanese.)

Pycnidia scattered, globose or depressed-globose, 100-150 μ in diam., wall parenchymatous, composed of dark brown polygonal cells 4-8 μ in diam.; ostiola even or warty, opening round, 15-20 μ across; pycnosporos elongate-cylindrical or sub-clavate, both ends rounded, 6-11-septate, hyaline, 18-35 \times 4-5 μ ; pedicels of pycnosporos short, arising from the base of pycnidial chamber, 4-6 \times 2-2.5 μ .

Saprophytic on the trunks of *Thea sinensis*.

Type locality: Shidzuoka-ken Iwara-gun Ejiri-chô, Nov. 24, 1918. (K. Hara.)

Illustrations: One half-tone plate showing diseased spots, section of a pycnidium, pycnosporos and pedicels (Figs. 13-16).

LEPTOSPHERIA HOTTAI K. Hara sp. nov. in Chagyôkai (Tea Journal) 14⁹: 14-15. T. 8, ix, Sept., 1919. (Japanese.)

Leptosphaeria Hottai K. Hara nom. subnud. in Byôchû-gai Zasshi (Journal Plant Prot.) 6¹: 37. T. 8, iv, April, 1918. (Japanese.)

Spots orbicular or irregular, large, brown, with greasy luster, later darker with minutely crowded dots of perithecia; perithecia superficial, nearly always covered by epidermis, globose or depressed-globose, 350-500 μ in diameter, wall carbonaceous, black, thick, especially so at the place touching the host epidermis so as to show more or less clipeus-form, ostiolate at the apex; opening of ostiola round, 30-45 μ across; asci clavate or cylindric, apex round, base short pedicellate, 60-70 \times 8-10 μ , paraphysate, octosporous; paraphyses filiform, considerably longer than the asci, usually simple, hyaline, 1-1.5 μ across; ascospores biseriata or obliquely tri-seriate, ellipsoid, oblong-ovoid or fusoid, at first unicellular and 4-nucleate, later 3-septate with one-sided middle septum, constricted, flavescent, 12-18 \times 4.5-5.5 μ .

Parasitic on the trunks of *Thea sinensis*.

Type localities: Ejiri, Iikuma, Mitsuke and Takabe in Shidzuoka Prefecture.

The shape and size of the ascospores resemble *Leptosphaeria Conio hyrium* forma *Theae*, but the shape of the perithecia differ greatly from this species, so a different name is given.

Japanese name: Kuroazabyô (black spot disease).

This disease was at first discovered by Masazō Hotta at Aratama district, Inasa-gun, Shidzuoka-ken, and reported in the Annual Report of Shidzuoka-ken Agricultural Experiment Station (for the fiscal year T. 5, 1916). Hara in the Byōchū-gai Zasshi states that the disease is serious in the vicinity of Hamamatsu and also occurs in the Mie Prefecture.

Illustration: One half-tone text figure showing asci, paraphyses and ascospores. (Fig. 6.)

SILLIA THEAE K. Hara sp. nov. in Chagyōkai (Tea Journal) 14^o: 15-16. T. 8, ix, Sept., 1919. (Japanese.)

Stromata scattered or gregarious, at first immersed, later erumpent, pillow-shaped or wart-like, sometimes confluent, afterwards with rounded margin adhering to substratum, 0.8-5 mm. in diam., surface orange-yellow or dirty-yellow, rugose with black perithecial spots, inside orange-yellow, somewhat membranaceous in structure, with imbedded perithecia; perithecia globose or ovoid, dark-colored, 300-350 × 180-300 μ , wall carbonaceous or parenchymatous, dark-colored; ostiola terminal, forming wart-like protrusions on the surface of stroma, opening one, round, 80-100 μ across; asci cylindrical or clavate, apex rounded or somewhat mamelon-shaped, base tapering to pedicel, 150-170 × 20-25 μ , paraphysate, octosporous; paraphyses filiform, forked, longer than or equal to the asci, 1-1.5 μ across; ascospores biseriate or irregularly tri-seriate, fusoid, cylindrical or clavate, rounded at both ends, straight, bent or curved, or more or less lunate, with numerous biseriate oil globules, giving the appearance of a septum, 6-11-septate, constricted or straight, hyaline, 35-44 × 8-9 μ , germinating at both ends.

Parasitic on trunks and branches of *Thea sinensis*.

Type locality: Shidzuoka-ken Hamana-gun Hikuma-mura, November 11, 1918. (K. Hara.)

The affected area first appears on one side of branches or trunks as a spot of dark pink or gray color, and by increasing its size it entirely surrounds the bark, simultaneously spreading upwards and downwards. The stroma then makes its appearance as dirty-yellow or in some rare instances pinkish-yellow spots, raised from the diseased surface like warts or a pillow-shaped elevation or sometimes a button-shaped swelling of 0.8-8 mm. in diameter. Perithecial bodies are formed on the stromata as elevated or flat

black spots round in shape. Such spots are solitary or run together to form warts of irregular outline. The dying out of the diseased portion is rather slow, occurring two or three years after the infection. The surrounding area of stromata often develops a greenish color which looks attractive in comparison with pink stromatic bodies.

Suggestions for control: (1) Diseased branches should be removed and destroyed by fire; (2) infected areas on trunks should be peeled off and disinfected with grafting wax or a similar substance; (3) to prevent the disease the woody part of the tree should be washed with Bordeaux mixture.

Japanese name of the disease: Chaju no Sanchada-byô (Shark-skin disease of the tea-plant).

Illustration (Fig. 7, on p. 16): One half-tone text figure showing asci, paraphyses and ascospores (one germinating).

ASCOCHYTA THEAE K. Hara sp. nov. in Chagyôkai (Tea Journal) 14¹⁰: 13-14. T. 8, x, October, 1919. (Japanese.)

Pycnidia punctiform, globose or depressed-globose, 80-120 μ , wall membranaceous, consisting of dark-brown carbonaceous polygonal cells 5-10 μ in diam.; ostiola apical, even or papillate, opening simple, 10-12 μ across; pycnosporae ellipsoid, cylindrical or subovoid, both ends rounded or truncate, uniseptate, dividing into homogenous or slightly unequal locules, provided with a large oil globule in each locule, not constricted at the septum, hyaline, 7-10 \times 3.5-4.5 μ .

Parasitic on the leaves of *Thea sinensis*.

Type locality: Shizuoka-ken Abe-gun Okawa-mura, October 24, 1918. (K. Hara.)

Found occurring on tea leaves infected by *Exobasidium reticulatum*.

Illustration: One half-tone text figure showing pycnosporae. (Fig. 8, on p. 14.)

VALSA THEAE K. Hara sp. nov. in Chagyôkai (Tea Journal) 14¹¹: 15-16. T. 8, xi, November, 1919. (Japanese.)

Stromata scattered, at first immersed, later erumpent, black, punctiform to the naked eye, conical, apex projecting, black, typically Valsa-like; perithecia annular, 5-10 or more on one stroma,

globose or depressed-globose, 200-350 μ broad, 130-170 μ high, wall fungoid-parenchymatous, black, 12-15 μ in thickness; ostiola separate but grouped, elongate, 30-300 μ long; asci clavate or cylindrical, rounded at the apex, narrowed into pedicel at the base, 25-30 \times 1-5 μ , aparaphysate, octosporous; ascospores distichous or irregularly distichous, cylindrical, rounded or truncate at both ends, usually curved in one direction, rarely straight, hyaline or flavescens, 5-10 \times 1.5-2 μ .

Parasitic on weakened trunk of *Thea sinensis*.

Type locality: Shizuoka-ken Hamana-gun Hikuma-mura, December 12, 1918. (K. Hara.)

Illustration: One half-tone text figure showing cross-section of a stroma with perithecia, asci and ascospores. (Fig. 9.)

Notes: There are two species of *Valsa* found on the tea-plant, but it is still undetermined which causes the die-back of the trunk. The other species not described here has no stroma, though it resembles this species in other respects. The latter is left unnamed until its characters are more fully studied.

DIATRYPE THEAE K. Hara sp. nov. in Chagyōkai (Tea Journal)

14th: 19. T. 8, xi, November, 1919. (Japanese.)

Stromata subepidermal, later erumpent, oblong or linear, 1-2 mm. long, 0.5-1 mm. wide, cross-section oblate-triccolate, slightly rounded at the upper part, flat or somewhat concave at the base, with a broad neck at the top, cinereous, more or less parenchymatous; perithecia deeply immersed in the stroma, globose or ovoid, 300-330 μ high, 100-170 μ in diam., wall parenchymatous, dark colored, 15-30 μ thick, long ostiolate; ostiola penetrating the stromatic neck, opening round, 20-25 μ across; asci clavate or obovoid, apex usually narrowed, rarely swollen and rounded, base tapering very much into a filiform pedicel, 20-40 \times 6-8 μ , aparaphysate, octosporous; ascospores cylindrical or fusoid, rounded at both ends, straight or curved, plane or nucleate at both ends, hyaline or flavescens, 7-11 \times 2-2.5 μ .

Saprophytic on the trunks of *Thea sinensis*.

Type locality: Shizuoka-ken Abe-gun Okawa-mura, October 24, 1918. (K. Hara.)

Differs from *Diatrype stigma* (Hoffm.) Fr. in the shape of the stromata, also from *D. Hochclayae* E. & E. in the aparaphysate asci. The former is found in the same village where the present species was discovered.

Illustration: One half-tone text figure showing infected trunk, cross-section of a stroma, asci and ascospores (Fig. 12).

HENDERSONIA THEAE K. Hara sp. nov. Chagyôkai (Tea Journal) 14¹²: 22-23. T. 8, December, 1919. (Japanese.)

Pycnidia globose or depressed-globose, 60-130 μ in diam., immersed, later slightly erumpent, pycnidial wall parenchymatous, composed of angular cells of 4-7 μ in diam., apically ostiolate; ostiola papillate or warty, with opening 11-15 μ across; pycnospores broad-ellipsoid or broad-fusoid, broadest near the middle, narrowed toward both ends, at first hyaline, finally changing to yellowish-brown, 3-septate, somewhat constricted, 7-10 \times 4-5 μ .

Parasitic on the leaves of *Thea sinensis*.

Type locality: Shidzuoka-ken Abe-gun Okawa-mura, October 24, 1918. (K. Hara.)

Foliicolous, appearing mostly at the leaf tips, on spots that increase their area downward by degrees toward the leaf base with definite but undulating border lines. The infected area is at first dark brown, but later it changes color, becoming gray, and minute spottings of fungus bodies appear somewhat sparsely on the surface. The lower surface of the diseased area is light brown in color.

Illustration: One half-tone text figure showing an infected leaf, a section of a pycnidium and pycnospores. (Fig. 13, nos. 1, 2, 3.)

Since March, 1919, Kanesuke Hara has been publishing in Chagyôkai (Tea Journal) a series of papers dealing with the diseases of the tea-plant, in which he describes a number of new species of fungi. The translations given here and in the last number of New Japanese Fungi (Mycologia 12⁶: 330-332) cover nearly all of those published in 1919; the rest of his new species will be given in the subsequent numbers of this series.

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NEW JAPANESE FUNGI
NOTES AND TRANSLATIONS—XI

FYŌZABURŌ TANAKA

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BOOK
OF THE
BOTANICAL
GARDEN

NEW JAPANESE FUNGI

NOTES AND TRANSLATIONS—XI

TYÔZABURÔ TANAKA

HELMINTHOSPORIUM ORYZAE Miyabe & Hori sp. nov. ex S. Hori in Nôji Shikenjô Hôkoku (Bulletin of the Agric. Exper. Station), Nishigahara, Tôkyô, no. 18: 67-84. M. 34, xi, Nov., 1901. (Japanese); Saccardo, Sylloge fungorum 22: 1394. 1913 (nom. nud.); Oudemans, Enum. syst. fung. 1: 723. 1919 (nom. nud.).

Spots scattered or grouped, fuliginous or soot-color, velvety; conidiophores fascicled, 2-5 in group meeting rather loosely at the base, dark-brown, more or less bending, 7-15-septate, lowermost cell largest, rather rounded and swollen, width of cells gradually reduced toward the apex, terminated by blunt, thin-walled, light-colored or almost colorless cell, 100-330 x 6-8 μ ; conidia lunate or obclavate bending to one side, obtuse at both ends, easily detached, pale-olivaceous of sooty shade, 6-11-septate, only slightly constricted at the septum, contents finely granular, 84-140 x 10-22 μ , germinating at both ends.

Parasitic on culms, leaves, and glumes of *Oryza sativa*.

TYPE LOCALITIES: Experimental farm of the Imperial Agricultural Experiment Station, Nishigahara, Tôkyô, Sept., 1900 (S. Hori); Tôkyô-fu Minamitama-gun Motohachiôji-mura, Sept. 26, 1900 (S. Hori); Okayama-ken, Sept., 1900 (T. Nishida).

Japanese name of the disease: Ine Goma-hagarebyô (Sesame-spot leaf blight of rice plant) ex Hori in Dainippou Nôkwaishô (Journ. Agric. Soc., Japan), no. 380: 6. Feb., 1913. (Japanese.)

Hori later revised the description as follows: Conidiophores 2-3-fascicled, brownish, 100-330 x 7.2 μ ; conidia 6-10-septate, fuscous. See Hori's Nôsakumotsu Byôgaku (Discourse on diseases of agricultural crops), Tôkyô, Seibidô, June, 1911, pp. 106-107. (Japanese.)

ILLUSTRATION: Hori's original drawings of conidia and conidiophores are seen in the book above mentioned (p. 107). Ileta's

Handbook (*see* Mycologia 9: 167), p. 744, also gives fairly good illustrations of the fungus.

Both paddy and upland rices are infected. The fungus usually appears as minute spots on the leaf blade, about the size of sesame seeds, often elongated or confluent, forming larger spots. In such infected leaves, especially when the plant is young, the discoloration and withering soon follow, proceeding from the leaf-tip, often causing death of the entire plant. In an advanced stage of the disease characteristic brown velvety bodies are produced from the surface of the diseased spots.

K. Hara (in Hara's *Ine no Byôgai*, Diseases of the rice plant, Gifu-ken, June, 1918, p. 61, in Japanese) states that the Japanese rice blight fungus might be identical with that which had been described by Breda de Haan as *Helminthosporium Oryzae* (in Bull. l'Institut. Bot. Buitenzorg., no. 6: 11. 1900), though the description of the latter is rather imperfect. The present species, however, differs very strikingly from *H. macrocarpum* Grev. in the shape of the conidia which are obclavate or fusoid, whereas in the latter they are simply clavate (refer Fig. 249 CH of Engler & Prantl, Nat. Pflanzenfam. I, 1**: 479).

The disease was first known in Japan about 1895, but is now established everywhere as far as Formosa. Recently prevention through seed treatment and spraying with various kinds of fungicides has proved to be effective. *See* Nishikado, Y., in *Byôchûgai Zasshi* (Journ. Pl. Prot.), 5^o: 693-712, Sept., 1918, and Suyematsu, N., ditto, 7¹: 26-29, Jan., 1920 (both in Japanese). In a series of inoculation tests, a number of rice-plant varieties as well as wild grasses was examined by Suyematsu in connection with the susceptibility and resistance to the *Helminthosporium* rice blight. *See* Suyematsu, N., in *Nôgaku Kwaihô* (Journ. Sci. Agric. Soc.), Tôkyô, no. 212: 279-286, Apr., 1920; no. 214: 443-446, June, 1920; and no. 217: 655-657, Oct., 1920. (All in Japanese.)

GLOMERELLA CINNAMOMI Yoshino sp. nov. in *Shokubutsugaku Zasshi* (Bot. Mag.) Tôkyô, 21²⁴⁸: 230-232, Pl. 5. M. 40, ix, Sept., 1907. (Japanese.)

Mycelia first colorless, later fulvous, hyphae mostly colored in

substratum, septate, 2-3.5 μ across; acervuli of conidial stage (*Gloeosporium*) minutely tuberculate, subepidermal, later erumpent, light pink in color; stromata disciform, brown; conidiophores densely seated on the stroma; conidia oblong, frequently ovoid ellipsoid or euneate, often slightly curved, without guttulae or 1-2-guttulate, colorless, light pink in mass, variable in size but chiefly 10-18 \times 4-6 μ ; perithecia subepidermal, black punctiform, solitary or two together, globose or depressed-globose, slightly raised at the apex with orbicular ostiola 17-20 μ wide, brown or brownish-blue, 100-150 μ in diam.; asci numerous in one perithecium, fusoid, broad at the middle, narrowed near the apex, wall often thickened at the apex but not stained by iodine, 46-60 \times 8-13 μ , octosporous, paraphysate; ascospores oblong, narrowed at both ends, usually curved, hyaline, non-guttulate or guttulate, 10-15 \times 3.5-5 μ .

On *Cinnamomum camphora*, infesting leaves, petioles, leaf-buds, and young shoots in the nursery, causing considerable damage. Old plants are also infected. Diseased spots are usually orbicular, elliptical, or fusiform, 3-5 mm. in diam., first reddish-brown, later becoming fuliginous, finally fading into light-brown. The infected area is definitely marked from the healthy part, usually sunken, and when severely affected the infected areas become confluent, causing brown rot of the surrounding part, finally girdling the stem and killing the entire plant.

TYPE LOCALITIES: Kumamoto-ken, Yatsushiro-gun, Dec. 29, 1905 (T. Tejimazaki); Kikuchi-gun Waiju-chô, Oct. 25, 1906 (K. Yoshino); Hôtaku-gun Ôe-mura, Nov., 1906 (K. Yoshino); Ashikita-gun Hinagu-chô, Dec., 1906 (K. Yoshino); Hôtaku-gun Kawachi-mura, May 12, 1907 (T. Nishida); and Saga-ken Saga-shi, Nov., 1906.

ILLUSTRATION: One copper plate giving ten figures, showing the diseased plant, conidial layer, germination of conidia, perithecia, asci, ascospores, and germination of ascospores.

DISTRIBUTION: Formosa. See Sawada, K., in *Taiwan Haku-butsu Gakkwai Kwaihô* (Journ. Formosan Nat. Hist. Soc.), no. 25: 131-133. T. 5, x, Oct., 1916. (Japanese.)

Sawada states that the outbreak of the disease in the nursery and young plantation of camphor trees near Taihoku caused much damage in the spring of 1913. The Formosan fungus generally agrees with that described from Kyûshû by Yoshino, with the exception

of the smaller size of the ascospores, which Sawada finds to measure $12-13 \times 5.5-7 \mu$. Sawada also revises the description of the fungus as follows: "Conidiophores straight or more or less curved, simple, hyaline, $16-27 \times 3.5-4 \mu$; asci clavate-fusoid or fusoid, $53-67 \times 8-8.5 \mu$."

Hara in *Shokubutsugaku Zasshi* (Bot. Mag.) Tôkyô, 27⁸¹⁷: 272 (Japanese) suggests to call the present species *Guignardia Cinnamomi* (erroneously spelled *cinnamomii*) on account of the lack of the stroma which should be present in *Glomerella*.

PHYSODERMA MAYDIS Miyabe in A. Ideta, *Nippon Shokubutsu Byôrigaku* (Handbook of plant diseases of Japan) ed. 4, Tôkyô, Shôkwabô, M. 42, 1909, part 1: 114, fig. 19. (Japanese.)

Cladochytrium sp. nov. K. Sengoku, in *Ehime-ken Nôkwaihô Journ. Agr. Soc.*, Ehime prefecture) no. 32: 58, M. 34, xii, Dec., 1901. (Japanese.)

Cladochytrium Maydis Miyabe in Ideta's *Nippon Shokubutsu Byôrigaku* (Handb. Pl. Dis., Japan)¹ ed. 3, Tôkyô, Shôkwabô, M. 36, 1903, p. 75 (nomen nudum); Omori, J. & Yamada, G. *Shokubutsu Byôrigaku* (Plant pathology) Tôkyô, Hakubunkwan, M. 37, 1904, p. 202 (nomen nudum).

Occurs on the parenchymatous cells of the culm, midrib of the leaves, and the lower part of the husk, producing numerous orbicular, elliptical, or linear spots; spots mostly small-sized, often confluent, brown or fuliginous, light-colored near the margin, much deeper at the center; sporangia ellipsoid-ovate or globose, deep-brown, $24-26 \times 22-24 \mu$.

Parasitic on *Zea Mais*.

¹ Referring to Ideta's Handbook of Plant Diseases here quoted, the first and second editions were published in 1901 and in 1902, respectively, under the title *Jitsuyô Shokubutsu Byôrigaku* (Practical discourse on plant diseases); the third edition, issued in 1903, was greatly enlarged and largely rewritten, and bears a new title, *Nippon Shokubutsu Byôrigaku*; it is called the third edition in the German title page only. The fourth edition, which came out under the same title, was issued originally in two parts, the first in 1909 (pp. 1-344) and the second in 1911 (pp. 345-935, with appendices), and is really a new work written under the critical supervision of Prof. K. Miyabe, who contributed diagnoses of some of his new species published here for the first time. Unaltered reprints of the fourth edition were issued in 1912 and in 1914, sometimes called fifth and sixth editions.

The disease does not usually prevent fruiting, but sometimes does when it occurs abundantly in the early stage of the host plant. In 1901 the disease was first discovered by K. Sengoku in the prefecture of Ehime, Slikoku island, and the above description is probably based upon the material collected at this time. It has not been reported from any other locality in the Japanese territory.

ILLUSTRATION: One black-and-white wood-cut figure showing sporangia.

Notes: *Physoderma zeae-maydis* Shaw, first reported from India (Sydow, H., Sydow, P., & Butler, E. J., in *Annales mycologici* 10³: 245-247, fig. 2. 1912), and now known as the causal organism of one of the worst diseases of corn in the United States (see Tisdale, W. H., in *Journ. Agr. Res.* 16³: 137-154, 10 pls., Feb., 1919), is, in many respects, identical with the present species, though no actual comparison of the organism has yet been carried out. Plant quarantine against this fungus was announced by the U. S. Department of Agriculture in 1916 (see Notice of Quarantine No. 24, 1916).

MYCOSPIAERELLA BAMBUSIFOLIA Miyake & Hara sp. nov. in *Shokubutsugaku Zasshi* (Bot. Mag.) Tôkyô, 24²⁻⁶: 338-340, M. 43, xi, Nov., 1910. (Japanese.)

Foliicolous; pycnidia punctiform, black to the naked eye, immersed, globose or depressed-globose, fuliginous, open at the apex, 70-100 x 60-90 μ ; pycnosporos abundant, oozing from pycnidial opening when mature, ellipsoid ovoid or cylindrical, hyaline, 2-3.5 x 1-1.5 μ ; pedicels minute; perithecia mixed with the pycnidia, globose or depressed-globose, 70-100 μ broad, 90-100 μ high, rarely 60 μ in diam.; wall thick, fungoid-parenchymatous, fuscous or black, ostiola as high as the epidermal plane or slightly raised; asci many, fasciculate, oblong-ovoid and more or less stipitate below or fusoid-lunate and obtuse at both ends, 37-50 x 0-10 μ , octosporous, aparaphysate; ascospores distichous, ovoid or ellipsoid, uniseptate, usually not constricted, hyaline, at first granular, usually becoming homogeneous later, 13-16 x 4.5-5 μ .

Parasitic on *Phyllostachys puberula* and *Phyllostachys bambusoides*.

Infected leaves develop round, elliptical, or irregular fuscous

spots of black periphery, which often run together in increasing size, finally causing death of the surrounding area. This gives the leaves a brownish appearance, and when they are severely infested the entire bamboo grove appears badly discolored and seriously injured. Later fruiting bodies make their appearance on the discolored area as minute black spots.

TYPE LOCALITIES: Gifu-ken Ena-gun Tôyama-mura and Kawayue-mura, Apr., 1908; Tôkyô Komaba, May, 1909.

Differs from *Mycosphaerella Arundinariae* Atk. (Bull. Corn. Univ. 3¹: 9. 1897) in the absence of brown hyphae around the perithecium, and in the shape and size of the asci and ascospores.

PHAEOSPHAERIA BAMBUSAE Miyake & Hara sp. nov. in Shokubutsugaku Zasshi (Bot. Mag.) Tôkyô, 24²⁵⁶: 340-341, Pl. 43, xi, Nov., 1910. (Japanese.)

Foliicolous; spots appear along the vein, often with indefinite margin, brown or dark-colored, later becoming grayish or fuscous from the middle, finally covering the entire leaf; perithecia minutely punctiform, scattered or along the veins, immersed, globose or depressed-globose, black, 120-170 x 140-210 μ ; wall rather thin, dark-colored or fuscous, ostiolate at the apex; asci numerous, fascicled, clavate or cylindrical, 65-90 x 18-27 μ , octosporous, paraphysate; ascospores distichous or irregular, fusoid or ellipsoid, straight or slightly curved, triseptate, constricted, hyaline and granular when young, dark-colored with age, 25-30 x 10-12 μ .

Phyllosticta stage usually makes its appearance with the ascigerous stage on the same diseased spot as it does in the case of *Phacosphaeria Oryzae* Miyake. (See Journ. Coll. Agric., Imp. Univ. Tokyo 2¹: 247. 1910.) The description of this form follows:

Pycnidia immersed, globose or depressed-globose, ostiolate at the apex, 100-140 x 70-100 μ ; pycnospores ooze from the pycnidial opening when mature, ellipsoid or cylindrical, hyaline, 2-2.5 x 1.1-3 μ .

On the living leaves of *Arundinaria Simoni* and *Sasa paniculata*.

TYPE LOCALITIES: Tôkyô Komaba, July, 1906 (D. Karashima), July, 1910 (I. Miyake & K. Hara); Tochigi-ken Nikkô, Aug., 1910; Gifu-ken Ena-gun Kawayue-mura, Aug., 1910 (on the second host).

USTILAGINOIDEA SACCHARI-NARENGAE K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihō (Journ. of Formosan Nat. Hist. Soc.) 4¹⁵: 4-5. T. 3, v, May, 1914. (Japanese.)

Ovary infesting, appearing in group on the ear of the host plant, dark olive in color, balloon- or top-shaped, rounded at the apex, 3 mm. long, first covered by a membrane, later rupturing at maturity, exposing the dark-olive spore mass inside, lower part of the mass being associated with glume and palea, hard, sclerotium-like, inside of the mass white or very light straw-color, composed of closely arranged angular cells; spores globose or ovoid, covered with comparatively large-sized warts, dark-olive, 4-5.5 usually 4.5-5 μ .

Parasitic on *Saccharum narenga*.

TYPE LOCALITY: Akōchō Hanshoryō Keishūshō, Formosa, Dec. 10, 1907. (Y. Shimada.)

The cross-section of the sclerotium-like body is entirely parenchymatous, and no parallel hyphae are visible as in the case of *Ustilaginoidea Oryzae* Bref.¹

PLASMOPARA WILDEMANIANA P. Henn. var. MACROSPORA K. Sawada var. nov. in Taiwan Hakubutsu Gakkwai Kwaihō (Journ. Formosan Nat. Hist. Soc.) no. 16: 2-4. T. 3, vii, July, 1914. (Japanese.)

Follicolous; spots irregular, often occupying the entire leaf, light yellowish-green, white mouldy on the lower surface; hyphae in mesophyl intercellular, invading the cell only by haustorium, colorless, continuous, branching, 7-13 μ thick; haustoria globose or ovoid-globose, 13-17 x 9-18 μ ; conidiophores fascicled from the stoma, upright, 320-605 μ long, main axis 8-12 μ thick, slightly swollen at the base, first branching at about one half or one third of the whole length from the base, usually branching 5 to 7 times, terminal branchlets (commonly 4-8 μ long) and their underlying branchlets very short; conidia ovoid or elliptic-ovoid, rounded at the apex, papillate at the base, colorless, 14-18 x 11-13 μ .

Parasitic on the leaf of *Justicia procumbens*.

TYPE LOCALITY: Formosa. Taihokuchō Chōnaihoshō, Sept. 12, 1908 (Y. Fujikuro), Apr. 5, 1913 (Y. Fujikuro).

The present variety has noticeably larger-sized conidia than those of the type species described by P. Hennings and later by Sydow

and Butler. (See Wildeman, E., Études Flor. Bas- & Moyen-Congo, Sér. 5. II²: 85. 1907, and Ann. Mycol. 10³: 243-244. fig. 1. June, 1912.) Sawada suggests that more noticeable difference may be revealed if they are closely compared as in the case of species of *Brennia*. (See Mycologia 11²: 84-86. March, 1919.)

COLLETOTRICHUM BOEHMERIAE K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. Formosan Nat. Hist. Soc.) no. 17: 2. T. 3, ix, Sept., 1914. (Japanese.)

Foliicolous or caulicolous; spots scattered, cinereous with brown margin, orbicular and 1-2 mm. diam. on leaves, when on stem, forming orbicular, elliptical or fusiform spots, occasionally causing longitudinal rupture of the host epidermis, 1-6 x 0.8-2 mm. in size; hyphae colorless, 4 μ thick; acervuli small, with setae; conidiophores dense, short, terminated by conidia; conidia colorless, cylindrical or occasionally clavate, straight, obtuse at both ends, granular, 14-19 x 4-5 μ ; setae dark-brown, tapering toward the apex, 1-2-septate, 45-85 x 4-5 μ .

Parasitic on Ramie (*Boehmeria nivea*).

TYPE LOCALITY: Taihokuchô Chônaihoshô, Formosa. June 29, 1914 (A. Imachi).

hardly removable when the fibers are bleached. The infected

Stem infection causes bad staining of the bast fibers, which is plant, therefore, yields only lower grade fibers of less commercial value.

CERCOSPORA PIRICOLA K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. Formosan Nat. Hist. Soc.) no. 17: 3. T. 3, ix, Sept., 1914. (Japanese.)

Hypophyllous; spots usually angular, occupying certain area enclosed by veinlets, later coalesce, often cover the entire surface, cinereous, later changing into brown, generally 1-3 mm. in diam.; conidiophores fascicled, several or more than ten together, straight or curved, cinereous, 0-2-septate, 15-27 x 3-4 μ ; conidia linear, curved, 3-5-septate, grayish or almost colorless, 28-57 x 2.5-3.5 μ .

On *Pirus communis* (pear) and *Pirus sinensis* (sand-pear).

TYPE LOCALITIES: Formosa. Taihokuchô Chônaihoshô, Jan. 15, 1910 (Y. Fujikuro), Sept. 2, 1911 (K. Sawada); Taichûchô Tai-

heishô, Aug. 6, 1911 (Y. Fujikuro); Kagichô Toroku, Apr. 30, 1913 (K. Sawada).

Resembles *Cercospora minima* Tracy & Earle (Bull. Torr. Bot. Cl. 23⁵: 206. May, 1896) on pear from America, but differs in being hypophyllous and in having longer conidiophores and shorter but thicker conidia of grayish color, while the American species is characterized by being epiphyllous and having shorter conidiophores and slender and hyaline conidia.

The extent of injury due to this fungus is not known.

USTILAGO FORMOSANA K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. Formosan Nat. Hist. Soc.) no. 34: 6-8. T. 7, v, May, 1918. (Japanese.)

Infesting inflorescence and the upper part of the culm; semi linear, fuliginous, 2.5-14 cm. long, at first enclosed by grayish-white membrane, later escaping from enclosing sheath, ruptures and emits black spore mass inside, leaving only fibrous tissue behind; spores globose or subangular-globose, light reddish-brown, containing granules, 5-7 μ generally 5.5-6 μ in diam.; epispore apparently smooth, but finely echinulate under close observation; promycelia very short and continuous, or somewhat longer and uniseptate, producing sporidia at the end or at the joint between two cells, 8-17 x 1-3 μ ; sporidia fusoid to oblong-fusoid, often producing secondary sporidia thereupon, 3-6 x 1-2 μ ; germinating tube sometimes formed on the promycelium.

On *Panicum proliferum*.

When the disease occurs in the field, whole culms arising from common root are infested.

TYPE LOCALITIES: Formosa. Taihokuchô Chônaihoshô, May, 1906 (S. Suzuki), Apr. 22, 1907 (Y. Fujikuro), Aug. 10, 1908 (Y. Fujikuro), Nov. 27, 1908 (K. Sawada), Dec. 4, 1908 (K. Sawada); Tôenchô Nanseishô, June 2, 1917 (K. Sawada); Taitôchô Daimabukutsu, Apr. 29, 1909 (K. Sawada); Taitôchô Toran, May 21, 1911 (K. Sawada).

Differs from *Ustilago Panici-prolifera* P. Henn., which occurs on *Panicum proliferum acuminatum* in America, in having distinctly smaller spores.

NEW JAPANESE FUNGI ~~III~~

TYÔZABURÔ TANAKA

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NEW JAPANESE FUNGI

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NOTES AND TRANSLATIONS—XII

TYÔZABURÔ TANAKA

GYMNOSPORANGIUM ASIATICUM Miyabe in Shokubutsugaku Zasshi (Bot. Mag.) Tôkyô. 17¹⁹²: 34. M. 36, ii, Feb., 1903 (nomen nudum); in Ideta's Nippon Shokubutsu Byôrigaku (Handb. Pl. Diseases in Japan) ed. 3. Tôkyô, Shôkwabô, M. 36, iv, Apr., 1903, G. 214-217. fig. 50, 51 (nomen subnudum); Yamada in Ômori, J. & Yamada, G. Shokubutsu Byôrigaku (Plant Pathology) Tôkyô, Hakubunkwan, M. 37, ix, Sept., 1904, p. 303-306. (Japanese.)

Description by G. Yamada:

O. Pycnia epiphyllous on spots, first small, punctiform and orange-yellow, gregarious, few in number; pycnospores small, fusoid.

I. Aecia hypophyllous, on thickened, well-developed, brown spots having a beautiful, flavo-rubescens margin, very slender, 3-6 mm. high, cinereous; peridium tubular, not recurved in dehiscence, irregularly torn at the end, liberating reddish-brown aeciospores; aeciospores globose or sub-angular, minutely-verrucose, the pores several.

On *Pyrus sinensis* (Japanese sand-pear) and *Cydonia vulgaris*.

III. Telia foliicolous, forming reddish-brown, gelatinous masses, deep-fuscous when desiccated, pulvinate with sticky, orange-yellow teliospores; teliospores long-pediceled, orange-yellow, those produced on the outer part of the telium broad and short, thick-walled and deep colored, those formed in the inner part of the telium slender, thin-walled and light colored, readily germinating from the places near the septum; promycelia 1-2, rarely produced from the apex of the teliospore; sporidia 2-3 on a promycelium.

On *Juniperus chinensis* and *J. chinensis* var. *procumbens*.

The sporidia of III readily produce *Roestelia* (*R. korcaensis* P. Henn.) on Japanese pear leaves, according to the inoculation test conducted by Miyabe.

Ideta (under supervision of Miyabe) gives the spore characters as follows: "Teliospores 2 celled, fusoid, 45-70 x 20-25 μ , long-pediceled." (*In Nippon Shokubutsu Byōrigaku* ed. 4, pt. 2: 470, M. 44, 1911. Japanese.)

Notes: Sydow first described *Gymnosporangium japonicum* from the specimens on the branch of *Juniperus chinensis* collected by Shirai at Komaba, Tōkyō (*in Helwigia*, Beibl. 38¹: 111, M. 38, June, 1899), and later, Shirai succeeded in producing *Roestelia* (*R. koreana*) on Japanese pear leaves by inoculating with some mixed forms of *Gymnosporangium* found on the leaves and stems of *Juniperus chinensis*, and which he called *G. japonicum* (*in Zeitsch. f. Pflkr.* 10¹: 1-4, pls. 1-2. Apr., 1900). These results apparently induced many Japanese pathologists to believe that *G. japonicum* is the causal organism of the devastating Japanese pear-rust, though Miyabe clearly defines that *G. asiaticum* occurs only on the leaves. The first comprehensive description of *G. asiaticum* given by Yamada also limits the occurrence of the telia to the juniper leaf only, and Yoshino later showed that the pear-rust is caused only by the leaf-inhabiting form of *Gymnosporangium* (*G. asiaticum*) in the Kyūshū island, and not by the stem-inhabiting form which he never found existing in the island (*in Shokubutsugaku Zasshi*, Bot. Mag., Tōkyō, 19²²²: 167-168. M. 38, vii, July, 1905. Japanese). Ideta also describes the telial stage from the leaf-inhabiting form only, though he was liberal in bringing the name *G. asiaticum* into the synonymy with *G. japonicum* in his latest description (*l. c.* ed. 4, pt. 2: 467, 469-470. 1911).

Despite the existence of the valid name *Gymnosporangium asiaticum* applied to the form on the juniper leaves, Sydow renamed the leaf-inhabiting form as *Gymnosporangium haracanum*, based upon the material collected by K. Hara from Mino province (*in Ann. Mycol.* 10¹: 405. Aug., 1912). Using the fresh material taken from the juniper plant upon which Sydow's type was collected, Hara succeeded in producing pear-rust by inoculation (*in Shokubutsugaku Zasshi* 27³¹⁹: 348. T. 2, vii, July, 1913. Japanese). At the same time, Itō succeeded in producing rust on *Photinia villosa* by inoculating the stem-inhabiting form which he determined to be *G. japonicum* Syd. (*in Shok. Zass.* 27³²¹: 221-

222. Nov., 1913). Itô concludes, therefore, that the leaf-inhabiting *Gymnosporangium* (*G. haracanum* = *G. asiaticum*) is the cause of the Japanese pear-rust (*Roestelia korcaensis*), while the stem-inhabiting form (*G. japonicum*) is connected with the *Photinia* rust (*Roestelia photiniae* P. Henn.). (See l. c. p. 221, and also in Byôchû-gai Zasshi, Journ. Pl. Prot. 4³: 178-182. T. 6, iii, Mar., 1917. Japanese.) Jackson also succeeded in infecting sand-pear and quince with the teliospores from *Gymnosporangium korcaensis* Jacks. (= *G. asiaticum* = *G. haracanum*) and recommended *G. photiniae* Kern (in Bull. N. Y. Bot. Gard. 7: 443. Oct., 1911) to supersede *G. japonicum*, following Itô's successful inoculation. (See Journ. Agr. Res. 5: 1006, 1007. Feb., 1916.) Dietel, on the other hand, made examination of aecia found on the leaves of *Cydonia vulgaris*, *Pirus sinensis* and *Pourthiaca villosa* (*Photinia villosa*) collected by Kusano at the Botanic Garden, Tôkyô, and brought altogether under one species *G. confusum* Plowr. (in Engler's Bot. Jahrb. 28³: 286, May, 1900), but Itô states that *G. confusum* never occurs in Japan, though Shirai lists it in his Nippon Kinrui Mokuroku (A list of Japanese fungi hitherto known, Tôkyô, Nippon Engei Kenkyûkai, M. 38, 1905, p. 39) and he also maintains that the first two must be identical with *G. asiaticum* and the third must be *G. japonicum* (in Byôchû-gai Zasshi 4³: 180. Mar., 1917).

In Korea, pear-rust was known quite early and its connection with juniper was suspected by the Korean agriculturist Soh You-Koh in his work *Haing po chi* written as early as about 1845. (Shirai, in Ann. Phytopath. Soc., Japan 1¹: 2. Jan., 1918.) In Japan, Hori first noticed the connection of the pear-rust with juniper *Gymnosporangium* in 1892, and he studied the actual damage of the pear plantation in Okayama first in 1900. (See Hori's Shokubutsu Byôgai Kôwa [Lectures on plant diseases] v. 2. Tôkyô, Seibidô, t. 5, xi, Nov., 1916, p. 301-302 [Japanese].) The infection of quince (*Cydonia vulgaris*) by the pear-rust fungus was reported by Miyabe and all later investigators, but Sydow made it a new species giving the name *Gymnosporangium spiniferum* to the aecial stage. (See Ann. Mycol. 10: 78. Feb., 1912.) Itô conceives this to be identical with *G. asiaticum* (l. c. p. 181), but

Kern brings this into the synonymy with *G. photiniae* (in Mem. N. Y. Bot. Gard. 6: 246. Aug., 1916). Successful inoculation of *Cydonia japonica* by the pear *Gymnosporangium* was also reported by Yoshino (l. c. p. 168), Hori (l. c. p. 309) and Itô (l. c. p. 182). According to Yoshino (in Shok. Zass. 20²³²: 91. M. 39, v, May, 1906. Japanese), Ideta (l. c. ed. 4, p. 467) and Itô (l. c. 4³: 327), natural infection of European pear (*Pyrus communis*) is found but of slight extent, and Hori adds *Pyrus Toringo* and *Cydonia sinensis* as incidental hosts (in Hori's Nōsakumotsu Byōgaku, [Discourse on plant diseases], 7 impr. 1911. p. 292. Japanese). Ideta first reported that *G. asiaticum* occurs also on the leaves and stems of *Juniperus rigida* (in Shok. Zass. 18²¹¹: 157-158. M. 37, viii, Aug., 1904. Japanese), but later he corrected the statement in accordance with Miyabe's inoculation tests, that the leaf-inhabiting form only can produce acia on pear leaves (l. c. 18²¹³: 223. Oct., 1904. Japanese). Later investigators all agreed with Ideta's final statement (see Hara, in Engei no Tomo [Friend of Hort.] 13⁹: 811-812. T. 6, ix, Sept., 1917. Japanese), except Itô who doubts these statements because only exceptional species can infect both the Sabina and *Oxycedrus* groups of juniper (in Byōchū-gai Zasshi 4³: 182-183). R. Nodzu even suggested that the pear-rust infects several species of *Chamaecyparis* (in Shimane Kenritsu Nōji Shikenjō T. 4 Nendo Gyōmu Kōtei, [Ann. Rept. Simane Agr. Exp. Stat. for 1915]. p. 13. Japanese), but his suggestion received little credit by succeeding authors. Yoshino, on the other hand, succeeded in obtaining rust on *Cydonia vulgaris*, *C. japonica* and the Japanese pear by infecting with a *Gymnosporangium* found on the small stems of *Juniperus chinensis* in the Saga prefecture (in Shok. Zass. 20²³²: 91. May, 1906). He describes this stem-inhabiting telium as being "only swollen or expanded or globular, appearing quite different from the ordinary stem-inhabiting form which expands greatly with moisture into a tongue-like petal." This shows, according to Yoshino, that the telium of *G. asiaticum* occurs also on the small twigs of juniper in a form quite distinct from that of *G. japonicum*.

GYMNOSPORANGIUM YAMADAE Miyabe in Shokubutsugaku Zasshi (Bot. Mag.) Tōkyō, 17¹⁹²: 34-35. M. 36, ii, Feb., 1903 (nomen

nudum); Yamada in Ômori, J. & Yamada, G. Shokubutsu Byôrigaku (Plant Pathology) Tôkyô, Hakubunkwan, M. 37, 1904, p. 306-308, fig. 38 (Japanese).

Gymnosporangium Yamadaï Miyabe ex Ideta in Nippon Shokubutsu Byôrigaku (Handb. Pl. Diseases in Japan) ed. 3, Tôkyô, Shôkwabô, M. 36, iv. Apr., 1903 (nomen subnudum); Miyabe in Ideta ditto ed. 4 pt. 2: 471-474, fig. 174. M. 44, 1911 (Japanese).

Description by G. Yamada and K. Miyabe combined:

I. Aecia hypophyllous, on more or less thickened, reddish-brown spots, cylindrical, thick, 0.4-0.5 mm. in diam., 5-8 mm. high; peridium fulvous, splitting into a fine lace-like network; perial cells narrow and elongated, 60-80 x 20-24 μ , inner wall smooth, outer wall slightly verrucose, side wall tuberculate with short papillae and never making elongated ridges; aecio-pores subglobose or polygonal, 16-24 μ in diam., wall thick, brown, finely verrucose, the pores 8 scattered.

On *Pyrus Malus* (Apple), *Pyrus spectabilis*, and *P. Toringo*.

III. Telia cauliculous, from a perennial mycelium, appearing on reddish-brown, spheric swellings of the host stem, of somewhat shining appearance, disclosed by the rupturing of the cork in irregular fissure; flavo-rubescens, flat, petal- or tongue-shaped, irregular, deep-fuscous when desiccated; teliospores 2-celled, oblong, broad-ellipsoid, obovoid or clavate, upper cell always larger, frequently with thick-walled, obtuse papilla at the apex, 30-50 x 15-22 μ .

On *Juniperus chinensis* and *J. chinensis* var. *procumbens*.

Apple culture of the northeastern territories has been menaced by the disease. In Sapporo, Hokkaidô, it made its first appearance in 1902 with the introduction of *J. chinensis*, carrying the fungus from the south. According to Ideta (l. c. ed. 4 p. 472), Miyabe first found in 1904 the connection of apple rust with this particular *Gymnosporangium* inhabiting on the juniper stems. The aecial stage develops in July and August causing discoloration of apple leaves, which frequently results in defoliation. The telial stage appears on the juniper in April or May in the main island, and in May or June at Sapporo, Hokkaidô.

Illustrations: 4 text-figures by Yamada (l. c. p. 307) are given, showing telia on juniper branch, cross section on the swollen stem, teliospores and germination of teliospores.

Notes: The finding of aecia on *Pyrus spectabilis* by Shirai in Tōkyō was reported by Dietel as ?*Gymnosporangium clavariae-forme* Jacq. (in *Hedwigia* 37: 216. July, 1863) and by P. Sydow as *Gymnosporangium ?clavariiforme* (Jacq.) Rees (do, *Beibl.* 37⁷: (207) Nov.-Dec., 1868). P. Hennings listed in a eum on *Pyrus Torinago* collected by Shirai at Nikkō as ?*G. clavariiforme* (Jacq.) Rees (in *Engler's Bot. Jahrb.* 28: 262. Mar., 1900), and he later reported *G. clavariiforme* from Tōkyō, found by Hori on *P. spectabilis* (do, 31⁵: 732. Aug., 1902). These are all likely to represent *G. Yamadae*. Under *G. Yamadae* Miyabe sp. nov., Kern presented a description of the aecial stage found on *Pyrus spectabilis* by Nambu at Tōkyō (in *Bull. N. Y. Bot. Gard.* 7²: 466. Oct., 1911), and Sydow later described the telial stage under the same name from material presented by M. Miura (in *Ann. Mycol.* 12: 159-160. Apr., 1914). Itō (in *Byōchū-gai Zasshi, Journ. Pl. Prot.* 4¹: 244-245. Apr., 1917) ventured, however, to bring this name into the synonymy with *G. chinensis* Long (in *Journ. Agr. Res.* 1: 345. Jan., 1914) but all later investigators have considered the latter to be identical to *G. asiaticum* (= *G. haracanum* = *G. korcaensis*). See Clinton, in *Ann. Rept. Conn. Agr. Exp. Stat.* for 1914 p. 15, 16. 1914; Jackson, in *Journ. Agr. Res.* 5: 1006. Feb., 1916 and Kern in *Mem. N. Y. Bot. Gard.* 6: 247-249. Aug., 1916.

GYMNOSPORANGIUM ISETAE Yamada: ex K. Hara in Hara's Kwajit Byōgairon (Discourse on fruit diseases) Irie-chō, Shidzuoka-ken, T. 5, xi, Nov., 1916. p. 95 (Japanese); in Shidzuoka-ken Nōkwaishō (Journ. Agr. Soc., Shidzuoka prefecture) no. 287: 51-52. T. 10, ix, Sept., 1921 (Japanese).

Description from Hara's second article:

O. Pycnia epiphyllous, immersed, on orbicular or irregularly-orbicular orange-yellow spots of 5-15 mm. broad, which later turn into beautiful reddish-brown color, globose, with pointed apex; pycnospires fusoid, exude with mucilaginous substance, 8-10 x 3-3.5 μ .

I. *Aecia* gregarious, protruding from the host tissue, often with common base, cylindrical, grayish-yellow, with apex first rounded, later lacerating, 1-3 x 0.3-0.6 mm.; aeciospores broad-ellipsoid, globose or subangular, grayish-brown, verrucose, 18-28 μ in diam.

On *Amelanchier asiatica*, collected by Hara in Kawauye-mura, prov. Mino (Gifu-ken).

Description from Hara's first article:

III. Telia caulicolous, formed on fusoid swellings, roughened at first, later lacerate, exposed as purplish-brown masses; teliospores cylindric-clavate or rarely subfusoid, 1-septate, upper cell being broader and shorter, 45-75 x 15-20 μ , wall 1.5 μ thick, the pores 2 in both upper and lower cells near the septum, or 1 apically in the upper and 2 in the lower cell, germinating mostly from the apical pore; sporidia ellipsoid, ovoid or globose, 12-15 x 7-10 μ .

On *Juniperus rigida*.

Revised description of III in the second article of Hara:

"Telial masses chestnut-brown or purplish-brown, at first hemispheric, later becoming flat by union, or liquify, varying in size, smallest about 5 mm. in diam., largest several inches broad, occasionally surrounding the twig; teliospores 2-celled, rarely 1- or 3-celled; 2-celled spores with thick, colored wall, ellipsoid, broad-ellipsoid, subfusoid or ovoid, the cells equal in shape but lower cell being a little longer and narrower than the upper, upper cell occasionally papillate, not constricted or slightly constricted, both ends rounded or narrowed, 35-50 x 20-25 μ , those round ones measuring 28-33 x 18-28 μ , wall 1.5 μ thick, the pores 2 or 1, mostly one apical in the upper cell, two lateral near the septum in the lower cell; colorless spores ellipsoid, cylindrical or fusoid, the cells unequal, upper cell larger and flatter, lower cell cylindrical or tapering toward the pedicel, 50-55 x 16-23 μ , wall 1 μ thick, the pores one apical in the upper cell, or two near the septum as in the lower cell; 3-celled spores elongated, contents brown or yellow-rust color, 1-nucleate, 65-75 x 18-20 μ ; pedicels cylindrical, very long, hyaline, 3-5 μ thick; promycelia clavate or cylindrical, 3-septate; sterigmata 3-4; sporidia ellipsoid ovoid or reniform, 10-15 x 7-10 μ ."

Related to *G. Miyabei* Yamada & Miyake much closer than to *G. japonicum* Syd. Inoculations by Yamada and by Hara, conducted independently, resulted in the formation of aecia on *Amelanchier asiatica*.

Notes: The telial stage found on *Juniperus rigida* was first identified as *G. tremelloides* Hart. (Hara in Shok. Zass. 27³¹³:

67. T. 2, i, Jan., 1913. Japanese). This identification was made by Sydow according to Hara's second report (l. c. 27²¹⁹: 348. T. 2, vii, July, 1913. Japanese), but as he had formerly succeeded in inoculating *Amelanchier* he considered this to be identical, at least partly, to *G. juniperinum* mentioned by Shirai in his "List" p. 39. Hara later obtained materials from Yamada who proposed the present scientific name according to the results of his inoculation. See Engei no Tomo (Friend of Hort.) 13⁹: 812. T. 6, ix, Sept., 1917 (Japanese).

The present species was later acknowledged by Itô as a distinct species, differing from *G. clavariiforme* by having much flatter telia; from *G. amelanchieris* in the elongated shape of the teliospores; and from *G. clavipes* in the different shape of the pedicel of the teliospores. See Byôchû-gai Zasshi (Journ. Pl. Prot.) 4⁵: 325-326. T. 6, v, May, 1917 (Japanese).

Hara's descriptions are based upon the specimens collected at Kawaye-mura, Mino province (Gifu-ken) (O. I. III.); various localities in Tôtômi province (Shidzuoka-ken) as Sakabe, Makinohara, Kasuisai, and Mikatagahara (III.).

Illustrations: Fig. 11, no. 6 in Hara's Kwaju Byôgairon shows 2 germinating teliospores and 2 sporidia.

GYMNOSPORANGIUM HEMISPHERICUM K. Hara sp. nov. in Engei no Tomo (Friend of Hort.) 13⁹: 813. T. 6, ix, Sept., 1917 (nomen nudum); in Dainippon Sanrin Kwaihô (Journ. Forest. Soc., Japan) no. 419: 16-18. T. 6, x, Oct., 1917. (Japanese.)

O. Pycnia epiphyllous, on orbicular orange-yellow spots, gregarious, first immersed, later piercing the epidermis with ostiola erumpent, globose or depressed-globose, 125-170 μ in diam., ostiolar filaments hyaline, resembling pedicels of pycnospores; pycnospores fusoid or ellipsoid, hyaline, 10-13 \times 2.5-3 μ ; pedicels filiform, 50-80 \times 1-1.5 μ .

I. Accia hypophyllous, cespitose or simply aggregate, conical or subcylindrical, delicate, brown, later cinereous or flavescent, 1-1.5 mm. high; peridium dehiscent only at the end; aeciospores globose or sub-angular, fulvous, verrucose, 20-28 \times 18-25 μ .

On *Pyrus Zumi*.

Spots at first orange-yellow or yellowish-pink, orbicular, 1.5 mm. in diam., later enlarging attaining to 6 mm., becoming viscid and

then black-spotted on the upper surface, and producing hair-like aecia on the lower surface. At this stage, there develops a discolored area of pale-yellow or occasionally light-pinkish color around the spot.

III. Telia foliicolous or caulicolous, arising between scale-like leaves, oblate or hemispherical, fuscous or purplish-brown, later pulvinate, 1-5 mm. when desiccated, attaining to soy-bean size with moisture; teliospores subglobose, broad-ellipsoid or fusoid, rounded at both ends, sometimes papillate at the apex, occasionally with narrowed base, 2-celled, the cells almost equal-sized, constricted, $30-35 \times 25-30 \mu$, wall thin, 1-1.5 μ thick, the pores 2 in each cell near the septum, or 1 apically in the upper, 2 in the lower cell; colorless spores fusoid or ellipsoid, commonly narrowed at both ends, 2-celled, each cell unequal, upper cell being 2-4 μ shorter than the lower, slightly or not constricted, $30-37 \times 17-25 \mu$, wall thin, 1 μ thick, the pores 1 apical or 1-2 lateral in the upper, and 1-2 lateral in the lower cell, lateral pores being located near the septum; 1-celled teliospores ellipsoid or ovoid, rounded at both ends, or papillate at the apex, wall colored, 1-2 μ thick, the pores apical or lateral; pedicels cylindrical, long, 3-4.5 μ thick; promycelia cylindrical or elongated like hyphae, curved, 3-septate, 10-12 μ in diam.; sterigmata 3-4 on a promycelium, cylindrical, 5-6 μ long; sporidia ellipsoid or ovoid, 10-13 \times 9-10 μ .

On *Juniperus chinensis*.

Type locality: Mino province (Gifu-ken) Kawauye-mura, Mar., 1917 (K. Hara).

The telia received a preliminary identification as *G. haracanum* by T. Hemmi and S. Itô, but after examining well-developed teliospores Hara became aware of its great difference from common pear-rust *Gymnosporangium* and thought it to be a new form. The inoculation was then carried out and he obtained positive results on *P. Zumi*, and negative on *P. Malus*, *P. Toringo* and *P. sinensis*. Hara also collected aecia from naturally infected *P. Zumi* in August, 1916.

Hara observed, on the other hand, a type of sorus arising from the space between the scaly leaves of juniper, in this respect similar to a telium. This form, becoming globose or hemispheric in shape, is much lighter in color than the telium, being brown or rust-colored, pulvinate, composed of numerous spores arranged in

chains on the pedicel $3-4.5\mu$ thick (sometimes attaining to 9μ thick in absorbing moisture). The spores are globose or broad-ellipsoid, $20-26\mu$ in diam., wall is thick, dark brown, $1.5-2\mu$ thick, contents being granular, rust-colored. In cutting the sori longitudinally, well-developed hyphae were observed, which were either apparently filling the enlarged host cells or running between them. The hyphae were colorless or fulvous, branching, $2-2.5\mu$ in diam. The spores did not germinate after several attempts, and that led Hara to consider these to be rudimentary urediniospores which had probably lost their function. He states that these peculiar spores occur also in the telia without forming independent sori of their own. He also ventures to add an account of this form to the generic character of *Gymnosporangium*. See Byōchū-gai Zasshi (Journ. Pl. Prot.) 6^o: 754-755. T. 8, ix, Sept., 1919. (Japanese.)

GYMNOSPORANGIUM SHIRAIANUM K. Hara sp. nov. in Byōchū-gai Zasshi (Journ. Pl. Prot.) 6^o: 681-687, 6^o: 751-756. 1 pl. T. 8, viii-ix, Aug.-Sept., 1919. (Japanese.)

O. Pycnia epiphyllous, on orange-red or reddish spots of 5-10 mm. broad, immersed, globose or depressed-globose, $150-200\mu$ in diam., ostiolar filaments needle-shaped, narrowed at the apex, straight, containing orange-colored granules, $80-120 \times 3-4\mu$; periospores cylindric or ellipsoid, narrowed at both ends, hyaline, $8-12 \times 3-4\mu$; pedicels linear, narrowed at the apex, hyaline, $15-30 \times 2.5-3\mu$.

I. Aecia hypophyllous, on 7-10-times thickened spots, the surface of which undulate, orange-yellow with margin of orange or reddish color, cespitose in small group or irregularly scattered, at first cinereous with purplish-yellow, simply projecting, later elongating into cylinder or tube, 0.25-0.5 mm. in diam., 1-5 mm. high; peridium straight or curved, at first with rounded end, later delhiscent; peridial cells sub-hexagonal, elongated, or fusoid, rarely subglobose, lower ones much shorter and light-brown in color, $33-60 \times 20-40\mu$, outer wall parallel-striated, $4-7\mu$ thick; aeciospores globose, ovoid or polygonal, fulvous, $18-23 \times 10-18\mu$, wall verrucose, $1-2\mu$ thick, the pores 6-14, pedicel linear, variable in length, $4-5\mu$ in diam.

On *Pyrus sinensis*.

Type locality: Tōtomi province (Shizuoka-ken) Mikatagahara, June 6, 1919 (K. Hara).

III. Telia foliicolous, epiphyllous, solitary or rarely 2-3 together, first subepidermal, later erumpent, minute, depressed-globose or oblate-ellipsoid, upper surface convex, purplish-brown or castaneous, lower surface more or less flat, light-brown or light-colored, looking as though attached to the substratum with pedicel-like body, 1-3 mm. in diam., 0.5-1 mm. high, becoming honey-color with moisture; teliospores broad-ellipsoid, fusoid or ovoid, rounded or narrowed at both ends, sometimes pointed at the apex, 2-celled (rarely 3- or 1-celled), usually equal-sized, sometimes upper cell being broader and shorter, lower just opposite, or rarely vice versa, constricted or not constricted, $30-50 \times 15-25 \mu$, wall castaneous, $1.5-2.5 \mu$, the pores 2 in each cell near the septum, or 1 apically in the upper, 2 laterally in the lower cell; colorless spores oblong short-cylindrical or fusoid, rounded or narrowed at both ends, 2-celled, the cells equal or unequal, upper being larger or just opposite, mostly not constricted but rarely much constricted, wall fulvous, 1μ thick, the pores mostly 1 apically in the upper, 2 laterally in the lower cell, or 2 in each cell near the septum; 3-celled spores clavate or oblong, not constricted at the septum or slightly constricted, $64-66 \times 15-18 \mu$; 1-celled spores globose, ovoid or ellipsoid, $22-25 \times 20-22 \mu$, round ones 22μ in diam., wall $2-2.5 \mu$ thick; pedicels cylindrical, very long, $4-9 \mu$ thick, hyaline; promycelia at first cylindrical, later occasionally elongate into hyphal form of $5-7 \mu$ thick, or simply curved, 3-celled and $5-8 \mu$ thick; sterigmata filiform, $15-20 \times 2-4 \mu$, terminated by sporidia; sporidia reniform or ellipsoid, orange-colored, $10-16 \times 5-9 \mu$.

On *Juniperus littoralis*.

Type locality: Tôtômi province (Shidzuoka-ken) Mikatagahara, Mar. 20, 1919 (K. Hara), Mar. 21, 1919 (K. Yoshida), Apr. 7, 1919 (Y. Watanabe).

Illustrations: 1 black-and-white plate giving 15 figures to show aecial form on Japanese pear leaf: section of a pycnium, its ostiolar filaments, pedicels of pycnospor, pycnospor, section of an aecium, peridial cells, formation of aeciospor, mature aeciospor, telia on leaves of *J. littoralis*, a swollen telium, colored teliospor, colorless teliospor, germination of teliospor and sporidia.

The appearance of the aecial stage is quite similar to that of *G. asiaticum*, except the aecia look more or less purplish in color.

Notes: Sand-pear culture in the Mikatagahara region was given up some time ago on account of the virulence of rust, though

no *Juniperus chinensis* was found in the vicinity. After careful examination, Hara found *J. littoralis* growing wild in the region which carried telia looking quite different from those of *J. chinensis*. Inoculation, using type material collected by Watanabe, proved that this telial form infects *P. sinensis* very easily, but *P. aucuparia* (*Sorbus aucuparia*, *S. japonica*) remained free (l. c. 6^o: 751-752). Hara also suggested that the case reported by Ideta, regarding the leaf-inhabiting form of *Gymnosporangium* on *J. rigida* as the pear-rust organism, is one of misidentification of the host, because *J. littoralis* is often mistaken for *J. rigida* (l. c. p. 753).

SYNOPSIS OF JAPANESE GYMNOSPORANGIUM SPECIES *

I. TELIA ON STEM, CAUSING HYPERTROPHY

1. Telia on spheric swelling of the stem of *Juniperus chinensis*, and *J. chinensis* var. *procumbens*; accia on *Pyrus Malus*, *P. spectabilis* and *P. Toriŋgo*; aeciospores chestnut-brown.

GYMNOSPORANGIUM YAMADAE Miyabe, ex Yamada 1904, and Ideta 1911
(*G. Yamadai* Miyabe).

Syn. *G. claviaeforme* Dietel, non Jacq.

G. clavariiforme Syd., P. Henn., non Rees.

G. chinensis Itô, non Long.

2. Telia on fusoid swelling of the stem of *Juniperus chinensis*, and *J. chinensis* var. *procumbens*; accia on *Photinia villosa* (*P. laevis*); aeciospores yellowish-brown.

GYMNOSPORANGIUM JAPONICUM Syd. 1899.

Syn. *Roestelia photiniae* P. Henn, in Hedwigia 33: 231, Aug., 1894.

(Ex Itô, 1913.)

Roestelia fourthiaca Miyabe in Shok. Zass. (Bot. Mag.) Tôkyô, 17¹⁹²: 35, M. 36, ii, Feb., 1903 (Japanese). (Ex Itô, 1917.)

Aecidium fourthiaca Syd. in Bull. Herb. Bois. 1900, no. 4: 3.
(Ex Itô, 1917.)

Gymnosporangium confusum Dietl., non Plowr. in Engl. Bot. Jahrb. 28: 286, May, 1900 *pro parte*. (Ex Itô, 1917, p. 180.)

G. photiniae Kern. 1911.

* In looking over this synopsis, Prof. Miyabe kindly made the following comments:

(1) The plant here called *Juniperus chinensis* var. *procumbens* should be *J. chinensis* var. *Sargentii*, since *J. procumbens*, according to E. H. Wilson, represents an entirely different plant.

(2) The plant here called *Juniperus littoralis* is better called *J. conferta*, in accordance with modern classification.

(3) The apple rust fungus probably had been existing in the prefecture of Aomori for centuries, where the wild crab apple is found common.

3. Telia on fusoid swelling of the stem of *Juniperus rigida*; aecia on *Amelanchier asiatica*; aeciospores chestnut-brown.

GYMNOSPORANGIUM IDETAE Yamada ex K. Hara, 1916, 1921.

Syn. *Gymnosporangium tremelloides* Syd., non Hartig. (Ex Hara.)
G. juniperinum Shirai pro parte, non Fries. (Ex Hara.)

4. Telia on fusoid swelling of the stem of *Chamaecyparis pisifera*, *Ch. pisifera* var. *plumosa*, and *Ch. pisifera* var. *squarrosa*; aecia on *Pyrus Miyabei* and *P. Aria* var. *kamaocensis*; aeciospores yellowish-brown.

GYMNOSPORANGIUM MIYABEI Yamada & Miyake in Shok. Zass. (Bot. Mag.) Tôkyô, 22²⁵³: 21-28. Feb., 1908.

Syn. *Roestelia solitaria* Miyabe in Shok. Zass. 17¹⁰²: 35 M. 36, ii, Feb., 1903. (Ex Yamada & Miyake.)

R. solenoides Diet. in Engl. Bot. Jahrb. 32: 631. June, 1903. (Ex Yamada & Miyake.)

Gymnosporangium solenoides Kern in Bull. N. Y. Bot. Gard. 7: 450. Oct., 1911.

II. TELIA ON LEAP OR ON GREEN STEM, NOT CAUSING HYPERTROPHY

5. Telia conic or spheric, on *Juniperus chinensis*, *J. chinensis* var. *procumbens*, and *J. rigida*; aecia on *Pyrus sinensis*, *Cydonia vulgaris*, *C. japonica*, and *Pyrus communis*; aeciospores yellowish-brown, 18-22 × 18-21 μ (P. Henn.).

GYMNOSPORANGIUM ASIATICUM Miyabe, ex Yamada, 1904.

Syn. *Roestelia koreaensis* P. Henn. in Monsunia 1: 5. 1900. (Ex Yamada.)

Gymnosporangium japonicum Shirai, non Syd. pro parte.

G. confusum Diet., non Plowr. pro parte. (Ex Itô, 1917.)

G. spiniferum Syd. (Ex Itô, 1917.)

G. haraeannum Syd. 1912.

G. chinensis Long. (Ex Kern, Jackson).

G. koreaense Jacks. 1916.

6. Telia oblate or hemispheric, on *Juniperus chinensis*; aecia on *Pyrus Zumi*; aeciospores yellowish-brown, 20-28 × 18-25 μ (K. Hara).

GYMNOSPORANGIUM HEMISPHERICUM K. Hara. 1917.

7. Telia depressed-globose or oblate-ellipsoid; on *Juniperus littoralis*; aecia on *Pyrus sinensis*; aeciospores yellowish-brown, 18-23 × 16-18 μ (K. Hara).

GYMNOSPORANGIUM SHIRAIANUM K. Hara. 1919

UNDESCRIBED OR QUESTIONABLE SPECIES REPORTED FROM JAPAN

1. Telia on *Juniperus nipponica*; aecia on *Sorbus japonica* (*Pyrus aucuparia* var. *japonica*) and *S. sambucifolia* var. *pseudogracilis* (*P. aucuparia*).

GYMNOSPORANGIUM ALPINUM Yamada ex Hara in Byôchû-gai Zasshi (Journ. Pl. Prot.) 6⁹: 754. T. 8, ix, Sept., 1919 (nomen nudum).

Syn. *Gymnosporangium juniperi* Itô, non Link, based upon Miyabe (1903) and Ideta (1911). In Byôchû-gai Zasshi 4⁴: 246. T. 6, iv, Apr., 1917 (Japanese). (Ex Hara, l. c.)

G. juniperinum Miyabe, Shok. Zass. 17: (35), non Fries (Aecia only; on *Pyrus aucuparia*. 1903). Ideta; aecia on *Sorbus japonica*, telia on *Juniperus nana* (?) 1911. Also Yamada, 1904, p. 368; Shirai List ed. I, p. 39 pro parte.

2. Telia on unknown host, collected by Miyabe in Karafuto (Saghalien).
GYMNOSPORANGIUM CLAVARIIFORME (Jacq.) Rees. (Ex Ideta, 1911, p. 474-475.
(Collected by Miyabe in Karafuto on *Juniperus nana*, ex Hara, l. c.)
(Shirai, List ed. 1, p. 39 *pro parte*; Accia on *Sorbus* sp.; List ed. 2, p. 265; accia on *Pyrus*.)
3. Telia on unknown host; accia on *Photinia villosa*.
GYMNOSPORANGIUM BLASDALEANUM Kern, 1911 p. 438; 1916, p. 257.
Syn. *Accidium fourthiaca* Syd. (Ex Kern.)
4. Host entirely unknown.
ROESTELIA CANCELLATA Reb. ex Matsumura Shokubutsu Meikwan, Index
Pl. Japon. vol. 1: 171. M. 37, ii, Feb., 1904; Shirai List ed. 1, p. 88
(*Gymnosporangium Sabiniae* for the synonym).
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