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Uromyces of Japan.

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(With Plates VII-IX)

On the first line of the bibliography on the Japanese Mycology, we would like to mention a paper written by M. J. BERKELEY and M. A. CURTIS, with the title "Characters of New Fungi, collected in North Pacific Expedition by Charles Wright," in the Proceedings of the American Academy of Arts and Sciences, Vol. IV, pp. 110-130 (1858). Although there are some mention of a few Japanese fungi in the earlier publications, such as E. KAEMPFER'S *Amoenitates Exoticæ*, &c. (1712), C. P. THUNBERG'S *Flora Japonica* (1784), and P. F. VON SIEBOLD'S *Synopsis Plantarum Oeconomicarum* (1826), they are all unimportant and also unscientific in some degree. BERKELEY and CURTIS described in their paper a new genus and one hundred seventy four new species of fungi, of which Japanese species are more than one half, surely ninety nine in number. Among them two rust-fungi were recorded, one *Uromyces Japonica* on leaves of an orchid?, the other *Uredo asperata* on leaves of *Xanthoxylum*. This is the first record of our rust-fungi, but they seem to have been overlooked by many mycologists. The author had an interest in these fungi from the mycological and the historical standpoint of view, and endeavored to revise all our species of *Uromyces*. As to *Uromyces Japonica* it will be discussed in detail later.

From the beginning of the present century, a large number of our rust-fungi have been collected by the Japanese botanists and sent to P. HENNINGS, P. DIETEL or P. & H. SYDOW for identification. The reports by these authors were published in ENGLER'S *Botanische Jahrbücher*, *Hedwigia*, *Annales Mycologici*, etc. These works brought numerous

Japanese species to the light. The mycologists of our country also have published various papers on the same subject. At the present time, we count seventy two species of *Uromyces*, valid or invalid in Japan. The author himself examined all these Japanese *Uromyces*, except a few Formosan species, which specimens did not arrive before his departure for a two years journey in foreign countries.

In the present work the species of *Uromyces* are arranged in the natural order of their host-plants. Under each host-plant is given a list of specimens examined, with localities, dates and collectors. It is hoped that confusion due to the non-uniformity of the specimens distributed by a collector may be avoided. The illustrations are all original and from Japanese specimens. Those of the spores are magnified five hundred times, and the surface-sculpture is frequently shown on a few of them in each species, others being simply in outlines to cover the limit of form-variation.

The specimens studied are all kept in the Herbarium of the Hokkaidō Imperial University, Sapporo, Japan.

ON COMPOSITÆ

Key to species

Uredospores lacking in life-cycle

Micro-form

Teleutospores not or slightly thickened above, provided with conical papilla on germ-pore; on *Cacalia*1. *U. Cacaliæ*

Teleutospores much thickened above; on *Solidago*2. *U. Solidaginis*

Lepto-form, on *Solidago*3. *U. Rudbeckiæ*

Uredospores present in life-cycle; on *Wedelia*4. *U. Wedeliæ*

1. *Uromyces Cacaliæ* (DC.) UNGER.

Einfl. Bod. Vert. Gew. p. 216, 1836—FISCHER, Ured. Schw. p. 56, fig. 42, 1904—HARIOT, Urédinées, p. 216, 1908—SACC Syll. VII, p. 560, 1888, *p. p.*—SCHRÖTER, Pilze Schles. I, p. 310, 1889, *p. p.*—SYDOW, Monogr. Ured. II, p. 1, 1909—TROTTER, Flora Ital. Crypt. Uredinales, p. 26, fig. 36a, 1908—WINTER, Pilze Deut. I, p. 152, 1884, *p. p.*

(Pl. VII, fig. 1.)

Syn. *Uredo Cacaliæ* DC. *Encycl. Bot.* VIII, p. 223, 1808.

Puccinia Cacaliæ DC. *Synops.* p. 46, 1806.

Uromyces Cacaliæ LÉV. *Ann. Sc. Nat. Sér. 3, VIII*, p. 371, 1847.

Cæomurus Cacaliæ KUNTZE, *Rev. Gen.* III³, p. 449, 1898.

Telospora Cacaliæ ARTH. *Rés. Sc. Congr. Bot. Wien*, p. 346, 1906.

Hab. On leaves of *Cacalia auriculata* DC. var. *kamtschatica* Maxim. (*Mimi-kōmori*).

Saghalien—Mt. Susuya (27, VII, 1907. T. MIYAKE).

Kurile Isl.—Etorofu (13, VII, 1906. K. MIURA).

Distrib. Europe, Siberia and Japan.

Remarks. The general character of this fungus is as follows:—Teleutosori hypophyllous, on roundish yellowish or yellowish-brown spots (3–10 mm. in diam.), minute (0.5 mm), roundish, often confluent to a large roundish mass (3–5 mm. across), long covered by the lead-colored epidermis, then naked, pulverulent, dark brown; teleutospores ovate or piriform, rarely subglobose or irregular in shape, not or slightly thickened above, with hyaline conical papilla (4–7 μ in height), rounded or attenuated at both ends, smooth, light brown, 22–35 (rarely 47)=14–25 μ ; epispore thick; pedicels hyaline, short and deciduous.

According to SYDOW (1909), the host-plants of this fungus are restricted to the genus *Adenostyles*, denying its occurrence on *Cacalia hastata*. In our country, although *Adenostyles* is not represented by any species, *Cacalia hastata* is comparatively abundant in the northern part. The latter plant remains, however, quite free from this fungus, as has been stated by SYDOW. But we have an *Uromyces* on *Cacalia auriculata* var. *kamtschatica*, collected by T. MIYAKE and K. MIURA in Saghalien and a Kurile Island respectively. On account of the widely separated systematic position of the two genera, *Adenostyles* and *Cacalia*, I have studied the fungus in question with special attention and have come to the conclusion, from the morphological character as above mentioned, that it is identical to *Uromyces Cacaliæ*.

Although ED. FISCHER (1898) experimentally proved that this fungus has no æcidial stage in its life-cycle, P. HENNINGS (ENGLER'S *Bot. Jahrb.* XXVIII, p. 261, 1901) recorded the æcidia on *Cacalia delphinifolia* S. et Z. and *C. bulbifera* MAXIM. collected by M. SHIRAI

at Nikkō, under the name of *Uromyces Cacaliæ*. These still remain as unsettled æcidia up to the present.

2. *Uromyces Solidaginis* (SOMMERF.) NIESSL.

Verh. Naturf. Vereins Brunn, X, p. 153, pl. III, fig. 10, 1872—FISCH.
Ured. Schw. p. 59, 543, fig. 44—HARIOT, Ured. p. 216—SACC. Syll.
VII, p. 566—SCHRÖT. Pilze, I, p. 311—SYDOW, Monogr. Ured. II, p.
10—TROT. Fl. Ital. Crypt. Ured. p. 27—WINT. Pilze, I, p. 141.

(SYDOW, Ann. Mycol. XI, p. 93, 1913; XII, p. 158, 1914—SHIRAI
& MIYAKE, List, p. 711, 1917.)

(Pl. VII, fig. 2.)

Syn. *Cæoma Solidaginis* SOMMERFELT, Supplem. Fl. Lappon. p.
234, 1826.

Cæomurus Solidaginis KUNTZE, Rev. Gen. III³, p. 450, 1898.

Telospora Solidaginis ARTH. Rés. Sc. Congr. Bot. Wien, p.
346, 1906.

Teleutospora Solidaginis ARTH. et BISBY, Bull. Torr. Club,
XLVIII, p. 39, 1921.

Hab. On leaves, petioles and stems of *Solidago Virgaurea* L.
(*Akino-kirinsō*).

Saghalien—Mt. Susuya (25, VII, 1907. T. MIYAKE).

Hokkaidō—Prov. Kitami; Rishiri Isl. (1, VIII, 1899. T. KAWAKAMI; 15, VIII, 1907.
M. MIURA). Prov. Shiribeshi; Raidentōge (29, VII, 1897. G. YAMADA). Prov. Ihuri; Mt.
Shiribeshi (7, VIII, 1907. S. ITŌ).

Honshū—Prov. Rikuchū; Mt. Ganju (24, VIII, 1897. Y. TAKAHASHI). Prov. Shimo-
tsuke; Nikkō (23, VII, 1891. S. HORI), Mt. Shirane (7, VIII, 1900. G. YAMADA & J.
HANZAWA). Prov. Echigo; Hirono (19, VII, 1906. S. ITŌ).

Distrib. Europe, N. America, Himalaya, China, Siberia and Japan.

Remarks. The general character of this fungus is as follows:—
Teleutosori hypophyllous, rarely epiphyllous, or petiolicolous and caul-
icolous, on yellowish or brownish round spots (up to 1cm. in diam.),
minute or medium in size (0.5–1 mm.), roundish, often elongate on
petioles and stems, densely gregarious in roundish groups (often 0.5cm.
across), often confluent (up to 2mm. across), early naked, surrounded
by the ruptured epidermis, pulvinate, compact, black or brownish-black;
teleutospores ovate, ovate-oblong, ellipsoidal or globose, apex rounded,
applanate or attenuated, greatly thickened (7–16 μ), base mostly at-
tenuated, smooth, yellowish-brown, darker at apex, 22–40=13–28 μ ;

germ-pore often sublateral; pedicels persistent, hyaline or light brown, thick, 86 μ in length.

SYDOW (1909) recorded for the first time the occurrence of this species in Japan and remarked that the teleutospores of the Japanese specimens differ somewhat from those of other countries in their slender shape and more attenuated apex. But I could not recognize these clear or decided differences between them.

3. *Uromyces Rudbeckiæ* ARTH. et HOLW.

Bull. Iowa Agric. Coll. p. 154, 1884—SACC. Syll. VII, p. 581—SYDOW, Monogr. Ured. II, p. 7.

(DIET. ENGL. Bot. Jahrb. XXXVII, p. 99, 1905; Ann. Mycol. VIII, p. 305, 1910.)

(Pl. VII, fig. 3.)

Syn. *Uromyces Rudbeckiæ* forma *Virgaureæ* P. HENN. Hedw. XL, p. 125, 1901 (hyponym) (YOSHINAGA, Bot. Mag. Tokyo, XVI, p. 7, 1902—SHIRAI, List, p. 109, 1905—SHIRAI & MIYAKE, List, p. 709.)

U. Komaroviï Bubák, Sitzungsber. königl. Böhm. Ges. Wiss., p. 13, fig. 25-35, 1902—SACC. Syll. XVII, p. 245—SYDOW, Monogr. Ured. II, p. 11. (SYDOW, Ann. Mycol. XI, p. 93, 1913—SHIRAI & MIYAKE, List, p. 703.)

U. Solidaginis var. *sakawensis* P. HENN. *in litt.*

U. sakawensis P. HENN. Hedw. XLII, p. (107), 1903—SACC. Syll. XVII, p. 245. (P. HENN. ENGL. Bot. Jahrb. XXXI, p. 729, 1902—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 36, 1904—MATSUMURA, Ind. Plant. Jap. I, p. 181, 1904—SHIRAI, List, p. 109—SHIRAI & MIYAKE, List, p. 709.)

Cæomurus Rudbeckiæ KUNTZE, Rev. Gen. III³, p. 450, 1898.

Teleospora Rudbeckiæ ARTH. Rés. Sc. Congr. Bot. Wien, p. 346, 1906.

Teleospora Rudbeckiæ ARTH. et BISBY, Bull. Torr. Bot. Club, XLVIII, p. 39, 1921.

Hab. On leaves of *Solidago Virgaurea* L. (*Akino-kirinsō*)

Saghalien—Kusunkotan (10, VII, 1907. T. MIYAKE).

Hokkaidō—Prov. Ishikari; Mt. Moïwa (31, VII, 1900. K. MIYABE; 30, VII, 1900. G. YAMADA), Jōzankai (24, VII, 1898. T. NISHIDA), Horomui (30, VII, 1900. G. YAMADA), Sorachibuto (8, VIII, 1891. K. MIYABE). Prov. Iburi. Mt. Shiribeshi (6, VIII, 1905. K. MIYABE; 5, VIII, 1907. S. IRŌ; 7, VIII, 1907. M. MIURA); Noboribetsu (4, IX, 1914. K. MIYABE), Rebunge (18, VIII, 1897. T. NISHIDA). Prov. Kushiro; Kutcharo (16, VIII, 1915.

K. MIYABE). Prov. Oshima; Fukuyama (9, VII, 1890. K. MIYABE), Chiisago-sandō (22, VII, 1890. K. MIYABE), Ichinowatari (16, VII, 1890. K. MIYABE), Hakodate (9, VIII, 1895. Y. TOKUBUCHI). Prov. Hidaka; Niikappu (20, VIII, 1907. M. KASAI).

Honshū—Prov. Mutsu; Mt. Iwaki (24, VIII, 1896. K. KIKUCHI). Prov. Uzen; Mt. Gwassan (7, VIII, 1901. G. YAMADA). Prov. Echigo; Kanazu (19, VIII, 1908. S. ITŌ).

Shikoku—Prov. Iyo; Mt. Ishitetsu (VII, 1906. K. OKUDAIRA). Prov. Tosa; Sakawa (VI, 1901; 1903. T. YOSHINAGA), Kuroiwa (V, 1907. T. YOSHINAGA).

Kiushū—Prov. Higo; Kumamoto (21, V, 1905. K. YOSHINO), Mt. Aso (13, VII, 1906. K. YOSHINO). Prov. Satsuma; Sakurajima (18, VII, 1906. J. HANZAWA).

Distrib. N. America, Manchuria and Japan.

Remarks. The general character of this fungus is as follows:—Teleutosori hypophyllous, rarely epiphyllous, on yellowish, brownish or black roundish or irregular shaped spots (up to 0.8 cm. in diam.), minute or medium in size, (0.5–2 mm.), roundish, scattered or densely gregarious often confluent, early naked, pulvinate, compact, dark brown; teleutospores fusiform, clavulate or oblong-clavate, apex attenuated, rounded or pointed, greatly thickened (7–11 μ), base mostly attenuated, smooth, yellowish, 26–35 = 10–15 μ ; epispore thin; pedicels persistent, hyaline thin, ca. 35 μ (rarely 60 μ) in length. Germination of spores occurs as soon as mature.

This fungus is easily distinguished from *Uromyces Solidaginis* in the brown-colored teleutosori and in the size of the spores. Moreover, this species belongs to Lepto-form, while the latter to Micro-form. In our country, the fungus is very widely distributed, extending from Saghalien to Kiushu.

4. *Uromyces Wedeliae* P. HENN.

Hedw. XLIII, p. 150, 1904—SACC. Syll. XVII, p. 245—SYDOW, Monogr. Ured. II, p. 12, fig. 14.

(P. HENN. ENGL. Bot. Jahrb. XXXIV, p. 594, 1905—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 713—YOSHINAGA, Bot. Mag. Tokyo, XIX, p. 36, 1905.)

(Pl. VII, fig. 4.)

Hab. On leaves of *Wedelia prostrata* Hemsl. (*Hamaguruma*).

Shikoku—Prov. Tosa; Shimoyama (XI, 1903. T. YOSHINAGA), Katsura-hama (IX, 1906. T. YOSHINAGA).

Distrib. Japan.

Remarks. The general character of this fungus is as follows:—Uredosori amphigenous, mostly epiphyllous, without spot, scattered or

gregarious, minute (ca. 0.5 mm.), roundish or elliptical, early naked, surrounded by the ruptured epidermis, compact, ferruginous-brown or chestnut-brown; uredospores subglobose, ellipsoidal or ovate, loosely aculeate (ca. 2μ in length), chestnut-brown or brown, $25-40=22-35\mu$; epispore ca. 3.5μ thick; germ-pores 1 or 2, equatorial. Teleutosori conformed; teleutospores ovate, piriform or ellipsoidal, apex rounded, greatly thickened ($7-18\mu$), base rounded or attenuated, smooth, light brownish, often subhyaline at apex, $30-50=20-30\mu$; pedicels persistent, hyaline, thick (up to 10μ), 80μ in length.

This endemic species seems to have a narrow range of distribution. We have only two specimens collected at the type localities.

ON RUBIACEÆ

5. *Uromyces Galii* DIETEL.

Ann. Mycol. V, p. 71, 1907—SYDOW, Monogr. Ured. II, p. 21, fig. 21. (SHIRAI & MIYAKE, List, p. 701.)

(Pl. VII, fig. 5.)

Syn. *Uromyces* sp. YOSHINO, Bot. Mag. Tokyo, XIX, p. 103, 1905.

Hab. On leaves and stems of *Galium aparine* L. (*Yaemugura*).

Hokkaido—Prov. Oshima; Kamiiso (13, VII, 1890. K. MIYABE), Satsukari (13, VII, 1890. K. MIYABE).

Honshū—Prov. Harima; Himeji (IX, 1899. Y. TAKAHASHI).

Shikoku—Prov. Tosa; Aki-machi (IV, 1905; IX, 1905. T. YOSHINAGA).

Kiushū—Prov. Higo; Imizu-mura (26, V, 1904. K. YOSHINO).

Distrib. Japan.

Remarks. The general character of the fungus is as follows:—*Aecidia* hypophyllous, irregularly gregarious or scattered, minute, cupulate; peridium yellowish, the margin lacerate; peridial cells polygonal or rhomboidal, $25-40\mu$ in length, the outer wall striate, $7-10\mu$ thick, the inner wall verrucose, $25-40\mu$ thick; æcidiospores polygonal, ellipsoidal or globose, verruculose, light yellow, $17-25\mu$ in diam. Teleutosori amphigenous, mostly hypophyllous, or caulicolous, scattered or gregarious, minute or medium in size, irregular in shape, often confluent (up to 1 cm. long), long covered by the lead-colored epidermis, then naked, blackish-brown; teleutospores ovate or ellipsoidal, more or less angulate, apex rounded or truncate, thickened ($5-9\mu$), base rounded or attenuated, chestnut-brown, or yellowish-brown, $20-36=15-25\mu$; germ-pore sublateral; pedicels

persistent or subpersistent, hyaline or light brown, short, rarely 50μ in length.

ON PLUMBAGINACEÆ

6. *Uromyces Limonii* (DC.) LÉV.

Dict. d'Hist. Nat. Art. Ured. p. 19, 1840—GROVE, Brit. Rust Fungi, p. 88, fig. 40, 1913—HARIOT, Ured. p. 218—PLOWR. Monogr. Ured. & Ustil. p. 122, *p. p.*—SACC. Syll. VII, p. 532, *p. p.*—SYDOW, Monogr. Ured. II, p. 41; Ann. Mycol. I, p. 239, 1903—TROTTE. Fl. Ital. Crypt. Ured. p. 31, fig. 38b—WINT. Pilze Deut. I, p. 156, *p. p.*

Syn. *Puccinia Limonii* DC. Fl. Franç. II, p. 595, 1805.

Uredo Statices DESM. Pl. Crypt. p. 128, 1826.

Aecidium Statices DESM. *l. c.* p. 132.

Cæoma Statices RUDOLPHI, Linn. IV, p. 510, 1829.

Aecidium Limonii DUBY, Bot. Gall. II, p. 904, 1830.

Uredo Limonii DUBY, *l. c.* p. 897.

Uromyces Statices BERK. et CURT. Proc. Am. Acad. IV, p. 126, 1858.

Cæomurus Limonii KUNTZE, Rev. Gen. III³, p. 450, 1898.

Nigredo Limonii ARTH. Rés. Sc. Congr. Bot. Wien, p. 344, 1906.

Hab. On leaves and stems of *Statice japonica* S. et Z. (*Hamasaji*).

Sh koku—Prov. Iyo; Awai-mura (VI, 1903. K. OKUDAIRA).

Distrib. Europe, N. America, Africa, Siberia and Japan.

Remarks. This is a new addition to the mycological flora of Japan. The æcidial and teleuto-generations have not been found in our country up to the present time. However, the characters of the uredosori and spores, when compared with those of the American specimens of *Uromyces Limonii* on *Statice Limonicum*, show clearly that they are undoubtedly identical with each other.

The character of the uredospores of our fungus in question is as follows:—

Uredosori amphigenous, scattered, mostly roundish, those on stems, oblong, long covered by the epidermis, then naked, pulverulent, cinnamon-colored; uredospores globose, subglobose, ovate, ellipsoidal or oblong, densely verruculose yellowish-brown, $18-30=14-26\mu$; epispore $1.5-2.5\mu$ thick; germ-pores 2 or 3.

ON LEGUMINOSÆ

Key to species

- Life-cycle with all spore-forms
- Autoecious form
- Teleutospore-wall smooth
- Paraphyses absent
- Uredospore-wall thin (1.5-2.5 μ)
- Teleutospores 20-30 (rarely 36) = 16-22 μ ; on *Vicia hirsuta*....24. *U. Ervi*
- Teleutospores 22-40 (rarely 50) = 17-28 μ ; on *Vicia*, *Pisum* &
- Lathyrus*.....23. *U. Faba*
- Uredospore-wall thick (3-4 μ); on *Vicia unijuga* 25. *U. Orobi*
- Paraphyses present; on *Lespedeza* 11. *U. Lespedezæ-procumbentis*
- Teleutospore-wall smooth or with a few fine beads
- Teleutospore-wall thin (ca. 2 μ), apex with small papilla; on *Trifolium*
- repens*20. *U. Trifolii-repens*
- Teleutospore-wall thick (2-3.5 μ), apex with large papilla; on
- Phaseolus* & *Vigna*14. *U. appendiculatus*
- Teleutospore-wall striate; on *Mackia*12. *U. amurensis*
- Heteroecious form
- Uredospores 17-27 = 16-23 μ ; with 2-5 germ-pores; on *Lotus*.....27. *U. Loti*
- Uredospores 15-22 μ , with 3-4 germ-pores; on *Medicago*28. *U. siriatus*
- Life-cycle with aecidia and teleutospores
- Teleutospore-apex with small papilla; on *Trifolium Lupinaster*.....22. *U. minor*
- Teleutospore-apex with large papilla; on *Hedysarum*9. *U. Hedysari-obscuri*
- Life-cycle with uredo- and teleutospores
- Teleutospore-wall smooth, hyaline7. *U. hyalosporus*
- Teleutospore-wall verrucose
- Paraphyses present
- Teleutospores piriform or ellipsoidal, 23-40 = 14-22 μ ; on *Sophora*
- shikokiana* 5. *U. shikokianus*
- Teleutospores globose or depressed globose, 18-22 = 18-25 μ ; on
- Mucuna*.....13. *U. Mucunæ*
- Paraphyses absent
- Teleutospore-apex not thickened; on *Sophora flavescens* ..19. *U. Sophoræ-flavescens*
- Teleutospore-apex thickened; on leaves of *Sophora japonica* ..18. *U. Sophoræ-japonicæ*
- Teleutospore-apex not thickened, but with small papilla
- Uredospore-wall thick (3-4 μ); on *Vicia unijuga*26. *U. Viciæ-unijugæ*
- Uredospore-wall thin (1.5-2 μ)
- Teleutospores 20-28 = 15-20 μ ; on *Caragana*8. *U. Genistæ-tinctoriæ*
- Teleutospores 18-28 = 17-22 μ ; on *Indigofera*10. *U. sphaerocarpus*
- Life-cycle with only teleutospores, or other spore-forms unknown
- Teleutospore-apex not thickened, but with small papilla; on *Trifolium*
- repens*21. *U. flectens*
- Teleutospore-apex thickened
- Paraphyses present; on leaves of *Sophora shikokiana*16. *U. Clairastidiæ*
- Paraphyses absent; on stems of *Sophora japonica*17. *U. truncicola*

7. *Uromyces hyalosporus* SAWADA.

Bot. Mag. Tokyo, XXVII, p. 19, fig. 1-5, 1913.

(FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 391, 1914: Trans. Form. Nat. Hist. Soc. XIX, p. 2, (extr.), 1914—SHIRAI & MIYAKE, List, p. 703.)

(Pl. VII, fig. 6.)

Syn. *Uromyces fusisporus* (non COOKE et MASSEE) SHIRAI & MIYAKE, List, p. 701.

Hab. On phyllodes, twigs and pods of *Acacia confusa* MERRILL. (*Sōshiju*).

Formosa—Ta'hoku (XII, 1903. T. KAWAKAMI), Taichū (XI, 1903. T. KAWAKAMI), Akō (XI, 1909. K. SAWADA).

Distrib. Japan.

Remarks. In 1913, K. SAWADA described this anomalous fungus on *Acacia* from Formosa, after comparison with six thitherto known species of *Uromyces* on *Acacia*. The general character of this fungus is as follows:—

Uredosori amphigenous, mostly hypophyllous, or on stems and pods, large (0.1-1cm. in diam.), roundish or oblong, scattered or gregarious, bullate, compact, naked, brown; uredospores fusiform or ellipsoidal, apex obtuse or acute, base rounded or cuneate, densely verrucose, yellowish or brown, $30-80=17-29\mu$; epispore $2-4\mu$ thick, rarely thickened at apex; germ-pores 3-4, equatorial. Teleutosori conformed, or smaller (0.5-2mm.), roundish or irregular in shape, white; teleutospores ellipsoidal, clavate or ovate, apex not thickened, rounded at both ends, smooth, hyaline or light brownish, $36-64$ (rarely 72)= $14-27\mu$; epispore ca. 1μ thick; pedicels persistent, hyaline or light brown, up to 130μ in length. Germination occurs as soon as mature.

The teleutospores of this fungus are quite different from those of the ordinary species of *Uromyces* in the following characteristics. They are hyaline, thin-walled and have no germ-pore. When matured, their upper portion is protruded into a large papilla, and on this protuberance promycelium is directly formed. The method of germination resembles very closely that of *Blastospora*. However, the promycelia are mostly stipitate, although there are occasionally sessile ones.

Y. FUJIKURO wrote to me that this fungus has a spermogonial stage. Spermogonia are hypophyllous, gregarious, cup-shaped, $81-105=90-120\mu$; spermatia hyaline, ellipsoidal, oval or subglobular, $4-6=3.5-4.5\mu$. Unfortunately, there is no spermogonium in our specimens.

8. *Uromyces Genistæ-tinctoriæ* (PERS.) WINT.

Pilze Deutschl. I, p. 149, 1884—HARIOT, Uréd. p. 207—SACC. Syll. VII, p. 550. *p. p.*—SYDOW, Monogr. Ured. II, p. 90—TROTT. Fl. Ital. Crypt. Ured. p. 60, fig. 46a.

(SHIRAI & MIYAKE, List, p. 701.)

(Pl. VII, fig. 7.)

Syn. *Uredo apiculata* STRAUSS var. *Cytisi* et *Laburni* OPIZ, in sched.

U. appendiculata var. *Genistæ-tinctoriæ* PERS. Syn. p. 222, 1801.

U. Caraganæ THUEM. Contrib. Fl. Myc. Lusit. III, no. 478.

U. Cytisi STRAUSS, Ann. Wett. II, p. 98, 1811.

U. Cytisi DC. Fl. Franç. VI, p. 63, 1815.

U. Genistarum DUBY, Bot. Gall. II, p. 898, 1930.

U. Laburni DC. *l. c.* p. 63.

U. Leguminosarum var. *Genistarum* RABH. Handb. p. 7.

Puccinia Laburni DC. *l. c.* II, p. 224, 1805.

Uromyces Cytisi SCHROET. Hedw. p. 62, 1878.

U. Genistæ SCHROET. Pilze Schles. I, p. 308, 1889.

U. Genistæ FUCK. Symb. p. 63, 1869.

U. Pteleacearum RABH. Fg. Eur. no. 93, 1859.

U. Laburni FUCK. *l. c.* p. 62.

U. caraganicola P. HENN. Hedw. XL, p. (124), 1901—SACC. Syll. XVII, p. 254. (P. HENN. ENGL. Bot. Jahrb. XXXI, p. 729, 1902—MATSUM. Ind. Pl. Jap. I, p. 180—YOSHINAGA, Bot. Mag. Tokyo, XVI, p. 7, 1902—SHIRAI, List, p. 107—SHIRAI & MIYAKE, List. p. 697.)

Cæoma apiculosum CDA. Icon. Fung. II, p. 2, fig. 9, 1838.

Cæomurus Genistæ KUNTZE, Rev. Gen. III, p. 450, 1898.

Hab. On leaves of *Caragana Chamlagu* LAM. (*Mure-suzume*).

Shikoku—Prov. Tosa; Sakawa-machi (VI, 1901. T. YOSHINAGA), Aki-machi (XII, 1903; VI, 1904. T. YOSHINAGA).

Distrib. Europe, Africa, China, Siberia and Japan.

Remarks. The general character of this fungus is as follows:—Urodasori hypophyllous, on yellowish spots, scattered or gregarious, minute, surrounded by the torn epidermis, pulverulent, brown; uredospores globose or ellipsoidal, echinulate, yellowish-brown, 20–25 = 18–22 μ ; epispore ca. 1.5–2 μ thick; germ-pores 3–6. Teleutosori conformed; teleuto-

spores globose, subglobose, ovate or ellipsoidal, apex rounded, not or slightly thickened, sometimes papillate, verrucose, brown, 20–28 = 15–20 μ ; pedicels hyaline, short, deciduous.

In 1901, P. HENNINGS described this fungus under the name, *Uromyces caraganicola*, with the following remarks:—

“Die Art ist von *Uromyces Genistæ* PERS. durch die sehr kleinen sehr lange bedeckbleibenden Uredosori, durch die anders gefärbten, glatteren Uredosporen und durch die Teleutosporen verschieden.”

In their monograph, P. and H. SYDOW treated the fungus in question as identical to *U. Genistæ-tinctoriæ*. In our materials, it is a fact that the sori are smaller than those of European *Genistæ-tinctoriæ*, as P. HENNINGS stated. In 1921, F. KOBEL stated in his “Einige Bemerkungen zu den *Astragalus*-und *Cytisus*-bewohnenden *Uromyces*-Arten” (Ann. Mycol. XIX, p. 1–16) that “Was schliesslich die Form auf *Caragana arborescens* (Siberian specimen) anbetrifft, so ist ihre Verschiedenheit von *Genista*- u. *Cytisus*-Bewohnern sehr deutlich. Ob sie mit dem von P. HENNINGS beschriebenen *Uromyces caraganicola* auf *Caragana Chamlagu* identifiziert werden kann, vermag ich infolge Fehlens von Abbildungen nicht zu entscheiden”. We have also some question on the identification of this fungus. For the present, however, we classified as above mentioned and reserve its solution for future experiments.

9. *Uromyces Hedysari-obscuri* (DC.) CARESTIA et PICCONE.

Erb. Critt. Ital. II, Fasc. IX, no. 447, 1871—FISCH. Ured. Schw. p. 26, fig. 21—HARIOT, Ured. p. 208—SYDOW, Monogr. Ured. II, 99—TROTT. Fl. Ital. Crypt. Ured. p. 51—WINT. Pilze, I, p. 152.

(Pl. VII, fig. 8.)

- Syn.** *Puccinia Hedysari-obscuri* DC. Synops. p. 46, 1806.
P. Hedysari-obscuri SCHLEICH. Pl. Crypt. Helvet. no. 80.
Uredo Hedysari-obscuri DC. Fl. Franç. VI, p. 64, 1815.
Uromyces Hedysari FUCK. Symb. Myc. III, p. 15, 1875.
U. Hedysari HAZSL. Math. Termes. Közlem. 1877.
U. Hazslinskii DETONI, Sacc. Syll. VII, p. 565.
U. borealis PECK, Bot. Gaz. VI, p. 276, 1881.
U. apiculatus LÉV. var. *Hedysari* KALCHBR. in sched.
U. astragalicola P. HENN. Hedw. XXXVII, p. 268, 1898.
Aecidium Hedysari KALCHBR. in sched.

A. Leguminosarum UNG. Einfl. Bod. p. 221, 1836.

Cæomurus Hedysari KUNTZE, Rev. Gen. III³, p. 450, 1898.

C. Hasslinszkii KUNTZE, l. c. p. 450.

Uromycopsis Hedysari-obscuri ARTH. Rév. Sc. Congr. Bot. Wien, p. 345, 1906.

U. astragalicola ARTH. l. c. p. 345.

Pucciniola Hedysari-obscuri ARTH. N. Am. Fl. VII, p. 450, 1921.

Hab. On leaves of *Hedysarum obscurum* L. (*Chishimarengé*).

Saghalien—Chikaporonai (8, VIII, 1907. T. MIYAKE).

Distrib. Europe, N. America, Siberia, China and Japan.

Remarks. This is a new addition to our mycological flora. The æcidial stage is not yet collected in our country. The general character of the teleutostage of this fungus is as follows:—

Teleutosori amphigenous, mostly epiphyllous, scattered or gregarious, small, roundish, early naked, surrounded by the ruptured epidermis, pulverulent, dark brown; teleutospores globose, oblong or ellipsoidal, apex rounded, with light colored papilla, (3–7 μ in height), base rounded, verrucose, chestnut-brown, 18–29=14–18 μ ; epispore thick (1.5–2.5 μ); pedicel hyaline, short, deciduous.

10. *Uromyces sphærocarpus* SYDOW.

Ann. Mycol. II, p. 349, 1904; Monogr. Ured. II, p. 102, fig. 71—SACC. Syll. XVII, p. 253.

(P. HENN. ENGL. Bot. Jahrb. XXXIV, p. 595, 1905—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 219, 1904; XIX, p. 36, 1905—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 711).

(Pl. VII, fig. 9.)

Syn. *Uromyces* sp. KUSANO, Bot. Mag. Tokyo, XVI, p. 199, 1902.

Hab. On leaves of *Indigofera pseudo-tinctoria* MATSUM. (*Komatsunagi*).

Honshû—Prov. Shima; Toba (VIII, 1898. Y. TOKUBUCHI).

Shikoku—Prov. Tosa; Iokimura (XI, 1923. T. YOSHINAGA), Ushioe (IX & XI, 1906. T. YOSHINAGA).

Distrib. Japan.

Remarks. The general character of this fungus is as follows:—Uredosori hypophyllous, rarely epiphyllous, without or with small discolored spots, scattered or gregarious, minute, roundish, early naked,

pulverulent, light cinnamon-colored; uredospores globose, subglobose or ellipsoidal, echinulate, yellowish-brown, $20-25=18-22\mu$; episore ca. 2μ thick; germ-pores 2-5. Teleutosori conformed; teleutospores globose, subglobose or ovate, apex rounded, not thickened, without or with minute hyaline papilla, densely verrucose, brown, $18-28=17-22\mu$; episore ca. 2μ thick; pedicels deciduous, hyaline, up to 25μ in length.

This is an endemic species of Japan.

11. *Uromyces Lespedezæ-procumbentis* (SCHW.) CURT.

Cat. Pl. N. Car. p. 123, 1867—ARTHUR, Journ. Mycol. X, p. 14, 1904.
(Pl. VII, fig. 10-14.)

Syn. *Puccinia Lespedezæ-procumbentis* SCHW. Schr. Nat. Ges. I, p. 73, 1822.

P. Lespedezæ-polystachyæ SCHW. l. c. p. 73.

P. Lespedezæ SPRENG. Syst. IV, p. 568, 1827.

P. Lespedezæ-violaceæ SCHW. Trans. Am. Phil. Soc. II, p. 296, 1832.

Uromyces Lespedezæ-procumbentis LAGH. Ured. Herb. FRIES, p. 38, 1894.—SYDOW, Monogr. Ured. II, p. 109. (SYDOW, Ann. Mycol. XI, p. 94—FUJIKURO, Trans. Form. Nat. Hist. Soc. No. 19, p. 3 (extr), 1914—SHIRAI & MIYAKE, List, p. 705).

Aecidium leucostictum BERK. et CURT. Grev. III, p. 61, 1874.

A. Orobi-leucostictum BERK. Grev. III, p. 61, 1874.

Uredo Lespedezæ THUEM. Myc. Univ. no. 643, 1877.

Uromyces Lespedezæ PECK, ELLIS N. Am. Fung. no. 245, 1879.—SACC. Syll. VII, p. 549. (DIET. Hedw. XXXVII, p. 214, 1898; Ann. Mycol. VI, p. 223, 1908—P. HENN. ENGL. Bot. Jahrb. XXXI, p. 729, 1902; XXXIV, p. 594, 1905—KUSANO, Bot. Mag. Tokyo, XVI, p. 200, 1902; l. c. p. 206—MATSUM. Ind. Plant. Jap. I, p. 181, 1904—SHIRAI, List, p. 109—SHIRAI & MIYAKE, List, p. 703—SYDOW, Hedw. XXXVII, p. (207), 1898—TANAKA, Bot. Mag. Tokyo, IV, p. 299, 1890—YOSHINAGA, Bot. Mag. Tokyo, XVI, p. 7, 1902—YOSHINO, Bot. Mag. Tokyo, XIX, p. 102, 1905).

Caomurus Lespedezæ KUNTZE, Rev. Gen. III, p. 450, 1898.

C. Lespedezæ-procumbentis ARTH. Proc. Ind. Acad. Sc. 1898, p. 180, 1899.

Nigredo Lespedezæ-procumbentis ARTH. Rés. Sc. Congr. Bot. Wien, p. 344, 1906.

Hab. On leaves of *Lespedeza bicolor* TURCZ. (*Hagi*).

Hokkaido—Prov. Ishikari; Sapporo (7, X, 1894; 28, X, 1894; X, 1895. Y. TOKUBUCHI; IX, 1896. N. HIRATSUKA & J. HANZAWA), Kotoni (IX, 1911. S. ITÖ), Kataishiyama (9, X, 1906. S. ITÖ), Ishiyama (11, X, 1905. S. ITÖ), Mt. Moiwa (11, X, 1903. J. HANZAWA), Jōzankei (11, X, 1905. J. HANZAWA), Garugawa (24, X, 1905. J. HANZAWA). Prov. Sh'ribeshi; Zenibako (17, X, 1900. J. HANZAWA), Temiya (17, X, 1895. K. MIYABE), Oshoro (21, IX, 1908. S. ITÖ). Prov. Oshima; Shikabe (21, VIII, 1890. K. MIYABE).

Honshū—Prov. Mutsu; Mt. Iwaki (3, VIII, 1896. K. KIKUCHI). Prov. Musashi; Tokyo (8, XI, 1898. S. KUSANO; 29, VIII, 1900. G. YAMADA; IX, 1888. Y. TANAKA), Ōji (29, X, 1895. K. SENGOKU; 9, X, 1899. T. NISHIDA). Prov. Yamashiro; Kyoto (X, 1898. Y. TOKUBUCHI).

Shikoku—Prov. Tosa; Ochi-machi (XI, 1901. T. YOSHINAGA), Aki-machi (XI, 1903. T. YOSHINAGA). Prov. Iyo; Koshioreyama (VI, 1903. K. OKUDAIRA).

On *Lespedeza Buergeri* MIQ. (*Kihagi*).

Shikoku—Prov. Tosa; Akatsuchi-tōge (XI, 1901. T. YOSHINAGA).

On *Lespedeza cyrtobotrya* MIQ. (*Miyamahagi*).

Shikoku—Prov. Tosa; Jūrokumura (28, IX, 1919. T. YOSHINAGA).

On *Lespedeza juncea* PERS. var. *sericea* MAXIM. (*Medohagi*).

Shikoku—Prov. Tosa; Ushioe-mura (X, 1906. T. YOSHINAGA).

On *Lespedeza pilosa* S. et Z. (*Nekohagi*).

Shikoku—Prov. Tosa; Jigokudani (17, X, 1906. T. YOSHINAGA).

On *Lespedeza striata* HOOK. et ARN. (*Yahazusō*).

Honshū—Prov. Ugo; Yotsuya (9, IX, 1908. M. MIURA). Prov. Musashi; Tokyo (7, X, 1899. S. KUSANO). Prov. Suruga; Gotemba (12, VIII, 1907. K. MIURA). Prov. Ōmi; Ōtsu (X, 1898. Y. TOKUBUCHI). Prov. Settsu; Kōbe (5, IX, 1889. K. MIYABE).

Shikoku—Prov. Tosa; Kōchi (XI, 1907. T. YOSHINAGA).

Distrib. N. America, Siberia, China and Japan.

Remarks. The aecidial stage of this fungus is not yet collected in our country. The teleutospores of our fungus are generally larger than those of the American *Uromyces Lespedezæ-procumbentis*, especially in the case of *Lespedeza striata*, as P. and H. SYDOW stated in their monograph. The writer treated here all these forms as one and the same collective-species on account of the presence of many transitional forms among them.

The general character of our fungus is as follows:—
Uredosori hypophyllous, on yellowish spots, scattered or gregariuos, minute, roundish or irregular in shape, naked, surrounded by the ruptured epidermis, pulverulent, cinnamon-colored; uredospores globose, subglobose or ovate, echinulate, yellowish, 18–28 = 14–22 μ ; episporium thin; germ-pores 3–5, subequatorial; paraphyses clavate, curved, hyaline or yellowish, 45–60 = 7–14 μ . Teleutospores amphigenous, mostly hypophyllous, scat-

tered or gregarious, minute, roundish or irregular in shape, naked, surrounded by the ruptured epidermis, pulvinate, compact, black; teleutospores ovate, oblong or oblong-clavate, apex rounded, rarely obtusely acute or truncate, greatly thickened (up to 15μ), base mostly attenuated, smooth, brown, $22-45=12-21\mu$; pedicels, hyaline, light brownish at the upper portion, thick, 70μ in length; paraphyses clavate, curved, hyaline or yellowish.

12. *Uromyces amurensis* KOM.

Fungi Ross. exs. no. 157, 158, 1898; Hedw. XXXVIII, p. (54), 1899—KUSANO, Bot. Mag. Tokyo, XIX, p. 84, fig. 3, 1905—SACC. Syll. XVI, p. 261—SYDOW, Monogr. Ured. II, p. 86, fig. 57.

(DIET. ENGL. Bot. Jahrb. XXXVII, p. 98, 1908—SYDOW, Ann. Mycol. XI, p. 93, 1913—YOSHINAGA, Bot. Mag. Tokyo, XIX, p. 36, 1905—SHIRAI, List, p. 107—SHIRAI & MIYAKE, List, p. 695.)

(Pl. VII. fig. 15.)

Syn. *Uromyces oedipus* DIET. ENGL. Bot. Jahrb. XXXIV, p. 583, 1905. (P. HENN. ENGL. Bot. Jahrb. XXXIV, p. 595, 1905—SHIRAI, List, p. 109—SHIRAI & MIYAKE, List, p. 705.)

Hab. On leaves of *Maackia amurensis* RUPR. et MAXIM. var. *Buergeri* C. K. Schn. (*Inuenju*).

Hokkaido—Prov. Ishikari; Sapporo (X, 1889; 6, IX, 1890; 25, VIII, 1891; 28, IX, 1916; 4, X, 1895. K. MIYABE; X, 1896. Y. TOKUBUCHI), Nopporo (4, VII, 1914. K. MIYABE), Mt. Moiwa (13, VII, 1900. G. YAMADA; 18, VIII, 1907. S. ITŌ), Garugawa (14, VIII, 1904; 11, X, 1910. K. MIYABE), Makomanai (IX, 1893. K. MIYABE), Ishiyama (11, X, 1905; 15, IX, 1907. S. ITŌ), Jōzankei (14, X, 1902. G. YAMADA; 17, X, 1907. M. KASAI), Kamuikotan (9, VIII, 1891. K. MIYABE). Prov. Ihuri; Chitose (12, X, 1900. G. YAMADA). Prov. Hidaka; Samani (22, VIII, 1892. Y. TOKUBUCHI), Mt. Apoi (17, VIII, 1912. K. KONDŌ).

Honshū—Prov. Iwaki; Mt. Zuwō (28, VIII, 1893. K. MIYABE). Prov. Musashi; Tokyo (IX, 1889; VIII, 1893. K. MIYABE; 29, VIII, 1900. G. YAMADA), Prov. Echigo; Mt. Ninōji (14, VIII, 1910. S. ITŌ).

Shikoku—Prov. Tosa (IX, 1907. K. OGAWA).

Kiushū—Prov. Higo; Kumamoto (20, V, 1904; 16, IX, 1904. K. YOSHINO).

Distrib. Amur. and Japan.

Remarks. The general character of this fungus is as follows:—Spermogonia amphigenous, mostly epiphyllous, minute, gregarious, yellowish; aecidia hypophyllous, on roundish, minute or up to 6 mm across, yellow or yellowish-brown spots, gregarious in the roundish or rarely linear groups, cupulate; peridium yellowish, the margin lacerate, peridial

cells polygonal or rhomboidal, $23-36\mu$ long, the outer wall striate or verrucose, $3.6-4.5\mu$ thick, the inner wall verrucose, $7-10\mu$ thick; aecidiospores angular-globose, verruculose, light yellowish, $18-26\mu$. Uredosori hypophyllous, without or with small yellowish or brownish spots, minute, scattered, punctiform, pulverulent, cinnamon-colored; uredospores globose, ovate or ellipsoidal, aculeate, yellowish or yellowish-brown, $20-35=18-25\mu$; epispore $1.5-2\mu$ thick; germ-pores 3-4, equatorial. Teleutosori conformed, or gregarious in irregular groups and confluent, black; teleutospores globose, ovate, piriform, apex rounded, not or slightly thickened, base rounded, chestnut-brown, $22-36$ (rarely 41) $=19-25\mu$; epispore longitudinally striate; pedicels hyaline, thick, intumescent in water, up to 90μ in length, 18μ in width, asperulous at lower portion, persistent.

This species is characterized by the striate wall of the teleutospore with the asperulous pedicel. The rust-fungus is one of the most widely distributed in our country.

In 1905, P. DIETEL treated it as a new species under the name of *Uromyces oedipus* and its host-plant as *Sophora japonica*. He corrected the mistake in 1908.

13. *Uromyces Mucunae* RABH.

Hedw. XVII, p. 62, 1878—SACC. Syll. VII, p. 568—SYDOW, Monogr. Ured. II, p. 117.

(FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 482, 1914; Trans. Form. Nat. Hist. Soc. no. 19, p. 3 (extr.), 1914.)

Syn. *Caenomurus Mucunæ* KUNTZE, Rev. Gen. III³, p. 450, 1898.

Hab. On leaves of *Mucuna capitata* W. et A. (*Hasshōmame*).

Formosa.

Distrib. East India and Japan.

Remarks. FUJIKURO reported that this fungus occurs on a new host-plant, *Mucuna capitata*, in Formosa. The character of this fungus is as follows:— Teleutosori hypophyllous, scattered, minute, punctiform, pulverulent, blackish-brown; uredospores intermixed, globose or subglobose, densely verrucose-echinulate, subhyaline, $18-22\mu$ in diam.; paraphyses clavate, curved, hyaline; teleutospores globose or depressed globose, densely verrucose, chestnut-brown, $18-22=18-25\mu$; epispore $2.5-3\mu$ thick; pedicels thick, hyaline, longer than spores.

14. *Uromyces appendiculatus* (PERS.) LINK.

Observ. II, p. 28, 1816—FISCH. Ured. Schw. p. 19, fig. 16—HARIOT, Ured. p. 210—MCALP. Rusts Austr. p. 92, pl. XLII, fig. 306—SACC. Syll. VII, p. 535—SCHROET. Pilze Schles. I, p. 302—SYDOW, Monogr. Ured. II, p. 120—TROTT. Fl. Ital. Crypt. Ured. p. 43, fig. 42a.

(DIET. ENGL. Bot. Jahrb. XXXII, p. 47, 1903—FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 485, 1914; Trans. Form. Nat. Hist. Soc. no. 19, p. 2 (extr.), 1914—P. HENN. ENGL. Bot. Jahrb. XXXI, p. 728, 1902—KAWAKAMI & SUZUKI, Agr. Exp. Sta. Form. Bull. I, p. 15, 1908—MATSUM. Ind. Plant. Jap. I, p. 180—SHIRAI, List, p. 107—SHIRAI & MIYAKE. List, p. 697—SYDOW, Ann. Mycol. XI, p. 94, 1913; Hedw. XXXVII, p. 207, 1898—YOSHINAGA, Bot. Mag. Tokyo. XVIII, p. 30, 1904; *l. c.* p. 219—YOSHINO, Bot. Mag. Tokyo, XIX, p. 101, 1905.)

(Pl. VII. fig. 16, 17.)

Syn. *Uredo appendiculata* PERS. Obs. Myc. I, Usteri Ann. Bot. XV, p. 17, 1796.

U. appendiculata var. *Phaseoli* PERS. Syn. p. 222, 1801.

U. Phaseolorum DC. Encycl. VIII, p. 221, 1808.

U. Phaseoli STR. Ann. Wett. II, p. 98, 1811.

U. Dolichi BERK. et BR. Journ. Linn. Soc. XIV, p. 92, 1875.

Aecidium candidum BON. Rabh. Fg. Eur. no. 188, 1860.

A. Phaseolorum WALLR. Fl. Crypt. Germ. II, p. 256, 1833.

Uredo Pamparum SPEG. An. Soc. Ci. Argent. XII, p. 74, 1881.

U. rufa SPEG. *l. c.* XVII, p. 124, 1884.

Caecoma Phaseoli NEES, Syst. p. 16, pl. I, fig. 10, 1816.

C. appendiculatum SCHLECHT. Fl. Berol. II, p. 129, 1824.

C. apiculorum BON. Rabh. Fg. Eur. no. 193, 1860.

C. rufum BON. *l. c.* no. 194, 1860.

Puccinia Phaseoli RABH. Fl. Neom. p. 357, 1804.

P. Phaseolorum DC. Fl. Fr. II, p. 224, 1805.

P. Phaseoli-trilobi SCHW. Syn. Fg. Am. Bor. p. 296, 1832.

P. Dolichi ARTH. Bull. Torr. Bot. Club, XXXIII, p. 28, 1906.

Uredo Dolichi ARTH. *l. c.* p. 513.

Uromyces appendiculatus FR. Summ. Veg. Scand. p. 514, 1846.

U. Phaseolorum DEBARY, Ann. Sc. Nat. Sér. 4. XX, p. 80, 1863.

U. Phaseoli WINT. Pilze Deutschl. I, p. 157, 1884. (SHIRAI, List, p. 109—SHIRAI & MIYAKE, List, p. 707.)

Uromyces obscurus DIET. et. HOLW. Bot. Gaz. XXIV, p. 24, 1897.

U. Vigna-lutcolae P. HENN. Ann. Mus. Congo Bot. Sér. 5. II, p. 89, 1907.

U. punctiformis SYD. Ured. no. 1513, 1901.

Hypodermium appendiculatum LINK, Ges. Nat. Freun. Berlin, VII, p. 28, 1815.

Caenomurus Phaseolorum GRAY, Nat. Arr. Brit. Pl. I, p. 541, 1821.

C. appendiculatus O. KUNTZE, Rev. Gen. III, p. 449, 1898.

C. Phaseoli ARTH. Proc. Ind. Acad. Sc. 1898, p. 181, 1899.

Nigredo appendiculata ARTH. Rés. Sc. Congr. Bot. Wien, p. 343, 1906.

Uromyces aberrans DIET. ENGL. Bot. Jahrb. XXVIII, p. 281. 1901—SACC. Syll. XVI. p. 260—SYDOW, Monogr. Ured. II, p. 63. (KUSANO, Bot. Mag. Tokyo, XVI, p. 206, 1902—MATSUM. Ind. Plant. Jap. I, p. 180—SHIRAI, List, p. 107—SHIRAI & MIYAKE, List, p. 695.)

Uromyces Fatouæ P. HENN. Hedw. XLI. p. 18, 1902—SACC. Syll. XVII. p. 258—SYDOW, Monogr. Ured. II, p. 246, fig. 123. (P. HENN. ENGL. Bot. Jahrb. XXXI, p. 729, 1902.—MATSUM. Ind. Plant. Jap. I, p. 180—SHIRAI, List, p. 108.)

Hab. On leaves of *Phaseolus multiflorus* WILLD. (*Benibana-ingen*),

Hokkaido—Prov. Shiribeshi; Yoichi (4, VIII, 1904. T. MIYAKE).

On *Phaseolus radiatus* L. var. *aurea* PRAIN. (*Azuki*).

Hokkaido—P. ov. Ishikari; Sapporo (IX, 1893; 14, IX, 1905. K. MIYABE; IX, 1892. T. NAKANO; 15, IX, 1907. S. ITÔ), Kakuta (IX, 1896. T. ÔGAI), Iwamizawa (IX, 1899. T. KAWAKAMI), Nagayama (31, VIII, 1915. S. ITÔ), Takigawa (4, X, 1903. J. HANZAWA). Prov. Hidaka; Urakawa (26, IX, 1900. T. KAWAKAMI).

Honshû—Prov. Rikuzen; Funaoka (4, VIII, 1895. Y. TAKAHASHI). Prov. Mutsu; Mt. Iwaki (3, VIII, 1896. K. KIKUCHI). Prov. Musashi; Tokyo (X, 1899. S. KUSANO; 5, IX, 1899. T. NISHIDA; 21, VIII, 1900. G. YAMADA & J. HANZAWA). Prov. Sagami, Miaki, (24, VIII, 1900. G. YAMADA & J. HANZAWA). Prov. Harima; Himeji (26, VIII, 1899. Y. TAKAHASHI). Prov. Mikawa; Aomi 17, VIII, 1896. T. YOSHINO).

Shikoku—Prov. Iyo; Kumanchô-mura (13, VIII, 1899. K. OKUDAIRA).

On *Phaseolus radiatus* L. var. *flexuosus* MATS. (*Tsuruazuki*).

Shikoku—Prov. Tosa; Sakawa-machi (VI, 1901. T. YOSHINAGA).

On *Phaseolus vulgaris* L. (*Ingenmame*).

Hokkaido—Prov. Ishikari; Sapporo (27, VIII, 1894. K. MIYABE; 30, IX, 1906; 4, X,

1906. S. Itō; VII, 1899. G. YAMADA), Teine (11, X, 1910. K. MIYABE). Prov. Shiribeshi; Okushiri (31, VII, 1890. K. MIYABE).

Honshū—Prov. Rikuzen; Funaoka (4, VIII, 1895. Y. TAKAHASHI), Sendai (5, X, 1895, K. SENGOKU). Prov. Rikuchū; Nakano (29, IX, 1897. Y. TAKAHASHI). Prov. Echigo: Yonozu (9, VIII, 1908. S. ITŌ). Prov. Musashi; Chichibu (2, IX, 1904. N. ADACHI). Prov. Settsu; Ōsaka (IX, 1903. A. IDETA).

Shikoku—Prov. Iyo; Sugō-mura (10, VIII, 1899. K. OKUDAIRA), Matsuyama (IX, 1902. K. OKUDAIRA).

Kiushū—Prov. Higo; Kumamoto (IX, 1904. K. YOSHINO).

Loochoo—Hanechi (9, VIII, 1904. T. MIYAGI).

On *Phaseolus* sp.

Honshū—Prov. Musashi; Tokyo (29, VII, 1899. S. KUSANO)

On *Vigna Catiang* ENDL. var. *sinensis* KING. (*Sasage*).

Honshū—Prov. Harima; Himeji (6, X, 1899. Y. TAKAHASHI).

Shikoku—Prov. Tosa, Aki-machi (VIII, 1901. T. YOSHINAGA).

Formosa—Shinchiku (9, X, 1907. T. KAWAKAMI & R. SUZUKI).

Distrib. World-wide.

Remarks. To the numerous synonyms attributed to the species, the writer has to add two more names to its long list, *viz.* *Uromyces Fatouae* and *Urom. aberrans*.

Uromyces Fatouae P. HENN. was described from the specimen on *Fatoua pilosa* GAUD. var. *subcordata* BUR. collected by T. YOSHINAGA in 1902. SACCARDO and SYDOWS enumerated this name in their works, and moreover the latter authors illustrated the teleutospores in Plate IX, fig. 123 in their monograph. The collector of the type-specimen, T. YOSHINAGA found later that it is nothing but *Uromyces appendiculatus*, which seems to have contaminated the leaves, when *Fatoua pilosa* var. *subcordata* was placed in the same collecting-box with rusted *Phaseolus vulgaris*, and he reported this remarkable fact in the Botanical Magazine, Tokyo, Vol. XXV, p. 490, 1911 in Japanese. Hence, the name, *Uromyces Fatouae*, must be omitted from the mycological list. In the present paper, the writer placed it as a synonym of *Uromyces appendiculatus*.

In 1901, P. DIETEL described a new species, *Uromyces aberrans*, parasitic on *Desmodium podocarpum* DC. var. *latifolium* MAXIM. which was collected by S. KUSANO in Tokyo on June 29, 1899. This fungus especially called the attention of many mycologists, for he recorded that it has a "pseudoaecidium" in its life-cycle. In the Monographia Uredinearum, P. & H. SYDOW pointed out the host-plant to be *Amphicarpia Edgeworthii* BENTH. var. *japonica* OLIV. and the "pseudoaeci-

idium" is nothing but the sorus of the sporangia of *Synchytrium decipiens* FARLOW.

In the course of study on the type-specimen, I noticed that two different host-plants were inclosed in the same pocket. One of them is real *Falcata japonica* KOM. (= *Amphicarpaea Edgeworthii* var. *japonica*) and is affected by *Synchytrium decipiens*, but another one is free from this fungus while the sori of an *Uromyces* are found abundantly on its leaves. The latter host-plant is not *Falcata* nor *Desmodium*. Although the outline of their leaves resembles each other, they differ distinctly in several minute characters, especially in hairs on various parts of the leaf. The plant in question seems to be one of the species belonging to the genus of *Phaseolus*. A careful comparative study of the fungus with *Uromyces appendiculatus* shows clearly that they are inseparable morphologically from each other.

The general character of the species is as follows:—

Spermogonia epiphyllous, in small groups; aecidia hypophyllous, on yellow or yellowish-brown spots, gregarious in small roundish (about 2-3mm across), or rarely in linear groups, cupulate; peridium white, the margin revolute and lacerate peridial cells polygonal or rhomboidal, the outer wall minutely verrucose, 5-7 μ thick, the inner wall thinner, ca. 3 μ , verrucose; aecidiospores angular-globose or ellipsoidal, verrucose, hyaline, 18-35=16-22 μ . Uredosori mostly hypophyllous, without or with brownish spots, scattered or gregarious, minute, early naked, surrounded by the ruptured epidermis, pulverulent, cinnamon-colored; uredospores globose, subglobose or ovate, echinulate, light brown, 18-28=18-24 μ ; epispore ca. 1.5 μ thick; germ-pores 2 in number. Teleutosori conform, blackish-brown or black; teleutospores subglobose, ovate or ellipsoidal, apex rounded, with hyaline or subhyaline large hemispherical papilla, smooth or slightly verrucose on upper part, chestnut-brown, 24-35=18-25 μ ; epispore ca. 3.5 μ thick; pedicels hyaline, thin, as long as spores or little longer.

15. *Uromyces shikokianus* KUSANO.

Bot. Mag. Tokyo, XIX, p. 83, fig. 1, 1905—SYDOW, Monogr. Ured. II, p. 85, fig. 55.

(DIET. ENGL. Bot. Jahrb. XXXVII, p. 98, 1908—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 711—YOSHINAGA, Bot. Mag. Tokyo, XIX, p. 36, 1905.)

(Pl. VII, fig. 18.)

Hab. On leaves of *Sophora shikokiana* MAKINO (*Yukunoki*).*Shikoku*—Prov. Tosa; Mt. Yanaze (X, 1904. T. YOSHINAGA), Makiyama-mura (28, VIII, 1910. T. YOSHINAGA).**Distrib.** Japan.

Remarks. The general character of this fungus is as follows:—Teleutosori hypophyllous, on yellowish or brownish irregular-shaped spots, minute, punctiform, early naked, not confluent, pulverulent, black; uredospores intermixed, globose or ellipsoidal, echinulate, yellowish, $23-29=15-23\ \mu$; epispore rather thin; germ-pores inconspicuous (2 ?); teleutospores piriform, ellipsoidal or ellipsoidal-oblong, apex conically thickened (up to $7\ \mu$) and lighter colored, base rounded, evenly densely verrucose, yellowish-brown or blackish-brown $23-40=14-22\ \mu$; epispore thin; pedicels hyaline, persistent, as long as spores or little longer; paraphyses numerous, clavate, curved, yellowish, up to $40\ \mu$ long.

On the same host-plant, there is an *Uromyces* which is closely related to the present fungus, but it can be distinguished only by the fact that the teleutospores of the latter are more globular in shape and provided with the finer verrucose wall.

16. *Uromyces Cladrastidis* KUSANO.

Bot. Mag. Tokyo, XIX, p. 83, fig. 2, 1905—SYDOW, Monogr. Ured. II, p. 86, fig. 56.

(SHIRAI, List, p. 108—SHIRAI & MIYAKE, List, p. 697).

(Pl. VII, fig. 19.)

Hab. On leaves of *Sophora shikokiana* MAKINO (*Yukunoki*).*Honshū*—Prov. Musashi; Chichibu (27, X, 1900. Y. YABE).**Distrib.** Japan.

Remarks. The specimen, on which this species is based, was obtained from phanerogamic specimens in the herbarium of Y. YABE by S. KUSANO. A small piece of the type-specimen was kindly sent me by the author at my request. The writer wishes to express here his heartiest thanks to him.

The general character of this fungus is as follows:—Teleutosori, hypophyllous, without spot, scattered, minute, punctiform, pulverulent, black; teleutospores globose, ovate or ellipsoidal, apex obtusely pointed, (ca. $3\ \mu$ thick), base rounded, verruculose, chestnut-brown, $18-28=$

16-20 μ ; pedicels hyaline, persistent, up to 50 μ in length; paraphyses numerous, curved, light yellowish.

As stated in the remarks of *Uromyces shikokianus*, the species under consideration is closely related to that fungus. It seems to me that the younger teleutospores of the latter are hardly distinguishable from those of the present fungus.

17. *Uromyces truncicola* P. HENN. et SHIRAI.

ENGL. Bot. Jahrb. XXVIII, p. 260, 1901—KUSANO, Bot. Mag. Tokyo, XVIII, p. 1, fig. 2, 4, 1904—SACC. Syll. XVI, p. 261—SYDOW, Monogr. Ured. II, p. 130, fig. 80.

(DIET. Ann. Mycol. V, p. 71, 1907—MATSUM. Ind. Plant. Jap. I, p. 181—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 713).

(Pl. VII, fig. 20.)

Hab. On stems of *Sophora japonica* L. (*En-ju*).

Honshū—Prov. Musashi; Tokyo (10, IX, 1904. K. MIYABE & S. KUSANO).

Distrib. Japan.

Remarks. The general character of this fungus is as follows:—Teleutosori caulicolous, at first covered by the cortex, then erumpent, large, gregarious, linear, roundish or irregular in shape, often confluent, pulverulent, blackish-brown or black; teleutospores ellipsoidal, clavate or subglobose, apex rounded, thickened in papillar form (up to 10 μ), base rounded, evenly verruculose, chestnut-brown, 32-47 (rarely 54) = 21-28 μ ; epispore 3-4.5 μ thick; pedicels hyaline, light yellowish at the upper part, persistent, up to 70 μ in length.

The perennial mycelium of this fungus often causes the spindle-shaped canker. The wall of the teleutospores was described to be smooth, but it was found not to be true. The warts on the wall can clearly be seen when the spores are viewed dry.

18. *Uromyces Sophoræ-japonicæ* DIETEL.

ENGL. Bot. Jahrb. XXXII, p. 47, 1902—KUSANO, Bot. Mag. Tokyo, XVIII, p. 2, fig. 2, 5, 1904—SACC. Syll. XVII, p. 254—SYDOW, Monogr. Ured. II, p. 129, fig. 78.

(DIET. Hedw. XLI, p. (177), 1902—MATSUM. Ind. Plant. Jap. I, p. 181—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 711—YOSHINO, Bot. Mag. Tokyo, XIX, p. 102, 1905).

(Pl. VII, fig. 21.)

Hab. On leaves of *Sophora japonica* L. (*En-ju*).*Honshū*—Prov. Musashi; Tokyo (12, XI, 1901. T. NISHIDA).**Distrib.** Japan.

Remarks. The general character of this fungus is as follows:—
 Teleutosori hypophyllous, without or with yellowish spots, minute, roundish, scattered or gregarious, often confluent, early naked, surrounded by the ruptured epidermis, pulverulent, blackish-brown or black; uredospores intermixed, globose, ovate or ellipsoidal, epispore ca. $2\ \mu$ thick, aculeate, yellow or yellowish-brown, $25-33=20-27\ \mu$; germ-pores 2; teleutospores globose, subglobose or ellipsoidal, apex papillary thickened (up to $11\ \mu$), base rounded, densely verrucose, chestnut-brown, lighter at apex, $29-43=25-32\ \mu$; pedicels hyaline, light yellowish at the upper part, persistent, up to $60\ \mu$ in length.

About the difference between this species and *Uromyces truncicola*, S. KUSANO stated in his "Notes on the Japanese Fungi, I, Uredineae on *Sophora*," as follows:— "We see that the presence or absence of uredospores and the character of the wall of teleutospores are the most important points which characterize the species concerned." But the wall of teleutospores is not smooth in *Uromyces truncicola* as above stated. They are similarly verrucose. In spite of the fact that the form and size of the typical teleutospores of these two fungi differ somewhat from each other, there are, however, many transitional forms among them. The variations in the presence or absence of the uredospores and in the characters of the teleutospores, may be due to the difference in the affected portions of the same host-plant. The question, whether they are identical or different in species, remains unsolved until careful infection experiments are undertaken thoroughly in future.

19. *Uromyces Sophoræ-flavescentis* KUSANO.

Bot. Mag. Tokyo, XVIII, p. 4, fig. 3, 1904—SACC. Syll. XVII, p. 254—SYDOW, Monogr. Ured. II, p. 129, fig. 79.

(DIET. ENGL. Bot. Jahrb. XXXVII, p. 98, 1908—SYDOW, Ann. Mycol. XI, p. 94, 1913; XII, p. 158, 1914—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 711.—YOSHINAGA, Bot. Mag. Tokyo. XVIII, p. 219, 1904).

(Pl. VII, fig. 22.)

Hab. On leaves of *Sophora flavescens* AIT. (*Kurara*).

Honshū—Prov. Mutsu; Hirosaki (19, VIII, 1899. K. KIKUCHI), Oguriyama (19, IX, 1897. K. KIKUCHI), Goshogawara (XI, 1904. T. KASHIWAI). Prov. Ugo; Ōmagari (2, X, 1908. M. MIURA). Prov. Musashi; Tokyo (29, VIII, 1900. G. YAMADA).

Distrib. China and Japan.

Remarks. The general character of this fungus is as follows:—
Uredosori hypophyllous, without spot, scattered or gregarious, rarely confluent, minute or medium in size, roundish, at first covered by the epidermis, then naked, surrounded by the ruptured epidermis, pulverulent, yellowish-brown; uredospores globose, subglobose or ovate, echinulate, yellowish, 20–26=19–25 μ ; epispore ca. 2 μ thick; germ-pores 6–8, often with hyaline papilla. Teleutosori conformed, blackish-brown, little larger in size; teleutospores subglobose, ellipsoidal or ovate, apex rounded, not thickened, base rounded, densely verrucose, chestnut-brown, 22–29=20–22 μ ; epispore ca. 2–3 μ thick; pedicels hyaline, thin, short.

20. *Uromyces Trifolii-repentis* (CAST.) LIRO.

Acta Soc. Fauna et Flora Fennica, XXIX, No. 6, p. 15, 1906—
GROVE, Brit. Rust Fungi, p. 91, fig. 43—SYDOW, Monogr. Ured. II, p. 131.

(Pl. VIII, fig. 1.)

Syn. *Aecidium Trifolii-repentis* CAST. Observ. I, p. 33, 1842.

Trichobasis fallens COOKE, Micr. Fung. p. 226, 1870, *p. p.*

Puccinia fallens COOKE, Handb. p. 508, *p. p.*

Nigredo Trifolii ARTH. Résult. Sc. Congr. Bot. Wien, p. 344, 1906.

Uromyces Trifolii PLOWR. Monogr. Ured. & Ustil. p. 124, 1899, *p. p.* (SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 713).

Hab. On leaves and petioles of *Trifolium repens* L. (*Shiro-tsumekusa*).

Hokkaido—Prov. Ishikari; Sapporo (13, VII, 1917. T. FUKUSHI; 20, VII, 1917. T. HEMMI).

Distrib. Europe, N. & S. America, Australia, Asia Minor, Persia, Siberia and Japan.

Remarks. The general character of this fungus is as follows:—
Spermogonia epiphyllous, minute, gregarious, yellow; aecidia hypophyllous, in small roundish groups or along the nerves (5mm. long), short, cupulate; peridium yellowish-white, the margin revolute, lacerate; peridial cells polygonal or rhomboidal, the outer wall striate, 4–6 μ

thick, the inner wall verrucose, thin (ca. $2\ \mu$); aecidiospores angular-globose or ellipsoidal, verruculose, yellowish, $14-21=11-18\ \mu$. Uredosori hypophyllous or rarely on petiolicolous, uniformly scattered or gregarious, minute, often confluent, early naked, pulverulent, light brown; uredospores globose, subglobose, ovate or ellipsoidal, echinulate, yellowish-brown, $18-28=16-24\ \mu$; epispore ca. $1.5\ \mu$ thick; germ-pores 2-4, equatorial. Teleutosori conformed, blackish-brown; teleutospores subglobose, ovate or ellipsoidal, apex rounded, with minute hyaline papilla, base rounded, smooth or diffusely or linearly verrucose, brownish, $20-30=16-23\ \mu$; epispore ca. $2\ \mu$ thick; pedicels hyaline, thin, short, deciduous.

This species is readily separated from *Uromyces Trifolii* LÉV. by the fewer germ-pores (2-4, mostly 2, against 5-6) of uredospores and also by the presence of aecidia.

21. *Uromyces flectens* LAGH.

Svensk Bot. Tidskrift, III, p. 36, 1909—GROVE, Brit. Rust Fungi, p. 92, fig. 44—SYDOW, Monogr. Ured. II, p. 360.

(Pl. VIII, fig. 2.)

Syn. *Puccinia neurophila* DE TONI, SACC. Syll. VII, p. 698.

P. nerviphila GROGN. Pl. Crypt. p. 154, 1863.

Hab. On leaves and petioles of *Trifolium repens* L. (*Shiro-tsumekusa*).

Hokkaido—Prov. Ishikari; Sapporo (25, X, 1906. K. MIURA), Numakai (IX, 1907. S. ITŌ).

Distrib. Europe, Persia and Japan.

Remarks. This is a species new to Japan. The general character of this fungus is as follows:—Teleutosori hypophyllous, or petiolicolous, scattered, large, 0.5-2 mm. long, often confluent to large masses, long covered by the epidermis, then naked, pulverulent, dark brown; teleutospores globose, subglobose, ellipsoidal or ovate, apex rounded, with hyaline minute papilla, base rounded or attenuated, smooth or often verrucose, brownish, $20-32=16-25\ \mu$; epispore ca. $2\ \mu$ thick; pedicels hyaline, short, deciduous.

From *Uromyces Trifolii-repentis*, the present species can be distinguished by the absence of aecidia and uredo. Moreover, the teleutosori of this species are larger, prominent upon nerves and petioles, long covered by the epidermis, not distributed uniformly over the leaf and often cause distortions of petioles.

22. *Uromyces minor* SCHROET.

Pilze Schles. I, p. 310—FISCH. Ured. Schw. p. 25, fig. 20—HARIOT, Ured. p. 212—SACC. Syll. VII, p. 560—SYDOW, Monogr. Ured. II, p. 134, 361—TROTT. Fl. Ital. Crypt. Ured. p. 58.

(DIET. Ann. Mycol. VII, p. 304, 1910).

(Pl. VIII, fig. 3.)

Syn. *Caecomurus minor* KUNTZE, Rev. Gen. III³, p. 450, 1898.

Uromycopsis minor ARTH. Résult. Sci. Congr. Bot. Wien, p. 345, 1906.

Pucciniola oblonga ARTH. N. Am. Fl. VII, 447, 1921.

Hab. On leaves of *Trifolium Lupinaster* L. (*Shajikuso*).

Kurile Isl.—Etorofu; Rubetsu (VII, 1898. T. KAWAKAMI).

Honshū—Prov. Shinano; Oiwake (12, VIII, 1909. T. YOSHINAGA).

Distrib. Europe, N. America and Japan.

Remarks. This species is distinguished from *Uromyces Trifolii* and *Urom. Trifolii-repentis* by the smaller size of teleutospores and lack of the uredo-generation in its life-cycle. Neither of our materials has an aecidial stage.

The general character of this fungus is as follows:—Teleutosori mostly hypophyllous, scattered or gregarious, minute or medium in size, punctiform, round or oblong, often confluent, at first covered by the epidermis, then naked, pulverulent, blackish-brown; teleutospores globose, subglobose, ovate or ellipsoidal, apex rounded, not or slightly thickened, with minute hyaline papilla, smooth or verrucose, brown or chestnut-brown, 18–25 = 14–18 μ ; epispore ca. 2 μ thick; pedicels hyaline, short, deciduous.

23. *Uromyces Fabae* (PERS.) DE BARY.

Ann. Sc. Nat. Sér. 4, XX, p. 72, 1863—FISCH. Ured. Schw. p. 65, fig. 49–51—GROVE, Brit. Rust Fungi, p. 97, fig. 49–52—HARIOT, Ured. p. 213—MCALP. Rusts Austr. p. 93, pl. XLII, fig. 307—PLOWR. Monogr. Ured. & Ustil. p. 119—SACC. Syll. VII, p. 531—SCHROET. Pilze Schles. I, p. 299—SYDOW, Monogr. Ured. II, p. 103—TROTT. Fl. Ital. Crypt. Ured. p. 45, fig. 42b.

(DIET. ENGL. Bot. Jahrb. XXVIII, p. 282, 1901; XXXVII, p. 98, 1905—P. HENN. ENGL. Bot. Jahrb. XXXIV, p. 594, 1905; XXIX, p. 146, 1901—FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 485, 1914; Trans.

Form. Nat. Hist. Soc. no. 19, p. 2 (extr.), 1914—KAWAKAMI & SUZUKI, Agr. Exp. St. Form. Bull. I, p. 17, 1908—MATSUM. Ind. Plant. Jap. I, p. 180—SHIRAI, List, p. 108—SHIRAI & MIYAKE, List, p. 701—SYDOW, Ann. Mycol. IV, p. 428, 1906; XI, p. 94, 1913—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 36, 1904—YOSHINO, Bot. Mag. Tokyo, XIX, p. 102, 1905).

(Pl. VIII, fig. 4-11.)

Syn. *Uredo Fabae* PERS. ROEMER, Neues Mag. Bot. I, p. 93, 1794.

U. Viciae-Fabae PERS. Syn. Fung. p. 221, 1801.

U. Viciae-Fabae SCHUM. Enum. Pl. Saell. p. 232, 1803.

U. Leguminosarum RABH. Krypt. Fl. Deut. I, p. 7. *p. p.*

U. Viciae REBENT. Prodr. Fl. Neom. p. 355, 1804.

Caecoma Leguminosarum SCHLECHT. Fl. Berol. II, p. 127,

p. p.

C. appendiculatum SCHLECHT. Linn. I, p. 107. *p. p.*

Erysibe appendiculata WALLR. Fl. Crypt. Germ. II, p. 210.

p. p.

Aecidium Leguminosarum RABH. *l. c.* p. 19. *p. p.*

A. album CLINT. Ann. Rep. N. Y. St. Museum, XXVI, p.

78, 1874.

Uromyces Viciae FUCK. Symb. Myc. p. 62. *p. p.*

U. polymorphus PECK et CLINT. *l. c.* XXXI, p. 43, 1879.

U. appendiculatus UNGER, Einfl. Bod. p. 216, 1836.

U. Orobi KIRCH. Lotos, p. 181, 1836.

Caecomurus Fabae KUNTZE, Rev. Gen. III³, p. 450, 1898.

C. polymorphus KUNTZE, *l. c.* p. 450.

Nigredo Fabae ARTH. N. Am. Fl. VII, p. 251, 1912.

Uromyces Yoshinagai P. HENN. Hedw. XL, p. (124), 1901—SACC. Syll. XVII, p. 251. (DIET. ENGL. Bot. Jahrb. XXXVII, p. 98, 1905—P. HENN. ENGL. Bot. Jahrb. XXXI, p. 729, 1902—MATSUM. Ind. Plant. Jap. I, p. 182—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 713—YOSHINAGA, Bot. Mag. Tokyo, XVI, p. 7, 1902—YOSHINO, Bot. Mag. Tokyo, XIX, p. 103, 1905).

U. Pisi (non WINT.) MATSUM. Ind. Plant. Jap. I, p. 181—(SHIRAI, List, p. 181—SHIRAI & MIYAKE, List, p. 707).

U. sp. YOSHINO, Bot. Mag. Tokyo, XIX, p. 103, 1905.

U. Orobi (non LÉV.) DIET. ENGL. Bot. Jahrb. XXVII, p. 570, 1900; XXXVII, p. 98, 1908 (KUSANO, Bot. Mag. Tokyo, XVI, p. 206, 1902—MATSUM. Ind. Plant. Jap. I, p. 181—SHIRAI, List, p. 109—

SHIRAI & MIYAKE, List, p. 707—YOSHINAGA, Bot. Mag. Tokyo, XIX, p. 36, 1905).

Hab. On leaves and stems of *Vicia amoena* FISCH. (*Tsurufuji-bakama*).

Saghalin—Horochi (3, IX, 1907. T. MIYAKE).

Hokkaido—Prov. Iburi; Chitose (4, VIII, 1902. K. MIYABE & S. ARIMOTO).

On *Vicia Faba* L. (*Sora-mame*).

Hokkaido—Prov. Ishikari; Nagayama (24, VIII, 1903. T. MIYAKE), Chubetsu (10, VIII, 1891. K. Miyabe).

Honshū—Prov. Rikuzen; Sendai (24, IV, 1903. A. YASUDA). Prov. Musashi; Tokyo (2, VI, 1899. S. KUSANO). Prov. Owari; Nagoya (24, VI, 1893. S. HORI), Chita (3, V, 1899. Y. TOKUBUCHI). Prov. Mino; Gifu (5, V, 1899. Y. TOKUBUCHI). Prov. Yamashiro; Kyoto (13, VI, 1895. N. HIRATSUKA). Prov. Harima; Himeji (13, VI, 1899. Y. TAKAHASHI).

Shikoku—Prov. Iyo; Dōgo (3, VI, 1903. K. OKUDAIRA). Prov. Tosa; Kawakita (VI, 1905. T. YOSHINAGA).

Formosa—Taihoku (22, IV, 1911. Y. FUJIKURO).

On *Vicia Fauriae* FRANCH. (*Tsugaru-fuji*).

Hokkaido—Prov. Oshima; Fukuyama (19, VII, 1890. K. MIYABE).

On *Vicia Cracca* L. (*Kusafuji*).

Hokkaido—Prov. Ishikari; Sapporo (20, X, 1895. Y. TOKUBUCHI; 4, XI, 1907. M. KASAI). Prov. Oshima; Kikonai (14, VII, 1890. K. MIYABE), Kamiiso (13, VII, 1890. K. MIYABE).

On *Vicia pallida* TURCZ. var. *japonica* MAXIM. (*Hirohaku-safuji*).

Hokkaido—Prov. Oshima; Kamiiso (12, VII, 1890. K. MIYABE).

On *Vicia pseudo-Orobis* FISCH. et MEY. (*Obakusafuji*).

Honshū—Prov. Rikuchū; Morioka (5, VII, 1903. G. YAMADA).

On *Vicia sativa* L. (*Yahazu-endō*).

Shikoku—Prov. Tosa; Aki-machi (V, 1904. T. YOSHINAGA), Kōchi (VI, 1902. T. YOSHINAGA).

On *Vicia tetrasperma* MOENCH. (*Kasumagusa*).

Shikoku—Prov. Tosa; Iokimura (V, 1905. T. YOSHINAGA).

On *Vicia venosa* MAXIM. (*Ebirafuji*).

Honshū—Prov. Mutsu; Hachinohe (16, VII, 1899. K. KIKUCHI). Prov. Rikuchū; Morioka (30, V, 1903. G. YAMADA).

On *Lathyrus maritimus* (L.) BIGEL. (*Hama-endō*).

Hokkaido—Prov. Ishikari; Ishikari (17, X, 1903. J. HANZAWA). Prov. Shiribeshi; Okushiri (27, VII, 1890. K. MIYABE; 3, XI, 1900. T. KAWAKAMI).

Honshū—Prov. Awa (30, XII, 1897. S. KUSANO).

Shikoku—Prov. Tosa; Katsurahama (XII, 1906. T. YOSHINAGA).

On *Lathyrus palustris* L. (*Rewisō*).

Honshū—Prov. Rikuchū; Asagishi (23, X, 1897. Y. TAKAHASHI).

On *Pisum sativum* L. (Endō).

Shikoku—Prov. Tosa; Engyoji (VI, 1910. T. YOSHINAGA).

Distrib. World-wide.

Remarks. This fungus is one of the most common species in our country. The general character of this fungus is as follows:—Spermatogonia minute, yellow; aecidia hypophyllous, rarely epiphyllous or caulicolous, on yellowish or brownish spots, scattered or gregarious in roundish or elongate groups (1–5mm. in diam.), short, cupulate; peridium white, the margin lacerate, revolute peridial cells rhomboidal, the outer wall striate, 6–7 μ thick, the inner wall verrucose, 2–3 μ thick; aecidiospores angular-globose or ellipsoidal, verruculose, yellowish, 14–25 μ in diam. Uredosori amphigenous, petiolicolous or caulicolous, scattered or gregarious, minute or medium in size, roundish or oblong, naked, surrounded by the torn epidermis, pulverulent, brownish; uredospores globose, subglobose, ellipsoidal or ovate, echinulate, light brown, 18–30 (rarely 36)=16–25 (rarely 29) μ ; epispore 1.5–2.5 μ thick; germ-pores 3–4. Teleutosori amphigenous, petiolicolous or caulicolous, minute or medium in size, roundish or oblong (1–5mm. long), early naked or long covered by the epidermis, then naked, surrounded by the torn epidermis, more or less compact, pulvinate, blackish-brown or black; teleutospores subglobose, ovate or ellipsoidal, apex rounded or truncate, greatly thickened (7–11 μ), base attenuated or rounded, smooth, brownish, 22–40 (rarely 50)=17–28 μ ; pedicels persistent, yellowish or brownish, thick, up to 100 μ in length.

In 1900, P. DIETEL reported in ENGLER'S *Botanische Jahrbücher* that the form on *Lathyrus maritimus*, collected by S. KUSANO in Prov. Awa on December 30, 1897, is *Uromyces Orobi* (PERS.) LÉV., but in the next year, P. HENNINGS recorded it as *Uromyces Fabae*, by the same specimen in the same magazine (the latter author wrote erroneously the date of its collection as November 30, 1897). In our Herbarium, a co-type specimen is preserved which was kindly sent by S. KUSANO. The specimen bears only teleutospores, so that we can not determine its real position. DIETEL again reported the occurrence of *Uromyces Orobi* on *Lathyrus Davidii* HCE. and *L. maritimus* from Japan in the same magazine, remarking the wall of their uredospores as very thick. Although I have not been able to examine any specimen on *Lathyrus Davidii*, I had opportunity to study those on *Lathyrus maritimus* which is comparatively abundant in our locality. In the latter, the wall of

the uredospores is always thinner than that of *Uromyces Orobi*. In the present paper, the writer treated this fungus as *Uromyces Fabæ*.

24. *Uromyces Ervi* (WALLR.) WESTENDORP.

Bull. Acad. Roy. d. Sc. de Belg. XXI, pt. II, p. 246, fig. 3, 1854—
GROVE, Brit. Rust Fungi, p. 96, fig. 48—SYDOW, Monogr. Ured. II, p. 96—TROTT. Fl. Ital. Crypt. Ured. p. 44.

(Pl. VIII, fig. 12.)

Syn. *Aecidium Ervi* WALLR. Fl. Crypt. Germ. II, p. 247, 1833.

Puccinia Ervi OPIZ, Seznam, p. 139, 1852.

Uromyces Ervi PLOWR. Monogr. Ured. & Ustil. p. 140, 1889.

(DIET. ENGL. Bot. Jahrb. XXXVII, p. 98, 1905).

U. sp. YOSHINO, Bot. Mag. Tokyo, XIX, p. 103, 1905.

Caenomurus Ervi KUNTZE, Rev. Gen. III³, p. 450, 1898.

Dicaeoma Ervi KUNTZE, *l. c.* p. 465.

Hab. On leaves, petioles and stems of *Vicia hirsuta* KOCH. (*Suzumenoendô*).

Shikoku—Prov. Tosa; Aki-machi (IV & V, 1924. T. YOSHINAGA).

Distrib. Europe and Japan.

Remarks. This species is closely related to *Uromyces Fabae*, but it differs in the smaller size of teleutospores and especially in the biological relation. DIETEL (Zeits. Pflanzenkr. III, p. 263, 1893) and E. JORDI (Centralbl. Bakt. II. Abt. XI, p. 776, 1904) proved by many culture-experiments that this fungus is strictly confined to the one host-plant, *Vicia hirsuta* (= *Ervum hirsutum*).

The general character of this fungus is as follows:—Aecidia amphigenous, mostly hypophyllous, or petiolicolous, scattered or gregarious in small groups, cupulate; peridium white or yellowish, the margin revolute, lacerate; peridial cells polygonal, the outer wall striate, ca. 5-6 μ thick, the inner wall verrucose, 2-3 μ thick; aecidiospores angular-globose or ellipsoidal, densely verruculose, light yellowish, 16-25 = 14-18 μ . Uredosori amphigenous, petiolicolous or caulicolous, scattered, minute, roundish or oblong, naked, surrounded by the torn epidermis, pulverulent, cinnamon-colored; uredospores globose, ovate or ellipsoidal, echinulate, yellowish-brown, 20-29 = 18-22 μ ; epispore ca. 2 μ thick; germ-pores 2, equatorial. Teleutosori amphigenous, petiolicolous or caulicolous, scattered or gregarious, minute, oblong (up to 0.15mm

long), long covered by the lead-colored epidermis, or naked, surrounded by the torn epidermis, pulverulent, blackish-brown; teleutospores subglobose, ovate or ellipsoidal, rarely oblong or irregular in shape, apex rounded or attenuated, rarely truncate, greatly thickened (up to 9μ), base rounded or attenuated, smooth, brownish, 20–30 (rarely 36) = 16–22 μ ; germ-pore apical or sublateral; pedicels persistent, brownish, as long as spores or up to 60 μ in length.

25. *Uromyces Orobi* (PERS.) LÉV.

Ann. Sc. Nat. Sér. 3, VIII, p. 371, 376, 1847—FISCH. Ured. Schw. p. 69, fig. 52—GROVE, Brit. Rust Fungi, p. 99, fig. 53—JORDI, Centralbl. Bakt. II. Abt., XI, p. 763, 1904—PLOWR. Monogr. Ured. & Ustil. p. 121—SYDOW, Monogr. Ured. II, p. 105—TROTT. Fl. Ital. Crypt. Ured. p. 47, fig. 43a—WINT. Pilze I, p. 158.

(Pl. VIII, fig. 13.)

Syn. *Aecidium Orobi* PERS. ROEMER, N. Magazin, I, p. 92, 1794.

A. Orobi-tuberosi PERS. Disp. Meth. Fung. p. 12.

A. Orobi DC. Fl. Franç. VI, p. 95, *p. p.*

A. Leguminosarum RABH. Krypt. Fl. Deut. I, p. 19, *p. p.*

Uredo Orobi SCHUM. Enum. Pl. Saell. p. 232, 1803.

Uromyces Orobi FUCK. Symb. Myc. p. 62, 1869.

Nigredo Orobi ARTH. Rés. Sc. Congr. Bot. Wien, p. 344, 1906.

Hab. On leaves and stems of *Vicia unijuga* AIT. (= *Orobus japonicus* SIEB., *Lathyrus Messerschmidtii* F. S., *Orobus lathyroides* L.) (*Nanten hagi*).

Hokkaido—Prov. Shiribeshi; Kudô (26, VII, 1890. K. MIYABE). Prov. Oshima; Hakodate (10, VII, 1890. K. MIYABE).

Shikoku—Prov. Tosa; Mt. Oko (28, I, 1908; II, 1908. T. YOSHINAGA).

Distrib. Europe and Japan.

Remarks. The whole character of this species coincides with *Uromyces Fabae*, except the epispore of uredospores of the former being thicker than that of the latter species (namely 2–3 μ against 1.5–2.5 μ).

E. JORDI made attempts to infect *Lathyrus vernus*, *L. pratensis*, *L. luteus*, *L. niger*, *Vicia sativa*, *V. Faba*, *V. hirsuta*, *V. angustifolia* and *Pisum sativum* with *Uromyces Orobi* on *Lathyrus montanus* (= *Orobus tuberosus*), but in every case without success. Although there has been no infection-experiment on this species in our country, the

writer placed the fungus on our *Vicia unijuga* provisionally under the present species, as its uredospores have thicker membrane.

26. *Uromyces Viciæ-unijugæ* nov. sp.

Teleutosoris hypophyllis, maculis minutis atro-purpureis insidentibus, minutis, punctiformibus, sparsis, non confluentibus, mox nudis, pulvinatis, atro-brunneis; uredosporis immixtis, globosis, subglobosis vel ellipsoideis, laxe echinulatis, flavis, 18-29=18-22 μ ; episporio ca. 3-4 μ crasso, poris germinationis 3-5 instructis; teleutosporis ellipsoideis, ovatis vel globosis, rarius globoso-lenticulatis, apice rotundatis, non incrassatis, subinde papilla minutissima hyalina praeditis vel haud papillatis, basi rotundatis vel rarius attenuatis, verruculosus undique denseque obsitis, brunneis, 20-27=18-24 μ , episporio 3-4 μ crasso; pedicello hyalino, brevi, deciduo.

(Pl. VIII, fig. 14.)

Hab. On leaves of *Vicia unijuga* AL. (*Nanten-hagi*).

Honshū—Prov. Mutsu; Hachinohe (8, VII, 1899, K. KIKUCHI).

Distrib. Japan.

Remarks. This species is somewhat related to *Uromyces Heimerlianus* P. MAGN., but it can be distinguished in the thicker wall of uredo- as well as teleutospores.

27. *Uromyces Loti* BLYTT.

Christ. Viden. Selsk. Forhandl. p. 37, 1896—GROVE, Brit. Rust Fungi, p. 94, fig. 46—SYDOW, Monogr. Ured. II, p. 110.

Syn. *Puccinia Loti* KIRCHN. Lotos, p. 181, 1856, *p. p.*

Uromyces Euphorbiae-Corniculati JORDI, Centr. Bakt. II. Abt. XI, p. 791, 1904.

U. striatus (non SCHROETER) (DIET. ENGL. Bot. Jahrb. XXIX, p. 570—P. HENN. ENGL. Bot. Jahrb. XXIX, p. 146, 1901—MATSUM. Ind. Plant. Jap. I, p. 181—SHIRAI, List, p. 110—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 219, 1904).

Dicaeoma Loti KUNTZE, Rev. Gen. III³, p. 469, 1898, *p. p.*

Hab. On leaves of *Lotus corniculatus* L. var. *japonica* RGL. (*Miyakogusa*).

Honshū—Prov. Awa (30, XII, 1897. S. KUSANO).

Shikoku—Prov. Tosa; Noichi-mura (27, XI, 1910. T. YOSHINAGA).

Distrib. Europe and Japan.

Remarks. The acedial and teleuto-generations have not yet been collected in our country. The uredo was formerly identified as *Uromy-*

ces striatus by P. DIETEL and P. HENNINGS, but P. and H. SYDOW have corrected this misidentification in their monograph. The general character of the uredospores of our fungus is as follows:—

Uredosori amphigenous, scattered, minute, often confluent, long covered by the epidermis, then naked, pulverulent, cinnamon-colored; uredospores globose, subglobose or ellipsoidal, echinulate, brownish, $17-25 = 16-23 \mu$; episore $2.5-3 \mu$ thick; germ-pores 2-5.

28. *Uromyces striatus* SCHROET.

Abhandl. Schles. Ges. Vaterl. Cultur, 1869-1872, p. 11, 1872—FISCH. Ured. Schw. p. 31, fig. 24—GROVE, Brit. Rust Fungi, p. 93, fig. 45—SACC. Syll. VII, p. 542, *p. p.*—SCHROET. Pilze Schles. I, p. 306—SYDOW, Monogr. Ured. II, p. 115—TROTT. Fl. Ital. Crypt. Ured. p. 56, fig. 46b.

(FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 426, 1914; Trans. Form. Nat. Hist. Soc. no. 19, p. 3 (extr.), 1914—KAWAKAMI & SUZUKI, Form. Exp. Sta. Bull. I, p. 50, 1908—SHIRAI, List, p. 110, *p. p.*—SHIRAI & MIYAKE, List, p. 711, *p. p.*).

Syn. *Uredo Fabae* var. *Medicaginis-falcatæ* DC. Fl. Franç. VI, p. 69, 1815.

U. apiculata STR. var. *Trifolii* STR. Ann. Wett. II, p. 97, *p. p.*

U. Medicaginis SPEG. Fl. Argent. II, p. 66, 1902.

U. medicaginicola SPEG. Anal. Mus. VI, p. 234, 1898.

Uromyces Medicaginis PASS. THÜM. Herb. Oecon. no. 156, 1872.

U. Medicaginis-falcatæ WINT. Pilze Deut. I, p. 159, 1884.

Caomurus striatus KUNTZE, Rev. Gen. III³, p. 450, 1898.

Nigredo Medicaginis-falcatæ ARTH. Rés. Sc. Cong. Bot. Wien, p. 344, 1906.

N. Medicaginis ARTH. N. Am. Fl. VII, p. 256, 1912.

Hab. On leaves of *Medicago sativa* L. (*Murasaki-umagoyashi*).

Formosa—Taihoku (29, II, 1908. Y. FUJIKURO).

Distrib. Europe, N. & S. America, East India and Japan.

Remarks. This rust-fungus seems to be very rare in our country. The writer has a specimen bearing uredospores from Formosa. The character of the uredospores is as follows:—

Uredosori amphigenous, without spot, scattered or gregarious, sometimes confluent, minute, pulverulent, cinnamon-colored; uredospores globose, subglobose or ellipsoidal, echinulate, yellowish-brown, $14-23 \mu$ in diam.; episore $1.5-2 \mu$ thick; germ-pores 3-4.

ON EUPHORBIACEÆ.

Key to species

Teleutospore-wall verrucose

Teleutospores 14-22 (rarely 28) = 13-18 μ , wall ca. 1 μ thick; on *Euphorbia*
humifusa29. *U. proeminens*Teleutospores 22-28 = 16-20 μ , wall 1.5-2.5 μ thick; on *Euphorbia*
serrulata30. *U. Kawakamii*Teleutospore-wall smooth; on *Mercurialis*31. *U. Mercurialis*29. *Uromyces proeminens* (DC.) LÉV.

Ann. Sc. Nat. Bot. Sér. 3, VIII, p. 371, 375, 1847—HARIOT, Ured.
p. 222—MAGNUS, Ber. Deut. Bot. Ges. IX, p. 86, pl. XIV, fig. 1-11,
1891—SACC. Syll. VII, p. 553, *p. p.*—SYDOW, Monogr. Ured. II, p. 158
—TRANZ. Ann. Mycol. VIII, p. 5, 1910—TROTT. Fl. Ital. Crypt.
Ured. p. 35.

(Pl. VIII, fig. 15.)

Syn. *Uredo proeminens* DC. Fl. Franç. II, p. 235, 1805.*U. scutellata* SCHW. Schr. Nat. Ges. Leipzig, I, p. 71, 1822.*Caeoma punctuosum* SCHW. Trans. Amer. Phil. Soc. Philad.
IV, p. 291, 1834.*C. Euphorbiae-hypericifoliae* SCHW. *l. c.* p. 293.*Aecidium Euphorbiae-hypericifoliae* SCHW. *l. c.* p. 309.*A. Euphorbiarum* β *Chamaesyces* DUBY, Bot. Gall. II, p.
907, 1830.*A. Euphorbiae* SCHW. Schr. Nat. Ges. Leipzig, I, p. 69, 1822.*Uromyces Chamaesyces* SACC. Riv. Per. Padova, XXIV, fig.
12-15, 1874.*U. Euphorbiae* CKE. et PECK, 25th Ann. Rep. N. Y. State
Mus. p. 90, 1873—SACC. Syll. VII, p. 556. (P. HENN. ENGL. Bot.
Jahrb. XXXIV, p. 595, 1905—SHIRAI, List, p. 108—SHIRAI & MIYAKE,
List, p. 699—YOSHINAGA, Bot. Mag. Tokyo, XIX, p. 36, 1905).*U. pulvinatus* KALCHBR. et CKE. Grev. IX, p. 21, 1830.*U. Macounianus* ELL. et EV. Proc. Acad. Nat. Sc. Phil. p.
155, 1893.*Caeomurus Euphorbiae* KUNTZE, Rev. Gen. III¹, p. 450, 1898.*Nigredo Euphorbiae-hypericifoliae* ARTH. Rés. Sc. Cong. Bot.
Wien, p. 343, 1906.

N. proeminens ARTH. N. Am. Fl. VII, p. 259, 1912.

Hab. On leaves of *Euphorbia humifusa* WILLD. (*Nishikisō*).

Shikoku—Prov. Tosa; Aki-machi (XII, 1923; V, 1924. T. YOSHINAGA).

Distrib. Europe, N. America, Africa, Siberia, China, Corea and Japan.

Remarks. We have not a good specimen of the uredo stage of this fungus. The character of this fungus is as follows:—

Spermogonia scattered among aecidia, minute, yellow; aecidia hypophyllous, or caulicolous, scattered, cupulate, short; peridium white; peridial cells quadrate or rhomboidal, the outer wall 4–5 μ thick, striate, the inner wall thinner, verrucose; aecidiospores angular-globose or ellipsoidal, verruculose, hyaline or yellowish, 14–20 μ in diam. Uredosori amphigenous, gregarious, minute, cinnamon-colored; uredospores globose or ellipsoidal, echinulate, yellowish-brown, 16–25 = 15–20 μ ; germ-pores 4–5. Teleutosori amphigenous, mostly epiphyllous, minute, scattered or gregarious, naked, pulverulent, blackish-brown; teleutospores ovate or ellipsoidal, rarely oblong or globose, apex rounded, not thickened, with small papilla, base rounded or attenuated, verrucose, brown, 14–24 = 13–18 μ ; episporium ca. 1 μ thick; pedicels short, hyaline.

30. *Uromyces Kawakamii* SYDOW.

Ann. Mycol. XII, p. 105, 1914.

(FUJIKURO, Trans. Form. Nat. Hist. Soc. no. 19, p. 2 (extr.), 1914).

Hab. On leaves of *Euphorbia serrulata* REIUV. (*Miyakojima-nishikisō*).

Formosa—Tainan.

Distrib. Japan.

Remarks. SYDOW'S original description of this fungus is as follows:—
Aecidiis hypophyllis, totam folii superficiem dense aequaliterque obtegentibus, sat parvis, cupuliformibus, immersis, margine brevi crenulato emergentibus; cellulis pseudoperdii rhomboideis, pariete externo 3–5 μ crasso striolato, interno tenui dense verruculoso; aecidiosporis angulato-globosis, subtilissime verruculosis, hyalino-flavidis, 15–19 μ diam.; soris uredosporiferis hypophyllis, sparsis, punctiformibus, cinnamomeis; uredosporis globosis vel subglobosis, subtiliter echinulatis, dilute flavo-brunneis, 17–24 \times 16–20 μ , episporio 1–1.5 μ crasso, poris germinationis 4–6 sparsis instructis; soris teleutosporiferis conformibus, atro-brunneis;

teleutosporis ovatis vel ellipsoideis, plerumque papilla plana vel conica instructis, laxiuscule grossiusculeque verrucosis (verrucis sparsis, non vel vix in ordines dispositis), castaneo-brunneis, $22-28 \times 16-20 \mu$, episporio $1.5-2.5 \mu$ crasso: pedicello hyalino, brevi.

He remarked that "Die Art unterscheidet sich von dem nächstverwandten *Uromyces proeminens* (DC.) LÉV. durch durchschnittlich grössere Teleutosporen mit größeren Warzen und dickerem Epispor."

31. *Uromyces Mercurialis* P. HENN. char. emend.

Hedw. XLI, p. (62), 1902—SACC. Syll. XVII, p. 249—SYDOW, Monogr. Ured. II, p. 186.

(SHIRAI & MIYAKE, List, p. 705—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 36, 1904).

(Pl. VIII. fig. 16.)

Pycnidiis minutis, melleis, inter aecidia sparsis; aecidiis amphigenis, plerumque hypophyllis vel petiolicolis, in foliis ad nervos evolutis ibique in greges rotundatos vel saepius elongatos incrassatulos dispositis, in petiolis plerumque in greges longe expansis ordinatis et distorsiones saepe efficientibus, margine primum integro tandem parum revoluto inciso, aurantiacis, cellulis pseudoperidii rhomboideis, partie externo $4-6 \mu$ crasso, verruculoso, interno tenue dense verrucoso; aecidiosporis globosis, ellipsoideis vel angulatis, dense minuteque verruculosis, hyalino-flavidis, $18-25=20-30 \mu$; soris teleutosporiferis hypophyllis, maculis nullis vel minutis, rotundatis, atris vel atro-brunneis, obsoletis insidentibus, sparsis vel aggregatis, solitariis vel rarius confluentibus, minutis rotundatis, ca. $\frac{1}{2}-1$ mm. diam., epidermide fissa cinctis, pulverulentis, ferrugineis; uredosporis subinde immixtis globosis, ovatis vel ellipsoideis, laxe echinulatis vel aculeatis, hyalino-flavidis vel flavo-brunneis, $20-28=18-25 \mu$, episporio $2.5-3 \mu$ crasso, poris germinationis $3-5$ instructis; teleutosporis ellipsoideis, ovatis vel suboblongis, apice papilla subhyalina ($3-6 \mu$ alta) instructis vel rarius non papillatis, non incrassatis, levibus vel laxiuscule verrucosis, flavo-brunneis, $18-36=14-21 \mu$, episporio tenui; pedicello hyalino, tenui, brevissimo (usque 15μ longo).

Hab. On leaves and petioles of *Mercurialis leiocarpa* S. et Z. (*Yama-ai*)

Shikoku—Prov. Tosa; Mt. Yokogura (XI, 1901; V, 1906. T. YOSHINAGA). Prov. Iyo; Iwaya-yama (22, V, 1899. K. OKUDAIRA).

Distrib. Japan.

Remarks. The teleuto-generation of this species was originally described from a collection made by T. YOSHINAGA at Mt. Yokogura, Prov. Tosa, in Nov., 1901. On the examination of the co-type specimen, the uredospores intermixed in the teleutosori were found by the writer. A second collection was made by YOSHINAGA at the same place in May of the next year. The specimen bearing an aecidium was sent to P. DIETEL who recorded it under the name? *Aecidium Marci* BUBÁK. in *Annales Mycologici*, vol. VI, p. 229 in 1908. In our herbarium, there is also an aecidial specimen collected by K. OKUDAIRA in Prov. Iyo. On the assumption that these three spore-forms belong to a single species, the writer has given the amended description of the species under consideration.

ON GERANIACEÆ

32. *Uromyces Geranii* (DC.) OTTH et WARTM.

Schweiz. Krypt. no. 401, 1863—FISCH. Ured. Schw. p. 16, fig. 14—GROVE, Brit. Rust Fungi, p. 103, fig. 57—PLOWR. Monogr. Ured. & Ustil. p. 126—SACC. Syll. VII, p. 535—SCHROET. Pilze Schles. p. 302—SYDOW, Monogr. Ured. II, p. 190—WINT. Pilze, I, p. 160.

(Pl. VIII, fig. 17.)

Syn. *Uredo Geranii* DC. Syn. Plant. p. 47, 1806.

Aecidium Geranii DC. Fl. Franç. VI, p. 93, 1815.

Caecoma geraniatum LINK, Spec. Plant. II, p. 57, 1825.

Trichobasis Geranii BERK. CKE. Handb. p. 530, 1871.

Uromyces puccinioides RABH. Bot. Zeit. p. 627, 1851.

Caecomurus Geranii KUNTZE, Rev. Gen. III, p. 450, 1898.

Nigredo Geranii ARTH. Rés. Sc. Congr. Bot. Wien, p. 343, 1906.

Hab. On leaves and petioles of *Geranium erianthum* DC. (*Chishima-furo*).

Saghalin—Kusunkotan (10, VII, 1907. T. MIYAKE), Nayashi (14, VI, 1907. T. MIYAKE), Horochi (3, IX, 1907. T. MIYAKE), Tokostchira (23, VIII, 1907. T. MIYAKE).

Distrib. Europe, Siberia and Japan.

Remarks. In our country, an aecidium and uredo commonly occur on *Geranium nepalense* SWEET. Although this fungus was regarded as *Uromyces Geranii* by European authors, the writer has doubts in its identification.

The Saghalien specimens above mentioned are exactly identical to the European specimens. The general character of our fungus is as follows:—

Spermogonia scattered among aecidia, yellow; aecidia hypophyllous or petiolicolous, gregarious in large dense clusters on thickened spots of the leaves, or forming elongate clusters on the petioles, often causing a great distortion, short, cupulate; peridium yellowish, the margin slightly revolute; aecidiospores ellipsoidal or ovate, densely verruculose, yellowish, $22-32=18-25\ \mu$; epispore thick. Uredosori hypophyllous, on brownish or reddish spots, scattered or gregarious, minute, roundish, naked, surrounded by the epidermis, pulverulent, cinnamon-colored; uredospores globose, subglobose or ellipsoidal, echinulate, brownish, $21-30=18-25\ \mu$; epispore ca. $2\ \mu$ thick; germ-pores 1-2. Teleutosori conform, blackish-brown; teleutospores subglobose or ellipsoidal, apex with hyaline papilla (up to $7\ \mu$ in height), rounded at both ends, smooth, brownish, $28-40=21-25\ \mu$; pedicels short, hyaline, deciduous.

ON RANUNCULACEÆ

33. *Uromyces Aconiti-Lycoctoni* (DC.) WINT.

Pilze, p. 153—FISCH. Ured. Schw. p. 14, fig. 13—HARIOT, Uréd. p. 201—SACC. Syll. VII, p. 561—SYDOW, Monogr. Ured. II, p. 208.

(SYDOW, Ann. Mycol. XII, p. 158, 1914).

(Pl. VIII, fig. 18.)

Syn. *Aecidium bifrons* DC. var. *Aconiti-Lycoctoni* DC. Fl. Franç. II, p. 146, 1805.

Caeoma Ranunculaceatum LINK, Sp. Plant. VI, 2, p. 54, 1825, p. p.

Uredo Lycoctoni KALCHBR. Verzeich. Zipser Schwämme, n. 900, 1865.

Uromyces Aconiti FUCH. Symb. Myc. p. 61, 1869.

Caeomurus bifrons KUNTZE, Rev. Gen. III³, p. 449, 1898.

Uromycopsis Aconiti-Lycoctoni ARTH. Rés. Sci. Congr. Bot. Wien, p. 345, 1906.

Hab. On leaves and petioles of *Aconitum umbrosum* Kom. (*Ōreijinsō*).

Hokkaidō—Prov. Ishikari: Mt. Teine (6, VII, 1907. S. ITŌ). Prov. Hidaka; Shoya (17, VIII, 1892. Y. TOKUBUCHI), Saruru (13, VIII, 1892. Y. TOKUBUCHI).

Honshū—Prov. Mutsu; Mt. Hakkōda (25, VIII, 1913. M. MIURA).

Distrib. Europe, N. America, Siberia and Japan.

Remarks. The aecidial stage of this fungus seems to be of rare occurrence in our country. Only one specimen was collected in Hokkaidō by the writer. There is an aecidium on *Aconitum Fischeri*, but it differs from this fungus in the character of the peridial wall and spores.

The general character of this fungus is as follows:—

Aecidia hypophyllous or petiolicolous, on yellowish discolored spots, in large roundish or irregular shaped elongate groups on petioles, cupulate; peridium yellowish, the margin revolute; aecidiospores angular-globose or ellipsoidal, verruculose, hyaline or yellowish, $21-32=18-25\mu$. Teleutosori amphigenous, mostly epiphyllous, on yellowish discolored spots scattered or gregarious, minute, at first covered by the epidermis, then naked, pulverulent, blackish-brown; uredospores (?) rarely intermixed, globose, subglobose or ellipsoidal, verrucose, hyaline, $21-32=18-25\mu$; epispore ca. $2-3\mu$ thick; germ-pore absent; teleutospores globose, subglobose or ellipsoidal, rarely angular or irregular in shape, apex slightly thickened, rounded, base mostly rounded, smooth, brownish (sometimes intermixed with hyaline abortive spores), $22-35=18-25\mu$ (rarely $43=32\mu$); pedicels hyaline, short, deciduous.

The verruculose hyaline spores without any germ-pore, which may be uredospores, are more or less abundantly present in the specimen collected by M. MIURA in Prov. Mutsu, with the hyaline abortive teleutospores. The teleutospores seem to be very variable in shape on account of their habits.

ON CARYOPHYLLACEÆ

Key to species

- Teleutospores uniformly thickened, provided with papilla on germ-pore, punctate; on
Dianthus34. *U. caryophyllinus*
 Teleutospores very thickened above, smooth
 Teleutospores ovate or subclavate; on *Lychnis*35. *U. crassivertex*
 Teleutospores globose or ovate; on *Silene*36. *U. inequaltus*

34. *Uromyces caryophyllinus* (SCHRANK) WINTER.

Pilze Deutschl. p. 149, 1884—FISCH. Ured. Schw. p. 11, fig. 10, 11,—HARIOT, Ured. p. 202—GROVE, Brit. Rust Fungi, p. 108, fig. 61—MCALPINE, Rusts of Aust. p. 102, pl. 18, fig. 152-154, pl. G, fig. 30-31, 1906—SACC. Syll. VII, p. 545—SYDOW, Monogr. Ured. II, p. 211.

(DIET. ENGL. Bot. Jahrb. XXXIV, p. 584, 1905—FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 396, 1914; Trans. Nat. Hist. Soc. no. 19 (extr.), 1914—SHIRAI, List, p. 104—SHIRAI & MIYAKE, List, p. 697).

(Pl. VIII, fig. 19.)

Syn. *Lycoperdon caryophyllum* SCHRANK, Baier. Fl. II, p. 668, 1789.

Uredo Dianthi PERS. Syn. Fung. p. 222, 1801.

U. dianthicola HARIOT, Journ. Bot. XIV, p. 116, 1900.

U. bullatum WEST. Prodr. Fl. Bat. II, p. 177, 1866.

Uromyces Dianthi NIESSL, Verh. Nat. Ver. Brünn, X, p. 162, 1872.

U. sinensis SPEG. Dec. Myc Ital. n. 69.

Caecoma Dianthi LINK, Sp. Pl. VI, 2, p. 26, 1825.

Caecomurus caryophyllum KUNTZE, Rev. Gen. III³, p. 449, 1898.

Aecidium Euphorbiae-Gerardiana FISCH. Beitr. Krypt. Schw. II, 2, p. 530, 1904.

Nigredo caryophyllina ARTH. N. Amer. Fl. VII, p. 246, 1912.

Hab. On leaves and stems of *Dianthus superbus* L. (*Kawaranadeshiko*).

Saghalin—Toyohara (IX, 1905. S. TAKEO).

Hokkaidō—Prov. Shiribeshi; Zenibako (5, X, 1891; 28, VII, 1900. K. MIYABE).

Honshū—Prov. Rikuzen; Shiroishi (1, VIII, 1895. Y. TAKAHASHI).

Shikoku—Prov. Tosa; Ōsakayama (19, VI, 1912. T. YOSHINAGA). Prov. Iyo; Unzengun (VII, 1906. K. OKUDAIRA), Matsuyama (V, 1903. K. OKUDAIRA).

Distrib. Europe, N. America, Africa, Australia, Asia Minor, Persia and Japan.

Remarks. The aecidial stage of this fungus is still unknown in our country. P. DIETEL and Y. FUJIKURO recorded that this fungus attacks also *Dianthus chinensis* L. The general character of our fungus is as follows:—Uredosori amphigenous, mostly hypophyllous, or caulicolous, on discolored spots, minute, scattered, roundish or oblong, early naked, pulverulent, cinnamon-colored; uredospores globose, subglobose or ellipsoidal, echinulate, yellowish brown, 20–30=18–25 μ ; epispore ca. 2.5 μ thick; germ-pores 4–5. Teleutosori amphigenous, mostly hypophyllous, or caulicolous, on discolored spots, minute, scattered or gregarious, oblong, long covered by the epidermis, or naked, surrounded by the ruptured epidermis, pulverulent, blackish-brown or black; teleutospores globose, subglobose or ellipsoidal, apex rounded, not thickened, with hyaline papilla, base rounded, minutely punctate, chestnut-brown, 20–30=18–24 μ ; epispore thick (2–3 μ); pedicels short, hyaline.

35. *Uromyces crassivertex* DIETEL.

ENGL. Bot. Jahrb. XXXII, p. 624, 1903—SACC. Syll. XVII, p. 225—SYDOW, Monogr. Ured. II, p. 213, fig. 106.

(SHIRAI, List, p. 108—SHIRAI & MIYAKE, List, p. 699).

(Pl. VIII, fig. 20.)

Hab. On leaves and stems of *Lychnis Miqueliana* ROHR. (*Fushiguro-sennō*).

Honshū.—Prov. Musashi; Akabane (II, V, 1902. TAMURA, comm. S. KUSANO).

Distrib. Japan.

Remarks. This fungus seems to be of rare occurrence in our country. The general character of this endemic fungus is as follows:—Uredosori amphigenous, mostly epiphyllous, or caulicolous, without spot, minute ($1/2$ — $2/3$ mm.), scattered or gregarious in circular (5mm., rarely 15mm. in diam.) or irregular shaped groups, rarely confluent, naked, surrounded by the ruptured epidermis, cinnamon-colored; uredospores globose, subglobose or ellipsoidal, echinulate, yellowish-brown, 24 – 30 = 20 – 26μ ; epispore ca. 3μ thick; germ-pores 5–7. Teleutosori conform, compact, black; teleutospores ovate, piriform, cuneate or subclavate, apex rounded, truncate or acute, greatly thickened (up to 18μ), base mostly attenuated, smooth, yellowish-brown, darker at apex, 26 – 42 = 16 – 25μ ; pedicels yellowish, persistent, up to 60μ in length.

36. *Uromyces inaequialtus* LASCH.

RABH. Fg. Eur. n. 94, 1859—FISCH. Ured. Schw. p. 63, fig. 47—HARIOT, Ured. p. 203—SYDOW, Monogr. Ured. II, p. 217—WINT. Pilze, p. 161.

(Pl. VIII, fig. 21.)

Syn. *Uromyces Silenes* FUCK. Symb. Myc. p. 61, 1869.

U. pulchellus ELL. et EV. Bull. Torr. Bot. Club, XXII, p. 57, 1895.

Caoma Silenes SCHL. Fl. Berol. II, p. 128, 1824.

Erysibe Silenes WALLR. Fl. Crypt. Germ. II, p. 206, 1833.

Aecidium sparsum HAZSL. Math. Term. Közl. XIV, p. 136, 1877.

Caomurus Silenes KUNTZE, Rev. Gen. III¹, p. 450, 1898.

C. pulchellus KUNTZE, l. c. p. 450.

Nigredo Silenes ARTH. N. Am. Fl. VII, p. 247, 1912.

Hab. On leaves and stems of *Silene foliosa* MAXIM. (*Yezo-mantema*).

Hokkaidō—Prov. Ishikari; Sapporo (IX, 1884. K. MIYABE). Prov. Shiribeshi; Oshoro (15, VII, 1888. K. MIYABE).

Distrib. Europe, N. America, Asia Minor, Persia, Siberia and Japan.

Remarks. This species is distinguishable from *Uromyces Behenis* (DC.) UNGER by the fact of the presence of uredospores in its life-cycle. The general character of this fungus is as follows:—

Spermogonia minute, yellowish; aecidia mostly hypophyllous, in round or elongate groups (up to 6mm. across.), on discolored spots, short, cupulate; peridium pale-yellow, the margin revolute, lacerate; peridial cells polygonal or rhomboidal, the outer wall 7–11 μ thick, striate, the inner wall thinner, 2–3 μ , verrucose; aecidiospores angular-globose or ellipsoidal, verruculose, yellowish, 18–25 = 14–18 μ . Uredosori amphigenous, mostly hypophyllous, scattered or in circular groups, minute, early naked, pulverulent, cinnamon-colored; uredospores globose or subglobose, verruculose, yellowish-brown, 20–27 = 20–25 μ ; epispore ca. 2.5 μ thick; germ-pores 2–4. Teleutosori mostly hypophyllous or caulicolous, scattered or gregarious in circular groups, minute (0.5 mm. across), compact, blackish-brown or black; teleutospores globose, subglobose or ovate, apex rounded, greatly thickened (up to 8 μ), base rounded, smooth, brownish, darker at apex, 25–38 = 18–26 μ ; pedicels persistent, hyaline, up to 80 μ in length.

This is a species new to Japan.

ON POLYGONACEÆ

37. *Uromyces Polygoni* (PERS.) FUCK.

Symb. Myc. p. 64, 1869—FISCH. Ured. Schw. p. 61, fig. 46—GROVE, Brit. Rust Fungi p. 117, fig. 69—HARIOT, Ured. p. 220—MCALP. Rusts Austr. p. 99, pl. 18, fig. 150–151—FLOWR. Monogr. Ured. & Ustil. p. 123—SACC. Syll. VII, p. 533—SCHROET. Pilze Schles. I, p. 301—SYDOW, Monogr. Ured. II, p. 236—WINT. Pilze, I, p. 154.

(P. HENN. ENGL. Bot. Jahrb. XXXIV, p. 594, 1905—SHIRAI, List, p. 109—SHIRAI & MIYAKE, List, p. 707—SYDOW, Ann. Mycol. VII, p. 168, 1909; XI, p. 94, 1913—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 219, 1904; XIX, p. 36, 1905).

(Pl. VIII, fig. 22.)

- Syn.** *Puccinia Polygoni* PERS. Disp. Meth. Fg. p. 39, 1797.
P. Polygoni-aviculare PERS. Syn. Fung. p. 227, 1801.
P. aviculariae DC. Fl. Franç. II, p. 221, 1805.
Aecidium aviculare KZE. Fl. Dresd. II, p. 129, 1823.
Uredo Centumnodii SCHUM. Enum. Pl. Saell. II, p. 231, 1803.
U. Polygoni-aviculariae ALB. et SCHW. Consp. Fl. Lusat. p. 127, 1805.
U. Polygonorum DC. Fl. Franç. VI, p. 71, 1815, *p. p.*
Uromyces Polygonorum LÉV. Ann. Sc. Nat. Sér. 3, VIII, p. 376, 1847.
U. Aviculariae SCHROET. Abh. Schles. Ges. XLVIII, p. 8, 1870.
U. vaginalium LINK, CKE. Handb. p. 495.
Trichobasis Polygonorum BERK. CKE. Micr. Fungi, p. 226, *p. p.*
Dicaeoma Aviculariae GRAY, Nat. Arr. Brit. Pl. I, p. 542, 1821.
Capitularia Polygoni RABH. Bot. Zeit. IX, p. 449, 1851.
Caenomurus Polygoni KUNTZE, Rev. Gen. III³, p. 450, 1898.
Nigredo Polygoni ARTH. Rés. Congr. Bot. Wien, p. 344, 1906.

Hab. On leaves and stems of *Polygonum aviculare* L. (*Michiyanagi*).

Saghalin—Kusunkotan (16, VII, 1907. T. MIYAKE), Nayashi (12, VIII, 1906. T. MIYAKE).

Hokkaidō—Prov. Kitami; Rishiri Isl. (21, VII, 1899. T. KAWAKAMI). Prov. Nemuro; Tomoshiri (2, VIII, 1894. K. MIYABE). Prov. Iburī; Muroan (3, VIII, 1900. G. YAMADA). Prov. Ishikari; Sapporo (VII, 1883; 27, VI, 1890; 28, IX, 1916. K. MIYABE; 28, VI, 1891. Y. TOKUBUCHI; 10, VI, 1896. K. KIKUCHI; VII, 1897. T. KAWAKAMI; 25, VIII, 1907; 15, VIII, 1909; 20, VII, 1918. S. Itō), Horomui (30, VII, 1900. G. YAMADA). Prov. Shiribeshi; Zenibako (6, VIII, 1895. Y. TOKUBUCHI). Okushiri (31, VII, 1890. K. MIYABE). Prov. Oshima; Kamiiso (12, VII, 1890. K. MIYABE).

Honshū—Prov. Rikuzen; Funaoka (4, VIII, 1895. Y. TAKAHASHI), Sendai (5, X, 1895. K. SENGOKU). Prov. Yamashiro; Kyoto (14, VII, 1895. Y. TAKAHASHI). Prov. Settsu; Kōbe (5, IX, 1889. K. MIYABE).

Shikoku—Prov. Tosa; Aki-machi (X, 1904. T. YOSHINAGA), Ushioe (IX, 1902. T. YOSHINAGA). Prov. Iyo; Dōgo (VI, 1903. K. OKUDAIRA).

Distrib. World-wide.

Remarks. This fungus is known to attack many species of *Polygonum* and *Rumex*, but it occurs on *Polygonum aviculare* only in our country. There is an aecidium on *Polygonum Thunbergii*, the spores and peridial walls of which have a quite different character from those of this species under consideration. The general character of this species is as follows:—

Spermogonia minute, yellowish; aecidia hypophyllous or caulicolous, on reddish-violet spots, minute, gregarious in circular or irregular shaped groups (1-2mm., sometimes to 4mm. in diam.), short, cupulate; peridium white, the margin revolute; peridial cells rhomboidal, the outer wall 5-7 μ thick, striate, the inner wall thinner, verrucose; aecidiospores angular-globose or ellipsoidal, densely verruculose, yellowish, 15-25 = 14-18 μ . Uredosori amphigenous or caulicolous, scattered or gregarious, minute, roundish, early naked, surrounded by the ruptured epidermis, pulverulent, cinnamon-colored; uredospores globose, subglobose or ellipsoidal, densely verruculose, light brownish, 18-26 = 17-24 μ ; episporium 1.5-2.5 μ thick; germ-pores 3-4. Teleutosori amphigenous, or caulicolous, small ($\frac{1}{3}$ -1 $\frac{1}{2}$ mm. in diam.), roundish, scattered or gregarious on leaves, often oblong, confluent (2mm.-1cm., rarely 4cm. in length) on stems, compact, blackish brown; teleutospores subglobose, ovate or ellipsoidal, apex rounded, thickened (6 μ), base mostly rounded, smooth, chestnut-brown, darker at apex, 22-38 = 14-22 μ ; pedicels yellowish or brownish, persistent, up to 90 μ in length.

Beside this, two more species of *Uromyces* on another Polygonaceous plant were recorded from Japan by the European authors. They are *Uromyces Acetosae* SCHROET. and *U. Rumicis* (SCHUM.) WINT. on *Rumex acetosa*. Moreover, *Puccinia Acetosae* (SCHUM.) KOERN. was recorded on the same hostplant. In the absence of the teleutospores, these three species are hardly distinguishable by the size and the character of spines of the uredospores. Hence, these species may be often mistaken for each other in an incomplete specimen. Unfortunately, the teleutospores of this fungus in question are not yet collected in our country up to the present. The question of its real position remains for future study.

ON SAURURACEÆ

38. *Uromyces Saururi* P. HENN.

Hedw. XLI, p. (19), 1902—SACC. Syll. XVII, p. 257—SYDOW, Monogr. Ured. II, p. 246.

(P. HENN. ENGL. Bot. Jahrb., XXXI, p. 729, 1902—MATSUM. Ind. Plant Jap. I, p. 181—SHIRAI, List, p. 109—SHIRAI & MIYAKE, List, p. 709—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 36, 1904).

(Pl. VIII, fig. 23.)

Hab. On leaves of *Saururus Loureiri* DECNE. (*Hangeshō*).

Shikoku—Prov. Tosa; Aki-machi (X, 1904; X, 1906. T. YOSHINAGA).

Distrib. Japan.

Remarks. The general character of this endemic fungus is as follows:—

Aecidia hypophyllous, on small roundish or irregular shaped, blackish spots, scattered or rarely gregarious, minute, cupulate, short, white; peridial cells rhomboidal, ca. 22μ long, the outer wall $4-5\mu$ thick, striate, the inner wall thinner, verrucose; aecidiospores globose or ellipsoidal verrucose, subhyaline, $14-22\mu$ in diam. Teleutosori hypophyllous, on small roundish or often confluent (0.5–3mm. across), blackish or blackish-violet conspicuous spots, minute, roundish, scattered or gregarious in roundish groups (1–3mm. across), naked, compact, blackish; teleutospores globose, ovate, oblong or ellipsoidal, often angular, apex rounded or obtusely pointed, slightly thickened (up to 6μ), base mostly attenuated, smooth, brownish, $22-36=14-22\mu$ pedicels persistent, brown, short.

This fungus is not common.

ON LILIACEÆ

Key to species

Teleutospore-wall smooth

Teleutosori crustaceous, black; on *Allium nipponicum* 40. *U. durus*

Teleutosori powdery, chestnut-brown; on *Veratrum* 44. *U. Veratri*

Teleutospore-wall with anastomosed ridges; on *Erythronium* & *Tulipa*.. 41. *U. Erythronii*

Teleutospore-wall verrucose

Teleutospore-wall thick ($2-3.5\mu$), $24-43=20-28\mu$, warts in more or less

regular rows; on *Lilium* 43. *U. Holwayi*

Teleutospore-wall thin ($1-1.5\mu$), $20-39=15-21\mu$, warts small and scattered;

on *Fritillaria*..... 42. *U. Miurae*

Teleutospore-wall moderately thick ($1.5-2\mu$), $22-36=16-24\mu$, warts loosely scattered

or rarely in rows; on *Allium Victorialis* 39. *U. japonicus*

39. *Uromyces japonicus* BERK. et CURT. (non SYDOW)

Proc. Am. Acad. Arts & Sc. IV, p. 126, 1858 (sub. *Urom. Japonica*).

(MIQUEL, Prolusio Florae Japonicae, p. 392, 1866-67—SHIRAI, List, p. 108—SHIRAI & MIYAKE, List, p. 703—MATSUM. Ind. Pl. Jap. I, p. 181).

(Pl. VIII, fig. 24)

Syn. *Uredo japonica* DE TONI, SACC. Syll. VII, p. 851. (SHIRAI, List, p. 105—SHIRAI & MIYAKE, List, p. 687).

Aecidium reticulatum THUEN. Beitr. Pilzfl. Sibir. IV, p. 206, 1880.

Uromyces reticulatus BUBÁK, Sitz. Königl. Böhm. Ges. Wiss. p. 22, 1902—FISCH. Ured. Schw. p. 5, fig. 4—HARIOT, Ured. p. 224—SACC. Syll. XVII, p. 259—SYDOW, Monogr. Ured. II, p. 261. (SYDOW, Ann. Mycol. XI, p. 94, 1913—SHIRAI & MIYAKE, List, p. 709).

Hab. On leaves of *Allium Victorialis* L. (*Gyoja-ninniku*).

Saghalien—Todomoshiri (26, VII, 1906. T. MIYAKE).

Kurile Isl.—Etorofu; Shana (3, VIII, 1898. T. KAWAKAMI).

Hokkaidō—Prov. Kitami; Mt. Rishiri (13, VIII, 1899. T. KAWAKAMI). Prov. Iburi; Muroran (12, VI, 1900. K. MIYABE; 29, VI, 1901. G. YAMADA). Mt. Shiribeshi (5, VIII, 1907. S. ITŌ). Prov. Ishikari; Sapporo (11, V, 1903. S. ITŌ), Mt. Teine (6, VII, 1907. S. ITŌ). Prov. Oshima; Hakodate (1854. C. WRIGHT).

Distrib. Europe, Siberia and Japan.

Remarks. During the North Pacific Exploring Expedition, CHARLES WRIGHT has collected this fungus at Hakodate, Prov. Oshima in 1854 and BERKELEY and CURTIS described it under the name *Uromyces Japonica* in 1858. Its description is so simple and incomplete as follows:—

“Maculis orbicularibus; soris solitariis vel circinantibus; sporis ovatis, apicule terminali. hyalino; pedunculo brevi, externa membrana evanescente. On leaves of an Orchid? Japan.”

Later, DE TONI changed this name to *Uredo japonica* B. et C. in SACCARDO'S Sylloge Fungorum without any remarks.

This fungus is the most interesting to us, because it is one of the first described rust-fungi from Japan. Through the courtesy of Prof. K. MIYABE, the writer observed a bit of type-specimen which was sent from Prof. FARLOW to Prof. K. MIYABE. Careful study of it shows that this fungus is identical to BUBÁK'S *Uromyces reticulatus* on *Allium Victorialis*. According to priority, we must retain the species name given by BERKELEY and CURTIS. The writer corrected its name to *Uromyces japonicus* for *Urom. Japonica* by the rule of Latin language. There is the same name which was given to the fungus parasitic on *Lilium Maximowiczii* RGL. by H. ET P. SYDOW in 1900. The latter species will be discussed on a later page.

The general character of *Uromyces japonicus* on *Allium Victorialis* s as follows:—

Aecidia hypophyllous, on yellowish discolored spots, gregarious in oblong groups (2-6mm. in diam.), or linear on nerves (1cm. in length),

minute, cupulate; peridium short, yellowish-white, the margin lacerate; peridial cells polygonal or rhomboidal, the outer wall $5-7\mu$ thick, striate, the inner wall thinner, verrucose; aecidiospores angular-globose, densely verruculose, hyaline or yellowish, $18-25=14-20\mu$. Teleutosori amphigenous, minute or medium in size, on discolored spots, scattered or gregarious in roundish groups ($2-5\text{mm}$ across), roundish or oblong, covered by the lead-colored epidermis, or naked, surrounded by the ruptured epidermis, pulverulent, dark brown; uredospores (?) intermixed, globose, subglobose, ellipsoidal or ovate, verruculose, hyaline, $21-28=18-24\mu$; epispore thin or ca. 2μ thick; teleutospores ellipsoidal, ovate or globose, apex rounded or rarely attenuated, with small conical hyaline papilla, base rounded or attenuated, verrucose, brown, $22-36=16-22\mu$; epispore ca. 2μ thick; pedicels hyaline, short, deciduous.

40. *Uromyces durus* DIETEL.

Ann. Mycol. V, p. 70, 1907—SYDOW, Monogr. Ured. II, p. 264. (SHIRAI & MIYAKE, List, p. 696).

(Pl VIII, fig. 25)

Syn. *Uromyces ambiguus* DIET. (non Lév.), Hedw. XLI, p. (177), 1902—(SHIRAI, List, p. 170—SHIRAI & MIYAKE, List, 695—YOSHINAGA, Bot. Mag. Tokyo, XVI, p. 7, 1902—YOSHINO, Bot. Mag. Tokyo, XIX, p. 101, 1905).

Hab. On leaves and flower-stalks of *Allium nipponicum* FR. et SAV. (*Nobiru*).

Shikoku—Prov. Tosa; Aki-machi (IX, 1905; X, 1905. T. YOSHINAGA), Kamodamura (XI, 1908. T. YOSHINAGA).

Kiushū—Prov. Higo; Kumamoto (25, V, 1904. K. YOSHINO).

Distrib. Japan.

Remarks. The general character of this fungus is as follows:—
Uredosori on leaves, without spot, scattered, small, roundish or elliptical, long covered by the epidermis, then naked, surrounded by the ruptured epidermis, pulverulent, cinnamon-colored; uredospores ellipsoidal, subglobose or ovate, echinulate, brownish, $18-36=16-26\mu$. Teleutosori on leaves and flower-stalks, oblong or elongate to linear (up to 2cm. long), covered by the epidermis, crustaceous, conspicuous, black; teleutospores obovate or clavate, apex thickened, base rounded or attenuated, smooth, chestnut-brown, $24-37=13-23\mu$; pedicels short, hyaline; paraphyses forming compartments, clavate, chestnut-brown.

This fungus was classified erroneously as *Uromyces ambiguus*. The two-celled teleutospores are intermixed rarely among the one-celled typical ones in the sori on leaves. The general characters of the two-celled spores and the surrounding paraphyses exactly coincide with those of *Puccinia Blasdalei* DIET. et HOLW.

41. *Uromyces Erythronii* (DC.) PASS.

Comm. Soc. Critt. Ital. II, p. 452, 1867—FISCH. Ured. Schw. p. 7, fig. 6—HARIOT, Ured. p. 224—SACC. Syll. VII, p. 564—SCHROET. Pilze, I, p. 311. *p. p.*—SYDOW, Monogr. Ured. II, p. 269—WINT. Pilze, I, p. 149. *p. p.*

(DIET. ENGL. Bot. Jahrb. XXVIII, p. 282, 1901—MATSUM. Ind. Pl. Jap. I, p. 180—SHIRAI, List, p. 108—SHIRAI & MIYAKE, List, p. 699—SYDOW, Ann. Mycol. XI, p. 94, 1913).

(Pl. IX, fig. 1 and 2.)

Syn. *Accidium Erythronii* DC. Fl. Franç. II, p. 246, 1805.

Uredo Erythronii DC. *l. c.* VI, p. 67, 1815.

Uromyces Erythronii LÉV. Ann. Sc. Nat. Ser. 3, VIII, p. 371, 1847.

Caenomurus Erythronii KUNTZE, Rev. Gen. III³, p. 450, 1898.

Uromycopsis Erythronii ARTH. Rés. Sc. Congr. Bot. Wien, p. 345, 1906.

Uromyces Tulipae DIET. ENGL. Bot. Jahrb. XXVIII, p. 282, 1901—SACC. Syll. XVI, p. 266—SYDOW, Monogr. Ured. II, p. 284. (P. HENN. ENGL. Bot. Jahrb. XXXIV, p. 595, 1905—MATSUM. Ind. Pl. Jap. I, p. 182—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 713—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 37, 1904).

Hab. On leaves of *Erythronium dens-canis* L. (*Katakuri*).

Hokkaidō—Prov. Ishikari; Sapporo (1, VI, 1891. Y. TOKUBUCHI; V, 1896. J. HANZAWA; IV, 1906. S. ITÔ), Makomanai (21, V, 1901. G. YAMADA; 5, VI, 1905. S. ITÔ), Jōzankai (23, V, 1893. Y. TOKUBUCHI). Prov. Shiribeshi; Otaru (29, IV, 1900. G. YAMADA; 2, V, 1890. K. MIYABE).

Honshū—Prov. Ugo; Ōmagari (V, 1904. Y. TOKUBUCHI). Prov. Musashi; Mt. Chichibu (2, VIII, 1905. H. TAKEDA). Prov. Mimasaka; Furumachi (5, IV, 1904. S. ARIMOTO).

On *Tulipa edulis* BAK. (*Amana*).

Honshū—Prov. Awa; Shishikui (III, 1902. T. YOSHINAGA).

Distrib. Europe and Japan.

Remarks. In 1901, P. DIETEL described *Uromyces Tulipae* from the specimen sent by S. KUSANO and he remarked that its characteristic is the thinner transversal ridges on the wall of the teleutospores.

The writer studied the specimen collected by T. YOSHINAGA which was identified as *Uromyces Tulipae* by P. HENNINGS in 1905. A comparison with *Uromyces Erythronii* on *Erythronium dens-canis* clearly shows that this is identical to it. The genera *Tulipa* and *Erythronium* have a close relationship in the systematic position.

The general character of this fungus is as follows:—

Spermogonia amphigenous, brownish or yellowish, among aecidia; aecidia mostly hypophyllous or petiolicolous, minute, on yellowish spots, gregarious in round or elongate groups, cupulate; peridium short, yellowish-white, the margin revolute; peridial cells rhomboidal, the outer wall 4-6 μ thick, striate, the inner wall ca. 4 μ thick, verrucose; aecidiospores angular-globose or ellipsoidal, densely verrucose, yellowish, 20-30 = 15-24 μ . Teleutosori amphigenous, on discolored spots, minute ($\frac{1}{3}$ —1 mm across), roundish, scattered or gregarious, naked, dark brown; teleutospores subglobose, ellipsoidal or ovate, apex rounded, with hyaline papilla, base rounded, with undulate anastomosed ridges on wall, brownish, 22-42 = 16-25 μ ; epispore ca. 1.5-2 μ thick; pedicels hyaline, short.

42. *Uromyces Miurae* Sydow

Ann. Mycol. XI, p. 94, 1913.

(Pl. IX, fig. 3.)

Syn. *Pucciniola Miurae* ARTH. N. Am. Fl. VII, p. 442, 1921.

Hab. On leaves of *Fritillaria camtschatensis* GAWL. (*Kuroyuri*).

Honshū—Prov. Shinano; Mt. Yatsugatake (4, VIII, 1903. T. MIYAKE), Mt. Shiro-uma (10, VIII, 1906. M. MIURA).

Distrib. N. America and Japan.

Remarks. This fungus is distinguished from *Uromyces Lili* by the smallness in size and by the thinner wall of the teleutospores.

The general character of this fungus is as follows:—

Teleutosori amphigenous, on small yellowish or brownish irregular shaped spots (3-6 mm. across), minute, roundish, gregarious in roundish, oblong or circular groups (2-4 mm. across), long covered by the epidermis, brownish; teleutospores fusiform, ellipsoidal, ovate or oblong, apex rounded, with conical hyaline papilla (4 μ), base mostly rounded, verrucose, brown, 19-39 = 15-21 μ ; epispore 1.5-2 μ thick; pedicels hyaline, deciduous, short. We have a specimen of aecidium on the same host-plant, which was collected by T. MIYAKE at Kusunkotan, Saghalien, on July 10, 1906. The aecidium is left undetermined for the future study.

43. *Uromyces Holwayi* LAGERH.

Hedw. XXVIII, p. 103, 1889—SACC. Syll. IX, p. 194—SYDOW, Monogr. Ured. II, p. 276, 1910.

(Pl. IX, fig. 4.)

Syn. *Uromyces Lili* CLINTON, PECK, 27 Ann. Rep. N. Y. State Mus. p. 103, 1875.

U. japonicus SYD. Mem. Herb. BOISS. p. 3, 1900; Monogr. Ured. II, p. 276—SACC. Syll. XVI, p. 267. (DIET. Ann. Mycol. V, p. 70, 1907—P. HENN. ENGL. Bot. Jahrb. XXVIII, p. 261, 1901—MATSM. Ind. Pl. Jap. I, p. 181—SHIRAI, List, p. 108—SHIRAI & MIYAKE, List, p. 703).

U. nipponicus ITO, Bot. Mag. Tokyo, XXXII, p. 207, 1918.

U. Lili SYD. (non FUCK.) Ann. Mycol. XI, p. 94, 1913.

Caomurus Holwayi KUNTZE, Rev. Gen. III³, p. 450, 1898.

C. Lili KUNTZE, l. c. p. 450.

Nigredo Lili ARTH. Rés. Sc. Congr. Bot. Wien, p. 344, 1906.

Hab. On leaves of *Lilium auratum* LINDL. (*Yamayuri*).

Hokkaidō—Prov. Ishikari; Sapporo (17, VII, 1905. K. MIYABE).

Honshū—Prov. Rikuchū; Morioka (3, VII, 1907. M. MIURA).

On *Lilium dahuricum* GAWL. (*Yezo-sukashiyuri*).

Saghalien—Raichiska (6, IX, 1907. T. MIYAKE).

Hokkaidō—Prov. Ishikari; Ishikari (VI., 1896. T. KAWAKAMI); Prov. Shiribeshi; Zenibako (11, VI, 1891. Y. TOKUBUCHI; 31, V, 1897. K. MIYABE).

On *Lilium Maximowiczii* REGEL. (*Ko-oniyuri*).

Shikoku—Prov. Tosa; Higashigawa-mura (V, 1905; VI, 1905. T. YOSHINAGA).

Distrib. N. America and Japan.

Remarks. SYDOW reported the occurrence of *Uromyces Lili* FUCK. on *Lilium auratum* in Japan, by the specimen collected by M. MIURA at Morioka on July 3, 1907. The writer found many uredospores in the same specimen as well as in those on *Lilium dahuricum* and *L. Maximowiczii*. Hence, the fungus is not identical to *Uromyces Lili* FUCK.

Uromyces Holwayi was thought of as a Hemi-form until ARTHUR described it as an Eu-form under the name *Nigredo Lili* (CLINT.) ARTH. in North American Flora, VII, p. 242, 1912. In our country, the acidium is found on *Lilium dahuricum* only.

By the use of the name *Uromyces japonicus* BERK. et CURT. for *Urom. reticulatus* BUBÁK, the name *Urom. japonicus* SYD. must be

changed. Therefore, the writer proposed a new name *Urom. nipponicus* for the latter species. Later, in the course of comparative study, the writer found these fungi on *Lilium auratum*, *L. dahuricum* and *L. Maximowiczii* to be the same species and identical to *Urom. Holwayi*.

The general character of our fungus is as follows:—

Spermogonia mostly hypophyllous, small, yellow; aecidia mostly hypophyllous, gregarious, short, cupulate; peridium white, the margin erect; peridial cells rhomboidal, the walls 2–3 μ thick, the inner wall verrucose; aecidiospores globose, verruculose, hyaline, 16–24=15–20 μ . Uredosori amphigenous, on discolored spots, scattered or gregarious, minute, at first covered by the epidermis, then naked, pulverulent, cinnamon-colored; uredospores globose, subglobose or ellipsoidal, echinulate, yellowish, 20–32=18–28 μ ; epispore thick (3–4 μ); germ-pores 3–4. Teleutosori conformed, blackish-brown; teleutospores subglobose, ovate, piriform or ellipsoidal, apex rounded, not thickened, with hyaline papilla, linearly verrucose, brown, 24–46=20–29 μ ; pedicels hyaline, short, deciduous.

44. *Uromyces Veratri* (DC.) Schroet.

Abhandl. Schles. Gesel. p. 10, 1872—HARIOT, Uréd. p. 225—SACC. Syll. VII, p. 543—SCHROET. Pilze Schles. I, p. 307—SYDOW, Monogr. Ured. II, p. 284.

(DIET. ENGL. Bot. Jahrb. XXXII, p. 624, 1903—SHIRAI, List, p. 110—SHIRAI & MIYAKE, List, p. 713).

(Pl. IX, fig. 5.)

Syn. *Uredo Veratri* DC. Encycl. VIII, p. 224, 1808.

Uromyces Veratri OTTH et WARTM. Schw. Crypt. no. 402.

U. Veratri WINT. Pilze Deut. I, p. 143, 1884.

Aecidium Adenostylis SYD. Oesterr. Bot. Zeit. p. 9, 1901.

A. Caeciliae THÜM. Doubl. Verz. Leip. Bot. Tauschv. p. 3, 1870.

Cœomurus Veratri KUNTZE, Rev. Gen. III³, p. 451. 1898.

Hab. On leaves of *Veratrum album* L. var. *Lobelianum* BAK. f. *japonica* BAK. (*Baikeisō*).

Saghalien—Mt. Susuya (27, VII, 1907. T. MIYAKE), Mt. Nupuripo (13, VIII, 1907. T. MIYAKE).

Hokkaidō—Prov. Kushiro; Nusamai (7, VII, 1886. M. NAKAMURA).

Honshū—Prov. Uzen; Mt. Gwassan (7, VIII, 1901. G. YAMADA). Prov. Shimotsuke:

Nikkō (16, VIII, 1891. S. HORI), Mt. Shirane (7, VIII, 1900. G. YAMADA & J. HANZAWA).

Kiushū—Prov. Hyuga; Mt. Ichibusa (VIII, 1902. T. KAWAKAMI).

Distrib. Europe, Siberia and Japan.

Remarks. In our country, aecidia are found on *Cacalia delphinifolia*, *C. bulbifera*, *C. adenostyloides*, *C. Krameri* and *Senecio* sps. Perhaps, some of these aecidia may have a biological relation to *Uromyces Veratri*.

The general character of our fungus is as follows:—

Uredosori hypophyllous, on discolored spots, scattered or gregarious, often confluent, minute, roundish, naked, surrounded by the ruptured epidermis, pulverulent, chestnut-brown; uredospores subglobose or ellipsoidal, echinulate, yellowish-brown, $20-28=17-25\mu$; epispore $1.5-2.5\mu$ thick; germ-pores 2, equatorial. Teleutosori conformed, chestnut-brown; teleutospores ellipsoidal, ovate or oblong, apex mostly rounded, with hyaline or subhyaline conical papilla (up to 9μ in height), base rounded or attenuated, smooth, brown, $18-38=14-22\mu$; pedicels hyaline or subhyaline, subpersistent, up to 40μ long.

ON COMMELINACEÆ

45. *Uromyces Commelinæ* CKE.

Trans. Roy. Soc. Edinb. p. 342, 1887—SACC. Syll. VII, p. 573—SYDOW, Monogr. Ured. II, p. 292.

(FUJIKURO, Trans. Form. Nat. Hist. Soc. no. 19, p. 2 (extr.), 1914—SHIRAI & MIYAKE, List, p. 697).

Syn. *Uredo Commelinæ* SPEG. An. Soc. Ci. Argent. IX, p. 170, 1880.

U. Spegazzinii DETONI, SACC. Syll. VII, p. 845, 1888.

U. ochracea DIET. Hedw. XXXVI, p. 35, 1897. (DIET. ENGL. Bot. Jahrb. XXVII, p. 572, 1900—SACC. Syll. XIV, p. 403—SHIRAI, List, p. 105—SHIRAI & MIYAKE, List, p. 689—YOSHINO, Bot. Mag. Tokyo, XIX, p. 101, 1905).

U. Commelinacea ELL. et KELS. Bull. Torr. Bot. Club. XXIV, p. 209, 1897.

U. Miyoshiana DIET. SYD. Ured. no. 1348.

Uromyces Commelinæ var. *abyssinica* P. HENN. ENGL. Bot. Jahrb. XVII, p. 10, 1893.

U. tosensis P. HENN. Hedw. XLIII, p. (107), 1903—SACC. Syll. XVII, p. 261. (SHIRAI, List, p. 110—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 36—YOSHINO, Bot. Mag. Tokyo, XIX, p. 103, 1905).

U. Spegazzinii ARTH. Bull. Torr. Bot. Club, XXXVII, p. 573, 1910. (SYDOW, Ann. Mycol. XII, p. 106, 1914—SHIRAI & MIYAKE, List, p. 711).

Caenomirus Commelinae KUNTZE, Rev. Gen. III³, p. 450, 1898.

Nigredo Commelinae ARTH. N. Am. Fl. VII, p. 237, 1912.

Hab. On leaves and stems of *Commelina communis* L. (*Tsuyukusa*).

Honshû—Prov. Musashi; Tokyo (8, X, 1892. S. MATSUDA; 29, IX, 1895. S. HORI; 31, X, 1898. M. MIYOSHI; IX, 1899. S. KUSANO; 15, X, 1899. T. NISHIDA), Yokohama (3, IX, 1889. K. MIYABE). Prov. Awa; Mera (29, VII, 1893. K. MIYABE), Nemoto (30, VII, 1893. K. MIYABE). Prov. Mino; Gifu (IX, 1898. Y. TOKUBUCHI). Prov. Shima; Toba (7, VIII, 1898. Y. TOKUBUCHI). Prov. Harima; Himeji (6, IX, 1899. Y. TAKAHASHI).

Shikoku—Prov. Tosa; Sakawa-machi (VIII, 1902. T. YOSHINAGA).

Distrib. South & North America, Africa, India and Japan.

Remarks. This fungus was recorded from Japan under various names by European authors, viz., *Uromyces tosensis*, *Uredo ochracea*, *U. Miyoshiana* and *Uromyces Spegazzinii*. It may be due to the absence of teleutospores. Fortunately, Y. FUJIKURO found the teleutospores of this fungus on the leaves of *Commelina nudiflorum* L. (*Shimatsuyukusa*) in Formosa and he identified it with *Uromyces Commelinae*.

The general character of the uredostage of this fungus, is as follows:—

Uredosori mostly hypophyllous or caulicolous, without or with yellowish discolored spots, minute or medium in size ($1/4$ – $3/4$ mm. in diam.), roundish, or elongate on stem, scattered or gregarious in irregular or circular groups, early naked, surrounded by the ruptured epidermis, cinnamon-colored; uredospores globose, ovate or ellipsoidal, aculeate, yellowish-brown or brownish, 22 – $32 = 20$ – 26μ ; epispore 1.5 – 2μ thick.

ON AMARANTACEÆ

46. *Uromyces Deeringiæ* SYDOW

Ann. Mycol. I, p. 324; Monogr. Ured. II, p. 226, fig. 113—SACC. Syll. XVII, p. 257.

(SYDOW, Ann. Mycol. XII, p. 105, 1914—FUJIKURO, Trans. Form. Nat. Hist. Soc. no. 19, p. 2 (extr.), 1914).

Hab. On leaves of *Deeringia indica* GOLL. (*Shimahimokazura*).

Formosa.

Distrib. Java, Luzon and Japan.

Remarks. The uredostage of this fungus was found in Formosa. Unfortunately, the writer has not seen this specimen.

ON ARACEÆ

47. *Uromyces pyriformis* CKE.

PECK, 29 Rep. N. Y. State Museum, p. 69, 1878—SACC. Syll. VII, p. 572—SYDOW, Monogr. Ured. II, p. 294.

(FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 391, 1914; Trans. Form. Nat. Hist. Soc. no. 19, p. 3, 1914),

Syn. *Caeomurus pyriformis* KUNTZE, Rev. Gen. III³, p. 450, 1898.

Nigredo pyriformis ARTH. N. Am. Fl. VII, p. 237, 1912.

Hab. On leaves of *Acorus Calamus* L. (*Shōbu*).

Formosa.

Distrib. N. America, Java and Japan.

Remarks. Y. FUJIKURO recorded the occurrence of this species in Formosa in 1914. The writer has not seen this specimen.

ON CYPERACEÆ

Key to species

Teleutospores 20-36 = 10-20 μ ; uredospores 18-26 = 15-20 μ ; on

Rhynchospora.....48. *U. Rhynchosporæ*

Teleutospores 25-36 = 10-15 μ ; uredospores 25-39 = 18-25 μ ; on

Scirpus.....49. *U. Harcamis*

48. *Uromyces Rhynchosporæ* ELL.

Journ. Mycol. VII, p. 274, 1893—SACC. Syll. XI, p. 180—SYDOW, Monogr. Ured. II, p. 302.

(Pl. IX, fig. 6.)

Syn. *Uromyces rhynchosporicola* P. HENN. Hedw. XXXV, p. 226, 1896.

Caeomurus Rhynchosporæ KUNTZE, Rev. Gen. III³, p. 450, 1898.

Nigredo Rhynchosporæ ARTH. Rés. Sc. Congr. Bot. Wien, p. 344, 1906.

Hab. On leaves of *Rhynchospora alba* (L.) VAHL. (*Mikazukigusa*).

Hokkaidō—Prov. Ishikari; Tsuishikari (6, X, 1907. M. KASAI).

Distrib. N. & S. America and Japan.

Remarks. This fungus is new to Japan. We have not yet observed its uredosori. The general character of our fungus is as follows:—

Teleutosori hypophyllous, on brownish discolored spots, scattered or gregarious, often confluent, roundish or elliptical, $1/3$ –1 mm long, naked, surrounded by the ruptured epidermis, pulvinate, compact, blackish; uredospores intermixed, subglobose or ellipsoidal, echinulate, yellowish or yellowish-brown, 18 – $26 = 15$ – 20μ ; episore ca. 1.5μ thick; germ-pores 2 in number; teleutospores ellipsoidal, ovate, oblong or clavate, apex rounded or truncate, thickened (10 – 16μ), base mostly attenuated, smooth, brown, darker at apex, 20 – $36 = 10$ – 20μ ; pedicels persistent, light brown, up to 50μ in length.

49. *Uromyces Haræanus* SYDOW.

Ann. Mycol. X, p. 405, 1912.

(HARA, Bot. Mag. Tokyo, XXVII, p. 67, 1913),

(Pl. IX, fig. 7.)

Hab. On leaves of *Scirpus Cyperinus* KUNTH var. *concolor* MAK. (*Aburagaya*)

Honshū—Prov. Echigo; Mt. Hakkai (10, X, 1897. T. ARAI). Prov. Mino; Kawaue (2, X, 1912. K. HARA).

Distrib. Japan.

Remarks. In 1912, SYDOW, described this species from the specimen collected at Kawaue, Prov. Mino by K. HARA. In the course of study, the writer found there are two kinds of uredospores in the same sorus of this fungus. One of them is distinctly echinulate, thin walled and yellowish-colored, while the other is almost smooth, thick walled and brown-colored. The latter form only was described in the original diagnosis.

The general character of this endemic fungus is as follows:—

Uredosori amphigenous, mostly hypophyllous, on elongate brownish spots, scattered or gregarious in linear groups, minute, roundish or oblong ($1/4$ – $1/2$ mm. in length), at first covered by the epidermis, then naked, pulverulent, brown; (a) uredospores globose, ovate or ellipsoidal, echinulate, yellowish or yellowish-brown, episore ca. 1.5μ thick; (b)

uredospores globose, ovate or angular, almost smooth, chestnut-brown, episore $2.5-3.5\mu$ thick, often with persistent pedicels, $25-39=18-25\mu$; germ-pores 2-4, equatorial, provided with hyaline papilla. Teleutosori conformed, blackish-brown; teleutospores clavate, oblong or irregular in shape, apex rounded or conically attenuated, greatly thickened ($7-12\mu$), base attenuated, yellowish-brown or brown, darker at apex, smooth, $25-36=10-15\mu$; pedicels persistent, yellowish or brownish, up to 43μ in length.

ON GRAMINÆ

Key to species

Teleutospore-apex coronate

Teleutospores $18-30=13-24\mu$; on *Leersia*52. *U. Halstedii*

Teleutospores $20-40=10-20\mu$; on *Zizania*56. *U. coronatus*

Teleutospore-apex not coronate

Teleutospore-apex very thickened

Uredospores $17-24=14-22\mu$; on *Muehlenbergia*53. *U. Muehlenbergia*

Uredospores $22-28=20-25\mu$; on *Panicum*55. *U. linearis*

Teleutospore-apex not or slightly thickened

Uredospores $18-26=15-21\mu$, with 6-8 germ-pores; on *Alopecurus*50. *U. Alopecuri*

Uredospores $22-34=18-29\mu$, with 3-4 germ-pores; on *Setaria*....54. *U. Setariae-italica*

Uredospores $24-38=20-28\mu$, with 4-6 germ-pores; on *Eriochloa*51. *U. Eriochloa*

50. *Uromyces Alopecuri* Szym.

Proc. Bost. Soc. Nat. Hist. XXIV, p. 186, 1889—SACC. Syll. IX, p. 295—SYDOW, Monogr. Ured. II, p. 318.

(DIETEL, ENGL. Bot. Jahrb. XXXII, p. 47, 1902—FUJIKURO, Trans. Form. Nat. Hist. Soc. no. 19, p. 2 (extr.), 1914—MATSUM. Ind. Pl. Jap. I, p. 180—SHIRAI, List, p. 107—SHIRAI & MIYAKE, List, p. 695—YOSHINAGA, Bot. Mag. Tokyo, XVIII, p. 35, 1904.

(Pl. IX, fig. 8.)

Syn. *Uromyces Alopecuri* var. *japonica* ITO, Journ. Agr. Coll. Tohoku Imp. Univ. III, p. 184, pl. X, fig. 3, 1909.

Caecomurus Alopecuri KUNTZE, Rev. Gen. III³, p. 449, 1898.

Nigredo Alopecuri ARTH. Rés. Sc. Congr. Bot. Wien, p. 343, 1906.

Nielsenia Alopecuri SYD. Ann. Mycol. XIX, p. 171, 1921.

Hab. On leaves and sheaths of *Alopecurus fulvus* L. (*Suzumeno-teppō*).

Hokkaidō—Prov. Ishikari; Sapporo (20, VI, 1891. K. MIYABE), Nopporo (27, VII, 1905. J. HANZAWA), Garugawa (22, IX, 1907. S. ITŌ), Iwamizawa (10, VII, 1908. S. ITŌ). Prov. Iburi; Muroran (10, VI, 1900. K. MIYABE).

Honshū—Prov. Rikuchū; Morioka (30, V, 1903. G. YAMADA; 3, VII, 1907. M. MIURA). Prov. Echigo; Yoshida (22, VII, 1908. S. ITŌ), Tsubame (26, VII, 1908. S. ITŌ). Prov. Musashi; Tokyo (VII, 1899; 2, V, 1899. S. KUSANO), Nishigahara (22, VI, 1896. S. HORI; 29, XI, 1899. T. NISHIDA), Kawaguchi (31, V, 1906. N. NAMBU), Aoyama (VI, 1902. K. YOSHINO). Prov. Yamashiro; Kyoto (8, VI, 1895. N. HIRATSUKA; 14, VII, 1895. Y. TAKAHASHI).

Shikoku—Prov. Iyo, Sugō-mura (22, V, 1899. K. OKUDIRA). Prov. Tosa; Shimoji-mura (12, VI, 1909. T. YOSHINAGA).

Kiushū—Prov. Chikuzen; Omuda (23, IV, 1905. K. YOSHINO). Prov. Higo; Imizu-mura (26, V, 1904. K. YOSHINO), Mt. Aso (13, VII, 1906. J. HANZAWA & K. YOSHINO), Kumamoto (2, VI, 1907. T. NISHIDA).

Formosa—Taihoku (5, IV, 1907. T. KAWAKAMI & R. SUZUKI).

On *Alopecurus japonicus* STEUD. (*Setogaya*).

Shikoku—Prov. Tosa; Asahi-mura (IV, 1903. T. YOSHINAGA).

Kiushū—Prov. Higo; Imizu-mura (25, V, 1905. S. MAIHARA).

Distrib. N. America and Japan.

Remarks. In a previous paper, the writer has founded a new variety comparing our specimens with the description of the American *Uromyces Alopecuri*. Later, the writer found that the original description of this fungus is somewhat incorrect and our fungus is identical to the American. P. & H. SYDOW already pointed out my misidentification in their monograph.

The general character of our fungus is as follows:—

Uredosori amphigenous, mostly hypophyllous, or on sheaths small, roundish or oblong, scattered or gregarious, often confluent, naked, surrounded by the ruptured epidermis, pulverulent, or sometimes loosely covered by the epidermis, especially on the sheaths, orange-colored; uredospores subglobose or ellipsoidal, verrucose-echinulate, 16-28 = 14-27 μ ; epispore 1.5-2 μ thick; germ-pores 6-8. Teleutosori amphigenous, mostly hypophyllous, or on sheaths and culms, those on leaf-blade small, roundish or oblong, scattered, rarely confluent; those on sheaths and culms small, roundish, oblong or linear, scattered or gregarious, often confluent; long covered by the epidermis, pulvinate, greyish-black; teleutospores globose, ovate or polygonal, apex rounded, truncate or obliquely pointed, more or less thickened (3-4 μ), base rounded or attenuated, yellowish-brown, darker at apex, 18-29 = 15-21 μ ; epispore 1-1.5 μ thick; pedicels brownish, persistent, as long as spores or sometimes little longer.

51. *Uromyces Eriochloæ* (SYD.) SYD. et BUTL.

Ann. Mycol. V, p. 492, 1907—SYDOW, Monogr. Ured. II, p. 327, fig. 162.

(DIET. Ann. Mycol. VIII, p. 304, 1910—SHIRAI & MIYAKE, List, p. 699).

Syn. *Uredo Eriochloae* SYD. Ann. Mycol. IV, p. 444, 1906.

Hab. On leaves and sheaths of *Eriochloa villosa* KUNTH. (*Narukobie*).

Shikoku—Prov. Tosa; Kada (IX, 1909. T. YOSHINAGA).

Distrib. East India and Japan.

Remarks. The writer has not seen the teleutospores of this fungus in the Japanese specimen. The general character of the uredospores is as follows:—

Uredosori amphigenous, scattered, small, roundish or oblong, long covered by the epidermis, then naked, pulverulent, yellowish-brown; uredospores subglobose, ovate or oblong, often angular, aculeate, brown, 24-39=21-28 μ ; epispore ca. 1.5 μ thick.

52. *Uromyces Halstedii* DE TONI.

SACC. Syll. VII. p. 557, 1888—SYDOW, Monogr. Ured. II, p. 330, fig. 164.

(SHIRAI & MIYAKE, List, p. 701).

(Pl. IX, fig. 9.)

Syn. *Uromyces digitatus* HALST. Journ. Mycol. III, p. 138, 1887.

U. ovalis DIET. ENGL. Bot. Jahrb. XXXVII, p. 97, 1905.

(DIET. Ann. Mycol. VIII, p. 304, 1910—ITÔ, Journ. Coll. Agr. Tohoku Imp. Univ. III, p. 182, pl. X, fig. 1, 1909—SHIRAI & MIYAKE, List, p. 707).

Caenomurus Halstedii KUNTZE. Rev. Gen. III³, p. 450, 1898.

Nigredo digitata ARTH. Rés. Sc. Congr. Bot. Wien, p. 343, 1906.

N. Halstedii ARTH. N. Am. Fl. VII, p. 226, 1912.

Hab. On leaves of *Leersia oryzoides* SW. var. *japonica* HACK. (*Sayanukagusa*)

Honshû—Prov. Musashi; Kami-itabashi (29, X, 1904. S. KUSANO).

Shikoku—Prov. Tosa; Kodakasamura (26, X, 1908. T. YOSHINAGA).

Distrib. N. America and Japan.

Remarks. In 1905, P. DIETEL described this fungus under the name of *Uromyces ovalis*, from the specimen collected by S. KUSANO, with remarks on the affinities with and differences from *Uromyces Halstedii*. The writer used previously DIETEL'S name, but these fungi are utterly identical.

The general character of our fungus is as follows:

Uredosori amphigenous, mostly hypophyllous, minute, round or oblong, gregarious or arranged in lines, on brownish discolored spots, usually not confluent, loosely covered by the epidermis, soon naked, somewhat pulverulent, yellowish-brown; uredospores globose, ellipsoidal or ovate, echinulate, light brown or yellowish-brown, $20-28=16-20\mu$; episporium thin; germ-pores 4-6, equatorial; paraphyses intermixed, mostly capitate, apex more or less thickened (about 4μ), light brown, $40-50=12-20\mu$. Teleutosori amphigenous, mostly hypophyllous, small, oblong or linear, scattered or gregarious on discolored spots, often confluent, naked, surrounded by the ruptured epidermis, somewhat pulvinate, brownish-black; teleutospores ovate, clavate or cuneiform, apex rounded, thickened (ca. 4μ), with many irregular blunt processes, base rounded or attenuated, chestnut-brown at the apex, lighter at the base, $18-30=13-24\mu$; pedicels persistent, brown, as long as the spores, sometimes 40μ in length.

53. *Uromyces Muehlenbergiae* S. ITŌ.

Journ. Coll. Agr. Tōhoku Imp. Univ. III, p. 186, pl. X, fig. 5, 1909—SYDOW, Monogr. Ured. II, p. 333.

(SHIRAI & MIYAKE, List, p. 705).

(Pl. IX, fig. 10.)

Hab. On leaves of *Muehlenbergia japonica* STEUD. (*Nezumigaya*).

Hokkaidō—Prov. Ishikari; Sapporo (X, 1890. K. MIYABE). Prov. Shiribeshi; Zenibako (9, X, 1895. K. MIYABE).

Distrib. Japan.

Remarks. The general character of our fungus is as follows:—

Teleutosori hypophyllous, very rarely epiphyllous, small, oblong or linear, scattered or gregarious, often confluent, naked, compact, blackish-brown; uredospores intermixed, globose, subglobose or ellipsoidal, echinulate, brownish-yellow, $17-24=16-24\mu$; episporium $2-4\mu$ thick; germ-pores 3-4; teleutospores subglobose, ovate or oblong, apex rounded, angular or apiculate, thickened ($6-13\mu$), base rounded, smooth, chestnut-

brown; darker at apex, $18-28=12-21\mu$, rarely 32μ in length; epispore rather thick; pedicels persistent, brownish, $10-42\mu$, sometimes 60μ in length.

54. Uromyces Setariae-italicae (DIET.) YOSHINO.

Bot. Mag. Tokyo, XX, p. 247, 1906—ITŌ, Journ. Coll. Agr. Tohōku Imp. Univ. III, p. 185, pl. X, fig. 4, 1909—SYDOW, Monogr. Ured. II, p. 339, fig. 171.

(FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 484, 1914; Trans. Form. Nat. Hist. Soc. no. 19, p. 3, 1914—SHIRAI & MIYAKE, List, p. 709—SYDOW, Ann. Mycol. XI, p. 94, 1913; XII, p. 106, 1914).

(Pl. IX, fig. 11.)

Syn. *Uredo Setariae-italicae* DIET. ENGL. Bot. Jahrb. XXXII, p. 632, 1903.—SACC. Syll. XVII, p. 457. (DIET. Ann. Mycol. VIII, p. 314, 1910—SHIRAI, List, p. 106—SHIRAI & MIYAKE, List, p. 691—YOSHINO, Bot. Mag. Tokyo, XIX, p. 101, 1905).

Hab. On leaves of *Setaria italica* BEAUV. var. *germanica* TRIN. (Awa)

Honshū—Prov. Rikuchū; Shinjō, Morioka. (26, IX, 1897. Y. TAKAHASHI). Prov. Musashi: Tokyo (3, X, 1901. S. KUSANO; 26, IX, 1896. S. HORI).

Shikoku—Prov. Tosa; Niida-hama (VIII, 1911. T. YOSHINAGA).

Kiushū—Prov. Higo; Kumamoto (V, 1902. T. KAWAKAMI; 19, X, 1906. K. YOSHINO).

On *Setaria glauca* BEAUV. (*Kinneokoro*.)

Shikoku—Prov. Tosa; Kadzurashima (23, X, 1910. T. YOSHINAGA).

On *Setaria viridis* BEAUV. (*Enokorosō*)

Honshū—Prov. Musashi; Tokyo (29, IX, 1896. S. HORI; 3, X, 1901. S. KUSANO); Prov. Izu; Shuzenji (1, XI, 1900. N. NAMBU).

Distrib. East India and Japan.

Remarks. The teleutospores of this fungus are not yet observed on *Setaria glauca* and *S. viridis*. The general character of this fungus is as follows:—

Uredosori amphigenous, mostly hypophyllous, minute, oblong, scattered or arranged in lines, naked, surrounded by the ruptured epidermis, pulverulent, cinnamon-colored; uredospores globose, subglobose or ovate, echinulate, yellowish-brown, $22-34=18-26\mu$; epispore 1.5μ thick; germ-pores 3-4. Teleutosori mostly hypophyllous or on sheaths, small, oblong or roundish, scattered or gregarious, not confluent, long covered by the epidermis, inconspicuous, greyish-black; teleutospores spherical, obovate or oblong, mostly angular, apex not or slightly thickened, rounded or truncate, base rounded or attenuated, yellowish-brown or yellowish;

20-30 = 16-24 μ ; epispore thick (2-3 μ); pedicels persistent, hyaline or subhyaline, as long as spores.

55. *Uromyces linearis* BERK. et BR.

Journ. Linn. Soc. XIV, p. 92, 1875—SACC. Syll. VII, p. 575—SYDOW, Monogr. Ured. II, p. 336, fig. 168.

(FUJIKURO, Trans. Form. Nat. Hist. Soc. no. 19, p. 3 (extr.), 1914).

Syn. *Caomurus linearis* KUNTZE, Rev. Gen. III¹, p. 450, 1898.

Hab. On leaves of *Panicum proliferum* LAM. (*Onukakibi*) and *P. repens* L. (*Ha'kibi*).

Formosa.

Distrib. East India, Ceylon and Japan.

Remarks. Y. FUJIKURO reported this species from Formosa in 1914. The teleutostage of this fungus has not yet been collected in our country. The writer has not seen the specimen.

56. *Uromyces coronatus* MIYABE et NISHIDA (non YOSHINAGA).

Bot. Centralbl. CV, p. 495—ITŌ, Journ. Coll. Agr. Tōhoku Imp. Univ. III, p. 183, pl. X, fig. 2, 1909.

(SHIRAI, List, p. 123).

(Pl. IX, fig. 12.)

Syn. *Uromyces coronatus* YOSHINAGA, Ann. Mycol. V, p. 70, 1907—SACC. Syll. XXI, p. 588—SYDOW. Monogr. Ured. II, p. 344, fig. 175. (FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 486; Trans. Form. Nat. Hist. Soc. no. 19, p. 2 (extr.), 1914—SHIRAI & MIYAKE, List, p. 699).

Ontoteliium coronatum SYD. Ann. Mycol. XIX, p. 174, 1921.

Hab. On leaves of *Zizania aquatica* L. (*Makomo*).

Honshū—Prov. Echigo; Yoshikawa-mura (24, VII, 1903. K. YOSHINO). Prov. Musashi; Akabane (22, X, 1902. K. YOSHINO), Komaba (16, VII, 1906. T. KARASHIMA).

Shikoku—Prov. Tosa; Ushioe-mura (X, 1906. T. YOSHINAGA), Kōchi (1, I, 1907. S. KUSANO).

Kiushū—Prov. Higo; Kōno-mura (6, VI, 1906. H. MATSUO). Prov. Chikugo: Yanagawa (17, IX, 1906. K. YOSHINO).

Formosa—Taihoku (5, XII, 1906. T. KAWAKAMI & R. SUZUKI).

Distrib. Japan.

Remarks. At first, K. MIYABE and T. NISHIDA studied this fungus and gave the name *Uromyces coronatus*. T. YOSHINAGA sent the specimen to P. DIETEL with the manuscript name on its label. When

P. DIETEL published the description, he wrote the author's name as YOSHINAGA. Soon later, he corrected this misunderstanding in the Botanisches Centralblatt.

The general character of our fungus is as follows:

Uredosori amphigenous, mostly hypophyllous, small, linear or oblong, scattered, naked, surrounded by the ruptured epidermis, brownish; uredospores ellipsoidal, ovate or globose, echinulate, yellowish-brown, darker at apex, $21-35=18-25\mu$; epispore ca. 2μ thick; germ-pores 3-4; paraphyses clavate. Teleutosori conformed, long covered by the epidermis, black; teleutospores ovate, oblong or ellipsoidal, apex rounded, coronate, base mostly attenuated, smooth brownish, darker at apex, $20-40=10-22\mu$; pedicels persistent, brownish, $30-45\mu$, rarely 50μ in length.

APPENDIX

GENUS PILEOLARIA CAST.

Key to species

- Uredospore-wall with spiral warts-rows
 Teleutospores large ($22-28=29-50\mu$), blackish; uredospore-wall with 3 or 4 warts-rows; on *Rhus trichocarpa*, *succedanea* 1. *P. Shiraiana*
 Teleutospores small ($16-23=23-28\mu$), chestnut brown; uredospore-wall with 8 or 9 warts-rows; on *Rhus Torientalis*.... 2. *P. Toxicodendri*
 Uredospore-wall with spiral ridges; on *Rhus javanica*..... 3. *P. Klugistanus*

1. *Pileolaria Shiraiana* (DIET. et SYD.) *nov. nom.*

(Pl. IX, fig. 13)

Syn. *Uromyces Shiraianus* DIET. et SYD. Hedw. XXXVII, p. 213, 1898—SACC. Syll. XIV, p. 274—SYDOW, Monogr. Ured. II, p. 145. (DIETEL, ENGL. Bot. Jahrb. XXXII, p. 47, 1903—P. HENN. ENGL. Bot. Jahrb. XXXIV, p. 595, 1905—MATSUM. Ind. Pl. Jap. I, p. 181—NISHIDA, Bot. Mag. Tokyo, XVI, p. 271, 1902—SHIRAI. List, p. 109—SHIRAI & MIYAKE, List, p. 711—SYDOW, Hedw. XXXVII, p. (207), 1898; Ann. Mycol. XI, p. 94, 1913; *l. c.* XII, p. 158, 1914—YOSHINAGA, Bot. Mag. Tokyo, XIX, p. 36, 1905—YOSHINO, Bot. Mag. Tokyo, XIX, p. 102, 1905).

Hab. On leaves of *Rhus succedanea* L. (*Hazenoki*).

Loochoo—Yagachi (10, VIII, 1924. T. MIYAGI).

On *Rhus trichocarpa* MIQ. (*Yamaurushi*).

Hokkaidō—Prov. Ishikari; Ishiyama near Sapporo (11, X, 1905. S. ITŌ). Prov. Shiribeshi; Inahotōge (31, VII, 1897. G. YAMADA). Prov. Iburi; Tomakomai (17, X, 1924. J. HANZAWA). Prov. Hidaka; Urakawa (26, IX, 1900. T. KAWAKAMI).

Honshū—Prov. Mutsu; Mt. Iwaki (28, VII, 1896; 3, VIII, 1896. K. KIKUCHI). Prov. Uzen; Mt. Gwassan (23, VIII, 1894. T. KAWAKAMI). Prov. Musashi; Mt. Takao (18, X, 1899. S. KUSANO). Prov. Mino; Kinkwazan, Gifu (IX, 1898. Y. TOKUBUCHI).

Shikoku—Prov. Tosa; Kōnomori (X, 1927. T. YOSHINAGA), Mt. Yanaze (X, 1904. T. YOSHINAGA).

Distrib. Japan.

Remarks. The general character of this fungus is as follows:—

Uredosori amphigenous, on roundish or elongate, reddish-violet or blackish-brown spots (1–2mm. across, sometimes up to 8mm. in length on the nerves), small, scattered, roundish (0.5–2mm. across) or elongate, naked, compact, ferruginous-colored; uredospores ellipsoidal, apex acuminate or rounded, chestnut-brown or brown 29–50=21–28 μ ; epispore with 3–4 warts-rows, 2–3 μ thick. Teleutosori conformed, brown or black; teleutospores depressed globose, verrucose, blackish or brownish-black, 18–36 μ in height, 25–37 μ in width; epispore 3.5–6 μ thick; pedicels persistent, hyaline, thick, asperulate at lower part, up to 35 μ in length.

2. *Pileolaria Toxicodendri* (BERK. et RAV.) ARTHUR.

North Amer. Flora, VII, p. 147, 1907.

(Pl. IX, fig. 14.)

Syn. *Uromyces Toxicodendri* BERK. et RAV. *Rev.* III, p. 56. 1874—SYDOW, *Monogr. Ured.* II, p. 146, fig. 85. (FUJIKURO, *Trans. Form. Nat. Hist. Soc.* no. 19, p. 3, 1914—SYDOW, *Ann. Mycol.* XI, p. 94, 1913; *l. c.* XII, p. 105, 1914—SHIRAI & MIYAKE, *List*, p. 713).

U. brevipes PAZSCHKE, RABH. *Fg.* Eur. no. 3824, 1892. (DIET. *Ann. Mycol.* II, p. 530; ENGL. *Bot. Jahrb.* XXXVII, p. 98, 1908—P. HENN. ENGL. *Bot. Jahrb.* XXXIV, p. 594, 1905—SHIRAI, *List*, p. 107—SHIRAI & MIYAKE, *List*, p. 697).

Pileolaria brevipes BERK. et RAV. *l. c.* p. 58.

Hab. On leaves and petioles of *Rhus orientalis* C. K. Schn. (*Tsutaaurushi*).

Hokkaidō—Prov. Ishikari; Sapporo (22, IX, 1895. Y. TOKUBUCHI; 28, X, 1895. K. KIKUCHI; 29, X, 1896; 9, X, 1897; 20, X, 1897; 3, X, 1902. G. YAMADA; 20, VIII, 1927;

11, VIII, 1907; 18, VIII, 1907. S. ITÔ), Bannaguro (25, IX, 1898. G. YAMADA), Jōzankei (24, VIII, 1898. K. MIYABE; 2, X, 1902; 14, X, 1902. G. YAMADA; 17, X, 1907. M. KASAI), Yubari (15, VIII, 1893. Y. TOKUBUCHI). Prov. Shiribeshi; Raiden-tōge (29, VII, 1897. G. YAMADA). Prov. Iburu; Mt. Shiribeshi (5, VIII, 1907. S. ITÔ), Muroran (21, VII, 1897. G. YAMADA). Prov. Hidaka; Saruru (13, VIII, 1892. Y. TOKUBUCHI), Samani (22, VIII, 1912. K. KONDŌ); Prov. Oshima; Hakodate (10, VII, 1890. K. MIYABE).

Honshū—Prov. Rikuchū; Morioka (12, VII, 1903. G. YAMADA). Prov. Shimotsuke; Nikkō (27, VIII, 1904. S. KUSANO). Prov. Echigo; Yashiroda (19, VIII, 1908. S. ITÔ).

Shikoku—Prov. Tosa; Mt. Yokogura (24, VIII, 1910. T. YOSHINAGA).

Distrib. N. America and Japan.

Remarks. Y. FUJIKURO recorded that the uredospores of this fungus occur on the leaves of *Rhus javanica* L. in Formosa. The general character of our fungus is as follows:—

Uredosori amphigenous, mostly epiphyllous, or petiolicolous, often on yellowish discolored spots, small, roundish, or those on petioles elongate (1–2cm. long), scattered or gregarious, naked, pulverulent, brown; uredospores ellipsoidal, brownish, $28-55=20-34\mu$; epispore with 8–9 spiral warts-rows. ca. 3.5μ thick. Teleutosori conformed, black; teleutospores depressed globose or lenticular, rounded at both ends, verrucose, $16-23\mu$ in height, $23-28\mu$ in width; epispore 3–4 μ thick; pedicels persistent, hyaline, sometimes yellowish at upper part, asperulate at lower part, 40μ in length.

3. *Pileolaria Klugkistiana* (DIET.) DIETEL.

Ann. Mycol. XIX, p. 301, 1921.

(Pl. IX, fig. 15)

Syn. *Uromyces spiralis* HORI, Bot. Mag. Tokyo, VI, p. 106, 1892, (hyponym).

U. levispiralis MIYABE, Bot. Mag. Tokyo, VI, p. 144, 1893. (hyponym).

Uredo Klugkistiana DIET. Hedw. XXXVII, p. 213, 1898. (SHIRAI, List, p. 105—SHIRAI & MIYAKE, List, p. 687).

Uromyces Klugkistianus DIET. ENGL. Bot. Jahrb. XXVII, p. 570, pl. VII, fig. 11 & 12, 1900.—SACC. Syll. XVI, p. 257—SYDOW, Monogr. Ured. II, p. 150. (DIET. Ann. Mycol. II, p. 531; *l. c.* VI, p. 223, 1908—FUJIKURO, Bot. Mag. Tokyo, XXVIII, p. 483, 1914; Trans. Form. Nat. Hist. Soc. no. 19, p. 2 (extr.), 1914—P. HENN. ENGL. Bot. Jahrb. XXVIII, p. 260, 1901—MATSUM. Ind. Pl. Jap. I, p. 181—SHIRAI, List, p. 108—SHIRAI & MIYAKE, List, p. 703).

Hab. On leaves of *Rhus javanica* L. (*Fushinoki*).

Hokkaidô—Prov. Ishikari; Mt. Moiwa (18, VIII, 1907. S. ITÔ), Ishiyama (17, X, 1897. K. KIKUCHI), Jōzankei (10, X, 1917. S. ITÔ), Kataishiyama (X, 1900. K. MIYABE; 16, X, 1900. G. YAMADA). Prov. Shiribeshi; Zenibako (7, IX, 1896; 9, IX, 1896; 5, X, 1891. K. MIYABE; IX, 1895. T. KAWAKAMI), Otaru (17, IX, 1897; 30, VII, 1905. K. MIYABE; VIII, 1897; VIII, 1898. G. YAMADA; 17, IX, 1897. T. NISHIDA; X, 1896. T. KAWAKAMI), Temiya (17, X, 1895. K. MIYABE), Sandō-mura (8, X, 1901. G. YAMADA).

Honshū—Prov. Mutsu; Hirosaki (VII, 1896. K. KIKUCHI). Prov. Musashu; Tokyo (VI, 1888. N. TANAKA; IX, 1889. K. MIYABE; 5, IX, 1899. T. NISHIDA), Komaba (14, X, 1895. K. SENGOKU; 21, VIII, 1900. G. YAMADA), Hachiōji (IX, 1889. K. MIYABE). Prov. Awa; Mera (29, VII, 1893. K. MIYABE). Prov. Mino; Gifu (X, 1898. Y. TOKUBUCHI).

Shikoku—Prov. Tosa; Kōnomori (X, 1907. T. YOSHINAGA).

Distrib. Japan.

Remarks. P. DEITEL described the uredostage of this fungus from the specimen collected by C. KLUGKIST at Yokohama and Tsurumi in 1897 and the teleutostage from the specimen from S. KUSANO. The general character of this fungus is as follows:—

Uredosori amphigenous, without or with small yellowish discolored spots, medium in size (1–1.5mm.), roundish, early naked, pulverulent, brown; uredospores ellipsoidal, brownish, $32-57=20-32\mu$; episporium with prominent spiral ridges, 3–4 μ thick; germ-pores 4. Teleutosori conformed, black; teleutospores depressed globose, verrucose, chestnut-brown, 21–32 μ in height, 28–36 μ in width; episporium 7–9 μ thick; pedicels persistent, hyaline, 100 μ , rarely 160 μ in length.

CONCLUSION

1. Species enumerated in the present paper are fifty six of *Uromyces* and three of *Pileolaria*.
2. Species endemic to Japan are nineteen, common to Europe are twenty three and common to America also twenty three.
3. Species new to science is one, (*Uromyces Viciae-unijugae*), and emended is one, (*Uromyces Mercurialis* P. HENN).
4. Species new to Japan are eight, [*Uromyces Cacaliae* (DC.) UNGER, *Urom. Limonii* (DC.) LÉV., *Urom. Hedysari-obscuri* (DC.) CAR. et PICC., *Urom. Trifolii-repentis* (CAST.) LIRO, *Urom. flectens* LAGH., *Urom. inaequialtus* LASCH., *Urom. Holwayi* LAGH. and *Urom. Rhynchosporae* ELL.]
5. Species undetermined or doubtful are five, [*Uromyces Rumicis* (SCHUM.) WINT., *Urom. Acetosae* SCHROET., *Urom. tenuicultis* MCALP. *Urom. Rottboelliae* ARTH. and *Urom. Sojae* (P. HENN.) SYD.]. These species were based on the uredo-specimens from Japan.
6. Species newly recognized as synonyms to other species are six, [*Uromyces aberrans* DIET., *Urom. Fatouae*, P. HENN., *Urom. reticulatus* Bubák, *Urom. japonicus* SYD., *Urom. Tulipae* DIET. and *Urom. Spegazzinii* ARTH.].
7. Species excluded from our fungus flora are nine, [*Uromyces ambiguus* (DC.) LÉV., *Urom. Betae* (PERS.) LÉV., *Urom. Hedysari-paniculati* (SCHW.) FARL., *Urom. Lilii* (LK.) FUCK., *Urom. Trifolii* (HEDW. F.) LÉV., *Urom. Pisi* (PERS.) WINT., *Urom. fallens* KERN, *Urom. fusisporus* CKE. et MASS. and *Urom. hypercinus* SPEG.].
8. Species excluded from the genus are three, [*Uromyces Puerariae* (P. HENN.) DIET. = *Synchytrium Puerariae* MIYABE (not KUSANO), *Urom. Inouyei* P. HENN. = *Synchytrium decipiens* FARL. and *Urom. deformans* BERK. et BR. = *Caeoma deformans* TUBEUF].
9. The writer supported the opinion separating the genus *Pileolaria* from the genus *Uromyces*, because the spores are quite different from each other.
10. Mr. Y. FUJIKURO kindly showed me his Notes on the Uredinae of Formosa, in which he described a new species *Uromyces Callicarpae* (PETCH). He also remarked that SYDOW identified the uredostage of this fungus to *Uredo Callicarpae* PETCH, when he had sent the specimen to him. But later he found its teleutostage on the

same host-plant. The translation of his original Japanese description of this fungus is as follows:—

Uromyces Callicarpae (PETCH) FUJIKURO.

Uredosori amphigenous, small (0.3–0.7mm.), roundish, scattered or gregarious, at first covered by the epidermis, then naked, pulverulent, yellowish-brown; uredospores globose, subglobose or ellipsoidal, echinulate, yellowish-brown, $20-30=20-27\mu$; epispore $2-3\mu$ thick; germ-pores 7; paraphyses numerous, linear or capitate, slightly curved, not thickened at apex, yellowish, $10-16=40-100\mu$. Teleutosori conformed, somewhat pulverulent, lighter colored; teleutospores obovate or long-obovate, apex rounded, thickened ($2-4\mu$), base rounded or attenuated, smooth, hyaline or light yellowish, $22-30=14-17\mu$; pedicels persistent, hyaline, short, 15μ in length.

Hab. On leaves of *Callicarpa formosana* ROLF. (*Horaimurasaki*) and *C. tomentosa* WILLD. (*Oniyabumurasaki*). *Formosa* (Taihoku and Nantō)

The writer has not observed any specimen of this fungus.

Nov, 1921.

Fungus index.

- Uromyces Aconiti-Lycotoeni* (DC.) WINT. *Aconitum umbrosum* KOM.
- Urom. Alopecuri* SEYM. { *Alopecurus fulvus* L.
A. japonicus STEUD.
- Urom. amurensis* KOM. *Maackia amurensis* RUPR. et MAXIM. var. *Buergeri*
C. K. SCHN.
- Urom. appendiculatus* (PERS.) LINK. { *Phaseolus multiflorus* WILLD.
P. radiatus L. var. *aurea* PRAIN.
P. radiatus L. var. *flexuosus* MATS.
P. vulgaris L.
P. sp.
Vigna Cat'ang ENDL. var. *sinensis* KING.
- Urom. Cacaliae* (DC.) UNGER. *Cacalia auriculata* DC. var. *kamtschatica* MAXIM.
- Urom. Callicarpæ* (PEICH) FUJKURO { *Callicarpa formosana* ROLF.
C. tomentosa WILLD.
- Urom. caryophyllinus* (SCHRANK) WINT. { *Dianthus chinensis* L.
D. superbus L.
- Urom. Cladrastidis* KUSANO. *Sophora shikokiana* MAKINO.
- Urom. Commelinae* CKE. *Commelina communis* L.
- Urom. coronatus* MIYABE et NISHIDA. *Zizania aquatica* L.
- Urom. crassivertex* DIET. *Lychnis Miqueliana* ROHR.
- Urom. Deeringiae* SYD. *Deeringia indica* ZOLL.
- Urom. durus* DIET. *Allium nipponicum* FR. et SAV.
- Urom. Eriochloæ* (SYD.) SYD. et BUTL. *Eriochloa villosa* KUNTH.
- Urom. Ervi* (WALLR.) WEST. *Vicia hirsuta* KOCH.
- Urom. Erythronii* (DC.) PASS. { *Erythronium dens-canis* L.
Tulipa eulis BAK.
- Uromyces Faba* (PERS.) DEBARY { *Vicia amoena* FISCH.
V. cracca L.
V. Faba L.
V. Fauriae FRANCH.
V. pallida TURCZ. var. *japonica* MAXIM.
V. pseudo-Orobis FISCH. et MEY.
V. sativa L.
V. tetrasperma MOENCH.
V. venosa MAXIM.
Lathyrus maritimus (L.) BIGEL.
L. palustris L.
Pisum sativum L.
- Urom. flectens* LAGH. *Trifolium repens* L.
- Urom. Galii* DIET. *Galium aparine* L.
- Urom. Genista-tinctorie* (PERS.) WINT. *Caragana Chamlagu* LAM.
- Urom. Geranii* (DC.) OTTH et WARTM. *Geranium erianthum* DC.
- Urom. Halstedii* DE TONI. *Leersia oryzoides* SW. var. *japonica* HACK.
- Urom. Haræanus* SYD. *Scirpus Cyperinus* KUNTH var. *concolor* MAK.
- Urom. Hedysari-obscuri* (DC.) CAR. et PICC.
..... *Hedysarum obscurum* L.

- Urom. Holwayi* LAGH. { *Lilium auratum* LINDL.
L. dahuricum GAWL.
L. Maximowiczii REGEL.
- Urom. hyalosporus* SAWADA *Acacia confusa* MERRILL.
- Urom. inaequaltus* LASCH. *Silene foliosa* MAXIM.
- Urom. japonicus* BERK. et CURT. *Allium Victorialis* L.
- Urom. Kawakamii* SYD. *Euphorbia serrulata* RED.
- Urom. Lespedeza-procumbentis* (SCHW.) CURT. { *Lespedeza bicolor* TURCZ.
L. Buergeri MIQ.
L. cyrtobotrya MIQ.
..... { *L. juncea* PERS. var. *sericea* MAXIM.
L. pilosa S. et Z.
L. striata HOOK. et ARN.
- Urom. Limonii* (DC.) LÉV. *Statice japonica* S. et Z.
- Urom. linearis* BERK. et BR. { *Panicum proliferum* LAM.
P. repens L.
- Urom. Loti* BLYTT. *Lotus corniculatus* L. var. *japonica* RGL.
- Urom. Mercurialis* P. HENN. *Mercurialis leiocarpa* S. et Z.
- Urom. minor* SCHROET. *Trifolium Lupinaster* L.
- Urom. Miurae* SYD. *Fritillaria kantschatensis* GAWL.
- Urom. Mucunae* RABL. *Mucuna capitata* W. et A.
- Urom. Muehlenbergiae* S. ITŌ. *Muehlenbergia japonica* STEUD.
- Urom. Orobi* (PERS.) LÉV. *Vicia unijuga* AIT.
- Urom. Polygoni* (PERS.) FUCH. *Polygonum aviculare* L.
- Urom. proeminens* (DC.) LÉV. *Euphorbia humifusa* WILLD.
- Urom. pyriformis* CKE. *Acorus Calamus* L.
- Urom. Rhynchospora* ELL. *Rhynchospora alba* (L.) VAHL.
- Urom. Rudbeckiae* ARTH. et HOLW. *Solidago Virgaurea* L.
- Uromyces Saururi* P. HENN. *Saururus Lourieri* DECN.
- Urom. Setaria-italica* (DIET.) YOSHINO. { *Setaria glauca* BEAUV.
S. italica BEAUV. var. *germanica* TRIN.
S. viridis BEAUV.
- Urom. shikokianus* KUSANO. *Sophora shikokiana* MAKINO.
- Urom. Solidaginis* (SOMM.) NISSL. *Solidago Virgaurea* L.
- Urom. Sophora-flavescentis* KUSANO. *Sophora flavescens* AIT.
- Urom. Sophora-japonica* DIET. *Sophora japonica* L.
- Urom. sphaerocarpus* SYD. *Indigofera pseudo-tinctoria* MATS.
- Urom. striatus* SCHROET. *Medicago sativa* L.
- Urom. Trifolli-repentis* (CAST.) LIRO. .. *Trifolium repens* L.
- Urom. truncicola* P. HENN. et SHIR. *Sophora japonica* L.
- Urom. Veratri* (DC.) SCHROET. *Veratrum album* L. var. *Lobelianum* BAK. f.
japonica BAK.
- Urom. Vicia-unijugae* S. ITŌ. *Vicia unijuga* AIT.
- Urom. Wedelia* P. HENN. *Wedelia prostrata* HEMSL.
- Pileolaria Klugkistiana* (DIET.) DIETEL. *Rhus javanica* L.

- Pil. Shiraiana* (DIET. et SYD.) S. ITO... { *R. succedanea* L.
R. trichocarpa MIQ.
Pil. Toxicodendri (BERK. et RAV.) ARTH. *R. orientalis* C. K. SCHN.

Host index.

- Acacia confusa* MERRILL..... *Urom. hyalosporus* SAWADA.
Aconitum umbrosum KOM..... *Urom. Aconiti-Lycoctoni* (DC.) WINT.
Acorus Calamus L..... *Urom. pyriformis* CKE.
Allium nipponicum FR. et SAV. *Urom. durum* DIET.
A. Victorialis L..... *Urom. japonicus* BERK. et CURT.
Alopecurus fulvus L. } *Urom. Alopecuri* SEYM.
A. japonicus STEUD. }
Cacalia auriculata DC. var. *kamtschatica* MAXIM.....
..... *Urom. Cacaliae* (DC.) UNGER.
Callicapa formosana ROLF. } *Urom. Callicapae* (PETCH) FUJIKURO.
C. tomentosa WILLD. }
Caragana Chamissoi LAM..... *Urom. Genista-tinctoria* (PERS.) WINT.
Commelina communis L. *Urom. Commelinae* CKE.
Deeringia indica ZOLL..... *Urom. Deeringiae* SYD.
Dianthus chinensis L. } *Urom. caryophyllinus* (SCHRANK) WINT.
D. superbus L. }
Eriochloa villosa KUNTH..... *Urom. Eriochloae* (SYD.) SYD. et BUTL.
Erythronium dens-canis L. *Urom. Erythronii* (DC.) PASS.
Euphorbia humifusa WILLD. *Urom. proeminens* (DC.) LÉV.
E. serrulata RED. *Urom. Kawakamii* SYD.
Fritillaria kamtschatensis GAWL..... *Urom. Miurae* SYD.
Galium aparine L. *Urom. Galii* DIET.
Geranium erianthum DC. *Urom. Geranii* (DC.) OTTH et WARTM.
Hedysarum obscurum L. *Urom. Hedysari-obscuri* (DC.) CAR. et PICC.
Indigofera pseudo-tinctoria MATS. *Urom. sphaerocarpus* SYD.
Lathyrus maritimus BIGEL. } *Urom. Fabae* (PERS.) DEBARY.
L. palustris L. }
Leersia oryzoides Sw. var. *japonica* HACK. *Urom. Halstedii* DETONI.
Lespedeza bicolor TURCZ. }
L. Buergeri MIQ. } *Urom. Lespedeza-procumbentis* (SCHW.) CURT.
L. cyrtobotrya MIQ. }
L. juncea PERS. var. *sericea* MAXIM. }
L. pilosa S. et Z. }
L. striata HOOK. et ARN. }
Lilium auratum LINDL. } *Urom. Holwayi* LAGH.
L. dahuricum GAWL. }
L. Maximowiczii REGEL. }
Lotus corniculatus L. var. *japonica* RGL. *Urom. Loti* BLYTT.
Lychnis Miqueliana ROHR. *Urom. crassivertex* DIET.
Maackia amurensis RUPR. et MAXIM. *Urom. amurensis* KOM.
var. *Buergeri* C. K. SCHN.
Medicago sativa L. *Urom. striatus* SCHROET.
Mercurialis leiocarpa S. et Z. *Urom. Mercurialis* P. HENN.

- Muehlenbergia japonica* STEUD. *Urom. Muehlenbergiæ* S. ITÔ.
Mucuna capitata W. et A. *Urom. Mucunæ* RABH.
Panicum proliferum LAM. } *Urom. linearis* BERK. et BR.
P. repens L. }
Phaseolus multiflorus. WILLD. }
P. radiatus L. var. *aurea* PRAIN. } *Urom. appendiculatus* (PERS.) LINK.
P. radiatus L. var. *flexuosus* MATS. }
P. vulgaris L. }
Pisum sativum L. *Urom. Fabæ* (PERS.) DE BARY.
Polygonum aviculare L. *Urom. Polygoni* (PERS.) FUCK.
Rhus javanica L. } *Pil. Klugkistiana* (DIET.) DIETEL.
R. succedanea L. }
R. orientalis C. K. SCHN. *Pil. Toxicodendri* (BERK. et RAV.) ARTH.
R. trichocarpa MIQ. *Pil. Shiraiana* (DIET. et SYD.) ITÔ.
Rhynchospora alba (L.) VAHL. *Urom. Rhynchosporæ* ELL.
Saururus Loureiri DECN. *Urom. Saururi* P. HENN.
Scirpus Cyperinus KUNTH. var. *concolor*
MAK. *Urom. Harzanius* SYD.
Setaria glauca BEAUV. }
S. italica BEAUV. var. *germanica* TRIN. } *Urom. Setariae-italica* (DIET.) YOSHINO.
S. viridis BEAUV. }
Silene foliosa MAXIM. *Urom. inæquialtus* LASCH.
Solidago Virgaurea L. { *Urom. Rudbeckiæ* ARTH. et HOLW.
Urom. Solidaginis (SOMM.) NISSL.
Sophora flavescens AIT. *Urom. Sophoræ-flavescentis* KUSANO.
Sophora japonica L. { *Urom. Sophoræ-japonicæ* DIET.
Urom. truncicola P. HENN. et SHIR.
Sophora shikokiana MAKINO. { *Urom. Cladrastidis* KUSANO.
Urom. shikokianus KUSANO.
Statice japonica S. et Z. *Urom. Limonii* (DC.) LÉV.
Trifolium Lupinaster L. *Urom. minor* SCHROET.
T. repens L. { *Urom. flectens* LAGH.
Urom. Trifolii-repentis (CAST.) LIRO.
Tulipa edulis BAK. *Urom. Erythronii* (DC.) PERS.
Veratrum album L. var. *Lobelianum* BAK.
f. *japonica* BAK. *Urom. Veratri* (DC.) SCHROET.
Vicia amoena FISCH. }
V. cracca L. } *Urom. Fabæ* (PERS.) DE BARY.
V. Faba }
V. Fauriæ FRANCH. }
V. hirsuta KOCH. *Urom. Ervi* (WALLR.) WEST.
V. pallida TURCZ. *japonica* MAXIM. }
V. pseudo-Orobis FISCH. et MEX. } *Urom. Faba* (PERS.) DE BARY.
V. sativa L. }
V. tetrasperma MOENH. }
V. unijuga AIT. { *Urom. Orobis* (PERS.) LÉV.
Urom. Viciæ-unijugæ S. ITÔ.
V. venosa MAXIM. *Urom. Fabæ* (PERS.) DE BARY.

- Vigna Catiang* ENDL. var. *sinensis* KING. *Urom. appendiculatus* (PERS.) LINK.
Wedelia prostrata HEMSL. *Urom. Wedeliae* P. HENN.
Zizania aquatica L. *Urom. coronatus* MIYABE et NISHIDA.

Explanation of Figures.

Plate VII.

- Fig. 1. *Uromyces Cacaliae* (DC.) UNGER.
 Fig. 2. *Urom. Solidaginis* (SOMMERF.) NIESSL.
 Fig. 3. *Urom. Rudbeckiae* ARTH. et HOLW.
 Fig. 4. *Urom. Wedeliae* P. HENN.
 Fig. 5. *Urom. Galii* DIET.
 Fig. 6. *Urom. hyalosporus* SAWADA.
 Fig. 7. *Urom. Genistae-tinctoriae* (PERS.) WINT.
 Fig. 8. *Urom. Hedysari-obscuri* (DC.) CAR. et PICC.
 Fig. 9. *Urom. sphaerocarpus* SYD.
 Fig. 10. *Urom. Lespedezae-procumbentis* (SCHW.) CURT. on *Lespedeza bicolor*.
 Fig. 11. *Urom.* on *Lespedeza juncea*.
 Fig. 12. „ on *Lespedeza pilosa*.
 Fig. 13. „ on *Lespedeza Buergeri*.
 Fig. 14. „ on *Lespedeza striata*.
 Fig. 15. *Urom. amurensis* KOM.
 Fig. 16. *Urom. appendiculatus* (PERS.) LINK on *Phaseolus vulgaris*.
 Fig. 17. *Urom.* on *Phaseolus sp.* (*Urom. aberrans* DIET.)
 Fig. 18. *Urom. shikokianus* KUSANO.
 Fig. 19. *Urom. Cladrastidis* KUSANO.
 Fig. 20. *Urom. truncicola* P. HENN. et SHIR.
 Fig. 21. *Urom. Sophorae-japonicae* DIET.
 Fig. 22. *Urom. Sophorae-flavescentis* KUSANO.

Plate VIII.

- Fig. 1. *Uromyces Trifolii-repentis* (CAST.) LIRO.
 Fig. 2. *Urom. flectens* LAGH.
 Fig. 3. *Urom. minor* SCHROET.
 Fig. 4. *Urom. Fabae* (PERS.) DEBARY on *Vicia Faba*.

- Fig. 5. *Urom. Fabæ* (PERS.) DEBARY on *Vicia Cracca*.
 Fig. 6. „ on *Vicia Fauriæ*.
 Fig. 7. „ on *Vicia sativa*.
 Fig. 8. „ on *Vicia pallida*.
 Fig. 9. „ on *Pisum sativum*.
 Fig. 10. „ on *Lathyrus palustris*.
 Fig. 11. „ on *Lathyrus maritimus*.
 Fig. 12. *Urom. Ervi* (WALLR.) WESTEN.
 Fig. 13. *Urom. Orobi* (PERS.) LÉV.
 Fig. 14. *Urom. Viciæ-unijugæ* S. ITO.
 Fig. 15. *Urom. proeminens* (DC.) LÉV.
 Fig. 16. *Urom. Mercurialis* P. HENN.
 Fig. 17. *Urom. Geranii* (DC.) OTTH et WARTM.
 Fig. 18. *Urom. Aconiti-Lycoctoni* (DC.) WINT.
 Fig. 19. *Urom. caryophyllinus* (SCHRANK) WINT.
 Fig. 20. *Urom. crassivertex* DIET.
 Fig. 21. *Urom. inaequialtus* LASCH.
 Fig. 22. *Urom. Polygoni* (PERS.) FUCK.
 Fig. 23. *Urom. Saururi* P. HENN.
 Fig. 24. *Urom. japonicus* BERK. et CURT.
 Fig. 25. *Urom. durus* DIET.

Plate IX.

- Fig. 1. *Uromyces Erythronii* (DC.) PASS. on *Erythronium dens-canis*
 Fig. 2. „ on *Tulipa edulis* (*Urom. Tulipæ*. (DIET.)
 Fig. 3. *Urom. Miuræ* SYD.
 Fig. 4. *Urom. Holwayi* LAGERH.
 Fig. 5. *Urom. Veratri* (DC.) SCHROET.
 Fig. 6. *Urom. Rhynchosporæ* ELL.
 Fig. 7. *Urom. Haraeanus* SYD.
 Fig. 8. *Urom. Alopecuri* SEYM.
 Fig. 9. *Urom. Halstedii* DE TONI.
 Fig. 10. *Urom. Muehlenbergiæ* S. ITO.
 Fig. 11. *Urom. Setariæ-italicæ* (DIET.). YOSHINO.
 Fig. 12. *Urom. coronatus* MIYABE et NISHIDA.
 Fig. 13. *Pileolaria Shiraiana* (DIET. et SYD.) S. ITO.
 Fig. 14. *Pil. Toxicodendri* (BERK. et RAV.) ARTH.
 Fig. 15. *Pil. Klugkistiana* (DIET.) DIETEL.

Contents.

Introduction	211
On Compositae	212
<i>Uromyces Cacaliæ</i> (DC.) UNGER.	"
<i>Uromyces Solidaginis</i> (SOMMERF.) NIESSL.	214
<i>Uromyces Rudbeckiæ</i> ARTH. et HOLW.	215
<i>Uromyces Wedeliæ</i> P. HENN.	216
On Rubiaceae	217
<i>Uromyces Galii</i> DIET.	"
On Plumbaginaceae	218
<i>Uromyces Limonii</i> (DC.) LÉV.	"
On Leguminosae	219
<i>Uromyces hyalosporus</i> SAWADA.	220
<i>Uromyces Genistæ-tinctoriæ</i> (PERS.) WINT.	221
<i>Uromyces Hedysari-obscuri</i> (DC.) CAR. et PICC.	222
<i>Uromyces sphaerocarpus</i> SYD.	223
<i>Uromyces Lespedezæ-procumbentis</i> (SCHW.) CURT.	224
<i>Uromyces amurensis</i> KOM.	226
<i>Uromyces Mucunæ</i> RABH.	227
<i>Uromyces appendiculatus</i> (PERS.) LINK.	"
<i>Uromyces shikokianus</i> KUSANO.	231
<i>Uromyces Cladrastidis</i> KUSANO.	232
<i>Uromyces truncicola</i> P. HENN. et SHIR.	233
<i>Uromyces Sophoræ-japonicæ</i> DIET.	"
<i>Uromyces Sophoræ-flavescentis</i> KUSANO.	234
<i>Uromyces Trifolii-repentis</i> (CAST.) LIRO.	235
<i>Uromyces flectens</i> LAGH.	236
<i>Uromyces minor</i> SCHROET.	"
<i>Uromyces Fabæ</i> (PERS.) DE BARY.	237
<i>Uromyces Ervi</i> (WALLR.) WESTEN.	240
<i>Uromyces Orobi</i> (PERS.) LÉV.	242
<i>Uromyces Viciæ-unijugæ</i> nov. sp.	243
<i>Uromyces Loti</i> BLYTT.	"
<i>Uromyces striatus</i> SCHROET.	244
On Euphorbiaceae	245
<i>Uromyces proeminens</i> (DC.) LÉV.	"
<i>Uromyces Kawakamii</i> SYD.	246
<i>Uromyces Mercurialis</i> P. HENN.	247

On Geraniaceae	248
<i>Uromyces Geranii</i> (DC.) OTTH et WARTM.	”
On Ranunculaceae	249
<i>Uromyces Aconiti-Lycoctoni</i> (DC.) WINT.	”
On Caryophyllaceae	250
<i>Uromyces caryophyllinus</i> . (SCHRANK) WINT.	”
<i>Uromyces crassivertex</i> DIET.	252
<i>Uromyces inaequialtus</i> LASCH.	”
On Polygonaceae	253
<i>Uromyces Polygoni</i> (PERS.) FUCK.	”
On Saururaceae	255
<i>Uromyces Saururi</i> P. HENN.	”
On Liliaceae	256
<i>Uromyces japonicus</i> BERK. et CURT.	”
<i>Uromyces durus</i> DIET.	258
<i>Uromyces Erythronii</i> (DC.) PASS.	259
<i>Uromyces Miuræ</i> SYD.	260
<i>Uromyces Holwayi</i> LAGERH.	261
<i>Uromyces Veratri</i> (DC.) SCHROET.	262
On Commelinaceae	263
<i>Uromyces Commelinæ</i> CKE.	”
On Amarautaceae	264
<i>Uromyces Deeringiæ</i> SYD.	”
On Araceae	265
<i>Uromyces pyriformis</i> CKE.	”
On Cyperaceae	”
<i>Uromyces Rhynchosporæ</i> ELL.	”
<i>Uromyces Haraeanus</i> SYD.	266
On Graminae	267
<i>Uromyces Alopecuri</i> SEYM.	”
<i>Uromyces Eriochloæ</i> (SYD.) SYD. et BUTL.	269
<i>Uromyces Halstedii</i> DE TONI.	”
<i>Uromyces linearis</i> BERK. et BR.	272
<i>Uromyces coronatus</i> MIYABE et NISHIDA.	”
<i>Uromyces Muehlenbergiæ</i> S. ITŌ.	270
<i>Uromyces Setariæ-italicæ</i> (DIET.) YOSHINO.	271
Appendix	273
<i>Pileolaria Shiraiana</i> (DIET. et SYD.) S. ITO.	”
<i>Pileolaria Toxicodendri</i> (BERK. et RAV.) ARTH.	274

	<i>Uromyces of Japan.</i>	287
	<i>Pileolaria Klugkistiana</i> (DIET.) DIETEL.	275
Conclusion.....		277
	<i>Uromyces Callicarpæ</i> (PETCH) FUJIKURO	278
Fungus index		279
Host index		281
Explanation of figures		283
Contents		285
Plates		VII—IX





