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NOTAE MYCOLOGICAE ASIAE ORIENTALIS I.*

AUCTORIBUS

SEIYA ITO ET YOSIO TOKUNAGA

(伊藤誠哉・徳永芳雄)

1. *Olpidium Bothriospermi* SAWADA, Descrip. Catal. Formosan Fungi, II, p. 13, tab. I, fig. 1-13, 1922, nom. seminud.

Maculis in caulibus interdum deformatis et in foliis incrassatis, aurantinis vel brunneis; zoosporangiis in inflatis cellulis epidermidis 1-6 aggregatis, sphaeroideis vel oboideo-ellipsoideis, contentu hyalino dein cinnabarino, leptodermis, $64-120 \times 62-95 \mu$; zoosporis ovoideis, interdum elongatis, uno cilio praeditis, $4-5 \times 3-3.5 \mu$; sporangiis perdurantibus in cellulis epidermidis 1-5 evolutis, sphaericis vel oblongatis, $30-100 \times 28-56 \mu$, tunica crassa, exosporio brunneo.

Hab. in foliis caulibusque *Bothriospermi tenelli* F. et MEY.

Distrib. Formosa.

The above diagnosis is condensed and translated from the original.

2. *Synchytrium Linderniae* S. Ito, sp. nov.

Gallis compositis, amphigenis vel cauliculis, sparsis vel aggregatis, interdum per totam superficiem foliorum subaequaliter distributis, hemisphaericis, minutis, brunneis; soris perdurantibus globosis vel subglobosis, $88-135 \mu$ diam., membrana externa brunnea, crassa, levi, interna hyalina, contentu flavo-aureo, glanuloso; soris zoosporangiorum globosis vel ellipsoideis, $130-176 \mu$ diam.; sporangiis solitariis, globosis vel mutua pressione angulosis, $28-46 \mu$ diam., protoplasmate flavo-aureo continentibus; zoosporis incognitis.

Hab. in foliis caulibusque *Linderniae Pyxidariae* ALL. Kirin, Manchuria (M. MIURA, 17 Aug. 1918—*typus*).

Distrib. Manchuria.

* The present series was intended to publish the descriptions of the species which are new to science and are newly named by the writers. In addition, some species described in Japanese only up to the present time are inserted in this paper. The new species and some of the others will be illustrated in the Mycological Flora of Japan which will be published by the senior author.

3. *Pythiogeton dichotomum* TOKUNAGA, sp. nov.

Mycelio intra- et extra-matricali, ex hyphis ramosis, hyalinis, gracilibus, 1.8–3 μ latis; sporangiis terminaliter in ramulo laterali non vel 1–2-ies dichotome ramoso evolutis, sphaericis vel globoso-ovoideis, 20–34 $\times$ 18–28 μ , proliferis, in apice vel lateraliter tubulo exitus brevi, 4.8–15 μ longo, 4–6 μ lato ornatis; vesiculis oblongo-ovoideis, membrana tenuissima tectis; zoosporis reniformibus, a latere binis ciliis praeditis; oogoniis oosporisque ignotis.

Hab. in plantis novellis marcidis *Oryzae sativae* L. Kuroishi, Prov. Mutsu (J. KIMURA, Maio 1930); Utsunomiya, Prov. Kozuke (Junio 1931); Shimoina, Prov. Shinano (Junio 1931).

Distrib. Honshu.

This species differs from *Pythiogeton uniforme* A. LUND in size of the exit tube and from the other species in the genus in shape of the sporangium.

4. *Pythium apleroticum* TOKUNAGA, sp. nov.

Mycelio entophyto vel interdum ultra cellulam hospitis crescenti, ex hyphis hyalinis, tenuibus, usque ad 3 μ latis; sporangiis filiformibus, ca. 3 μ latis, in apice vel lateraliter tubulo exitus longitudine vario, infra membranam non incrassato ornatis; zoosporis 2–25 vel plus in vesicula evolutis, reniformibus, ca. 8.4 $\times$ 4.8 μ , a latere biciliatis; oogoniis entophytis, terminalibus vel intercalaribus, sphaeroideis, 11–20 μ diam., membrana levi; antheridiis singulis vel binis, diclinis, ab caudicula per septum sectis; oosporis solitariis, apleroticis (oogonium numquam implentibus), sphaericis, 9–17 μ diam., episporio tenui, levi, 0.6–0.8 μ crasso tectis.

Hab. parasitice in cellulis *Spirogyrae* sp. Sapporo, Prov. Ishikari (Y. TOKUNAGA, 24 Junio 1931; 17 Maio 1933).

Hab. parasitice in cellulis *Sphaeropleae annulinae* (ROTH.) AGARDH. Takinosawa prope Jozankei, Prov. Ishikari (Y. TOKUNAGA, 12 Julio 1931).

Distrib. Hokkaido.

This species differs from *Pythium gracile* SCHENK in the small oogonium and the thin oospore wall and from *Pythium akanense* TOKUNAGA in the aplerotic oospore.

5. *Pythium diclinum* TOKUNAGA, sp. nov.

Pythium gracile SCHENK var. *b* BUTLER, Mem. Dept. Agr. India, I, 5, p. 68, 1907.

Mycelio intra- et extra-matricali, ex hyphis hyalinis, 1–5 μ latis, frequenter multos ramos gemmiformes formantibus; sporangiis filiformibus, simulate hyphae similibus, tubulo exitus longitudine vario ornatis; vesiculis sphaericis,

18-40 μ diam., paucas ad 50 vel plus zoosporas gignentibus; zoosporis reniformibus, lateraliter biciliatis, quiescentibus globosis, 7.2-9.6 μ diam.; oogoniis terminalibus vel intercalaribus, sphaeroideis, levibus, interdum prope apicem uno spiculo praeditis, 18-25.2 μ diam.; antheridiis 1-3 fere 2 quoque oogonio, diclinis, ovoideis vel clavatis, saepe curvatis, 6-12 μ longis, parte latissimo 3.6-7.2 μ latis, tubulo fertili tenuissimo, ca. 1 μ lato ornatis; oosporis solitariis, apertoticis, sphaericis vel interdum late ellipsoideis, 14.4-22.8 μ diam., episporio 2-2.4 μ crasso tectis.

Hab. in plantis novellis *Oryzae sativae* L. Kotoni, Prov. Ishikari (Y. TOKUNAGA, 21 Maio 1931).

Distrib. Hokkaido.

6. *Pythium Iwayamai* S. ITO, sp. nov.

Pythium sp. IWAYAMA, Toyama Agr. Exp. Sta. Pub. p. 1-18, tab. I-II, 1933.

Mycelio intra- et extra-matricali, ex hyphis hyalinis vel olivaceo-lutescentibus, ramosissimis, 2.9-8.9 μ , fere 6.6 μ latis; sporangiis terminalibus, sphaericis vel raro late ellipsoideis, ovoideis, citriformibus, etc., levibus, leviter olivaceo-luteolis, leptodermis, 28-48 $\times$ 44 μ , per hypham lateralem vel per zoosporas germinantibus; zoosporis 8-12 in vesicula evolutis, quiescentibus sphaericis, 9-15 μ diam.; chlamydosporis intercalaribus, ellipsoideis, leviter olivaceis, 36-48 $\times$ 24 μ , membrana plus minusve crassa; oogoniis terminalibus vel intercalaribus, sphaericis, levibus; antheridiis plerumque singulis, interdum binis, androgenis vel diclinis, clavatis; oosporis sphaericis, olivaceo-lutescentibus, levibus, pleroticis (perfecte oogonium implentibus), 19-24 μ diam.

Hab. parasitice in plantis *Hordei sativi* JESS., *Tritici vulgaris* L. necnon in plantis plurimorum speciorum gramineorum.

Distrib. Honshu.

The above diagnosis is condensed and translated from the descriptions given by IWAYAMA.

7. *Phytophthora Cyperi* (IDETA) S. ITO, comb. nov.

Peronospora Cyperi IDETA, Shin-nôhô, n. 57, p. 30, 1903.

P. ? Cyperi MIYABE et IDETA, Handb. Phytopath. p. 122, fig. 20, 1904.

Kawakamia Cyperi MIYABE, New Gen. Peron. p. 1, 2 tab., 1904—PATTERSON, CHARLES & VEIHMEYER, Bull. Pl. Ind. U. S. Dept. Agr. n. 171, p. 8, 1910—SACC. Syll. XXI, p. 867—SAWADA, Descrip. Catal. Formosan Fungi, I, p. 83, tab. III, fig. 1-12, 1919—WILSON, Mycol. IV, p. 192, 1911.

Hab. in foliis calamisque *Cyperi malaccensis* LAM.

Distrib. Honshu, Kyushu, Formosa.

8. *Phytophthora Lepironiae* SAWADA, Bull. Form. Agr. n. 146, p. 8, 1919, nom. seminud.; Form. Agr. Exp. Sta. Bull. p. 131, 1919, nom. seminud.

Nozemia Lepironiae SAWADA, Descrip. Catal. Formosan Fungi, I, p. 88, tab. II, fig. 1-14, 1919, nom. seminud.

Maculis calamicolis, fusco-brunneis, elongatis; hyphis intercellularibus, 3-8 μ latis, haustriis obovoideis, ca. 7 $\times$ 8 μ instructis; conidiophoris e stomatibus erumpentibus, brevissimis, usque ad 13 μ longis, simulate hyphae similibus, rarissime ramosis; sporangiis ovoideis vel ovoideo-globosis, apice rotundatis, misere papillatis, basi brevissime pedicellatis, 40-64 $\times$ 36-52 μ , per zoosporas germinantibus; oogoniis sphaericis, dein plus minusve angulatis, 40-52 $\times$ 40-48 μ , membrana 4 μ crassa; antheridiis obovoideis, diclinis, paragenis, 22-24 $\times$ 14-16 μ ; oosporis sphaericis, flavo-brunneis, 30-38 μ diam., episporio levi, 3-4 μ crasso tectis.

Hab. in calamis *Lepironiae mucromatae* RICH.

Distrib. Formosa.

The above diagnosis is condensed and translated from the original.

9. *Phytophthora Cyperi-Iriae* SAWADA, Descrip. Catal. Formosan Fungi, V, p. 13, tab. I, fig. 13-16, 1931, nom. seminud.

Maculis in foliis petiolisque primo fulvis dein brunneis; hyphis intercellularibus, 3.5-5 μ latis, haustriis ovoideis instructis; conidiophoris e stomatibus erumpentibus, brevibus, tenuibus, non ramosis; sporangiis ovoideo-ellipsoideis, basi rotundatis, papilla depressa ornatis, 49-62 $\times$ 29-33 μ , per zoosporas germinantibus; oogoniis inter cellulas hospitis, sphaericis, luteo- vel fusco-brunneis, 35-50 $\times$ 29-46 μ , membrana 2-3 μ crassa; antheridiis plerumque paragenis vel raro amphigenis, obovoideis vel ellipsoideis, 17-23 $\times$ 12-17 μ ; oosporis sphaericis, brunneolis, 25-43 μ diam., episporio levi, 1-3.5 μ crasso tectis.

Hab. in foliis petiolisque *Cyperi Iriae* L.

Distrib. Formosa.

The above diagnosis is condensed and translated from the original.

10. *Phytophthora citricola* SAWADA, Descrip. Catal. Formosan Fungi, III, p. 21, tab. II, fig. 10-19, 1927, nom. seminud.

Maculis fructiculis, primo rotundatis dein totam superficiem fructuorum occupantibus, brunneis; hyphis 4-10 μ latis, haustrio carentibus; conidiophoris simplicibus vel sympodice ramosis; sporangiis ovoideis vel obclavatis, basi rotundatis, papilla plana lataque ornatis, 21-70 $\times$ 15-39 μ , per zoosporas vel raro per tubum germinantibus; zoosporis ovoideis, a latere biciliatis, 13 $\times$ 8-9 μ ; oogoniis sphaericis, interdum basi corniformiter attenuatis, hyalinis vel brunneis,

21-44 μ diam., membrana levi, 1-1.5 μ vel raro 4 μ crasso; antheridiis obovoideis, paragenis vel rarissime amphigenis, 12-13 $\times$ 8-10 μ ; oosporis sphaericis, paene pleroticis, hyalinis vel luteis, 18-38 μ diam., episporio levi, 1-2 μ crasso tectis.

Hab. in fructis *Citri sinensis* OSB. f. *Sekkan* HAYATA necnon *C. Tankan* HAY form., etc.

Distrib. Formosa.

The above diagnosis is condensed and translated from the original.

11. *Phytophthora Fagopyri* TAKIMOTO, Bull. Sc. Fak. Terk. Kjusu Imp. Univ. VI, p. 108, tab. II, 1935, nom. seminud.

Maculis cauliculis, fusco-brunneis; hyphis hyalinis, 4-12 μ latis; sporangiis globosis, ellipsoideis vel oblongo-ovoideis, papilla distincta ornatis, hyalinis, 35-45 $\times$ 24-35 μ , per tubum germinantibus; chlamydosporis hyalinis, dein flavo-brunneis, 40-50 $\times$ 40-46 μ ; membrana 4-8 μ crassa tectis; antheridiis diclinis, paragenis, clavatis.

Hab. in caulibus *Fagopyri vulgaris* HILL.

Distrib. Kyushu, Korea.

The above diagnosis is condensed and translated from the original.

12. *Phytophthora Cyperi-rotundati* SAWADA, Descrip. Catal. Formosan Fungi, III, p. 26, tab. II, fig. 20-25, 1927, nom. seminud.

Maculis foliiculis, ellipticis, oblongo-ellipticis vel elongatis, margine pallide luteo-auranticis, medio brunneo-auranticis; hyphis intercellularibus, 3-7 μ latis, haustriis obovoideis instructis; conidiophoris e stomatibus exeuntibus, usque ad 30 μ longis, simplicibus vel raro sympodice ramosis; sporangiis oblongo-ovoideis, basi rotundatis vel attenuatis, 22-67 $\times$ 14-34 μ , per zoosporas vel per tubum germinantibus; oogoniis in parenchymate foliorum sphaericis, brunneis, leptodermis, 31-47 $\times$ 25-45 μ ; antheridiis paragenis vel amphigenis, obovoideis vel subsphaericis; oosporis sphaericis, hyalinis vel brunneolis, apleroticis, 22-39 μ diam., episporio levi, 1-3 μ crasso tectis.

Hab. in foliis *Cyperi rotundati* L.

Distrib. Kyushu, Formosa.

The above diagnosis is condensed and translated from the original.

13. *Phytophthora Boehmeriae* SAWADA, Descrip. Catal. Formosan Fungi, III, p. 10, tab. I, fig. 15-24, 1927, nom. seminud.

Maculis foliiculis, rotundatis, brunneo-olivaceis; hyphis inter vel intra cellulas hospitis, 4-8 μ latis, haustriis cylindraceis instructis; conidiophoris non ramosis, gracilissimis, 15-16 μ longis, 2-3.5 μ latis; sporangiis ovoideo-globosis, ovoideis

vel oblongo-ovoideis, apice distincte papillatis, basi brevissime pedicellatis, $27-72 \times 20-46 \mu$, per zoosporas germinantibus; oogoniis sphaericis, hyalinis vel brunneis, $21-41 \mu$ diam.; antheridiis diclinis, amphigenis, sphaericis vel obovoideis, $12-16 \times 11-15 \mu$; oosporis sphaericis, hyalinis, $17-35 \mu$ diam., pleroticis vel apleroticis, per tubum germinantibus.

Hab. in foliis *Boehmeriae viveae* HOOK. et ARN.

Distrib. Formosa.

14. *Phytophthora Tabaci* SAWADA, Descrip. Catal. Formosan Fungi, III, p. 35, tab. III, fig. 10-20, 1927, nom. seminud.

Maculis in foliis caulibusque, rotundatis, olivaceis dein brunneis; hyphis intercellularibus, $7-8 \mu$ latis, haustriis cylindraceis instructis; sporangiis ovoideis, ellipsoideis vel globoso-ovoideis, apice papilla distincta ornatis, $16-58 \times 12-45 \mu$, interdum $74 \times 64 \mu$, per zoosporas vel per tubum germinantibus; zoosporis ovoideis, a latere biciliatis, $13 \times 8-9 \mu$; chlamydosporis flavo-brunneis, sphaericis, $21-55 \mu$ diam., membrana $1.5-2 \mu$ crassa; oogoniis sphaericis, hyalinis, $26-30 \mu$ vel raro 43μ diam., membrana levi; antheridiis amphigenis, obovoideis vel sphaericis, $14-18 \times 11-18 \mu$; oosporis sphaericis, hyalinis, $21-24 \mu$ vel raro 30μ diam., episporio levi, tenuiusculo tectis.

Hab. in foliis caulibusque *Nicotianae Tabaci* L.

Distrib. Honshu.

This species is closely related to *Phytophthora parasitica* DASTUR, and it may be a biologic species of the latter. The above diagnosis is condensed and translated from the original.

15. *Phytophthora Polygoni* SAWADA, Descrip. Catal. Formosan Fungi, II, p. 32, tab. I, fig. 32-34, tab. II, fig. 1-3, 1922, nom. seminud.

Maculis in foliis primo flavo-viridis dein fulvis vel brunneis, effusis; hyphis intercellularibus, $5-15 \mu$ latis; conidiophoris tenellissimis, $4-20$ e stomatibus coalitis, simplicibus vel infra sporangium sympodice ramosis, $15-75 \mu$ longis, $1.5-5 \mu$ latis; sporangiis oblongatis vel citriformibus, forma variis, apice papilla conica ornatis, $17-41 \times 4-20 \mu$, per zoosporas vel per tubum germinantibus; zoosporis ovoideis, apice obtusatis, basi rotundatis, $11-15 \times 6-9 \mu$, a latere biciliatis; oogoniis oosporisque ignotis.

Hab. in foliis *Polygoni japonici* MEISN.

Distrib. Formosa.

The above diagnosis is condensed and translated from the original.

16. *Phytophthora Canavaliae* HARA, Pathol. Agr. Plant. p. 845, fig. 361-362, 1930, nom. seminud.

Maculis in foliis, caulibus et fructicis, fusco-brunneis; hyphis intercellularibus, 3-8.8 μ latis, haustriis cylindricis vel globosis instructis; conidiophoris singulis vel plurimis coalitis, simplicibus vel sympodice ramosis, longitudine variis, plerumque 5-35 μ longis, 2.2-4.4 μ latis; sporangiis forma variis, fere 55 $\times$ 25 μ , per zoosporas vel raro per tubum germinantibus; zoosporis ellipsoideis, biciliatis, 10-12 $\times$ 7-9 μ ; oogoniis oosporisque ignotis.

Hab. in foliis caulibus et fructicis *Canavaliae ensiformis* DC.

Distrib. Honshu.

The above diagnosis is condensed and translated from the original.

17. *Albugo Wasabiae* HARA, Path. Agr. Plant. p. 721, fig. 306-307, 1930, nom. seminud.

Soris in foliis, petiolis, caulibus et floribus, albidis vel pallidissime luteis, distinctis, magnitudine formaque variis, saepe confluentibus; conidiophoris hyalinis, clavatis, cylindraceis vel oblongo-ovoideis, interdum medio plus minusve incrassatis, parallere dense stipatis, 28-51 μ longis, 10-19 μ latis; conidiis catenulatis, omnibus forma magnitudineque aequalibus, globosis vel late ovoideis, hyalinis, 13-24 $\times$ 11-22 μ , media 18.29 $\times$ 16.76 μ , membrana tenui, circumcirca aequali tectis; oosporis ignotis.

Hab. in foliis, petiolis, caulibus et floribus vivis *Eutremae Wasabi* MAXIM. = *Wasabiae japonicae* BOIS.

Distrib. Hokkaido, Honshu.

18. *Albugo macrospora* (TOGASHI) S. ITO, comb. nov.

Albugo candida (PERS.) O. KUNTZE var. *macrospora* TOGASHI, Agr. & Hortic. V, p. 880, 1930; Bull. Imp. Coll. Agr. & Forest. Morioka, n. 18, p. 84, 1934.

A. Brassicae SAWADA, Descrip. Catal. Formosan Fungi, VI, p. 16, 1933, nom. nudum.

Soris in foliis, petiolis, caulibus, floribus et fructis, albidis vel vix lutescentibus, forma valde irregularibus, saepe confluentibus, magnitudine variis, interdum plantam hospitem deformantibus; conidiophoris hyalinis, clavatis, parallere dense stipatis, 21-48 μ longis, 9-18 μ latis; conidiis catenulatis, omnibus forma magnitudineque aequalibus, sphaericis vel globoso-ellipsoideis, hyalinis, 12-29 $\times$ 10-27 μ , media 20.03 $\times$ 18.18 μ , membrana tenui, circumcirca aequali tectis; oosporis creberrimis in caulibus fructisque, sphaericis, flavo-brunneis, 30-48 μ diam., episporio crasso, irregulariter rugoso tectis.

Hab. in foliis, petiolis, caulibus, floribus et fructis vivis *Brassicae chinensis* L., *B. chinensis* var. *amplexicaulis* MAKINO, *B. chinensis* var. *Komatsuna* MATSUM.

et NAKAI, *B. chinensis* var. *oleiferae* MAKINO, *B. cernuae* FORBES et HEMSL, *B. japonicae* SIEB., *B. juncea* COSS., *B. oleraceae* L., *B. pekinensis* RUPR., *B. pekinensis* var. *dentatae* MATSUM. et NAKAI, *B. Rapae* L., *Raphani sativi* L. var. *macropodi* MAKINO, etc.

Distrib. Sachalin austr., Hokkaido, Honshu, Shikoku, Kyushu, Loochoo, Formosa, Korea, Manchuria.

19. *Albugo Molluginis* S. ITO, sp. nov.

Soris hypophyllis vel cauliculis, pallide lutescentibus, prominulis, superficialibus, rotundatis vel elongatis, 0.5–2.5 mm. diam., saepe confluentibus; conidiophoris hyalinis, cylindraceis, parallere dense stipatis, 28.8–38.4 μ longis, 9.6–12 μ latis; conidiis catenulatis, omnibus forma magnitudineque aequalibus, globosis, hyalinis, 12–19.2 μ diam., membrana tenui, circumcirca aequali tectis; oosporis in parenchymate foliorum, sphaericis, flavo-brunneis vel castaneo-brunneis, 40.8–52.8 μ diam., episporio reticulato, areolis plerumque 6–15 μ diam., interdum $24 \times 7.2 \mu$.

Hab. in foliis caulibusque vivis *Molluginis strictae* L. Higashiyata-mura, Prov. Tamba (Y. IMAI, 22 Aug. 1931—*typus*); Kumamoto, Prov. Higo (K. YOSHINO, 20 Julio 1907).

Distrib. Honshu, Kyushu.

20. *Albugo Ipomoeae-aquaticae* SAWADA, Descrip. Catal. Formosan Fungi, II, p. 27, tab. II, fig. 4–16, 1922, nom. seminud.

Soris hypophyllis, cauliculis floricolisque, forma rotundatis vel irregularibus, 1–3 mm. diam. vel usque ad 7 mm. longis, albis, demum epidermide rupta pulverulentis, interdum plantam hospitem deformantibus; conidiophoris hyalinis, clavatis, 32–72 μ longis, 18–23 μ latis; conidiis catenulatis, magnitudine aequalibus, globoso-cuboideis, hyalinis, 18–26 $\times$ 16–23 μ , media 21 $\times$ 18.9 μ , membrana aequali vel ad medium intus annulatim leviter incrassata tectis; oosporis hyalinis, sphaericis, 39–48 μ diam., episporio levi, 6–8 μ crasso tectis.

Hab. in foliis, caulibus et floribus vivis *Ipomoeae aquaticae* FORSK.

Distrib. Formosa.

21. *Albugo Ipomoeae-Hardwickii* SAWADA, Descrip. Catal. Formosan Fungi, III, p. 7, tab. I, fig. 9–14, 1927, nom. seminud.

Soris in foliis, caulibus floribusque, albis vel vix brunneis, rotundatis vel oblongatis, subsuperficialibus, pulverulentis, 0.5–1 mm. diam., interdum plantam hospitem deformantibus; conidiophoris hyalinis, clavatis, 28–48 μ longis, 16–19 μ latis; conidiis catenulatis, globoso-cuboideis, 17–24 $\times$ 16–21 μ , fere 20 $\times$ 19 μ ,

membrana ad medium annulo transverse plus minusve incrassato praeditis, per zoosporas germinantibus; oosporis sphaericis, hyalinis, $29-39 \times 29-36 \mu$, episporio levi, $3-4 \mu$ vel raro 6μ crasso tectis; oogoniis tunica interne tuberculoso-rugosa tectis.

Hab. in foliis, caulibus et floribus vivis *Ipomoeae Hardwickii* HESML.

Distrib. Formosa.

The above diagnosis is condensed and translated from the original.

22. *Albugo Achyranthis* (P. HENN.) MIYABE, in sched.

Cystopus Bliti DE BARY f. *Achyranthis* P. HENN. in ENGL. Bot. Jahrb. XXVIII, p. 259, 1901; ibid. XXXI, p. 728, 1902, nom. nud.—SACC. Syll. XXI, p. 858, nom. nud.

Albugo Bliti O. KUNTZE, f. *Achyranthis* SAWADA, Descrip. Catal. Formosan Fungi, II, p. 25, 1922, nom. seminud.

Soris hypophyllis, albidis vel pallide brunneis, rotundatis vel oblongatis, distinctis, pulverulentis, 0.5–3 mm. diam.; conidiophoris hyalinis, clavatis, $28-48 \mu$ longis, $12-19 \mu$ latis; conidiis catenulatis, obovoideis vel globosis, interdum angulatis, hyalinis, $12-34 \times 9-20 \mu$, membrana ad medium annulo transverse incrassato praeditis; oosporis ignotis.

Hab. in foliis vivis *Achyranthis japonicae* NAKAI necnon *A. obtusifoliae* LAM.

Distrib. Honshu, Shikoku, Kyushu, Formosa, Africa.

23. *Sclerospora Miscanthi* T. MIYAKE, in SACC. Syll. XXIV, p. 65, nom. nud.

Sclerospora macrospora (?) T. MIYAKE, Rep. Sugar Exp. Sta. Formosa, I, p. 58, tab. IX, 1911, nom. seminud.

Maculis in foliis calamisque, primo albo-lutescentibus, dein brunneis, ut in *Sclerospora graminicola* longitudinaliter filamentose dissilientibus; conidiophoris conidiisque nonvisis; oogoniis sphaeroideis vel irregulariter polyedricis, $48-72 \mu$ vel raro 34μ diam., tunica castaneo-brunnea vel rubro-brunnea, latitudine inaequali, $3-17 \mu$ crassa praeditis; oosporis sphaericis, $40-56 \mu$ vel raro 28μ diam., episporio pallide lutescenti, levi, $2.5-3.5 \mu$ crasso tectis.

Hab. in foliis calamisque vivis *Miscanthi japonici* ANDERS. Hokuto, Formosa (T. MIYAKE, 16 Junio 1911).

Hab. in foliis calamisque vivis *Sacchari officinali* L. Nagomura, Loochoo (T. MIYAGI, Aug. 1907; 3 Sept. 1907).

Distrib. Kyushu, Loochoo, Formosa.

This species is closely related to *Sclerospora graminicola* (SACC.) SCHRÖT. but it differs in larger oogonium and oospore.

24. *Plasmopara* (Rhysotheca) *Elatostematis* (TOGASHI et ONUMA) S. ITO et TOKUNAGA, comb. nov.

Peronoplasmopara Elatostemae TOGASHI et ONUMA, SAITO Ho-on Kai Mus. Res. Bull. n. 1, p. 2, fig. 1, 1934.

Maculis in foliis, pallide lutescentibus, angulatis, dein totum folium occupantibus, caespitulis hypophyllis, mollibus, albidis, floccosis insidentibus; conidiophoris singulis vel plurimis e stomatibus exeuntibus, gracilibus, 240-570 μ altis, superne 4-6-ies monopodice vel subdichotome ramosis, stipite (parte axis subter ramo infimo) $\frac{1}{2}$ - $\frac{2}{3}$ totius altitudinis efficienti, 5-11 μ crasso, basi leviter incrassato, ramis laxe ramosis, longis, ramulis ultimis fere bifurcatis, subulatis, 5-17 μ vel raro 24 μ longis; conidiis late ellipsoideis vel ellipsoideis, hyalinis, 16-24 $\times$ 12-18 μ ; oosporis ignotis.

Hab. in foliis vivis *Elatostematis umbellati* BL. var. *involutrelati* MAKINO. Monte Hayachine, Prov. Rikuchu (K. TOGASHI, 7 Sept. 1929).

Distrib. Honshu.

This fungus has been described as a member of *Peronoplasmopara* by TOGASHI and ONUMA, but after examination of the original specimen the writers propose to remove the species into the genus *Plasmopara* and emend the description of the species as above.

25. *Plasmopara* (Rhysotheca) *Miyakeana* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis, sparsis, albidis, mollibus, dein totum folium occupantibus; conidiophoris singulis vel plurimis e stomatibus exeuntibus, 350-900 μ altis, superne monopodice ramosis, sub apice ramos 5-8 gerentibus, patentibus, stipite $\frac{1}{2}$ - $\frac{3}{4}$ totius altitudinis efficienti, 7-17 μ crasso, ramis primariis longis, laxe ramosis, secundariis 1-4-ies ramosis, ramulis ultimis frequenter trifurcatis vel interdum verticillatis, conico-subulatis, 6-15 μ longis; conidiis ovoideis, ellipsoideis vel globosis, hyalinis, 15-29 $\times$ 13-21 μ , media 18.88 $\times$ 15.86 μ ; oosporis ignotis.

Hab. in foliis vivis *Urticae Thunbergianae* SIEB. et ZUCC. Tokyo, Prov. Musashi (T. MIYAKE, 18 Julio 1903-typus).

Distrib. Honshu.

This species differs from *Plasmopara Elatostematis* in the branching of conidiophores. In the former the ultimate branchlets are frequently three forked, while in the latter they are usually two forked.

26. *Plasmopara* (Rhysotheca) *Pileae* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis, sparsis, albidis, plus minusve densis, floccosis, dein totum folium occupantibus; conidiophoris singulis vel plurimis e stomatibus ex-

euntibus, gracilibus, 430-820 μ altis, superne monopodice ramosis, sub apice ramos 5-7 gerentibus, patentibus, stipite $\frac{1}{2}$ - $\frac{3}{4}$ totius altitudinis efficienti, 7-12 μ crasso, ramis primariis longis, laxe ramosis, ramulis ultimis bifurcatis vel trifurcatis, conico-subulatis, brevissimis, 2.5-10 μ longis; conidiis late ovoideis vel globosis, hyalinis, 12-21 $\times$ 12-17 μ , media 15.34 $\times$ 13.61 μ ; oosporis ignotis.

Hab. in foliis vivis *Pileae viridissimae* MAKINO. Monte Kariyose, Prov. Musashi (T. OGAWA, 24 Sept. 1933—*typus*).

Distrib. Honshu.

This species differs from *Plasmopara Miyakeana* in the smaller dimensions of conidium and ultimate branchlet than those of the latter species.

27. *Plasmopara* (Rhysotheca) *Vernoniae-chinensis* SAWADA, Trans. Formosan Nat. Hist. Soc. XXV, p. 125, 1916, nom. seminud.; Descrip. Catal. Formosan Fungi, I, p. 98, tab. III, fig. 13-15, 1919, nom. seminud.

Maculis foliicolis, pallide viridis, dein brunneis, nervuli foliorum limitatis, angularibus, 2-10 μ diam., caespitulis hypophyllis, albidis insidentibus; conidiophoris e stomatibus egredientibus, 360-760 μ altis, superne 5-9-ies ramosis, stipite 280-470 μ longo, 7-12 μ crasso, ramis inferis longis, ceteris plus minusve breviusculis, ramulis ultimis interdum 3-4 verticillatis, conico-subulatis, 9-20 μ longis; conidiis ovoideo-ellipsoideis, apice papilla depressa et basi pedicella brevi praeditis, hyalinis, 17-24 $\times$ 13-17 μ ; oosporis ignotis.

Hab. in foliis vivis *Vernoniae chinensis* LESS.

Distrib. Formosa.

The above diagnosis is condensed and translated from the original.

28. *Plasmopara* (Rhysotheca) *Petasitidis* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis, effusis, albidis, densiusculis, interdum totum folium occupantibus; conidiophoris singulis vel plurimis e stomatibus erumpentibus, 180-700 μ altis, superne monopodice ramosis, sub apice ramos 3-6 gerentibus, patentibus, stipite $\frac{2}{3}$ - $\frac{4}{5}$ totius altitudinis efficienti, 130-580 μ longo, 7-15 μ crasso, ramis primariis longis, secundariis plerumque breviusculis, ramulis ultimis plerumque bifurcatis, conico-subulatis, rectis, 7-24 μ longis; conidiis late ellipsoideis, ovoideis vel globosis, hyalinis, 16-30 $\times$ 15-26 μ , media 22.58 $\times$ 18.89 μ ; oosporis ignotis.

Hab. in foliis vivis *Petasitidis gigantei* FR. SCHM. Nopporo, Prov. Ishikari (Y. TOKUNAGA, 26 Maio 1929—*typus*); Maruyama prope Sapporo, Prov. Ishikari (I. TANAKA, 28 Maio 1926); Ebetsu, Prov. Ishikari (D. MURAYAMA, 19 Junio 1931).

Distrib. Hokkaido.

This species differs from *Plasmopara Halstedii* (FARL.) BERL. et DE TONI in the shape of conidiophores. In the former species the ultimate branchlets are usually two forked and never verticillate.

29. *Plasmopara* (Rhysotheca) *Cimicifugae* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis, sparsis, albidis, floccosis, densissimis; conidiophoris plurimis e stomatibus coalitis, 140-480 μ altis, superne monopodice ramosis, sub apice ramos 2-5 gerentibus, stipite gracili, 4-12 μ crasso, basi leniter incrassato, ramis primariis rectis, longiusculis, 2-3-ies ramosis, ramulis ultimis conico-subulatis, 5-20 μ vel interdum 27 μ longis; conidiis ellipsoideis, hyalinis, 12-24 $\times$ 10-21 μ ; oosporis ignotis.

Hab. in foliis vivis *Cimicifugae foetidae* L. var. *intermediae* REGEL. Uen-betsu, ins. Etorofu, Kuriles (M. NAGAI, 24 Julio 1934—*typus*).

Distrib. Kuriles.

This species differs from *Plasmopara pygmaea* (UNG.) SCHRÖT. and *P. alpina* (JOHANS.) ROSENB. in the shape of conidiophores. In the former species they are very slender and possess long distinct branches.

***Pseudoplasmodium* SAWADA**

Descrip. Catal. Formosan Fungi, II, p. 40, 1922, nom. seminud.

Mycelium ramosum, intercellulare, haustriis ovoideis instructum. Conidiophori erecti, solitarii vel fasciculati e stomatibus foliorum egredientes, superne pluries ramosi, ramis monopodice dispositis, patulis, fere rectangulo-divaricatis, ultime ramulos apice truncatos productis. Conidia ovoidea, hyalina, per tubum germinantia. Oosporae ignotae.

30. *Pseudoplasmodium* *Justiciae* SAWADA. Descrip. Catal. Formosan Fungi, II, p. 40, tab. II, fig. 17-25, 1922, nom. seminud.

Plasmopara Wildemaniana P. HENN. var. *macrospora* SAWADA, Trans. Formosan Nat. Hist. Soc. n. 16, p. 2, 1914; Descrip. Catal. Formosan Fungi, I, p. 105, tab. III, fig. 16-19, 1919, nom. seminud.

Maculis foliicolis, lutescentibus, rotundatis vel irregularibus; caespitulis hypophyllis, albidis, mollibus; conidiophoris 1-5 e stomatibus erumpentibus, 320-720 μ altis, superne monopodice ramosis, sub apice ramos 5-9 gerentibus, stipite 170-400 μ longo, 7-12 μ crasso, basi saepe incrassato, usque 17 μ crasso, ramis primariis longis, pluries ramosis, inferioribus ramis secundariis longiusculis ramosis praeditis, ramulis ultimis fere bi- vel tri-furcatis, conico-subulatis, 5-17 μ longis; conidiis ovoideis vel ovoideo-ellipsoideis, apice rotundatis, basi brevissime pedicellatis, hyalinis, 12-18 $\times$ 11-14 μ , per tubum germinantibus; oosporis ignotis.

Hab. in foliis vivis *Justiciae procumbentis* L. Taihoku, Formosa (K. SAWADA, 25 Oct. 1923).

Distrib. Formosa.

31. *Peronospora Cucubali* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis, mollibus, difficile visibilibus, leviter fulvescentibus, effusis; conidiophoris singulis vel plurimis e stomatibus erumpentibus, $450-780\ \mu$ altis, trunco $\frac{3}{5}-\frac{3}{4}$ totius altitudinis efficienti, $7-10\ \mu$ crasso, basi non incrassato, ramis 6-10-ies dichotome ramosis, patentibus, primariis oblique erectis, paenultimis plerumque arcuatis, ramulis ultimis bifurcatis, rectangulis, arcuatis vel sigmatim curvatis, $4.5-18\ \mu$ longis, aut omnibus aequilongis aut uno plus minusve brevioribus; conidiis hyalinis vel leviter griseo-violaceis, late ellipsoideis vel ovoideis, fere brevissime pedicellatis, $15-27 \times 13-20\ \mu$, fere $17-24 \times 15-17\ \mu$, media $20.28 \times 16.24\ \mu$; oosporis creberrimis in foliis marcidis, laete brunneis, globosis, $35-50\ \mu$ diam., episporio $6-8\ \mu$ crasso, dense verrucoso tectis.

Hab. in foliis vivis *Cucubali bacciferi* L. var. *japonici* MIQ. Sapporo, Prov. Ishikari (Y. TOKUNAGA, 13 Junio 1930—*typus*; K. MIYABE, 6 Junio 1890; Y. TOCHINAI et Y. HOMMA, 15 Junio 1934).

Distrib. Hokkaido.

32. *Peronospora Cerastii-glandulosi* S. ITO et TOKUNAGA, sp. nov.

Caespitulis in foliis floribusque, densis, griseo-violaceis, totum tergum foliorum tegentibus; conidiophoris singulis vel plurimis e stomatibus exeuntibus, patentibus, $250-600\ \mu$ altis, superne 4-8-ies dichotome ramosis, trunco $\frac{1}{2}-\frac{3}{4}$ totius altitudinis efficienti, $7-14\ \mu$ crasso, basi leviter tumido, ramis acutangulo divergentibus, plerumque arcuatis, ramulis ultimis rectangulis, leviter curvatis vel rectis, plerumque aequilongis, $3-26\ \mu$, fere $6-14\ \mu$ longis; conidiis hyalinis vel leviter flavis, late ellipsoideis, $14-29 \times 13-23\ \mu$, fere $18-24 \times 15-19\ \mu$ latis, media $21.97 \times 17.73\ \mu$; oosporis creberrimis in floribus, laete brunneis, globosis, $30-46\ \mu$, fere $35-42\ \mu$ diam., episporio reticulato tectis.

Hab. in foliis et quoque pedunculis calycibusque vivis *Cerastii vulgati* L. var. *glandulosi* REGEL. Sapporo, Prov. Ishikari (Y. TOKUNAGA, 21 Maio 1928—*typus*; S. ITO, 17 Maio 1930); Maruyama prope Sapporo, Prov. Ishikari (H. OTANI, 27 Maio 1929).

Distrib. Hokkaido, Honshu, Kyushu.

This species is closely related to *Peronospora trivialis* GÄUM., but they differ from each other in the size of conidium. In the latter the conidia are $19-36 \times 12-38\ \mu$, average $26.40 \times 21.18\ \mu$.

33. *Peronospora Stellariae-aquaticae* SAWADA, Trans. Formosan Nat. Hist. Soc. n. 79-80, p. 204, 1925, nom. seminud.; Descrip. Catal. Formosan Fungi, III, p. 58, tab. IV, fig. 19-21, 1927, nom. seminud.

Maculis in foliis, flavescentibus, subrotundatis, caespitulis hypophyllis, albidis, effusis insidentibus; conidiophoris singulis vel plurimis e stomatibus egredientibus, 150-500 μ altis, trunco $\frac{1}{2}$ - $\frac{2}{3}$ totius altitudinis efficienti, 80-300 μ longo, 6-15 μ crasso, ramis 4-8-ies vel raro novies dichotome ramosis, rectis vel leniter arcuatis, ramulis ultimis fere rectangulis, rectis vel leviter curvatis, 4-17 μ longis; conidiis late ellipsoideis vel ellipsoideis, hyalinis, 14-26 $\times$ 12-19 μ , fere 17-22 $\times$ 14-17 μ , media 19.29 $\times$ 16.07 μ ; oosporis in foliis petiolisque, sphaericis, 34-42 μ diam., episporio flavo-brunneo, reticulato tectis.

Hab. in foliis vivis *Stellariae aquaticae* Scop.

Distrib. Hokkaido, Honshu, Kyushu, Formosa.

34. *Peronospora Stellariae-radiantis* S. ITO et TOKUNAGA, sp. nov.

Caespitulis mollibus, griseo-violaceis, totum tergum foliorum tegentibus; conidiophoris singulis vel plurimis e stomatibus exeuntibus, 200-550 μ altis, superne 3-8-ies dichotome ramosis; trunco $\frac{2}{5}$ - $\frac{4}{5}$ totius altitudinis efficienti, 100-400 μ longo, 7-17 μ crasso, basi leviter incrassato, ramis paene rectis vel curvatis, tenuibus, ramulis ultimis rectangulis, 4-20 μ longis, arcuatis vel sigmatim curvatis; conidiis hyalinis vel pallide brunneis, saepe ellipsoideis vel late ellipsoideis, interdum ovoideis, raro basi brevissime pedicellatis, magnitudine variabilibus, 15-34 $\times$ 14-21 μ , fere 19-24 $\times$ 16-19 μ , media 21.31 $\times$ 17.23 μ ; oosporas invenire non potui.

Hab. in foliis vivis *Stellariae radiantis* L. Shikka, Sachalin austr. (Y. HOSHINO, 8 Julio 1933—*typus*).

Distrib. Sachalin austr.

This species is very related to *Peronospora Stellariae-aquaticae* SAWADA, but it differs from the latter in the size of conidium.

35. *Peronospora Stellariae-uliginosae* SAWADA, Trans. Formosan Nat. Hist. Soc. n. 79-80, p. 203, 1925, nom. seminud.; Descrip. Catal. Formosan Fungi, III, p. 59, tab. IV, fig. 22-26, 1927, nom. seminud.

Maculis in foliis caulibusque, flavo-viridis, dein albidis; caespitulis hypophyllis vel cauliculis, effusis, mollibus, albidis; conidiophoris singulis vel plurimis e stomatibus egredientibus, 180-850 μ altis, trunco 100-350 μ longo, 7-12 μ crasso, ramis 6-9-ies dichotome ramosis, plus minusve curvatis, ramulis ultimis fere rectangulis, brevibus; conidiis obovoideis vel late ellipsoideis, hyalinis, 14-24 $\times$ 12-18 μ , media 18.96 $\times$ 15.02 μ ; oogoniis sphaericis vel obovoideis, 33-74 $\times$

30–53 μ ; antheridiis oblongis, ca. $18 \times 14 \mu$, paragenis; oosporis sphaericis, 28–40 μ diam., episporio brunneo, reticulato tectis.

Hab. in foliis caulibusque vivis *Stellariae uliginosae* L.

Distrib. Hokkaido, Honshu, Kyushu, Formosa.

36. *Peronospora Hiratsukae* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis, griseo-albis, mollibus, effusis, totum tergum foliorum occupantibus; conidiophoris saepe singulis e stomatibus exeuntibus, 200–500 μ altis, superne 4–7-ies dichotome ramosis, trunco $\frac{1}{2}$ – $\frac{2}{3}$ totius altitudinis efficienti, 6–16 μ crasso, ramulis ultimis rectangulo-divaricatis, curvatis, inaequilongis, 6–34 μ longis; conidiis ellipsoideis, leniter brunneo-violaceis, $14\text{--}28 \times 12\text{--}21 \mu$, media $21.6 \times 16.99 \mu$; oosporis ignotis.

Hab. in foliis vivis *Galii brachypodii* MAXIM. Monte Teine, Prov. Ishikari (N. HIRATSUKA, 28 Junio 1925—*typus*); Sounkyo, Prov. Ishikari (K. MIYABE et N. HIRATSUKA, 19 Aug. 1925).

This species is related to *Peronospora calotheca* DE BARY rather than to *Peronospora* parasitic on *Galium* spp.

37. *Peronospora Sakamotoi* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis, pallide griseo-violascentibus, mollibus, interdum plus minusve densiusculis, per totam superficiem foliorum occupantibus; conidiophoris plerumque singulis e stomatibus erumpentibus, gracilibus, 300–800 μ altis, trunco $\frac{1}{3}$ – $\frac{3}{4}$ totius altitudinis efficienti, 6–12 μ crasso, ramis 3–7-ies dichotome ramosis, patentibus, inferis rectis, ceteris curvatis, ramulis ultimis rectangulo-divaricatis, validis, curvatis vel rectis, 7–27 μ longis; conidiis oblongatis vel elongatis, leviter flavo-brunneis, $26\text{--}56 \times 16\text{--}24 \mu$, media $43.62 \times 20.56 \mu$; oosporis ignotis.

Hab. in foliis vivis *Galii pseudoasprelli* MAKINO. Zenibako, Prov. Shiribeshi (M. SAKAMOTO, 15 Junio 1929—*typus*; K. FUJITA, 15 Junio 1929).

Distrib. Hokkaido.

This species is closely related to *Peronospora Aparines* (DE BARY) GÄUM., but its conidia are larger and longer than those of the latter.

38. *Peronospora Galii-trifidi* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis vel cauliculis, mollibus vel densiusculis, griseo-albis, per totam superficiem occupantibus; conidiophoris singulis vel plurimis e stomatibus erumpentibus, gracilibus, 300–650 μ altis, superne 5–8-ies dichotome ramosis, patentibus, trunco $\frac{1}{3}$ – $\frac{2}{3}$ totius altitudinis efficienti, 6–12 μ crasso, basi raro leviter incrassato, ramulis ultimis rectangulis, parum curvatis vel rectis,

fere brevibus tenuibusque, 5-15 μ , interdum 22 μ longis; conidiis ellipsoideis vel citriformibus, interdum ovoideis, utrimque vel utralibet plus minusve acutiusculis, leviter flavo-violaceis, 19-29 $\times$ 13-20 μ , media 23.36 $\times$ 15.44 μ ; oosporis ignotis.

Hab. in foliis caulibusque vivis *Galii trifidi* L. Higashitaraika prope Shikka, Sachalin austr. (H. OTANI et Y. IMAI, 23 Julio 1930—*typus*); Shikka, Sachalin austr. (H. OTANI et Y. IMAI, 19 Julio 1930).

Distrib. Sachalin austr.

This species is closely related to *Peronospora borealis* GÄUM., but it differs from the latter in shape and size of the conidium. In this species the conidia are usually acute in both sides and smaller than those of the latter.

39. *Peronospora Hommae* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis vel cauliculis, pallide griseo-violascentibus, plus minusve densiusculis, per totam superficiem foliorum occupantibus; conidiophoris singulis vel plusculis e stomatibus erumpentibus, 200-720 μ altis, trunco $\frac{1}{3}$ - $\frac{2}{3}$ totius altitudinis efficienti, ramis 4-9-ies dichotome vel plus minusve irregulariter ramosis, ramulis ultimis rectangulis, curvatis vel rectis, interdum parum flexuosis, validis, 7-26 μ interdum 40 μ longis; conidiis ellipsoideis, basi raro brevissime pedicellatis, pallide brunneo-violascentibus, 18-30 $\times$ 14-22 μ , media 23.8 $\times$ 17.52 μ ; oosporis ignotis.

Hab. in foliis caulibusque vivis *Galii trifloriformis* KOM. Nopporo, Prov. Ishikari (Y. TOKUNAGA, 15 Junio 1929—*typus*); monte Moiwa, Prov. Ishikari (Y. HOMMA, 19 Junio 1921); Maruyama prope Sapporo, Prov. Ishikari (I. TANAKA, 28 Junio 1929); Kitanayoshi, Sachalin austr. (Y. TOKUNAGA et K. KAWAI, 28 Aug. 1929).

Distrib. Sachalin austr., Hokkaido.

This species is closely related to *Peronospora Aparines* (DE BARY) GÄUM., but its conidia are smaller than those of the latter.

40. *Peronospora Yamadana* TOGASHI, in litt.

Maculis foliiculis, angularibus, a nervis limitatis, dein totam superficiem occupantibus; caespitulis hypophyllis, pallide flavo-brunneis, mollibus; conidiophoris singulis vel plurimis e stomatibus erumpentibus, 140-280 μ altis, superne 3-6-ies dichotome ramosis, trunco brevi, $\frac{1}{3}$ - $\frac{1}{2}$ totius altitudinis efficienti, 60-140 μ longo, 5-10 μ crasso, basi leniter incrassato (usque ad 14 μ), ramis tenuibus, curvatis, ramulis ultimis rectangulo-divaricatis, arcuatis vel sigmatim curvatis, interdum plus minusve flexuosis, 5-24 μ longis; conidiis ellipsoideis vel globoso-ellipsoideis, leviter luteo-brunneis, 14-25 $\times$ 10-20 μ , media 20.05 $\times$

14.56 μ ; oosporis ignotis.

Hab. in foliis vivis *Thalictri tuberiferi* MAXIM. Monte Iwate, Prov. Rikuchu (K. TOGASHI, 16 Julio 1934—*typus*; G. YAMADA, 18 Julio 1908).

Distrib. Honshu.

41. *Peronospora Achlydis* S. ITO et TOKUNAGA, sp. nov.

Maculis in foliis, lutescentibus, angularibus; caespitulis mollissimis, griseo-albis, totum tergum foliorum subtegentibus; conidiophoris singulis vel plusculis e stomatibus exeuntibus, 85–300 μ altis, trunco $\frac{2}{5}$ – $\frac{2}{3}$ totius altitudinis efficienti, 40–180 μ longo, 5–10 μ crasso, ramis 3–7-ies dichotome ramosis, rectis vel arcuatis, ramulis ultimis rectangulis, sigmatim curvatis, aequilongis vel uno axiali longiore, 5–18 μ longis; conidiis leviter flavis vel paene hyalinis, late ellipsoideis, ovoideis vel globosis, 14–25 $\times$ 12–21 μ , fere 17–21 $\times$ 15–18 μ , media 18.87 $\times$ 16.51 μ ; oosporis creberrimis in foliis marcidis, globosis, 17–33 μ diam., episporio flavo-brunneo, levi, leviter rugoso tectis; oogoniis forma irregularibus, 25–40 μ diam.

Hab. in foliis vivis *Achlydis japonici* MAXIM. Monte Tengu, Prov. Ishikari (Y. IMAI et K. ISHIZUKA, 21 Junio 1931—*typus*).

42. *Peronospora Desmodii* MIYABE, in sched.

Maculis foliicolis, luteo-viridis, angularibus, a nervis limitatis, sparsis, dein totum folium occupantibus, caespitulis hypophyllis, mollissimis, leviter griseo-albis insidentibus; conidiophoris singulis vel plusculis e stomatibus exeuntibus, tenuissimis, 200–500 μ altis, trunco $\frac{2}{5}$ – $\frac{2}{3}$ totius altitudinis efficienti, 140–350 μ longo, 3–8 μ crasso, basi rarius leviter incrassato, ramis 4–6-ies dichotome ramosis, plerumque arcuatis, ramulis ultimis rectangulis, paene rectis vel leviter curvatis, 4–18 μ longis, uno axiali saepe longiore; conidiis obscure griseis, late ellipsoideis, 15–26 $\times$ 14–24 μ , fere 19–21 $\times$ 16–19 μ , media 20.4 $\times$ 18.36 μ ; oosporis creberrimis in parenchymate foliorum, globosis, 25–34 μ diam., episporio levi, dilute brunneo tectis.

Hab. in foliis vivis *Desmodii racemosi* DC. Maruyama prope Sapporo, Prov. Ishikari (Y. TOKUNAGA, 28 Sept. 1934—*typus*; G. YAMADA, 7 Aug. 1901; S. ITO, 16 Julio 1934); Ishiyama, Prov. Ishikari (K. MIYABE, 15 Julio 1896); monte Usu, Prov. Iburi (K. ISHIZUKA, 28 Sept. 1932); Tokyo, Prov. Musashi (G. YAMADA, 29 Aug. 1900).

Peronosporae forma in foliis vivis *Dumasiae truncatae* SIEB. et ZUCC. Hiraishi-mura, Prov. Shimotsuke (R. KIKUCHI, 25 Julio 1926); Oshima-mura, Prov. Echigo (K. ISHIZUKA, 23 Aug. 1930; 27 Aug. 1933).

Peronosporae forma in foliis vivis *Falcatae comosae* O. KUNTZE var. *japonicae*

MAKINO. Maruyama prope Sapporo, Prov. Ishikari (K. ISHIZUKA, 14 Sept. 1930; Y. TOKUNAGA, 2 Oct. 1934); monte Komagadake, Prov. Ugo (K. TOGASHI, 31 Julio 1929).

Distrib. Hokkaido, Honshu.

In the fungus parasitic on *Dumasia truncata* the conidia are somewhat smaller than those of above description. They are $15-22 \times 14-20 \mu$, average $18.20 \times 16.36 \mu$.

43. *Peronospora Eritrichii* S. ITO et TOKUNAGA, sp. nov.

Peronospora Echinosperti MIURA (non SWINGLE), Fl. Manch. & Mong. III, p. 52, 1928.

Caespitulis mollibus, leviter flavo-albis, totum tergum foliorum tegentibus; conidiophoris singulis vel plurimis e stomatibus exeuntibus, validis, compactis, $100-250 \mu$ altis, trunco $\frac{1}{3}-\frac{3}{4}$ totius altitudinis efficienti, $50-150 \mu$ longo, $7-12 \mu$ crasso, basi interdum leviter incrassato, ramis 3-5-ies dichotome ramosis, paene rectis vel arcuatis, ramulis ultimis rectangulis, rectis vel interdum curvatis, validis, $5-24 \mu$ longis; conidiis ellipsoideis, leviter brunneis, $16-32 \times 15-25 \mu$, fere $20-28 \times 18-21 \mu$, media 24.84×19.94 ; oosporis creberrimis in parenchymate foliorum marcidiorum, globosis, $30-48 \mu$ diam., episporio crasso, flavo-brunneo, irregulariter rugoso tectis.

Hab. in foliis vivis *Eritrichii pectinati* DC. Kung-chu-ling, Manchuria (M. MIURA, 17 Maio 1921—*typus*).

Distrib. Manchuria.

This species differs from *Peronospora Echinosperti* SWING. in the smaller conidiophores and conidia. In the latter species the conidiophores are $120-530 \mu$ high, the conidia $19-36 \times 16-27 \mu$, average $27.39 \times 21.57 \mu$.

44. *Peronospora Trigonotidis* S. ITO et TOKUNAGA, sp. nov.

Caespitulis mollibus, leviter griseo-violaceis, totum tergum foliorum tegentibus; conidiophoris singulis vel plurimis e stomatibus erumpentibus, $350-800 \mu$ altis, trunco $\frac{1}{2}-\frac{2}{3}$ totius altitudinis efficienti, $7-14 \mu$ crasso, basi leviter incrassato, ramis 5-9-ies dichotome ramosis, patentibus, primariis oblique rectis, paenultimis plerumque leviter curvatis, ramulis ultimis rectangulis, tenuibus, leviter sigmatim curvatis vel arcuatis, $6-24 \mu$ longis, aut omnibus aequilongis aut uno plus minusve brevioribus; conidiis late ellipsoideis, leviter brunneis, $16-28 \times 15-23 \mu$, fere $19-24 \times 17-21 \mu$, media $21.77 \times 19.06 \mu$; oosporis creberrimis in parenchymate foliorum marcidiorum, globosis, $22-31 \mu$ diam., episporio crasso, flavo, irregulariter rugoso tectis.

Hab. in foliis vivis *Trigonotidis peduncularis* BENTH. Iro-zaki, Prov. Izu

(Y. TOKUNAGA, 18 Apr. 1934—*typus*); Morioka, Prov. Rikuchu (G. YAMADA, 6 Maio 1904); Nakamura, Prov. Mino (M. HIURA, 5 Junio 1934).

Distrib. Honshu.

This species is distinct from the species in *Peronospora Echinospirmi* group by possessing the slender conidiophores and smaller conidia.

45. *Peronospora Bothriospermi* SAWADA, Descrip. Catal. Formosan Fungi, III, p. 54, tab. IV, fig. 12-14, 1927, nom. seminud.

Maculis foliicolis, flavo-viridis, effusis, caespitulis hypophyllis, mollibus, pallide brunneo-violascentibus insidentibus; conidiophoris singulis vel plurimis e stomatibus exeuntibus, gracilibus, 250-750 μ altis, trunco $\frac{1}{2}$ - $\frac{3}{4}$ totius altitudinis efficienti, 5-10 μ crasso, basi leviter incrassato, ramis 5-9-ies dichotome ramosis, patentibus, curvatis, ramulis ultimis rectangulo-divaricatis, tenuibus, sigmatim curvatis, 2-25 μ longis; conidiis late ellipsoideis vel ellipsoideis, leviter brunneo-violascentibus vel hyalinis, 14-26 $\times$ 11-21 μ , media 19.53 $\times$ 16.06 μ ; oosporis ignotis.

Hab. in foliis vivis *Bothriospermi tenelli* F. et MEY. necnon *B. tenelli* F. et MEY. var. *asperugoidis* MAXIM.

Distrib. Honshu, Formosa.

46. *Peronospora Perillae* MIYABE, in sched.

Caespitulis mollissimis, griseo-violaceis, tergum foliorum nonnulla parte subtegentibus; conidiophoris fere singulis e stomatibus erumpentibus, 350-600 μ altis, superne 4-8-ies dichotome ramosis, trunco $\frac{1}{2}$ - $\frac{3}{4}$ totius altitudinis efficienti, 200-430 μ longo, 7-13 μ crasso, ramulis ultimis rectangulis, literae sigma similiter curvatis vel interdum rectis, fere inaequalibus, tenuibus, fere 10-36 μ longis; conidiis late ellipsoideis vel globosis, pallide brunneo-violaceis, 15-27 $\times$ 14-25 μ , fere 19-24 $\times$ 18-22 μ , media 21.57 $\times$ 19.68 μ ; oosporis sphaericis, 19-28 μ diam., episporio hyalino vel lutescenti, levi, 0.5 μ crasso tectis.

Hab. in foliis vivis *Perillae frutescentis* BRIT. var. *crispae* DECNE. Utsunomiya, Prov. Shimotsuke (R. KIKUCHI, 16 Julio 1926—*typus*).

Distrib. Honshu.

47. *Peronospora Chrysanthemi-coronarii* (SAWADA) S. ITO et TOKUNAGA, comb. nov.

Plasmopara Chrysanthemi-coronarii SAWADA, Descrip. Catal. Formosan Fungi, V, p. 15, tab. I, fig. 17-21, 1931, nom. seminud.

Maculis in foliis, flavo-viridis, angularibus vel rotundatis, saepe a nervis limitatis, dein totam superficiem occupantibus, caespitulis hypophyllis, albidis,

densis insidentibus; conidiophoris 1-3 e stomatibus coalitis, 420-780 μ altis, trunco 225-545 μ longo, 11-15 μ crasso, ramis 5-8-ies dichotome ramosis, rectis vel leniter curvatis, plus minusve crassiusculis, ramulis ultimis sub angulo obtuso orientibus, interdum trifurcatis, rectis vel raro vix curvatis, apice leviter incrassatis, 9-26 μ longis, 3-5 μ crassis; conidiis oblongatis vel ellipsoideis, hyalinis, 38-56 $\times$ 18-28 μ , media 44.6 $\times$ 24.1 μ ; oosporis ignotis.

Hab. in foliis vivis *Chrysanthemi coronarii* L.

Distrib. Formosa.

The above diagnosis is condensed and translated from the original description of *Plasmopara Chrysanthemi-coronarii*.

48. *Peronospora Helichrysi* TOGASHI et EGAMI, in litt.

Caespitulis hypophyllis, albo-lutescentibus, mollibus, effusis, dein per totam superficiem foliorum distributis; conidiophoris singulis vel plurimis e stomatibus exeuntibus, 200-500 μ altis, superne 3-7-ies ramosis, trunco $\frac{1}{2}$ - $\frac{3}{4}$ totius altitudinis efficienti, 7-12 μ crasso, ramis dichotomis vel subdichotomis, interdum trichotomis, leniter curvatis vel rectis, crassiusculis, ramulis ultimis interdum trifurcatis, fere rectis vel leviter curvatis, 7-24 μ longis, basi plus minusve incrassatis; conidiis ellipsoideis, hyalinis vel leviter flavo-brunneis, 22-38 $\times$ 17-25 μ , media 29.20 $\times$ 19.01 μ ; oosporis ignotis.

Hab. in foliis vivis *Helichrysi bracteati* WILLD. Sapporo, Prov. Ishikari (Y. IMAI, 26 Julio 1932—*typus*; T. FUKUSHI et Y. IMAI, 24 Sept. 1932); Kotoni, Prov. Ishikari (K. KURIBAYASHI, 15 Julio 1925); Morioka, Prov. Rikuchu (T. EGAMI, 5 Nov. 1931).

Distrib. Hokkaido, Honshu.

49. *Peronospora Fujitai* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis, mollibus, sordide violaceis, effusis; conidiophoris singulis vel plurimis e stomatibus exeuntibus, 180-300 μ altis, trunco $\frac{1}{2}$ - $\frac{2}{3}$ totius altitudinis efficienti, 7-15 μ crasso, basi saepe leviter tumido, ramis 3-6-ies dichotome ramosis, primariis paene rectis, paenultimis plerumque arcuatis, ramulis ultimis rectangulis, arcuatis vel sigmatim curvatis, fere inaequalibus, 5-25 μ longis; conidiis late ellipsoideis, leviter fulvescentibus, 18-33 $\times$ 16-28 μ , media 26.27 $\times$ 21.69 μ ; oosporis creberrimis in foliis marcidis, globosis, 25-36 μ diam., episporio crasso, pallide brunneis, levi, leviter rugoso tectis.

Hab. in foliis vivis *Allii Victorialis* L. Zenibako-tôge, Prov. Shiribeshi (K. FUJITA, 1 Junio 1930—*typus*; Y. TOKUNAGA, 15 Junio 1932; 28 Maio 1933); monte Tengu, Prov. Ishikari (Y. TOKUNAGA, 15 Junio 1930; Y. IMAI, 21 Junio 1931).

Distrib. Hokkaido.

50. *Peronospora Hylomeconis* S. ITO et TOKUNAGA, sp. nov.

Caespitulis mollibus, brunneo-albis, tergum foliorum nonnulla parte tegentibus; conidiophoris singulis vel plurimis e stomatibus exeuntibus, 150–400 μ altis, superne 3–7-ies dichotome ramosis, trunco $\frac{2}{5}$ – $\frac{2}{3}$ totius altitudinis efficienti, 100–250 μ longo, 5–12 μ crasso, ramulis ultimis rectangulis, literae sigma similiter curvatis, 7–24 μ longis; conidiis hyalinis vel pallide brunneolis, late ellipsoideis, 16–28 $\times$ 15–24 μ , fere 20–25 $\times$ 18–21 μ , media 22.80 $\times$ 19.21 μ ; oosporis ignotis.

Hab. in foliis vivis *Hylomeconis japonicae* PRANTL et KUENDIG. var. *typicae* MAKINO. Akabane, Prov. Musashi (N. NAMBU et I. UEMURA, 24 Apr. 1900—*typus*).

Distrib. Honshu.

This species is closely related to *Peronospora Chelidonii* MIYABE, but it differs from the latter in the larger size of conidium.

51. *Peronospora Nasturtii-palustris* S. ITO et TOKUNAGA, sp. nov.

Caespitulis hypophyllis et cauliculis, densis, brunneo-albis, per totam superficiem distributis; conidiophoris plurimis e stomatibus exeuntibus, 140–400 μ altis, superne 4–8-ies dichotome ramosis, trunco $\frac{1}{2}$ – $\frac{3}{4}$ totius altitudinis efficienti, 80–300 μ longo, 6–20 μ crasso, ramis rectis, breviusculis, ramulis ultimis rectangulo-divaricatis, literae sigma similiter curvatis, sed parte ultima longioris ramuli saepe inflexis, 7–36 μ longis; conidiis ellipsoideis, hyalinis, 12–24 $\times$ 10–18 μ , fere 16–20 $\times$ 13–16 μ , media 18.05 $\times$ 14.71 μ ; oogoniis oosporisque ignotis.

Hab. in foliis caulibusque vivis *Nasturtii palustris* DC. Horomui, Prov. Ishikari (Y. IMAI, 1 Junio 1930—*typus*); Sapporo, Prov. Ishikari (I. TANAKA, 17 Julio 1924; M. SAKAMOTO, 21 Junio 1929); Shikka, Sachalin austr. (H. OTANI et Y. IMAI, 31 Julio 1930); Morioka, Prov. Rikuchu (G. YAMADA, 20 Maio 1904; K. TOGASHI, 2 Julio 1934).

Distrib. Sachalin austr., Hokkaido, Honshu.

52. *Bremia elliptica* SAWADA, Bot. Mag. Tokyo, XXVIII, p. 139, fig. 6, 1914, nom. seminud.; Descrip. Catal. Formosan Fungi, I, p. 107, tab. IV, fig. 10–13, 1919, nom. seminud.; ibid. II, p. 42, 1922, nom. seminud.

Maculis foliicolis, flavo-viridis, polygoniis, a nervis limitatis, caespitulis hypophyllis, albidis, mollibus insidentibus; conidiophoris singulis vel plurimis e stomatibus exeuntibus, 240–570 μ altis, superne 3–6 ies dichotome ramosis, trunco $\frac{1}{2}$ – $\frac{2}{3}$ totius altitudinis efficienti, 140–400 μ longo, 8–16 μ crasso, basi

vix incrassato, ramis validis, rectis vel plus minusve curvatis, ultimis brevibus, crassiusculis, apice in vesiculam tympaniformem inflatis, 2-6 sterigmatibus 5-12 μ longis praeditis; conidiis late ellipsoideis vel ellipsoideis, apice depresso papillatis, hyalinis, 15-24 $\times$ 12-20 μ ; oosporis ignotis.

Hab. in foliis vivis *Lactuae laciniatae* MAKINO, *L. formosanae* MAXIM. necnon *L. Raddeanae* MAXIM.

Distrib. Hokkaido, Formosa.

53. *Bremia microspora* SAWADA, Bot. Mag. Tokyo, XXVIII, p. 139, fig. 7, 1914, nom. seminud.; Descrip. Catal. Formosan Fungi, I, p. 109, tab. IV, fig. 14-18, 1919, nom. seminud.

Maculis foliicolis, luteolis, effusis, caespitulis hypophyllis, albidis, mollibus insidentibus; conidiophoris e stomatibus caespitosis, 270-600 μ altis, superne 3-7-ies dichotome ramosis, trunco $\frac{1}{3}$ - $\frac{2}{3}$ totius altitudinis efficienti, 140-340 μ longo, 6-16 μ crasso, basi interdum vix incrassato, ramis tenuiusculis, arcuatis, ultimis brevibus, apice in vesiculam subglobosam parviusculamque inflatis, 2-7 sterigmatibus brevibus 2.5-5 μ interdum 8 μ longis praeditis; conidiis ellipsoideis vel globosis, hyalinis, 9-19 $\times$ 8-15 μ ; oosporis ignotis.

Hab. in foliis vivis *Lactuae debilis* MASS. necnon *L. dentatae* MAKINO var. *Thunbergii* MAKINO.

Distrib. Hokkaido, Honshu, Formosa.

54. *Bremia Picridis* S. ITO et TOKUNAGA, sp. nov.

Maculis foliicolis, lutescentibus, rotundatis, effusis, caespitulis hypophyllis, albidis, densiusculis insidentibus; conidiophoris singulis vel plurimis e stomatibus erumpentibus, 300-850 μ altis, 4-7-ies dichotome ramosis, trunco $\frac{1}{3}$ - $\frac{3}{4}$ totius altitudinis efficienti, 200-650 μ longo, superne 7-15 μ crasso, basi leviter incrassato, ramis gracilibus, inferis rectis, superis curvatis, ultimis brevibus, apice in vesiculam tympaniformem inflatis, 3-7 sterigmatibus 5-9 μ longis praeditis; conidiis ovoideis, ellipsoideis vel globosis, hyalinis, 12-22 $\times$ 10-19 μ , fere 15-18 $\times$ 12-16 μ , media 16.86 $\times$ 14.54 μ ; oosporis ignotis.

Hab. in foliis vivis *Picridis hieracioidis* L. var. *japonicae* REGEL. Sounkyo, Prov. Ishikari (Y. TOCHINAI et Y. TOKUNAGA, 3 Aug. 1934—*typus*; S. ITO, 26 Julio 1926); ins. Rebun, Prov. Kitami (K. MIYABE, 23 Aug. 1894); Maruyama prope Sapporo, Prov. Ishikari (S. YAMAGIWA, 14 Junio 1931).

Distrib. Sachalin austr., Kuriles, Hokkaido, Honshu.

55. *Bremia Taraxaci* S. ITO et TOKUNAGA, sp. nov.

Maculis foliicolis, flavo-viridis, effusis, caespitulis hypophyllis albidis, densi-

usculis insidentibus; conidiophoris singulis vel plurimis e stomatibus erumpentibus, 200-720 μ altis, superne 4-7-ies dichotome ramosis; raro trichotomis, trunco $\frac{1}{3}$ - $\frac{3}{4}$ totius altitudinis efficienti, 70-500 μ longo, 7-19 μ crasso, interdum basi vix incrassato, ramis validiusculis, inferis rectis, superis plus minusve curvatis, ultimis plerumque longis, apice tympaniformem vel subglobosam inflatis, 3-7 sterigmatibus 4-8 μ longis praeditis; conidiis ellipsoideis, ovoideo-ellipsoideis vel globosis, apice papilla depressa ornatis, hyalinis, 16-24 $\times$ 15-22 μ ; oosporis ignotis.

Hab. in foliis vivis *Taraxaci vulgaris* SCHRENK. Nopporo, Prov. Ishikari (Y. TOKUNAGA, 26 Maio 1929—*typus*); Sapporo, Prov. Ishikari (T. MIYAKE, 25 Maio 1902; I. TANAKA, 29 Maio 1925).

Hab. in foliis vivis *Taraxaci ceratophori* DC. Monte Yubari, Prov. Ishikari (S. ITO, 9 Aug. 1931).

Hab. in foliis vivis *Taraxaci platycarpi* DAHLST. Tokyo, Prov. Mutsu (N. NAMBU, 1 Apr. 1901).

Distrib. Hokkaido, Honshu.

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