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Rust Fungi (Uredinales) Collected from the Tsukuba Botanical Garden (I)*

By

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(Communicated by Syo KUROKAWA)

The Tsukuba Botanical Garden, National Science Museum, was founded in Tsukuba Science City in 1976. The garden has very unique exhibitions which include 12 sections of vegetation in central Japan. For this reason, many species of plants have been introduced to the garden.

We have continued to survey rust fungi (Uredinales) in the garden with the authorization of the Director of the Tsukuba Botanical Garden since 1984, and we report here 31 species of rust fungi collected during the period June, 1984 to April, 1985. Rust fungi collected in the Tsukuba area were reported by Kakishima *et al.* (1976, 1979, 1980, 1983, 1985). Five species, *Phragmidium potentillae*, *Puccinia hemerocallidis*, *Puccinia linosyridicaricis*, *Uromyces euphorbiae* and *Aecidium araliae* were first recorded from the Tsukuba area.

Terminology of spore stages of rust fungi and classification of families of Uredinales follow those adopted by Cummins and Hiratsuka (1983). The Roman numerals 0, I, II and III denote spermogonial, aecial, uredinial and telial stages, respectively. All the specimens examined including host plants have been deposited in both the Herbarium of the Institute of Agriculture and Forestry, University of Tsukuba (TSH) and the Herbarium of the National Science Museum, Tokyo (TNS).

We wish to express our thanks to Dr. S. Kurokawa, Director of the Tsukuba Botanical Garden, National Science Museum for allowing us to conduct the field surveys of rust fungi in the garden. We are also grateful to the students of our laboratory for their cooperation in the surveys.

Fam. Pucciniastraceae

Pucciniastrum agrimoniae (Dietel) Tranzschel in Script. Bot. Hort. Univ. Petropol.

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4: 301, 1895; Hiratsuka in Mem. Tottori Agr. Coll. **4**: 231, 1936; Ito, Mycol. Fl. Japan **2**(2): 84, 1938; Hiratsuka in Mem. Facul. Agr. Tokyo Univ. Education **5**: 95, 1958 (Fig. 1).

Host plants examined: *Agrimonia japonica* (Miq.) Koidz. (*Kinmizuhiki*) (II, Nov. 21, 1984, TSH R6301, TNS F-52005).

This species commonly produces uredinia on *Agrimonia japonica* and is widely distributed in Japan (Hiratsuka 1936, 1958, 1960, Ito 1938). However, the telial stage is very rare, and spermogonial and aecial stages have not been identified.

Fam. Coleosporiaceae

Coleosporium pini-asteris Orishimo in Bot. Mag. Tokyo **24**: 4, 1910; Kaneko in Rept. Tottori Mycol. Inst. (Japan) **19**: 35, 1981 (Fig. 2).

Host plants examined: *Aster scaber* Thunb. (*Shirayamagiku*) (II, III, Sept. 17, 1984, TSH R6303, TNS F-52007).

This species had been treated as a synonym of *Coleosporium asterum* (Diet.) P. et H. Sydow by Ito (1938) and Hiratsuka (1960). However, Kaneko (1981) found morphological differences between the two species. Spermogonia and aecia occur mainly on needles of *Pinus densiflora* (*Akamatsu*) (Kaneko 1981).

Coleosporium plectranthi Barclay in J. Asiatic Soc. Bengal **59**: 89, 1890; Ito, Mycol. Fl. Japan **2**(2): 200, 1938; Kaneko in Rept. Tottori Mycol. Inst. (Japan) **19**: 126, 1981 (Fig. 3).

Host plants examined: *Mosla dianthera* (Hamilt.) Maxim. (*Himeziso*) (II, Sept. 17, 1984, TSH R6304, TNS F-52008).

Uredinial and telial stages of this species are produced on many species of *Elsholtzia, Keiskea, Mosla, Perilla* and *Plectranthus,* and are widely distributed in Japan (Kaneko 1981). Kaneko (1981) carried out inoculation experiments and proved that spermogonia and aecia were produced on *Pinus densiflora.*

Coleosporium solidaginis Thümen ex P. et H. Sydow, Monogr. Ured. **3**: 619, 1915.

Host plants examined: *Solidago altissima* Linn. (*Seitakaawadachiso*) (II, Nov. 5, 1984, TSH R6305, TNS F-52009); *Solidago virga-aurea* Linn. var. *asiatica* Nakai (*Akinokirinso*) (II, Sept. 7, 1984, TSH R6341, TNS F-52045; II, Nov. 5, 1984, TSH R6342, TNS F-52046).

This species has recently been observed in Japan (Hiratsuka *et al.* 1982, Kaneko and Hiratsuka 1984, Kakishima *et al.* 1985).

Fam. Cronartiaceae

Cronartium quercuum Miyabe ex Shirai in Bot. Mag. Tokyo **13**: 74, 1899; Ito, Mycol. Fl. Japan **2**(2): 152, 1938.

Host plants examined: *Quercus serrata* Thunb. (*Konara*) (II, June 4, 1984, TSH R6302, TNS F-52006).

Uredinial and telial stages are produced on many species of *Quercus, Castanea* and *Castanopsis.* Basidiospores from teliospores attack two-needle pines and make galls on the stems. Spermogonia and aecia are produced on these galls during winter to spring

(Ito 1938, Hiratsuka 1960).

Fam. Chaconiaceae

Ochropsora kraunhiae (Dietel) Dietel in Bot. Jahrb. **37**: 106, 1905; Ito, Mycol. Fl. Japan **2**(2): 226, 1938; Hiratsuka and Kaneko in Proc. Japan Acad. **54**: 303, 1978.

Host plants examined: *Wisteria brachybotrys* Sieb. et Zucc. (*Yamafuji*) (II, Sept. 17, 1984, TSH R6306, TNS F-52010).

This species is endemic to Japan and produces uredinia and telia on *Wisteria brachybotrys* and *W. floribunda* (Willd.) DC. (*Fuji*) (Ito 1938, Hiratsuka 1960, Hiratsuka and Kaneko 1978). Hiratsuka and Kaneko (1978) clarified the life cycle of this rust fungus by inoculation experiments. According to them, spermogonial and aecial stages are represented by *Aecidium corydalinum* P. et H. Sydow and are systemically produced on many species of *Corydalis*.

Fam. Pileolariaceae

Pileolaria klugkistiana Dietel in Ann. Mycol. **19**: 301, 1921; Ito, Mycol. Fl. Japan **2**(3): 10, 1950 (Figs. 4, 5).

Host plants examined: *Rhus javanica* Linn. (*Nurude*) (0, June 6, 1984, TSH R6307, TNS F-52011; 0, I, June 18, 1984, TSH R6308, TNS F-52012; 0, I, II, July 23, 1984, TSH R6309, TNS F-52013; II, III, Sept. 17, 1984, TSH R6310, TNS F-52014; II, III, Nov. 5, 1984, TSH R6311, TNS F-52015).

Kakishima *et al.* (1984) analysed the life cycle of this rust fungus by inoculation experiments. This rust is an autoecious species which produces spermogonia, uredinoid aecia, uredinia and telia on *Rhus javanica*.

Fam. Phragmidiaceae

Kuehneola japonica (Dietel) Dietel in Ann. Mycol. **10**: 205, 1912; Ito, Mycol. Fl. Japan **2**(3): 11, 1950.

Host plants examined: *Rosa multiflora* Thunb. (*Noibara*) (III, July 23, 1984, TSH R6312, TNS F-52016).

This rust fungus is a microcyclic species which produces telia on many species of *Rosa* (Ito 1950, Hiratsuka 1960).

Phragmidium pauciloculare (Dietel) P. et H. Sydow, Monogr. Ured. **3**: 138, 1912; Ito, Mycol. Fl. Japan **2**(3): 43, 1950; Hiratsuka *et al.* in Rept. Tottori Mycol. Inst. (Japan) **18**: 79, 1980 (Fig. 6).

Host plants examined: *Rubus parvifolius* Linn. (*Nawashiroichigo*) (II, III, Nov. 5, 1984, TSH R6314, TNS F-52018).

This species is widely distributed in Japan and produces uredinia and telia on *Rubus parvifolius* and *R. phoenicolasius* Maxim. (*Ebigara-ichigo*) (Hiratsuka *et al.* 1980).

Phragmidium potentillae (Pers.) Karsten, Mycol. Fenn. **4**: 49, 1878; Ito, Mycol. Fl.

Japan **2**(3): 25, 1950; Hiratsuka *et al.* in Rept. Tottori Mycol. Inst. (Japan) **18**: 69, 1980.

Host plants examined: *Potentilla chinensis* Ser. (*Kawarasaiko*) (0, I, II, June 4, 1984, TSH R6315, TNS F-52019).

Potentilla chinensis, P. matsumurae Th. Wolf (*Miyamakinbai*) and *P. nipponica* Th. Wolf (*Hirohanokawarasaiko*) are listed as host plants in Japan (Hiratsuka *et al.* 1980). This species is widely distributed in Japan. However, this is the first record in the Tsukuba area.

Xenodochus carbonarius Schlechtendal in Linnaea **1**: 237, 1826; Ito, Mycol. Fl. Japan **2**(3): 23, 1950 (Figs. 7, 8).

Host plants examined: *Sanguisorba officinalis* Linn. (*Waremoko*) (0, I, II, June 4, 1984, TSH R6313, TNS F-52017).

Sato and Sato (1980) demonstrated by inoculation experiments that this rust fungus was an autoecious species which produced spermogonia, aecia, caeomoid uredinia and telia on *Sanguisorba officinalis*.

Fam. Pucciniaceae

Gymnosporangium asiaticum Miyabe ex Yamada in Omori and Yamada, Shokubutsu-Byōrigaku 303, 1904.

Host plants examined: *Chaenomeles speciosa* (Sweet) Nakai (*Boke*) (0, June 4, 1984, TSH R6316, TNS F-52020; 0, I, July 23, 1984, TSH R6317, TNS F-52021).

This rust fungus had been known under the name, *Gymnosporangium haraeanum* P. et H. Sydow (Ito 1950, Hiratsuka 1960). However, it was treated as a synonym of *Gymnosporangium asiaticum* according to the International Code of Botanical Nomenclature (Hiratsuka 1975). This species also attacks pears and causes severe damage. Telia are produced on *Juniperus* spp.

Puccinia acetosae Körnicke in Hedwigia **15**: 184, 1876: Ito, Mycol. Fl. Japan **2**(3): 239, 1950; Hiratsuka and Kaneko in Rept. Tottori Mycol. Inst. (Japan) **10**: 110, 1973 (Figs. 9, 10).

Host plants examined: *Rumex acetosa* Linn. (*Suiba*) (II, June 4, 1984, TSH R6322, TNS F-52026).

This rust fungus produces uredinia on *Rumex acetosa, R. acetosella* Linn. (*Himesuiba*), *R. montanus* Desf. (*Takanesuiba*) and *Oxyria digyna* (Linn.) Hill. (*Marubagishigishi*). However, telia have not been found in Japan (Hiratsuka and Kaneko 1973).

Puccinia chrysanthemi Roze in Bull. Soc. Mycol. Fr. **16**: 92, 1900; Ito, Mycol. Fl. Japan **2**(3): 319, 1950; Hiratsuka in Sydowia **1**: 37, 1956 (Figs. 11, 12).

Host plants examined: *Chrysanthemum indicum* Linn. (*Aburagiku*) (II, III, Nov. 5, 1984, TSH R6323, TNS F-52027).

This species causes black rust of cultivated chrysanthemum. Hiratsuka (1956, 1960) listed many species of *Chrysanthemum* as host plants of this rust fungus. Cummins (1978) and Hiratsuka (1980) considered *Puccinia chrysanthemi* as a synonym of *Puccinia tanaceti* DC. var. *tanaceti*.

Puccinia coronata Corda, Icon. Fung. **1**: 6, 1837; Ito, Mycol. Fl. Japan **2**(3): 148, 1950 (Fig. 13).

Host plants examined: *Rhamnus davurica* Pall. var. *nipponica* Makino (*Kurotsubara*) (0, I, June 4, 1984, TSH R6324, TNS F-52028); *Berchemia berchemiaefolia* (Makino) Koidz. (*Yokoguranoki*) (0, I, June 25, 1984, TSH R6325, TNS F-52029).

These are spermogonial and aecial stages of crown rust of grasses. According to Cummins (1971), Hiratsuka and Kaneko (1983) recognized 4 varieties in crown rust, *Puccinia coronata*.

Puccinia dieteliana P. Sydow in Hedwigia **37**: 215, 1898; Ito, Mycol. Fl. Japan **2**(3): 289, 1950 (Fig. 14).

Host plants examined: *Lysimachia clethroides* Duby (*Okatoranoo*) (I, II, III, Sept. 7, 1984, TSH R6337, TNS F-52041).

Sato and Kakishima (1982) analyzed the life cycle of this rust fungus by inoculation experiments. According to them, this rust fungus is an autoecious species which produces spermogonia, aecia, aecidioid uredinia and telia on *Lysimachia clethroides*.

Puccinia glecomatis DC. ex Poir. in Lam., Encycl. Bot. **8**: 245, 1808; Ito, Mycol. Fl. Japan **2**(3): 297, 1950; Hiratsuka in Rept. Tottori Mycol. Inst. (Japan) **14**: 38, 1976 (Fig. 15).

Host plants examined: *Glechoma hederacea* Linn. var. *grandis* (A. Gray) Kudo (*Kakidoshi*) (III, July 2, 1984, TSH R6334, TNS F-52038).

This rust fungus is a microcyclic species which produces only telia on *Glechoma hederacea* var. *grandis* and *Meehania urticifolia* (Miq.) Makino (*Rashomonkazura*) (Hiratsuka 1976).

Puccinia hemerocallidis Thümen in Bull. Soc. Imp. Nat. Moscou **55**: 81, 1880; Ito, Mycol. Fl. Japan **2**(3): 218, 1950; Hiratsuka and Hasebe in Rept. Tottori Mycol. Inst. (Japan) **16**: 4, 1978 (Figs. 16, 17).

Host plants examined: *Hemerocallis longituba* Miq. (*Nokanzo*) (II, III, July 4, 1984, TSH R6345, TNS F-52049).

Spermogonial and telial stages of this rust fungus are produced on the species of *Patrinia* (Ito 1950, Hiratsuka 1960). Hiratsuka and Hasebe (1978) treated *Puccinia funkiae* Dietel on *Hosta* spp. as a synonym of this species. Even though this species is common in Japan, this is the first record in the Tsukuba area.

Puccinia hieracii Martius, Prodr. Fl. Mosq. (2 ed.) 226, 1817; Ito, Mycol. Fl. Japan **2**(3): 326, 1950 (Fig. 18).

Host plants examined: *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi (*Kozorina*) (II, June 4, 1984, TSH R6326, TNS F-52030).

This rust fungus is an automacrocyclic species which produces spermogonia, uredinoid aecia, uredinia and telia on the species of *Hieracium*, *Hololeion*, *Picris*, *Scorzonera* and *Taraxacum* (Hiratsuka 1980). Hiratsuka (1980) treated this species as *Puccinia hieracii* var. *hieracii* according to Cummins (1978).

Puccinia kusanoi Dietel in Bot. Jahrb. **27**: 569, 1900; Ito, Mycol. Fl. Japan **2**(3): 124, 1950 (Fig. 19).

Host plants examined: *Deutzia crenata* Sieb. et Zucc. (*Utsugi*) (0, June 4, 1984, TSH R6327, TNS F-52031); *Pleioblastus chino* Makino (*Azumanezasa*) (II, III, June 4, 1984, TSH R6328, TNS F-52032; II, Sept. 17, 1984, TSH R6329, TNS F-52033; II, Nov. 5, 1984, TSH R6330, TNS F-52034).

Many species of bamboos are listed as uredinial and telial hosts of this rust fungus in Japan (Ito 1950, Hiratsuka 1960, Katsumoto 1968).

Puccinia linosyridi-caricis Ed. Fischer, Ured. der Schweiz 275, 1904; Kakishima and Sato in Trans. mycol. Soc. Japan **21**: 40, 1980 (Fig. 20).

Host plants examined: *Aster scaber* Thunb. (*Shirayamagiku*) (0, I, Apr. 22, 1985, TSH R6347, TNS F-52051).

Although this species was described from Europe, Kakishima and Sato (1980) first reported it from Japan. Uredinia and telia are produced on *Carex humilis* Less. (*Hosoba-hikagesuge*). This is a second report for the species in Japan and is new to the Tsukuba area.

Puccinia miscanthi Miura, Fl. Manchuria and E. Mongolia Pt. **3**: 302, 1928; Cummins, Rust Fungi of Cereals, Grasses and Bamboos 105, 1971.

Host plants examined: *Plantago asiatica* Linn. (*Oobako*) (0, I, June 4, 1984, TSH R6331, TNS F-52035; 0, I, June 18, 1984, TSH R6332, TNS F-52036).

Ito (1950) treated this rust fungus as *Puccinia eulaliae* Barclay. This rust fungus is a heteroecious species, which produces spermogonia and aecia on *Plantago* spp. and uredinia and telia on *Miscanthus* spp., *Imperata* sp. and *Pacelurus* sp. in Japan (Ito 1950, Hiratsuka 1960, Cummins 1971, Hiratsuka and Kaneko 1983). Sato and Kakishima (1982) added *Lysimachia clethroides* Duby (*Okatoranoo*) as a spermogonial and aecial host of this fungus. Hiratsuka and Sato (1984) also analysed the life cycle of this fungus by inoculation experiments.

Puccinia polygoni-amphibii Persoon, Syn. Fung. 227, 1801; Ito, Mycol. Fl. Japan **2**(3): 231, 1950 (Fig. 21).

Host plants examined: *Polygonum cuspidatum* Sieb. et Zucc. (*Itadori*) (II, Sept. 17, 1984, TSH R6333, TNS F-52037).

Hiratsuka and Kaneko (1973) recognized 6 varieties in *Puccinia polygoni-amphibii* in Japan and treated this rust fungus as *Puccinia polygoni-amphibii* var. *tovariae* Arthur.

Puccinia recondita Rob. ex Desm. in Bull. Soc. Bot. Fr. **4**: 798, 1857; Cummins, Rust Fungi of Cereals, Grasses and Bamboos 320, 1971.

Host plants examined: *Agropyron tsukushiense* (Honda) Ohwi var. *transiens* (Hack.) Ohwi (*Kamojigusa*) (II, June 4, 1984, TSH R6338, TNS F-52042); *Agrostis clavata* Trin. (*Yamanukabo*) (II, June 4, 1984, TSH R6339, TNS F-52043; II, July 2, 1984, TSH R6340, TNS F-52044).

This species is a causal fungus of leaf rust of grasses. Many grasses are listed as uredinial and telial hosts of this fungus (Hiratsuka 1960, Cummins 1971, Hiratsuka and Kaneko 1983).

Puccinia sessilis Schneider ex Schröter in Abh. Schles. Ges. vaterl. Kult. **48**: 19, 1870; Ito, Mycol. Fl. Japan **2**(3): 165, 1950; Hiratsuka and Hasebe in Rept. Tottori

Mycol. Inst. (Japan) **16**: 28, 1978 (Fig. 22).

Host plants examined: *Polygonatum odoratum* (Mill.) Druce var. *pluriflorum* (Miq.) Ohwi (*Amadokoro*) (0, I, Apr. 22, 1985, TSH R6346, TNS F-52050).

Uredinia and telia occur on *Phalaris arundinacea* Linn. (*Kusayoshi*) (Ito 1950, Hiratsuka 1960, Hiratsuka and Hasebe 1978). Hiratsuka and Kaneko (1983) treated this species as *Puccinia sessilis* var. *sessilis* according to Cummins (1971).

Puccinia zoysiae Dietel in Bot. Jahrb. **32**: 48, 1902; Ito, Mycol. Fl. Japan **2**(3): 178, 1950; Cummins, Rust Fungi of Cereals, Grasses and Bamboos 339, 1971.

Host plants examined: *Paederia scandens* (Lour.) Merrill var. *mairei* (Leveille) Hara (*Hekusokazura*) (0, I, June 4, 1984, TSH R6335, TNS F-52039; 0, I, June 18, 1984, TSH R6336, TNS F-52040).

Uredinia and telia of this rust fungus occur on the species of *Zoysia* (Ito 1950, Hiratsuka 1960, Cummins 1971, Hiratsuka and Kaneko 1983).

Uromyces durus Dietel in Ann. Mycol. **5**: 70, 1907; Ito, Mycol. Fl. Japan **2**(3): 78, 1950; Hiratsuka in Rept. Tottori Mycol. Inst. (Japan) **10**: 66, 1973 (Fig. 23).

Host plants examined: *Allium grayi* Regel (*Nobiru*) (II, III, July 2, 1984, TSH R6318, TNS F-52022).

This species is mainly distributed in the central to southern parts of Japan (Hiratsuka 1973). Spermogonial and aecial stages have not been identified.

Uromyces erythronii (DC.) Passerini in Comm. Soc. Critt. Ital. **2**: 452, 1867; Ito, Mycol. Fl. Japan **2**(3): 79, 1950; Hiratsuka in Rept. Tottori Mycol. Inst. (Japan) **10**: 73, 1973 (Figs. 25, 26).

Host plants examined: *Erythronium japonicum* Decne. (*Katakuri*) (0, I, III, Apr. 22, 1985, TSH R6344, TNS F-52048).

This species produces spermogonia, aecia and telia on *Erythronium japonicum* and *Tulipa edulis* Bak. (*Amana*) in Japan (Ito 1950, Hiratsuka 1960, 1973).

Uromyces euphorbiae Cooke et Peck in Peck in Ann. Rept. N. Y. State Mus. **25**: 90, 1873; Hiratsuka in Rept. Tottori Mycol. Inst. (Japan) **10**: 54, 1973 (Fig. 24).

Host plants examined: *Euphorbia supina* Rafin (*Konishikiso*) (II. Sept. 17, 1984, TSH R6319, TNS F-52023).

Ito (1950) treated this species as *Puccinia proeminens* Léveillé. This fungus is an autoecious species which produces spermogonia, aecia, uredinia and telia on the species of *Euphorbia* (Hiratsuka 1973). This species is common in Japan, but this is the first record in the Tsukuba area.

Uromyces viciae-fabae (Pers.) Schröter in Hedwigia **14**: 161, 1875; Hiratsuka in Rept. Tottori Mycol. Inst. (Japan) **10**: 27, 1973.

var. **viciae-fabae** (Figs. 27, 28).

Host plants examined: *Lathyrus japonicus* Willd. (*Hamaendo*) (II, June 25, 1984, TSH R6320, TNS F-52024); *Vicia pseudo-orobus* Fisch. et Mey. (*Oobakusafuji*) (II, III, Nov. 21, 1984, TSH R6321, TNS F-52025).

Ito (1950) treated this species as *Uromyces fabae* De Bary. Hiratsuka (1973) recognized 2 varieties in *Uromyces viciae-fabae* in Japan. This rust fungus is an automacro-

cyclic species which is widely distributed in Japan (Hiratsuka 1973).

Uredinales Imperfecti

Aecidium araliae Sawada ex Ito et Murayama in Trans. Sapporo Nat. Hist. Soc. **17**: 171, 1943; Ito, Mycol. Fl. Japan **2**(3): 374, 1950 (Figs. 29, 30).

Host plants examined: *Aralia elata* (Miq.) Seemann (*Taranoki*) (0, I, June 4, 1984, TSH R6343, TNS F-52047).

This species has been reported from Taiwan, Okinawa and Kyushu (Ito and Murayama 1943, Ito 1950, Hiratsuka 1960). This is the first record in Honshu.

摘　　要

筑波実験植物園内において，1984年6月から1985年4月までの期間に採集することができた銹菌類31種を報告する。これらのうちの3種 *Phragmidium potentillae*, *Puccinia hemerocallidis*, *Uromyces euphorbiae* は日本に広く分布している種であるが，筑波地区では初めてその分布が確認された。また，*Puccinia linosyridi-caricis* はヨーロッパで命名記載された種で，日本においては長野県で初めてその分布が報告されたが，今回は2回目の記録である。さらに，タラノキに寄生する *Aecidium araliae* は今まで台湾，沖縄，九州にのみ分布することが報告されていたが，今回初めて筑波地区にも分布していることが認められた。

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Explanation of figures

Fig. 1. Urediniospores of *Pucciniastrum agrimoniae* (Bar=10 μm).
Fig. 2. Teliospores of *Coleosporium pini-asteris* (Bar=10 μm).
Fig. 3. Urediniospores of *Coleosporium plectranthi* (Bar=10 μm).
Fig. 4. Urediniospores of *Pileolaria klugkistiana* (Bar=10 μm).
Fig. 5. Teliospores of *Pileolaria klugkistiana* (Bar=10 μm).
Fig. 6. Teliospores of *Phragmidium pauciloculare* (Bar=10 μm).

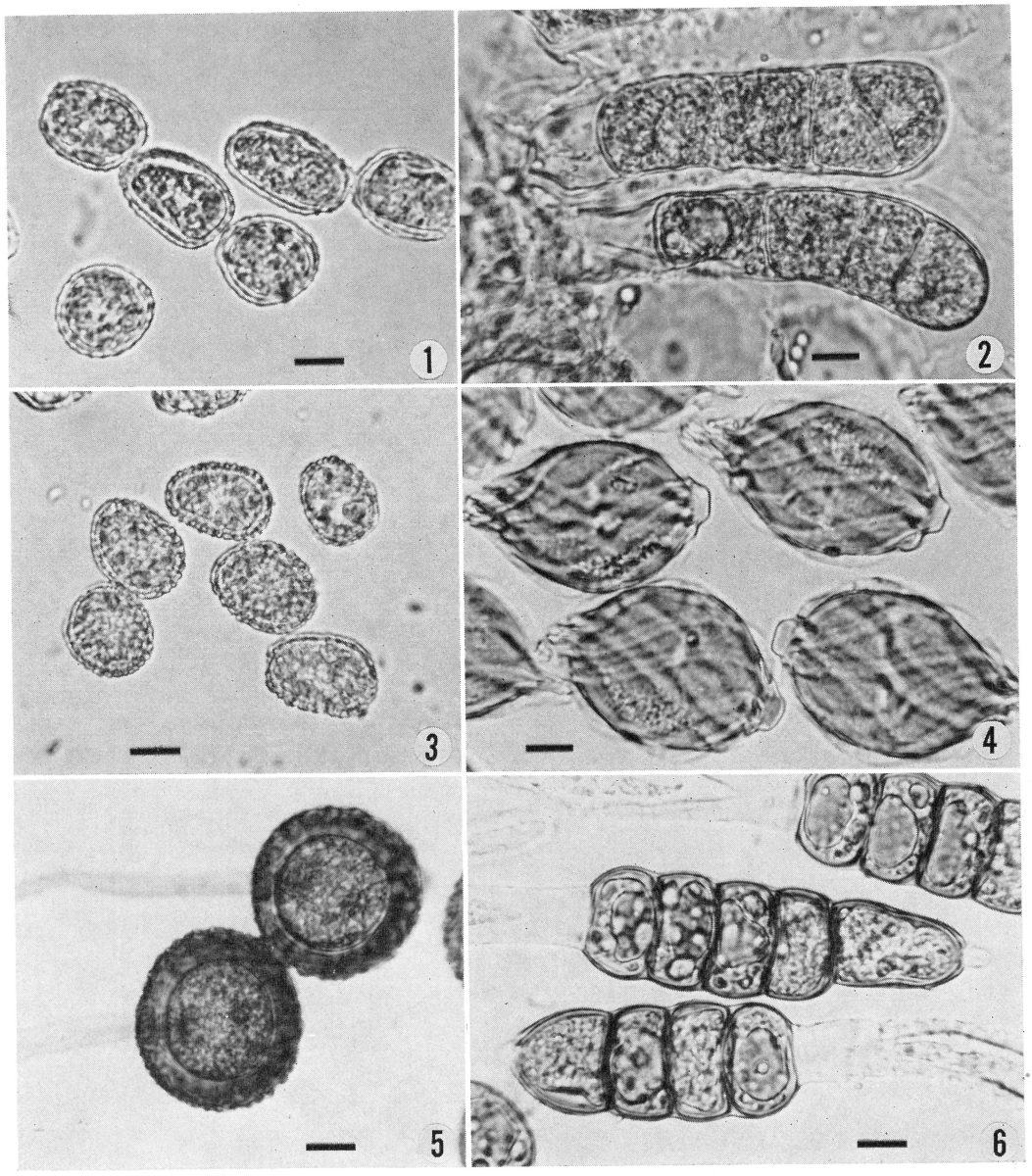
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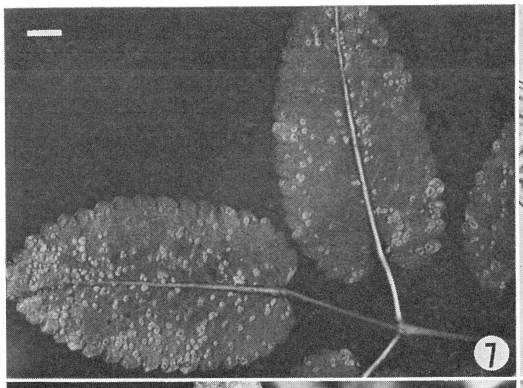
Fig. 7. Aecia and caeomoid uredinia of *Xenodochus carbonarius* on *Sanguisorba officinalis* (Bar=5 mm).
Fig. 8. Aeciospores of *Xenodochus carbonarius* (Bar=10 μm).
Fig. 9. Uredinia of *Puccinia acetosae* on *Rumex acetosa* (Bar=10 mm).
Fig. 10. Urediniospores of *Puccinia acetosae* (Bar=10 μm).
Fig. 11. Telia of *Puccinia chrysanthemi* on *Chrysanthemum indicum* (Bar=5 mm).
Fig. 12. Teliospores of *Puccinia chrysanthemi* (Bar=10 μm).
Fig. 13. Spermogonia and aecia of *Puccinia coronata* on *Rhamnus davurica* var. *nipponica* (Bar=5 mm).
Fig. 14. Teliospores of *Puccinia dieteliana* (Bar=10 μm).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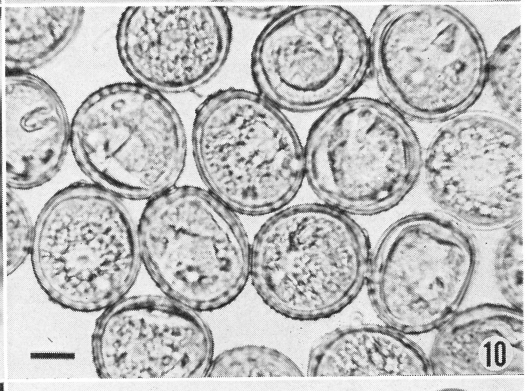
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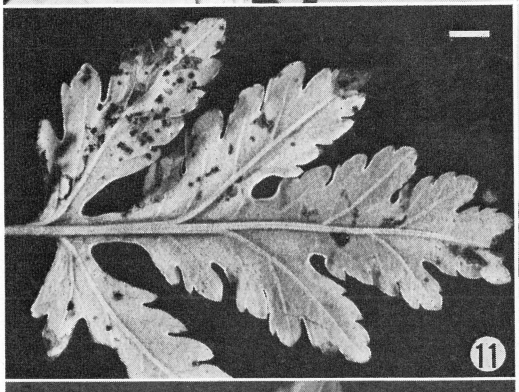
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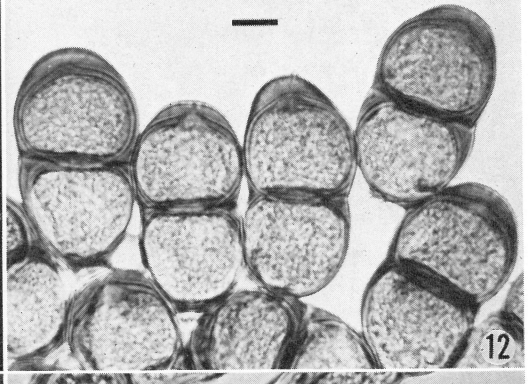
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Fig. 15. Teliospores of *Puccinia glecomatis* (Bar=10 μm).
Fig. 16. Urediniospores of *Puccinia hemerocallidis* (Bar=10 μm).
Fig. 17. Teliospores of *Puccinia hemerocallidis* (Bar=10 μm).
Fig. 18. Urediniospores of *Puccinia hieracii* (Bar=10 μm).
Fig. 19. Urediniospores of *Puccinia kusanoi* (Bar=10 μm).
Fig. 20. Aecia of *Puccinia linosyridi-caricis* on *Aster scaber* (Bar=10 mm).
Fig. 21. Urediniospores of *Puccinia polygoni-amphibii* (Bar=10 μm).
Fig. 22. Aecia of *Puccinia sessilis* on *Polygonatum odoratum* var. *pluriflorum* (Bar=10 mm).

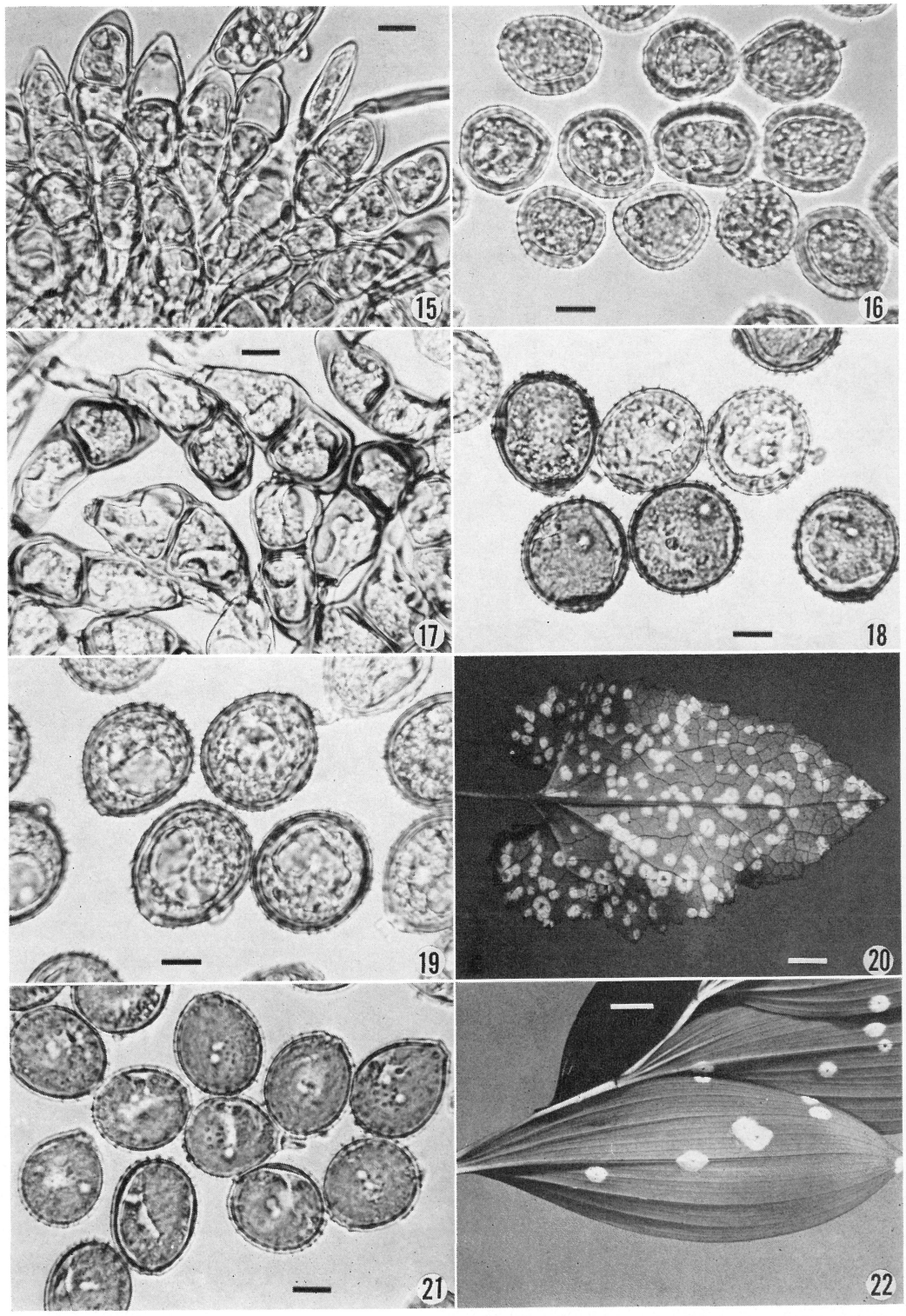
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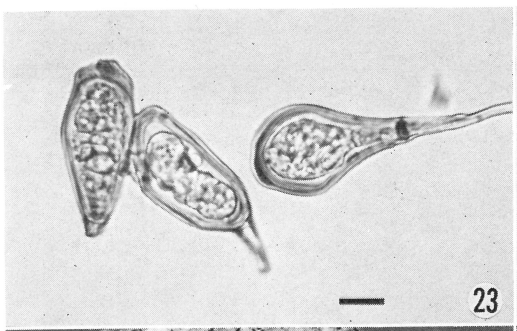
Fig. 23. Teliospores of *Uromyces durus* (Bar=10 μm).
Fig. 24. Urediniospores of *Uromyces euphorbiae* (Bar=10 μm).
Fig. 25. Telia of *Uromyces erythronii* on *Erythronium japonicum* (Bar=5 mm).
Fig. 26. Teliospores of *Uromyces erythronii* (Bar=10 μm).
Fig. 27. Urediniospores of *Uromyces viciae-fabae* var. *viciae-fabae* (Bar=10 μm).
Fig. 28. Teliospores of *Uromyces viciae-fabae* var. *viciae-fabae* (Bar=10 μm).
Fig. 29. Aecia of *Aecidium araliae* on *Aralia elata* (Bar=10 mm).
Fig. 30. Aeciospores of *Aecidium araliae* (Bar=10 μm).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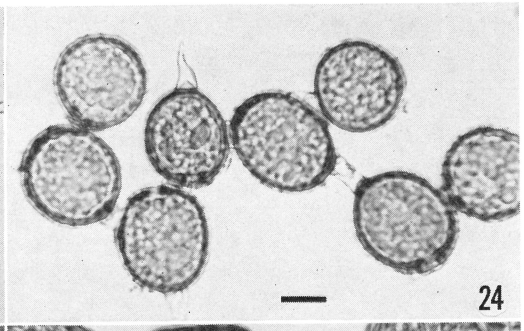
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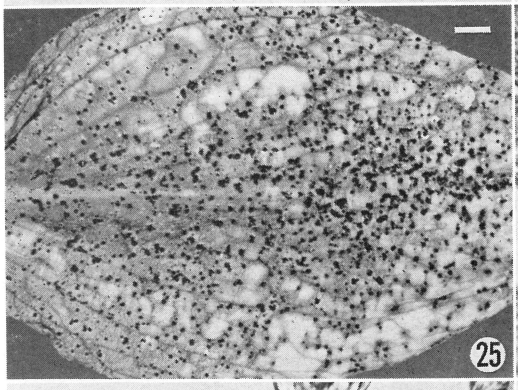
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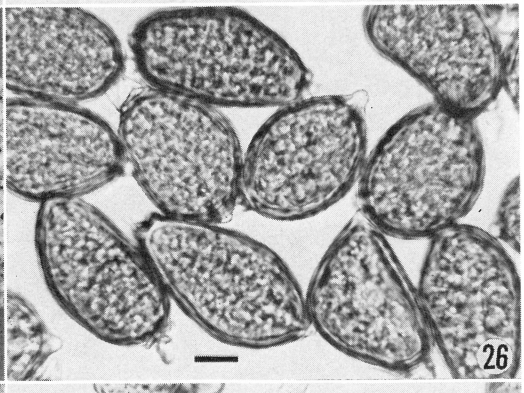
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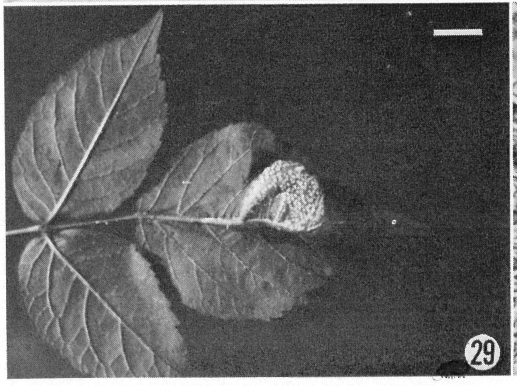
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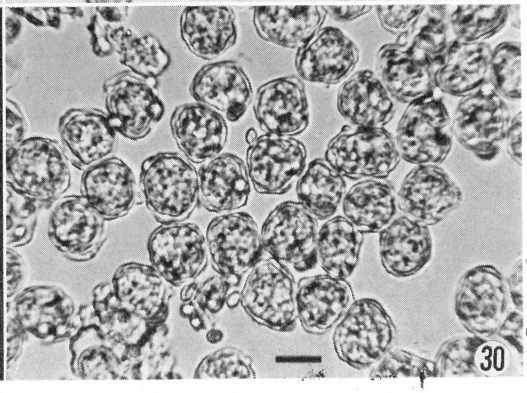
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