

Rust fungi (Pucciniales) in northern Ibaraki Prefecture, Japan

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Abstract

Rust fungi collected in Ibaraki Prefecture and preserved in the Herbarium of Systematic Mycology, Ibaraki University (IBAR) were studied for their taxonomic identity and biology. A previous report listed 129 species in 23 genera of rust fungi in Ibaraki. This list did not cover much in northern Ibaraki, however. In order to understand the rust fungus diversity in the Kanto District, Japan, a comprehensive survey in northern Ibaraki was needed. This study revealed that 159 species in 30 genera were distributed in northern Ibaraki.

Keywords – East Asia • Geographic distribution • Pucciniales • Rust fungus diversity • Taxonomy

Introduction

Ibaraki Prefecture is located in the Kanto District, east-central Honshu, Japan, at latitude of 36°56'43" north to 35°44'21" south, and longitude of 140°51'06" east to 139°41'15" west (Geospatial Information Authority of Japan, http://www.gsi.go.jp/KOKUJYOHO/CENTER/kendata/ibaraki_heso.htm, accessed 26 September 2016). Northern Ibaraki is hilly or low mountainous, with several apparent peaks including Mt. Yamizosan (1022 m, the highest peak in Ibaraki: the Yamizo Mountain Range), and Mt. Eizomuro (881 m), Mt. Hanazonoyama (798 m), Mt. Tatsuwaresan (658 m), Mt. Nantaisan (654 m), Mt. Takasuzuyama (623 m) and Mt. Tsuchidake (599 m) (at the southern end of the Abukuma Mountain Range) (Fig. 1). By contrast, southern Ibaraki occupies major part of the Kanto Plain.

Climatically Ibaraki Prefecture (represented by the prefectural capital Mito) is temperate with mean annual temperature of 13.6°C (the lowest temperature of -2.2°C in January and the highest temperature of 29.8°C in August) (<http://weather.time-j.net/Stations/JP/mito>, accessed 26 September 2016). The annual precipitation is 1353.8 mm. Ibaraki Prefecture faces the Pacific Ocean, with the coast extending over 100 km in the north-south direction. The warm Kuroshio Current runs northward some distance from the coast. Partly due to the influence of the warm tidal current and also due to the differences in the latitude and topography, northern Ibaraki is climatically cool temperate in contrast to warm temperate in southern Ibaraki, as indicated

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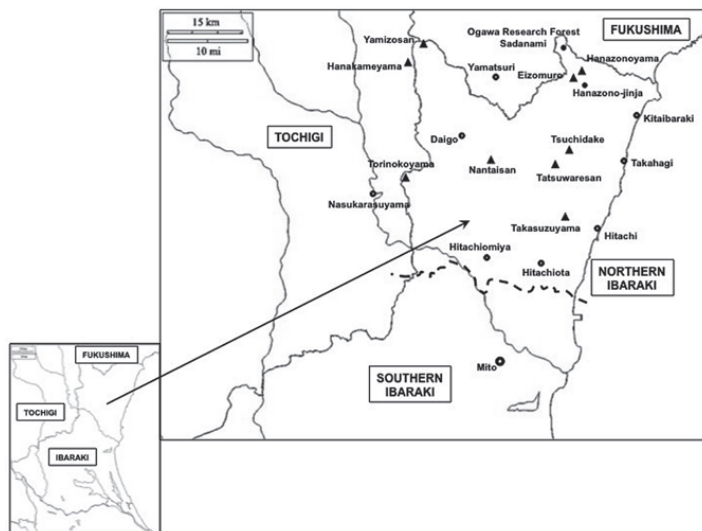


Fig. 1. Map of Ibaraki Prefecture with selected geographic names.

by mean annual temperatures and the Kira's warmth index (Kira 1977). The cool-temperate climate permits the growth of deciduous broad-leaved trees in the north, with representative species being *Fagus crenata* Blume and *Quercus crispula* Blume, while evergreen broad-leaved trees like *Castanopsis sieboldii* (Makino) Hatus. ex Yamaz. & Mashiba, *Quercus acuta* Thunb., *Q. glauca* Thunb., *Q. myrsinifolia* Blume, *Q. salicina* Blume, *Machilus thunbergii* Siebold & Zucc., *Camellia japonica* L., and *Neolitsea sericea* (Blume) Koidz. dominate in the south. These contrasting vegetation types correspond well to Kira's interpretation of the differential geographic distribution of vegetation by the warmth index (Kira 1977, Box et al. 1995).

Due to human exploitation of natural forests associated with extensive farming in the past several hundred years, virgin natural forests no longer exist anywhere in Ibaraki Prefecture. Nevertheless, isolated patches of woods with little human influences and large areas of human-mediated semi-natural woodlands (Satoyama) are distributed in northern Ibaraki (National Survey on the Natural Environment. Vegetation Survey of the 4th National Survey on the Natural Environment. http://www.biodic.go.jp/kiso/fnd_f_vg.html, accessed 20 May 2014). There still remain *F. crenata* and *Q. crispula* populations in isolated patches at 500-600 m above sea level in northern Ibaraki. It is noteworthy that *Betula platyphylla* Sukaczew var. *japonica* (Miq.) H. Hara is distributed at Mt. Yamizosan and the Ogawa Research Forest in Kitaibaraki and *Betula ermanii* Cham. near the summit of Mt. Yamizosan since these tree species are characteristic of cool-temperate and subalpine forest vegetation, respectively.

The potential evergreen broad-leaved forests have been mostly replaced by deciduous broad-leaved forests characteristic of human-mediated secondary woodlands (Satoyama), whose representative trees are *Quercus serrata* Murray, *Q. acutissima* Carruth., *Castanea crenata* Siebold & Zucc., *Fagus japonica* Maxim., *Carpinus laxifolia* (Siebold & Zucc.) Blume, *C. tschonoskii* Maxim., *C. japonica* Blume, *Padus buergeriana* (Miq.) T.T. Yü & T.C. Ku, *Cerasus jamazakura* (Siebold ex Koidz.) H. Ohba, and *Acer* spp.

(Suzuki et al. 1981, Anonymous 2000–2002, Iwasaki and Isoya 2010). Pines, *Pinus densiflora* Siebold & Zucc. and *Abies firma* Siebold & Zucc., are also important members of the secondary vegetation. Evergreen broad-leaved *Q. glauca* and *Q. myrsinifolia* are often intermixed in the deciduous broad-leaved woods in northern Ibaraki.

Rust fungi are biotrophs and necessarily obligate parasites of vascular plants (Voegelé and Mendgen 2011). They constitute the largest monophyletic taxon, the Order Pucciniales (or Uredinales), in the Phylum Basidiomycota (Rossman 1994, Cummins and Hiratsuka 2003, Aime et al. 2014). Over 7000 species are described and named in the world. However, 50000 species are estimated to exist on the globe (Rossman 1994) and the majority of rust fungi still remain to be explored. This estimate can be applied to the rust diversity in Japan. Seven hundred and sixty-three species in 52 teleomorphic genera are currently known in Japan (Ono, unpublished) and 129 species in 23 genera are reported in Ibaraki Prefecture (Ono and Kakishima 1982). In order to understand the rust fungus diversity in the Kanto District, Japan, a comprehensive survey in northern Ibaraki is needed. Only a comparable study in the Kanto District is the one in Tochigi Prefecture (Ono et al. 1992), in which 96 species in 18 genera are listed in addition to published records of 196 species in 30 genera. More natural plant-rust communities are assumed to remain in northern Ibaraki, despite of the extensive human exploitation in the past, than elsewhere in southern Ibaraki. This study examined rust fungi collected at various areas in Ibaraki Prefecture and preserved in the Herbarium of Systematic Mycology, Ibaraki University and reports that 159 species, including two varieties in one species, in 27 teleomorphic and 3 anamorphic genera, are distributed in northern Ibaraki.

Materials and Methods

For the purpose of the study of rust fungus diversity in Ibaraki Prefecture, northern Ibaraki was demarcated by the southernmost boundaries of cities of Hitachi, Hitachijota and Hitachiomiya (Fig. 1). Thus demarcated region includes the Yamizo Mountain Range and the southernmost Abukuma Mountain Range (including the Kuji Mountains and the Taga Mountains) and covers the northernmost evergreen broad-leaved forests and the southernmost deciduous broad-leaved forests. A map in Fig. 1 was prepared with free blank maps downloaded from “d-maps.com” at http://d-maps.com/pays.php?num_pay=517&lang=en (accessed 26 September 2016).

Rust fungus specimens deposited in the Herbarium of Systematic Mycology, College of Education, Ibaraki University (IBAR) were used for the study. They were listed under each rust fungus taxon. The fungus names accepted in Index Fungorum (<http://www.indexfungorum.org>, accessed 26 September 2016) were adopted in this study wherever applicable. Similarly, scientific and standard Japanese names listed in Yonekura and Kajita (2003–. BG plants vernacular name–scientific name index (YList). <http://ylist.info/index.html>, accessed 26 September 2016) were followed in this study wherever appropriate. The standard Japanese name was shown in parentheses following the scientific name.

Microscopic slides were prepared using the method described by Ono et al. (2012). Sorus structure

and spore morphology were observed with an Olympus BX51 microscope (Olympus, Tokyo, Japan) equipped with differential interference contrast (DIC) optics. Morphological characteristics observed by microscopy and host identity were compared to those described for individual species in the rust flora of Japan (Hiratsuka et al. 1992) and original descriptions, wherever necessary, for the fungus identification. In “Enumeration of Species” section, rust genera were arranged according to a taxonomic system proposed by Cummins and Hiratsuka (2003). Rust species were listed in alphabetical order under each genus.

Enumeration of Species

PUCCINIASTRACEAE

Hyalopsora aculeata Kamei on *Blechnum niponicum* (Kunze) Makino (Shishigashira, Blechnaceae): Hitachiota, Satomi, IBAR4809.

Hyalopsora polypodii (Pers.) Magnus on *Anisocampium niponicum* (Mett.) Y.C. Liu, W.L. Chiou & M. Kato (Inuwarabi, Athyriaceae): Daigo, Nantaisan, IBAR3217; Yamizosan, IBAR2011; on *Cystopteris fragilis* (L.) Bernh. (Nayoshida, Cystopteridaceae): Kitaibaraki, Hanazono-jinja, IBAR10983; on *Deparia japonica* (Thunb.) M. Kato (Shikeshida, Athyriaceae): Kitaibaraki, Hanazono-jinja, IBAR10978; on *D. pycnosora* (Christ) M. Kato (Miyamashikeshida): Daigo, Yamizosan, IBAR7019; on *Pentarhizidium orientale* (Hook.) Hayata (Inugansoku, Onocleaceae): Kitaibaraki, Hanazonoyama, IBAR6630; on *Onoclea sensibilis* L. var. *interrupta* Maxim. (Kouywarabi, Onocleaceae): Kitaibaraki, Hanazonoyama, IBAR6624; on *Thelypteris glanduligera* (Kunze) Ching (Hashigoshida, Thelypteridaceae): Kitaibaraki, Oshoyama, IBAR3741. Note: *Uredinopsis americana* was the only known rust fungus found on *O. sensibilis*, distributed in North America (Anonymous 1960, Parmelee 1988), Russia (Kuprevich and Tranzschel 1957) and UK (Henderson 2000). *Onoclea sensibilis* var. *interrupta* is a new host plant for this fungus. *Hyalopsora polypodii* is reported to have a broad host range in worldwide distribution (Hiratsuka et al. 1992). Morphology-based recognition of this species needs to be verified by a molecular systematic method for taxonomic re-evaluation.

Melampsorium alni (Thüm.) Dietel on *Alnus firma* Siebold & Zucc. (Yashabushi, Betulaceae): Hitachi, IBAR2447; Hitachi, Juo, IBAR2084; Kitaibaraki, Hanazono-jinja, IBAR3295 & 3300; Daigo, Yamizosan, IBAR1997; on *Larix kaempferi* (Lamb.) Carrière (Karamatsu, Pinaceae): Kitaibaraki, Hanazonoyama, IBAR3210.

Melampsorium asiaticum S. Kaneko & Hirats. f. on *Ostrya japonica* Sarg. (Asada, Betulaceae): Daigo, Nantaisan, IBAR6599.

Melampsorium carpini (Fuekel) Dietel on *Carpinus cordata* Blume (Sawashiba, Betulaceae); Kitaibaraki, Ogawa Research Forest, IBAR11003 & 11006.

Melampsorium hiratsukanum S. Ito ex Hirats. f. on *Alnus hirsuta* (Spach) Turcz. ex Rupr. var. *hirsuta* (Keyamahannoki, Betulaceae): Kitaibaraki, Hanazono, Kameyachi, IBAR11013 & 11016.

Milesina pteridicola Hirats. f. on *Pteris cretica* L. (Obainomotosou, Pteridaceae): Hitachiota, Suifu, IBAR3271 & 5731.

Naohidemycetes vaccinii (J. Schröt.) Spooner on *Vaccinium hirtum* Thunb. var. *pubescens* (Koidz.) T. Yamaz. (Usunoki, Ericaceae): Kitaibaraki, Hanazonoyama, IBAR6601; on *V. oldhami* Miq. (Natsuhaze): Kitaibaraki, Hanazono-jinja, IBAR3292.

Pucciniastrum agrimoniae (Dietel) Tranzschel on *Agrimonia pilosa* Ledeb. var. *japonica* (Miq.) Nakai (Kinmizuhiki, Rosaceae): Hitachiota: Suifu, IBAR6525; Kitaibaraki, Hanazono, IBAR7849; Hanazono-jinja, IBAR5991; Hanazonoyama, IBAR6661; Daigo, Yamizosan, IBAR2010; Shimonomiya, IBAR3189 & 5958.

Pucciniastrum boehmeriae Syd. & P. Syd. on *Boehmeria japonica* (L.f.) Miq. var. *longispica* (Steud.) Yahara (Yabumao, Urticaceae): Kitaibaraki, Hanazono-jinja, IBAR6678; Hanazonoyama, IBAR6682; Daigo, IBAR2671; Nantaisan, IBAR5611; on *B. spicata* (Thunb.) Thunb. (Koakaso): Kitaibaraki, Hanazono-jinja, IBAR5994 & 6213; Hanazono, IBAR11012; Daigo, Nantaisan, IBAR560, 5539 & 5629; Shimonomiya, IBAR3765.

Pucciniastrum hydrangeae-petiolaris Hirats. f. on *Hydrangea petiolaris* Siebold & Zucc. (Tsuruajisai, Hydrangeaceae): Kitaibaraki, Hanazono-keikoku, IBAR6637; Hanazonoyama, IBAR6660.

Pucciniastrum kusanoi Dietel on *Clethra barbinervis* Siebold & Zucc. (Ryoubu, Clethraceae): Kitaibaraki, Hanazonoyama, IBAR6679; Yamizosan, IBAR1998; Takahagi, Tsuchidake, IBAR2354.

Pucciniastrum minimum Arthur on *Lyonia ovalifolia* (Wall.) Drude var. *elliptica* (Siebold & Zucc.) Hand.-Mazz. (Nejiki, Ericaceae): Daigo, Tsukioresan, IBAR6511.

Pucciniastrum miyabeanum Hirats. on *Viburnum furcatum* Blume ex Maxim. (Okamenoki, Adoxaceae): Kitaibaraki, Hanazonoyama, IBAR6685.

Pucciniastrum potentillae Kom. on *Potentilla centigrana* Maxim. (Himehebiichigo, Rosaceae): Kitaibaraki, Hanazono, IBAR7847; on *P. fragarioides* L. (Kijimushiro): Hitachiota, Satomi, IBAR8255; Daigo, Nantaisan, IBAR6536.

Pucciniastrum pyrolae (J. F. Gmel.) J. Schröt. on *Pyrola japonica* Klenze ex Alefeld (Ichiyakusou, Pyrolaceae): Kitaibaraki, Oshoyama, IBAR5998.

Pucciniastrum rubiae (Kom.) Jørst. on *Rubia argyi* (H. Lévl. & Vaniot) H. Hara ex Lauener & D.K. Ferguson (Akane, Rubiaceae): Hitachi, Ouse, IBAR2716; Hitachiomiya, Yamagata, IBAR7618; Hitachiota, Suifu, IBAR5719 & 7315; Kitaibaraki, Hanazono, IBAR7853; Daigo, Nantaisan, IBAR3252, 4359, 4750, 5601, 5536, 5628 & 5638; Yamizosan, IBAR7012; Shimonomiya, IBAR5971.

Pucciniastrum styracinum Hirats. on *Styrax japonica* Siebold & Zucc. (Egonoki, Styracaceae): Hitachiota, Suifu, IBAR7317.

Uredinopsis komagatakensis Hirats. f. on *Abies firma* Siebold & Zucc. (Momi, Pinaceae): Takahagi, Hananuki, IBAR11019; on *Athyrium yokoscense* (Franch. & Sav.) Christ (Hebinonegoza, Athyriaceae): Kitaibaraki, Oshoyama, IBAR3739 & 3744. Note: The life cycle connection between the spermogonial and aecial stages on *Abies veitchii* Lindl. and the uredinial and telial stages on *Athyrium yokoscense* was proven by experimental inoculations (Sato 1966). Subepidermal and globose to subglobose spermogonia, peridiate aecia and completely verrucose aeciospores observed on the specimen from Hananuki-keikoku were characteristic of *U. komagatakensis*. *Abies firma* is a new naturally infected host plant for this fungus.

Uredinopsis pteridis Dietel & Holw. on *Pteridium aquilinum* (L.) Kuehn subsp. *japonicum* (Nakai) A.et D.

Löve (Warabi, Dennstaedtiaceae): Daigo, Nantaisan, IBAR7616.

COLEOSPORIACEAE

Coleosporium asterum (Dietel) P. Syd. & Syd. on *Aster ageratoides* Turcz. var. *ageratoides* (Shiroyomena, Asteraceae): Daigo, Nantaisan, IBAR5625; on *A. glehnii* F. Schmidt var. *hondoensis* Kitam.: Hitachiota, Satomi, IBAR2270, 8168 & 8333; Suifu, IBAR6524 & 7321; Kitaibaraki, Hanazono-jinja, IBAR3294 & 5992; Oshoyama, IBAR6651; Daigo, Shimonomiya, IBAR3757 & 5950; on *A. microcephalus* (Miq.) Franch. & Sav. var. *ovatus* (Franch. & Sav.) Soejima & Mot. Ito (Nokongiku): Daigo, Nantaisan, IBAR4368, 5612, 5639, 5654, 5973, 6534 & 6561; on *A. semiamplexicaulis* (Makino) Makino ex Koidz. (Yamashirogiku): Hitachiota, Satomi, IBAR8164.

Coleosporium clematidis Barclay on *Clematis florida* Thunb. (Tessen, Ranunculaceae): Hitachiota, Suifu, IBAR3282; on *C. japonica* Thunb. (Hanshozuru): Daigo, Nantaisan, IBAR5602 & 5637; on *C. terniflora* DC. (Senninsou): Hitachi, Juo, IBAR2082; Takasuzuyama, IBAR2721; Hitachiota, Suifu, IBAR3268, 5725 & 7318; Daigo, Nantaisan, IBAR4364, 5545, 5597, 5626 & 5630.

Coleosporium clematidis-apiifoliae Dietel on *Clematis apiifolia* DC. var. *apiifolia* (Botanzuru, Ranunculaceae): Kitaibaraki, Hanazono-jinja, IBAR3301; Oshoyama, IBAR3736; Daigo, Nantaisan, IBAR2009, 3191, 5604 & 6542; Shimonomiya, IBAR5960.

Coleosporium clerodendri Dietel on *Clerodendrum trichotomum* Thunb. (Kusagi, Lamiaceae): Hitachi, Takasuzuyama, IBAR2719; Hitachiota, Suifu, IBAR7314; Daigo, Yamizosan, IBAR7010; Shimonomiya, IBAR3194.

Coleosporium eupaderiae L. Guo on *Paederia foetida* L. (Hekusokazura, Rubiaceae): Kitaibaraki, Hanazono-jinja, IBAR6675; Daigo, Nantaisan, IBAR4358; Yamizosan, IBAR2003.

Coleosporium horianum Henn. on *Codonopsis lanceolata* (Siebold & Zucc.) Trautv. (Tsuruninjin, Campanulaceae): Hitachiota, Suifu, IBAR3257; Kitaibaraki, Hanazono-jinja, IBAR6215 & 6616; Oshoyama, IBAR3743; Daigo, Shimonomiya, IBAR3187 & 5967; Nantaisan, IBAR3238 & 6550.

Coleosporium lycopi P. Syd. & Syd. on *Adenophora triphylla* (Thunb.) A. DC. subsp. *japonica* (Regel) H. Hara (Tsuriganeninjin, Campanulaceae): Hitachiota, Satomi, IBAR2284; Daigo, Nantaisan, IBAR6516 & 7176; Tsukioresan, IBAR6517 & 6518.

Coleosporium phellodendri Kom. on *Phellodendron amurense* Rupr. (Kihada, Rutaceae): Kitaibaraki, Hanazonoyama, IBAR6680; Daigo, Nantaisan, IBAR5623.

Coleosporium pini-asteris Orishimo on *Aster scaber* Thunb. (Shirayamagiku, Asteraceae): Hitachi, Juo, IBAR2085; Hitachiota, Satomi, IBAR2272; Suifu, IBAR5711; Kitaibaraki, Hanazono-jinja, IBAR6676; Daigo, Nantaisan, IBAR3908, 5619, 6489, 6546 & 6556; Yamizosan, IBAR1990; Shimonomiya, IBAR3195.

Coleosporium plectranthi Barclay on *Isodon umbrosus* (Maxim.) H. Hara var. *leucanthus* (Murai) K. Asano f. *kameba* (Okuyama ex Ohwi) K. Asano (Kamebahikiokoshi, Lamiaceae): Hitachiota, Satomi, IBAR8336; Kitaibaraki, Hanazono-jinja, IBAR3302, 10979 & 10981; Ogawa Research Forest, IBAR8173, 9890, 10999 & 11005; on *Mosla punctulata* (J. F. Gmel) Nakai (Inukouju): Daigo, Nantaisan, IBAR3909; on *Perilla frutescens* (L.) Britton var. *crispa* (Benth.) W. Deane (Shiso): Daigo, Shimonomiya, IBAR 5948.

Coleosporium solidaginis (Schwein.) Thüm. on *Solidago altissima* L. (Seitakaawadachisou, Asteraceae):

Hitachiota, IBAR4354; on *S. virgaurea* L. subsp. *asiatica* (Nakai ex H. Hara) Kitam. ex H. Hara (Akinokirinsou): Hitachiota, Satomi, IBAR4120; Kitaibaraki, Hanazonoyama, IBAR6662; Oshoyama, IBAR6659; Ogawa Research Forest, IBAR11000; Daigo, Nantaisan, IBAR5605, 5606 & 6465; Yamizosan, IBAR7018; Shimonomiya, IBAR3190, 3760 & 5977.

Coleosporium xanthoxyli Dietel & P. Syd. on *Zanthoxylum schinifolium* Siebold & Zucc. (Inuzanshou, Rutaceae): Daigo, Shimonomiya, IBAR3759.

Coleosporium yamabense (Saho) Hirats. f. on *Petasites japonicus* (Siebold & Zucc.) Maxim. (Fuki, Asteraceae): Daigo, Yamizosan, IBAR7013; Nantaisan, IBAR2000 & 5538; Shimonomiya, IBAR3761.

CRONARTIACEAE

Cronartium orientale S. Kaneko on *Quercus acutissima* Carruth. (Kunugi, Fagaceae): Daigo, Shimonomiya, IBAR6209; Yamizosan, IBAR8159; on *Q. crispula* Blume (Mizunara): Daigo, Yamizosan, IBAR2008; on *Q. dentata* Thunb. (Kashiwa): Hitachi, Juo, IBAR2081; Kitaibaraki, Hanazono-jinja, IBAR6618; on *Q. glauca* Thunb. (Arakashi): Kitaibaraki, Hanazono-jinja, IBAR6214; on *Q. serrata* Murray (Konara): Hitachi, Juo, IBAR2083; Hitachiota, Satomi, IBAR8334; Suifu, IBAR6526; Daigo, IBAR6569; Tsukioresan, IBAR6514; Shimonomiya, IBAR6211; Takahagi, Tsuchidake, IBAR2348; on *Quercus* sp.: Hitachiota, Satomi, IBAR8683.

MIKRONEGELIACEAE

Blastospora smilacis Dietel on *Armeniaca mume* (Siebold & Zucc.) de Vriese (Ume, Rosaceae): Daigo, Nantaisan, IBAR3218, 4749 & 7164); on *Smilax sieboldii* Miq. (Yamakashu, Smilacaceae): Daigo, Nantaisan, IBAR3910, 5603 & IBAR5631; Shimonomiya, IBAR5953; Hitachiota, Nishikanasa-Jinja, IBAR7681; Suifu, IBAR7319 & 7329. Note: The heteroecious life cycle of this fungus was proven by field observations and reciprocal inoculation experiments by Ono et al. (1986). This rust disease occurred severely on cultivated mume trees at home gardens in northern Ibaraki in the early 1990s; but it has subsequently disappeared in the late 1990s.

MELAMPSORACEAE

Melampsora caprearum Thüm. on *Salix caprea* L. (Bakkoyanagi, Salicaceae): Kitaibaraki, Hanazonoyama, IBAR6628; Ogawa Research Forest, IBAR7858; on *S. shiraii* Seemen (Shiraiyanagi): Daigo, Nantaisan, IBAR5618 & 5635; on *S. vulpina* Andersson subsp. *vulpina* (Kitsuneyanagi): Hitachiota, Satomi, IBAR2275; Daigo, Nantaisan, IBAR5620; on *Salix* sp.: Hitachiota, Suifu, IBAR3279; Hitachi, Juo, IBAR2080.

Melampsora epitea Thüm. on *Salix futura* Seemen (Okituneyanagi, Salicaceae): Daigo, Yamizosan, IBAR1994; Hitachiota, Satomi, IBAR2277; Kitaibaraki, Hanazono-jinja, IBAR3296 & 3297; on *S. gracilistyla* Miq. (Nekoyanagi): Daigo, Shimonomiya, IBAR3197; on *S. miyabeana* Seemen subsp. *gymnolepis* (H. Lév. et Vaniot) H. Ohashi & Yonek. (Kawayanagi): Kitaibaraki, Hanazonoyama, IBAR6636.

Melampsora euphorbiae (Ficinus & C. Schub.) Castagne on *Euphorbia lasiocaula* Boiss. (Takatoudai, Euphorbiaceae): Daigo, Shimonomiya, IBAR3186 & 5970.

Melampsora humilis Dietel on *Salix integra* Thunb. (Inukoriyanagi, Salicaceae): Kitaibaraki, Hanazonoyama, IBAR6638.

PHAKOPSORACEAE

Cerotelium asari S. Kaneko, Katsum. & Hirats. f. ==> see Chaconiaceae.

Phakopsora ampelopsidis Dietel & P. Syd. on *Ampelopsis glandulosa* (Wall.) Moriy. var. *heterophylla* (Thunb.) Moriy. (Nobudou, Vitaceae): Hitachiota, IBAR4350, 5990 & 6260; Nishikanasa, IBAR10571; Satomi, IBAR4117; Suifu, IBAR4356, 7328, 7780, 9775 & 10110; Zuiryu, IBAR6462, 7130, 9776, 10111, 10569 & 11107; Daigo, Nantaisan, IBAR3907, 4357, 4361, 5537, 5542, 5598, 5615 & 5978; Shimonomiya, IBAR5952 & 5961.

Phakopsora artemisiae Hirats. f. on *Artemisia princeps* Pamp. (Yomogi, Asteraceae): Daigo, Nantaisan, IBAR4363, 5614, 5621 & 5636; Shimonomiya, IBAR3198; Hitachiota, IBAR4352; Satomi, IBAR4118 & 8335; Hitachi, Ouse, IBAR2715; Juo, IBAR2087; Takahagi, Tsuchidake, IBAR2355; Kitaibaraki, Jorenji, IBAR10348.

Phakopsora meliosmae Kusano on *Meliosma myriantha* Siebold & Zucc. (Awabuki, Sabiaceae): Hitachiota, Satomi, IBAR4798; Kitaibaraki, Hanazono, IBAR6629 & 9977; Hanazono-jinja, IBAR5997, 6216 & 10059; Ogawa Research Forest, IBAR10991; Daigo, Yamizosan, IBAR6360, 7007, 9945 & 10058; Nantaisan, IBAR5540; Takahagi, Hananuki, IBAR10060.

Phakopsora meliosmae-myrianthae (Henn. & Shirai) Y. Ono on *Meliosma myriantha* Siebold & Zucc. (Awabuki, Sabiaceae): Hitachiota, Satomi, IBAR2278; Kitaibaraki, Hanazono-jinja, IBAR3290, 6606, 6612; Hanazonoyama, IBAR8084; Hanazono-keikoku, IBAR6647; Ogawa Research Forest, IBAR8113 & 8695; on *Vitis* cv. *Kyoho* (Vitaceae): Hitachiota, IBAR4349, 5565, 5642 & 6461; Suifu, IBAR10112; Zuiryu, IBAR5989, 7287, 7326, 7778, 7779, 8036, 9472, 9779, 10570 & 11106; Daigo, IBAR10568; Hitachiomiya, Yamagata, IBAR6694; on *V. coignetiae* Pulliat ex Planch. (Yamabudou): Kitaibaraki, IBAR4123; Oshoyama, IBAR6218; Hanazono-jinja, IBAR5996 & 6217; on *V. flexuosa* Thunb. (Sankakuzuru): Daigo, Yamizosan, IBAR7008. Note: The enigmatic nature of this rust fungus in life cycle and biology was studied by Ono (2000). The heteroecious life cycle, host specificity, morphology and DNA sequences separated this fungus from a morphologically allied species, *P. ampelopsidis* and *P. vitis*. It was named as *P. euvitis* Y. Ono and, subsequently, changed to *P. meliosmae-myrianthae* (Henn. & Shirai) Y. Ono (Ono et al. 2012), in accordance with the new International Code of Nomenclature of algae, fungi, and plants (<http://www.iapt-taxon.org/nomen/main.php>).

Phakopsora pachyrhizi Syd. & P. Syd. on *Pueraria lobata* (Willd.) Ohwi (Kuzu, Fabaceae): Daigo, Nantaisan, IBAR7020.

Phakopsora vitis P. Syd. on *Parthenocissus tricuspidata* (Siebold & Zucc.) Planch. (Tsuta, Vitaceae): Hitachiota, IBAR6261; Kanasago, IBAR7781; Nishikanasa, IBAR7682, 8037 & 11108; Suifu, IBAR4355, 7131, 7327 & 9774; Zuiryu, IBAR9780; Daigo, Nantaisan, IBAR5979 & 6554.

Pucciniostele clarkiana Dietel on *Astilbe thunbergii* (Siebold & Zucc.) Miq. var. *thunbergii* (Toriashishouma, Saxifragaceae): Hitachiota, Satomi, IBAR10388; Kitaibaraki, Hanazono-jinja, IBAR3204, 5995, 6212, 6580, 6613; Hanazonoyama, IBAR6593 & 8083; Daigo, Chofukusan, IBAR6496.

Pucciniostele mandshurica Dietel on *Astilbe microphylla* Knoll (Chidakesashi, Saxifragaceae): Kitaibaraki, Hanazono-jinja, IBAR6623; Daigo, Yamizosan, IBAR2005.

CHACONIACEAE

Aplopsora lonicerae Tranzschel on *Anemone pseudoaltaica* H. Hara (Kikuzakiichige, Ranunculaceae):

Kitaibaraki, Ogawa Research Forest, IBAR8258 & 8498; on *Lonicera gracilipes* Miq. (Uguisukagura, Caprifoliaceae): Kitaibaraki, Ogawa Research Forest, IBAR8108, 8563 & 9887. Note: Tranzschel (1904) proved the heteroecious life cycle of this rust fungus.

Cerotelium asari S. Kaneko, Katsum. & Hirats. f. on *Asarum caulescens* Maxim. (Futabaaoi, Aristolochiaceae): Daigo, Yamizosan, IBAR6359, 6720 & 7005; on *Corydalis lineariloba* Siebold & Zucc. (Yamaengosaku, Papaveraceae): Daigo, Yamizosan, IBAR6687, 6690, 6693, 6697 & 8499. Note: This fungus was assigned to the genus *Cerotelium* due to seemingly catenulate nature of teliospores (Kaneko et al. 1983). Ono (1995a) proved that the teliospores were cylindrical and laterally free, and originated from a basal sporogenous cell and suggested the taxonomic affinity of this fungus to the genus *Aplopsora*.

Ochropsora ariae (Fuckel) Ramsb. on *Anemone pseudoaltaica* H. Hara (Kikuzakiichige, Ranunculaceae): Kitaibaraki, Ogawa Research Forest, IBAR8909 & 9502. Note: The heteroecious life cycle of this fungus was proven in Europe by experimental inoculations (Tranzschel 1904, Klebahn 1907, Fischer 1910). *Anemone pseudoaltaica* is a spermogonial and aeical host first proven in Japan (Ono 2006). The fungus having been identified as *O. ariae* in Japan was found distinct from a fungus named *O. ariae* distributed in Europe in telium and teliospore morphology (Ono 2006).

Ochropsora kraunhiae (Dietel) Dietel on *Corydalis incisa* (Thunb.) Pers. (Murasakikeman, Papaveraceae): Hitachiota, Satomi, IBAR4797; Kitaibaraki, Hanazono-jinja, IBAR3200, 5693, 6570 & 6579; Hanazonoyama, IBAR6598 & 10892; Daigo, Tsukioresan, IBAR6469; Nantaisan, IBAR3235, 4769, 4774, 6040, 6477, 7178, 7823, 8057 & 10039; on *Wisteria floribunda* (Willd.) DC. (Fuji, Fabaceae): Hitachiota, Suifu, IBAR7320; Zuiryu, IBAR9777; Kitaibaraki, Hanazono-keikoku, IBAR6643; Oshoyama, IBAR6657; Ogawa Research Forest, IBAR11007; Daigo, Nantaisan, IBAR5543, 5548, 5624 & 6558); Shimonomiya, IBAR5968; Takahagi, Tsuchidake, IBAR2350.

Ochropsora nambuana (Henn.) Dietel on *Anemone flaccida* Fr. Schmidt (Nirinso, Ranunculaceae): Kitaibaraki, Ogawa Research Forest, IBAR8911; Daigo, Yamizosan, IBAR7333; on *Elaeagnus multiflora* Thunb. var. *hortensis* (Maxim.) Servett. (Tougumi, Elaeagnaceae): Hitachiota, Suifu, IBAR7322; Kitaibaraki, Ogawa Research Forest, IBAR8564.

UROPYXIDACEAE

Tranzschelia fusca (Pers.) Dietel on *Anemone pseudoaltaica* H. Hara (Kikuzakiichige, Ranunculaceae): Daigo, Yamizosan, IBAR6700.

Tranzschelia pruni-spinosae (Pers.) Dietel on *Anemone pseudoaltaica* H. Hara (Kikuzakiichige, Ranunculaceae): Kitaibaraki, Ogawa Research Forest, IBAR9475; Daigo, Nantaisan, IBAR8494; on *Padus buergeriana* (Miq.) T.T. Yü & T.C. Ku (Inuzakura, Rosaceae): Kitaibaraki, Ogawa Research Forest, IBAR8204 & 9892); on *P. grayana* (Maxim.) C.K. Schneid. (Uwamizuzakura) : Kitaibaraki, Ogawa Research Forest, IBAR8565 & 10993. Note: The heteroecious life cycle of this fungus in Japan was proven by experimental inoculations (Ono unpublished).

PILEOLARIACEAE

Pileolaria klugkistiana (Dietel) Dietel on *Rhus javanica* L. var. *chinensis* (Mill.) Y. Yamaz. (Nurude, Anacardiaceae): Kitaibaraki, Hanazono, IBAR6632; Hitachiota, Suifu, IBAR3260 & 3269; Daigo, Nantaisan,

IBAR3224, 4741, 4763, 5599, 5701 & 6533; Yamizosan, IBAR1993; Shimonomiya, IBAR3183 & 5969.

Pileolaria shiraiana (Dietel & P. Syd.) S. Ito on *Toxicodendron trichocarpum* (Miq.) Kuntze (Yamaurushi, Anacardiaceae): Daigo, Shimonomiya, IBAR3185, 3196 & 5965; Takahagi, Tsuchidake, IBAR2353.

RAVENELIACEAE

Ravenelia japonica Dietel & P. Syd. on *Albizia julibrissin* Durr. (Nemunoki, Fabaceae): Hitachiota, IBAR4353; Daigo, Nantaisan, IBAR4360; Shimonomiya, IBAR5963 & 6210.

PHRAGMIDIACEAE

Gerwasia rubi Raciborski on *Rubus buergeri* Miq. (Fuyuchigo, Rosaceae): Kitaibaraki, Jorenji, IBAR10350. Note: Kitaibaraki is the northernmost site where the fungus of subtropical and tropica distribution is recorded in Japan. The previous northernmost distribution record of this fungus was from Gozenyama, Shirosato-machi, Higashiibaraki-gun (IBAR2686).

Kuehneola japonica (Dietel) Dietel on *Rosa luciae* Rochebr. et Franch. ex Crép. (Terihanoibara, Rosaceae): Hitachiota, IBAR4351; Daigo, Shimonomiya, IBAR3762; Takahagi, IBAR2347; Kitaibaraki, Ogawa Research Forest, IBAR8260; on *R. multiflora* Thunb. (Noibara): Daigo, Nantaisan, IBAR4760.

Phragmidium griseum Dietel on *Rubus crataegifolius* Bunge (Kumaichigo, Rosaceae): Kitaibaraki, Hanazono-jinja, IBAR3293, 3299, 6614, 6626, 6677 & 6681; Daigo, Nantaisan, IBAR3221 & 7165; Yamizosan, IBAR2002 & 8158.

Phragmidium pauciloculare (Dietel) P. Syd. & Syd. on *Rubus parvifolius* L. (Nawashiroichigo, Rosaceae): Daigo, Nantaisan, IBAR6565; Shimonomiya, IBAR2670 & 5972; on *R. phoenicolasius* Maxim. (Ebigaraichigo): Daigo, Tsukioresan, IBAR6515.

Phragmidium rosae-multiflorae Dietel on *Rosa multiflora* Thunb. (Noibara, Rosaceae): Hitachiota, Satomi, IBAR2283 & 8169; Suifu, IBAR3262; Kitaibaraki, Hanazono-jinja, IBAR3203, 5696, 6572, 6577 & 6582; Hanazono-keikoku, IBAR6592; Hanazonoyama, IBAR8082; Eizomuro, IBAR10888; Daigo, Nantaisan, IBAR3215, 3229, 4736, 4745, 4756, 5627, 5706, 6463, 6480, 6485, 7160, 7815 & 7821; Yamizosan, IBAR1995; Shimonomiya, IBAR3192.

PUCCINIACEAE

Endophyllum paederiae (Dietel) Stevens & Mendiola on *Paederia foetida* L. (Hekusokazura, Rubiaceae): Hitachiota, Suifu, IBAR5716, 5730 & 7316; Kitaibaraki, Jorenji, IBAR10349; Daigo, Shimonomiya, IBAR5974; Tsukioresan, IBAR6475; Nantaisan, IBAR4732, 4748, 5596, 6548, 6559, 6491 & 6532.

Miyagia anaphalidis Miyabe ex P. Syd. & Syd. on *Anaphalis margaritacea* (L.) Benth. & Hook., f. subsp. *margaritacea* (Yamahahako, Asteraceae): Kitaibaraki, Hanazono-jinja, IBAR6600 & 6621.

Gymnosporangium asiaticum Miyabe ex Yamada on *Chaenomeles speciosa* (Sweet) Nakai (Boke, Rosaceae): Daigo, Nantaisan, IBAR5704; Hitachiota, Suifu IBAR3278; Satomi, IBAR4812.

Gymnosporangium miyabei Yamada & I. Miyake on *Chamaecyparis pisifera* (Siebold & Zucc.) Endl. (Sawara, Cupressaceae): Hitachiota, Satomi, IBAR3212 & 4814; on *Malus toringo* (Siebold) Siebold ex de Vries (Zumi, Rosaceae): Hitachiota, Satomi, IBAR4813; Kitaibaraki, Hanazonoyama, IBAR6635; Oshoyama, IBAR6650 & 6653; Daigo, Nantaisan, IBAR6568.

Puccinia absinthii DC. on *Artemisia princeps* Pampan. (Yomogi, Asteraceae): Daigo, Shimonomiya,

IBAR3766 & 5955; Nantaisan, IBAR3213, 3222 & 6538; Hitachiota, Suifu, IBAR3283; Kitaibaraki, Hanazonoyama, IBAR6684.

Puccinia acetosae Körn. on *Rumex acetosa* L. (Suiba, Polygonaceae): Daigo, IBAR7166; Nantaisan, IBAR3233, 4754, 5609, 6490 & 8049.

Puccinia albispora Y. Ono & Kakish. on *Carex rugata* Ohwi (Kusasuge, Cyperaceae): Hitachiota, Satomi, IBAR8221, 8222, 8319, 8331, 8538 & 8539; on *Disporum sessile* D. Don ex Schult. f. (Houchakusou, Colchicaceae): Kitaibaraki, Hanazono-jinja, IBAR6603; Hanazonoyama, IBAR10894; Daigo, Nantaisan, IBAR6498 & 6541; on *Disporum smilacinum* A. Gray (Chigoyuri, Colchicaceae): Hitachiota, Satomi, IBAR4804 & 8299; Suifu, IBAR5723 & 6528; Kitaibaraki, Hanazonoyama, IBAR6597; Ogawa Research Forest, IBAR8682; Daigo, Tsukioresan, IBAR6474; Nantaisan, IBAR3242, 3244, 3249, 4777, 4788, 8053 & 8306. Note: Taxonomic status of this fungus was determined by life cycle, host specificity and morphology (Ono et al. 2001).

Puccinia angustata Peck on *Scirpus wichuriae* Böckl. f. *concolor* (Maxim.) Ohwi (Aburagaya, Cyperaceae): Hitachiota, Satomi, IBAR8022, 8212 & 8330; Kitaibaraki, Hanazono, IBAR11009; Ogawa Research Forest, IBAR7859.

Puccinia aomoriensis Syd. & P. Syd. on *Atractylodes ovata* (Thunb.) DC. (Okera, Asteraceae): Hitachiota, Suifu, IBAR3270, 5728 & 6527; Daigo, Nantaisan, IBAR3247, 4782, 4789 & 6497; Kitaibaraki, Ogawa Research Forest, IBAR8326.

Puccinia arenariae G. Winter on *Silene miqueliana* (Rohrb.) H. Ohashi & H. Nakai (Fushigurosenou, Caryophyllaceae): Kitaibaraki, Ogawa Research Forest, IBAR8110.

Puccinia argentata (Schultz) G. Winter on *Impatiens textori* Miq. (Tsurifunesou, Balsaminaceae): Hitachiota, Satomi, IBAR2281, 3745 & 4125; Suifu, IBAR3253; Kitaibaraki, Oshoyama, IBAR6652; Daigo, Shimonomiya, IBAR3764 & 5966; Takahagi, Tsuchidake, IBAR2352.

Puccinia artemisiae-keiskeanae Miura on *Artemisia keiskeana* Miq. (Inuyomogi, Asteraceae): Hitachiota, Suifu, IBAR3256 & 3259; Kitaibaraki, Oshoyama, IBAR6654 & 6655; Daigo, Nantaisan, IBAR6557.

Puccinia brachypodii Otth on *Brachypodium sylvaticum* (Huds.) P. Beauv. (Yamakamojigusa, Poaceae): Kitaibaraki, Hanazono, IBAR11011.

Puccinia calcitrapae DC. on *Cirsium* sp. (Asteraceae): Kitaibaraki, Ogawa Research Forest, Sadanami, IBAR7857.

Puccinia caricis-circaearum Y. Harada on *Circaea erubescens* Franch. & Sav. (Tanitade, Onagraceae): Kitaibaraki, Hanazonoyama, IBAR6596; Hanazono-jinja, IBAR6573 & 6605; Daigo, Tsukioresan, IBAR6519; on *Carex* sp. (Cyperaceae): Hitachiota, Satomi, IBAR8167; Kitaibaraki, Ogawa Research Forest, IBAR8321 & 8327.

Puccinia caricis-fediae Y. Harada on *Lysimachia japonica* Thunb. (Konasubi, Primulaceae): Daigo, Nantaisan, IBAR7587 & 8044.

Puccinia caricis-gibbae Dietel on *Carex* cf. *gibba* Wahl. (Masukusa, Cyperaceae): Kitaibaraki, Ogawa Research Forest, IBAR8650, 8661 & 10997.

Puccinia caricis-petasitidis Y. Harada on *Carex dimorpholepis* Steud. (Azenaruko, Cyperaceae): Hitachiota,

Satomi, IBAR8034, 8163, 8219 & 8220; Kitaibaraki, Eizomuro, IBAR10885; on *Petasites japonicus* (Siebold & Zucc.) Maxim. (Fuki, Asteraceae): Hitachiota, Satomi, IBAR4802, 4806, 8093 & 8095; Kitaibaraki, Hanazonoyama, IBAR6594.

Puccinia caricis-rhizopodae Miura on *Carex rhizopoda* Maxim. (Shirakosuge, Cyperaceae): Kitaibaraki, Ogawa Research Forest, IBAR8257, 8659, 8660, 9888, 9891 & 9972; on *Carex* sp.: Kitaibaraki, Ogawa Research Forest, IBAR8541.

Puccinia caricis-siderostictae Dietel on *Parasenecio adenostyloides* (Franch. & Sav. ex Maxim.) H. Koyama (Kanikoumori, Asteraceae): Kitaibaraki, Ogawa Research Forest, IBAR8680; on *P. farfarifolius* (Siebold & Zucc.) H. Koyama var. *bulbiferus* (Maxim.) H. Koyama (Tamabuki): Kitaibaraki, Ogawa Research Forest, IBAR8681; on *Carex siderosticta* Hance (Taganesou, Cyperaceae): Hitachiota, IBAR8651; Kitaibaraki, Ogawa Research Forest, IBAR8740, 8835, 9219, 9231, 9235, 9974, 9975 & 11001.

Puccinia caricis-thunbergii Homma on *Carex cf. thunbergii* Steud. (Azesuge, Cyperaceae): Hitachiota, Satomi, IBAR2285.

Puccinia chaerophylli Purton on *Osmorhiza aristata* (Thunb.) Rydb. (Yabuninjin, Apiaceae): Daigo, Nantaisan, IBAR4775; Tsukioresan, IBAR6507.

Puccinia chrysanthemi Roze on *Chrysanthemum morifolium* Ramat. (Kiku, Asteraceae): Hitachiota, IBAR3287; Daigo, Nantaisan, IBAR5700; on *C. seticuspe* (Maxim.) Hand.-Mazz. f. *boreale* (Makino) H. Ohashi & Yonek. (Kikutanigiku): Hitachi, Takasuzuyama, IBAR2718; on *Chrysanthemum* sp.: Daigo, Nantaisan, IBAR5699.

Puccinia circaeae Pers. on *Circaea erubescens* Franch. & Sav. (Tanitade, Onagraceae): Kitaibaraki, Hanazono-jinja, IBAR6672; Hanazono-keikoku, IBAR6644.

Puccinia coronata Corda on *Berchemia pauciflora* Maxim. (Miyamakumayanagi, Rhamnaceae): Hitachiota, Suifu, IBAR3258 & 5718; Kitaibaraki, Hanazono-jinja, IBAR6619; Hanazonoyama, IBAR6595; Daigo, Nantaisan, IBAR4735, 4755 & 7161 on *Rhamnus japonica* Maxim. var. *decipiens* Maxim. (Kuroumemodoki, Rhamnaceae): Hitachiota, Satomi, IBAR4810; on *Brachypodium cf. sylvaticum* (Huds.) P. Beauv. (Yamakamojigusa, Poaceae): Kitaibaraki, Hanazono, IBAR11015.

Puccinia crepidis-japonicae Dietel on *Youngia japonica* (L.) DC. (Onitabirako, Asteraceae): Daigo, Nantaisan, IBAR4733, 4740, 4747, 4759 & 5649.

Puccinia cymbiformis He & Kakish. on *Akebia trifoliata* (Thunb.) Koidz. (Mitsubaakebi, Lardizabalaceae): Hitachiota, Suifu, IBAR6521; Daigo, Nantaisan, IBAR6529, 6567 & 8301; Kagoiwa, IBAR5739.

Puccinia dieteliana P. Syd. on *Lysimachia clethroides* Duby (Okatoranoo, Primulaceae): Hitachi, Takasuzuyama, IBAR2720; Hitachiota, Satomi, IBAR8337; Suifu, IBAR3254 & 7313; Daigo, Nantaisan, IBAR4727, 65350, 6555 & 6560; Yamizosan, IBAR1996 & 7017; Shimonomiya, IBAR3184 & 5956; Takahagi, Tsuchidake, IBAR2349; Kitaibaraki, Oshoyama, IBAR3738.

Puccinia erythropus Dietel on *Cynanchum sublanceolatum* (Miq.) Maxim. var. *sublanceolatum* (Kobanokamomezuru, Asclepiadaceae); Daigo, Nantaisan, IBAR7163, 7586 & 8045; on *Miscanthus sinensis* Andersson (Susuki, Poaceae): Daigo, Nantaisan, IBAR7331, 7615 & 7761. Note: Ono and Azbukina (1997) proved the heteroecious life cycle of this fungus with materials from Nantaisan.

Puccinia exhausta Dietel on *Clematis apiifolia* DC. var. *apiifolia* (Botanzuru, Ranunculaceae): Daigo, Shimonomiya, IBAR5951.

Puccinia ferruginosa P. Syd. & Syd. on *Artemisia montana* (Nakai) Pamp. (Oyomogi, Asteraceae): Kitaibaraki, Oshoyama, IBAR6656; Hitachiota, Suifu, IBAR5714; Daigo, Nantaisan, IBAR3250; Shimonomiya, IBAR3758.

Puccinia glechomatis Poir on *Glechoma hederacea* L. subsp. *grandis* (A. Gray) H. Hara (Kakidooshi, Laminaceae): Kitaibaraki, Hanazono-jinja, IBAR6673; on *Meehania urticifolia* (Miq.) Makino (Rashoumonkazura, Laminaceae): Daigo, Nantaisan, IBAR6544; Yamizosan, IBAR7006.

Puccinia glyceriae S. Ito on *Hydrangea paniculata* Siebold (Noriutsugi, Hydrangeaceae): Hitachiota, Satomi, IBAR4801, 4808 & 8092; Kitaibaraki, Hanazonoyama, IBAR8079.

Puccinia graminis Pers. subsp. *graminicola* Urban on *Berberis thunbergii* DC. (Megi, Berberidaceae): Hitachiota, Satomi, IBAR8298.

Puccinia hemerocallidis Thüm. on *Hemerocallis fulva* L. var. *disticha* (Donn ex Ker Gawl.) M. Hotta (Nokanzou, Xanthorrhoeaceae): Hitachiota, Suifu, IBAR3285; Daigo, Fukuroda, IBAR8834; Nantaisan, IBAR1987, 4365, 5534, 6537 & 8832; Shimonomiya, IBAR3193 & 5959; on *Patrinia villosa* (Thunb.) Juss. (Otokoeshi, Caprifoliaceae): Daigo, Nantaisan, IBAR8831. Note: The heteroecious life cycle of this fungus was first proven by experimental inoculations in Russia by Tranzschel (1914). Ono (2003) proved the host-alternation between *H. fulva* var. *disticha* and *P. villosa* in Japan.

Puccinia hibayamensis Morim. on *Cardiocrinum cordatum* (Thunb.) Makino (Ubayuri, Liliaceae): Kitaibaraki, Hanazono-jinja, IBAR3205, 6571 & 6581; Hanazonoyama, IBAR10895; Ogawa Research Forest, IBAR8259; Daigo, Tsukioresan, IBAR6470; Nantaisan, IBAR8055; on *Carex multifolia* Ohwi var. *multifolia* (Miyamakansuge, Cyperaceae): Hitachiota, Satomi, IBAR8217; Kitaibaraki, Hanazono-jinja, IBAR10987; Ogawa Research Forest, IBAR8027; on *Carex* sp.: Hitachiota, Satomi, IBAR8218.

Puccinia hieracii (Röhl.) H. Mart. on *Picris hieracioides* L. subsp. *japonica* (Thunb.) Krylov. (Kouzorina, Asteraceae): Hitachiota, Suifu, IBAR3277; Daigo, Yamizosan, IBAR2004; on *Taraxacum* sp. (Asteraceae): Daigo, Nantaisan, IBAR3236, 4737, 4764 & 5652.

Puccinia hikawaensis Hirats. f. & S. Uchida on *Philadelphus satsumi* Siebold ex Lindl. & Paxton (Baikautsugi, Hydrangeaceae): Kitaibaraki, Hanazono-jinja, IBAR6608, 6617 & 6627; Daigo, Nantaisan, IBAR6484.

Puccinia hommae S. Ito on *Carex* sp. (Cyperaceae): Kitaibaraki, Ogawa Research Forest, IBAR8649 & 8664.

Puccinia horiana Henn. on *Chrysanthemum makinoi* Matsum. & Nakai (Ryunougiku, Asteraceae): Hitachiota, Suifu, IBAR3261 & 5715; Daigo, Nantaisan, IBAR6547; on *C. morifolium* Ramat. (Kiku): Daigo, Shimonomiya, IBAR5976.

Puccinia infra-aequatorialis Jørst. on *Cirsium* sp. (Asteraceae): Kuji-gun, Daigo, Yamizosan, IBAR1992; Nantaisan, IBAR5632 & 7162.

Puccinia japonica Dietel on *Anemone flaccida* Fr. Schmidt (Nirinsou, Ranunculaceae): Kitaibaraki, Hanazono, IBAR9221; Daigo, Nantaisan, IBAR6467.

Puccinia kawakamiensis Kakish. & S. Sato on *Carex foliosissima* F. Schmidt (Okunokansuge, Cyperaceae): Kitaibaraki, Hanazono, IBAR8015.

Puccinia kusanoi Dietel on *Deutzia crenata* Siebold & Zucc. (Utsugi: Hydrangeaceae): Hitachiota, Satomi, IBAR4800; Suifu, IBAR3266, 4796, 5722 & 6520; Kitaibaraki, Hanazono, IBAR10896; Eizomuro, BAR10887; Hanazonoyama, IBAR8078; Daigo, Chofukusan, IBAR6499; Nantaisan, IBAR3216, 3220, 3225, 3230, 3248, 4726, 4752, 4758, 4765, 4772, 4779, 5705, 6479 & 6483; Tsukioresan, IBAR6504; on *Deutzia* sp.: Daigo, Kagoiwa, IBAR5710; Hitachiota, Suifu, IBAR3255; Kitaibaraki, Hanazonoyama, IBAR8077; on *Pleioblastus chino* (Franch. & Sav.) Makino (Azumanezasa, Poaceae): Kitaibaraki, Hanazono, IBAR10234; Hanazono-jinja, IBAR6578; Daigo, Kitatomita, IBAR7751 & 7855; Nantaisan, IBAR7825.

Puccinia lactucae-debilis Dietel on *Ixeridium dentatum* (Thunb.) Tzvelev subsp. *dentatum* (Nigana, Asteraceae): Kitaibaraki, Hanazono-jinja, IBAR6620; Hanazono-keikoku, IBAR6589 & 6590; Daigo, Nantaisan, IBAR5617.

Puccinia lactucae-denticulatae Dietel on *Crepidiastrum denticulatum* (Houtt.) J. H. Pak et Kawano (Yakushisou, Asteraceae): Daigo, Yamizosan, IBAR2006; Hitachiota, Nishikanasa-jinja, IBAR7760; Satomi, IBAR8338; Suifu, IBAR3286 & 5712; Daigo, Yamizosan, IBAR2001; Shimonomiya, IBAR3188 & 5962.

Puccinia lantanae Farl. on *Justicia procumbens* L. var. *leucantha* Honda (Kitsunenomago, Acanthaceae): Hitachiomiya, Yamagata, IBAR7619; Daigo, Nantaisan, IBAR6531; Shimonomiya, IBAR5954.

Puccinia lineariformis Syd. & P. Syd. on *Carex* sp. (Cyperaceae): Kitaibaraki, Ogawa Research Forest, IBAR8171.

Puccinia linosyridi-caricis Fisch. on *Aster scaber* Thunb. (Shirayamagiku, Asteraceae): Kitaibaraki, Ogawa Research Forest, IBAR8111 & 8694.

Puccinia littoralis Rostrup on *Juncus* cf. *krameri* Franch. & Sav. (Tachikougaizekishou, Juncaceae): Hitachiota, Satomi, IBAR8166.

Puccinia longicornis Pat. & Har. on *Pleioblastus chino* (Franch. & Sav.) Makino (Azumanezasa, Poaceae): Daigo, Nantaisan, IBAR10238; on *Sasa borealis* (Hack.) Makino & Shibata (Suzutake, Poaceae): Daigo, Nantaisan, IBAR10237; on *S. nipponica* Makino & Shibata (Okamezasa): Kitaibaraki, Hanazono, IBAR11014; Daigo, Yamizosan, IBAR10236.

Puccinia magnusiana Körn. on *Ranunculus japonicus* Thunb. (Umanoashigata, Ranunculaceae): Daigo, Nantaisan, IBAR4762; on *R. silerifolius* H. Lév. var. *glaber* (H. Boissieu) Tamura (Kitsunenobotan): Kitaibaraki, Eizomuro, IBAR10891; Daigo, Nantaisan, IBAR7817.

Puccinia minussensis Thüm. on *Lactuca indica* L. (Akinonogeshi, Asteraceae): Hitachiota, Suifu, IBAR3284, 5713 & 5720.

Puccinia miscanthi Miura ex Syd. on *Plantago asiatica* L. (Obako, Plantaginaceae): Kitaibaraki, Eizomuro, IBAR10889; Daigo, Tsukioresan, IBAR6473; Nantaisan, IBAR4728, 4771 & 7159.

Puccinia mitriformis S. Ito on *Hamamelis japonica* Siebold & Zucc. (Mansaku, Hamamelidaceae): Kitaibaraki, Hanazono-jinja, IBAR3291, 661520 & 6666; Hanazonoyama, IBAR8075; Daigo, Nantaisan, IBAR6553, 7170 & 8051; Yamizosan, IBAR8157.

Puccinia miyakei Syd. & P. Syd. on *Alangium platanifolium* (Siebold & Zucc.) Harms. var. *trilobum*

(Miq.) Ohwi (Urinoki, Alangiaceae): Daigo, Chofukusan, IBAR6500; Nantaisan, IBAR3173, 4791 & 4852; Shimonomiya, IBAR3199; on *Carex siderosticta* Hance (Taganesou, Cyperaceae): Daigo, Yamizosan, IBAR6358; Nantaisan, IBAR5546 & 5547; on *Carex* sp.: Daigo, Nantaisan, IBAR5549. Note: Ono (1995b) proved the heteroecious life cycle of this fungus with materials from Nantaisan.

Puccinia nanbuana Henn. on *Angelica decursiva* (Miq.) Franch. & Sav. (Nodake, Apiaceae): Kitaibaraki, IBAR4122; on *A. polymorpha* Maxim. (Shiranesenkyu): Kitaibaraki, Hanazono, IBAR6642 & 7851; Hanazonoyama, IBAR6665 & 8081; Hanazono-jinja, IBAR5993 & 6670; Ogawa Research Forest, IBAR10992; Oshoyama, IBAR3748; Daigo, Yamizosan, IBAR6361, 7009 & 7015; Nantaisan, IBAR6549; on *Dystaenia ibukiensis* (Y. Yabe) Kitag. (Serimodoki, Apiaceae): Hitachiota; Satomi, IBAR2276.

Puccinia nipponica Dietel on *Salvia nipponica* Miq. (Kibanaakigiri, Lamiaceae): Kitaibaraki, Hanazono, IBAR7850; Hanazono-jinja, IBAR10984 & 10988; Oshoyama, IBAR3746; Ogawa Research Forest, IBAR8329; Daigo, Nantaisan, IBAR6530 & 6539; Yamizosan, IBAR7016; Shimonomiya, IBAR5975.

Puccinia nishidana Henn. on *Cirsium* sp. (Asteraceae): Kitaibaraki, Hanazonoyama, IBAR6668; Daigo, Nantaisan, IBAR3237, 4766, 4786, 5607, 5633 & 8052; Yamizosan, IBAR1989 & 7014.

Puccinia orbicula Peck & Clinton on *Nabalus acerifolius* Maxim. (Fukuosou, Asteraceae): Hitachiota, Satomi, IBAR2279; Kitaibaraki, Hanazono-jinja, IBAR3208 & 5695; Daigo, Nantaisan, IBAR3243, 4776, 6564 & 7822.

Puccinia phaeospora Kakish. & Y. Ono on *Nanocnide japonica* Blume (Katensou, Urticaceae): Kitaibaraki, Hanazono-jinja, IBAR6576 & 6583; Daigo, Tsukioresan, IBAR6471; Nantaisan, IBAR4757, 6466, 6481 & 8056.

Puccinia pileatospora Kakish. & S. Sato on *Ainsliaea acerifolia* Sch.-Bip. var. *acerifolia* (Momijihaguma, Asteraceae): Daigo, Yamizosan, IBAR8155.

Puccinia polygoni-amphibii Pers. var. *polygoni-caespitosi* Hirats. f. & S. Kaneko on *Persicaria posumbu* (Buch.-Ham. ex D. Don) H. Gross (Hanatade, Polygonaceae): Daigo, Nantaisan, IBAR5608.

Puccinia polygoni-amphibii Pers. var. *tovariae* Arthur on *Fallopia japonica* (Houtt.) Ronse Decr. var. *japonica* (Itadori, Polygonaceae): Daigo, Nantaisan, IBAR4362; on *Persicaria filiformis* (Thunb.) Nakai ex W. T. Lee (Mizuhiki, Polygonaceae): Kitaibaraki, Hanazono-jinja, IBAR6671; Ogawa Research Forest, IBAR11002; Daigo, Kagoiwa, IBAR5980; *P. thunbergii* (Siebold & Zucc.) H. Gross (Mizosoba): Kitaibaraki, Hanazono, IBAR11010; Daigo, Nantaisan, IBAR4367, 5622 & 6543; Shimonomiya, IBAR5957.

Puccinia recondita Dietel & Holw. On *Cimicifuga japonica* (Thunb.) Spreng. (Obashouma, Ranunculaceae): Kitaibaraki, Ogawa Research Forest, IBAR8692; Daigo, Chofukusan, IBAR6501; Nantaisan, IBAR7175, 78199 & 8058; Kagoiwa, IBAR5708; on *Clematis terniflora* DC. (Senninsou, Ranunculaceae): Hitachiota, Suifu, IBAR3263; Daigo, Tsukioresan, IBAR6476; Nantaisan, IBAR3223, 3227, 4730, 4738, 4743, 4753, 4770, 4787, 5703, 6478, 7157, 7814 & 8046; on *Thalictrum minus* L. var. *hypoleucum* (Siebold & Zucc.) Miq. (Akikaramatsu, Ranunculaceae): Daigo, Nantaisan, IBAR4783, 6468, 7177, 7820 & 8048.

Puccinia seijoensis Hirats. f. & S. Sato on *Pertya glabrescens* Sch.-Bip. ex Nakai (Nagabanokouyabouki, Asteraceae): Daigo, Chofukusan, IBAR6493; Tsukioresan, IBAR6508; Nantaisan, IBAR3251; Hitachiota, Suifu, IBAR3273 & 6523; on *P. scandens* (Thunb.) Sch.-Bip. (Kouyabouki): Hitachiota, Suifu, IBAR5721

& 5729; Daigo, Nantaisan, IBAR3246, 4778, 4781, 4785, 7167, 8054 & 8302; Tsukioresan, IBAR6509; Yamizosan, IBAR8156.

Puccinia sessilis J. Schröt. on *Polygonatum falcatum* A. Gray (Narukoyuri, Asparagaceae): Daigo, Nantaisan, IBAR6486, 8304 & 8833; Kagoiwa, IBAR5707.

Puccinia suzutake Kakish. & S. Sato on *Hydrangea hirta* (Thunb.) Siebold & Zucc. (Koajisai, Hydrangeaceae): Hitachiota, Satomi, IBAR2282 & 8094; Kitaibaraki, Hanazono, IBAR7845; Hanazono-jinja, IBAR3298 & 10985; Hanazonoyama, IBAR8074; Daigo, Chofukusan, IBAR6495; Nantaisan, IBAR3240, 3241, 4773, 4784, 6545, 7171 & 8303; Takahagi, Tsuchidake, IBAR2351; on *Sasa borealis* (Hack.) Makino & Shibata (Suzutake, Poaceae): Kitaibaraki, Hanazono, IBAR8014; Hanazono-jinja, IBAR8216, 8229, 8546 & 10986; Hanazonoyama, IBAR10893; Ogawa Research Forest, IBAR8228 & 10994.

Puccinia tokyensis P. Syd. & Syd. on *Cryptotaenia canadensis* (L.) DC. subsp. *japonica* (Hassk.) Hand.-Mazz. (Mitsuba, Apiaceae): Hitachiota, Suifu, IBAR3281; Kitaibaraki, Hanazono, IBAR7846; Hanazono-jinja, IBAR6575, 6584, 6607, 6639, 10980 & 10982; Hanazonoyama, IBAR8080; Eizomuro, IBAR10886; Ogawa Research Forest, IBAR8693; Daigo, Tsukioresan, IBAR6472 & 6503; Nantaisan, IBAR4739, 6487 & 7156; Kagoiwa, IBAR5709.

Puccinia tottoriensis Hirats. f. on *Mitella pauciflora* Rosend. (Kocharumerusou, Saxifragaceae): Hitachiota, Satomi, IBAR4799.

Puccinia velutina Kakish. & S. Sato on *Carex lenta* D. Don. var. *lenta* (Nakirisuge, Cyperaceae); Daigo, Kitatomita, IBAR8761 & 8762.

Puccinia violae (Schumach.) DC. On *Viola grypoceras* A. Gray (Tachitsubosumire, Violaceae): Hitachiota, Satomi, IBAR2268, 2273, 4119 & 8254; Suifu, IBAR5727 & 6522; Kitaibaraki, Hanazono-jinja, IBAR3202, 5694, 6574, 6585 & 6609; Hanazonoyama, IBAR6667; Hanazono-keikoku, IBAR6588 & 6649; Oshoyama, IBAR6658; Daigo, Nantaisan, IBAR3214, 4731, 5544, 6540 & 7824; Yamizosan, IBAR2007 & 7011; Shimonomiya, IBAR3763; on *V. hondoensis* W. Becker & H. Boissieu: Hitachiota, Nishikanasa-jinja, IBAR7759; Daigo, Shimonomiya, IBAR5964; on *V. kusanoana* Makino (Otachitsubosumire): Daigo, Yamizosan, IBAR2012; on *V. phalacrocarpa* Makino (Akanesumire): Kitaibaraki, Hanazono-jinja, IBAR3201.

Uromyces amurensis Kom. on *Maackia amurensis* Rupr. & Maxim. (Inuenju, Fabaceae), Daigo, Yamizosan, IBAR1999.

Uromyces azukicola Hirata on *Phaseolus angularis* (Willd.) Ohwi & H. Ohashi var. *nipponensis* (Ohwi) Ohwi & H. Ohashi (Yabutsuruazuki, Fabaceae): Daigo, Kitatomita, IBAR7021; Nantaisan, IBAR4369.

Uromyces dactylidis G.H. Oth on *Ranunculus silerifolius* H.Lév. var. *glaber* (H. Boissieu) Tamura (Kitsunenobotan, Ranunculaceae): Daigo, Nantaisan, IBAR3232.

Uromyces durus Dietel on *Allium macrostemon* Bunge (Nobiru, Amaryllidaceae): Daigo, Nantaisan, IBAR5655, 7179 & 7818.

Uromyces erythronii (DC.) Pass. On *Amana edulis* (Miq.) Honda (Amana, Liliaceae): Daigo, Nantaisan, IBAR8777 & 8803; on *Erythronium japonicum* Decne. (Katakuri, Liliaceae): Kitaibaraki, Hanazono, IBAR8035; Ogawa Research Forest, IBAR8030; Daigo, Yamizosan, IBAR6692 & 6698.

Uromyces geranii (DC.) G.H. Oth & Wartm. on *Geranium krameri* Franch. & Sav. (Tachifuro, Geraniaceae): Kitaibaraki, Hanazono-jinja, IBAR6622.

Uromyces itoanus Hirats., f. on *Kummerowia striata* (Thunb.) Schnindl. (Yahazusou, Fabaceae): Daigo, Shimonomiya, IBAR3767; Yamizosan, IBAR1991.

Uromyces lespedezae-procumbentis (Schwein.) Curtis on *Lespedeza bicolor* Turcz. (Yamahagi, Fabaceae): Hitachiota, Suifu, IBAR7312; Kitaibaraki, Hanazono-jinja, IBAR6674; Hanazonoyama, IBAR6683; Hitachi, Juo, IBAR2086; Daigo, Nantaisan, IBAR5535, 5616 & 6562.

Uromyces rudbeckiae Arthur & Holw. on *Solidago virgaurea* L. (Akinokirinsou, Asteraceae): Hitachiota, Satomi, IBAR2274; Daigo, Shimonomiya, IBAR5949.

ANAMORPHIC GENERA

Aecidium araliae Sawada ex S. Ito & K. Maruy. on *Aralia elata* Seem. (Taranoki, Araliaceae): Daigo, Nantaisan, IBAR4768.

Aecidium epimedii Dietel on *Epimedium grandiflorum* C. Morr. var. *thunbergianum* (Miq.) Nakai (Ikarisou, Berberidaceae): Daigo, Tsukioresan, IBAR6513; Nantaisan, IBAR3245, 4790 & 6494.

Aecidium fraxini-bungeanae Dietel on *Fraxinus sieboldiana* Blume (Marubaaodamo, Oleaceae): Hitachiota, Suifu, IBAR3280.

Aecidium klugkistianum Dietel on *Ligustrum obtusifolium* Siebold & Zucc. (Ibotanoki, Oleaceae): Daigo, Nantaisan, IBAR6482 & 7173.

Aecidium laportae Henn. on *Laportea bulbifera* (Siebold & Zucc.) Wedd. (Mukagoirakusa, Urticaceae): Kitaibaraki, Hanazonoyama, IBAR6611; Hanazono-jinja, IBAR6604; Hanazono-keikoku, IBAR6645.

Aecidium macroclinidii Henn. & Shirai on *Pertya robusta* (Maxim.) Makino (Kashiwabahaguma, Asteraceae): Daigo, Nantaisan, IBAR6566; Tsukioresan, IBAR6510; on *P. triloba* (Makino) Makino (Oyarihaguma): Kitaibaraki, Hanazono-keikoku, IBAR6641, 6646 & 6664; Oshoyama, IBAR3747; Ogawa Research Forest, IBAR8109 & 8691.

Aecidium mori Barclay on *Morus australis* Poir. (Yamaguwa, Moraceae): Kitaibaraki, Hanazono-jinja, IBAR6669; Oshoyama, IBAR3734, 3735 & 3740; Daigo, Nantaisan, IBAR6551.

Aecidium raphiolepidis Syd. on *Raphiolepis indica* (L.) Lindle. var. *umbellata* (Thunb.) H. Ohashi f. *umbellata* (Sharinbai, Rosaceae): Kitaibaraki, Izura, IBAR10075.

Aecidium vincetoxici Henn. & Shirai on *Tylophora aristolochioides* Miq. (Okamomezuru, Asclepiadaceae): Daigo, Nantaisan, IBAR4734.

Aecidium zanthoxyli-schinifolii Dietel on *Zanthoxylum piperitum* (L.) DC. (Sanshou, Rutaceae): Daigo, Nantaisan, IBAR7158 & 9230.

Aecidium sp. 1 on *Sambucus chinensis* Lindl. (Sokuzu, Adoxaceae): Kitaibaraki, Hanazonoyama, IBAR6640; Daigo, Tsukiorisan, IBAR6505; Nantaisan, IBAR6488; on *S. racemosa* L. subsp. *sieboldiana* (Miq.) H. Hara (Niwatoko): Kitaibaraki, Hanazono-jinja, IBAR3304; Hitachiota, Suifu, IBAR5724. Note: *Puccinia bolleyana* Sacc. host-alternates between *Sambucus* spp. and *Carex* spp. in North America (Arthur 1934, Anonymous 1960, Ginns 1986). Arthur (1934) listed *Aecidium sambuci* Schw. as the aecial anamorph of *P. bolleyana*. An aecial fungus on *Sambucus* is widely distributed in China (Tai 1979, Zhuang 1988). While Tai (1979)

identified the aecial fungus as the *Aecidium* state of *P. bolleyana*, Zhuang (1988) and Zhuang et al. (1998) questioned the taxonomic identity of the *Sambucus* rust fungus in China with *P. bolleyana* distributed in North America. This aecial fungus is commonly found on the two *Sambucus* species in Ibaraki. Experimental inoculations with aeciospore from the two Japanese *Sambucus* species onto *Carex* species have failed to prove life cycle connection to a teleomorphic state on *Carex* (Ono unpublished).

***Aecidium* sp. 2** on *Hydrangea scandens* (L. f.) Ser. (Gakuutsugi, Hydrangeaceae): Hitachiota, Suifu, IBAR3265 & 3276; Kitaibaraki, Hanazono-jinja, IBAR3303 & 3305; Hanazonoyama, IBAR8073; on *H. serrata* (Thunb.) Ser. var. *serrata* (Yamaajisai): Kitaibaraki, Hanazono-jinja, IBAR6602, 6610, 6631 & 6634; on *Hydrangea* sp.: Hanazonoyama, IBAR8076. Note: An aecial fungus on *Hydrangea hirta* (Thunb.) Siebold & Zucc. was proven to be spermogonial and aecial stages of *Puccinia suzutake* Kakish. & S. Sato (Kakishima and Sato 1981). Basidiosores of *P. suzutake* from *Sasa borealis* (Hack.) Makino & Shibata were inoculated onto *H. scandens* and *H. serrata* var. *serrata*; however, no infection was observed (Ono unpublished).

***Aecidium* sp. 3** on *Veratrum stamineum* Maxim. (Kobaikeisou, Melanthiaceae): Kitaibaraki, Eizumuro, IBAR10884. Note: No aecial fungus was previously reported on *V. stamineum*. Assuming a possible life cycle connection to *Puccinia sessilis* J. Schröt., Ito (1950) carried out experimental basidiospore inoculations onto *Veratrum grandiflorum* (Maxim. ex Miq.) O. Loes. The inoculations resulted in no successful infection with no sporulation, however. The aecial infection on *V. stamineum* was scattered in 2015 and was not re-confirmed in 2016.

Caecoma tsukubaense P.E. Crane et al. on *Rhododendron* sp. (ornamental “Tsutsuji,” Ericaceae): Hitachiota, Suifu, IBAR3272, 3274 & 5732; on *Rhododendron kaempferi* Planch. var. *kaempferi* (Yamatsutsuji, Ericaceae): Hitachiota, Suifu, IBAR3264 & 5726; Kitaibaraki, Hanazono-jinja, IBAR3206; Ogawa Research Forest, IBAR10990 & 11004.

Uredo caricis-incisae S. Ito & K. Maruy. on *Carex incisa* Boott (Kawarasuge, Cyperaceae): Daigo, Nantaisan, IBAR855; Hitachiota, Satomi, IBAR8652.

Uredo iyoensis Hirats. f. & Yoshin. on *Viola grypoceras* A. Gray (Tachitsubosumire, Violaceae): Kitaibaraki, Ogawa Research Forest, Sadanami, IBAR10989 & 11008; Oshoyama, IBAR3742; Daigo, Nantaisan, IBAR7174.

Uredo sumirecola Morim. on *Viola grypoceras* A. Gray (Tachitsubosumire, Violaceae): Takahagi, Hananuki-keikoku, IBAR11018.

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