

# Competing sexual and asexual generic names in *Pucciniomycotina* and *Ustilaginomycotina* (*Basidiomycota*) and recommendations for use

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**Abstract:** With the change to one scientific name for pleomorphic fungi, generic names typified by sexual and asexual morphs have been evaluated to recommend which name to use when two names represent the same genus and thus compete for use. In this paper, generic names in *Pucciniomycotina* and *Ustilaginomycotina* are evaluated based on their type species to determine which names are synonyms. Twenty-one sets of sexually and asexually typified names in *Pucciniomycotina* and eight sets in *Ustilaginomycotina* were determined to be congeneric and compete for use. Recommendations are made as to which generic name to use. In most cases the principle of priority is followed. However, eight generic names in the *Pucciniomycotina*, and none in *Ustilaginomycotina*, are recommended for protection: *Classicula* over *Naiadella*, *Gymnosporangium* over *Roestelia*, *Helicobasidium* over *Thanatophyllum* and *Tuberculina*, *Melampsorella* over *Peridermium*, *Milesina* over *Milesia*, *Phragmidium* over *Aregma*, *Sporobolomyces* over *Blastoderma* and *Rhodomyces*, and *Uromyces* over *Uredo*. In addition, eight new combinations are made: *Blastospora juruensis*, *B. subneurophylla*, *Cronartium bethelii*, *C. kurilense*, *C. sahoanum*, *C. yamabense*, *Milesina polypodii*, and *Prospodium crusculum* combs. nov.

## Key words:

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## INTRODUCTION

With the change to one scientific name for all *Fungi* in accordance with the *International Code of Nomenclature for algae, fungi, and plants* (ICN, McNeill *et al.* 2012), it has been necessary to determine which generic name should be applied when two or more generic names are typified by different morphs of the same genus. Recommendations about which generic name to use have been made primarily by specialized Subcommissions or Working Groups of the International Commission for the Taxonomy of Fungi (ICTF), each representing a different group of *Fungi*. A number of papers recommending generic names for use have been published including the major groups of *Sordariomycetes* such as *Diaporthales* (Rossman *et al.* 2015a), *Hypocreales* (Rossman *et al.* 2013, Quandt *et al.* 2014, Kepler *et al.* 2017), *Magnaporthales* (Zhang *et al.* 2016), *Microascales* and

*Ophiostomatales* (de Beer *et al.* 2013), *Xylariaceae* (Stadler *et al.* 2013) and remaining *Sordariomycetes* (Réblová *et al.* 2016) as well as *Dothideomycetes* (Rossman *et al.* 2015b), *Eurotiales* (Samson *et al.* 2014, Visagie *et al.* 2014), *Leotiomyces* including *Erysiphales* (Braun 2013, Johnston *et al.* 2014), *Orbiliomycetes* (Baral *et al.* 2017), *Pezizomycetes* (Healy *et al.* 2016), yeasts (Daniel *et al.* 2014) and overlooked generic names in the *Ascomycota* (Rossman *et al.* 2016). A companion paper to this one on the *Agaricomycotina* is in progress. Generic names that follow the principle of priority whether they are sexually or asexually typified do not need to be confirmed by the Nomenclature Committee for Fungi (NCF) and General Committee of the International Botanical Congress (IBC). The former Art. 57.2 which required approve for the use of asexually typified names over sexually typified ones was removed from the *Code* at the 2017 International Botanical Congress (Turland *et al.* 2017, 2018). However,

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those generic names that do not have priority must be approved by the NCF.

Generic names of *Pucciniomycotina* and *Ustilaginomycotina* (*Basidiomycota*), representing sexually and asexually typified genera that compete for use have been evaluated by the *Heterobasidiomycetes* Working Group and the International Subcommittee on Rust Taxonomy of the ICTF. Members of these groups have been consulted and agree with the recommendations made herein about which generic name to use<sup>1</sup>. The comprehensive list of sexual-aseexual generic names by Wijayawardene *et al.* (2012) was used as the initial starting point for discovering competing basidiomycete generic names. Citations for generic names and type species are based on *Index Fungorum*. Each set of generic names was evaluated based on the phylogenetic placement of their type species using the literature to determine whether the names are congeneric. Then a recommendation for use is made considering such factors as priority, number of species and thus number of required name changes, use outside of the ICN, frequency of citations in the literature and frequency of use based primarily on number of citations in Google Scholar (GS).

Here we advocate abandoning the use of many asexually typified generic names in *Pucciniales* such as *Aecidium*, *Caeoma*, *Milesia*, *Peridermium*, *Roestelia*, and *Uredo* for their corresponding sexually typified generic names. This is problematic as many species have been described using these names. Often it is difficult to determine in which genus a rust fungus belongs because of the lack of the telial stage. However, these formal asexually typified generic names are based on type species that are synonyms of species in other genera. In the case of *Aecidium* and *Caeoma* these generic names are synonyms of an earlier generic name, *Puccinia*. For *Peridermium* the type species is a synonym of a species in *Melampsorella*, a later generic name that is recommended for protection over *Peridermium*; most species described in *Peridermium*, however, belong in *Cronartium*. Similarly, the type species of the generic name *Roestelia* is a synonym of the type species in *Gymnosporangium*, an important and well-defined genus that is recommended for protection. Finally, the generic name *Uredo* is a synonym of the later name *Uromyces*, which is recommended for use for two reasons. Firstly, species of *Uredo* belong to many different rust genera, and secondly *Uromyces* is a commonly used generic name. See under those generic names for more detailed discussion.

Although the abandoned *Pucciniales* asexual morph names should no longer be used to describe new species, the species already described in those names are not invalidated and can still be used. As for all scientific names

that cannot be correctly placed in a genus, the problem with the generic name could be noted by including quotes around the name or by indicating the temporary taxonomic placement with “pro tem.” as has been suggested for anamorphically typified species of *Ustilaginomycotina* (Wang *et al.* 2015b). Efforts will be made in the future to determine the correct generic placement for the names currently in use in these asexually typified genera. With the increasingly available use of molecular data for determining phylogenetic relationships, the need for these asexually typified names of rust fungi should be eliminated or, as has been done for years, species known only from an asexual state can be placed in the genus most likely to be considered correct.

Generic names used for asexual rust fungi can, however, be used in a non-latinized sense to describe a morphology, as illustrated in Cummins & Hiratsuka (2003). As in other groups of fungi, for example, a species may be described as having ascomata that are nectria-like, meaning they produce light- to bright-coloured, fleshy perithecia, or fusarium-like meaning that they produce fusiform, multiseptate, hyaline conidia. Thus, one can refer to an asexual morph of a rust fungus as being aecidium-like, caeoma-like, peridermium-like, or uredo-like.

Twenty-one sets of sexual and asexual generic names in *Pucciniomycotina* and eight sets of generic names in *Ustilaginomycotina* were determined to compete for use and evaluated for recommended use. Most of the generic names recommended for use have priority. None of the names of *Ustilaginomycotina* but eight generic names of *Pucciniomycotina* do not have priority and are recommended for protection over older names, specifically: *Classicula* over *Naiadella*, *Gymnosporangium* over *Roestelia*, *Helicobasidium* over *Thanatophytum* and *Tuberculina*, *Melampsorella* over *Peridermium*, *Milesina* over *Milesia*, *Phragmidium* over *Aregma*, *Sporobolomyces* over *Rhodomyces* and *Blastoderma*, and *Uromyces* over *Uredo*. Details about each set of generic names and the basis for each decision are presented below with an S indicating a sexually typified name and an A indicating an asexually typified name. The citation for each generic name, type species, accepted name of type species, and action required are listed in Table 1 for *Pucciniomycotina* and Table 2 for *Ustilaginomycotina*.

## COMPETING SEXUAL AND ASEQUAL GENERIC NAMES OF PUCCINIOMYCOTINA, BASIDIOMYCOTA AND RECOMMENDATIONS FOR USE

### Use *Basidiopycnis* Oberw. et al. 2006 (S) rather than *Basidiopycnides* J. Reid et al. 2008 (A)

The monotypic generic name *Basidiopycnis* is typified by the sexual species *B. hyalina*, described from bark beetle galleries (Oberwinkler *et al.* 2006). Another monotypic generic name *Basidiopycnides* typified by *B. albertensis* was described for an asexual morph also from bark beetle galleries (Hausner *et al.* 2008). Kirschner & Oberwinkler (2009) confirmed the relationship between these types as sexual and asexual morphs of the same species and

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International Subcommittee on Rust Taxonomy: Cathie Aime, Chair; Mehrdad Abbasi, Gaddam Bagyanarayana, Reinhard Berndt, Cvetomir Denchev, José Dianese, Richard Hamelin, Stephan Helfer, Drew Minnis, Yoshitaka Ono, and Markus Scholler.

**Table 1.** Recommended generic names of *Pucciniomycotina* among sexual-asexual names that compete for use. The recommended name is in bold; see text for the rationale behind these recommendations. For each generic name this list provides the author, its date and place of publication, type species of the genus, its basionym, their dates of publication and the currently accepted name, if different. The action required is indicated in the last column such as approval by the Nomenclature Committee for Fungi (NCF) for those generic names that do not have priority and thus need protection.

Recommended generic name	Synonymous alternate morph generic name(s)	Action required
<b>Basidiopycnis</b> Oberw. <i>et al.</i> in <i>Mycologia</i> <b>98</b> : 639. 2006. Type: <i>B. hyalina</i> Oberw. <i>et al.</i> 2006.	<i>Basidiopycnides</i> J. Reid <i>et al.</i> in <i>Mycotaxon</i> <b>103</b> : 285. 2008. Type: <i>B. albertensis</i> J. Reid <i>et al.</i> 2008, now regarded as <i>Basidiopycnis hyalina</i> Oberw. <i>et al.</i> 2006.	None.
<b>Blastospora</b> Dietel in <i>Ann. Mycol.</i> <b>6</b> : 222. 1908. Type: <i>B. smilacis</i> Dietel 1908.	<i>Pelastoma</i> M. Salazar <i>et al.</i> in <i>Mycologia</i> <b>104</b> : 116. 2012. Type: <i>P. juruensis</i> (Henn.) M. Salazar <i>et al.</i> 2012, basionym: <i>Uredo juruensis</i> Henn. 1904, now regarded as <i>Blastospora juruensis</i> (Henn.) Aime & Rossman 2018.	None.
<b>Camptobasidium</b> Marvanová & Suberkr. in <i>Mycologia</i> <b>82</b> : 209. 1990. Type: <i>C. hydrophilum</i> Marvanová & Suberkr. 1990.	<i>Crucella</i> Marvanová & Suberkr., <i>Mycologia</i> <b>82</b> : 212, 1990. Type: <i>C. subtilis</i> Marvanová & Suberkr. 1990, now regarded as <i>Camptobasidium hydrophilum</i> Marvanová & Suberkr. 1990.	None.
<b>Classicula</b> R. Bauer <i>et al.</i> in <i>Mycologia</i> <b>95</b> : 757. 2003. Type: <i>C. fluitans</i> <i>et al.</i> 2003.	<i>Naiadella</i> Marvanová & Bandoni in <i>Mycologia</i> <b>79</b> : 579. 1987. Type: <i>N. fluitans</i> Marvanová & Bandoni 1987, now regarded as <i>Classicula fluitans</i> R. Bauer <i>et al.</i> 2003.	Protection needed by NCF.
<b>Cronartium</b> Fr., <i>Observ. Mycol.</i> <b>1</b> : 220. 1815. Type: <i>C. asclepiadeum</i> (Willd.) Fr. 1815, basionym: <i>Erineum asclepiadeum</i> Willd. 1806, now regarded as <i>Cronartium flaccidum</i> (Alb. & Schwein.) G. Winter 1880.	<i>Endocronartium</i> Y. Hirats. in <i>Canad. J. Bot.</i> <b>47</b> : 1493. 1969. Type: <i>E. harknessii</i> (J.P. Moore) Y. Hirats. 1969, basionym: <i>Peridermium harknessii</i> J.P. Moore 1884, now regarded as <i>Cronartium harknessii</i> (J.P. Moore) E. Meinecke 1920.	None.
<b>Elateraecium</b> Thirum. <i>et al.</i> in <i>Mycologia</i> <b>58</b> : 394. 1966. Type: <i>E. salaciicola</i> Thirum. <i>et al.</i> 1966.	<i>Hiratsukamyces</i> Thirum. <i>et al.</i> <i>Sydowia</i> <b>27</b> : 80, 1975. Type: <i>H. salaciicola</i> Thirum. <i>et al.</i> 1975, now regarded as <i>Elateraecium salaciicola</i> Thirum. <i>et al.</i> 1966.	None.
<b>Gerwasia</b> Racib. in <i>Bull. Int. Acad. Sci. Cracovie, Cl. Sci. Math.</i> <b>3</b> : 270. 1909. Type: <i>G. rubi</i> Racib. 1909.	<i>Morispota</i> Salazar-Yepes <i>et al.</i> in <i>Caldasia</i> <b>29</b> : 108. 2007. Type: <i>M. tenella</i> (H.S. Jacks. & Holw.) Salazar-Yepes <i>et al.</i> 2007, basionym: <i>Mainsia tenella</i> H.S. Jacks. & Holw. 1931, now regarded as <i>Gerwasia tenella</i> (H.S. Jacks. & Holw.) Buriticá 1994.	None.
<b>Gymnosporangium</b> R. Hedw. ex DC., in Lamarck & de Candolle, <i>Fl. franç.</i> , ed. 3 2: 216. 1805. Type: <i>G. fuscum</i> DC. 1805, now regarded as <i>Gymnosporangium sabinae</i> (Dicks.) G. Winter 1884.	<i>Roestelia</i> Rebent., <i>Prodr. fl. neomarch.</i> : 350. 1804. Type: <i>R. cancellata</i> (Pers.) Rebent. 1804, basionym: <i>Aecidium cancellatum</i> Pers. 1792, now regarded as <i>Gymnosporangium sabinae</i> (Dicks.) G. Winter 1884.	Protection needed by NCF.
<b>Helicobasidium</b> Pat. in <i>Bull. Soc. Bot. France</i> <b>32</b> : 172. 1885. Type: <i>H. purpureum</i> (Tul.) Pat. 1885, basionym: <i>Hypochnus purpureus</i> Tul. 1865.	<i>Thanatophytum</i> Nees, <i>Syst. Pilze</i> : 148. 1816. Type: <i>T. crocorum</i> (Pers.) Nees 1816, basionym: <i>Sclerotium crocorum</i> Pers. 1801, now regarded as <i>Helicobasidium purpureum</i> (Tul.) Pat. 1885. <i>Tuberculina</i> Tode ex Sacc. in <i>Michelia</i> <b>2</b> : 34. 1881. Type: <i>T. persicina</i> (Ditmar) Sacc. 1881, basionym: <i>Tubercularia persicina</i> Ditmar 1817, now regarded as <i>Helicobasidium purpureum</i> (Tul.) Pat. 1885.	Protection needed by NCF.
<b>Hyalopycnis</b> Höhn. in <i>Hedwigia</i> <b>60</b> : 152. 1918. Type: <i>H. hyalina</i> Höhn. 1918, now regarded as <i>Heterogastridium pycnidioideum</i> Oberw. & R. Bauer 1990.	<i>Heterogastridium</i> Oberw. & R. Bauer in <i>Mycologia</i> <b>82</b> : 57. 1990. Type: <i>H. pycnidioideum</i> Oberw. & R. Bauer 1990.	None.

Table 1. (Continued).

Recommended generic name	Synonymous alternate morph generic name(s)	Action required
<b>Kriegeria</b> Bres. in Rev. Mycol. (Toulouse) <b>13</b> : 14. 1891. Type: <i>K. eriophori</i> Bres. 1891.	<i>Xenogloea</i> Syd. & P. Syd. in Ann. Mycol. <b>17</b> : 44. 1919. Type: <i>X. eriophori</i> (Bres.) Syd. & P. Syd. 1919, basionym: <i>Kriegeria eriophori</i> Bres. 1891. <i>Zymoxenogloea</i> D.J. McLaughlin & Doublés in Mycologia <b>84</b> : 671. 1992. Type: <i>Z. eriophori</i> D.J. McLaughlin & Doublés 1992, now regarded as <i>Kriegeria eriophori</i> Bres. 1891.	None.
<b>Kuehneola</b> Magnus in Bot. Centralbl. <b>74</b> : 169. 1898. Type: <i>K. albida</i> (J.G. Kühn) Magnus 1898, basionym: <i>Chrysomyxa albida</i> J.G. Kühn 1883, now regarded as <i>Kuehneola uredinis</i> (Link) Arthur 1906.	<i>Spirechina</i> Arthur in J. Mycol. <b>13</b> : 30. 1907. Type: <i>S. loeseneriana</i> (Henn.) Arthur 1907, basionym: <i>Uredo loeseneriana</i> Henn. 1898, now regarded as <i>Kuehneola loeseneriana</i> (Henn.) H.S. Jacks. & Holw. 1931.	None.
<b>Melampsorella</b> J. Schröt. in Hedwigia <b>13</b> : 85. 1874. Type: <i>M. caryophyllacearum</i> (DC.) J. Schröt. 1874, basionym: <i>Uredo caryophyllacearum</i> DC. 1805.	<i>Peridermium</i> (Link) J.C. Schmidt & Kunze in Deutschl. Schwämme <b>6</b> : 4. 1817, basionym: <i>Hypodermium</i> subgen. <i>Peridermium</i> Link 1816. Type: <i>Aecidium elatinum</i> Alb. & Schwein. 1805, now regarded as <i>Melampsorella caryophyllacearum</i> (DC.) J. Schröt. 1874.	Protection needed by NCF.
<b>Milesina</b> Magnus in Ber. Deutsch. Bot. Ges. <b>27</b> : 325. 1909. Type: <i>M. kriegeriana</i> (Magnus) Magnus 1909, basionym: <i>Melampsorella kriegeriana</i> Magnus 1901.	<i>Milesia</i> F.B. White in Scott. Nat. <b>4</b> : 162. 1878. Type: <i>M. polypodii</i> F.B. White 1878, now regarded as <i>Milesina polypodii</i> (F.B. White) Aime & Rossman 2018.	Protection needed by NCF.
<b>Phragmidium</b> Link in Ges. Naturf. Freunde Berlin Mag. <b>7</b> : 30. 1816. Type: <i>P. mucronatum</i> (Pers.) Schltld. 1824, basionym: <i>Puccinia mucronata</i> Pers. 1794.	<i>Aregma</i> Fr., Observ. Mycol. <b>1</b> : 22., 1815. Type: <i>A. obtusatum</i> Fr. 1832, now regarded as <i>Phragmidium fragariae</i> (DC.) G. Winter 1884, basionym: <i>Puccinia fragariae</i> DC., 1808. <i>Lecythea</i> Lév. in Ann. Sci. Nat., Bot., sér. 3 <b>8</b> : 373. 1847. Type: <i>L. miniata</i> (Pers.) Lév. 1847, basionym: <i>Uredo miniata</i> Pers. 1801, now regarded as <i>Phragmidium mucronata</i> (Pers.) Schltld. 1824.	Protection needed by NCF.
<b>Prospodium</b> Arthur in J. Mycol. <b>13</b> : 31. 1907. Type: <i>P. appendiculatum</i> (G. Winter) Arthur 1907, basionym: <i>Dicaeoma appendiculata</i> Kuntze 1898.	<i>Canasta</i> A.A. Carvalho & J.F. Hennen in Mycologia <b>102</b> : 1096. 2010. Type: <i>C. cruscula</i> A.A. Carvalho & J.F. Hennen 2010, now regarded as <i>Prospodium cruscula</i> (A.A. Carvalho & J.F. Hennen) Aime & Rossman 2018.	None.
<b>Puccinia</b> Pers. in Neues Mag. Bot. <b>1</b> : 118. 1794. Type: <i>P. graminis</i> Pers. 1794.	<i>Aecidium</i> Pers., Observ. Mycol. <b>1</b> : 97. 1796. Type: <i>A. berberidis</i> Pers. 1796, now regarded as <i>Puccinia graminis</i> Pers. 1794. <i>Caeoma</i> Link in Ges. Naturf. Freunde Berlin Mag. <b>3</b> : 5. 1809. Type: <i>C. berberidis</i> (Pers.) Har. 1809, basionym: <i>Aecidium berberidis</i> Pers. 1792, now regarded as <i>Puccinia graminis</i> Pers. 1794.	None.
<b>Rhodotorula</b> F.C. Harrison in Proc. & Trans. Roy. Soc. Canada, ser. 3 <b>21</b> : 349. 1927. Type: <i>R. glutinis</i> (Fresen.) F.C. Harrison 1928.	<i>Chromotorula</i> F.C. Harrison in Proc. & Trans. Roy. Soc. Canada, ser. 3 <b>21</b> : 350. 1927. Type: <i>C. kitae</i> F.C. Harrison 1927. <i>Rhodospordium</i> Banno in J. Gen. Appl. Microbiol. <b>13</b> : 192. 1967. Type: <i>R. toruloides</i> Banno 1967, now regarded as <i>Rhodotorula toruloides</i> (Banno) Q.M. Wang et al. 2015.	None.
<b>Septobasidium</b> Pat. in J. Bot. (Morot) <b>6</b> : 63. 1892. Type: <i>S. velutinum</i> Pat. 1892.	<i>Johncouchia</i> S. Hughes & Cavalc. in Canad. J. Bot. <b>61</b> : 2226. 1983. Type: <i>J. mangiferae</i> (Bat.) S. Hughes & Cavalc. 1983, basionym: <i>Cladotrichum mangiferae</i> Bat. 1956, now regarded as <i>Septobasidium pilosum</i> Boedijn & B.A. Steinm. 1930.	None.

Table 1. (Continued).

Recommended generic name	Synonymous alternate morph generic name(s)	Action required
<p><b><i>Sporobolomyces</i></b> Kluver &amp; C.B. Niel in Centralbl. Bakteriöl., 2 Abt. 2: 63. 1924.</p> <p>Type: <i>S. salmonicolor</i> (B. Fisch. &amp; Brebeck) Kluver &amp; C.B. Niel 1924, basionym: <i>Blastoderma salmonicolor</i> B. Fisch. &amp; Brebeck 1894.</p>	<p><i>Aessosporon</i> Van der Walt in Antonie van Leeuwenhoek 36: 54. 1970.</p> <p>Type: <i>A. salmonicolor</i> Van der Walt 1970, now regarded as <i>Sporobolomyces salmonicolor</i> (B. Fisch. &amp; Brebeck) Kluver &amp; C.B. Niel 1924.</p> <p><i>Blastoderma</i> B. Fisch. &amp; Brebeck, in Fischer, Morph. Syst.: 47. 1894.</p> <p>Type: <i>B. salmonicolor</i> B. Fisch. &amp; Brebeck 1894, now regarded as <i>Sporobolomyces salmonicolor</i> (B. Fisch. &amp; Brebeck) Kluver &amp; C.B. Niel 1924.</p> <p><i>Rhodomycetes</i> Wettst. in Sitzungsber. Kaiserl. Akad. Wiss., Wien, Math.-naturw. Kl., Abt. 1 91: 39. 1885.</p> <p>Type: <i>R. kochii</i> Wettst. 1885, now regarded as <i>Sporobolomyces salmonicolor</i> (B. Fisch. &amp; Brebeck) Kluver &amp; C.B. Niel 1924.</p> <p><i>Sporidiobolus</i> Nyland in Mycologia 41: 686. 1950.</p> <p>Type: <i>S. johnsonii</i> Nyland 1950, now regarded as <i>Sporobolomyces johnsonii</i> (Nyland) Q.M. Wang <i>et al.</i> 2015.</p>	Protection needed by NCF.
<p><b><i>Uromyces</i></b> (Link) Unger, Exanth. Pflanzen: 277. 1833 (nom. cons.), basionym: <i>Hypodermium</i> subgen. <i>Uromyces</i> Link 1816.</p> <p>Type: <i>U. appendiculata</i> (Pers.) Unger 1796, basionym: <i>Uredo appendiculatus</i> Pers., now regarded as: <i>Uromyces appendiculatus</i> (Pers.) Link 1816.</p>	<p><i>Uredo</i> Pers., Syn. Meth. Fung. 1: 214. 1801.</p> <p>Type: <i>U. betae</i> Pers. 1801, now regarded as <i>Uromyces beticola</i> (Belynyck) Boerema, Loer. &amp; Hamers 1987.</p>	Protection needed by NCF.

clarified the terminology associated with them, thus these generic names are synonyms. Given that *Basidiopycnis* has priority and both generic names are monotypic and relatively obscure (GS *Basidiopycnis* = 37, *Basidiopycnides* = 5), we follow the principle of priority and recommend the use of *Basidiopycnis*.

### Use *Blastospora* Dietel 1908 (S) rather than *Pelastoma* Salazar-Yepes *et al.* 2012 (A)

The generic name *Blastospora* typified by *B. smilacis* includes tropical heteroecious rust fungi as summarized by Salazar-Yepes *et al.* (2012) who described *Pelostoma* typified by *P. juruense* for the asexual morph of *B. colombiana* (syn. *Hemileia colombiana*). Aime (2006) demonstrated that *B. smilacis* has affinities to *Hemileia* and *Maravalia* in the *Mikronegeriaceae*. *Blastospora smilacis* and *B. itoana* were considered to have asexual morphs belonging to *Caeoma* (Ono *et al.* 1986, 1987); however, the type of *Caeoma* is *C. berberidis*, a synonym of *Puccinia graminis*, thus *Caeoma* is a synonym of *Puccinia*. No other species of *Blastospora* nor the second species of *Pelostoma* have been sequenced. Assuming that *B. colombiana* is congeneric with *B. smilacis*, then *Blastospora* and *Pelostoma* are synonyms. At present five species are included in *Blastospora* and one name additional to the type has been placed in *Pelostoma*. Considering the fact that *Blastospora* has priority, a greater number of names, and is more commonly used (GS *Blastospora* = 567, *Pelostoma* = 11), we recommend the use of *Blastospora* for this genus.

Two new combinations are required:

#### ***Blastospora juruensis* (Henn.) Aime & Rossman, comb. nov.**

MycoBank MB824643

Basionym: *Uredo juruensis* Henn., *Hedwigia* 43: 161 (1904).

Synonyms: *Hemileia juruensis* (Henn.) P. Syd. & Syd., *Mon. Ured.* 3: 219 (1915).

*Hemileia jahnii* Syd., *Ann. Mycol.* 28: 46 (1930).

*Uredo jahnii* (Syd.) Ritschel, *Biblioth. Mycol.* 200: 98 (2005).

*Hemileia colombiana* Buriticá, *Caldasia* 12: 165 (1978).

*Blastospora colombiana* (Buriticá) Salazar-Yepes *et al.*, *Mycologia* 104: 116 (2012).

#### ***Blastospora subneurophylla* (Speg.) Aime & Rossman, comb. nov.**

MycoBank MB824644

Basionym: *Uredo subneurophylla* Speg., *Anales Soc. Ci. Argent.* 17: 123 (1883).

Synonyms: *Puccinia subneurophylla* (Speg.) Speg., *Anales Mus. Nac. Hist. Nat. Buenos Aires* 31: 384 (1922).

*Pelastoma subneurophyllum* (Speg.) Salazar-Yepes *et al.*, *Mycologia* 104: 116 (2012).

*Uredo forsteroniae* Henn., *Hedwigia* 34: 99 (1895).

#### **Use *Camptobasidium* Marvanová & Suberkr. 1990 (S) rather than *Crucella* Marvanová & Suberkr. 1990 (A)**

**Table 2.** Recommended generic names of *Ustilaginomycotina* among sexual-asexual names that compete for use. The recommended name is in bold; see text for the rationale behind these recommendations. For each generic name this list provides the author, its date and place of publication, type species of the genus, its basionym, their dates of publication and the currently accepted name, if different. The action required is indicated in the last column such as approval by the Nomenclature Committee for Fungi (NCF) for those generic names that do not have priority and thus need protection.

Recommended generic name	Synonymous alternate morph generic name(s)	Action required
<b><i>Anthracoidea</i></b> Bref., Unters. Gesamtgeb. Mykol. <b>12</b> : 143. 1895. Type: <i>A. caricis</i> (Pers.) Bref. 1896, basionym: <i>Uredo caricis</i> Pers. 1801.	<i>Crotalia</i> Liro in Ann. Acad. Sci. Fenn., Ser. A <b>42</b> (1): 545, 273. 1938. Type: <i>C. cintractiae-fischeri</i> Liro 1939, now regarded as <i>Anthracoidea fischeri</i> (P. Karst.) Kukkonen 1963.	None.
<b><i>Doassansia</i></b> Cornu in Ann. Sci. Nat., Bot., sér. 6 <b>15</b> : 285. 1883. Type: <i>D. alismatis</i> (Nees ex Fr.) Cornu 1883, basionym: <i>Sclerotium alismatis</i> Nees ex Fr. 1822.	<i>Savulescuella</i> Cif. in Bontea et al. [eds], <i>Omag. Savulescu</i> : 179. 1959. Type: <i>S. alismacearum</i> (Sacc.) Cif. 1959, basionym: <i>Cylindrosporium alismacearum</i> Sacc. 1880, now regarded as <i>Doassansia alismatis</i> (Nees ex Fr.) Cornu 1883.	None.
<b><i>Doassansiopsis</i></b> (Setch.) Dietel in Engler & Prantl, Nat. Pflanzenfam. <b>1</b> (1**): 15. 1897, basionym: <i>Doassansia</i> subgen. <i>Doassansiopsis</i> Setch. 1891. Type: <i>Doassansia deformans</i> Setch. 1892, now regarded as <i>Doassansiopsis deformans</i> (Setch.) Dietel 1897.	<i>Doassansiella</i> Zambett. in Rev. Mycol. (Paris) <b>35</b> : 164. 1970. Type: <i>D. aquatilis</i> (Peck) Zambett. 1970, basionym: <i>Ramularia aquatilis</i> Peck 1884, now regarded as <i>Doassansiopsis hydrophila</i> (A. Dietr.) Lavrov 1937.	None.
<b><i>Entyloma</i></b> de Bary in Bot. Zeitung (Berlin) <b>32</b> (7): 101, 1874. Type: <i>E. microsporum</i> J. Schröt. 1874. Although some have attributed <i>E. microsporum</i> to <i>Protomyces microsporus</i> F. Unger 1834, this name is a later homonym of <i>P. microsporus</i> Pass. 1833.	<i>Entylomella</i> Höhn. in Ann. Mycol. <b>22</b> : 191. 1924. Type: <i>E. ranunculi</i> (Bonord.) Höhn. 1916, basionym: <i>Fusidium ranunculi</i> Bonord. 1851, now regarded as <i>Entyloma ficariae</i> F. Thümen ex A.A. Fischer v. Waldheim 1877.	None.
<b><i>Mycosarcoma</i></b> Bref., Unters. Gesamtgeb. Mykol. <b>15</b> : 53. 1912. Type: <i>M. maydis</i> (DC.) Bref. 1912, basionym: <i>Uredo maydis</i> DC. 1815. OR <b><i>Ustilago</i></b> (Pers.) Roussel, Fl. Calvados, ed. <b>2</b> : 4. 1806, basionym: <i>Uredo</i> [unranked] <i>Ustilago</i> Pers. 1801. Type: <i>Ustilago hordei</i> (Pers.) Lagerh. 1889, basionym: <i>Uredo segetum a hordei</i> Pers. 1801, or with a newly conserved type proposed by Thines (2016): <i>Ustilago maydis</i> (DC.) Corda 1842, basionym: <i>Uredo maydis</i> DC. 1815.	<i>Pseudozyma</i> Bandoni in J. Linn. Soc., Bot. <b>91</b> : 38. 1985. Type: <i>P. prolifica</i> Bandoni 1985, now regarded as <i>Mycosarcoma maydis</i> (DC.) Bref. 1912 or <i>Ustilago maydis</i> (DC.) Corda 1842.	Awaiting decision of NCF on the proposal of Thines (2016) as to whether <i>Mycosarcoma</i> should be taken up.
<b><i>Thecaphora</i></b> Fingerh. in Linnaea <b>10</b> : 230. 1836. Type: <i>T. hyalina</i> Fingerh. 1836, now regarded as <i>Thecaphora seminis-convolvuli</i> (Desm.) S. Ito 1935.	<i>Angiosorus</i> Thirum. & M.J. O'Brien 1974 in <i>Sydowia</i> <b>26</b> : 201 (1974) [1972]. Type: <i>A. solani</i> Thirum. & M.J. O'Brien 1974, now regarded as <i>Thecaphora solani</i> (Thirum. & M.J. O'Brien) Mordue 1988. <i>Rhombiella</i> Liro in Ann. Acad. Sci. Fenn., Ser. A <b>42</b> (1): 507, 545. 1939. Type: <i>R. cardamines</i> Liro 1939, now regarded as <i>Thecaphora thlaspeos</i> (Beck) Vánky 2004. <i>Thecaphorella</i> H. Scholz & I. Scholz in <i>Nova Hedwigia</i> <b>47</b> : 71. 1988. Type: <i>T. antherarum</i> (Oudem.) H. Scholz & I. Scholz 1988, basionym: <i>Gloeosporium antherarum</i> Oudem. 1898, now regarded as <i>Thecaphora seminis-convolvuli</i> (Desm.) S. Ito 1935.	None.
<b><i>Tilletia</i></b> Tul. & C. Tul. in Ann. Sci. Nat., Bot., sér. 3 <b>7</b> : 112. 1847. Type: <i>Tilletia caries</i> (DC.) Tul. & C. Tul. 1847, basionym: <i>Uredo caries</i> DC. 1815, now regarded as <i>T. tritici</i> (Bjerk.) G. Winter 1875, basionym: <i>Lycoperdon tritici</i> Bjerk. 1775.	<i>Tilletiella</i> Zambett. in Rev. Mycol. (Paris) <b>35</b> : 165. 1970. Type: <i>T. alopecuri</i> (Sawada) Zambett. 1970, basionym: <i>Entyloma alopecuri</i> Sawada 1922, now regarded as <i>Tilletia alopecuri</i> (Sawada) L. Ling 1949.	None.

Table 2. (Continued).

Recommended generic name	Synonymous alternate morph generic name(s)	Action required
<b><i>Urocystis</i></b> Rabenh. ex Fuckel in Jahrb. Nassauischen Vereins Naturk. <b>23–24</b> : 41. 1870 (nom. cons.). Type: <i>U. occulta</i> (Wallr.) A.A. Fisch. Waldh. 1867, basionym: <i>Erysibe occulta</i> Wallr. 1833.	<i>Paepalopsis</i> J.G. Kühn in Irmischia <b>7</b> : 39, 1882. Type: <i>P. irmischiae</i> J.G. Kühn 1882, now regarded as <i>Urocystis primulae</i> (Rostr.) Vánky 1985. <i>Polycystis</i> Lév. in Ann. Sci. Nat. Bot., Ser. 3, <b>5</b> : 269. 1846. Type: <i>P. pompholygodes</i> Lév. 1846, now regarded as <i>Urocystis anemones</i> (Pers.) G. Winter 1880.	None.

The generic names *Camptobasidium* and *Crucella* were described in the same article based on sexually and asexually typified morphs of the same species, thus they are synonyms and compete equally for use (Marvanová & Suberkropp 1990). Both are monotypic and have been used to the same extent, although *Crucella* is also the name of a fossil radiolarian, thus it is difficult to determine its usage as a fungus. Given the confusion about the use of the name *Crucella* and because preference has previously been given to sexual morph names, we recommend the use of *Camptobasidium*.

#### Protect *Classicula* R. Bauer *et al.* 2003 (S) over *Naiadella* Marvanová & Bandoni 1987 (A)

The monotypic generic name *Classicula* is typified by *C. fluitans*, which was described as the sexual morph of *N. fluitans* (Bauer *et al.* 2003), the type species of the monotypic generic name *Naiadella*, thus these names are synonyms. Neither name is frequently used (GS *Classicula* = 73; *Naiadella* = 86); however, the family *Classiculaceae*, order *Classiculales*, and class *Classiculomycetes* are based on the name *Classicula*, thus we recommend the use of *Classicula*.

#### Use *Cronartium* Fr. 1815 (S) rather than *Endocronartium* Y. Hirats. 1969 (S)

The generic name *Cronartium* is well known for species that cause stem rusts on conifers in temperate regions, often with alternate hosts on herbaceous plants. One of the most notorious species is *C. flaccidum*, cause of Scots pine blister rust, of which *C. asclepiadeum*, the type species of *Cronartium*, is a synonym (Mordue & Gibson 1978). *Endocronartium* was established for species genetically similar to *Cronartium* except for being autoecious (i.e. completing their life-cycle on a single host) and endocyclic (lacking aecia and uredinia and having aecioid telia) (Hiratsuka 1969). The type species of *Endocronartium*, *E. harknessii*, cause of western gall rust, has long been known to be indistinguishable from species of *Cronartium* except for the life-cycle reductions (Epstein & Buurlage 1988). With the change in the ICN, these generic names are synonyms and the six taxa of *Endocronartium* should be recognized in the older, commonly used genus *Cronartium*.

All species of *Endocronartium* have been shown to belong in the genus *Cronartium* either as synonyms or distinct species within that genus. Several new combinations are made below. In addition, *Endocronartium pini* (Willd.) Y. Hirats. (syn. *Peridermium pini* (Willd.) Lév.) has been shown

to be a synonym of *C. flaccidum* (Hantuka *et al.* 2002).

Although some of the asexual morphs of species of *Cronartium* have been recognized in *Peridermium*, that generic name is now regarded as a synonym of *Melampsorella* based on the type species, *Aecidium elatinum*, which is a later name for *M. caryophyllacearum* (see below under *Melampsorella*). Thus, names in *Peridermium* must be recognized in the sexually typified genus in which the species belong, primarily *Cronartium* but also *Chrysomyxa* and *Coleosporium*.

The following new combinations are required:

#### ***Cronartium bethelii*** (Hedgc. & Long) Aime & Rossman, **comb. nov.**

MycoBank MB824645

Basionym: *Peridermium bethelii* Hedgc. & Long, *Phytopathology* **3**: 251 (1913).

Vogler & Bruns (1998) demonstrated that *Peridermium bethelii* belongs in *Cronartium*, as sister to *C. comandrae*. With the change in the ICN, it is possible to place this name in *Cronartium*.

#### ***Cronartium kurilense*** (Dietel) Y. Ono, **comb. nov.**

MycoBank MB824647

Basionym: *Peridermium kurilense* Dietel, *Bot. Jahrb. Syst.* **37**: 107 (1905).

Synonym: *Endocronartium sahoanum* var. *hokkaidoense* Imazu & Kakish., *Trans. Mycol. Soc. Japan* **33**: 174 (1992).

A blister rust fungus on *Pinus pumila* in the North Kuril Islands (southeast of Kamchatka, Russia) was described as *Peridermium kurilense*, distinct from *C. ribicola* (Dietel 1905). It was subsequently synonymized under *C. kamtschaticum* (Jørstad 1934, Hiratsuka *et al.* 1992). An endocyclic fungus on *Pinus pumila* distributed in northern Honshu, Japan, was named as *E. sahoanum* (Imazu *et al.* 1989), and a similar fungus on the same host species distributed in Hokkaido was separated as a variety, *E. sahoanum* var. *hokkaidoense*, distinct from *E. sahoanum* var. *sahoanum* on the basis of differences in spore and germ tube morphology (Imazu & Kakishima 1992). Based on the similarity in spore shape, size, surface structure, and PCR-RFLP pattern, *P. kurilense* and *E. sahoanum* var. *hokkaidoense* have been shown to be conspecific and distinct from *C. kamtschaticum*, which is now considered a synonym of *C. ribicola* (Imazu *et al.* 2000, Kim *et al.* 2010). Thus, *P. kurilense* must be placed in *Cronartium*.

**Cronartium sahoanum** (Imazu & Kakish.) Aime & Rossman, **comb. nov.**

MycoBank MB824648

*Basionym: Endocronartium sahoanum* Imazu & Kakish. *Trans. Mycol. Soc. Japan* 30: 308 (1989).

**Cronartium yamabense** (Saho & I. Takah.) Aime & Rossman, **comb. nov.**

MycoBank MB824649

*Basionym: Peridermium yamabense* Saho & I. Takah., *Trans. Mycol. Soc. Japan* 22: 33 (1981).

*Synonym: Endocronartium yamabense* (Saho & I. Takah.) Paclt, *Mitt. Deutsch. Dendrol. Ges.* 77: 227 (1987).

### Use *Elateraecium* Thirum. et al. 1966 (A) rather than *Hiratsukamyces* Thirum. et al. 1975 (S)

The generic name *Hiratsukamyces*, typified by *H. salaciicola*, was established for the sexual morph of *Elateraecium salaciicola*, type species of *Elateraecium* (Thirumalachar et al. 1966, 1975), thus these generic names are synonyms. Two names were included in *Hiratsukamyces* when it was described, each also having a name in *Elateraecium* for the asexual morph. Since then two more names have been added to *Elateraecium* by Gjaerum & Reid (1983). Both generic names are obscure but given the greater number of names, priority, and slightly greater use (GS *Elateraecium* = 12, *Hiratsukamyces* = 11), we recommend the use of *Elateraecium*.

### Use *Gerwasia* Racib. 1909 (S) rather than *Morisporea* Salazar-Yepes et al. 2007 (A)

*Gerwasia*, typified by *G. rubi*, is a well-known genus of autoecious rust fungi that occurs on *Rosaceae*, primarily in the Asian and American tropics (Cummins & Hiratsuka 2003). Twenty-two species have been described in *Gerwasia* of which 12 have asexual morphs that have been placed in *Morisporea*, typified by *M. tenella*, a species with a sexual morph regarded as *G. tenella* (Salazar-Yepes et al. 2007). Thus, assuming that *G. rubi* and *G. tenella* are congeneric as indicated by Salazar-Yepes et al. (2007) but without molecular data, *Gerwasia* and *Morisporea* are synonyms. All names in *Morisporea* already have a name in *Gerwasia*. Given its priority, greater number of names, and widespread use (GS *Gerwasia* = 112, *Morisporea* = 6), the generic name *Gerwasia* is recommended for use.

### Protect *Gymnosporangium* R. Hedw. ex DC. 1805 (S) over *Roestelia* Rebent. 1804 (A)

The genus *Gymnosporangium*, based on *G. fuscum*, now recognized as *G. sabinae*, includes ubiquitous rust fungi that have been well-studied (Yun et al. 2009). Index Fungorum lists 145 names in this genus. The type species of *Roestelia*, *R. cancellata*, is a synonym of *G. sabinae* (Alexopoulos 1940, Kern 1973), thus these generic names are synonyms. Although 55 names have been placed in *Roestelia*, their sexual morphs belong primarily in *Gymnosporangium*. The need to protect *Gymnosporangium* was recognized many years ago; however, the proposal to conserve *Gymnosporangium* over *Roestelia* was rejected for lack of adequate justification (Rogers 1953). Because *Gymnosporangium* is by far the most commonly used name rather than *Roestelia* (GS *Gymnosporangium* = 6050,

*Roestelia* = 598) and includes a greater number of species, we recommend the protection of *Gymnosporangium*.

### Protect *Helicobasidium* Pat. 1885 (S) over *Thanatophytum* Nees 1816 (A) and *Tuberculina* Tode ex Sacc. 1880 (A)

*Helicobasidium*, typified by *H. purpureum*, includes 15 species, some of which cause plant diseases, such as *H. purpureum*, the cause of cosmopolitan violet root rot, and the closely related *H. mompa*, also causing violet root rot in Africa and Asia (Sayama et al. 1994). The asexual morph of *H. purpureum* has been regarded as *Thanatophytum crocorum* (Roberts 1999). Two species were mentioned in the protolog for *Thanatophytum*; Donk (1962) lectotypified this genus with *T. crocorum*. The generic name *Tuberculina* is lecto-typified by *T. persicina* (Clements & Shear 1931), a parasite of rust fungi. The relationship between these names all representing the same species was confirmed by Lutz et al. (2004) in which the life strategy of this unusual fungus was clarified. More specifically, they determined that *T. persicina* is a synonym of *Helicobasidium purpureum*. The commonly used name *H. purpureum* based on *Hypochnus purpureus* is herein proposed for protection over the older names *Sclerotium crocorum* and *Tubercularia persicina*. Among these three generic names, *Helicobasidium* is most commonly used (GS *Helicobasidium* = 2090, *Thanatophytum* = 67, *Tuberculina* = 487). Given the widespread use of *Helicobasidium* and the number of species in this genus, we recommend *Helicobasidium* for protection. In addition we recommend the name of the type species, *H. purpureum*, for protection.

#### Name for protection:

***Helicobasidium purpureum*** (Tul.) Pat., *Bull. Soc. Bot. France* 32: 171 (1885).

*Basionym: Hypochnus purpureus* Tul., *Ann. Sci. Nat., Bot.*, sér. 5 4: 295 (1865); nom. prot. prop.

*Rejected names and synonyms: Tuber parasiticum* Bull., *Hist. champ. France* 1: 81 (1791).

*Sclerotium crocorum* Pers., *Syn. meth. fung.* 1: 119 (1801).

*Rhizoctonia crocorum* (Pers.) DC., in De Candolle & Lamarck, *Fl. franç.*, 3<sup>rd</sup> edn 5: 110 (1815).

*Thanatophytum crocorum* (Pers.) Nees, *Syst. Pilze*: 148 (1816) ["1816-17"].

*Rhizoctonia medicaginis* DC., in De Candolle & Lamarck, *Fl. franç.*, 3<sup>rd</sup> edn 5: 111 (1815).

*Tubercularia persicina* Ditmar, in Sturm, *Deutschl. Fl.*, Abt. 3 1: 99 (1817).

*Tuberculina persicina* (Ditmar) Sacc., *Fungi italice autogr. del.* 17-28: tab. 964 (1881).

*Protonema brebissonii* Desm., *Pl. crypt. N. France*: no. 651 (1834).

*Helicobasidium brebissonii* (Desm.) Donk, *Taxon* 7: 164 (1958).

*Rhizoctonia rubiae* M.J. Decne., *Rech. Anat. Physiol. Garance*: 55 (1837).

*Rhizoctonia violacea* Tul. & C. Tul., *Fung. hypog.*: 188 (1851).

Among the extensive list of synonymous names, *Helicobasidium purpureum* is the name in *Helicobasidium* most commonly used for this important and ubiquitous

plant pathogen (GS *Helicosporium purpureum* = 627, *H. berbissonii* = 7). Although several names for this fungus have been placed in *Rhizoctonia*, the type species of *Rhizoctonia* is *R. solani*, which represents a genus in *Agaricomycotina*.

### Use *Hyalopycnis* Höhn. 1918 (A) rather than *Heterogastridium* Oberw. & R. Bauer 1990 (S)

The generic name *Hyalopycnis* is typified by *H. hyalina*. *Hyalopycnis blepharistoma*, a synonym of *H. hyalina*, was regarded as the asexual morph of *Heterogastridium pycnidoidium*, the type of the monotypic generic name *Heterogastridium* as explained by Oberwinkler *et al.* (1990) in describing the order *Heterogastridiales*, now placed in *Microbotryomycetes*, *Pucciniomycotina* (Aime *et al.* 2006, Toome & Aime 2014). Thus, the generic names *Heterogastridium* and *Hyalopycnis* are synonyms. Although the generic name *Heterogastridium* has been used slightly more frequently (GS *Heterogastridium* = 54, *Hyalopycnis* = 43) and serves as the basis for the ordinal name, *Hyalopycnis* has priority and its use circumvents the need for a name change for the only species, thus we recommend the use of *Hyalopycnis*. Its use does not affect the ordinal name.

### Use *Kriegeria* Bres. 1891 (S) rather than *Xenogloea* Syd. & P. Syd. 1919 (S) and *Zymoxenogloea* D.J. McLaughlin & Doublés 1992 (A)

The monotypic generic name *Kriegeria* Bres., typified by *K. eriophori*, was determined to be legitimate by Toome *et al.* (2015). Previously it has been confused with *Kriegeria* Höhnelt 1914 and *Kriegeria* Rabenh. ex Seaver 1943, whose species are now placed in other genera in the ascomycete families *Helotiaceae* and *Rutstroemiaceae*. *Kriegeria* Bres. 1891 has also been confused with the later monotypic generic name *Xenogloea* typified by the same species, *X. eriophori*. An asexual morph of *K. eriophori*, as *X. eriophori*, was named *Zymoxenogloea eriophori*, monotype species of *Zymoxenogloea*, thus *Kriegeria* Bres. 1891, *Xenogloea*, and *Zymoxenogloea* are synonyms. Following Toome *et al.* (2015) and priority, we recommend the use of *Kriegeria*.

### Use *Kuehneola* Magnus 1899 (S) rather than *Spirechina* Arthur 1907 (A)

The generic name *Kuehneola*, typified by *K. albida*, now regarded as *K. uredinis* (Ono 2015), includes about 25 species of rust fungi that occur primarily on species of *Rubus* and other *Rosaceae* (Cummins & Hiratsuka 2003). The generic name *Spirechina*, typified by *S. loeseneriana*, has been used for the asexual morph of species of *Kuehneola* and *Gerwasia*. *Spirechina loeseneriana* is regarded as the asexual morph of *K. loeseneriana* (Jackson 1931). Although 13 species had been named in *Spirechina*, all have been placed in *Gerwasia*, *Kuehneola*, or *Mainsia* (Kirk 2017). Given its priority, greater number of names, and more frequent use (GS *Kuehneola* = 590, *Spirechina* = 42), we recommend *Kuehneola* for use.

### Protect *Melampsorella* J. Schröt. 1874 (S) over *Peridermium* (Link) J.C. Schmidt & Kunze 1817 (A)

The type species of *Melampsorella* is *M. caryophyllacearum*, while *Peridermium* is typified with the conserved type, *Aecidium elatinum*, as formally proposed by Hiratsuka (1974) and approved (Petersen 1975). Because the latter is regarded as a synonym of *M. caryophyllacearum* (Hiratsuka 1974), these generic names are synonyms. *Melampsorella* has five names in Index Fungorum. The asexually typified generic name *Peridermium* includes many species most of which have sexual morphs in *Cronartium* (Vogler & Bruns 1998). Given the relationship of species of *Peridermium* with both *Melampsorella* and *Cronartium*, we recommend abandoning the name *Peridermium* in favour of *Melampsorella*.

Although the type species of *Peridermium* dictates that this generic name is a synonym of *Melampsorella*, a number of names introduced in *Peridermium* belong in other rust genera, such as *Cronartium*, *Coleosporium* and several genera of *Pucciniastraceae*. An effort will be made to determine the correct generic placement of species described in *Peridermium*. Furthermore, an asexual morph can still be referred to as peridermium-like, using the term in a non-latinized form to describe a morphology.

### Protect *Milesia* Magnus 1909 (S) over *Milesia* F.B. White 1878 (A)

The genus *Milesia* includes over 60 species, primarily occurring on *Abies* alternating with ferns in several families. The type species, *Milesia kriegeriana*, occurs on *Abies* and *Dryopteris* in Europe and is known to have an asexual morph recognized as *Milesia kriegeriana*. The type species of *Milesia* is *Milesia polypodii*, recognized as the uredinial state of *Milesia dieteliana* (Laundon 1967), thus *Milesia* and *Milesia* are synonyms. Although *Milesia* is the older generic name and has about the same number of names as *Milesia* (72 vs. 67, respectively), *Milesia* is in broader use especially in recent literature (e.g. Berndt 2007, Kakishima *et al.* 2016, Klenke & Scholler 2015, Smith 2015, Tanese & Negrean 2007, Wingfield *et al.* 2004). For these reasons, we recommend the protection and use of *Milesia*.

One new combination is required:

### *Milesia polypodii* (F.B. White) Aime & Rossman, comb. nov.

MycoBank MB824650

*Basionym:* *Milesia polypodii* F.B. White, *Scott. Naturalist (Perth)*. 4: 163 (1878) ["1877-1878"]

*Synonyms:* *Milesia dieteliana* (Syd. & P. Syd.) Magnus, *Ber. Deutsch. Bot. Ges.* 27: 325 (1909).

*Melampsorella dieteliana* Syd. & P. Syd., *Ann. Mycol.* 1(6): 537 (1903).

### Protect *Phragmidium* Link 1816 (S) over *Aregma* Fr. 1815 (S) and use rather than *Lecythea* Lév. 1847 (A)

The generic name *Phragmidium* is applied to a group of rust species that occur on *Rosaceae*. Recent molecular studies have shown that *Phragmidium* is a well-defined genus in *Phragmidiaceae* and that the type species of *Phragmidium*, *P. mucronatum*, is distinct from the other species commonly encountered on dog rose, *P. tuberculatum* (Ritz *et al.* 2005,

Yun et al. 2011). Both those papers also demonstrated that *P. mucronatum* is congeneric but distinct from *P. fragariae*, the correct name for the type species of *Aregma*, *A. obtusatum*; thus, *Aregma* and *Phragmidium* are synonyms. Several species are mentioned in the protolog for *Aregma*; this genus was lectotypified by Laundon (1965).

The asexually typified generic name *Lecythea* is typified by *L. miniata*, based on *Uredo miniata*, and now regarded as a synonym of *P. mucronatum*. Although *Lecythea* includes 27 names, all but four have been placed in other genera (see Index Fungorum). Most of the 16 names in *Aregma* have been placed or have synonyms in *Phragmidium*, while 250 names have been described in *Phragmidium*; this generic name is much more commonly used than *Aregma* (GS *Phragmidium* = 3770, *Aregma* = 244). Given its common usage and greater number of names, we recommend that *Phragmidium* be protected.

### Use *Prospodium* Arthur 1907 (S) rather than *Canasta* A.A. Carvalho & J.F. Hennen 2010 (A)

The generic name *Prospodium* includes about 50 species occurring on *Bignoniaceae* and *Verbenaceae* in tropical regions (Cummins & Hiratsuka 2003, Hernández & Hennen 2003). The generic name *Canasta* was established for asexual morphs of species of *Prospodium* (Carvalho & Hennen 2010), although the type species *C. cruscula* does not have a known sexual morph. Given that the other two names described in *Canasta* have sexual morphs that are species of *Prospodium*, it seems likely that *Canasta* is a synonym of *Prospodium*. Given its priority, greater number of species and widespread use, we recommend the use of *Prospodium*. One new combination is necessary:

#### *Prospodium crusculum* (A.A. Carvalho & J.F. Hennen)

Aime & Rossman, **comb. nov.**

Mycobank MB824651

*Basionym*: *Canasta cruscula* A.A. Carvalho & J.F. Hennen, *Mycologia* **102**: 1098 (2010)

### Use *Puccinia* Pers. 1794 (S) rather than *Aecidium* Pers. 1796 (A) and *Caeoma* Link 1809 (A)

The generic name *Puccinia* is typified by *P. graminis*, the cause of the important wheat rust disease that has plagued this major food source throughout history (Schumann 1991). Several thousand names have been placed in *Puccinia*. The asexually typified generic name *Aecidium* is typified by *A. berberidis*, a name used for one of the alternate morphs of *P. graminis* (Cummins 1971), thus these generic names are synonyms. Prior to 2012, *Aecidium* was used when a sexual morph was lacking for rust fungi that appeared to have affinities with *Puccinia*. Before the changes in the ICN, the species could not be described in the "correct" genus (*Puccinia*) even though it was possible to determine its generic placement. The need for the generic name *Aecidium* no longer exists. The type species of *Caeoma*, *C. berberidis*, is a synonym of *Puccinia graminis* (Laundon 1967), thus *Caeoma* is a synonym of *Puccinia*. Given the ubiquitous use of the generic name *Puccinia*, it is recommended for use.

### Use *Rhodotorula* F.C. Harrison 1928 (A) rather than *Chromotorula* F.C. Harrison 1928 (A) and *Rhodosporeidium* Banno 1967 (S)

The type species of *Rhodotorula*, *R. glutinis*, was shown to be congeneric with *Rhodosporeidium toruloides*, type of *Rhodosporeidium*, by Wang et al. (2015a). They recognized the priority of *Rhodotorula* and placed *Rhodosporeidium toruloides* in *Rhodotorula*. All 14 names described in *Rhodosporeidium* have been placed in two genera, *Rhodosporeidiobolus* and *Rhodotorula*. More than 150 names have been introduced in *Rhodotorula*. *Chromotorula*, typified by *C. kitae*, was published in the same article as *Rhodotorula* and thus has equal priority to *Rhodotorula*. *Chromotorula* has long been considered a synonym of *Rhodotorula* (Statzell-Tallman & Fell 1998), and all but two of the six names in *Chromotorula* have been placed elsewhere. In agreement with Wang et al. (2015a) as well as priority, greater number of names, and most frequent use (GS *Rhodotorula* = 50 300, *Rhodosporeidium* = 6130 *Chromotorula* = 30), we recommend the use of *Rhodotorula*.

### Use *Septobasidium* Pat. 1892 (S) rather than *Johncouchia* S. Hughes & Cavalc. 1983 (A)

The monotypic generic name *Johncouchia*, typified by *J. mangiferae*, was described for the asexual morph of *Septobasidium pilosum* (Hughes & Cavalcanti 1983). *Septobasidium pilosum* and *S. velutinum*, the type species of *Septobasidium*, were determined to be congeneric by Henk & Vilgalys (2007). *Septobasidium* includes over 300 names, has priority and is widely used (GS *Septobasidium* = 1200, *Johncouchia* = 15), and so we recommend the use of *Septobasidium*.

*Septobasidium* has already been formally conserved against *Campylobasidium* Lagerh. ex F. Ludw. 1892, *Gausapia* Fr. 1825, and *Glenospora* 1849.

### Protect *Sporobolomyces* Kluyver & C.B. Niel 1924 (A) over *Blastoderma* B. Fisch. & Breback 1894 (A) and *Rhodomyces* Wettst. 1885 (A) and use rather than *Aessosporon* Van der Walt 1970 (S) and *Sporidiobolus* Nyland 1950 (S)

The generic name *Sporobolomyces*, typified by *S. salmonicolor*, includes about 100 names and is widely used. An earlier generic name, *Rhodomyces*, typified by *R. kochii*, is now considered a synonym of *S. salmonicolor* (Sampaio 2011). A second earlier monotypic generic name, *Blastoderma*, is typified by *B. salmonicolor*, the basionym of *S. salmonicolor*, thus these three generic names are synonyms. Another later name, *Sporidiobolus*, has six species, and is typified by *S. johnsonii*, a name now placed in *Sporobolomyces* (Wang et al. 2015a). The generic name *Aessosporon*, typified by *A. salmonicolor*, was described as the sexual morph of *Sporobolomyces salmonicolor* (Van der Walt 1970). Later authors showed that *A. salmonicolor* had the same heterothallic life-cycle and was conspecific with *S. salmonicolor* (Fell & Statzell-Tallman 1980), thus *Aessosporon* and *Sporobolomyces* are synonyms. Among these five generic names *Blastoderma* has rarely been used. Although the name *Rhodomyces* appears in the literature,

the three described species are not closely related to the type, as shown by Wang *et al.* (2015a). A second species of *Aessosporon*, *A. dendrophilum*, was described as the sexual morph of *Bullera dendrophilum* (van der Walt 1973), but is now regarded as *Kwoniella dendrophila* in *Agaricomycotina* (Liu *et al.* 2015), and unrelated to *Sporobolomyces*. Because *Sporobolomyces* has priority, includes about 100 names and is widely used (GS *Sporobolomyces* = 10 600 *Rhodomycetes* = 183, *Blastoderma* = 523, *Sporidiobolus* = 2970, *Aessosporon* = 171), we recommend that *Sporobolomyces* be protected over *Rhodomycetes* and *Blastoderma*, and that *Sporobolomyces* be used rather than *Sporidiobolus* and *Aessosporon*.

### Protect *Uromyces* (Link) Unger 1833 (S) over *Uredo* Pers. 1801 (A)

The generic name *Uromyces*, typified by *U. appendiculatus*, includes over 800 names. When Persoon (1801) described *Uredo*, he included 30 species, one of which was *U. betae*. Laundon (1970) reviewed the history of the typification of the generic name *Uredo* and concluded that *U. betae* should be accepted as the type of the genus. *Uredo betae* is now considered a synonym of *Uromyces beticola* (Boerema *et al.* 1987, Simpson *et al.* 2006). *Uromyces appendiculatus* and *U. beticola* are regarded as congeneric, although species of *Uromyces* are interspersed within *Puccinia* in *Pucciniaceae* (Aime 2006, Demers *et al.* 2017, Maier *et al.* 2003, Wingfield *et al.* 2004), thus *Uromyces* and *Uredo* are synonyms. *Uredo* includes over 2000 names, but is not as widely cited as *Uromyces* (GS *Uromyces* = 26 400, *Uredo* 7500). Thus, we recommend that *Uromyces* be protected over *Uredo*.

The generic name *Uredo* has been used for uredinal morphs of rust fungi belonging to multiple rust families, and does not reflect the affinities of species. Prior to 2011, this generic name was used when a sexual morph was lacking and the species could not be described in the “correct” sexually typified genus according the *Code* even when it was possible to determine its generic placement. Now that placement of fungi in genera is no longer restricted by whether their types are asexual or sexual morphs, in theory the need for the generic name *Uredo* no longer exists. However, in reality rust fungi are often found without the sexual morph and it can be difficult to determine their affinities; the issue of genera typified by a sexual morphs is discussed further above (p. 76).

The generic name *Uromyces* is already conserved over *Coeomurus* Link ex Gray 1821 and *Pucciniola* L. Marchand 1829.

## COMPETING SEXUAL AND ASEXUAL GENERIC NAMES OF *USTILAGINOMYCOTINA*, *BASIDIOMYCOTA* AND RECOMMENDATIONS FOR USE

### Use *Anthracoidea* Bref. 1895 (S) rather than *Crotalia* Liro 1938 (A)

The sexually typified genus *Anthracoidea* in *Ustilaginales* includes over 200 names, of which 90 are accepted in Vánky (2012), while the asexually typified *Crotalia* has five names, all of which also have names in *Anthracoidea*. The type species of *Anthracoidea* is *A. caricis*. Initially the type

species of *Crotalia*, *C. cintractiae-fischeri*, was considered to be the asexual morph of *Cintractia fischeri*; however, that species is now regarded as *Anthracoidea fischeri* (Vánky 2012). Although *A. fischeri* was not included in Hendrichs *et al.* (2005), both *A. caricis* and *A. fischeri* are placed in *Anthracoidea* by Vánky (2012), thus *Anthracoidea* and *Crotalia* are synonyms.

Given its priority, the number of species, and more frequent citation in the literature (GS *Anthracoidea* = 619, *Crotalia* = 234), we recommend the use of *Anthracoidea*.

### Use *Doassansia* Cornu 1883 (S) rather than *Savulescuella* Cif. 1959 (A)

The generic name *Doassansia*, typified by *D. alismatis*, includes about 12 species (Vánky 2012) while *Savulescuella*, typified by *S. alismacearum*, includes only three names. Vánky (2012) assumed that the asexual morph typified by *S. alismacearum* might be just “basidiospores of spores that germinated *in situ*”, nevertheless *Savulescuella* was validly published. Currently, *S. alismacearum* is considered a synonym of *D. alismatis*, making these names generic synonyms. Given its priority, number of species, and widespread use (GS *Doassansia* = 457, *Savulescuella* = 7), we recommend the use of *Doassansia*.

### Use *Doassansiopsis* (Setch.) Dietel 1897 (S) rather than *Doassansiella* Zambett. 1970 (A)

The generic name *Doassansiopsis* is typified by *D. deformans*. Sixteen additional names have been placed in this genus, most of which are accepted by Vánky (2012). The monotypic generic name *Doassansiella* is typified by *D. aqualitis* and has rarely been used. The type species is now regarded as *Doassansiopsis hydrophila* (Vánky 2012). Given the priority, number of species, and more extensive use (GS *Doassansiopsis* = 153, *Doassansiella* = 2), we recommend the use of *Doassansiopsis*.

*Doassansiopsis* in *Urocystales* should not be confused with *Doassansia* and *Doassinga* in the *Doassansiales* (Begerow *et al.* 2004).

### Use *Entyloma* de Bary 1874 (S) rather than *Entylomella* Höhn. 1924 (A)

The generic name *Entylomella* was first mentioned by Höhnel (1916), although in that publication a description is lacking of either the genus or species although one species, *E. ranunculi*, is listed. Later in discussing *Cylindrosporium*, Höhnel (1924) mentioned *Entylomella* again as the conidial form of *Entyloma* and *Doassansia* species and two pages later provided a description of the type species as discussed by Braun (1995). *Entylomella ranunculi* is the type of *Entylomella*, which is now regarded as a synonym of *Entyloma ficariae*. The type species of *Entyloma* is *E. microsporium*. Begerow *et al.* (2002) demonstrated that *E. ficariae* and *E. microsporium* belong in *Entyloma*, thus *Entylomella* and *Entyloma* are synonyms. Over 400 names are listed in *Entyloma* and this generic name is well known (GS = 2410) while 59 names have been described in *Entylomella*, many of which have been placed elsewhere, and the name has been used infrequently (GS = 60). Given the priority, greater number of names, and familiarity, we recommend the use of *Entyloma*.

### Use *Mycosarcoma* Bref. 1912 or *Ustilago* (Pers.) Roussel 1806 (S) rather than *Pseudozyma* Bandoni 1985 (A)

The yeast-like morphs of *Ustilaginales* have been described in the genus *Pseudozyma*. Boekhout (1995) showed that the type species of *Pseudozyma*, *P. prolifica*, was closely related or synonymous with *Ustilago maydis*, the cause of corn smut (Ainsworth 1965). While 26 names have been described in *Pseudozyma*, many of these have now been placed in diverse sexual genera such as *Anthracoystis*, *Dirkmeia*, *Kalmanozyma*, *Langdonia*, *Moesziomyces* and *Sporisorium*. A controversy exists over which generic name to use for the species long referred to as *U. maydis*, an earlier name for *P. prolifica*. The generic name *Ustilago* had been considered to be typified by *U. hordei*, cause of barley smut (Clinton 1906, Vánky 2012). This and related species, such as *U. avenae*, *U. striiformis*, and *U. tritici* were determined by McTaggart et al. (2016) to fall in a clade distinct from the one that included *U. maydis*, type of the resurrected generic name *Mycosarcoma*, which was based on morphological and cultural characteristics by Brefeld (1912). Based on molecular data, five names were included in *Mycosarcoma* by McTaggart et al. (2016), resurrecting *Mycosarcoma maydis* for the corn smut and closely related species. However, a proposal has been made to conserve the name *Ustilago* with *U. maydis* as the conserved type (Thines 2016). *Pseudozyma prolifica* is a name used for the asexual morph of *Mycosarcoma / Ustilago maydis*, thus we recommend the use of *Mycosarcoma* or *Ustilago* depending on whether the NCF votes to conserve the name *Ustilago* with a new type. Because the generic name *Pseudozyma* is no longer available, the taxonomic treatment of several names in *Pseudozyma* (e.g. *P. alboarmeniaca*, *P. thailandica*, *P. tsukubaensis*, *P. pruni*) is unclear as they cannot currently be placed with confidence in any sexually typified lineage (Wang et al. 2015a; these species are therefore temporarily retained in *Pseudozyma* “pro tem.”

### Use *Thecaphora* Fingerh. 1836 (S) rather than *Angiosorus* Thirum. & M.J. O'Brien 1974 (S), *Rhombiella* Liro 1939 (A) and *Thecaphorella* H. Scholz & I. Scholz 1988 (A)

The type species of *Thecaphora*, *T. hyalina*, is now regarded as *T. seminis-convolvuli* (Vánky et al. 2008). The type species of the asexually typified generic name *Rhombiella*, *R. cardamines*, is now regarded as *Thecaphora thlaspeos* (Vánky et al. 2008). The type of *Thecaphorella*, *T. antherarum*, was described as the asexual morph of *Thecaphora seminis-convolvuli* (Scholz & Scholz 1988). Begerow et al. (1997) demonstrated that *Thecaphora* represents a well-resolved genus in *Ustilaginales* including the types of *T. seminis-convolvuli* and *T. thlaspeos*; these three generic names are therefore synonyms. Similarly, Andrade et al. (2004) and Vánky et al. (2008) demonstrated that *Thecaphora* includes *T. seminis-convolvuli* and *T. solani* (syn. *Angiosorus solani*, type of the monotypic generic name *Angiosorus*), an economically important fungus causing potato smut (Mordue 1988). Vánky (2012) includes over 60 species in *Thecaphora*, under which he lists four sexually typified generic names as later synonyms, along with the rejected name *Sorosporium*. *Thecaphora* has

priority, includes numerous species, and is well known (GS *Thecaphora* = 1420, *Rhombiella* = 5, *Angiosorus* = 128), thus we recommend the use of *Thecaphora*.

### Use *Tilletia* Tul. & C. Tul. 1847 (S) rather than *Tilletiella* Zambett. 1970 (A)

The genus *Tilletia* has long been accepted as the name for bunt fungi with over 100 accepted species, some of which cause serious diseases of crops in the grass family such as common bunt and dwarf bunt of wheat (Hoffman 1982, Mathre 1996). *Tilletia*, typified by *T. caries*, and treated as *T. tritici*, is now placed in *Tilletiaceae* (*Tilletiales*, *Exobasidiomycetes*; Begerow et al. 2006). The monotypic *Tilletiella* was established as an asexually typified genus for *T. alopecuri*, but that species is now regarded as *Tilletia alopecuri* (Vánky 2012). *Tilletiella* is therefore a synonym of *Tilletia*. Given the priority, large number of species, and widespread use (GS *Tilletia* = 16 900, *Tilletiella* = 0), we recommend the use of *Tilletia*.

### Use *Urocystis* Rabenh. ex Fuckel 1870, nom. cons. (S) rather than *Paepalopsis* J.G. Kühn 1882 (A)

The type species of *Paepalopsis*, *P. irmischiae*, is considered the asexual morph of *Urocystis primulae*, a species included in *Urocystis*, which is typified by *U. occulta* (Vánky 2012); these generic names are consequently synonyms. Vánky (2012) listed four sexually typified generic synonyms of *Urocystis*, including *Tubercinia* Fr. 1832 nom. sanct. and *Polycystis* Lév., earlier names of *Urocystis* which has been conserved over them (Wakefield 1939). Three names have been placed in *Paepalopsis*, two of which are now regarded as species of *Urocystis*, while the third, *P. deformans*, is now placed in the ascomycete genus *Hapalosphaeria* as *H. deformans*. Vánky (2012) accepted over 160 species of *Urocystis* in his world monograph of smut fungi. Given the priority, number of species, and widespread use (GS *Urocystis* = 4920, *Paepalopsis* = 24), *Urocystis* remains the correct name for this genus.

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