



Notes for genera: basal clades of Fungi (including *Aphelidiomycota*, *Basidiobolomycota*, *Blastocladiomycota*, *Calcarisporiellomycota*, *Caulochytriomycota*, *Chytridiomycota*, *Entomophthoromycota*, *Glomeromycota*, *Kickxellomycota*, *Monoblepharomycota*, *Mortierellomycota*, *Mucoromycota*, *Neocallimastigomycota*, *Olpidiomycota*, *Rozellomycota* and *Zoopagomycota*)

Nalin N. Wijayawardene^{1,2} · Julia Pawłowska³ · Peter M. Letcher⁴ · Paul M. Kirk⁵ · Richard A. Humber⁶ · Arthur Schüßler¹⁴ · Marta Wrzosek³ · Anna Muszewska⁸ · Alicja Okrasińska³ · Łukasz Istel³ · Aleksandra Gęsiorska³ · Paul Mungai¹² · Adebola Azeez Lateef¹¹ · Kunhiraman C. Rajeshkumar⁷ · Rajshree V. Singh⁷ · Renate Radek¹³ · Grit Walther⁹ · Lysett Wagner⁹ · Christopher Walker^{15,16} · D. Siril A. Wijesundara¹⁸ · Moslem Papizadeh^{19,20} · Somayeh Dolatabadi¹⁰ · Belle D. Shenoy²¹ · Yuri S. Tokarev²² · Saisamorn Lumyong¹⁷ · Kevin D. Hyde^{1,2}

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Abstract

Compared to the higher fungi (Dikarya), taxonomic and evolutionary studies on the basal clades of fungi are fewer in number. Thus, the generic boundaries and higher ranks in the basal clades of fungi are poorly known. Recent DNA based taxonomic studies have provided reliable and accurate information. It is therefore necessary to compile all available information since basal clades genera lack updated checklists or outlines. Recently, Tedersoo et al. (MycKeys 13:1–20, 2016) accepted *Aphelidiomycota* and *Rozellomycota* in Fungal clade. Thus, we regard both these phyla as members in Kingdom Fungi. We accept 16 phyla in basal clades viz. *Aphelidiomycota*, *Basidiobolomycota*, *Blastocladiomycota*, *Calcarisporiellomycota*, *Caulochytriomycota*, *Chytridiomycota*, *Entomophthoromycota*, *Glomeromycota*, *Kickxellomycota*, *Monoblepharomycota*, *Mortierellomycota*, *Mucoromycota*, *Neocallimastigomycota*, *Olpidiomycota*, *Rozellomycota* and *Zoopagomycota*. Thus, 607 genera in 153 families, 43 orders and 18 classes are provided with details of classification, synonyms, life modes, distribution, recent literature and genomic data. Moreover, *Catenariaceae* Couch is proposed to be conserved, *Cladochytriales* Mozl.-Standr. is emended and the family *Nephridiophagaceae* is introduced.

Keywords Invalid genera · *Nephridiophagaceae* fam. nov. · Outline · Phylogeny · Validation

Introduction

Classification and understanding the evolution of fungi has become one of the recent hot topics for research in mycology (Hyde et al. 2017a). DNA based systematic and evolutionary studies have become fundamental among mycologists and taxonomists as these provide a strong

foundation for understanding the kingdom Fungi. There have been numerous taxonomic studies on the Ascomycota (e.g. Hyde et al. 2013, 2017b; Ariyawansa et al. 2015; Li et al. 2016; Wijayawardene et al. 2016, 2018), Basidiomycota (E.g. Justo and Hibbett 2011; Justo et al. 2011; Millanes et al. 2011; He and Dai 2012; Ortiz-Santana et al. 2013) (i.e. Dikarya) and in the basal clades of fungi (e.g. Spatafora et al. 2016; Seto et al. 2017; Radek et al. 2017), which are important sources for dictionaries, outlines, checklists, various databases and the basic study of the fungi (Kirk et al. 2008, 2013; Lumbsch and Huhndorf

✉ Kevin D. Hyde
kdhyde3@gmail.com

Extended author information available on the last page of the article

2010; Hyde et al. 2011, 2013; Humber 2012, 2016; Benny et al. 2014, 2016b; Wijayawardene et al. 2012, 2014, 2017a, b, 2018; Lücking et al. 2017; Index Fungorum 2018). However, understanding of the earliest diverging events of Fungi are poorly understood as compared to the higher fungi i.e. Dikarya (Spatafora et al. 2016). Furthermore, the classification of basal clades of fungi is also debatable as mycologists do not have a broad agreement (e.g. Humber 2016 vs. Spatafora et al. 2016 on *Entomophthoromycota* and *Glomeromycota*). Moreover, elevating lower ranks to higher ranks and demoting the higher ranks to lower ranks (Spatafora et al. 2016; Tedersoo et al. 2016) also causes disagreements.

60 Distribution, life modes, applications

61 The basal lineages of fungi comprise the aquatic taxa (e.g. *Blastocladiomycota*, *Chytridiomycota*, *Neocallimastigomycetes*), and the terrestrial taxa (e.g. *Entomophthoromycota*, *Glomeromycota*) (Benny et al. 2016a, b). Most of the taxa are ubiquitous and show different life modes, viz. some causing diseases in agricultural crops (e.g. *Choanephora* rot caused by *Choanephora cucurbitarum*; *Gilbertella persicaria* as the cause of soft rot in *Syzygium cumini* and fruit rot in papaya *fide* Pinho et al. 2014; Cruz-Lachica et al. 2016); pathogens of humans and other mammals (e.g. mucormycosis caused by *Apophysomyces* spp. *fide* Kennedy et al. 2016; mucormycosis caused by *Rhizopus arrhizus*), mycoparasites (e.g. *Syncephalis* *fide* Lazarus et al. 2017), amoebae endoparasites (e.g. *Amoebophilus* *fide* Mrva 2011). Moreover, some taxa have been used in biotechnological biodegradation, biosorption, bioremediation and biotransformations (Benny et al. 2016a, b).

78 Classification

79 The classification of basal clades genera is conflicting in different publications. The collective term, Zygomycota Moreau was treated as a phylum in eumycotan fungi (e.g. Kendrick 2000; Kirk et al. 2008), but this rank has not been supported as a monophyletic clade in recent analyses and thus eumycotan taxa have been separated into different phyla (Spatafora et al. 2016). However, the establishment of new phyla has not been broadly accepted, thus synonymizing or erecting phyla/ sub phyla have been frequent since James et al. (2006) (e.g. Hibbett et al. 2007) introduced *Neocallimastigomycota* to accommodate *Neocallimastigomycetes*, but Spatafora et al. (2016) treated this as a class in *Chytridiomycota*. Seto et al. (2017), however, recognized *Neocallimastigomycota* as a distinct phylum in their phylogenetic analyses. Table 1 summarizes the

overview of phyla in basal clades based on major publications since 2000.

Recently, Tedersoo et al. (2016) proposed a new classification which accepted *Rozellomycota* (including *Microsporidia*) and *Aphelidiomycota* as phyla in Kingdom Fungi. Furthermore, Tedersoo et al. (2016) introduced *Calcarisporiellomycota*, *Kickxellomycota* and *Mortierellomycota* as new phyla. In this study, we follow classification in Tedersoo et al. (2016).

Overview

We accept 16 phyla (viz. *Aphelidiomycota*, *Basidiobolomycota*, *Blastocladiomycota*, *Calcarisporiellomycota*, *Caulochytridiomycota*, *Chytridiomycota*, *Entomophthoromycota*, *Glomeromycota*, *Kickxellomycota*, *Monoblepharomycota*, *Mortierellomycota*, *Mucoromycota*, *Neocallimastigomycota*, *Olpidiomycota*, *Rozellomycota* and *Zoopagomycota*) as early divergence groups in fungi (Fig. 1). Below, we provide the outline of all phyla and short entries for each genus in notes section. Moreover, we propose to conserve the family *Catenariaceae* Couch (which is based on *Catenaria* Sorokin; nom. illegit., Art. 53.1 *fide* Index Fungorum 2018), emend *Cladochytriales* Mozl.-Standr. and introduce *Nephridiophagaceae* R. Radek et al.

Materials and Methods

Data collection

Collecting data on existing names (including genera and higher ranks) was based on Kirk et al. (2008, 2013), Species Fungorum (2018) and Catalogue of Life (<http://www.catalogueoflife.org/>). The works by Humber (2012), Benny et al. (2016a, b), Spatafora et al. (2016), Cali et al. (2017), Desirò et al. (2017) and Tedersoo et al. (2016) were also used for further clarification. Data are provided in accordance to information available in publications and publicly-accessible databases such as NCBI. Wijayawardene et al. (2017a) was followed as the template for entries. The citation of the articles given in each entry was decided by the author who provided the entry and is not standardized. Based on recent publications and Species Fungorum (2018), synonyms of generic names (if fewer than 10) are also provided.

Taxonomy

Catenariaceae Couch *nom. cons. prop.*

Nom. illegit., see Art. 18.3 (Melbourne)

Table 1 Phyla currently recognized in different studies

Phylum	<i>Basidiobolomycota</i>	<i>Blastocladiomycota</i>	<i>Caulochytriomycota</i>	<i>Chytridiomycota</i>	<i>Entomophthoromycota</i>	<i>Glomeromycota</i>
Introduced by	Doweld (2011)	James et al. (2006)	Doweld (2014g)	Doweld (2001)	Humber (2012)	Schüssler et al. (2001)
Demoted by					Spatafora et al. (2016)	Spatafora et al. (2016)
Current rank	Phylum	Phylum	Phylum	Phylum	Sub phylum Entomophthoromycotina	Sub phylum Glomeromycotina
In this study	Phylum	Phylum	Phylum	Phylum	Phylum	Phylum
Phylum	<i>Monoblepharomycota</i>	<i>Mucoromycota</i>	<i>Neocallimastigomycota</i>	<i>Olpidiomycota</i>	<i>Zoopagomycota</i>	
Introduced by	Doweld (2001)	Doweld (2001)	Hibbett et al. (2007)	Doweld (2013c)	Spatafora et al. (2016)	
Demoted by			Spatafora et al. (2016)/Seto et al. (2017)			
Current rank		Phylum	Class Neozygitomycetes/or as the phylum	Phylum	Phylum	Phylum
In this study	Phylum	Phylum	Phylum	Phylum	Phylum	Phylum

Type: *Catenaria* Sorokin, Revue mycol., Toulouse 11(no. 43): 139 (1889) **nom. cons. prop.**
nom. illegit. Art. 53.1

Cladochytriales Mozl.-Standr. **emend.**

Index Fungorum (2018) mentioned that the type was not indicated in Mozley-Standridge et al. (2009) thus below we state the type.

Type: *Cladochytrium* Nowak., Cohn Beitr. Biol. Pfl. 2: 92. 1876".

See Mozley-Standridge et al. (2009) for a Latin and English description.

In here, we introduce new family *Nephridiophagaceae*

Nephridiophagales Doweld

Life style obligate biotrophic/parasitic in arthropods; uni- to multinucleate stages; endogenous spore formation; no thallic organization.

Order type: *Nephridiophagaceae* R. Radek, Letcher, Wijayaw., P.M. Kirk & K.D. Hyde

Nephridiophagaceae R. Radek, Letcher, Wijayaw., P.M. Kirk & K.D. Hyde **fam. nov.**

Merogonial plasmodia; sporogenic plasmodia with endogenous spore formation and residual somatic nuclei; cryptomitosis; bi- or tetranuclear sporoblasts; mature spores mostly uninucleate, flattened-oval form. Sporoblasts generally delimited in the sporogenic cytoplasm by ER cisternae and spore wall material deposited between the two resulting membranes. Extra- and intracellular in Malpighian tubules of insects. Transmission by oral infection

Family type: *Nephridiophaga* Ivanić 1937

Notes: Doweld (2014f) introduced *Nephridiophagales* Doweld based on the morphology of insect parasitic genus *Nephridiophaga* Ivanić. However, Doweld (2014f) did not typify the order with a family (i.e. ordinal type). Radek et al. (2017) showed that three *Nephridiophaga* species viz. *N. blattellae* (H. Crawley) P. Woolever, *N. maderae* R. Radek et al. and *N. blaberi* Fabel et al. grouped as a distinct clade in their phylogenetic analyses. Hence, we introduce new family, *Nephridiophagaceae* as the ordinal type of *Nephridiophagales* (Fig. 2).

Outline for basal clades

APHELIDIOMYCOTA Tedersoo, Koljal, Bahram, Doring, Schigel, T. May, Sanchez-Ramirez, M. Ryberg & Abarenkov

Aphelidiomycetes Tedersoo, Koljal, Bahram, Doring, Schigel, T. May, Sanchez-Ramirez, M. Ryberg & Abarenkov

Aphelidiales Tedersoo, Koljal, Bahram, Doring, Schigel, T. May, Sanchez-Ramirez, M. Ryberg & Abarenkov

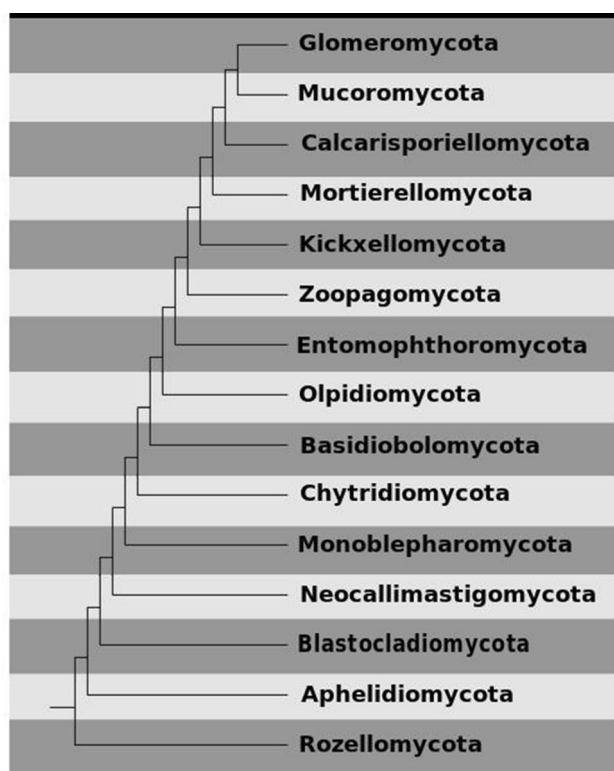


Fig. 1 Cladogram showing relationships between basal clades following taxonomy proposed by Tedersoo et al. (2016)

- 185 *Aphelidiaceae* Tedersoo, Koljalg, Bahram, Doring, Schigel, T. May, Sanchez-Ramirez, M. Ryberg & Abarenkov
 186 *Amoeboaphelidium* Scherff.
 187 *Aphelidium* Zopf
 188 *Paraphelidium* Karpov, Moreira, Lopez-Garcia
 189 *Pseudaphelidium* Schweikert & Schnepf
 190
 191 **BASIDIOBOLOMYCOTA** Doweld
 192 *Basidiobolomycetes* Humber
 193 *Basidiobolales* Caval.-Sm.
 194 *Basidiobolaceae* Claussen
 195 *Basidiobolus* Eidam
 196 *Schizangiella* J. Dwyer, B. Burwell, Humber, C. Mcleod,
 197 M. Fleetwood & T. Johnson bis
 198 **BLASTOCLADIOMYCOTA** T.Y. James
 199 *Blastocladiomycetes* Doweld
 200 *Blastocladiiales* H.E. Petersen
 201 *Blastocladiaceae* H.E. Petersen
 202 *Allomyces* E.J. Butler
 203 *Blastocladia* Reinsch
 204 *Blastocladopsis* Sparrow
 205 *Catenariaceae* Couch
 206 *Catenophlyctis* Karling
 207 *Nematoceromyces* Doweld

- Paraphysodermataceae* Doweld 208
Paraphysoderma Boussiba Boussiba, Zarka & T.Y. James 209
Sorochytriaceae Dewel 210
Sorochytrium Dewel 211
Blastocladiiales genera *incertae sedis* 212
Endoblastidium Codreanu 213
Catenomycetales Doweld 214
Catenomycetaceae Doweld 215
Catenomyces A.M. Hanson 216
Callimastigales Doweld 217
Callimastigaceae Fonseca 218
Callimastix Weissenb. 219
Coelomomycetaceae Couch 220
Coelomomyces Keilin 221
Coelomycidium Debais. 222
Blastocladiomycetes genera *incertae sedis* 223
Microallomyces R. Emers. & J.A. Robertson 224
Physodermatomyces Tedersoo, Koljalg, Bahram, Doring, Schigel, T. May, Sanchez-Ramirez, M. Ryberg & Abarenkov 225
Physodermatales Caval.-Sm. 226
Physodermataceae Sparrow 227
Physoderma Wallr. 228
CAULOCHYTRIOMYCOTA Doweld 229
Caulochytriomycetes Doweld 230
Caulochytriales Doweld 231
Caulochytriaceae Subram. 232
Caulochytrium Voos & L.S. Olive 233
CHYTRIDIOMYCOTA Doweld 234
Chytridiomycetes Caval.-Sm. 235
Chytridiales Cohn 236
Asterophlyctaceae Doweld 237
Asterophlyctis H.E. Petersen 238
Chytridiaceae Nowak. 239
Chytridium A. Braun 240
Dendrochytridium Letcher, Longcore & M.J. Powell 241
Irineochytrium Letcher, Longcore & M.J. Powell 242
Polyphlyctis Karling 243
Chytriomycetaceae Letcher 244
Avachytrium Vélez & Letcher 245
Chytriomyces Karling 246
Entophlyctis A. Fisch. 247
Fayochytriomyces W.J. Davis, Letcher, Longcore & M.J. Powell 248
Obelidium Nowak. 249
Odontochytrium Vélez & Letcher 250
Pendulichytrium K. Seto & Degawa 251

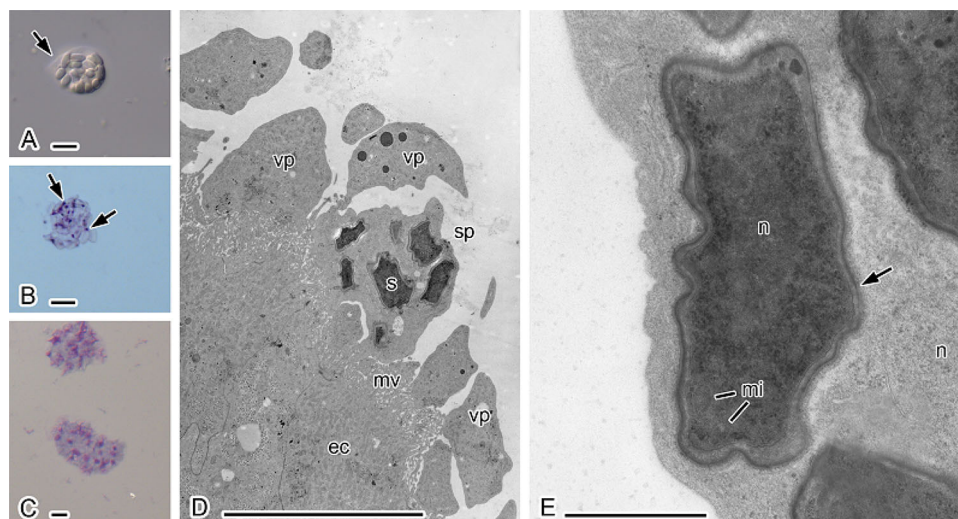


Fig. 2 A, B: *Nephridiophaga archimandrita*, C–E: *N. lucihormetica*. Bars A–D = 10 μ m, E = 1 μ m. A Sporogenic plasmodium with mature spores. Arrow = plasma membrane of plasmodium. Differential interference contrast (DIC). B Giemsa stained microscopic smear; sporogenic plasmodium. Arrows point to residual nuclei between the spores. Bright field. C Giemsa stained vegetative plasmodia with

many nuclei. DIC. D Ultrathin section of infected Malpighian tubule. Vegetative plasmodia (vp) and sporogenic plasmodia (sp) with internal spores (sp) attach to the microvilli (mv) of the epithelial cells (ec). E Part of a sporogenic plasmodium with mature spores. Spore with spore wall (arrow), nucleus (n) and mitochondria (mi). A further residual nucleus (n) is in the cytoplasm of the plasmodium

255	<i>Physocladia</i> Sparrow	<i>Saccopodiales</i> Doweld	281
256	<i>Podochytrium</i> Pfitzer	<i>Saccopodiaceae</i> Jacz. & P.A. Jacz.	282
257	<i>Rhizoclostratium</i> H.E. Petersen	<i>Saccopodium</i> Sorokin	283
258	<i>Siphonaria</i> H.E. Petersen	<i>Chytridiomycetes</i> families <i>incertae sedis</i>	284
259	<i>Phlyctochoytriaceae</i> Doweld	<i>Amoebochytriaceae</i> Doweld	285
260	<i>Phlyctochoytrium</i> J. Schröt.	<i>Amoebochytrium</i> Zopf	286
261	<i>Phlyctorhizaceae</i> Doweld	<i>Sparrowiaceae</i> Doweld	287
262	<i>Phlyctorhiza</i> A.M. Hanson	<i>Sparrowia</i> Willoughby	288
263	<i>Pseudorhizidiaceae</i> Doweld	<i>Sphaeromonadaceae</i> Doweld	289
264	<i>Pseudorhizidium</i> M.J. Powell, Letcher & Longcore	<i>Sphaeromonas</i> E. Liebet.	290
265	<i>Scherffeliomycetaceae</i> Doweld	<i>Tetrachytriaceae</i> Doweld	291
266	<i>Scherffeliomyces</i> Sparrow	<i>Tetrachytrium</i> Sorokin	292
267	<i>Zygorhizidiaceae</i> Doweld	<i>Thalassochytriaceae</i> Doweld	293
268	<i>Zygorhizidium</i> Löwenthal	<i>Thalassochytrium</i> Nyvall et al.	294
269	<i>Chytridiales</i> genera <i>incertae sedis</i>	<i>Chytridiomycetes</i> genera <i>incertae sedis</i>	295
270	<i>Delfinachytrium</i> Vélez & Letcher	<i>Aphanistis</i> Sorokin	296
271	<i>Nephridiophagales</i> Doweld	<i>Blyttomyces</i> A.F. Bartsch	297
272	<i>Nephridiophagaceae</i> R. Radek, Letcher, Wijayaw., P.M.	<i>Gamolpidium</i> Vlădescu	298
273	Kirk & K.D. Hyde	<i>Mucophilus</i> Plehn	299
274	<i>Coleospora</i> Gibbs	<i>Plasmophagus</i> De Wild.	300
275	<i>Nephridiophaga</i> Ivanić	<i>Rhizidiocystis</i> Sideris	301
276	<i>Oryctospora</i> Purrini & Weiser	<i>Rhizosiphon</i> Scherff.	302
277	<i>Peltomyces</i> Léger	<i>Sagittospora</i> Lubinsky	303
278	<i>Polyphagales</i> Doweld	<i>Scherffeliomycopsis</i> Geitler	304
279	<i>Polyphagaceae</i> F. Maekawa	<i>Septolpidium</i> Sparrow	305
280	<i>Polyphagus</i> Nowak.	<i>Sorokinocystis</i> Doweld	306
		<i>Trematophlyctis</i> Pat.	307

308	<i>Bertramia</i> Mesnil & Caullery	<i>Alogomycetaceae</i> Doweld	357
309	<i>Canterina</i> Karling	<i>Alogomyces</i> D.R. Simmons & Letcher	358
310	<i>Dangeardia</i> Schröd.	<i>Lobulomycetaceae</i> D.R. Simmons	359
311	<i>Dangeardiana</i> Valkanov ex A. Batko	<i>Clydaea</i> D.R. Simmons	360
312	<i>Dictyomorpha</i> Mullins	<i>Cyclopsomyces</i> K. Seto & Degawa	361
313	<i>Ichthyochytrium</i> Plehn	<i>Lobulomyces</i> D.R. Simmons	362
314	<i>Loborhiza</i> A.M. Hanson	<i>Maunachytrium</i> D.R. Simmons	363
315	<i>Macrochytrium</i> Minden	<i>Lobulomycetales</i> genera <i>incertae sedis</i>	364
316	<i>Megachytrium</i> Sparrow	<i>Algochytrrops</i> Doweld	365
317	<i>Mitochytridium</i> P.A. Dang.	<i>Mesochytriomycetes</i> Tedersoo, Koljalg, Bahram, Doring, Schigel, T. May, Sanchez-Ramirez, M. Ryberg & Abarenkov	366
318	<i>Nowakowskia</i> Borzí	<i>Gromochytriales</i> Karpov & Aleoshin	367
319	<i>Olpidiaster</i> Pascher	<i>Gromochytriaceae</i> Karpov & Aleoshin	368
320	<i>Perolpidium</i> Doweld	<i>Gromochytrium</i> Karpov & Aleoshin	369
321	<i>Physorhizophidium</i> Scherff.	<i>Mesochytriales</i> Doweld	370
322	<i>Pseudopileum</i> Canter	<i>Mesochytriaceae</i> Doweld	371
323	<i>Rhopalophlyctis</i> Karling	<i>Mesochytrium</i> B.V. Gromov, Mamkaeva & Pljusich	372
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326	<i>Schizolpidium</i> Doweld	<i>Arkayaceae</i> Doweld	375
327	<i>Septosperma</i> Whiffen ex R.L. Seym.	<i>Arkaya</i> Longcore & D.R. Simmons	376
328	<i>Solutoparies</i> Whiffen ex W.H. Blackw. & M.J. Powell	<i>Polychytriaceae</i> Doweld	377
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330	<i>Sporophlyctis</i> Serbinow	<i>Lacustromyces</i> Longcore	379
331	<i>Truittella</i> Karling	<i>Neokarlingia</i> Longcore & D.R. Simmons	380
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338	<i>Catenochytridium</i> Berdan	<i>Gammamyces</i> Letcher	387
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340	<i>Cladochytrium</i> Nowak	<i>Angulomyces</i> Letcher	389
341	<i>Endochytriaceae</i> Sparrow ex D.J.S. Barr	<i>Aquamycetaceae</i> Letcher	390
342	<i>Diphlophlyctis</i> J. Schröt.	<i>Aquamyces</i> Letcher	391
343	<i>Endochytrium</i> Sparrow	<i>Batrachochytriaceae</i> Doweld	392
344	<i>Nowakowskiellaceae</i> Sparrow ex Mozl.-Standr.	<i>Batrachochytrium</i> Longcore, Pessier & D.K. Nichols	393
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405	<i>Globomyces</i> Letcher	Powellomycetaceae D.R. Simmons	450
406	<i>Urceomyces</i> Letcher	<i>Fimicolochytrium</i> D.R. Simmons & Longcore	451
407	Gorgonomycetaceae Letcher	<i>Geranomyces</i> D.R. Simmons	452
408	<i>Gorgonomycetes</i> Letcher	<i>Powellomyces</i> Longcore	453
409	Halomycetaceae Letcher & M.J. Powell	<i>Thoreauomyces</i> D.R. Simmons & Longcore	454
410	<i>Halomyces</i> Letcher & M.J. Powell	Spizellomycetaceae D.J.S. Barr	455
411	<i>Paludomyces</i> Letcher & M.J. Powell	<i>Barromyces</i> M.J. Powell & Letcher	456
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811	<i>Fennellomyces</i> Benny & R.K. Benj.	<i>ROZELLOMYCOTA</i> Doweld	856
812	<i>Phascolomyces</i> Boedijn ex Benny & R.K. Benj.	<i>Microsporidea</i> Corliss & Levine	857
813	<i>Protomycocladus</i> Schipper & Samson	<i>Chytridiopsida</i> Weiser	858
814	<i>Syncephalastrum</i> J. Schröt.	<i>Burkeidae</i> Sprague	859
815	<i>Thamnostylum</i> Arx & H.P. Upadhyay	<i>Burkea</i> Sprague	860
816	<i>Zychaea</i> Benny & R.K. Benj.	<i>Buxtehudiidae</i> Larsson	861
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819		<i>Chytridiopsidae</i> Sprague, Ormières & Manier	864
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866	<i>Chytridiopsis</i> Schneider		
867	<i>Intexta</i> Larsson, Steiner & Bjørnson		
868	<i>Nolleria</i> Beard, Butler & Becnel		
869	Enterocytozoonidae Cali & Owen		
870	<i>Desmozoon</i> Freeman & Sommerville		
871	<i>Enterospora</i> Stentiford, Bateman, Longshaw & Feist		
872	<i>Hepatospora</i> Stentiford, Bateman, Dubuffet, Chambers &		
873	Stone		
874	<i>Nucleospora</i> Hedrick, Groff & Baxa		
875	<i>Obruspora</i> Diamant, Rothman, Goren, Galil, Yokes,		
876	Szitenberg & Huchon		
877	<i>Paranucleospora</i> Nylund, Watanabe, Nylund, Sævareid,		
878	Erik Arnesen & Karlsbakk		
879	Hesseidae Ormières & Sprague		
880	<i>Hessea</i> Ormières & Sprague		
881	Dissociodihaplophasida Sprague		
882	Caudosporidae Weiser		
883	<i>Binucleospora</i> Bronnvall & Larsson		
884	<i>Caudospora</i> Weiser, 1946		
885	<i>Flabelliforma</i> Canning, R. Killick-Kendrick & Killick-		
886	Kendrick		
887	<i>Neoflabelliforma</i> Morris & Freeman		
888	<i>Octosporea</i> Flu		
889	<i>Polydispyrenia</i> Canning & Hazard		
890	<i>Ringueletium</i> Garcia		
891	<i>Scipionospora</i> Bylén & Larsson		
892	<i>Weiseria</i> Doby & Saguez		
893	<i>Myrmecomorba</i> Plowes et al.		
894	Golbergiidae Issi		
895	<i>Golbergia</i> Weiser		
896	<i>Krishtalia</i> Kilochitskii		
897	<i>Simuliospora</i> Khodzhaeva, Krylova & Issi		
898	Mrazekiidae Léger & Hesse		
899	<i>Agmasoma</i> Hazard & Oldacre		
900	<i>Anostracospora</i> Rode, Landes, Lievens, Flaven, Segard,		
901	Jabbour-Zahab, Michalakakis, Agnew, Vivarés & Lenormand		
902	<i>Euplotespora</i> Fokin, Di Giuseppe, Erra & Dini		
903	<i>Helmichia</i> Larsson		
904	<i>Hrabyeia</i> Lom & Dyková		
905	<i>Jirovecia</i> Weiser		
906	<i>Mrazekia</i> Léger & Hesse		
907	<i>Rectispora</i> Larsson		
908	Nosematidae Labbe		
909	<i>Nosema</i> Nägeli		
910	<i>Oligosporidium</i> Codreanu-Balcescu, Codreanu & Traciuc		
911	<i>Vairimorpha</i> Pilley		
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	<i>Tetramicra</i> Matthews & Matthews		927
	Glugeida Gurley		928
	Abelsporidae Azevedo		929
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	Encephalitozoonidae Voronin		931
	<i>Encephalitozoon</i> Levaditi, Nicolau & Schoen		932
	<i>Mockfordia</i> Sokolova, Sokolov & C.E. Carlton		933
	Glugeidae Gurley		934
	<i>Alloglugea</i> Paperna & Lainson		935
	<i>Amazonospora</i> Azevedo & Matos		936
	<i>Glugea</i> Thélohan		937
	<i>Ichthyosporidium</i> Caullery & Mesnil		938
	<i>Johenrea</i> Lange, Becnel, Razafindratiana, Przybyszewski		939
	& H. Razafindrafara		940
	<i>Loma</i> Morrison & Sprague		941
	<i>Parapleistophora</i> Issi, Kadyrova, Pushkar, Khodzhaeva &		942
	Krylova		943
	<i>Pseudoloma</i> Matthews, Brown, Larison, Bishop-Stewart,		944
	Rogers & Kent		945
	Gurleyidae Sprague		946
	<i>Agglomerata</i> Larsson & Yan		947
	<i>Binucleata</i> Refardt, Decaestecker, Johnson & Vávra		948
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	<i>Marssoniella</i> Lemmermann		952
	<i>Norlevinea</i> Vávra		953
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	<i>Pyrotheca</i> Hesse		955
	<i>Senoma</i> Simakova, Pankova, Tokarev & Issi		956
	<i>Zelenkaia</i> Hyliš, Oborník, Nebesářová & Vávra		957

958	Microfilidae Sprague, Becnel & Hazard	<i>Pilospora</i> Hazard & Oldacre	1004
959	<i>Microfilum</i> Faye, Toguebaye & Bouix	<i>Tabanispora</i> Bykova, Sokolova & Issi	1005
960	Pleistophoridae Doflein	Cylindrosporidae Issi & Voronin	1006
961	<i>Dasyatispora</i> Diamant, Goren, Yokeş, Galil, Klopman,	<i>Cylindrospora</i> Issi & Voronin	1007
962	Huchon, Szitenberg & Karhan		
963	<i>Heterosporis</i> Schubert	Duboscqiidae R. Sprague	1008
964	<i>Myosporidium</i> Baquero, Rubio, Moura, Pieniazek &	<i>Duboscqia</i> Pérez	1009
965	Jordana	<i>Mitoplastophora</i> Codreanu	1010
966	<i>Ovipleistophora</i> Pekkarinen, Lom & F. Nilsen	<i>Pulicispora</i> Vedmed, Krylova & Issi	1011
967	<i>Pleistophora</i> Gurley	<i>Tardivesicula</i> Larsson & Bylén	1012
968	<i>Trachipleistophora</i> Hollister, Canning, Weidner, Field,	<i>Trichoduboscqia</i> L. Léger	1013
969	Kench & Marriott		
970	<i>Vavraia</i> Weiser	Pereziiidae Loubes, Maurand, Comps & Campillo	1014
971	Tuzetiidae Sprague, Tuzet & Maurand	<i>Ameson</i> V. Sprague	1015
972	<i>Nelliemelba</i> Larsson	<i>Nadelspora</i> Olson, Tiekotter & Reno	1016
973	<i>Pankovaia</i> Simakova, Tokarev & Issi	<i>Perezia</i> Léger & Duboscq	1017
974	<i>Paratuzetia</i> Poddubnaya, Tokarev & Issi	<i>Pernicivesicula</i> Bylén & Larsson	1018
975	<i>Tuzetia</i> Maurand, Fize, Vernick & Michel	Striatosporidae Issi & Voronin	1019
976	Unikaryonidae Sprague	<i>Striatospora</i> Issi & Voronin	1020
977	<i>Canningia</i> Weiser, Wegensteiner & Žižka		
978	<i>Dictyocoela</i> Terry, Smith, Sharpe, Rigaud, Littlewood,	Thelohaniidae Hazard & Oldacre	1021
979	Ironside, Rollinson, Bouchon, MacNeil, Dick & Dunn	<i>Bohuslavia</i> Larsson	1022
980	<i>Larssoniella</i> Weiser & David	<i>Chapmanium</i> Hazard & Oldacre	1023
981	<i>Unikaryon</i> Canning, Lai & Lie	<i>Coccospora</i> Wallr.	1024
982	Meiodihaplophasida Sprague, Becnel, Hazard	<i>Cucumispora</i> Ovcharenko, Bacela, Wilkinson, Ironside,	1025
983	Amblyosporidae Weiser	Rigaud & Wattier	1026
984	<i>Aedispora</i> Kilochitskii	<i>Hyperspora</i> Stentiford, Ramilo, Abollo, Kerr, Bateman,	1027
985	<i>Amblyospora</i> Hazard & Oldacre	Feist, Bass & Villalba	1028
986	<i>Andreanna</i> Simakova, C.R. Vossbrinck & Andreadis	<i>Napamichum</i> Larsson	1029
987	<i>Becnelia</i> Tonka & Weiser	<i>Nudispora</i> Larsson	1030
988	<i>Crepidulospora</i> Simakova, Pankova & Issi	<i>Octotetraspora</i> Issi, Kadyrova, Pushkar, Khodzhaeva &	1031
989	<i>Cristulospora</i> Khodzhaeva & Issi	Krylova	1032
990	<i>Culicospora</i> Weiser	<i>Ormieresia</i> C.P. Vivarès, G. Bouix & Manier	1033
991	<i>Culicosporella</i> Weiser	<i>Orthothelohania</i> Codreanu & Codreanu-Balcescu	1034
992	<i>Dimeiospora</i> Simakova, Pankova & Issi	<i>Paradoxium</i> G.D. Stentiford, S.H. Ross, R. Kerr, D. Bass &	1035
993	<i>Edhazardia</i> Becnel, V. Sprague & Fukuda	K.S. Bateman	1036
994	<i>Hyalinocysta</i> Hazard & Oldacre	<i>Pegmatheca</i> Hazard & Oldacre	1037
995	<i>Intrapredatorus</i> Chen, Kuo & Wu 1998	<i>Resiomeria</i> Larsson	1038
996	<i>Novothelohania</i> Andreadis, Simakova, Vossbrinck, Shep-	<i>Sphaerospora</i> J.J. Garcia	1039
997	ard & Yurchenko	<i>Thelohania</i> Henneguy	1040
998	<i>Parastempellia</i> Khodzhaeva	<i>Toxoglugea</i> Léger & Hesse	1041
999	<i>Parathelohania</i> Codreanu		
1000	<i>Trichoctosporea</i> Larsson	Microsporidea families <i>incertae sedis</i> ,	1042
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1002	Burenellidae Jouvenaz & Hazard	Oyarzún, J.C. Uribe, M. Palacios & D.M. Stone	1044
1003	<i>Burenella</i> Jouvenaz & Hazard	<i>Areospora</i> G.D. Stentiford, S. Bateman, Feist, S. Oyarzún,	1045
		J.C. Uribe, M. Palacios & D.M. Stone	1046
		Berwaldiidae Simakova, Tokarev, Issi	1047
		<i>Berwaldia</i> Larsson	1048

- 1049 *Fibrillanosema* Slothouber Galbreath, Smith, Terry, Becnel, & Dunn 1091
- 1051 **Cougourdellidae** Poisson 1092
- 1052 *Cougourdella* E. Hesse 1093
- 1053 **Facilisporidae** Jones, Prosperi-Porta & Kim 1094
- 1054 *Facilispora* Jones, Prosperi-Porta & Kim 1095
- 1055 **Heterovesiculidae** Lange, Macvean, Henry & Streett 1096
- 1056 *Heterovesicula* Lange, Macvean, Henry & Streett 1097
- 1057 **Myosporidae** Stentiford, Bateman, Small, Moss, Shields, Reece & Tuck 1098
- 1058 *Myospora* Stentiford, Bateman, Small, Moss, Shields, Reece & Tuck 1099
- 1059 *Myospora* Stentiford, Bateman, Small, Moss, Shields, Reece & Tuck 1100
- 1060 *Myospora* Stentiford, Bateman, Small, Moss, Shields, Reece & Tuck 1101
- 1061 **Neonosemoidiidae** Faye, Toguebaye & Bouix 1102
- 1062 *Neonosemoides* Faye & Toguebaye 1103
- 1063 **Ordosporidae** Larsson, Ebert & Vávra 1104
- 1064 *Ordospora* Larsson, Ebert & Vávra 1105
- 1065 **Pleistosporidiidae** Codreanu-Balcescu & Codreanu 1106
- 1066 *Pleistosporidium* Codreanu-Balcescu & Codreanu 1107
- 1067 **Neopereziiidae** Voronin 1108
- 1068 *Bacillidium* Janda 1109
- 1069 *Bryonosema* Canning, Refardt, Vossbrinck, Okamura & Curry 1110
- 1070 *Curry* 1111
- 1071 *Neoperezia* Issi & Voronin 1112
- 1072 *Pseudonosema* Canning, Refardt, Vossbrinck, Okamura & Curry 1113
- 1073 *Curry* 1114
- 1074 *Schroedera* D.J. Morris & A. Adams 1115
- 1075 *Trichonosema* Canning, Refardt, Vossbrinck, Okamura & Curry 1116
- 1076 *Curry* 1117
- 1077 **Telomyxidae** Léger & Hesse 1118
- 1078 *Telomyxa* Léger & Hesse 1119
- 1079 **Toxoglugeidae** Larsson 1120
- 1080 *Toxospora* Voronin 1121
- 1081 **Tubulinosematidae** Franzen, Fischer, Schröder, Schölmerich & Schneuwly 1122
- 1082 *Anncaliia* Issi, Krylova & Nikolaeva 1123
- 1083 *Kneallhazia* Sokolova & Fuxa 1124
- 1084 *Tubulinosema* Franzen, Fischer, Schröder, Schölmerich & Schneuwly 1125
- 1085 *Schneuwly* 1126
- 1086 *Schneuwly* 1127
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- 1088 *Alfvenia* Larsson 1129
- 1089 *Anisofilariata* Tokarev, Voronin, Seliverstova, Dolgikh, Pavlova, Ignatieva & Issi 1130
- 1090 *Pavlova* 1131
- Auraspora* Weiser & K. Purrini 1132
- Baculea* Loubès & Akbarieh 1133
- Campanulospora* Issi, Radishcheva & Dolzhenko 1134
- Caulleryetta* Dogiel 1135
- Chytridioides* Tregouboff 1136
- Ciliatosporidium* Foissner & Foissner 1137
- Crispospora* Tokarev, Voronin, Seliverstova, Pavlova & Issi 1138
- Cryptosporina* Hazard & Oldacre 1139
- Cystosporogenes* Canning, Barker, Nicholas & Page 1140
- Endoreticulatus* Brooks, Becnel & Kennedy 1141
- Enterocytopora* Rode, Landes, Lievens, Flaven, Segard, Jabbour-Zahab, Michalakakis, Agnew, Vivarés & Lenormand 1142
- Evlachovaia* Voronin 1143
- Geusia* Rühl & Korn 1144
- Globulispora* Vávra, Hylis, Viala, Nebesarova 1145
- Glugoides* (Chatton) Larsson, Ebert, Vávra & Voronin 1146
- Gurleyides* Voronin 1147
- Hamiltosporidium* Haag, Larsson, Refardt, and Ebert 1148
- Hazardia* Weiser 1149
- Hirsutosporos* Batson 1150
- Holobispora* Voronin 1151
- Issia* Weiser 1152
- Janacekia* Larsson 1153
- Kinorhynchospira* Adrianov & Rybakov 1154
- Liebermannia* Sokolova, Lange & Fuxa 1155
- Mariona* Stempell 1156
- Merocinta* Pell & Canning 1157
- Microsporidium* Balbiani 1158
- Multilamina* Becnel, Scheffrahn, Vossbrinck & Bahder 1159
- Myxocystis* Mrazek 1160
- Nematocenator* Sapir, Dillman, Connon, Grupe, Ingels, Mundo-Ocampo, Levin, Bladwin, Orphan & Sternberg 1161
- Nematocida* Troemel, Félix, Whiteman, Barrière & Ausubel 1162
- Nosemoides* Vinckier 1163
- Orthosomella* Canning, Wigley & Barker 1164
- Sheriffia* Larsson 1165
- Spiroglugea* Léger & Hesse 1166
- Sporanauta* Ardila-Garcia & Fast 1167
- Stempellia* Léger & Hesse 1168
- Systemostrema* Hazard & Oldacre 1169
- Takaokaspora* Andreadis, Takaoka, Otsuka & Vossbrinck 1170
- Trichotuzetia* Vávra, Larsson & Baker 1171
- Triwangia* Wang, Nai, Chih Wang, Solter, Hsu, Wang & Lo 1172
- Vittaforma* Silveira & Canning 1173
- Wittmannia* Czaker 1174
- Rudimicrosporea** Sprague 1175
- Metchnikovellida** Vivier 1176
- Amphiacanthidae** Larsson 1177
- Amphiacantha* Caullery & Mesnil 1178
- Amphiamblys* Caullery & Mesnil 1179

- 1142 **Metchnikovellidae** Caullery & Mesnil
 1143 *Desportesia* Issi & Voronin
 1144 *Metchnikovella* Caullery & Mesnil
 1145 *Microsporidiopsis* Schereschewsky

- 1146 **Rozellomycota** genera *incertae sedis*
 1147 *Mitosporidium* Haag, James, Pombert, Larsson, Schaer,
 1148 Refardt & Ebert
 1149 *Paramicrosporidium* Corsaro, Walochnik, Venditti, Stein-
 1150 mann, Müller & Michel

- 1151 **ZOOPAGOMYCOTA** Gryganskyi, M.E. Sm., Spatafora &
 1152 Stajich
 1153 **Zoopagomycetes** Doweld
 1154 **Zoopagales** Bessey ex R.K. Benj.
 1155 **Cochlonemataceae** Dudd.
 1156 *Amoebophilus* P.A. Dang.
 1157 *Aplectosoma* Drechsler
 1158 *Bdellospora* Drechsler
 1159 *Cochlonema* Drechsler
 1160 *Endocochlus* Drechsler
 1161 *Euryancale* Drechsler

- 1162 **Helicocephalidaceae** Boedijn
 1163 *Brachymyces* G.L. Barron
 1164 *Helicocephalum* Thaxt.
 1165 *Rhopalomyces* Corda
 1166 *Verrucocephalum* Degawa

- 1167 **Piptocephalidaceae** J. Schröt.
 1168 *Kuzuhaea* R.K. Benj.
 1169 *Piptocephalis* de Bary
 1170 *Syncephalis* Tiegh. & G. Le Monn.

- 1171 **Sigmoideomycetaceae** Benny, R.K. Benj. & P.M. Kirk
 1172 *Reticulocephalis* Benny, R.K. Benj. & P.M. Kirk
 1173 *Sigmoideomyces* Thaxt.
 1174 *Sphondylocephalum* Stalpers
 1175 *Thamnocephalis* Blakeslee

- 1176 **Zoopagaceae** Drechsler
 1177 *Acaulopage* Drechsler
 1178 *Cystopage* Drechsler
 1179 *Lecophagus* M.W. Dick
 1180 *Stylopage* Drechsler
 1181 *Tentaculophagus* Doweld
 1182 *Zoopage* Drechsler
 1183 *Zoopagus* Sommerst.

- 1184 **Zoopagales** genera *incertae sedis*
 1185 *Massartia* De Wild.

- 1186 **Zoopagomycotina** genus *incertae sedis*
 1187 *Basidiolum* Cienk.

NOTES FOR GENERA

In this section we provide an introduction for each phylum and entries for each genus with taxonomic placements, habitat, recent references etc.

Aphelidiomycota Tedersoo et al.

Tedersoo et al. (2016) introduced *Aphelidiomycota* which comprises one class, one order and one family. Currently, we accept four genera belonging in *Aphelidiomycota*.

Notes for genera

Amoeboaphelidium Scherff. 1925, *Aphelidiaceae*, *Aphelidiales*, *Aphelidiomycetes*, *Aphelidiomycota*, five species, type: *A. achnanthidis* Scherff., parasites, aquatic, cosmopolitan, see Letcher et al. (2015b; new species), Karpov et al. (2016; phylogeny), sequences are available.

Aphelidium Zopf 1885, *Aphelidiaceae*, *Aphelidiales*, *Aphelidiomycetes*, *Aphelidiomycota*, seven species, type: *A. deformans* Zopf, parasites of algae, aquatic, worldwide, see Karpov et al. (2016; phylogeny), Letcher et al. (2017; new species), sequences are available.

Paraphelidium Karpov, Moreira, Lopez-Garcia 2017b, *Aphelidiaceae*, *Aphelidiales*, *Aphelidiomycetes*, *Aphelidiomycota*, two species, type: *P. tribonemae* Karpov, Moreira, Lopez-Garcia, parasites of *Tribonema gayanum*, aquatic, Russia, see Karpov et al. (2017b, c; taxonomy, phylogeny), sequences are available.

Pseudaphelidium Schweikert & Schnepf 1996, *Aphelidiaceae*, *Aphelidiales*, *Aphelidiomycetes*, *Aphelidiomycota*, one species, type: *P. drebesii* Schweikert & Schnepf, parasite, marine, Germany, see Schweikert and Schnepf (1996, 1997; description, light microscopy, electron microscopy), sequences are unavailable.

Basidiobolomycota Doweld

Doweld (2011) introduced *Basidiobolomycota* based on *Basidiobolus* Eidam. Taxonomic placement of *Basidiobolus* (including higher taxonomic ranks i.e. *Basidiobolaceae*, *Basidiobolales*, *Basidiobolomycetes*) was doubtful since different publications accommodated it in different placements in Kingdom Fungi. Nagahama et al. (1995) and James et al. (2000) showed that *Basidiobolus* grouped with *Chytridiomycetes* based on 18S rDNA sequence analyses. However, James et al. (2006), for the first time, accepted *Basidiobolus* belongs in *Entomophthoromycota*. The placement in James et al. (2006) was followed by Humber (2012) and Gryganskyi et al. (2013a, b). Nevertheless, Hobbitt et al. (2007) provided contrary conclusion with all above placements on *Basidiobolus*, and placed it in uncertain placement in Kingdom Fungi. Nevertheless,

Tedersoo et al. (2016) accepted *Basidiobolomycota* (fide Doweld 2011) as a distinct phylum in their newly proposed classification of fungi. Our phylogenetic analyses also agree with this placement thus in here, we conclude *Basidiobolomycota* as a distinct phylum which comprises *Basidiobolus* and *Schizangiella* J. Dwyer et al. (Fig. 1).

Notes for genera

Basidiobolus Eidam 1886, *Basidiobolaceae*, *Basidiobolales*, *Basidiobolomycetes*, *Entomophthoromycota*, four species, type: *B. ranarum* Eidam, on dung, human pathogen, worldwide, see Rabie et al. (2011; *Basidiobolomycosis*), Sharma et al. (2011; human pathogen), Humber (2012; classification), Kumar Verma et al. (2012; subcutaneous zygomycosis), Kwon-Chung (2012; human pathogen), Gryganskyi et al. (2013a; notes), Kirk et al. (2013; genus accepted), Al-Maani et al. (2014; gastrointestinal basidiobolomycosis), Mendoza et al. (2015; human pathogen), Almoosa et al. (2017; pediatric gastrointestinal basidiobolomycosis), cultures and sequences are available, genomes available: *B. meristosporus* CDC-B9252 and CBS 931.73 (Chibucos et al. 2016) available at NCBI genomes, *B. heterosporus* CDC-B8920 (Chibucos et al. 2016) available at NCBI genomes.

Schizangiella J. Dwyer, B. Burwell, Humber, C. Mcleod, M. Fleetwood & T. Johnson bis 2006, *Basidiobolaceae*, *Basidiobolales*, *Basidiobolomycetes*, *Entomophthoromycota*, one species, type: *S. serpentis* J. Dwyer, B. Burwell, Humber, C. Mcleod, M. Fleetwood & T. Johnson bis, snake pathogen, cosmopolitan, see Gryganskyi et al. (2013a; notes, phylogeny), Hoffmann et al. (2013; notes), Humber (2016; classification), cultures and sequences are available.

Blastocladiomycota T.Y. James

James et al. (2006) elevated the order *Blastocladales*, which was traditionally treated as in *Chytridiomycota*, to a phylum *Blastocladiomycota*. The members of *Blastocladiomycota* show different life modes such as saprobic, invertebrate parasites (e.g. *Callimastix* Weissenb., *Coelomomyces* Keilin), and fungal and algal parasites (Hoffman et al. 2008; James et al. 2011). In evolution perspective, *Blastocladales* differs from the chytrids which have zygotic meiosis while most *Blastocladales* have a life cycle with sporic meiosis (James et al. 2006). Subsequent studies by Hibbett et al. (2007), Porter et al. (2011), James et al. (2012, 2014), Jones et al. (2016), Seto et al. (2017) and Krings et al. (2016) also recognized *Blastocladiomycota* as a distinct phylum of fungi.

In this study, we accept one class, three orders, eight families and 14 genera in *Blastocladiomycota*.

Notes for genera

Allomyces E.J. Butler 1911 (= *Septocladia* Coker & F.A. Grant 1922), *Blastocladiaceae*, *Blastocladales*, *Blastocladiomycetes*, *Blastocladiomycota*, c. ten species, type: *A. arbusculus* E.J. Butler, from soil, cosmopolitan, see Porter et al. (2011; phylogeny), James and Berbee (2012; phylogeny), Kirk et al. (2013; genus accepted), cultures and sequences are available.

Blastocladia Reinsch 1877, *Blastocladiaceae*, *Blastocladales*, *Blastocladiomycetes*, *Blastocladiomycota*, c. 20 species, type: *B. pringsheimii* Reinsch, saprobes, aquatic, Argentina, see Porter et al. (2011; DNA, phylogeny), Kirk et al. (2013; genus accepted), cultures and sequences are available.

Blastocladopsis Sparrow 1950, *Blastocladiaceae*, *Blastocladales*, *Blastocladiomycetes*, *Blastocladiomycota*, two species, type: *B. parva* Whiffen ex Sparrow, saprobes, aquatic, cosmopolitan, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.

Callimastix Weissenb. 1912, *Callimastigaceae*, *Callimastigales*, *Blastocladiomycetes*, *Blastocladiomycota*, one species, type: *C. cyclopis* Weissenb., on crustaceans, terrestrial, cosmopolitan, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.

Catenomyces A.M. Hanson 1944, *Catenomycetaceae*, *Catenomycetales*, *Blastocladiomycetes*, *Blastocladiomycota*, two species, type: *C. persicinus* A.M. Hanson, saprobes, North America, see Freeman et al. (Freeman et al. 2009; phylogeny), Kirk et al. (2013; genus accepted), Hillman et al. (2017; microbes in gastrointestinal tract), cultures and sequences are available.

Catenophlyctis Karling 1965 (= *Perirhiza* Karling 1946), *Catenariaceae*, *Blastocladales*, *Blastocladiomycetes*, *Blastocladiomycota*, two species, type: *C. variabilis* (Karling) Karling, saprobes, worldwide, see Kirk et al. (2013; genus accepted), cultures and sequences are available.

Coelomomyces Keilin 1921, *Coelomomycetaceae*, *Callimastigales*, *Blastocladiomycetes*, *Blastocladiomycota*, c. 75 species, type: *C. stegomyiae* Keilin, insect pathogens, worldwide, see Seye et al. (2009; pathogens of *Aedes albopictus*), Kirk et al. (2013; genus accepted), sequences are available.

Coelomycidium Debais. 1919 (= *Zografia* Bogoyavl. 1922), *Coelomomycetaceae*, *Callimastigales*, *Blastocladiomycetes*, *Blastocladiomycota*, one species, type: *C. simulii* Debais., insect pathogens, worldwide, see Porter et al. (2011; phylogeny), Kirk et al. (2013; genus accepted), cultures and sequences are available.

Endoblastidium Codreanu 1931, *Blastocladales* genera *incertae sedis*, *Blastocladiomycetes*, *Blastocladiomycota*, one species, type: *E. caulleryi* Codreanu, saprobes, cosmopolitan, see Kirk et al. (2013; genus accepted), cultures and sequences are available for unidentified species.

- 1336 ***Microallomyces*** R. Emers. & J.A. Robertson 1974, *Blasto-*
1337 *tocladiomycetes* genera *incertae sedis*, *Blastocladiomycota*,
1338 two species, type: *M. dendroideus* R. Emers. & J.A.
1339 Robertson, saprobes, aquatic, Costa Rica, see Kirk et al.
1340 (2013; genus accepted), cultures and sequences are
1341 unavailable.
- 1342 ***Nematoceromyces*** Doweld 2013, *Catenariaceae*, *Blasto-*
1343 *cladiales*, *Blastocladiomycetes*, *Blastocladiomycota*, three
1344 species, type: *N. spinosus* (W. Martin) Doweld, parasitic in
1345 eggs of insects, cosmopolitan, see Doweld et al. (2014k;
1346 genus accepted), cultures and sequences are unavailable.
- 1347 ***Paraphysoderma*** Boussiba, Zarka & T.Y. James 2011,
1348 *Paraphysodermataceae*, *Blastocladales*, *Blastocla-*
1349 *diomycetes*, *Blastocladiomycota*, three species, type: *P.*
1350 *sedebokerense* Boussiba, Zarka & T.Y. James, parasitic on
1351 *Haematococcus pluvialis*, Israel, see James et al. (2011;
1352 taxonomy), Letcher et al. (2016; ultrastructure studies),
1353 Strittmatter et al. (2016; flagellated dispersion stage), cul-
1354 tures and sequences are available.
- 1355 ***Physoderma*** Wallr. 1833 (= *Oedomyces* Sacc. ex Trab.
1356 1894; = *Physopella* G. Poirault 1905; = *Urophlyctis* J.
1357 Schröt. (1886) [1889]), *Physodermataceae*, *Physoder-*
1358 *matales*, *Physodermatomycetes*, *Blastocladiomycota*, c. 60
1359 species, type: *P. maculare* Wallr., saprobes, worldwide, see
1360 Kirk et al. (2013; genus accepted), cultures and sequences
1361 are available.
- 1362 ***Sorochytrium*** Dewel 1985, *Sorochytriaceae*, *Blastocladi-*
1363 *ales*, *Blastocladiomycetes*, *Blastocladiomycota*, one spe-
1364 cies, type: *S. milnesiophthora* Dewel, saprobes, USA, see
1365 Kirk et al. (2013; genus accepted), cultures and sequences
1366 are unavailable.
- 1367 ***Caulochytriomycota*** Doweld
1368 Doweld (2014g) introduced *Caulochytriomycota* based
1369 on *Caulochytrium* Voos & L.S. Olive. *Caulochytrium*
1370 *gloeosporii* Voos & L.S. Olive, the type species of *Cau-*
1371 *lochytrium* was isolated from dead leguminous pods and
1372 treated as in *Chytridiales* (Voos and Olive 1968). The
1373 genus lacks DNA sequences in GenBank (accession date
1374 29.06.2018) thus the erection was based only on mor-
1375 phology and habitat. Currently the phylum comprises one
1376 class, one order, one family and one genus.
- 1377 **Note for genus**
1378 ***Caulochytrium*** Voos & L.S. Olive 1968, *Caulochytri-*
1379 *aceae*, *Caulochytriales*, *Caulochytriomycetes*,
1380 *Caulochytriomycota*, two species, type: *C. gloeosporii*
1381 Voos & L.S. Olive, saprobes, USA, see Kirk et al. (2013;
1382 genus accepted), cultures and sequences are unavailable.

Chytridiomycota Doweld

Doweld (2001) introduced *Chytridiomycota* based on *Chytridium* A. Braun (1851). Hibbett et al. (2007) also introduced *Chytridiomycota* M.J. Powell based on the same genus thus this name is treated as an isonym of *Chytridiomycota* Doweld. (Index Fungorum 2018). Taxa in *Chytridiomycota* (Figs. 3 and 4) show a broad range of distribution and mostly occur as aquatic (fresh water or marine) saprobes and parasites, although taxa in some orders (e.g. *Spizellomycetales* and *Rhizophlyctidales*) are nearly exclusively terrestrial saprobes of refractive substrates.

Hibbett et al. (2007) accepted two classes i.e. *Chytridiomycetes* Caval.-Sm. (including three orders) and *Mono-blepharidomycetes* J.H. Schaffn. (including one order). Subsequent studies by Letcher et al. (2008a, b, c), Mozley-Standridge et al. (2009), Simmons et al. (2009), Longcore and Simmons (2012), Karpov et al. (2014) added several orders to *Chytridiomycetes*. We accept two classes, 13 orders, 57 families and 151 genera in *Chytridiomycota*.

Notes for genera

Achlyella Lagerh. 1890, *Chytridiomycota* genera *incertae sedis*, one species, type: *A. flahaultii* Lagerh., on pollen grains, aquatic, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.

Achlyogeton Schenk 1859, *Chytridiomycota* genera *incertae sedis*, one species, type: *A. entophytum* Schenk, parasitic, aquatic, cosmopolitan, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.

Algochytrrops Doweld 2014i, *Lobulomycetales* genera *incertae sedis*, *Lobulomycetes*, *Chytridiomycota*, one species, type: *A. polysiphoniae* (Cohn) Doweld, epibiotic, marine, cosmopolitan, see Simmons et al. (2009; as *Chytridium polysiphoniae*, phylogeny), Doweld (2014i; taxonomy), cultures and sequences are unavailable.

Allochytridium D.J.S. Barr & Désauln. 1987 (= *Allochytridium* Salkin 1970), *Cladochytriales* genera *incertae sedis*, *Cladochytriomycetes*, *Chytridiomycota*, one species, type: *A. luteum* D.J.S. Barr & Désauln., from sandy soil, Canada, see Mozley-Standridge et al. (2009; phylogeny), Kirk et al. (2013; genus accepted), cultures and sequences are available.

Alogomyces D.R. Simmons & Letcher 2012, *Alogomycetaceae*, *Lobulomycetales*, *Lobulomycetes*, *Chytridiomycota*, one species, type: *A. tanneri* D.R. Simmons & Letcher, from horse manure, USA, see Simmons et al. (2012; taxonomy), Doweld (2014b; introduced *Alogomycetaceae*), cultures and sequences are available.

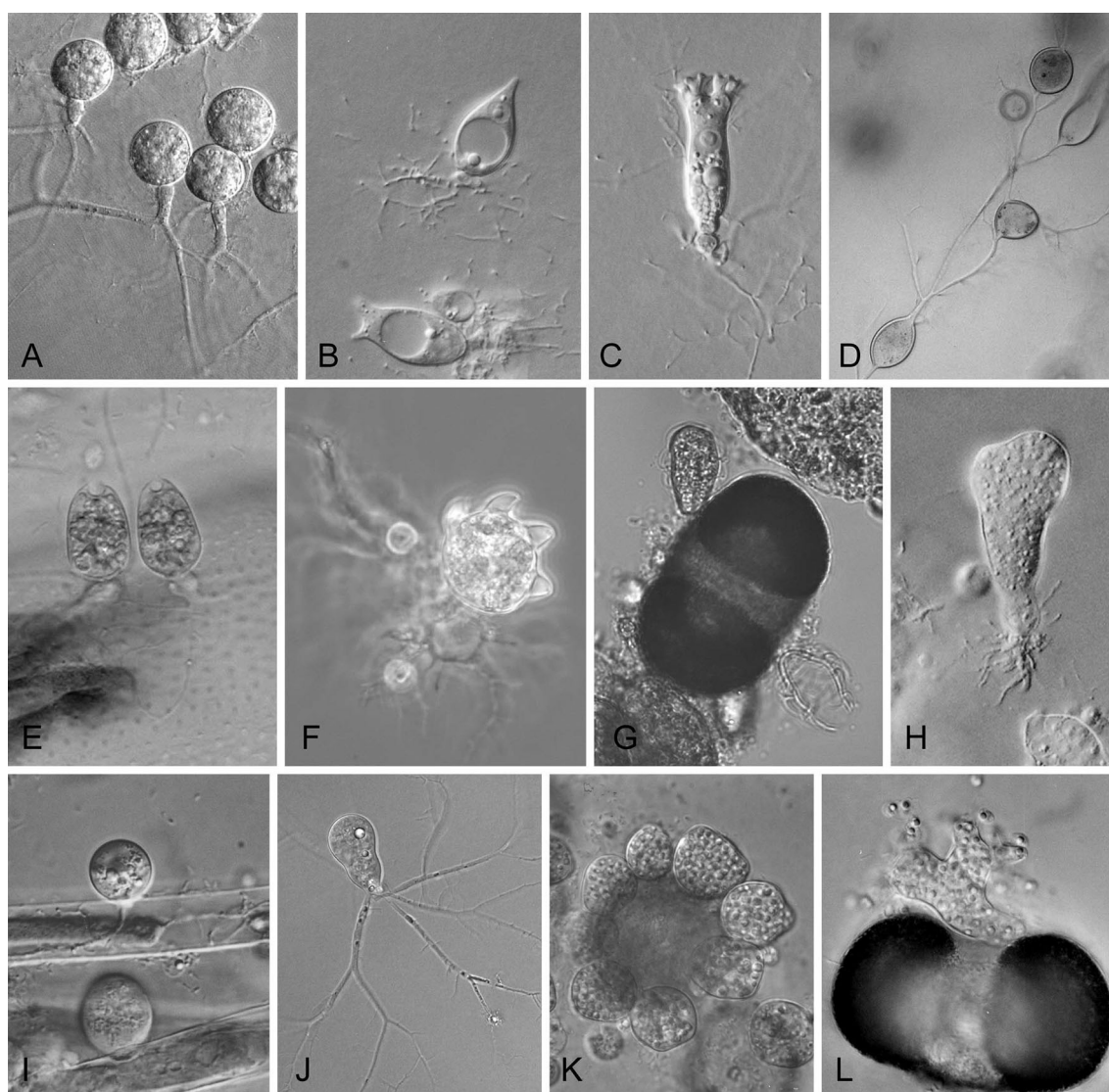


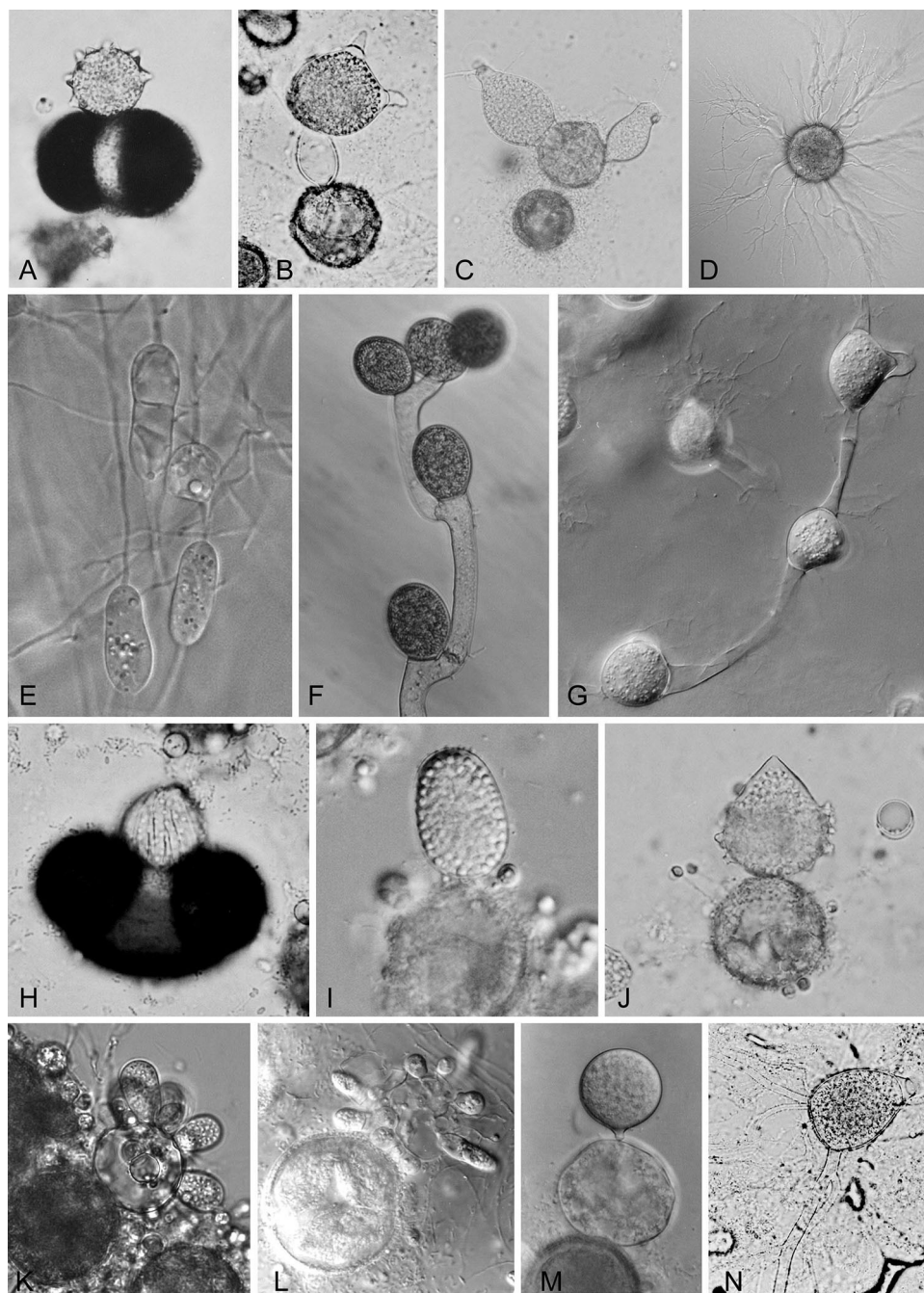
Fig. 3 A–D Chytriomycetaceae, Chytridiales. A Chytriomycetes hyalinus. B Obelidium mucronatum. C Podochytrium dentatum. D Physocladia obscura. E, F Chytridiaceae, Chytridiales. E Phlyctochytrium planicorne. F Phlyctochytrium bullatum. G, H Lobulomycetales.

G Lobulomyces poculatus. H Lobulomyces angularis. I–L Rhizophydiales. I Rhizophydium globosum. J Operculomyces laminatus. K Terramyces subangulosus. L Coralloidiomyces digitatus

- 1431 **Alphamyces** Letcher 2008, *Alphamycetaceae*, *Rhizophydiales*, *Rhizophyidiomycetes*, *Chytridiomycota*, one species,
1432 type: *A. chaetifer* (Sparrow) Letcher, on pollen, Argentina,
1433 see Letcher et al. (2008c, 2012a, b; taxonomy), Akinwole
1434 et al. (2014; fatty acids), cultures and sequences are
1435 available.
1436 **Amoebochytrium** Zopf 1884, *Amoebochytriaceae*,
1437 *Chytridiomycetes* families *incertae sedis*, *Chytridiomycota*,
1438 one species, type: *A. rhizidioides* Zopf, from soil, cos-
1439 mopolitan, see Kirk et al. (2013; genus accepted), Doweld
1440 (2014c; introduced *Amoebochytriaceae*), cultures and
1441 sequences are unavailable.
1442 **Angulomyces** Letcher 2008, *Angulomycetaceae*, *Rhizo-*
1443 *phydiales*, *Rhizophyidiomycetes*, *Chytridiomycota*, one

species, type: *A. argentinensis* Letcher, from submersed
mud, cosmopolitan, see Letcher et al. (2008b; taxonomy),
Davis et al. (2013; from Alabama), cultures and sequences
are available, ITS of the type culture NR_119644.
Aphanistis Sorokin 1883, *Chytridiomycetes* genera *incer-*
tae sedis, *Chytridiomycota*, two species, type: needs typi-
fication, Asia, see Kirk et al. (2013; genus accepted),
cultures and sequences are unavailable.
Aquamyces Letcher 2008, *Aquamycetaceae*, *Rhizophydia-*
les, *Rhizophyidiomycetes*, *Chytridiomycota*, one species,
type: *A. chlorogonii* (Serbinow) Letcher, South America,
see Letcher et al. (2008c; taxonomy, phylogeny), cultures
and sequences are available, ITS of the type culture
EF585643.

Fig. 4 **A, B** *Spizellomyces* *-etaceae*, *Spizellomycetales*.
A *Spizellomyces punctatus*.
B *Phlyctochytrium reinboldiae*.
C *Powellomycetaceae*, *Spizellomycetales*.
Powellomyces variabilis.
D *Rhizophlyctidales*.
Rhizophlyctis rosea.
E *Cladochytriales*.
Cladochytrium replicatum.
F, G *Blastocladiomycota*.
F *Allomyces anomalus*.
G *Catenaria anguillulae*.
H–N *incertae sedis*.
H *Blyttomyces helicus*.
I *Polyphlyctis cystofera*.
J *Phlyctochytrium mucronatum*.
K *Chytridium rhizophydii*.
L *Septosperma rhizophydii*.
M *Rhizophyidium obpyriformis*.
N *Rhizophlyctis ingoldii*



1459 *Arizonaphlyctis* Letcher 2008, *Arizonaphlyctidaceae*, *Rhi-*
 1460 *zophlyctidales*, *Rhizophlyctidomycetes*, *Chytridiomycota*,
 1461 one species, type: *A. lemmonensis* Letcher, USA, see
 1462 Letcher et al. (2008a; taxonomy, phylogeny), cultures and
 1463 sequences are available, ITS of the type culture EU379214.
 1464 *Arkaya* Longcore & D.R. Simmons 2012, *Arkayaceae*,
 1465 *Polychytriales*, *Polychytriomycetes*, *Chytridiomycota*, two
 1466 species, type: *A. lepida* Longcore & D.R. Simmons, USA,
 1467 see Longcore and Simmons (2012; taxonomy, phylogeny),
 1468 cultures and sequences are available.

Asterophlyctis H.E. Petersen 1903, *Asterophlyctaceae*,
Chytridiales, *Chytridiomycetes*, *Chytridiomycota*, two
species, type species. *A. sarcoptoides* H.E. Petersen, see
Vélez et al. (2011, taxonomy, phylogeny), Doweld (2014e;
introduced *Asterophlyctaceae*), cultures and sequences
available.
Avachytrium Vélez & Letcher 2013, *Chytriomycetaceae*,
Chytridiales, *Chytridiomycetes*, *Chytridiomycota*, two
species, type: *A. platense* Vélez & Letcher, USA, see Vélez
et al. (2013; taxonomy, phylogeny), Letcher et al. (2014;



- DNA), cultures and sequences are available, ITS of the type culture NR_111808.
- Barromyces** M.J. Powell & Letcher 2018, *Spizellomycetaceae*, *Spizellomycetales*, *Spizellomycetes*, *Chytridiomycota*, one species, type: *B. tenuis* (D.J.S. Barr) M.J. Powell & Letcher, from soil, USA, see Powell et al. (2018; taxonomy), ITS of type culture FJ827713.
- Batrachochytrium** Longcore, Pessier & D.K. Nichols 1999, *Batrachochytriaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, two species, type: *B. dendrobatidis* Longcore, Pessier & D.K. Nichols, from skin of amphibians, USA, The Netherlands, see Fisher et al. (2009; amphibian chytridiomycosis), Van Rooij et al. (2012; amphibian pathogens), Blooi et al. (2013; real time PCR), Doweld (2013b; *Batrachochytriaceae*), Martel et al. (2013; new species, phylogeny), Dillon et al. (2017; pathogens), cultures and sequences are available.
- Bertramia** Mesnil & Caullery 1897, *Chytridiomycetes* genera *incertae sedis*, *Chytridiomycota*, six species, type: *B. capitellae* Mesnil & Caullery, in annelids, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Betamyces** Letcher 2011, *Alphamycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *A. americaemerdionalis* Letcher, Vélez, Schultz & M.J. Powell, on pollen, Argentina, see Letcher et al. (2011; taxonomy), cultures and sequences are available, ITS of the type culture EF585664.
- Blyttomyces** A.F. Bartsch 1939, *Chytridiomycetes* genera *incertae sedis*, *Chytridiomycota*, eleven species, type: *B. spinulosus* (A. Blytt) A.F. Bartsch, saprobes, aquatic, worldwide, see Blackwell et al. (2011; reported from Alabama and Argentina, notes), Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Boothiomycetes** Letcher 2006, *Terramycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *B. macroporosum* (Karling) Letcher, from soil, terrestrial, New Zealand, see Davis et al. (2013; DNA, reported from Alabama), cultures and sequences are available, ITS of the type culture NR_119591.
- Borealophlyctis** Letcher 2008, *Borealophlyctidaceae*, *Rhizophlyctidales*, *Rhizophlyctidomycetes*, *Chytridiomycota*, two species, type: *B. paxensis* Letcher, from soil, on pollen, terrestrial, USA, see Letcher et al. (Letcher et al. 2008c; taxonomy), Davis et al. (2016a, b; new species), cultures and sequences are available, ITS of the type culture NR_111314.
- Brevicalcar** Letcher & M.J. Powell 2018, *Spizellomycetaceae*, *Spizellomycetales*, *Spizellomycetes*, *Chytridiomycota*, one species, type: *B. kilaueaense* Letcher and M.J. Powell, from soil, on pollen, terrestrial, Hawaii, see Letcher and Powell (2018; taxonomy), cultures and sequences are available.
- Bulbosomyces** Letcher & Longcore 2018, *Spizellomycetaceae*, *Spizellomycetales*, *Spizellomycetes*, *Chytridiomycota*, one species, type: *B. maxikinetosomus* Letcher & Longcore, from soil, on pollen, terrestrial, USA, see Letcher and Powell (2018; taxonomy), cultures and sequences are available.
- Canteria** Karling 1971, *Chytridiomycetes* genera *incertae sedis*, *Chytridiomycota*, one species, type: *C. apophysata* (Canter) Karling, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Carpenterophlyctis** Doweld 2013 (= *Carpenterella* Tehon & H.A. Harris 1941, *Synchytriaceae*, *Synchytriales*, *Synchytriomycetes*, *Chytridiomycota*, two species, type: *C. cannae* (Mundk. & Tirum.) Doweld, see Doweld (2013a; nomenclature), cultures and sequences are unavailable.
- Catenochytridium** Berdan 1939, *Catenochytridiaceae*, *Cladochytriales*, *Cladochytriomycetes*, *Chytridiomycota*, c. eight species, type: *C. carolinianum* Berdan, saprobes, cosmopolitan, see Kirk et al. (2013; genus accepted), cultures and sequences are available for unidentified species.
- Chytridium** A. Braun 1851, *Chytridiaceae*, *Chytridiales*, *Chytridiomycetes*, *Chytridiomycota*, c. 50 species, type: *C. olla* A. Braun, worldwide, see Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Chytriomycetes** Karling 1945, *Chytriomycetaceae*, *Chytridiales*, *Chytridiomycetes*, *Chytridiomycota*, c. 30 species, type: *C. hyalinus* Karling, worldwide, see Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Cladochytrium** Nowak. 1877 (= *Pyroctonum* Prunet 1897), *Cladochytriaceae*, *Cladochytriales*, *Cladochytriomycetes*, *Chytridiomycota*, c. 15 species, type: *C. tenue* Nowak., Europe, see Mozley-Standridge et al. (2009; DNA), Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Clydaea** D.R. Simmons 2009, *Lobulomycetaceae*, *Lobulomycetales*, *Lobulomycetes*, *Chytridiomycota*, one species, type: *C. vesicula* D.R. Simmons, USA, see Simmons et al. (2009; taxonomy), cultures and sequences are available, ITS of the type culture NR_121339.
- Coenomyces** K.N. Deckenb. 1901 (= *Deckenbachia* Jacz. 1931), *Chytridiomycota* genera *incertae sedis*, one species, type: *C. consuens* K.N. Deckenb., saprobes, cosmopolitan, see Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Coleospora** Gibbs 1959, *Nephridiophagaceae*, *Nephridiophagales*, *Chytridiomycetes*, *Chytridiomycota*, one species, type: *C. binucleata* Gibbs, insect parasites, cultures and sequences are unavailable.
- Coralloidiomycetes** Letcher 2008, *Coralloidiomycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *C. digitatus* Letcher, saprobes, South America, see Letcher et al. (2008b; genus accepted),

1585 Doweld (2014d; introduced *Coralloidiomycetaceae*),
 1586 Powell et al. (2015; phylogeny), cultures and sequences are
 1587 available.
 1588 **Cyclopsomyces** K. Seto & Degawa 2015, *Lobulomyc-*
 1589 *etaceae*, *Lobulomycetales*, *Lobulomycetes*, *Chytridiomy-*
 1590 *cota*, one species, type: *C. plurioperculatus* K. Seto &
 1591 Degawa, saprobes, Asia, see Seto et al. (2015; taxonomy,
 1592 phylogeny), cultures and sequences are available.
 1593 **Cylindrochytridium** Karling 1941, *Cladochytriales* genera
 1594 *incertae sedis*, *Cladochytriomycetes*, *Chytridiomycota*, two
 1595 species, type: *C. johnstonii* Karling, saprobes, cosmopoli-
 1596 tan, see Kirk et al. (2008) accepted the genus but Kirk et al.
 1597 (2013) did not list the genus, Steiger et al. (2012; phy-
 1598 logeny, accepted as in *Cladochytriales*).
 1599 **Dangeardia** Schröd. 1898, *Chytridiomycetes* genera *in-*
 1600 *certae sedis*, *Chytridiomycota*, six species, type: *D.*
 1601 *mamillata* Schröd., saprobes, cosmopolitan, see Kirk et al.
 1602 (2013; genus accepted), cultures and sequences are
 1603 unavailable.
 1604 **Dangeardiana** Valkanov ex A. Batko 1970 (= *Dangear-*
 1605 *diana* Valkanov 1964), *Chytridiomycetes* genera *incertae*
 1606 *sedis*, *Chytridiomycota*, two species, type: *D. eudorinae*
 1607 Valkanov ex A. Batko, saprobes, Europe, see Kirk et al.
 1608 (2013; genus accepted), cultures and sequences are
 1609 unavailable.
 1610 **Delfinachytrium** Vélez & Letcher 2013, *Chytridiales*
 1611 genera *incertae sedis*, *Chytridiomycetes*, *Chytridiomycota*,
 1612 one species, type: *D. mesopotamicum* Vélez & Letcher,
 1613 from marsh of semipermanent stream, Argentina, see Vélez
 1614 et al. (2013; genus accepted), cultures and sequences are
 1615 available.
 1616 **Dendrochytridium** Letcher, Longcore & M.J. Powell 2014,
 1617 *Chytridiaceae*, *Chytridiales*, *Chytridiomycetes*, *Chytrid-*
 1618 *iomycota*, one species, type: *D. crassum* Letcher, Longcore
 1619 & M.J. Powell, saprobes, Argentina, see Letcher et al.
 1620 (2014; taxonomy, phylogeny), cultures and sequences are
 1621 available.
 1622 **Dictyomorpha** Mullins 1961, *Chytridiomycetes* genera *in-*
 1623 *certae sedis*, *Chytridiomycota*, two species, type: *D. dioica*
 1624 Couch ex Mullins, insect pathogens, USA, see Kirk et al.
 1625 (2013; genus accepted), Blackwell et al. (2017; taxonomy),
 1626 cultures and sequences are unavailable.
 1627 **Dinomyces** Karpov & Guillou 2014, *Dinomycetaceae*,
 1628 *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*,
 1629 one species, type: *D. arenysensis* Karpov & Guillou, from
 1630 *Alexandrium*, Europe, see Lepelletier et al. (2014; taxon-
 1631 omy), Gleason et al. (2015; parasitic on harmful algal
 1632 blooms), Jephcott et al. (2016; impact on harmful algal
 1633 blooms), cultures and sequences are available.
 1634 **Diplophlyctis** J. Schröt. 1892 (= *Asterophlyctis* H.E.
 1635 Petersen 1903), *Endochytriaceae*, *Cladochytriales*,
 1636 *Cladochytriomycetes*, *Chytridiomycota*, twelve species,
 1637 type: *D. intestina* (Schenk) J. Schröt., saprobes,

cosmopolitan, see Mozley-Standridge et al. (2009; DNA),
 Kirk et al. (2013; genus accepted), cultures and sequences
 are available for unidentified species.

Endochytrium Sparrow 1933, *Endochytriaceae*,
Cladochytriales, *Cladochytriomycetes*, *Chytridiomycota*,
 seven species, type: *E. oophilum* Sparrow, parasitic on
 eggs, cosmopolitan, see Kirk et al. (2013; genus accepted),
 cultures and sequences are available for unidentified
 species.

Endodesmidium Canter 1949, *Synchytriaceae*, *Synchytri-*
ales, *Synchytriomycetes*, *Chytridiomycota*, one species,
 type: *E. formosum* Canter, parasitic on desmids, cos-
 mopolitan, see Kirk et al. (2013; genus accepted), cultures
 and sequences are available for unidentified species.

Entophlyctis A. Fisch. 1892, *Chytriomycetaceae*,
Chytridiales, *Chytridiomycetes*, *Chytridiomycota*, c. 30
 species, type: *E. cienkowskiana* (Zopf) A. Fisch., parasites,
 in soil, cosmopolitan, see Kirk et al. (2013; genus accep-
 ted), Wang et al. (2017b; in soil), cultures and sequences
 are available.

Fayochytrium W.J. Davis, Letcher, Longcore & M.J.
 Powell 2015a, b, *Chytriomycetaceae*, *Chytridiales*,
Chytridiomycetes, *Chytridiomycota*, one species, type: *F.*
spinus (Fay) W.J. Davis, Letcher, Longcore & M.J.
 Powell, saprobes, see Davis et al. (2015a, b; taxonomy),
 cultures and sequences are available.

Fimicolochytrium D.R. Simmons & Longcore 2012,
Powellomycetaceae, *Spizellomycetales*, *Spizellomycetes*,
Chytridiomycota, one species, type: *F. jonesii* D.R. Sim-
 mons & Longcore, on manure, USA, see Simmons and
 Longcore (2012; taxonomy), cultures and sequences are
 available.

Gaertneriomyces D.J.S. Barr 1980, *Spizellomycetaceae*,
Spizellomycetales, *Spizellomycetes*, *Chytridiomycota*, two
 species, type: *G. semiglobifer* Uebelm. ex D.J.S. Barr, from
 soil, cosmopolitan, see Kirk et al. (2013; genus accepted),
 Powell et al. (2018; new species), cultures and sequences
 are available.

Gallinipes Letcher & M.J. Powell 2018, *Spizellomyc-*
etaceae, *Spizellomycetales*, *Spizellomycetes*, *Chytridiomy-*
cota, three species, type: *G. danensis* Letcher and M.J.
 Powell, from soil, on pollen, terrestrial, USA, see Letcher
 and Powell (2018; taxonomy), cultures and sequences are
 available.

Gammamyces Letcher 2012, *Alphamycetaceae*, *Rhizophy-*
diales, *Rhizophydiomycetes*, *Chytridiomycota*, one species,
 type: *G. ourimbahensis* Letcher, saprobes, Australia, see
 Letcher et al. (2012a, b; genus accepted), cultures and
 sequences are available.

Gamolpidium Vlădescu 1892, *Chytridiomycetes* genera
incertae sedis, *Chytridiomycota*, two species, type: *G.*
nitidum Vlădescu, on algae, Europe, see Kirk et al. (2013;
 genus accepted), cultures and sequences are unavailable.

- 1691 **Geranomyces** D.R. Simmons 2011, *Powellomycetaceae*,
1692 *Spizellomycetales*, *Spizellomycetes*, *Chytridiomycota*, four
1693 species, type: *G. variabilis* (Longcore, D.J.S. Barr &
1694 Désauln.) D.R. Simmons, from soil, on manure, USA, see
1695 Simmons (2011; taxonomy, phylogeny), Simmons and
1696 Longcore (2012; new species), cultures and sequences are
1697 available.
- 1698 **Globomyces** Letcher 2008, *Globomycetaceae*, *Rhizophy-*
1699 *diales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species,
1700 type: *G. pollinis-pini* (A. Braun) Letcher, saprobes, cos-
1701 mopolitan, see Letcher et al. (2008c; taxonomy, phy-
1702 logeny), Davis et al. (2013; in Alabama), cultures and
1703 sequences are available.
- 1704 **Gorgonomycetes** Letcher 2008, *Gorgonomycetaceae*, *Rhi-*
1705 *zophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one
1706 species, type: *G. haynaldii* (Schaarschm.) Letcher, sap-
1707 robes, cosmopolitan, see Letcher et al. (2008c; taxonomy,
1708 phylogeny), Davis et al. (2013; in Alabama), Powell et al.
1709 (2015; phylogeny), cultures and sequences are available.
- 1710 **Gromochytrium** Karpov & Aleoshin 2014, *Gromochytri-*
1711 *aceae*, *Gromochytriales*, *Mesochytriomycetes*, *Chytrid-*
1712 *iomycota*, one species, type: *G. mamkaevae* Karpov &
1713 Aleoshin, parasites, Russia, see Karpov et al. (2014; tax-
1714 onomy, phylogeny), cultures and sequences are available,
1715 ITS of the type species NR_132054.1.
- 1716 **Halomyces** Letcher & M.J. Powell 2015, *Halomycetaceae*,
1717 *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*,
1718 one species, type: *H. littoreus* (Amon) Letcher & M.J.
1719 Powell, saprobes, marine, cosmopolitan, see Letcher et al.
1720 (2015a; taxonomy, phylogeny), cultures and sequences are
1721 available.
- 1722 **Homolaphlyctis** Longcore, Letcher & T.Y. James 2011,
1723 *Rhizophydiales* genera *incertae sedis*, *Rhizophydiomycetes*,
1724 *Chytridiomycota*, one species, type: *H. polyrhiza* Longcore,
1725 Letcher & T.Y. James, saprobes, from acidic lake, USA,
1726 see Longcore et al. (2011; taxonomy), cultures and
1727 sequences are available.
- 1728 **Ichthyochytrium** Plehn 1920, *Chytridiomycetes* genera
1729 *incertae sedis*, *Chytridiomycota*, one species, type: *I. vul-*
1730 *gare* Plehn, saprobes, Europe, see Kirk et al. (2013; genus
1731 accepted), cultures and sequences are unavailable.
- 1732 **Irineochytrium** Letcher, Longcore & M.J. Powell 2014,
1733 *Chytridiaceae*, *Chytridiales*, *Chytridiomycetes*, *Chytrid-*
1734 *iomycota*, one species, type: *I. annulatum* (Dogma)
1735 Letcher, Longcore & M.J. Powell, saprobes, see Letcher
1736 (2014; nomenclature correction), cultures and sequences
1737 are available.
- 1738 **Johnkarlingia** Pavgi & S.L. Singh 1979, *Synchytriaceae*,
1739 *Synchytriales*, *Synchytriomycetes*, *Chytridiomycota*, one
1740 species, type: *J. brassicae* S.L. Singh & Pavgi, saprobes,
1741 India, see Kirk et al. (2013; genus accepted), cultures and
1742 sequences are unavailable.
- Kappamyces** Letcher & M.J. Powell 2005, *Kappamyc-*
etaceae, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytrid-*
iomycota, one species, type: *K. laurelensis* Letcher & M.J.
Powell, saprobes, from aquaculture of moss-covered soil,
Eurasia, see Monchy et al. (2011; phylogeny), Davis et al.
(2013; in Alabama), cultures and sequences are available.
- Karlingiomyces** Sparrow 1960, *Polychytriaceae*, *Polychy-*
triales, *Polychytriomycetes*, *Chytridiomycota*, c. six spe-
cies, type: *K. asterocystis* (Karling) Sparrow, saprobes, see
Marano et al. (2011; diversity of zoospore fungi in Las
Cañas stream, Argentina), Longcore and Simmons (2012;
DNA), Kirk et al. (2013; genus accepted), cultures and
sequences are available.
- Kochiomyces** D.J.S. Barr 1980, *Spizellomycetaceae*,
Spizellomycetales, *Spizellomycetes*, *Chytridiomycota*, one
species, type: *K. dichotomus* (Umphlett) D.J.S. Barr, sap-
robes, USA, see Wakefield et al. (2010; phylogeny), Kirk
et al. (2013; genus accepted), Letcher and Powell (2017;
phylogeny), cultures and sequences are available.
- Lacustrimyces** Longcore 1993, *Polychytriaceae*, *Poly-*
chytriales, *Polychytriomycetes*, *Chytridiomycota*, one spe-
cies, type: *L. hiemalis* Longcore, from soil, USA, see
Karpov et al. (2010; relationship with *Mesochytrium*), Kirk
et al. (2013; genus accepted), cultures and sequences are
available.
- Loborhiza** A.M. Hanson 1944, *Chytridiomycetes* genera
incertae sedis, *Chytridiomycota*, one species, type: *L.*
metzneri A.M. Hanson, saprobes, see Kirk et al. (2013;
genus accepted), cultures and sequences are unavailable.
- Lobulomyces** D.R. Simmons 2009, *Lobulomycetaceae*,
Lobulomycetales, *Lobulomycetes*, *Chytridiomycota*, two
species, type: *L. angularis* (Longcore) D.R. Simmons,
saprobes, see Simmons et al. (2009, 2012; taxonomy,
phylogeny), cultures and sequences are available.
- Macrochytrium** Minden 1902, *Chytridiomycetes* genera
incertae sedis, *Chytridiomycota*, one species, type: *M.*
botrydioides Minden, saprobes, see Kirk et al. (2013; genus
accepted), Krings et al. (2016; fossil fungi), cultures and
sequences are unavailable.
- Maunachytrium** D.R. Simmons 2009, *Lobulomycetaceae*,
Lobulomycetales, *Lobulomycetes*, *Chytridiomycota*, one
species, type: *M. keaense* D.R. Simmons, from soil,
Hawaii, see Simmons et al. (2009, 2012; taxonomy, phy-
logeny), cultures and sequences are available.
- Megachytrium** Sparrow 1931, *Chytridiomycetes* genera
incertae sedis, *Chytridiomycota*, one species, type: *M.*
westonii Sparrow, saprobes, North America, see Kirk et al.
(2013; genus accepted), cultures and sequences are
unavailable.
- Mesochytrium** B.V. Gromov, Mamkaeva & Pljusich 2000,
Mesochytriaceae, *Mesochytriales*, *Mesochytriomycetes*,
Chytridiomycota, one species, type: *M. penetrans* B.V.
Gromov, Mamkaeva & Pljusich, from green algae, Asia, see

- Karpov et al. (2010, 2014; phylogeny), cultures and sequences are available.
- Micromyces** P.A. Dang. 1889 (= *Micromycopsis* Scherff. 1926), *Synchytriales* genera *incertae sedis*, *Synchytriomycetes*, *Chytridiomycota*, c. 13 species, type: *M. zygonii* P.A. Dang., on algae, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Mitochytridium** P.A. Dang. 1911, *Chytridiomycetes* genera *incertae sedis*, *Chytridiomycota*, two species, type: *M. ramosum* P.A. Dang., cosmopolitan, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Mucophilus** Plehn 1920, *Chytridiomycetes* genera *incertae sedis*, *Chytridiomycota*, one species, type: *M. cyprini* Plehn, in fishes, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Myiophagus** Thaxt. ex Sparrow 1939, *Chytridiales* genera *incertae sedis*, *Chytridiomycetes*, *Chytridiomycota*, one species, type: *M. ucrainicus* (Wize) Sparrow, in fishes, Europe, USA, Colombia, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Neokarlingia** Longcore & D.R. Simmons 2012, *Polychytriaceae*, *Polychytriales*, *Polychytriomycetes*, *Chytridiomycota*, one species, type: *N. chitinophila* (Karling) Longcore & D.R. Simmons, USA, see Longcore and Simmons (2012; taxonomy), cultures and sequences are available.
- Nephridiophaga** Ivanić 1937, *Nephridiophagaceae*, *Nephridiophagales*, *Chytridiomycetes*, *Chytridiomycota*, 13 species, type: *N. apis* Ivanić, insect parasites, worldwide, see Radek et al. (2011, 2017; new species), cultures of infected hosts and sequences are available.
- Nephrochytrium** Karling 1938, *Cladochytriales* genera *incertae sedis*, *Cladochytriomycetes*, *Chytridiomycota*, three species, type: *N. appendiculatum* Karling, cosmopolitan, see Mozley-Standridge et al. (2009; DNA), Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Nowakowskia** Borzí 1885, *Chytridiomycetes* genera *incertae sedis*, *Chytridiomycota*, one species, type: *N. hormothecae* Borzí, saprobes, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Nowakowskiella** J. Schröt. 1893, *Nowakowskiellaceae*, *Cladochytriales*, *Cladochytriomycetes*, *Chytridiomycota*, c. 15 species, type: *N. elegans* (Nowak.) J. Schröt., saprobes, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Obelidium** Nowak. 1877, *Chytriomycetaceae*, *Chytridiales*, *Chytridiomycetes*, *Chytridiomycota*, three species, type: *O. mucronatum* Nowak., on mosquito larva, Europe, see Blackwell et al. (2012; review), Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Odontochytrium** Vélez & Letcher 2013, *Chytriomycetaceae*, *Chytridiales*, *Chytridiomycetes*, *Chytridiomycota*, one species, type: *O. milleri* Vélez & Letcher, saprobes, South America, see Vélez et al. (2013; taxonomy), Letcher et al. (2014; phylogeny), cultures and sequences are available, ITS of the type: NG_042745.
- Olpidiaster** Pascher 1917, *Chytridiomycetes* genera *incertae sedis*, *Chytridiomycota*, three species, type: *O. brassicae* (Woronin) Doweld, parasitic, cosmopolitan, see Doweld et al. (2014; taxonomy), cultures and sequences are unavailable.
- Operculomyces** M.J. Powell, Letcher & Longcore 2011, *Operculomycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *O. laminatus* M.J. Powell, Letcher & Longcore, from soil, USA, see Powell et al. (2011; taxonomy), cultures and sequences are available, ITS of the type: NR_119590.
- Oryctospora** Purriini & Weiser 1990, *Nephridiophagaceae*, *Nephridiophagales*, *Chytridiomycetes*, *Chytridiomycota*, one species, type: *O. alata* Purriini and Weiser, insect parasites, cultures and sequences are unavailable.
- Paludomyces** Letcher & M.J. Powell 2015, *Halomycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *P. mangrovei* (Ulken) Letcher & M.J. Powell, marine, see Letcher et al. (2015a; taxonomy), cultures and sequences are available, ITS of the type: NR_138404.
- Paranomyces** Letcher & M.J. Powell 2015, *Halomycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *P. uniporus* Letcher & M.J. Powell, marine, South America, see Letcher et al. (2015a; taxonomy), cultures and sequences are available, ITS of the type: KP723828.
- Pateramyces** Letcher 2008, *Pateramycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *P. corrientinensis* Letcher, South America, see Letcher et al. (2008c; taxonomy), Powell et al. (2015; phylogeny), cultures and sequences are available, ITS of the type: NR_111261.
- Peltomyces** Léger 1909, *Nephridiophagaceae*, *Nephridiophagales*, *Chytridiomycetes*, *Chytridiomycota*, one species, type: *P. hyalinus* Léger, insect parasites, cultures and sequences are unavailable.
- Pendulichytrium** K. Seto & Degawa 2017, *Chytriomycetaceae*, *Chytridiales*, *Chytridiomycetes*, *Chytridiomycota*, one species, type: *P. sphaericum* K. Seto & Degawa, saprobes, Japan, see Seto and Degawa (2017; taxonomy), cultures and sequences are available, ITS of the type: LC223124.
- Perolpidium** Doweld 2014, *Chytridiomycetes* genera *incertae sedis*, *Chytridiomycota*, one species, type: *P. sacatum* (Sorokin) Doweld, saprobes, see Doweld (2014m; taxonomy), cultures and sequences are unavailable.

- Phlyctochytrium** J. Schröt. 1892, *Phlyctochytriaceae* Chytridiales, Chytridiomycetes, Chytridiomycota, c. 35 species, type: *P. hydrodictyi* (A. Braun) J. Schröt., saprobes, see Letcher et al. (2012a, b; DNA), Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Phlyctorhiza** A.M. Hanson 1946, *Phlyctorhizaceae*, Chytridiales, Chytridiomycetes, Chytridiomycota, one species, type: *P. endogena* A.M. Hanson, saprobes, on insect remains, USA, see Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Physocladia** Sparrow 1932, *Chytriomycetaceae*, Chytridiales, Chytridiomycetes, Chytridiomycota, one species, type: *P. obscura* (Sparrow) Sparrow, saprobes, on insect remains, USA, see Picard et al. (2009; phylogeny), Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Physorhizophidium** Scherff. 1926, *Chytridiomycetes* genera incertae sedis, Chytridiomycota, one species, type: *P. pachydermum* Scherff., on diatoms, USA, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Plasmophagus** De Wild. 1895, *Chytridiomycetes* genera incertae sedis, Chytridiomycota, one species, type: *P. oedogoniorum* De Wild., in algae, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Podochytrium** Pfitzer 1870, *Chytriomycetaceae*, Chytridiales, Chytridiomycetes, Chytridiomycota, seven species, type: *P. clavatum* Pfitzer, worldwide, see Kirk et al. (2013; genus accepted), Blooi et al. (2013; growing media), cultures and sequences are available.
- Polychytrium** Ajello 1942, *Polychytriaceae*, *Polychytriales*, *Polychytriomycetes*, Chytridiomycota, one species, type: *P. aggregatum* Ajello, saprobes, USA, see Kirk et al. (2013; genus accepted), cultures and sequences are available, ITS from reference material NR_119549 (fide James et al. 2006).
- Polyphagus** Nowak. 1877, *Polyphagaceae*, *Polyphagales*, Chytridiomycetes, Chytridiomycota, ten species, type: *P. euglenae* (Bail) Nowak., saprobes, worldwide, see Kirk et al. (2013; genus accepted), Doweld (2014n; new species), cultures and sequences are unavailable.
- Polyphlyctis** Karling 1968, *Chytridiaceae*, Chytridiales, Chytridiomycetes, Chytridiomycota, two species, type: *P. unispina* (R.A. Paterson) Karling, saprobes, cosmopolitan, see Vélez et al. (2011; DNA), Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Powellomyces** Longcore, D.J.S. Barr & Désauln. 1995, *Powellomycetaceae*, *Spizellomycetales*, *Spizellomycetes*, Chytridiomycota, one species, type: *P. hirtus* Longcore, D.J.S. Barr & Désauln., saprobes, Canada, see Simmons (2011; DNA, phylogeny, proposed *Powellomycetaceae*), Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Protrudomyces** Letcher 2008, *Protrudomycetaceae*, *Rhizophydiales*, *Rhizophyidiomycetes*, Chytridiomycota, one species, type: *P. lateralis* (A. Braun) Letcher, saprobes, South America, see Letcher et al. (2008c; taxonomy), cultures and sequences are available, ITS of the type NR_119650.
- Pseudopileum** Canter 1963, *Chytridiomycetes* genera incertae sedis, Chytridiomycota, one species, type: *P. unum* Canter, saprobes, British Isles, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Pseudorhizidium** M.J. Powell, Letcher & Longcore 2013, *Pseudorhizidiaceae*, Chytridiales, Chytridiomycetes, Chytridiomycota, one species, type: *P. endosporangiatum* (Karling) M.J. Powell, Letcher & Longcore, saprobes, USA, see Powell et al. (2013; genus accepted), cultures and sequences are available, ITS of the type NR_111221.
- Rhizidiocystis** Sideris 1929, *Chytridiomycetes* genera incertae sedis, Chytridiomycota, one species, type: *R. ananasi* Sideris, saprobes, Hawaii, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Rhizidium** A. Braun 1856, *Chytriomycetaceae*, Chytridiales, Chytridiomycetes, Chytridiomycota, c. 20 species, type: *R. mycophilum* A. Braun, saprobes, cosmopolitan, see Picard et al. (2009; new species, DNA), Kirk et al. (2013; genus accepted), Doweld (2014h; sub-order *Rhizidiineae*), cultures and sequences are available.
- Rhizoclostratium** H.E. Petersen 1903, *Chytriomycetaceae*, Chytridiales, Chytridiomycetes, Chytridiomycota, species, type: *R. globosum* H.E. Petersen, saprobes, worldwide, see Kirk et al. (2013; genus accepted), Akinwole et al. (2014; fatty acids), cultures and sequences are available.
- Rhizophlyctis** A. Fisch. 1892, *Rhizophlyctidaceae*, *Rhizophlyctidiales*, *Rhizophlyctidomycetes*, Chytridiomycota, c. ten species, type: *R. rosea* (de Bary & Woronin) A. Fisch., saprobes, worldwide, see Marano et al. (2011; diversity), Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Rhizophydium** Schenk ex Rabenh. 1868, *Rhizophydiaceae*, *Rhizophydiales*, *Rhizophyidiomycetes*, Chytridiomycota, c. 110 species, type: *R. globosum* (A. Braun) Rabenh., saprobes, parasites, worldwide, see Lilje and Lilje (2008; colony physiology), Gerphagnon et al. (2013; occurrence), Kirk et al. (2013; genus accepted), Zhang et al. (2015; occurrence and molecular detection), Maier and Peterson (2016, specific qPCR detection & identification), Scholz et al. (2016; pathogen), Seto et al. (2017; phylogeny), Frenken et al. (2017; ecology), cultures and sequences are available.
- Rhizosiphon** Scherff. 1926, *Chytridiomycetes* genera incertae sedis, Chytridiomycota, three species, type: *R. crassum* Scherff., parasitic, worldwide, see Kirk et al.

- 2006 (2013; genus accepted), Doweld (2014o; new species),
2007 cultures and sequences are unavailable.
- 2008 **Rhopalophlyctis** Karling 1945, *Chytridiomycetes* genera
2009 *incertae sedis*, *Chytridiomycota*, one species, type: *R.*
2010 *sarcoptoides* Karling, parasitic, America, see Kirk et al.
2011 (2013; genus accepted), cultures and sequences are
2012 unavailable.
- 2013 **Riethophlyctis** Doweld 2014, *Chytridiomycetes* genera *in-*
2014 *certae sedis*, *Chytridiomycota*, one species, type: *R. vau-*
2015 *cheriae* Doweld, Europe, see Doweld (2014p; taxonomy),
2016 cultures and sequences are unavailable.
- 2017 **Saccomyces** Serbinow 1907, *Chytridiomycetes* genera *in-*
2018 *certae sedis*, *Chytridiomycota*, two species, type: *S. dan-*
2019 *geardii* Serbinow, Europe, see Kirk et al. (2013; genus
2020 accepted), cultures and sequences are unavailable.
- 2021 **Saccopodium** Sorokĭn 1877, *Saccopodiaceae*, *Saccopodi-*
2022 *ales*, *Chytridiomycetes*, *Chytridiomycota*, one species,
2023 type: *S. gracile* Sorokĭn, Asia, see Kirk et al. (2013; genus
2024 accepted), cultures and sequences are unavailable.
- 2025 **Sagittospora** Lubinsky 1955, *Chytridiomycetes* genera *in-*
2026 *certae sedis*, *Chytridiomycota*, one species, type: *S.*
2027 *cameronii* Lubinsky, on *Eudiplodinium*, Asia, see Kirk
2028 et al. (2013; genus accepted), cultures and sequences are
2029 unavailable.
- 2030 **Scherffeliomyces** Sparrow 1934, *Scherffeliomycetaceae*,
2031 *Chytridiales*, *Chytridiomycetes*, *Chytridiomycota*, one
2032 species, type: *S. parasitans* (Sparrow) Sparrow, cos-
2033 mopolitan, see Kirk et al. (2013; genus accepted), cultures
2034 and sequences are unavailable.
- 2035 **Scherffeliomycopsis** Geitler 1962, *Chytridiomycetes* gen-
2036 *era incertae sedis*, *Chytridiomycota*, one species, type: *S.*
2037 *coleochaetes* Geitler, on algae, Europe, see Kirk et al.
2038 (2013; genus accepted), cultures and sequences are
2039 unavailable.
- 2040 **Schizolpidium** Doweld 2014, *Chytridiomycetes* genera *in-*
2041 *certae sedis*, *Chytridiomycota*, one species, type: *S. majus*
2042 (Ivimey Cook & W.B. Collins) Doweld, on cucumber, see
2043 Doweld et al. (2014q; taxonomy), cultures and sequences
2044 are unavailable.
- 2045 **Septochytrium** Berdan 1939, *Septochytriaceae*, *Cladochy-*
2046 *triales*, *Cladochytriomycetes*, *Chytridiomycota*, five spe-
2047 cies, type: *S. variabile* Berdan, on grass, USA, see Kirk
2048 et al. (2013; genus accepted), cultures and sequences are
2049 available.
- 2050 **Septolpidium** Sparrow 1933, *Chytridiomycetes* genera *in-*
2051 *certae sedis*, *Chytridiomycota*, one species, type: *S. lineare*
2052 Sparrow, in diatoms, Europe, see Kirk et al. (2013; genus
2053 accepted), cultures and sequences are available.
- 2054 **Septosperma** Whiffen ex R.L. Seym. 1971, *Chytrid-*
2055 *iomycetes* genera *incertae sedis*, *Chytridiomycota*, four
2056 species, type: *S. anomalum* (Couch) Whiffen ex R.L.
2057 Seym., on chytrids, Europe, see Kirk et al. (2013; genus
2058 accepted), cultures and sequences are unavailable.
- Siphonaria** H.E. Petersen 1903, *Chytriomycetaceae*,
Chytridiales, *Chytridiomycetes*, *Chytridiomycota*, three
species, type: *S. variabilis* H.E. Petersen, on chytrids,
Europe, see Kirk et al. (2013; genus accepted), cultures and
sequences are unavailable.
- Solutoparies** Whiffen ex W.H. Blackw. & M.J. Powell
1998, *Chytridiomycetes* genera *incertae sedis*, *Chytrid-*
iomycota, four species, type: *S. pythii* Whiffen ex W.H.
Blackw. & M.J. Powell, on chytrids, Europe, see Kirk et al.
(2013; genus accepted), cultures and sequences are
unavailable.
- Sonoraphlyctis** Letcher 2008, *Sonoraphlyctidaceae*, *Rhi-*
zophlyctidiales, *Rhizophlyctidomycetes*, *Chytridiomycota*,
one species, type: *S. ranzoni* Letcher, saprobes, USA, see
Letcher et al. (2008a; taxonomy), cultures and sequences
are available, ITS of the type NG_042454.
- Sorokinocystis** Doweld 2014, *Chytridiomycetes* genera
incertae sedis, *Chytridiomycota*, one species, type: *S.*
mirabilis (Sorokĭn) Doweld, saprobes, see Doweld et al.
(2014r; taxonomy), cultures and sequences are unavailable.
- Sparrowia** Willoughby 1963, *Sparrowiaceae*, *Chytrid-*
iomycetes families *incertae sedis*, *Chytridiomycota*, four
species, type: *S. parasitica* Willoughby, on fungi, Europe,
see Kirk et al. (2013; genus accepted), cultures and
sequences are unavailable.
- Spizellomyces** D.J.S. Barr 1980, *Spizellomycetaceae*,
Spizellomycetales, *Spizellomycetes*, *Chytridiomycota*, eight
species, type: *S. punctatus* (W.J. Koch) D.J.S. Barr, sap-
robes, worldwide, see Freeman et al. (2009; occurrence),
Kirk et al. (2013; genus accepted), Russ et al. (2016;
genome sequence), Ahrendt et al. (2017; biotechnology),
Hérivaux et al. (2017; biotechnology), cultures and
sequences are available, ITS of the type: NR_111189.
- Sporophlyctidium** Sparrow 1933, *Chytridiomycetes* genera
incertae sedis, *Chytridiomycota*, two species, type: *S.*
africanum Sparrow, on algae, Morocco, see Kirk et al.
(2013; genus accepted), cultures and sequences are
unavailable.
- Sporophlyctis** Serbinow 1900, *Chytridiomycetes* genera
incertae sedis, *Chytridiomycota*, one species, type: *S. ros-*
trata Serbinow, on algae, Asia, see Kirk et al. (2013; genus
accepted), cultures and sequences are unavailable.
- Staurostromyces** S. Van den Wyngaert, K. Seto & K.
Rojas-Jimenez 2017, *Staurostromycetaceae*, *Rhizophydi-*
ales, *Rhizophyidiomycetes*, *Chytridiomycota*, one species,
type: *S. oculus* S. Van den Wyngaert, K. Seto & K. Rojas-
Jimenez, Germany, see Van den Wyngaert et al. (2017;
taxonomy, phylogeny), sequences available, ITS of the
type culture KY350146.
- Synchytrium** de Bary & Woronin 1863 [1865], *Synchy-*
triaceae, *Synchytriales*, *Synchytriomycetes*, *Chytridiomy-*
cota, c. 100 species, type: *S. taraxaci* de Bary & Woronin,
saprobes, Europe, see Ballvora et al. (2011; pathogenicity),

- Yun et al. (2011; new report from Korea), Kirk et al. (2013; genus accepted), Smith et al. (2014; taxonomy and molecular detection), Obidiegwu et al. (2015; pathogenicity), Longcore et al. (2016; new species), cultures and sequences are available.
- Terramyces** Letcher 2006, *Terramycetaceae*, *Rhizophydiales*, *Chytridiomycetes*, *Rhizophydiomycetes*, one species, type: *T. subangulosus* (A. Braun) Letcher, on diatoms, Europe, see Letcher et al. (2008b; phylogeny), Gleason et al. (2011; physiology), cultures and sequences are available, ITS of the type: NR_119592.
- Tetrachytrium** Sorokin 1874, *Tetrachytriaceae*, *Chytridiomycetes* families incertae sedis, *Chytridiomycota*, one species, type: *T. triceps* Sorokin, saprobes, Asia, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Thalassochytrium** Nyvall, M. Pedersén & Longcore 1999, *Thalassochytriaceae*, *Chytridiomycetes* families incertae sedis, *Chytridiomycota*, one species, type: *T. gracilariopsis* Nyvall, M. Pedersén & Longcore, saprobes, China, see Kirk et al. (2013; genus accepted), cultures and sequences are available.
- Thoreauomyces** D.R. Simmons & Longcore 2012, *Powellomycetaceae*, *Spizellomycetales*, *Spizellomycetes*, *Chytridiomycota*, one species, type: *T. humboldtii* D.R. Simmons & Longcore, in soil, USA, see Simmons and Longcore (2012; taxonomy), cultures and sequences are available.
- Trematophlyctis** Pat. 1918, *Chytridiomycetes* genera incertae sedis, *Chytridiomycota*, one species, type: *T. leptodesmiae* Pat., saprobes, Madagascar, see Simmons and Longcore (2012; taxonomy), cultures and sequences are unavailable.
- Triparticalcar** D.J.S. Barr 1980, *Spizellomycetaceae*, *Spizellomycetales*, *Spizellomycetes*, *Chytridiomycota*, one species, type: *T. arcticum* (D.J.S. Barr) D.J.S. Barr, cultures and sequences are available.
- Truittella** Karling 1949, *Chytridiomycetes* genera incertae sedis, *Chytridiomycota*, one species, type: *T. setifera* Karling, saprobes, USA, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Uebelmesseromyces** M.J. Powell & Letcher 2015, *Uebelmesseromycetaceae*, *Rhizophlyctidiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *U. harderi* M.J. Powell & Letcher, saprobes, USA, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Ulkenomyces** Letcher & M.J. Powell 2015, *Halomycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *U. aestuarii* (Ulken) Letcher & M.J. Powell, saprobes, USA, see Letcher et al. (2015a; taxonomy), cultures and sequences are available.
- Urceomyces** Letcher 2008, *Globomycetaceae*, *Rhizophydiales*, *Rhizophydiomycetes*, *Chytridiomycota*, one species, type: *U. sphaerocarpus* (Zopf) Letcher, saprobes, America, see Letcher et al. (2008c; taxonomy), cultures and sequences are available.
- Volvorax** Doweld 2013, *Chytridiomycetes* genera incertae sedis, *Chytridiomycota*, one species, type: *V. ingoldii* Doweld, saprobes, UK, see Doweld et al. (2013a, b, c, d; taxonomy), cultures and sequences are unavailable.
- Zygochytrium** Sorokin 1874, *Chytridiomycetes* genera incertae sedis, *Chytridiomycota*, one species, type: *Z. aurantiacum* Sorokin, saprobes, Asia, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.
- Zygophlyctis** Doweld 2014, *Chytridiomycetes* genera incertae sedis, *Chytridiomycota*, one species, type: *Z. planktonica* Doweld, saprobes, Europe, see Doweld (2014a; taxonomy), cultures and sequences are unavailable.
- Zygorhizidium** Löwenthal 1904, *Zygorhizidiaceae*, *Chytridiales*, *Chytridiomycetes*, *Chytridiomycota*, c. ten species, type: *Z. willei* Löwenthal, saprobes, cosmopolitan, see Gsell et al. (2013; pathogenicity), Kirk et al. (2013; genus accepted), Seto et al. (2017; DNA, phylogeny), cultures and sequences are available.
- Calcarisporiellomycota** Tedersoo, Koljalg, Bahram, Doring, Schigel, T. May, Sanchez-Ramirez, M. Ryberg & Abarenkov
- Hirose et al. (2012) showed that *Calcarisporiella* de Hoog has phylogenetic affinity within Mucoromycotina but distinct to *Endogonales*, *Mortierellales* and *Mucorales*. Tedersoo et al. (2016) confirmed the findings in Hirose et al. (2012) and established a new phylum, *Calcarisporiellomycota* to accommodate *Calcarisporiella* and *Echinochlamydosporium*.
- We accept one class, one order, one family and two genera in *Calcarisporiellomycota*.
- Notes for genera**
- Calcarisporiella** de Hoog 1974, *Calcarisporiellaceae*, *Calcarisporiellales*, *Calcarisporiellomycetes*, *Calcarisporiellomycota*, one species, type: *C. thermophilum* H.C. Evans, hyphomycetous, isolate obtained from coal spoil tip soil, Europe, see Seifert et al. (2011; morphology), Hirose et al. (2012; DNA), Morgenstern et al. (2012; phylogeny), Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are available.
- Echinochlamydosporium** X.Z. Jiang, H.Y. Yu, M.C. Xiang, X.Y. Liu & Xing Z. Liu 2011, *Calcarisporiellaceae*, *Calcarisporiellales*, *Calcarisporiellomycetes*, *Calcarisporiellomycota*, one species, type: *E. variabile* X.Z. Jiang, H.Y. Yu, M.C. Xiang, X.Y. Liu & Xing Z. Liu, from nematodes, Liaoning (China), see Jiang et al. (2011;

2215 taxonomy), Benny et al. (2016b; classification), cultures and
2216 and sequences are unavailable.

2217 *Entomophthoromycota* Humber

2218 Introduction

2219 Humber (2012) introduced the phylum *Entomoph-*
2220 *thoromycota* to accommodate subphylum *Entomoph-*
2221 *thoromycotina* Humber which was introduced by Hibbett
2222 et al. (2007). The phylum comprises obligate parasites of
2223 animals which are distributed worldwide. Spatafora et al.
2224 (2016) did not accept Humber (2012) and proposed to
2225 maintain the subphylum *Entomophthoromycotina* under
2226 *Zoopagomycota*.

2227 We accept *Entomophthoromycota* as a distinct phylum
2228 which comprises two classes, two orders, five families and
2229 21 genera.

2230 Notes for genera

2231 *Ancylistes* Pfitzer 1872, *Ancylistaceae*, *Entomophthorales*,
2232 *Entomophthoromycetes*, *Entomophthoromycota*, five spe-
2233 cies, type: *A. closterii* Pfitzer, pathogens of desmid algae,
2234 cosmopolitan, see Humber (2012; classification), Kirk et al.
2235 (2013; genus accepted), Gryganskyi et al. (2013a; notes),
2236 cultures and sequences are unavailable.

2237 *Apterivorax* S. Keller 2005, *Neozygitaceae*, *Neozygiales*,
2238 *Neozygitomycetes*, *Entomophthoromycota*, two species,
2239 type: *A. sminthuri* (S. Keller & Steenb.) S. Keller, patho-
2240 gens, worldwide, see Humber (2012; classification), Gry-
2241 ganskyi et al. (2013a; notes), cultures and sequences are
2242 unavailable.

2243 *Batkoa* Humber 1989, *Entomophthoraceae*, *Entomophtho-*
2244 *rales*, *Entomophthoromycetes*, *Entomophthoromycota*, ten
2245 species, type: *B. apiculata* (Thaxt.) Humber, pathogens of
2246 insects, cosmopolitan, see Rocha et al. (2009; Brazil), Hum-
2247 ber (2012; classification), Hoffmann et al. (2013; phylogeny),
2248 Kirk et al. (2013; genus accepted), Gryganskyi et al. (2013a;
2249 notes), cultures and sequences are unavailable.

2250 *Completozia* Lohde 1874, *Completoziaceae*, *Entomoph-*
2251 *thorales*, *Entomophthoromycetes*, *Entomophthoromycota*,
2252 one species, type: *C. complens* Lohde, on pteridophyta,
2253 worldwide, see Humber (2012, 2016; classification),
2254 Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus
2255 accepted), Gryganskyi et al. (2013a; notes), cultures and
2256 sequences are unavailable.

2257 *Conidiobolus* Bref. 1884, *Ancylistaceae*, *Entomophtho-*
2258 *rales*, *Entomophthoromycetes*, *Entomophthoromycota*, c.
2259 40 species, type: *C. utriculosus* Bref., pathogens or sap-
2260 robes, worldwide, see Shankar et al. (2010; recovering
2261 silver from X ray film), Vilela et al. (2010; infection on
2262 sheep), Wüppenhorst et al. (2010; human pathogen),
2263 Kimura et al. (2011), Subramanian and Sobel (2011;
2264 human conidiobolomycosis), Humber (2012; classifica-
2265 tion), Nie et al. (2012; new species), Hoffmann et al. (2013;

notes), Kirk et al. (2013; genus accepted), Gryganskyi et al.
(2013a; notes), Mackey et al. (2015; dog pathogens), John
et al. (2016; human pathogen), Yong et al. (2016; new
species), cultures and sequences are available, *C. incon-*
gruus CDC-B7586 (Chibucos et al. 2016) available at
NCBI, *C. coronatus* NRRL 28638 [25977457] available at
NCBI.

Entomophaga A. Batko 1964, *Entomophthoraceae*, *Ento-*
mophthorales, *Entomophthoromycetes*, *Entomoph-*
thoromycota, c. 17 species, type: *E. grylli* (Fresen.) A.
Batko, on insects, saprobes, cosmopolitan, see Kereselidze
et al. (2011; Georgia), Tabaković-Tošić et al. (2012; Ser-
bia), Gryganskyi et al. (2013a; phylogeny), Kirk et al.
(2013; genus accepted), cultures and sequences are
available.

Entomophthora Fresen. 1856, *Entomophthoraceae*, *Ento-*
mophthorales, *Entomophthoromycetes*, *Entomoph-*
thoromycota, c. 30 species, type: *E. muscae* (Cohn)
Fresen., on insects, saprobes, cosmopolitan, see Jensen
et al. (2009; differential divergence), Lihme et al. (2009;
epidemics), Gryganskyi et al. (2013a, b; phylogeny, species
complex), Kirk et al. (2013; genus accepted), Mendoza
et al. (2015; human pathogens), cultures and sequences are
available, genome available: *Entomophthora muscae*
[27717247] at NCBI.

Erynia (Nowak. ex A. Batko) Remaud. & Hennebert 1980,
Entomophthoraceae, *Entomophthorales*, *Entomoph-*
thoromycetes, *Entomophthoromycota*, c. 20 species, type:
E. ovispora (Nowak.) Remaud. & Hennebert, on insects,
cosmopolitan, see Gryganskyi et al. (2012, 2013a; phy-
logeny), Hoffman et al. (2013; notes), Kirk et al. (2013;
genus accepted), cultures and sequences are available.

Eryniopsis Humber 1984, *Entomophthoraceae*, *Ento-*
mophthorales, *Entomophthoromycetes*, *Entomoph-*
thoromycota, five species, type: *E. lampyridarum* (Thaxt.)
Humber, on insects, cosmopolitan, see Gryganskyi et al.
(2013a; phylogeny), Hoffman et al. (2013; notes), Kirk
et al. (2013; genus accepted), Steinkraus et al. (2017; insect
pathogens), cultures and sequences are available.

Furia (A. Batko) Humber 1989, *Entomophthoraceae*, *Ento-*
mophthorales, *Entomophthoromycetes*, *Entomoph-*
thoromycota, c. 18 species, type: *F. virescens* (Thaxt.)
Humber, on insects, cosmopolitan, see Tkaczyk et al.
(2011; Poland, Austria), Humber (2012; classification),
Gryganskyi et al. (2013a; phylogeny), Kirk et al. (2013;
genus accepted), cultures and sequences are available.

Macrobotophthora Reukauf 1912, *Ancylistaceae*, *Ento-*
mophthorales, *Entomophthoromycetes*, *Entomoph-*
thoromycota, two species, type: *M. vimariensis* Reukauf, in
soil, pathogens of nematodes, Europe, see Humber (2012;
classification), Kirk et al. (2013; genus accepted), Gry-
ganskyi et al. (2013a; notes phylogeny), Hussain et al.
(2014; mycoinsecticide), a sequence is available.

- 2319 **Massospora** Peck 1878, *Entomophthoraceae*, *Entomoph-*
 2320 *thorales*, *Entomophthoromycetes*, *Entomophthoromycota*,
 2321 c. 14 species, type: *M. cicadina* Peck, on insects, cos-
 2322 mopolitan, see Humber (2012; classification), Gryganskyi
 2323 et al. (2013a, 2017; phylogeny, insect pathogens), Hoffman
 2324 et al. (2013; notes), Kirk et al. (2013; genus accepted),
 2325 Cooley et al. (2018; host sexual signal hijack), cultures and
 2326 sequences are available.
- 2327 **Meristacrum** Drechsler 1940, *Meristacraceae*, *Entomoph-*
 2328 *thorales*, *Entomophthoromycetes*, *Entomophthoromycota*,
 2329 c. 15 species, type: *M. asterospermum* Drechsler, on
 2330 nematodes, cosmopolitan, see Humber (2012; classifica-
 2331 tion), Gryganskyi et al. (2013a; classification), Hoffman
 2332 et al. (2013; notes), Kirk et al. (2013; genus accepted),
 2333 cultures and sequences are unavailable.
- 2334 **Neozygites** Witlaczil 1885, *Neozygitaceae*, *Neozygiales*,
 2335 *Neozygitomycetes*, *Entomophthoromycota*, 24 species,
 2336 type: *N. fresenii* (Nowak.) Remaud. & S. Keller, insects,
 2337 mites and springtails pathogens, worldwide, see Simelane
 2338 et al. (2008; host control), Agboton et al. (2011, 2013;
 2339 phylogeny, interaction with predatory mite *Typhlodroma-*
 2340 *lus aripo*), Gryganskyi et al. (2013a; DNA), Kirk et al.
 2341 (2013; genus accepted), Zhou et al. (2017; new species),
 2342 cultures and sequences are available.
- 2343 **Orthomyces** Steinkr., Humber & J.B. Oliv. 1998, *Ento-*
 2344 *mophthoraceae*, *Entomophthorales*, *Entomoph-*
 2345 *thoromycetes*, *Entomophthoromycota*, one species, type: *O.*
 2346 *aleyrodis* Steinkr., Humber & J.B. Oliv., in insects, USA,
 2347 see Humber (2012, 2016; classification), Gryganskyi et al.
 2348 (2013a; phylogeny, insect pathogens), Kirk et al. (2013;
 2349 genus accepted), cultures and sequences are unavailable.
- 2350 **Strongwellsea** A. Batko & J. Weiser 1965, *Entomophtho-*
 2351 *raceae*, *Entomophthorales*, *Entomophthoromycetes*, *Ento-*
 2352 *mophthoromycota*, three species, type: *S. castrans* A. Batko
 2353 & J. Weiser, in insects, USA, see Humber (2012; classifi-
 2354 cation), Gryganskyi et al. (2013a; phylogeny, insect
 2355 pathogens), Kirk et al. (2013; genus accepted), cultures and
 2356 a sequence are available.
- 2357 **Tabanomyces** Couch, R.V. Andrejeva, Laird & Nolan
 2358 1979, *Meristacraceae*, *Entomophthorales*, *Entomoph-*
 2359 *thoromycetes*, *Entomophthoromycota*, c. 15 species, type:
 2360 *T. milkoii* (Dudka & Koval) Couch, R.V. Andrejeva, Laird
 2361 & Nolan, from larva of horse flies, Ukraine, see Humber
 2362 (2012; classification), cultures and sequences are
 2363 unavailable.
- 2364 **Tarichium** Cohn 1875, *Entomophthoraceae* or *Neozygi-*
 2365 *taceae*, *Entomophthorales*, *Entomophthoromycetes*, *Ento-*
 2366 *mophthoromycota*, c. 26 species, type: *T. megaspermum*
 2367 Cohn, in insects, USA, see Keller et al. (2009; new spe-
 2368 cies), Humber (2012; classification, attributable in part to
 2369 *Entomophthoraceae* with some mite-pathogenic species
 2370 probably better classified in *Neozygites*), Gryganskyi et al.
 2371 (2013a; phylogeny, insect pathogens), Kirk et al. (2013;
 genus accepted), Hajek et al. (2016; two species known
 only from resting spores but placed genomically in
Zoophthora), some cultures and sequences are available.
- Thaxterosporium** Ben Ze'ev & R.G. Kenneth 1987,
Neozygitaceae, *Neozygiales*, *Neozygitomycetes*, *Ento-*
mophthoromycota, one species, type: *T. turbinatum* (R.G.
 Kenneth) R.G. Kenneth & Ben Ze'ev, insect pathogens,
 worldwide, see Humber et al. (2012; classification), Gry-
 ganskyi et al. (2013a; DNA), Kirk et al. (2013; genus
 accepted), cultures and sequences are unavailable, current
 name of the type: *Neozygites turbinata* (R.G. Kenneth)
 Remaud. & S. Keller *fide* Species Fungorum (2018).
- Zoophthora** A. Batko 1964, *Entomophthoraceae*, *Ento-*
mophthorales, *Entomophthoromycetes*, *Entomoph-*
thoromycota, 36 species, type: *Z. radicans* (Bref.) A.
 Batko, in insects, worldwide, see Guzmán-Franco et al.
 (2008; PCR primers), Xu et al. (2009; EST analysis), Batta
 et al. (2011; application), Humber (2012; classification),
 Mascarin et al. (2012; on *Thaumastocoris peregrines*),
 Gryganskyi et al. (2013a; phylogeny, insect pathogens),
 Kirk et al. (2013; genus accepted), Hajek et al. (2016; new
 species), a sequence is available.

Glomeromycota C. Walker & A. Schüßler

Introduction

Schüßler et al. (2001) introduced the phylum *Glomeromycota* to accommodate arbuscular mycorrhizal fungi. Subsequent studies by Hibbett et al. (2007), Kirk et al. (2008), Oehl et al. (2011d, e, g) and Redecker et al. (2013) accepted this phylum. However, Spatafora et al. (2016) introduced subphylum *Glomeromycotina* Spatafora & Stajich (demoted the phylum to subphylum) and accepted under phylum *Mucoromycota*.

We accept *Glomeromycota* (as a distinct phylum) with three classes, four orders, twelve families and 33 genera.

Notes for genera

Acaulospora Gerd. & Trappe 1974 (= *Kuklospora* p. p. Oehl & Sieverd. 2006), *Acaulosporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, c. 54 species, type: *A. laevis* Gerd. & Trappe, arbuscular mycorrhizal, terrestrial, worldwide, see Kaonongbua et al. (2010; new species), Krüger et al. (2011, 2012; new species, phylogeny), Vaingankar and Rodrigues (2011; new species), Oehl et al. (2011a, b, 2012b, c, 2014; new species, phylogeny), Furrazola et al. (2013; new species), Goto et al. (2013; new species), Redecker et al. (2013; notes, phylogeny), Błaszkowski et al. (2015a; new species), Palenzuela et al. (2013a, 2014, 2015; new species), Pereira et al. (2016a, b; new species), de Souza et al. (2017; new species), Crossay et al. (2018; new species), cultures and sequences are available.

- Ambispora** C. Walker, Vestberg & A. Schüßler 2007 (= *Appendicispora* Spain, Oehl & Sieverding 2006; = *Paracaulospora* S.P. Gautam & U.S. Patel 2007; = *Pseudoglomerus* S.P. Gautam & U.S. Patel 2007), *Ambisporaceae*, *Archaeosporales*, *Archaeosporomycetes*, *Glomeromycota*, c. 3–10 species depending on taxonomic opinion, type: *A. fennica* C. Walker, Vestberg & A. Schüßler, arbuscular mycorrhizal, terrestrial, worldwide, see Goto et al. (2008; new species), Walker (2008; resurrected the family, new species), Palenzuela et al. (2011; new species), Krüger et al. (2012; phylogeny), Oehl et al. (2012a; new species), Redecker et al. (2013; notes, phylogeny), Bills and Morton (2015; accepted only three species viz.: *A. leptoticha*, *A. gerdemanni* and *A. granatensis*, phylogeny), cultures and sequences are available.
- Archaeospora** J.B. Morton & D. Redecker 2001 (= *Intraspora* p. p. Oehl & Sieverd. 2006), *Archaeosporaceae*, *Archaeosporales*, *Archaeosporomycetes*, *Glomeromycota*, c. three species, type: *A. trappei* (R.N. Ames & Linderman) J.B. Morton & D. Redecker, arbuscular mycorrhizal, terrestrial, worldwide, see Schüßler and Walker (2010; new combination), Oehl et al. (2011d; new combinations), cultures and sequences are available.
- Bulbospora** Oehl & G.A. Silva 2014, *Gigasporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, one species, type: *B. minima* Oehl, Marinho, B.T. Goto & G.A. Silva, mycorrhizal status unknown, terrestrial, Brazil, see Marinho et al. (2014; taxonomy, described from field collected spores), cultures are unavailable and sequences from multi-species soil trap cultures available.
- Cetraspora** Oehl, F. A. Souza & Sieverd. 2009, *Gigasporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, c. four species, type: *C. gilmorei* (Trappe & Gerd.) Oehl, F.A. Souza & Sieverd, arbuscular mycorrhizal, terrestrial, North and South America, Azores, Europe, see Schüßler and Walker (2010; taxonomy), Oehl et al. (2011f; new species), Redecker et al. (2013; accepted three species), Lima et al. (2014; new species), cultures and sequences are available.
- Claroideoglomerus** C. Walker & A. Schüßler 2010 (= *Albahypha* p. p. Oehl, G.A. Silva, B.T. Goto & Sieverd. 2011), *Claroideoglomeraceae*, *Glomerales*, *Glomeromycetes*, *Glomeromycota*, eight species, type: *C. claroideum* (N.C. Schenck & G.S. Sm.) C. Walker & A. Schüßler, arbuscular mycorrhizal, terrestrial, worldwide, see Schüßler and Walker (2010; taxonomy), Krüger et al. (2012; phylogeny), Redecker et al. (2013; phylogeny), cultures and sequences are available.
- Corymbiglomerus** Błaszk. & Chwat 2012, *Diversisporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, four species, type: *C. corymbiforme* Błaszk. & Chwat, arbuscular mycorrhizal, terrestrial, Europe and North and South America, see Błaszkowski (2012; taxonomy), Redecker et al. (2013; notes), Medina et al. (2014; new species), cultures and sequences are available.
- Dentiscutata** Sieverd., F.A. Souza & Oehl (2009) [2008], *Gigasporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, c. five species, type: *D. nigra* (J.F. Redhead) Sieverd., F.A. Souza & Oehl, arbuscular mycorrhizal, terrestrial, worldwide, see Oehl et al. (2008; taxonomy), Redecker et al. (2013; epitype, rejection of *Fuscutata* and *Quatunica* and their combination with *Dentiscutata*), cultures and sequences are available, but not for type species.
- Desertispora** Błaszk., Kozłowska, Ryszka, Al-Yahya'ei & Symanczik 2018, *Diversisporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, one species, type: *D. omaniana* (Symanczik, Błaszk. & Al-Yahya'ei) Symanczik, Błaszk., Kozłowska & Al-Yahya'ei, arbuscular mycorrhizal, terrestrial, Oman, see Symanczik et al. (2018; taxonomy), cultures and sequences are available.
- Diversispora** C. Walker & A. Schüßler 2004, *Diversisporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, 17 species, type: *D. spurca* (C.M. Pfeiff., C. Walker & Bloss) C. Walker & A. Schüßler, arbuscular mycorrhizal, terrestrial, worldwide, see Gamper et al. (2009; new species), Schüßler and Walker (2010; new combinations), Estrada et al. (2011; new species), Oehl et al. (2011c; new combinations), Schüßler et al. (2011, b; relationships), Symanczik et al. (2014; new species), Błaszkowski et al. (2015e; new species), Balázs et al. (2015; new species), cultures and sequences are available.
- Dominikia** Błaszk., Chwat & Kovács 2015, *Glomeraceae*, *Glomerales*, *Glomeromycetes*, *Glomeromycota*, c. 13 species, type: *D. minuta* (Błaszk., Tadych & Madej) Błaszk., Chwat & Kovács, arbuscular mycorrhizal, terrestrial, worldwide, see Błaszkowski et al. (2015c, d, 2016; taxonomy, phylogeny), Oehl et al. (2015a; new species), cultures and sequences are available.
- Entrophospora** R.N. Ames & R.W. Schneid. 1979, *Glomeromycetes* genera *incertae sedis*, *Glomeromycota*, three species, type: *E. infrequens* (I.R. Hall) R.N. Ames & R.W. Schneid., arbuscular mycorrhizal, terrestrial, worldwide, see Oehl et al. (2011g; notes, phylogeny), Redecker et al. (2013; notes about unclear phylogenetic position), cultures and sequences are available, but sequence data and phylogenetic placement conflicting.
- Funneliformis** C. Walker & A. Schüßler 2010, *Glomeraceae*, *Glomerales*, *Glomeromycetes*, *Glomeromycota*, c. 12 species, type: *F. mosseae* (T.H. Nicolson & Gerd.) C. Walker & A. Schüßler, arbuscular mycorrhizal, terrestrial, worldwide, see Schüßler and Walker (2010; taxonomy), Oehl et al. (2011c; new combinations), Krüger et al. (2012; phylogeny), Redecker et al. (2013; phylogeny), cultures and sequences are available.

- Geosiphon** F. Wettst. 1915 (= *Geosiphonomyces* Cif. & Tomas. 1957), *Geosiphonaceae*, *Archaeosporales*, *Glomeromycetes*, *Glomeromycota*, one species, type: *G. pyri-formis* (Kütz.) F. Wettst., symbiosis with *Nostoc*, terrestrial, central Europe, see Krüger et al. (2012; phylogeny), Ellerbeck et al. (2013; ammonium transporters), cultures and sequences are available.
- Gigaspora** Gerd. & Trappe 1974, *Gigasporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, seven species, type: *G. gigantea* (T.H. Nicolson & Gerd.) Gerd. & Trappe, arbuscular mycorrhizal, terrestrial, worldwide, see Kirk et al. (2013; genus), cultures and sequences are available, but not for type species.
- Glomus** Tul. & C. Tul. 1844 (= *Endogone* p. p. Link 1809; = *Parapseudoglomus* p. p. S.P. Gautam & U.S. Patel, 2007; = *Paurocotylis* p. p. Berk. & Broome 1855; = *Sclerocystis* p. p. Berk. & Broome 1873; = *Simiglomus* p. p. Sieverd. 2011; = *Sphaeroceas* p. p. Sacc. & Ellis 1882), *Glomeraceae*, *Glomerales*, *Glomeromycetes*, *Glomeromycota*, c. 60 species (most are *Glomus sensu lato* and may belong in other genera), type: *G. macrocarpum* Tul. & C. Tul., arbuscular mycorrhizal, terrestrial, worldwide, see Khade (2009; new species), Baszkowski (2010; new species), Baszkowski et al. (2010; new species), Furrázola et al. (2011; new species), Goto et al. (2012a; new species), Cai et al. (2013; new species), Błaszowski et al. (2015b; new species), cultures and sequences are available.
- Innospora** Błasz., Kovács, Chwat & Kozłowska 2017, *Paraglomeraceae*, *Paraglomerales*, *Paraglomeromycetes*, *Glomeromycota*, one species, type: *I. majewskii* (Błasz. & Kovács) Błasz., Kovács, Chwat & Kozłowska, arbuscular mycorrhizal, terrestrial, worldwide, see Błaszowski et al. (2017; taxonomy, transfer of *Paraglomus majewskii* to *Innospora*), cultures and sequences are available.
- Intraornatospora** B.T. Goto, Oehl & G.A. Silva 2012a, *Gigasporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, one species, type: *I. intraornata* (B.T. Goto & Oehl) B.T. Goto, Oehl & G.A. Silva, arbuscular mycorrhizal, terrestrial, Brazil, see Goto et al. (2012b; taxonomy), Redecker et al. (2013; phylogeny, discussed the genus as “orphan taxon”), multi-species cultures availability unknown and sequences from multi-species cultures are available.
- Kamienskia** Błasz., Chwat & Kovács 2015, *Glomeraceae*, *Glomerales*, *Glomeromycetes*, *Glomeromycota*, three species, type: *K. bistrata* (Błasz., D. Redecker, Koegel, Symanczik, Oehl & Kovács) Błasz., Chwat & Kovács, arbuscular mycorrhizal, terrestrial, worldwide, see Błaszowski et al. (2015c, 2016; taxonomy, phylogeny, new species), cultures and sequences are available.
- Oehlia** Błasz., Kozłowska, Niezgoda, B.T.Goto & Dalpé 2018, *Glomeraceae*, *Glomerales*, *Glomeromycetes*, *Glomeromycota*, one species, type species: *O. diaphana* (J.B. Morton & C. Walker) Błasz., Kozłowska & Dalpé, arbuscular mycorrhizal, terrestrial, worldwide, see Błaszowski et al. (2018; taxonomy, phylogeny), cultures and sequences are available.
- Otospora** Oehl, Palenz. & N. Ferrol 2008, *Diversisporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, one species, type: *O. bareae* Palenz., N. Ferrol & Oehl, arbuscular mycorrhizal, terrestrial, known from Spain, see Palenzuela et al. (2008; taxonomy), Oehl et al. (2011g; notes), Redecker et al. (2013; phylogeny, mentioning genus as questionable), cultures are unavailable, sequences available are from multi-species soil trap cultures.
- Pacispora** Sieverd. & Oehl 2004, *Pacisporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, seven species, type: *P. scintillans* (S.L. Rose & Trappe) Sieverd. & Oehl ex C. Walker, Vestberg & A. Schüßler, arbuscular mycorrhizal, terrestrial, known from Europe, North and South America, Asia, see Krüger et al. (2012; phylogeny), Redecker et al. (2013; notes, phylogeny), cultures are unavailable and sequences available.
- Palaeospora** Oehl, Palenz., Sánchez-Castro & G.A. Silva 2015, *Archaeosporaceae*, *Archaeosporales*, *Archaeosporomycetes*, *Glomeromycota*, one species, type: *P. spainiae* Oehl, Palenz., Sánchez-Castro & G.A. Silva, arbuscular mycorrhizal, terrestrial, known from Switzerland, see Oehl et al. (2015b; taxonomy, phylogeny), cultures and sequences are available.
- Paradentiscutata** B.T. Goto, Oehl & G.A. Silva 2012, *Gigasporaceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromycota*, two species, type: *P. bahiana* Oehl, Magna, B.T. Goto & G.A. Silva, arbuscular mycorrhizal, terrestrial, known from Brazil, see Goto et al. (2012b; taxonomy), Redecker et al. (2013; phylogeny, suggested as designated from inadequate data and described as “orphan taxon”), multi-species cultures and sequences from multi-species cultures are available.
- Paraglomus** J.B. Morton & D. Redecker 2001, *Paraglomeraceae*, *Paraglomerales*, *Paraglomeromycetes*, *Glomeromycota*, c. eight species, type: *P. occultum* (C. Walker) J.B. Morton & D. Redecker, arbuscular mycorrhizal, terrestrial, worldwide, see Oehl et al. (2011c, 2016; new combinations, new species), Krüger et al. (2012; phylogeny), de Mello et al. (2013; new species), Redecker et al. (2013; notes, phylogeny), cultures and sequences are available.
- Pervetustus** Błasz., Chwat, Kozłowska, Symanczik & Al-Yahya’ei 2017, *Pervetustaceae*, *Paraglomerales*, *Paraglomeromycetes*, *Glomeromycota*, one species, type: *P. simplex* Błasz., Chwat, Kozłowska, Crossay, Symanczik & Al-Yahya’ei, arbuscular mycorrhizal, terrestrial, known from Europe, Northern Africa, New Caledonia, Oman, see

- 2632 Błaszkowski et al. (2017; taxonomy), cultures and
2633 sequences are available.
- 2634 **Racocetra** Oehl, F.A. Souza & Sieverd. 2009 [2008], *Gi-*
2635 *gasporaceae*, *Diversisporales*, *Glomeromycetes*, *Glom-*
2636 *eromycota*, c. 13 species, type: *R. coralloidea* (Trappe,
2637 Gerd. & I. Ho) Oehl, F.A. Souza & Sieverd., arbuscular
2638 mycorrhizal, terrestrial, known from Africa, North and
2639 South America, Asia, see Oehl et al. (2008; taxonomy),
2640 Morton and Msiska (2010; recognised the genus, Redecker
2641 et al. (2013; accepted three species viz. *R. tropicana*, *R.*
2642 *undulata* and *R. beninensis*, and, with reservation, accepted
2643 *Racocetra* as a genus), cultures and sequences are
2644 available.
- 2645 **Redeckera** C. Walker & A. Schüßler 2010, *Diversispor-*
2646 *aceae*, *Diversisporales*, *Glomeromycetes*, *Glomeromy-*
2647 *cota*, three species, type: *R. megalocarpum* (D. Redecker)
2648 C. Walker & A. Schüßler, arbuscular mycorrhizal, terres-
2649 trial, worldwide, see Schüßler and Walker (2010; taxon-
2650 omy), Krüger et al. (2012; phylogeny), Redecker et al.
2651 (2013; relationship to other genera), cultures are unavail-
2652 able and sequences available.
- 2653 **Rhizophagus** P.A. Dang. 1896 (= *Endogone* p. p. Link.
2654 1809; = *Rhizoglossum* p. p. Sieverd., G.A. Silva & Oehl
2655 2015; = *Stigeosporium* C. West 1916), *Glomeraceae*,
2656 *Glomerales*, *Glomeromycetes*, *Glomeromycota*, c. 19 spe-
2657 cies, type: *R. populinus* P.A. Dang., arbuscular mycor-
2658 rhizal, terrestrial, worldwide, see Schüßler and Walker
2659 (2010; new combinations), Redecker et al. (2013; new
2660 combination), Symanczik et al. (2014; new species),
2661 Walker et al. (2017; nomenclature, designate neotype),
2662 Crossay et al. (2018; new species), cultures and sequences
2663 are available.
- 2664 **Sacculospora** Oehl, Sieverd., G.A. Silva, B.T. Goto, I.C.
2665 Sánchez & Palenz. 2011, *Sacculosporaceae*, *Diversispor-*
2666 *ales*, *Glomeromycetes*, *Glomeromycota*, two species, type:
2667 *S. baltica* (Błaszk., Madej & Tadych) Oehl, Palenz., I.C.
2668 Sánchez, B.T. Goto, G.A. Silva & Sieverd., arbuscular
2669 mycorrhizal, terrestrial, known from Europe, India, North
2670 and South America, see Redecker et al. (2013; retained
2671 genus, but phylogenetic position is unclear), Willis et al.
2672 (2016; new species), culture availability unknown,
2673 sequences are available.
- 2674 **Sclerocystis** Berk. & Broome 1873 [1875] (= *Ackermannia*
2675 Pat. 1902; = *Xenomyces* Ces. 1879) *Glomeraceae*, *Glom-*
2676 *erales*, *Glomeromycetes*, *Glomeromycota*, c. 5 species,
2677 type: *S. coremioides* Berk. & Broome, arbuscular mycor-
2678 rhizal, terrestrial, worldwide, see Kirk et al. (2013; genus
2679 accepted), cultures and sequences are available.
- 2680 **Scutellospora** C. Walker & F.E. Sanders 1986 (= *Fuscu-*
2681 *tata* p. p. Oehl, F.A. Souza & Sieverd. 2009; = *Orbispora*
2682 p. p. Oehl, G.A. Silva & D.K. Silva 2011; = *Parascutel-*
2683 *lospora* Nom. inval. S.P. Gautam & U.S. Patel
2684 2007; = *Quatunica* p. p. F.A. Souza, Sieverd. & Oehl
2009), *Gigasporaceae*, *Diversisporales*, *Glomeromycetes*,
Glomeromycota, c. 33 species, type: *S. calospora* (T.H.
Nicolson & Gerd.) C. Walker & F.E. Sanders, arbuscular
mycorrhizal, terrestrial, worldwide, see Krüger et al. (2012;
phylogeny), Pontes et al. (2013; new species), Redecker
et al. (2013; notes, phylogeny), De Andrade et al. (2017;
new species), Crossay et al. (2018; new species), cultures
and sequences are available.
- Septoglomus** Sieverd., G.A. Silva & Oehl 2011 (= *Vis-*
cospora p. p. (T.H. Nicolson) Sieverd., Oehl & G.A. Silva
2011), *Glomeraceae*, *Glomerales*, *Glomeromycetes*,
Glomeromycota, c. ten species, type: *S. constrictum*
(Trappe) Sieverd., G.A. Silva & Oehl, arbuscular mycor-
rhizal, terrestrial, worldwide, see Krüger et al. (2012;
phylogeny), Błaszkowski et al. (2013, 2014; new species,
phylogeny), Palenzuela et al. (2013a, b; new species),
Redecker et al. (2013; phylogeny, genus accepted), cultures
and sequences are available.
- Tricispora** Oehl, Sieverd., G.A. Silva & Palenz. 2011,
Diversisporaceae, *Diversisporales*, *Glomeromycetes*,
Glomeromycota, one species, type: *T. nevadensis* (Palenz.,
N. Ferrol, Azcón-Aguilar & Oehl) Oehl, Palenz., G.A.
Silva & Sieverd., arbuscular mycorrhizal, terrestrial, Eur-
ope, see Oehl et al. (2011e; taxonomy), Redecker et al.
(2013; phylogeny, mentioning genus as questionable),
culture availability unlikely, sequences available but might
be dubious.
- Kickxellomycota** Tedersoo et al.
- Subphylum *Kickxellomycotina* Benny was upgraded to
Kickxellomycota by Tedersoo et al. (2016). Tedersoo et al.
(2016) introduced new class *Kickxellomycetes* Tedersoo
et al. to accommodate *Kickxella* Coem. (in *Kickxellaceae*,
Kickxellales) along with another five classes (viz. *Asel-*
lariomycetes, *Barbatosporomycetes*, *Dimargaritomycetes*
Harpellomycetes, and *Ramicandelaberomycetes*). We
accept *Kickxellomycota* with six classes, six orders, seven
families and 65 genera
- Notes for genera**
- Asellaria** R.A. Poiss. 1932, *Asellariaceae*, *Asellariales*,
Asellariomycetes, *Kickxellomycota*, c. seven species, type:
A. caulleryi R.A. Poiss., associated with Isopoda, world-
wide, see Guardia Valle and Cafaro (2008, new species,
biology, zygospore production), Lichtwardt (2012; Tri-
chomycete gut fungi from tropical regions), Kirk et al.
(2013; genus accepted), Tretter et al. (2014; DNA, phy-
logeny), Benny et al. (2016b; classification), cultures and
sequences are available.
- Austrosmithium** Lichtw. & M.C. Williams 1990, *Legeri-*
omycetaceae, *Harpellales*, *Harpellomycetes*, *Kickxellomy-*
cota, five species, type: *A. kiwiorum* M.C. Williams &
Lichtw. (Name is invalid as in Index Fungorum 2018; Art.

- 40.5 (Melbourne), in insects, worldwide, see Siri and López Lastra (2010; new species), Kirk et al. (2013; genus accepted), Hoffmann et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Bactromyces** William & Strongman 2012, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, one species, type: *B. fluminalis* William & Strongman, in *Paracapnia angulata* nymphs, Canada, see William and Strongman (2014; taxonomy), Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Baetimyces** L.G. Valle & Santam. 2002, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, one species, type: *B. ancorae* L.G. Valle & Santam., in hindgut of *Baetis* nymf, Spain, see Valle (2013a; Galicia), Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Ballocephala** Drechsler 1951, *Kickxellomycotina* genera *incertae sedis*, *Kickxellomycota*, one species, type: *B. sphaerospora* Drechsler, on tardigrades, worldwide, see Humber (2012; classification), Gryganskyi et al. (2013a, b; notes), Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Baltomyces** Cafaro 1999, *Asellariales* genera *incertae sedis*, *Kickxellomycetes*, *Kickxellomycota*, one species, type: *B. styrax* Cafaro, in Isopoda, USA, see Oman and White (2012; USA), Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Barbatospora** M.M. White, Siri & Lichtw. 2006, *Barbatosporaceae*, *Barbatosporales*, *Barbatosporomycetes*, *Kickxellomycota*, one species, type: *B. ambicaudata* M.M. White, Siri & Lichtw., in hindgut of larval *Simuliidae*, USA, see Hussain et al. (2014; mycoinsecticide), Tretter et al. (2014; DNA, phylogeny), Corsaro et al. (2018; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Bojamyces** Longcore 1989, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, three species, type: *B. repens* Longcore, cosmopolitan, see Hoffmann et al. (2013; classification), Kirk et al. (2013; genus accepted), Sato et al. (2013; Japan), Benny et al. (2016b; classification), cultures and sequences are available.
- Capniomyces** S.W. Peterson & Lichtw. 1983, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, three species, type: *C. stellatus* S.W. Peterson & Lichtw., in insects, cosmopolitan, see Bench and White (2012; new species), Hoffman et al. (2013; notes), Kirk et al. (2013; genus accepted), Hussain et al. (2014; mycopesticide), Benny et al. (2016b; classification), Corsaro et al. (2018, phylogeny), Wang et al. (2016a, b; genome sequencing of *C. stellatus*), cultures and sequences are available, genomes available: *C. stellatus* [PMID: 27491991] available at NCBI.
- Carouxella** Manier, Rioux & Whisler 1965, *Harpellaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, two species, type: *C. scalaris* Manier, Rioux & Whisler (Index Fungorum 2017 listed the type species as invalid), in insects, cosmopolitan, see Tretter et al. (2013; notes), Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are available.
- Caudomyces** Lichtw., Kobayasi & Indoh 1988, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, three species, type: *C. japonicus* Lichtw., Kobayasi & Indoh, on insects, cosmopolitan, see Tretter et al. (2013; notes), Kirk et al. (2013; genus accepted), Strongman and Wang (2015; new species), Benny et al. (2016b; classification), cultures and sequences are available.
- Coemansia** Tiegh. & G. Le Monn. 1873, *Kickxellaceae*, *Kickxellales*, *Kickxellomycetes*, *Kickxellomycota*, c. 20 species, type: *C. reversa* Tiegh. & G. Le Monn., saprobes, worldwide, see Kurihara et al. (2008; Indonesia, new species), Chuang and Ho (2011; Taiwan), Kirk et al. (2013; genus accepted), Tretter et al. (2013; phylogeny), Healy et al. (2014; mitosis), Benny et al. (2016b; classification), Chuang et al. (2018; phylogeny), cultures and sequences are available, *C. reversa* NRRL 1564 [25977457] at NCBI.
- Coleopteromyces** Ferrington, Lichtw. & López-Lastra 1999, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, one species, type: *C. amnicus* Ferrington, Lichtw. & López-Lastra, in insects, cosmopolitan, see Tretter et al. (2013; notes), Kirk et al. (2013; genus accepted), Wang et al. (2014a, b, c; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Dacryodimyces** Lichtw. 2011, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, one species, type: *D. oklahomensis* Lichtw., in insects, USA, see Lichtwardt et al. (2011a, b; taxonomy), Benny et al. (2016b; classification), cultures and sequences are available.
- Dimargaris** Tiegh. 1875, *Dimargaritaceae*, *Dimargaritales*, *Dimargaritomycetes*, *Kickxellomycota*, seven species, type: *D. cristalligena* Tiegh., coprophilous, fungicolous, cosmopolitan, see de Santiago et al. (2009; first record in S. America), De Godoi and Rafael (2013; new species, key), Gryganskyi et al. (2013a, b; notes), Kirk et al. (2013; genus accepted), Tretter et al. (2013; DNA), Nováková and Vaughan (2016; cave), Benny et al. (2016b; classification), cultures and sequences are available.
- Dipsacomyces** R.K. Benj. 1961, *Kickxellaceae*, *Kickxellales*, *Kickxellomycetes*, *Kickxellomycota*, one species, type: *D. acuminosporus* R.K. Benj., saprobes, Honduras, see Kirk et al. (2013; genus accepted), Tretter et al. (2014;

phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.

Dispira Tiegh. 1875, *Dimargaritaceae*, *Dimargaritales*, *Dimargaritomyces*, *Kickxellomycota*, four species, type: *D. cornuta* Tiegh., mycoparasites, cosmopolitan, see Ho and Chuang (2010; Taiwan), Kirk et al. (2013; genus accepted), Tretter et al. (2014; DNA), Benny et al. (2016b; classification), cultures and sequences are available.

Ejectosporus S.W. Peterson, Lichtw. & M.C. Williams 1991, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, one species, type: *C. spica* (S.W. Peterson & Lichtw.) Strongman, in insects, North America, see Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are unavailable

Ephemerellomyces M.M. White & Lichtw. 2004, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, one species, type: *E. aquilonius* M.M. White & Lichtw., from insects, cosmopolitan, see Kandel and White (2012; new species), Benny et al. (2016b; classification), cultures and sequences are unavailable.

Furculomyces Lichtw. & M.C. Williams 1992, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, three species, type: *F. boomerangus* (M.C. Williams & Lichtw.) M.C. Williams & Lichtw., in insects, Australia, Northern America, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are unavailable.

Gauthieromyces Lichtw. 1983, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, three species, type: *G. microsporus* Lichtw., in insects, cosmopolitan, see Misra and Tiwari (2008; new species, India), Valle et al. (2008; new species), Strongman et al. (2010; China), Lichtwardt (2011; tropics), Kirk et al. (2013; genus accepted), Valle et al. (2013; records from Italy), Strongman and Wang (2015; notes, China), Benny et al. (2016b; classification), cultures and sequences are unavailable.

Genistelloides S.W. Peterson, Lichtw. & B.W. Horn 1981, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, five species, type: *G. hibernus* S.W. Peterson, Lichtw. & B.W. Horn, in insects, cosmopolitan, see Kirk et al. (2013; genus accepted), Strongman and Wang (2015; new species, China), Benny et al. (2016b; classification), cultures and sequences are unavailable.

Genistellospora Lichtw. 1972, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, six species, type: *G. homothallica* Lichtw., in insects, cosmopolitan, see Lichtwardt (2011, 2012; tropics, new species), Hoffmann et al. (2013; classification, notes), Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are unavailable.

Glazia M. Gauthier ex Manier & Lichtw. 1970, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*,

Kickxellomycota, seven species, type: *G. centropitili* M. Gauthier ex Manier & Lichtw., in insects, cosmopolitan, see Strongman and White (2008; new species), Kirk et al. (2013; genus accepted), Valle et al. (2013; new species, Italy), Benny et al. (2016b; classification), cultures and sequences are unavailable.

Graminella L. Léger & M. Gauthier ex Manier 1962, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, three species, type: *G. bulbosa* L. Léger & M. Gauthier ex Manier, symbiote in insects, cosmopolitan, see Chen et al. (2012, 2015; plant virus vector, genome sequences), Kirk et al. (2013; genus accepted), Cassone et al. (2014; genetic studies), Benny et al. (2016b; classification), Heady and Nault (2017; acoustic signals), cultures and sequences are unavailable.

Harpella L. Léger & Duboscq 1929, *Harpellaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, seven species, type: *H. melusinae* L. Léger & Duboscq, in insects, cosmopolitan, see Misra and Tiwari (2008; India), Hapsari et al. (2009; new species), Nelder et al. (2009; ecology prediction), Percival and Harvey (2011; UK), Bench and White (2012; new species), Tretter et al. (2013; notes), Kirk et al. (2013; genus accepted), Wilson et al. (2014; effect of fungicides), Benny et al. (2016b; classification), cultures and sequences are available.

Harpellomyces Lichtw. & S.T. Moss 1984, *Harpellaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, four species, type: *H. eccentricus* Lichtw. & S.T. Moss, in insects, cosmopolitan, see Valle et al. (2013; new species, Italy), Kirk et al. (2013; genus accepted), Jamali (2015; Iran), Tretter et al. (2014; notes), Benny et al. (2016b; classification), cultures and sequences are available.

Kickxella Coem. 1862, *Kickxellaceae*, *Kickxellales*, *Kickxellomyces*, *Kickxellomycota*, one species, type: *K. alabastrina* Coem., saprobes, cosmopolitan, see Hoffman et al. (2013; notes), Kirk et al. (2013; genus accepted), Tretter et al. (2014; phylogeny), Wang et al. (2014a, b, c; DNA), Benny et al. (2016b; classification), cultures and sequences are available.

Klastostachys Lichtw., M.C. Williams & M.M. White 2011, *Harpellaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, one species, type: *K. reflexa* (Lichtw. & M.C. Williams) Lichtw., M.C. Williams & M.M. White, saprobes, cosmopolitan, see Lichtwardt et al. (2011a, b; taxonomy), Benny et al. (2016b; classification, accepted as in *Legeriomycetaceae*), cultures and sequences are unavailable

Laculus William & Strongman 2012, *Legeriomycetaceae*, *Harpellales*, *Harpellomyces*, *Kickxellomycota*, one species, type: *L. insecticola* William & Strongman, in insects, Canada, see William and Strongman (2012; taxonomy), Benny et al. (2016b; classification), cultures and sequences are unavailable.

- 2947 **Lancisporomyces** Santam. 1997, *Legeriomycetaceae*,
2948 *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, five spe-
2949 cies, type: *L. vernalis* Santam., in insects, cosmopolitan,
2950 see Bench and White (2012; new species), Lichtwardt
2951 (2012; tropics), Kirk et al. (2013; genus accepted), Wang
2952 et al. (2014a, b, c; DNA), Benny et al. (2016b; classifica-
2953 tion), cultures not available but sequences are available
2954 **Legerioides** M.M. White 1999, *Legeriomycetaceae*,
2955 *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, one spe-
2956 cies, type: *L. tumidus* M.M. White, in insects, North
2957 America, see Kirk et al. (2013; genus accepted), Tretter
2958 et al. (2014; DNA), Benny et al. (2016b; classification),
2959 cultures and sequences are available.
2960 **Legeriomyces** Pouzar 1972, *Legeriomycetaceae*, *Harpel-*
2961 *lales*, *Harpellomycetes*, *Kickxellomycota*, eleven species,
2962 type: *L. ramosus* (L. Léger & M. Gauthier) Pouzar, in
2963 insects, cosmopolitan, see Misra and Tiwari (2008; India),
2964 Strongman and White (2008; new species), Siri and López
2965 Lastra (2010; new species), Strongman (2010; Newfound-
2966 land), Strongman et al. (2010; new species), Lichtwardt
2967 (2012; tropics), Kirk et al. (2013; genus accepted), Valle
2968 (2013a; Portugal), Misra et al. (2014; new species), Tretter
2969 et al. (2014; DNA), Wang et al. (2014a, b, c; DNA), Benny
2970 et al. (2016b; classification), cultures and sequences are
2971 available.
2972 **Legeriosimilis** M.C. Williams, Lichtw., M.M. White &
2973 J.K. Misra 1999, *Legeriomycetaceae*, *Harpellales*,
2974 *Harpellomycetes*, *Kickxellomycota*, eight species, type: *L.*
2975 *tricaudata* M.C. Williams, Lichtw., M.M. White & J.K.
2976 Misra, in insects, cosmopolitan, see Strongman et al.
2977 (2010; new species), Strongman and White (2008, 2011;
2978 new species), White and Strongman (2012a; new species),
2979 Kirk et al. (2013; genus accepted), Tretter et al. (2013;
2980 DNA), Valle (2013b; France), Hussain et al. (2014;
2981 mycoinsecticide), Wang et al. (2014a, b, c; DNA), Benny
2982 et al. (2016b; classification), cultures and sequences are
2983 available.
2984 **Linderina** Raper & Fennell 1952, *Kickxellaceae*, *Kickxel-*
2985 *lales*, *Kickxellomycetes*, *Kickxellomycota*, two species,
2986 type: *L. pennispora* Raper & Fennell, saprobes, worldwide,
2987 see Kurihara et al. (2008; Indonesia), Chuang and Ho
2988 (2009; Taiwan), Zain et al. (2012; development of
2989 merosporangia), Kirk et al. (2013; genus accepted), Tretter
2990 et al. (2014; phylogeny), Benny et al. (2016b; classifica-
2991 tion), Chiranjeevi et al. (2017; anti-oxidant activity), cul-
2992 tures and sequences are available, genomes available: *L.*
2993 *pennispora* ATCC 12442 (unpublished) available at NCBI
2994 genomes.
2995 **Martensella** Coem. 1863, *Kickxellaceae*, *Kickxellales*,
2996 *Kickxellomycetes*, *Kickxellomycota*, one species, type: *M.*
2997 *pectinata* Coem., mycoparasites, worldwide, see Zain et al.
2998 (2012; development of merosporangia), Kirk et al. (2013;
2999 genus accepted), Tretter et al. (2014; phylogeny), Benny
et al. (2016b; classification), cultures and sequences are
available.
Martensiomycetes J.A. Mey. 1957, *Kickxellaceae*, *Kickxel-*
lales, *Kickxellomycetes*, *Kickxellomycota*, one species,
type: *M. pterosporus* J.A. Mey., mycoparasites, worldwide,
see Zain et al. (2012; comparison of merosporangia with
Linderina), Kirk et al. (2013; genus accepted), Tretter et al.
(2014; phylogeny), Benny et al. (2016b; classification),
cultures and sequences are available.
Mycoemilia Kurihara, Degawa & Tokum. 2004, *Kickxel-*
laceae, *Kickxellales*, *Kickxellomycetes*, *Kickxellomycota*,
one species, type: *M. scoparia* Kurihara, Degawa &
Tokum., saprobes, Asia, see Tretter et al. (2014; phy-
logeny), Benny et al. (2016b; classification), cultures and
sequences are available.
Myconymphaea Kurihara, Degawa & Tokum. 2001,
Kickxellaceae, *Kickxellales*, *Kickxellomycetes*, *Kickxel-*
lomycota, one species, type: *M. yatsukahoi* Kurihara,
Degawa & Tokum., saprobes, Asia, see Hoffmann et al.
(2013; phylogeny), Benny et al. (2016b; classification),
cultures and sequences are available.
Orphella L. Léger & M. Gauthier 1931, *Legeriomy-*
etaceae, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*,
c. ten species, type: *O. coronata* L. Léger & M. Gauthier,
in insects, cosmopolitan, see Kirk et al. (2013; genus
accepted), Tretter et al. (2013; DNA), Valle et al.
(2013, 2014; new species), Strongman and Wang (2015;
new species), Benny et al. (2016b; classification), Corsaro
et al. (2018, phylogeny), cultures and sequences are
available.
Pennella Manier 1968, *Legeriomycetaceae*, *Harpellales*,
Harpellomycetes, *Kickxellomycota*, eight species, type: *P.*
hovasseyi Manier, in insects, cosmopolitan, see Strongman
and White (2008; new species), Kirk et al. (2013; genus
accepted), Tretter et al. (2013; DNA), Benny et al. (2016b;
classification), cultures and sequences are available for
unidentified species.
Pinnaticoemansia Kurihara & Degawa 2006, *Kickxel-*
laceae, *Kickxellales*, *Kickxellomycetes*, *Kickxellomycota*,
one species, type: *P. coronantispora* Kurihara & Degawa,
from soil, Asia, see Hoffmann et al. (2013; notes), Benny
et al. (2016b; classification), cultures and sequences are
available.
Plecopteromyces Lichtw., Ferrington & López-Lastra
1999, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*,
Kickxellomycota, three species, type: *P. patagoniensis*
Lichtw., Ferrington & López-Lastra, cosmopolitan, see
Kirk et al. (2013; genus accepted), Hoffmann et al. (2013;
DNA), Benny et al. (2016b; classification), cultures and
sequences are available for unidentified species.
Pseudoharpella Ferrington, M.M. White & Lichtw. 2003,
Legeriomycetaceae, *Harpellales*, *Harpellomycetes*, *Kick-*
xellomycota, one species, type: *P. arcolamylica* Ferrington,

- 3053 M.M. White & Lichtw., saprobes, USA, see Tretter et al.
 3054 (2013; phylogeny), Benny et al. (2016b; classification),
 3055 cultures and sequences are available.
- 3056 **Pteromaktron** Whisler 1963, *Legeriomycetaceae*, *Harpel-*
 3057 *lales*, *Harpellomycetes*, *Kickxellomycota*, two species,
 3058 type: *P. protrudens* Whisler, saprobes, USA, see Williams
 3059 and Strongman (2012; new species), Tretter et al. (2013;
 3060 phylogeny), Wang et al. (2014a, b, c; DNA, phylogeny),
 3061 Benny et al. (2016b; classification), cultures and sequences
 3062 are available for unidentified species.
- 3063 **Ramicandelaber** Y. Ogawa, S. Hayashi, Degawa &
 3064 Yaguchi 2001, *Ramicandelaberaceae*, *Ramicande-*
 3065 *laberales*, *Ramicandelaberomycetes*, *Kickxellomycota*, four
 3066 species, type: *R. longisporus* Y. Ogawa, S. Hayashi,
 3067 Degawa & Y. Yaguchi, from soil, from soybean cyst
 3068 nematodes, Asia, see Hoffmann et al. (2013; notes),
 3069 Chuang et al. (2009, 2013; new species, Taiwan), Tretter
 3070 et al. (2014; DNA), Benny et al. (2016b; classification),
 3071 cultures and sequences are available.
- 3072 **Simuliumyces** Lichtw. 1972, *Legeriomycetaceae*, *Harpel-*
 3073 *lales*, *Harpellomycetes*, *Kickxellomycota*, one species,
 3074 type: *S. microsporus* Lichtw., in insect larva, USA, see
 3075 Benny et al. (2016b; classification), cultures and sequences
 3076 are unavailable.
- 3077 **Sinotrichium** Juan Wang, S.Q. Xu & Strongman 2010,
 3078 *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickx-*
 3079 *ellomycota*, one species, type: *S. chironomidarum* Juan
 3080 Wang, S.Q. Xu & Strongman, in insect larva, China, see
 3081 Wang et al. (2010; taxonomy), Benny et al. (2016b; clas-
 3082 sification), cultures and sequences are unavailable.
- 3083 **Smittium** R.A. Poiss. 1937, *Legeriomycetaceae*, *Harpel-*
 3084 *lales*, *Harpellomycetes*, *Kickxellomycota*, c. 80 species,
 3085 type: *S. arvernense* R.A. Poiss., in insect larva, China, see
 3086 Vojvodic and McCreadie (2008, 2009; species interaction,
 3087 morphological difference), Wang et al.
 3088 (2010, 2013b, 2014a, b, c; taxonomy, overview, phy-
 3089 logeny), Lichtwardt and White (2011; typification), Misra
 3090 (2012; systemics), White and Strongman (2012b; new
 3091 species), Kirk et al. (2013; genus accepted), Benny et al.
 3092 (2016b; classification), genomes available: *S. culicis*
 3093 GSMNP and ID-206-W2, *S. mucronatum* strain ALG-7-
 3094 W6 [27343289] are available at NCBI genomes.
- 3095 **Spartiella** Tuzet & Manier ex Manier 1968, *Legeriomyc-*
 3096 *etaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*,
 3097 three species, type: *S. barbata* Tuzet & Manier ex Manier,
 3098 in insect larva, Europe, Canada, see White and Strongman
 3099 (2012a; new species), Kirk et al. (2013; genus accepted),
 3100 Benny et al. (2016b; classification), cultures and sequences
 3101 are available.
- 3102 **Spinalia** Vuill. 1904, *Dimargaritales* genera *incertae sedis*,
 3103 *Dimargaritomycetes*, one species, type: *S. radians* Vuill.,
 3104 mycoparasites, Europe, see Kirk et al. (2013; genus
 accepted), Benny et al. (2016b; classification), cultures and
 sequences are unavailable.
- Spirodactylon** R.K. Benj. 1959, *Kickxellaceae*, *Kickxel-*
lales, *Kickxellomycetes*, *Kickxellomycota*, one species,
 type: *S. aureum* R.K. Benj., saprobes, USA, see Hoffmann
 et al. (2013; notes), Tretter et al. (2014; DNA), Benny et al.
 (2016b; classification), cultures and sequences are
 available.
- Spiromyces** R.K. Benj. 1963, *Kickxellaceae*, *Kickxellales*,
Kickxellomycetes, *Kickxellomycota*, two species, type: *S.*
minutus R.K. Benj., saprobes, USA, see Hoffmann et al.
 (2013; notes), Tretter et al. (2014; DNA), Benny et al.
 (2016b; classification), Corsaro et al. (2018, phylogeny),
 cultures and sequences are available.
- Stachylina** L. Léger & M. Gauthier 1932, *Harpellaceae*,
Harpellales, *Harpellomycetes*, *Kickxellomycota*, 40 spe-
 cies, type: *S. macrospora* L. Léger & M. Gauthier, sap-
 robes, cosmopolitan, Strongman (2010; new species),
 Wang et al. (2010, 2014a, b, c; new species, phylogeny),
 Misra (2012; systemics), White and Strongman (2012b;
 new species), Kirk et al. (2013; genus accepted), William
 and Strongman (2013; new species), Valle (2013a; new
 species), cultures and sequences are unavailable.
- Stachylinoides** Lichtw. & López-Lastra 1999, *Harpel-*
laceae, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*,
 one species, type: *S. arctata* Ferrington, Lichtw. & López-
 Lastra, in insects, South America, see Kirk et al. (2013;
 genus accepted), Benny et al. (2016b; classification), cul-
 tures and sequences are unavailable.
- Stipella** L. Léger & M. Gauthier 1932, *Legeriomycetaceae*,
Harpellales, *Harpellomycetes*, *Kickxellomycota*, two spe-
 cies, type: *S. vigilans* L. Léger & M. Gauthier, in insect
 larva, Europe, see Kirk et al. (2013; genus accepted),
 Benny et al. (2016b; classification), cultures and sequences
 are available, the genus is treated as a synonym of *Sty-*
pomyces Doweld in Index Fungorum (2018).
- Stypomyces** Doweld 2014, *Legeriomycetaceae*, *Harpel-*
lales, *Harpellomycetes*, *Kickxellomycota*, two species,
 type: *S. vigilans* (L. Léger & M. Gauthier) Doweld,
 replaced synonym of *Stipella* L. Léger & M. Gauthier 1932
 (see Index Fungorum 2018).
- Tectomyces** L.G. Valle & Santam. 2002, *Legeriomyc-*
etaceae, *Harpellales*, *Harpellomycetes*, *Kickxellomycota*,
 three species, type: *T. leptophlebiidarum* L.G. Valle &
 Santam., in insect larva, Europe, see (2010, 2013; zygos-
 pore description, new species), Benny et al. (2016b; clas-
 sification), cultures and sequences are available.
- Tieghemiomyces** R.K. Benj. 1959, *Dimargaritaceae*, *Di-*
margaritales, *Dimargaritomycetes*, *Kickxellomycota*, two
 species, type: *T. californicus* R.K. Benj., mycoparasites,
 cosmopolitan, see Kirk et al. (2013; genus accepted),
 Tretter et al. (2014; DNA), Benny et al. (2016b; classifi-
 cation), cultures and sequences are available.

- 3158 **Trichozygospora** Lichtw. 1972, *Legeriomycetaceae*,
3159 *Harpellales*, *Harpellomycetes*, *Kickxellomycota*, one spe-
3160 cies, type: *T. chironomidarum* Lichtw., in insects, cos-
3161 mopolitan, see Kirk et al. (2013; genus accepted), Tretter
3162 et al. (2013; DNA), Benny et al. (2016b; classification),
3163 cultures and sequences are available.
- 3164 **Trifoliellum** Strongman & M.M. White 2011, *Legeri-*
3165 *omycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomy-*
3166 *cota*, one species, type: *T. bioblitzii* Strongman & M.M.
3167 White., in insects, cosmopolitan, see Strongman and White
3168 (2011; taxonomy), Benny et al. (2016b; classification),
3169 cultures and sequences are unavailable.
- 3170 **Trissocladowyces** Doweld 2013, *Harpellales* genera *in-*
3171 *certae sedis*, *Harpellomycetes*, *Kickxellomycota*, one spe-
3172 cies, type: *T. digitatus* (L. Léger & M. Gauthier) Doweld,
3173 ?in insects, cosmopolitan, see Doweld (2013a).
- 3174 **Zancudomyces** Yan Wang, Tretter, Lichtw. & M.M. White
3175 2013, *Legeriomycetaceae*, *Harpellales*, *Harpellomycetes*,
3176 *Kickxellomycota*, one species, type: *Z. culisetae* (Lichtw.)
3177 Yan Wang, Tretter, Lichtw. & M.M. White, in insects,
3178 worldwide, see Tretter et al. (2013; DNA), Ellenberger
3179 et al. (2014; genetics), Benny et al. (2016b; classification),
3180 Wang et al. (2016a, b; genetics, gene transferring), *Z.*
3181 *culisetae* [27343289] is available at NCBI genomes.
- 3182 **Zygnemomyces** K. Miura 1973, *Kickxellomycotina* genera
3183 *incertae sedis*, *Kickxellomycota*, two species, type: *Z.*
3184 *mexicana echinulatus* K. Miura., in nematode, ?human
3185 pathogens, south America, see Humber (2012; excluded
3186 from *Meristacraceae*), Gryganskyi et al. (2013a, b;
3187 accepted as in *Kickxellomycotina*), Kirk et al. (2013; genus
3188 accepted), Benny et al. (2016b; classification), cultures and
3189 sequences are unavailable.
- 3190 **Zygopolaris** S.T. Moss, Lichtw. & Manier 1975, *Legeri-*
3191 *omycetaceae*, *Harpellales*, *Harpellomycetes*, *Kickxellomy-*
3192 *cota*, two species, type: *Z. ephemeridarum* S.T. Moss,
3193 Lichtw. & Manier, in insects, cosmopolitan, see Hoffman
3194 et al. (2013; notes), Benny et al. (2016b; classification),
3195 cultures and sequences are available.
- 3196 **Monoblepharomycota** Doweld
3197 Doweld (2001) introduced *Monoblepharomycota* based
3198 on *Monoblepharis* Cornu. Tedersoo et al. (2016) accepted
3199 *Monoblepharomycota* and introduced *Sanchytriomycetes*
3200 Tedersoo et al. We accept three classes, three orders, seven
3201 families and eight genera in *Monoblepharomycota*.
- 3202 **Notes for genera**
- 3203 **Amoeboradix** Karpov, Lopez-Garcia, Mamkaeva & Mor-
3204 eira 2018, *Sanchytriaceae*, *Sanchytriales*, *Sanchytri-*
3205 *omycetes*, *Monoblepharomycota*, one species, type: *A.*
3206 *gromovi* Karpov, Lopez-Garcia, Mamkaeva & Moreira,
3207 parasite, aquatic, Russia, see Karpov et al. (2018; light
microscopy, electron microscopy, molecular phylogeny),
sequences are available.
- Gonapodya** A. Fisch. 1892, *Gonapodyaceae*, *Monoble-*
pharidales, *Monoblepharidomycetes*, *Monoblepharomy-*
cota, one species, type: *G. prolifera* (Cornu) Fisch.,
saprobies, cosmopolitan, see Kirk et al. (2013, genus
accepted), cultures and sequences are available.
- Harpochytrium** Lagerh. 1890 (= *Fulminaria* Gobi et al.
1891; = *Rhabdium* P.A. Dang.), *Harpochytriaceae*,
Monoblepharidales, *Monoblepharidomycetes*, *Monoble-*
pharomycota, c. ten species, type: *H. hyalothecae* Lagerh.,
on green algae, marine, South America, see Kirk et al.
(2013; genus accepted), cultures and sequences are
available.
- Hyaloraphidium** Korshikov 1931, *Hyaloraphidiaceae*,
Hyaloraphidiales, *Hyaloraphidiomycetes*, *Monoble-*
pharomycota, one species, type: *H. curvatum* Korshikov,
saprobies, cosmopolitan, see Kirk et al. (2013; genus
accepted), cultures and sequences are available.
- Monoblepharella** Sparrow 1940, *Gonapodyaceae*, *Mono-*
blepharidales, *Monoblepharidomycetes*, *Monoble-*
pharomycota, five species, type: *M. taylorii* (Sparrow)
Sparrow, saprobies, cosmopolitan, see Kirk et al. (2013,
genus accepted), cultures and sequences are available.
- Monoblepharis** Cornu 1871 (= *Diblepharis* Lagerh. 1900
[1899]; = *Monoblephariopsis* Laib. 1927), *Monoblephari-*
daceae, *Monoblepharidales*, *Monoblepharidomycetes*,
Monoblepharomycota, five species, type: *M. sphaerica*
Cornu, saprobies, cosmopolitan, see Kirk et al. (2013, genus
accepted), cultures and sequences are available.
- Oedogoniomyces** Kobayasi & M. Ôkubo 1954, *Oedogo-*
niomycetaceae, *Monoblepharidales*, *Monoblephar-*
idomycetes, *Monoblepharomycota*, one species, type: *O.*
lymnaeae Kobayasi & M. Ôkubo, on shells of *Lymnaea*
spp., Asia, see Kirk et al. (2013; genus accepted), Zhang
et al. (2015; population study), cultures and sequences are
available.
- Sanchytrium** Karpov & Aleoshin 2017, *Sanchytriaceae*,
Sanchytriales, *Sanchytriomycetes*, *Monoblepharomycota*,
one species, type: *S. tribonematis* Karpov & Aleoshin,
fresh water, Russia, see Karpov et al. (2017a; taxonomy),
cultures and sequences are available.
- Telasphaerula** Longcore & T.Y. James 2017, *Telas-*
phaerulaceae, *Monoblepharidales*, *Monoblephar-*
idomycetes, *Monoblepharomycota*, one species, type: *T.*
gracilis Longcore & T.Y. James, saprobies, fresh water,
USA, see Karpov et al. (2017a; taxonomy), cultures and
sequences are available.
- Mortierellomycota** Tedersoo et al.
Tedersoo et al. (2016) upgraded *Mortierellomycotina*
Kerst. Hoffm. to a phylum. Currently the phylum com-
prises one class, one order, one family and six genera.

Notes for genera

Aquamortierella Embree & Indoh 1967, *Mortierellaceae*, *Mortierellales*, *Mortierellomycetes*, *Mortierellomycota*, one species, type: *A. elegans* Embree & Indoh, on midge larva, aquatic, New Zealand, Japan, see Hoffmann et al. (2013; classification, notes), Kirk et al. (2013; genus accepted), Wagner et al. (2013; classification), Benny et al. (2016b; classification), cultures and sequences are unavailable.

Dissophora Thaxt. 1914, *Mortierellaceae*, *Mortierellales*, *Mortierellomycetes*, *Mortierellomycota*, three species, type: *D. decumbens* Thaxt., saprobes, worldwide, see Takó et al. (2012; production of lipase), Hoffmann et al. (2013; classification, notes), Kirk et al. (2013; genus accepted), Wagner et al. (2013; treated as a synonym of *Dissophora*), Benny et al. (2016b; classification), cultures and sequences are available.

Gamsiella (R.K. Benj.) Benny & M. Blackw. 2004, *Mortierellaceae*, *Mortierellales*, *Mortierellomycetes*, *Mortierellomycota*, one species, type: *G. multidivariata* (R.K. Benj.) Benny & M. Blackw., saprobes, North America, see Petkovits et al. (2011; DNA), Hoffmann et al. (2013; classification, phylogeny), Wagner et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.

Mortierella Coem. 1863, *Mortierellaceae*, *Mortierellales*, *Mortierellomycetes*, *Mortierellomycota*, c. 100 species, type: *M. polycephala* Coem., saprobes, in soil, worldwide, see Fakas et al. (2009a; single cell oil production, fatty acid composition), Sakuradani et al. (2009; hybrid for oil production), Sato et al. (2010; interactions with bacteria), Wang et al. (2011a, b, 2013a; metabolism, genomic studies), Petkovits et al. (2011; notes, classification), Hoffmann et al. (2013; classification, notes), Kirk et al. (2013; genus accepted), Smith et al. (2013; DNA, phylogeny), Wagner et al. (2013; classification), Edgington et al. (2014; insecticides), Hao et al. (2014a, b, 2015; enzymes, metabolism), Ariyawansa et al. (2015; new species), Benny et al. (2016b; classification), Werner et al. (2016; biology), Hyde et al. (2017b; new species), Ge et al. (2018, biotechnology), Luo et al. (2017; biotechnology), Uehling et al. (2017; comparative genomics), Zhang et al. (2017; biotechnology), cultures and sequences are available, genome available: *M. alpina* CDC-B6842 (Etienne et al. 2014), CCTCC M207067 and ATCC 32222 [22174787], *M. elongata* AG-77 [28076891], *M. verticillata* NRRL 6337 available at NCBI genomes.

Modicella Kanouse 1936, *Mortierellaceae*, *Mortierellales*, *Mortierellomycetes*, *Mortierellomycota*, two species, type: *M. malleola* (Harkn.) Gerd. & Trappe, saprobes, in soil, water, worldwide, see Petkovits et al. (2011; classification), Hoffmann et al. (2013; classification, notes), Kirk et al.

(2013; genus accepted), Smith et al. (2013; DNA, phylogeny), Wagner et al. (2013; classification), Benny et al. (2016b; classification), cultures and sequences are available.

Lobosporangium M. Blackw. & Benny 2004, *Mortierellaceae*, *Mortierellales*, *Mortierellomycetes*, *Mortierellomycota*, one species, type: *L. transversale* (Malloch) M. Blackw. & Benny, saprobes, North America, see Petkovits et al. (2011; DNA), Hoffmann et al. (2013; classification), Wagner et al. (2013; DNA), Benny et al. (2016b; classification), cultures and sequences are available, genomes available: *L. transversale* strain NRRL 3116 (unpublished) available at NCBI genomes.

Mucoromycota Doweld

Doweld (2001) introduced *Mucoromycota* but Kirk et al. (2008) accepted the subphylum *Mucoromycotina* to accommodate *Mucor* Fresen. However, Spatafora et al. (2016) accepted *Mucoromycota* as a distinct phylum with three subphyla viz. *Glomeromycotina* (in this study we do not accept this rank under *Mucoromycota*), *Mortierellomycotina* and *Mucoromycotina*. The members of *Mucoromycota* occur as saprobes and rarely as facultative parasites (Figs. 5 and 6) (Kirk et al. 2008).

We accept three class, three orders, 16 families and 66 genera in *Mucoromycota*.

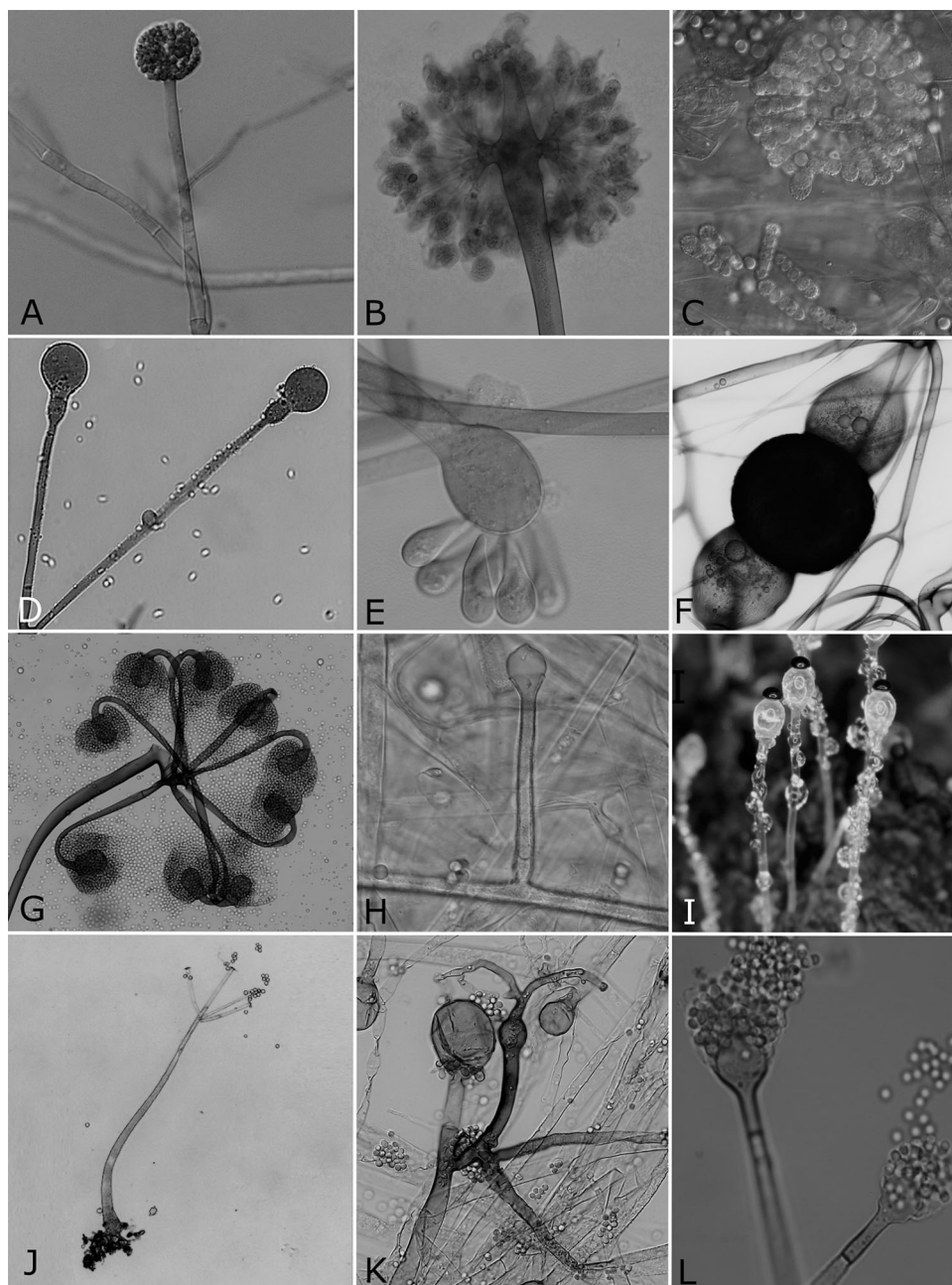
Notes for genera

Absidia Tiegh. 1878, *Cunninghamellaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, c. 20 species, type: *A. reflexa* Tiegh., saprobes or pathogens of human and animals, in soil, animal dung, worldwide, see Hoffmann and Voigt (2009; introduced *Lentamyces* for *A. parvicida* and *A. zychae*), Richardson (2009; notes), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Ariyawansa et al. (2015; new species, phylogeny), Li et al. (2016; new species), Wang et al. (2017e; fermentation), cultures and sequences are available, genomes available: *A. padenii* NRRL 2977 (unpublished) at JGI portal (Grigoriev et al. 2014), *A. repens* NRRL 1336 (Mondo et al. 2017) genomes at JGI portal (Grigoriev et al. 2014).

Actinomucor Schostak. 1898, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species and three varieties, type: *A. elegans* (Eidam) C.R. Benj. & Hesselt., opportunistic pathogens of human and animals, in soil, on human, worldwide, see Li et al. (2008; debittering effect), Tully et al. (2009; human pathogens), Gomes et al. (2011; mucormycosis, review), Mahmud et al. (2012; cause of mucormycosis), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Kia et al. (2014; mutualism with *Abutilon theophrasti*), Mou et al. (2014; biotransformation of

Fig. 5 Mucoromycota:

- A** *Umbelopsis* sp.
B *Thamnostylum piriforme*.
C *Syncephalastrum racemosum*.
D *Gongronella* sp.
E *Cunninghamella* sp.
F Zygosporangium of *Syzygites megalocarpus*. **G** *Circinella umbellata*. **H** *Lichtheimia* sp.
I *Pilobolus* sp. **J** *Mortierella* sp.
K *Rhizomucor pusillus*.
L *Absidia* sp.



resibufogenin), Wang et al. (2014a, c; enhanced glucosamine production and biotransformation of resibufogenin), Zhou et al. (2014; biotechnology), Karimi et al. (2015, pathogen of chafer beetle), Dorin et al. (2017; diagnosis methods combining molecular tools, mucormycosis), Li et al. (2018; biotechnology), genomes available: *A. elegans* JCM_22485 at NCBI genomes.
Ambomucor R.Y. Zheng & X.Y. Liu 2014, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, three species and three varieties, type: *A. seriatoinflatus* X.Y. Liu & R.Y. Zheng, in soil, China, see Zheng and Liu (2014;

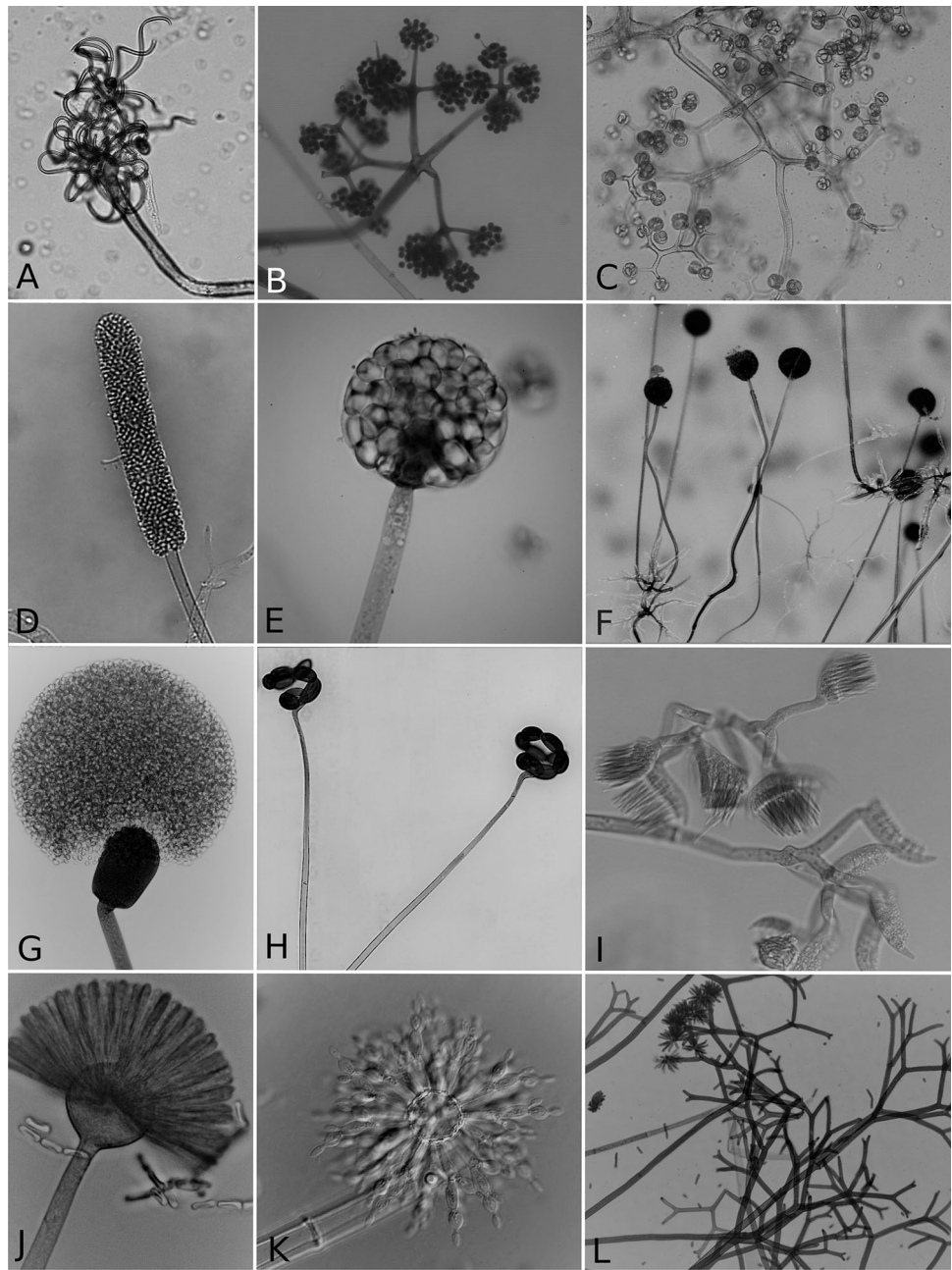
taxonomy), Liu and Zheng (2015; new species), cultures and sequences are available.

Amylomyces Calmette 1892, *Rhizopodaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *A. rouxii* Calmette, use in food production, cosmopolitan, see Kito et al. (2009; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny, in *Rhizopus arrhizus* var. *arrhizus*), Benny et al. (2016b; classification), cultures and sequences are available.

Apophysomyces P.C. Misra 1979, *Saksenaaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, five species, type:

Fig. 6 A–G Mucoromycota:

A *Cokeromyces recurvatus*.
 B *Chaetocladium* sp.
 C *Thamnidium elegans*.
 D *Mycotypha microspora*.
 E *Mucor* sp. F *Rhizopus* sp.
 G *Mucor* sp. H–
 L Zoopagomycota:
 H *Helicocephalum* sp.
 I *Coemansia* sp. J *Syncephalis*
 sp. K *Dimargaris* sp.
 L *Piptocephalis* sp



A. elegans P.C. Misra, K.J. Srivast. & Lata, in soil, human and animal pathogens, cosmopolitan, see Álvarez et al. (2010b; new species, human pathogens, phylogeny), Guarro et al. (2011; human pathogens), Hoffmann et al. (2013; phylogeny, notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Bonifaz et al. (2014; new species, Mexico), Dave et al. (2014; novel cause of endogenous endophthalmitis), Al-Zaydani et al. (2015; pathogenic on a child), Benny et al. (2016b; classification), Bertumen et al. (2016; clinical diagnosis difficulties), Kennedy et al. (2016; mucormycosis in Australia), Prakash et al. (2016, 2017; environmental sources, genome

sequencing), Wolkow et al. (2017; chronic orbital and calvarial fungal infection), cultures and sequences are available, genomes available: *A. elegans* CDC-B7760 (Chibucos et al. 2016), and *A. trapeziformis* CDC-B9324 (Chibucos et al. 2016) and *A. variabilis* NCCPF 102052 [PMID: 28923009] available at NCBI genomes.
Backusella Hesselt. & J.J. Ellis 1969, *Backusellaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, 14 species, type: *B. circina* J.J. Ellis & Hesselt., in soil, in excrements of animals, worldwide, see Nyilasi et al. (2008; molecular identification), Santiago et al. (2011b; in excrement of non-ruminant), Li et al. (2012; biodiversity), Kirk et al. (2013;

- genus accepted), Walther et al. (2013; phylogeny), Hoffmann et al. (2013; phylogeny), de Souza et al. (2014; new species), Benny et al. (2016b; classification), Lima et al. (2016; new species), cultures and sequences are available, genomes available: *Backusella circina* FSU 941 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Benjaminiella** Arx 1981, *Mycotyphaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, three species, type: *B. poitrasii* (R.K. Benj.) Arx, in soil, cosmopolitan, see Hoffmann et al. (2013; classification), Joshi et al. (2013; dimorphism mechanism), Kirk et al. (2013; genus accepted), Walther et al. (2013; classification), Benny et al. (2016b; classification), Mane et al. (2017; Chitosan production), Pathan et al. (2017; reference genes for quantitative real-time RT-PCR), cultures and sequences are available.
- Bifiguratus** Torr.-Cruz & Porras-Alfaro 2017, *Mucoromycotina* genera *incertae sedis*, one species, type: *B. adelaidae* Torr.-Cruz & Porras-Alfaro, from photosynthetic tissue of *Leucobryum* in Arizona, USA, see Torres-Cruz et al. (2017), cultures and sequences are available, genomes available: *B. adelaidae* strain AZ0501 [28876195] genome available at NCBI.
- Blakeslea** Thaxt. 1914, *Choanephoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *B. trispora* Thaxt., worldwide, see Choudhary et al. (2008; β -carotene and lycopene), Mantzouridou et al. (2008; glycerol in media), Schachtschabel et al. (2008; trisporoid synthesis), Sun et al. (2012; metabolites), Hoffmann et al. (2013; classification), Kirk et al. (2013; genus accepted), Sahadevan et al. (2013; biotechnology), Benny et al. (2016b; classification), cultures and sequences are available, genome available: *B. trispora* NRRL 2456 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Chaetocladium** Fresen. 1863, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *C. jonesiae* (Berk. & Broome) Fresen., fungicolous, cosmopolitan, see Ho et al. (2008; Taiwan), Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Chlamydoabsidia** Hesselt. & J.J. Ellis 1966, *Cunninghamellaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *A. padenii* Hesselt. & J.J. Ellis, saprobes, cosmopolitan, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), cultures and sequences are available.
- Choanephora** Curr. 1873, *Choanephoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *C. infundibulifera* (Curr.) D.D. Cunn., worldwide, however, disease development is more common in tropical and subtropical regions characterized by high temperatures and humidity, see Siddiqui et al. (2008, 2009; control by *Trichoderma*, Tea), Kagiwada et al. (2010; infection in *Mesembryanthemum crystallinum*, Japan), Saroj et al. (2012; infection in *Withania somnifera*, India), Sun et al. (2012; metabolites), Hoffmann et al. (2013; classification), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), Min et al. (2017; genome analyses of *C. cucurbitarum*), cultures and sequences are available, genome available: *C. cucurbitarum* KUS-F28377 at NCBI genomes [28091548]
- Circinella** Tiegh. & G. Le Monn. 1873, *Syncephalastreaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, eleven species, type: *C. umbellata* Tiegh. & G. Le Monn., saprobes, coprophilous, worldwide, see Alpat et al. (2008; biosensor), Gonzalez et al. (2010; Mexico), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), Lima et al. (2017; taxonomy), de Souza et al. (2017; notes), Zheng et al. (2017; new species), cultures and sequences are available, genome available, *C. umbellata* NRRL1351 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Cokeromyces** Shanor 1950, *Mycotyphaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *C. recurvatus* Poitras, human pathogen, worldwide, see Ryan et al. (2011; fatal pneumonia), Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Gade et al. (2016; molecular diagnostics), Benny et al. (2016b; classification), Chibucos et al. (2016; mucormycosis causing fungi), cultures and sequences are available, *C. recurvatus* NRRL 2243 (CBS 158.50) unpublished genome at JGI portal (Grigoriev et al. 2014) and CDC-B5483 (Chibucos et al. 2016) available at NCBI.
- Cunninghamella** Matr. 1903, *Cunninghamellaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *C. echinulata* (Thaxt.) Thaxt. ex Blakeslee, saprobes, human pathogen, cosmopolitan, see Asha and Vidyavathi (2009; review), Fakas et al. (2009b; substrates for oil production), Pastor et al. (2010; antifungal properties), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Berger et al. (2014; biotechnology), Ganjali Dashti et al. (2014; biosynthesis of lipase), Saad et al. (2014; Lipid and Gamma Linolenic Acid Production), Silva et al. (2014; metabolites), Zawadzka et al. (2015; Carbazole hydroxylation), Dube and Kumar (2017; in biotransformation), Siddiqui et al. (2017; biotransformation), cultures and sequences are available, available genomes: *C. echinulata* NRRL 1382 unpublished genome at JGI portal (Grigoriev et al. 2014), *C. elegans* CDC-B9769 and *C. bertholletiae* 175 and CDC-B7461 (Chibucos et al. 2016) available at NCBI genomes.
- Densospora** McGee 1996, *Endogonaceae*, *Endogonales*, *Endogonomycetes*, *Mucoromycota*, nine species, type: *D.*

3515 *tubiformis* (P.A. Tandy) McGee, mycorrhizal, Australia,
 3516 Northern Hemisphere, see Kirk et al. (2013; genus accep-
 3517 ted), Desirò et al. (2017; ecology and phylogeny), Truong
 3518 et al. (2017; phylogeny), Yamamoto et al. (2017a, b;
 3519 reported from Northern Hemisphere), cultures unavailable,
 3520 sequences available.
 3521 **Dichotomocladium** Benny & R.K. Benj. 1975,
 3522 *Lichtheimiaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromy-*
 3523 *cota*, five species, type: *D. elegans* Benny & R.K. Benj.,
 3524 saprobes, worldwide, see Hoffmann et al. (2013; phy-
 3525 logeny), Kirk et al. (2013; genus accepted), Walther et al.
 3526 (2013; phylogeny), Benny et al. (2016b; classification),
 3527 cultures and sequences are available, genome available *D.*
 3528 *elegans* RSA 919 unpublished genome at JGI portal
 3529 (Grigoriev et al. 2014)
 3530 **Dicranophora** J. Schröt. 1886, *Mucoraceae*, *Mucorales*,
 3531 *Mucoromycetes*, *Mucoromycota*, one species, type: *D.*
 3532 *fulva* J. Schröt., saprobes, cosmopolitan, see Hoffmann
 3533 et al. (2013; phylogeny), Kirk et al. (2013; genus accepted),
 3534 Benny et al. (2016b; classification), cultures and sequences
 3535 are unavailable.
 3536 **Ellisomyces** Benny & R.K. Benj. 1975, *Mucoraceae*, *Mu-*
 3537 *corales*, *Mucoromycetes*, *Mucoromycota*, one species,
 3538 type: *E. anomalus* (Hesselt. & P. Anderson) Benny & R.K.
 3539 Benj., saprobes, cosmopolitan, see Hoffmann et al. (2013;
 3540 phylogeny), Kirk et al. (2013; genus accepted), Walther
 3541 et al. (2013; phylogeny), Benny et al. (2016b; classifica-
 3542 tion), cultures and sequences are available.
 3543 **Endogone** Link 1809 (= *Youngiomyces* Y.J. Yao 1995 fide
 3544 Desirò et al. 2017), *Endogonaceae*, *Endogonales*, *Endo-*
 3545 *gonomycetes*, *Mucoromycota*, c. 21 species, type: *E. pisi-*
 3546 *formis* Link, in mycorrhiza, cosmopolitan, see Bidartondo
 3547 et al. (2011; symbiosis with plants), Schüßler et al. (2011;
 3548 arbuscular mycorrhizal fungi), Desirò et al.
 3549 (2013, 2015, 2017; phylogeny, endobacteria, symbioses
 3550 with hornworts), Kirk et al. (2013; genus accepted),
 3551 Yamamoto et al. (2015, 2017a, b; morphology, phylogeny,
 3552 oak forests, new species), Benny et al. (2016b; classifica-
 3553 tion), Benitez et al. (2017; species in rhizosphere), cultures
 3554 and sequences are available.
 3555 **Fennellomyces** Benny & R.K. Benj. 1975, *Syncephalas-*
 3556 *tracae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, four
 3557 species, type: *F. linderi* (Hesselt. & Fennell) Benny & R.K.
 3558 Benj., saprobes, coprophilous, worldwide, see Xess et al.
 3559 (2012; phylogeny, De Azevedo Santiago et al. (2013;
 3560 coprophilous, Brazil), Hoffmann et al. (2013; phylogeny),
 3561 Kirk et al. (2013; genus accepted), Walther et al. (2013;
 3562 phylogeny), Benny et al. (2016b; classification), cultures
 3563 and sequences are available, genome available: *Fennel-*
 3564 *lomyces* sp. T-0311 unpublished genome at JGI portal
 3565 (Grigoriev et al. 2014)
 3566 **Gilbertella** Hesselt. 1960, *Choanephoraceae*, *Mucorales*,
 3567 *Mucoromycetes*, *Mucoromycota*, two species, type: *G.*

persicaria (E.D. Eddy) Hesselt., worldwide, plant patho-
 gen, see Amiri et al. (2011; abiotic factors effect), Guo
 et al. (2012; rot in dragon fruit), Sun et al. (2012;
 metabolites), Hoffmann et al. (2013; phylogeny), Kirk
 et al. (2013; genus accepted), Walther et al. (2013; phy-
 logeny), Karthikeyan and Gopalakrishnan (2014; infection
 on shrimp), Uloth et al. (2015; associated with calcium
 oxalate crystals), Benny et al. (2016b; classification), Cruz-
 Lachica et al. (2016; papaya fruit rot), cultures and
 sequences are available, genome available: *G. persicaria*
 var. *persicaria* CBS 190.32-T unpublished genome at JGI
 portal (Grigoriev et al. 2014)

Gongronella Ribaldi 1952, *Cunninghamellaceae*, *Muco-*
rales, *Mucoromycetes*, *Mucoromycota*, six species, type: *G.*
butleri (Lendn.) Peyronel & Dal Vesco, saprobes, cos-
 mopolitan, see Nwe et al. (2009; chitosan for tissue
 regeneration), Ghizelini et al. (2012; record from Brazil),
 Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus
 accepted), Walther et al. (2013; phylogeny), Zhang et al.
 (2013; Enhancement of chitosanase production), Adamčík
 et al. (2015; new species), Ariyawansa et al. (2015; new
 species), Babu et al. (2015; *G. butleri* from Korea), Li et al.
 (2016; new species), Tibpromma et al. (2017; new species),
 cultures and sequences are available., genome available, *G.*
butleri CBS 227.36 unpublished genome at JGI portal
 (Grigoriev et al. 2014), *Gongronella* sp. W5 (unpublished)
 available at NCBI.

Halteromyces Shipton & Schipper 1975, *Cunninghamel-*
laceae, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one
 species, type: *H. radiatus* Shipton & Schipper, saprobes,
 Australia, see Hoffmann et al. (2013; phylogeny), Kirk
 et al. (2013; genus accepted), Walther et al. (2013; phy-
 logeny), cultures and sequences are available.

Helicostylum Corda 1842, *Mucoraceae*, *Mucorales*, *Mu-*
coromycetes, *Mucoromycota*, c. two species, type: *H. ele-*
gans Corda., saprobes, cosmopolitan, see Hoffmann et al.
 (2013; phylogeny), Kirk et al. (2013; genus accepted),
 Walther et al. (2013; phylogeny), Benny et al. (2016b;
 classification), cultures and sequences are available.

Hesseltinella H.P. Upadhyay 1970, *Cunninghamellaceae*,
Mucorales, *Mucoromycetes*, *Mucoromycota*, one species,
 type: *H. vesiculosa* H.P. Upadhyay, saprobes, South
 America, see Hoffmann et al. (2013; phylogeny), Kirk
 et al. (2013; genus accepted), Walther et al. (2013; phy-
 logeny), Benny et al. (2016b; classification), Spatafora
 et al. (2016; phylogeny), cultures and sequences are
 available, *H. vesiculosa* NRRL3301 (Mondo et al. 2017)

Hyphomucor Schipper & Lunn 1986, *Mucoraceae*, *Mu-*
corales, *Mucoromycetes*, *Mucoromycota*, one species,
 type: *H. assamensis* (B.S. Mehrotra & B.R. Mehrotra)
 Schipper & Lunn., saprobes, cosmopolitan, see Hoffmann
 et al. (2013; phylogeny), Kirk et al. (2013; genus accepted),

- Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Isomucor*** J.I. Souza, Pires-Zottar. & Harakava 2012, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *I. truffemiae* J.I. Souza, Pires-Zottar. & Harakava, from soil, Brazil, see de Souza et al. (2012; taxonomy), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Jingerdemannia*** Trappe, Desirò, M.E. Sm., Bonito & Bidartondo 2017, *Endogonaceae*, *Endogonales*, *Endogonmycetes*, *Mucoromycota*, two species, type: *J. flammi-cora* (Trappe & Gerd.) Trappe, Desirò, M.E. Sm., Bonito & Bidartondo, Desirò et al. (2017; phylogeny), cultures unavailable, sequences available.
- Kirkiana*** L.S. Loh, Kuthub. & Nawawi 2001, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *K. ramosa* L.S. Loh, Kuthub. & Nawawi, saprobes, cosmopolitan, see Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Kirkomyces*** Benny 1996, *Mycotyphaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *K. cordensis* (B.S. Mehrotra & B.R. Mehrotra) Benny, saprobes, Asia, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), Satari and Karimi (2017; biologically active molecule production), cultures and sequences are unavailable.
- Lentamyces*** Kerst. Hoffm. & K. Voigt 2008 [2009], *Lentamyetaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, four species, type: *L. parricidus* (Renner & Muskat ex Hesselt. & J.J. Ellis) Kerst. Hoffm. & K. Voigt, pathogens, cosmopolitan, see Hoffmann and Voigt (2009; taxonomy), Budziszewska et al. (2010a; Poland), Hoffmann et al. (2013; phylogeny), Walther et al. (2013; phylogeny), Gebremariam et al. (2014; notes), Tretter et al. (2014; DNA), Benny et al. (2016b; classification), cultures and sequences are available.
- Lichtheimia*** Vuill. 1903, *Lichtheimiaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, c. wight species, type: *L. corymbifera* (Cohn) Vuill., worldwide, saprobes and pathogens, see Kirk et al. (2008; treated as a synonym of *Absidia*), Garcia-Hermoso et al. (2009; molecular Parasitology), Alastruey-Izquierdo et al. (2010a, b; clinical), Hoffmann et al. (2009a, b, 2013; introduction of family, phylogeny), Bellanger et al. (2010; farmer lung disease), Borrás et al. (2010; clinical), Gomes et al. (2011; human pathogens), Neves et al. (2011; enzyme production), Schrödl et al. (2011; MALDI ToF), Schwartz et al. (2012, 2014a, b; pathogenicity, genomics), Kirk et al. (2013; genus accepted), Walther et al. (2013; DNA), André et al. (2014; new species), Linde et al. (2014; whole genome sequence), Garcia et al. (2015; β -glucosidase production), Benny et al. (2016b; classification), cultures and sequences are available (Ex-neotype of type: CBS 429.75; sequence of type: NR_111413), genome available: *L. corymbifera* JMRC:FSU:9682 (Schwartz et al. 2014a, b), *L. corymbifera* strains CDC-B2541 and 008-049 (Chibucos et al. 2015), *L. hyalospora* unpublished genome at JGI portal (Grigoriev et al. 2014), *L. ramosa* strains CDC-B5399 and CDC-B5792 (Chibucos et al. 2015) and JMRC FSU:6197 (Linde et al. 2014)
- Mucor*** Fresen. 1850, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, c. 60 species, type: *M. mucedo* Fresen., worldwide, saprobes, in soil, human pathogens, see Hoffmann et al. (2013; classification, notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Aziz et al. (2016; medicinal nanobiology), Benny et al. (2016b; classification), Behnam et al. (2016; xylanase production), Kroll et al. (2016; mutations), Racs et al. (2016; blood infection), Tang et al. (2016; proteomics), Calo et al. (2017; molecular pathway disruption), Garcia et al. (2017; recyclable genetic marker), Taj-Aldeen et al. (2017; molecular parasitology), cultures and sequences are available, genomes available, *M. ambiguus* NBRC 6742, *M. circinelloides* CBS277.49 (Corrochano et al. 2016) and WJ11 [26352831], 1006PhL (no publication), CDC-B8987 (Shelburne et al. 2015) and JCM 22480 are available at NCBI genomes, *M. irregularis* B50 (no publication) is available at NCBI genomes, *M. cordense* RSA 1222 unpublished genome at JGI portal (Grigoriev et al. 2014), *M. heterogamus* NRRL 1489 unpublished genome at JGI portal (Grigoriev et al. 2014), *M. indicus* CDC-B7402 (Shelburne et al. 2015), *M. racemosus* CDC-B9645 (Shelburne et al. 2015), *M. velutinous* CDC-B5328 (Shelburne et al. 2015)
- Mycocladus*** Beauverie 1900, *Mycocladaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *M. verticillatus* Beauverie, human pathogens, worldwide, see Alvarez et al. (2009; clinical importance), Hoffmann et al. (2009a, b, 2013; accepted in *Mucoraceae*), Alastruey-Izquierdo et al. (2010a, b; accepted as a synonym of *Lichtheimia*), Kirk et al. (2013; genus accepted), Schofield et al. (2013; human pathogens), Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Mycotypha*** Fenner 1932, *Mycotyphaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, three species, type: *M. microspora* Fenner, insect symbionts, saprobes, or human pathogen (rare), from soil, worldwide, see Jayachandra et al. (2011; Biomethanation), De Azevedo Santiago et al. (2013; in Brazil), Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Woodbury and Gries (2013; ecology), Benny et al. (2016b; classification), cultures and sequences are available, *M. africana* NRRL 2978 unpublished genome at JGI portal (Grigoriev et al. 2014).

- Nawawiella** L.S. Loh & Kuthub. 2001, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *N. apophysa* L.S. Loh & Kuthub., saprobes, in soil, South East Asia, see Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Nothadelphia** Degawa & W. Gams 2004, *Mucoromycota* genera *incertae sedis*, one species, type: *N. mortierellicola* Degawa & W. Gams, mycoparasite of *Mortierella*, on bat dung, Japan, see Benny et al. (2016b; classification), cultures and sequences are available.
- Palaeoendogone** Strullu-Derr., Kenrick, Pressel, Duckett, J.P. Rioult & Strullu 2014, *Mucoromycotina* genera *incertae sedis*, one species, type: *O. gwynne-vaughaniae* Strullu-Derr., Kenrick, Pressel, Duckett, J.P. Rioult & Strullu, in plants (fossil fungi), UK, see Strullu-Derrien et al. (2014; taxonomy), cultures and sequences are unavailable.
- Parasitella** Bainier 1903, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *P. parasitica* (Bainier) Syd., parasites, cosmopolitan, see Burmeste et al. (2013; gene transferring), Hoffmann et al. (2013; phylogeny), Walther et al. (2013; phylogeny), Ellenberger et al. (2014; complete mitochondrion sequence), Benny et al. (2016b; classification), cultures and sequences are available, genome available: *P. parasitica* genome at NCBI genomes.
- Peridiospora** C.G. Wu & Suh J. Lin 1997, *Endogonaceae*, *Endogonales*, *Endogonomycetes*, *Mucoromycota*, two species, type: *P. tatchia* C.G. Wu & Suh J. Lin, in mycorrhiza, Taiwan, see Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), Benítez et al. (2017; species in rhizosphere), cultures and sequences are unavailable.
- Phascolomyces** Boedijn ex Benny & R.K. Benj. 1976, *Syncephalastraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *P. articulatus* Boedijn ex Benny & R.K. Benj., ?coprophilous, saprobes, worldwide, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available, genome available: *P. articulatus* unpublished genome at JGI portal (Grigoriev et al. 2014).
- Phycomyces** Kunze 1823, *Phycomycetaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, three species, type: *P. nitens* (C. Agardh) Kunze, saprobes, worldwide, see Sanz et al. (2009, 2011; interactions with the environment, functional analysis), Chaudhary et al. (2013; genetic linkage map), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Shakya and Idnurm (2014; uniparental mitochondrial inheritance), Žižić et al. (2014; vanadate influence on metabolism), Benny et al. (2016b; classification), cultures and sequences are available, genome available: *P. blaskeleanus* NRRL1555 (Corrochano et al. 2016), *P. nitens* S607, S608 and S609 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Pilaira** Tiegh. 1875, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, seven species and one subspecies, type: *P. anomala* (Ces.) J. Schröt., saprobes, coprophilous, cosmopolitan, see Zheng and Liu (2009; taxa in China), Hoffmann et al. (2013; notes), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), Urquhart et al. (2017; new species), cultures and sequences are available, genome available: *P. anomala* RSA1997 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Pilobolus** Tode 1784, *Pilobolaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, ten species and one subspecies, type: *P. crystallinus* (F.H. Wigg.) Tode, saprobes, coprophilous, cosmopolitan, see Kubo (2011; gene expression), Pierce and Foos (2011; species associated with horses), Hoffmann et al. (2013; notes), Walther et al. (2013; phylogeny), Rajachan et al. (2014; depsi-done), Benny et al. (2016b; classification), cultures and sequences are available, genome available: *P. umbonatus* NRRL 6349 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Pirella** Bainier 1882, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *P. circinans* Bainier, saprobes, coprophilous, cosmopolitan, see Bridge et al. (2008; new host), Clum et al. (2009; genomics), Hoffmann et al. (2013; notes), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Poitrasia** P.M. Kirk 1984, *Choanephoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *G. circinans* (H. Nagan. & N. Kawak.) P.M. Kirk, worldwide, see Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Qi et al. (2016; population study), Benny et al. (2016b; classification), cultures and sequences are available.
- Protomycocladus** Schipper & Samson 1994, *Syncephalastraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *P. faisalabadensis* (J.H. Mirza, S.M. Khan, S. Begum & Shagufta) Schipper & Samson, saprobes, Asia, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Radiomyces** Embree 1959, *Radiomycetaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, three species, type: *R. spectabilis* Embree, saprobes, USA, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), *R. spectabilis* NRRL 2753 unpublished genome at JGI portal (Grigoriev et al. 2014).

- Rhizomucor** Lucet & Costantin 1900, *Lichtheimiaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, eight species, type: *R. pusillus* (Lindt) Schipper, saprobes, human pathogens, cosmopolitan, see Lu et al. (2009; endemic zygomycosis), Zheng et al. (2009; new species), Budziszewska et al. (2010b; taxonomic revision), Rodrigues and Fernandez-Lafuente (2010; lipase as biocatalyst), Tajdini et al. (2010; Chitosan), Tawil et al. (2010; α -amylase), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Martinez et al. (2013; biotransformation of fatty acid), Walther et al. (2013; phylogeny), Bard et al. (2014, pathogenicity) Benny et al. (2016b; classification), *R. variabilis* (Chibucos et al. 2016), *R. miehei* CAU432 [24746234] and *R. pusillus* (no publication) available at NCBI genomes.
- Rhizopodopsis** Boedijn 1959, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *R. javensis* Boedijn, saprobes, Indonesia, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Rhizopus** Ehrenb. 1821, *Rhizopodaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, c. ten species, type: *R. stolonifer* (Ehrenb.) Vuill., saprobes, worldwide, in soil, plant pathogen, human pathogen, see monograph with key (Zheng et al. 2017), Hernandez-Lauzardo et al. (2008; Chitosan effect), Qin et al. (2008; biodiesel production), Abedinifar et al. (2009; ethanol production), Ma et al. (2009; Genomics), Abe et al. (2010; molecular phylogeny), Gryganskyi et al. (2010; phylogeny), Xu et al. (2010; fumaric acid production), Das et al. (2012; gold nanoparticles), Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Dolatabadi et al. (2014; nomenclature of *Rhizopus arrhizus*), Kaerger et al. (2015; virulence), Mendoza et al. (2015; human pathogens), Benny et al. (2016b; classification), Li et al. (2016; new species), Zhang et al. (2013, xylanase production), Wu et al. (2018, fumaric acid production), Canet et al. (2017; biodiesel synthesis), Liu et al. (2016; food waste fermentation), Baggio et al. (2017; phytopathology), Gryganskyi et al. (2018; phylogenomics), NRRL 21446, NRRL 21477, NRRL 21447, NRRL 21789 (Chibucos et al. 2016) available at NCBI genomes, *R. microsporus* CDC-B7455 and CDC-B9738 (Chibucos et al. 2016), available at NCBI genomes, *R. microsporus* ATCC 11559, ATCC 52813, ATCC 52814, B9738 and B7455 available at NCBI genomes, *R. microsporus* CCTCC M201021 (Wang et al. 2013a, b, c, d) available at NCBI genomes, *R. oryzae* 99-892, CDC-B7407, HUMC 02, NRRL 13440, NRRL 18148, NRRL 21396 (Chibucos et al. 2016), 99-133 and 97-1192 available at NCBI genomes, *R. stolonifer* CDC-B9770 (Chibucos et al. 2016) available at NCBI genomes, cultures and sequences are available.
- Saksenaea** S.B. Saksena 1953, *Saksenaeaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, five species, type: *S. vasiformis* S.B. Saksena, human pathogen, cosmopolitan, see García-Martínez et al. (2008; human pathogen), Lechevalier et al. (2008; molecular diagnosis), Baradkar and Kumar (2009; cutaneous zygomycosis), Alvarez et al. (2010a, b; new species), Hospenthal et al. (2011; fatal infection), Salas et al. (2012; disseminated infection by *Saksenaea vasiformis*), Kirk et al. (2013; genus accepted), Tretter et al. (2014; notes), Benny et al. (2016b; classification), Crous et al. (2016, 2017; new species), *S. oblongispora* B3353 and *S. vasiformis* B4078 (Chibucos et al. 2016) available at NCBI genomes.
- Sclerogone** Warcup 1990, *Endogonaceae*, *Endogonales*, *Endogonomycetes*, *Mucoromycota*, one species, type: *S. eucalypti* Warcup, in mycorrhiza, Australia, see Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), Desirò et al. (2017; notes, provisionally accepted as in *Endogonaceae*), cultures and sequences are unavailable.
- Sphaerocreas** Sacc. & Ellis 1882, *Endogonaceae*, *Endogonales*, *Endogonomycetes*, *Mucoromycota*, type: *S. pubescens* Sacc. & Ellis, four species, plant related, Hirose et al. (2014; classification), Desirò et al. (2017; phylogeny), cultures unavailable, sequences available.
- Spinellus** Tiegh. 1875, *Phycomycetaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, five species, type: *S. fusiger* (Link) Tiegh., mycoparasites, worldwide, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), *S. fusiger* NRRL 22323 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Sporodiniella** Boedijn 1959, *Rhizopodaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *S. umbellata* Boedijn, saprobes, mild (and minor) entomopathogen, worldwide, see Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), *S. umbellata* MES 1446 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Syncephalastrum** J. Schröt. 1886, *Syncephalastraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *S. racemosum* Cohn ex J. Schröt., saprobes, human pathogens worldwide, see Baradkar et al. (2008; infection), Mathur et al. (2010; emulsification), Batista et al. (2013; wastewater treatment), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), cultures and sequences are available, genomes available: Walther et al. (2013; phylogeny), Huang et al. (2014; nematicide), Benny et al. (2016b; classification), *S. racemosum* NRRL 2496 (Mondo et al. 2017), *S. racemosum* B6101 and *S. monosporum* B8922 (Chibucos et al. 2016) available at NCBI genomes.
- Syzygites** Ehrenb. 1818 (= *Sporodinia* Link), *Rhizopodaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one

- species, type: *S. megalocarpus* Ehrenb., mycoparasites, saprobes, cosmopolitan, see Beyer et al. (2013; on button mushroom), Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Thamnidium** Link 1809, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *T. elegans* Link, saprobes, cosmopolitan, see Papanikolaou et al. (2010; lipid production), Akar et al. (2013; environmental clean-up), Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), *T. elegans* unpublished genome at JGI portal (Grigoriev et al. 2014).
- Thamnostylum** Arx & H.P. Upadhyay 1970, *Syncephalastraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, four species, type: *T. piriforme* (Bainier) Arx & H.P. Upadhyay, coprophilous, human pathogens, worldwide, see Xess et al. (2012; human pathogen), De Azevedo et al. (2013; coprophilous), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Thermomucor** Subrahman., B.S. Mehrotra & Thirum. 1977, *Lichtheimiaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *T. indicae-seudaticae* Subrahman., B.S. Mehrotra & Thirum., saprobes, India, see Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), *T. indicae-seudaticae* HACC 243 available at NCBI genomes.
- Tortumyces** L.S. Loh 2001, *Mucoraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, two species, type: *T. fimicola* L.S. Loh, saprobes, Asia, see Benny et al. (2016b; classification), cultures and sequences are unavailable.
- Umbelopsis** Amos & H.L. Barnett 1966, *Umbelopsidaceae*, *Umbelopsis*, *Umbelopsidomycetes*, *Mucoromycota*, 16 species, type: *T. versiformis* Amos & H.L. Barnett, saprobes, in soil, worldwide, see Meeuwse et al. (2011; lipid accumulation), Ogawa et al. (2011; polyphyly), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Wang et al. (2013c, 2015; new species, taxonomy), Takeda et al. (2014; genome sequence), Benny et al. (2016b; classification), Janicki et al. (2016; endocrine disruptors' degradation), Crous et al. (2017; new species), cultures and sequences are available, genome available: *U. isabellina* NBRC 7784 [24578268] and B7317 (Chibucos et al. 2016) available at NCBI genomes, *U. isabellina* AD026 unpublished genome at JGI portal (Grigoriev et al. 2014), *U. ramanniana* AG unpublished genome at JGI portal (Grigoriev et al. 2014), *Umbelopsis* sp. nov. AD052 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Utharomyces** Boedijn ex P.M. Kirk & Benny 1980, *Pilobolaceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species and one sub-species, type: *U. epallocaulus* Boedijn ex P.M. Kirk & Benny, saprobes, coprophilous, cosmopolitan, see Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), cultures and sequences are available.
- Zychaea** Benny & R.K. Benj. 1975, *Syncephalastraceae*, *Mucorales*, *Mucoromycetes*, *Mucoromycota*, one species, type: *Z. mexicana* Benny & R.K. Benj., coprophilous, human pathogens, South America, see Xess et al. (2012; phylogeny, represent *Thamnostylum* spp.), Hoffmann et al. (2013; phylogeny), Kirk et al. (2013; genus accepted), Walther et al. (2013; phylogeny), Benny et al. (2016b; classification), *Z. mexicana* RSA 1403 unpublished genome at JGI portal (Grigoriev et al. 2014).
- Neocallimastigomycota** M.J. Powell
Hibbett et al. (2007) introduced *Neocallimastigomycota*, with *Neocallimastix* Vávra & Joyon ex I.B. Heath as the type genus. The phylum comprises anaerobic taxa (including gut fungi, coprophilous taxa) and the phylum was accepted in several subsequent studies since Hibbett et al. (2007), (Griffith et al. 2010; Ligginstoffer et al. 2010; Gruninger et al. 2014).
We accept one class, one order, three families and ten genera in *Neocallimastigomycota*.
- Notes for genera**
Anaeromyces Breton, Bernalier, Dusser, Fonty, B. Gaillard & J. Guillot 1990, *Anaeromycetaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, four species, type: *A. mucronatus* Breton, Bernalier, Dusser, Fonty, B. Gaillard & J. Guillot, inside animal colon, in dung, cosmopolitan, see Kirk et al. (2013; new species, genus accepted), Doweld (2014a; introduced *Anaeromycetaceae*), Li et al. (2016; new species), cultures and sequences are available, ITS of the type culture NR_111156.1.
- Buwchfawromyces** T.M. Callaghan & G.W. Griff. 2015, *Neocallimastigaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, one species, type: *B. eastonii* T.M. Callaghan & G.W. Griff., from buffalo dung, anaerobic, terrestrial, Europe, see Callaghan et al. (2015; taxonomy), Wang et al. (2017a, b, c, d, e; phylogeny), cultures and sequences are available, ITS of the type culture NR_132002.
- Caecomyces** J.J. Gold 1988, *Neocallimastigaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, five species, type: *C. f. equi* J.J. Gold, in caecum animals, cosmopolitan, see Kirk (2012; new species), Kirk et al. (2013; genus accepted), Henske et al.

(2018; new species), Li et al. (2016; new species), cultures and sequences are available.

Cyllamyces Ozkose, B.J. Thomas, D.R. Davies, G.W. Griff. & Theodorou 2001, *Neocallimastigaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, one species, type: *C. aberensis* Ozkose, B.J. Thomas, D.R. Davies, G.W. Griff. & Theodorou, from cow faeces, UK, see Sridhar et al. (2014; new species), cultures and sequences are available.

Neocallimastix Vávra & Joyon ex I.B. Heath 1983, *Neocallimastigaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, seven species, type: *N. frontalis* (R.A. Braune) Vávra & Joyon ex I.B. Heath, coprophilous, in rumen of cattle, sheep, worldwide, see Kirk et al. (2013; genus accepted), Ariyawansa et al. (2015; new species), Li et al. (2016; new species), cultures and sequences are available.

Oontomyces Dagar, Puniya & G.W. Griff. 2015, *Neocallimastigaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, one species, type: *O. anksri* Dagar, Puniya & G.W. Griff., in rumen of camel, Asia, see Dagar et al. (2015; taxonomy), cultures and sequences are available, ITS of the type: NR_132022.

Orpinomyces D.J.S. Barr, H. Kudo, Jakober & K.J. Cheng 1989, *Neocallimastigaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, two species, type: *O. bovis* D.J.S. Barr, H. Kudo, Jakober & K.J. Cheng, in digestive tract of Holstein, Canada, see Kirk et al. (2013; genus accepted), cultures and sequences are available.

Pecoramyces Hanafy, N.H. Youssef, G.W. Griff. & Elshahed 2017, *Neocallimastigaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, one species, type: *P. ruminantium* Hanafy, N.H. Youssef, G.W. Griff. & Elshahed, USA, see Hanafy et al. (2017; taxonomy), cultures and sequences are available, ITS of the type: NR_152323.

Piromyces J.J. Gold, I.B. Heath & Bauchop 1988 (= *Piromonas* E. Liebet. 1910), *Neocallimastigaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, six species, type: *P. communis* J.J. Gold, I.B. Heath & Bauchop, worldwide, see Kirk (2012; new species), Kirk et al. (2013; genus accepted), Ariyawansa et al. (2015; new species), Li et al. (2016; DNA), cultures and sequences are available.

Sphaeromonas E. Liebet. 1910, *Sphaeromonadaceae*, *Neocallimastigales*, *Neocallimastigomycetes*, *Neocallimastigomycota*, four species, type: *S. communis* E. Liebet., stomach of ruminant, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.

Olpidiomycolata Doweld

Doweld (2013c) introduced *Olpidiomycolata* to accommodate *Olpidiales* which was accepted in

Chytridiomycetes (Kirk et al. 2008). The members of *Olpidiomycolata* showed broad range of life modes as saprobes and parasites (in algae, aquatic fungi, rotifers *vide* Kirk et al. 2008).

We accept one class, one order, one family and four genera in *Olpidiomycolata*.

Notes for genera

Chytridhaema Moniez 1887, *Olpidiaceae*, *Olpidiales*, *Olpidiomycolata*, one species, type: *C. cladocerarum* Moniez, saprobes, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.

Cibdelia Juel 1925, *Olpidiaceae*, *Olpidiales*, *Olpidiomycolata*, one species, type: *C. infestans* Juel, Europe, see Kirk et al. (2013; genus accepted), cultures and sequences are unavailable.

Leioldipidium Doweld 2014, *Olpidiaceae*, *Olpidiales*, *Olpidiomycolata*, five species, type: *L. cucurbitacearum* (D.J.S. Barr & Dias) Doweld, intracellular parasites of roots, cosmopolitan, see Doweld (2014j; nomenclature), cultures and sequences are unavailable.

Olpidium (A. Braun) J. Schröt. 1886, *Olpidiaceae*, *Olpidiales*, *Olpidiomycolata*, c. 50 species, type: *O. endogenum* (A. Br.) Schroet., parasitic, cosmopolitan, see Kirk et al. (2013; genus accepted), cultures and sequences are available.

Rozellomycota

Doweld (2013d) introduced *Rozellomycota* which mostly comprises aquatic parasites. Tedersoo et al. (2016) accepted *Microsporidea* Corliss & Levine as a class in *Rozellomycota*. However, the classification of *Rozellomycota* is still poorly known thus, we follow Catalogue of Life (2018) (<http://www.catalogueoflife.org>).

Notes for genera

Abelspora Azevedo 1987, *Abelsporidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, one species, type: *A. portucalensis* C. Azevedo, parasites of crabs, aquatic, South America, see Azevedo (1987a, b; generic description), Sprague et al. (1992; taxonomic review), sequences are unavailable.

Acarispora Radek and Alberti 2015, *Chytridiopsidae*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, one species, type: *I. acarivora* Larsson, M.Y. Steiner & Bjørnson, parasites of mites, Europe, see Radek et al. (2015; taxonomy), sequences are unavailable.

Aedispora Kilochitskii 1997, *Amblyosporidae*, *Meiodiaphlophasida*, *Microsporidea*, *Rozellomycota* one species, type: *A. dorsalis* Kilochitskii, parasites of mosquitoes, aquatic, Europe, see Kilochitskii (1997; taxonomy), Andreadis (2007; reported on mosquito larva), sequences are unavailable.

- 4143 **Agglomerata** Larsson & Yan 1988, *Gurleyidae*, *Glugeida*,
4144 *Microsporidea*, *Rozellomycota*, five species, type: *A. sidae*
4145 (Jírovec) Larsson & Yan, parasites of crustaceans, aquatic,
4146 worldwide, see Larsson and Yan (1988; taxonomy), Larsson
4147 et al. (1996a, b; new species), Larsson and Voronin
4148 (2000; new species), Bronnvall (2001; microscopic cytology),
4149 Ovcharenko and Wita (2001; new species), Sokolova
4150 et al. (2016; *Agglomerata cladocera* from Siberian
4151 microcrustaceans, phylogeny), sequences are available.
- 4152 **Agmasoma** Hazard & Oldacre 1975, *Mrazekiidae*, *Dissociodihaplophasida*,
4153 *Microsporidea*, *Rozellomycota*, three species, type: *A. penaei* (Sprague)
4154 Hazard & Oldacre, parasites of shrimps, aquatic, North America, see Laisutis-
4155 san et al. (2009; ultrastructure), Sokolova et al. (2015; phylogeny),
4156 sequences are available.
- 4157 **Alfvenia** Larsson 1983, *Microsporidea* genera incertae
4158 sedis, *Rozellomycota*, four species, type: *A. nuda* Larsson,
4159 parasites of crustaceans, aquatic, Eurasia, see Sokolova
4160 et al. (2016; new species), sequences are available.
- 4161 **Alloglugea** Paperna & Lainson 1995, *Glugeidae*, *Glugeida*,
4162 *Haplophasea*, *Rozellomycota*, one species, type: *A. bufonis*
4163 Paperna & Lainson, parasites of fishes and amphibia,
4164 aquatic, worldwide, see Paperna and Lainson (1995a, b; taxonomy),
4165 Lom and Dyková (2005; on fishes), sequences are unavailable.
- 4166 **Amazonspora** Azevedo & Matos 2003, *Glugeidae*, *Glugeida*,
4167 *Microsporidea*, *Rozellomycota*, one species, type: *A. portucalensis*
4168 C. Azevedo, parasites of fishes, aquatic, South America, Azevedo (2003a, b; taxonomy),
4169 sequences are unavailable.
- 4170 **Amblyospora** Hazard & Oldacre 1975, *Amblyosporidae*,
4171 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, c. 90
4172 species, type: *A. californica* (Kellen & Lipa) Hazard & Oldacre,
4173 parasites of mosquitoes, aquatic, worldwide, see Andreadis et al. (2012; taxonomy),
4174 Simakova (2014; phylogeny), sequences are available.
- 4175 **Ameson** Sprague 1977, *Pereziiidae*, *Meiodihaplophasida*,
4176 *Microsporidea*, *Rozellomycota*, five species, type: *A. michaelis* (Sprague)
4177 Sprague, parasites of crustaceans, aquatic, worldwide, Wang et al. (2017a, b, c, d, e; new species),
4178 sequences are available.
- 4179 **Amphiacantha** Caullery & Mesnil 1914, *Amphiacanthidae*,
4180 *Metchnikovellida*, *Rudimicrosporea*, *Rozellomycota*, two species, type: *A. longa*
4181 Caullery & Mesnil, parasites of gregarines, aquatic, Europe, see Larsson (2014a, b; notes),
4182 Paskerova et al. (2016; notes), sequences are available for unidentified species.
- 4183 **Amphiambls** Caullery & Mesnil 1914, *Amphiacanthidae*,
4184 *Metchnikovellida*, *Rudimicrosporea*, *Rozellomycota*, two species, type: *A. capitellides*
4185 (Caullery & Mesnil) Caullery & Mesnil, parasites of gregarines, aquatic, Europe, see Larsson (2014a, b; notes),
4186 Mikhailov et al. (2016; genomic study), sequences are available for unidentified species.
- 4187 **Andreanna** Simakova, Vossbrinck & Andreadis 2008, *Amblyosporidae*,
4188 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *A. caspii*
4189 Simakova, C.R. Vossbrinck & Andreadis, parasites of mosquitoes, aquatic, Asia, see Simakova et al. (2008; taxonomy),
4190 sequences are available.
- 4191 **Anisofilariata** Tokarev, Voronin, Seliverstova, Dolgikh, Pavlova, Ignatieva & Issi 2010, *Microsporidea* genera incertae
4192 sedis, *Rozellomycota*, one species, type: *A. chironomi* Tokarev, Voronin, Seliverstova, Dolgikh, Pavlova,
4193 Ignatieva & Issi, parasites of chironomids, aquatic, Europe, see Tokarev et al. (2010a, b, taxonomy),
4194 sequences are available.
- 4195 **Anncaliia** Issi, Krylova & V.M. Nikolaeva 1993, *Tubulinosematidae*, *Microsporidea* families incertae sedis,
4196 *Rozellomycota*, six species, type: *A. meligethi* (Issi & Radishcheva) Issi, Krylova & V.M. Nikolaeva,
4197 parasites of insects and humans, worldwide, see Cali et al. (2010; human infection of *A. algerae*),
4198 Monaghan et al. (2011; in-vitro growth of *A. algerae*), Panek et al. (2014; *A. algerae* as a parasite),
4199 Watts et al. (2014; *A. algerae* microsporidial myositis), sequences are available.
- 4200 **Anostracospora** Rode, Landes, Lievens, Flaven, Segard, Jabbour-Zahab, Michalakakis, Agnew, Vivarés & Lenormand
4201 2013, *Mrazekiidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *A. rigaudi*
4202 N Rode, Landes, Lievens, Flaven, Segard, Jabbour-Zahab, Michalakakis, Agnew, Vivarés & Lenormand,
4203 parasites of shrimps, aquatic, Europe, see Rode et al. (2013; taxonomy), sequences are available.
- 4204 **Antonospora** Fries, Paxton, Tengo, Slemenda, da Silva, & Pieniazek 1999, *Ovavesiculidae*, *Dissociodihaplophasida*,
4205 *Microsporidea*, *Rozellomycota*, two species, type: *A. scoticae* Fries, Paxton, Tengo, Slemenda, da Silva, & Pieniazek,
4206 parasites of insects, worldwide, see Sokolova et al. (2010a, b; new species), sequences are available.
- 4207 **Areospora** Stentiford, Bateman, Feist, Oyarzún, Uribe, Palacios & Stone 2014, *Areosporiidae*, *Microsporidea*
4208 families incertae sedis, *Rozellomycota*, one species, type: *A. rohanae* Stentiford, Bateman, Feist, Oyarzún, Uribe,
4209 Palacios & Stone, parasites of king crabs, aquatic, South America, see Stentiford et al. (2014; taxonomy),
4210 Simakova et al. (2011; identification), sequences are available.
- 4211 **Auraspora** Weiser & K. Purrini 1980, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *A. canningae*
4212 Weiser & K. Purrini, parasites of springtails, Europe, see Weiser and Purrini (1980; taxonomy),
4213 sequences are unavailable.
- 4214 **Bacillidium** Janda 1928, *Neopereziiidae*, *Microsporidea* families incertae sedis, *Rozellomycota*, five species, type: *B. criodrili*
4215 Janda, parasites of invertebrates, aquatic, worldwide, see Nielsen (1999) sequences are available.

- 4248 **Baculea** Loubès & Akbarieh 1978, *Microsporidea* genera
4249 *incertae sedis*, *Rozellomycota*, one species, type: *B. daph-*
4250 *niae* Loubès & Akbarieh, parasites of cladocerans, aquatic,
4251 Europe, see Loubès and Akbarieh (1978; taxonomy),
4252 sequences are unavailable.
- 4253 **Becnelia** Tonka & Weiser 2000, *Amblyosporidae*,
4254 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one
4255 species, type: *B. sigarae* Tonka & Weiser, parasites of
4256 bugs, aquatic, Europe, see Tonka and Weiser (2000; tax-
4257 onomy), sequences are unavailable.
- 4258 **Berwaldia** Larsson 1981, *Berwaldiidae*, *Microsporidea*
4259 families *incertae sedis*, *Rozellomycota*, four species, type:
4260 *B. singularis* Larsson, parasites of crustaceans, worldwide,
4261 see Larsson (1981; taxonomy), Vávra et al. (2017; new
4262 species, biology), Simakova et al. (2018a, b; new species,
4263 taxonomy), sequences are available.
- 4264 **Binucleata** Refardt, Decaestecker, Johnson & Vávra 2008,
4265 *Gurleyidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, one
4266 species, type: *B. daphniae* Decaestecker, Johnson & Vávra,
4267 parasites of daphniids, aquatic, Europe, see Refardt et al.
4268 (2008; taxonomy), sequences are available.
- 4269 **Binucleospora** A.M. Bronnvall & Larsson 1995, *Cau-*
4270 *dosporidae*, *Dissociodihaplophasida*, *Microsporidea*,
4271 *Rozellomycota*, one species, type: *B. elongata* A.M.
4272 Bronnvall & Larsson, parasites of ostracods, aquatic, Eur-
4273 ope, see Stentiford et al. (2013; emergent pathogens in
4274 aquatic systems), sequences are unavailable.
- 4275 **Bohuslavia** Larsson 1985, *Thelohaniidae*, *Meiodihap-*
4276 *lophasida*, *Microsporidea*, *Rozellomycota*, one species,
4277 type: *B. asterias* (Weiser) Larsson, parasites of chirono-
4278 mids, aquatic, Europe, see Larsson (1985; taxonomy),
4279 sequences are unavailable.
- 4280 **Bryonosema** Canning, Refardt, Vossbrinck, Okamura &
4281 Curry 2002, *Neopereziiidae*, *Microsporidea* families *in-*
4282 *certae sedis*, *Rozellomycota*, *Rozellomycota*, two species,
4283 type: *B. plumatellae* Canning, Refardt, Vossbrinck, Oka-
4284 mura & Curry, parasites of bryozoans, aquatic, Europe, see
4285 Canning et al. (2002a, b, 2004; taxonomy, correction of the
4286 type species), sequences are available.
- 4287 **Burenella** Jouvenaz & Hazard 1978, *Burenellidae*,
4288 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one
4289 species, type: *B. dimorpha* Jouvenaz & Hazard, parasites of
4290 ants, North America, see Jouvenaz and Hazard (1978;
4291 taxonomy), sequences are unavailable.
- 4292 **Burkea** Sprague 1977, *Burkeidae*, *Chytridiopsida*, *Mi-*
4293 *crosporidea*, *Rozellomycota*, two species, type: *B. gatesi*
4294 (de Puytorac & Tourret) Sprague, parasites of oligochaetes,
4295 aquatic, worldwide, see Sprague (1977a, b; taxonomy),
4296 sequences are unavailable.
- 4297 **Buxtehudea** Larsson 1980, *Buxtehudiidae*, *Chytridiopsida*,
4298 *Microsporidea*, *Rozellomycota*, one species, type: *B. sca-*
4299 *niae* Larsson, parasites of bristletails, Europe, see Larsson
(1980, 2014a, b; taxonomy, notes), sequences are
unavailable.
- Campanulospora** Issi, Radishcheva & Dolzhenko 1983,
Microsporidea genera *incertae sedis*, *Rozellomycota*, one
species, type: *C. denticulata* Issi, Radishcheva & Dolz-
henko, parasites of flies, Europe, see Issi et al. (1983;
taxonomy), Sokolova et al. (2018; Microsporidia described
in the Former Soviet Union and Russia in twentieth cen-
tury), sequences are unavailable.
- Canningia** Weiser Wegensteiner & Žižka 1995, *Unikary-*
onidae, *Glugeida*, *Microsporidea*, *Rozellomycota*, two
species, type: *C. spinidentis* Weiser, Wegensteiner &
Žižka, parasites of beetles, Europe, see Weiser et al. (1995;
taxonomy), sequences are unavailable.
- Caudospora** Weiser 1946, *Caudosporidae*, *Dissociodi-*
haplophasida, *Microsporidea*, *Rozellomycota*, one species,
type: *C. simulii* Weiser, parasites of blackflies, see Voss-
brinck and Debrunner-Vossbrinck (2005; phylogeny),
sequences are available.
- Caulleryetta** Dogiel 1922, *Microsporidea* genera *incertae*
sedis, *Rozellomycota*, one species, type: *C. mesnili* Dogiel,
parasites of gregarines, aquatic, Europe, sequences are
unavailable.
- Chapmanium** Hazard & Oldacre 1975, *Thelohaniidae*,
Meiodihaplophasida, *Microsporidea*, *Rozellomycota*, four
species, type: *C. cirritus* Hazard & Oldacre, parasites of
phantom midges, aquatic, North America, see Hazard and
Oldacre (1975; taxonomy), sequences are unavailable.
- Chytridioides** Tregouboff 1913, *Microsporidea* genera *in-*
certae sedis, *Rozellomycota*, one species, type: *C. schizo-*
phylli Tregouboff, parasites of millipedes, Europe,
sequences are unavailable.
- Chytridiopsis** Schneider 1884, *Chytridiopsidae*, *Chytrid-*
iopsida, *Microsporidea*, *Rozellomycota*, eleven species,
type: *C. socia* Schneider, parasites of insects, Europe, see
Burjanadze and Goginashvili (2009; infections on *Ips*
typographus), Takov and Pilarska (2009; infections on *Ips*
typographus), Tonka et al. (2010; development of *C.*
typographi), Larsson (2014a, b; taxonomy, notes),
sequences are unavailable.
- Ciliatosporidium** Foissner & Foissner 1995, *Mi-*
crosporidea genera *incertae sedis*, *Rozellomycota*, one
species, type: *C. platyophryae* I. Foissner & W. Foissner,
parasites of ciliates, aquatic, North America, see Foissner
and Foissner (1995; taxonomy), sequences are unavailable.
- Coccospora** Kudo 1925, *Thelohaniidae*, *Meiodihap-*
lophasida, *Microsporidea*, *Rozellomycota*, one species,
type: *C. micrococcus* (Léger & Hesse) Kudo, parasites of
chironomids, aquatic, Europe, sequences are unavailable.
- Cougourdella** Hesse 1935, *Cougourdellidae*, *Mi-*
crosporidea families *incertae sedis*, *Rozellomycota*, seven
species, type: *C. magna* Hesse, parasites of daphniids,
aquatic, worldwide, see Heilveil et al. (2001; life cycle and

transmission), Hyliš et al. (2007; phylogeny), sequences are available.

Crepidulospora Simakova, Pankova & Issi 2004, *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *C. beklemishevi* (Simakova, Pankova & Issi) Simakova, Pankova & Issi, parasites of mosquitoes, aquatic, Asia, see Simakova et al. (2004; taxonomy), sequences are unavailable.

Crispospora Tokarev, Voronin, Seliverstova, Pavlova & Issi 2010, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, one species, type: *C. chironomi* Tokarev, Voronin, Seliverstova, Pavlova & Issi, parasites of chironomids, aquatic, Europe, see Tokarev et al. (2010a, b, taxonomy), sequences are available.

Cryptosporina Hazard & Oldacre 1975, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, one species, type: *C. brachyfila* Hazard & Oldacre, parasites of spiders, North America, sequences are unavailable.

Cristulospora Khodzhaeva & Issi 1989, *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, three species, type: *C. sherbani* Khodzhaeva & Issi, parasites of blackflies, Asia, see Khodzhaeva & Issi (1989; taxonomy), sequences are unavailable.

Cucumispora Ovcharenko, Bacela, Wilkinson, Ironside, Rigaud & Wattier 2010, *Thelohaniidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, two species, type: *C. dikerogammari* (Ovcharenko & Kurandina) Ovcharenko, Bacela, Wilkinson, Ironside, Rigaud & Wattier, parasites of crustaceans, aquatic, Europe, see Ovcharenko et al. (2010; taxonomy), Bojko et al. (2015; new species), sequences are available.

Culicospora Weiser 1977, *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, two species, type: *C. magna* (Kudo) Weiser, parasites of mosquitoes, worldwide, see Simakova (2014; comparison with other mosquito parasitic *Microsporidea*), sequences are available.

Culicosporella Weiser 1977, *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *C. lunata* (Hazard & Savage) Hazard & Savage, parasites of insects, Europe, sequences are available.

Cylindrospora Issi & Voronin 1986, *Cylindrosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, two species, type: *C. chironomi* Issi & Voronin, parasites of insects, aquatic, Europe, see Sokolova et al. (2018; *Microsporidia* from USSR in twentieth Century), sequences are unavailable.

Cystosporogenes Canning, Barker, Nicholas & Page 1984, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, four species, type: *C. operophterae* (Canning) Canning, Barker, Nicholas & Page, parasites of insects, worldwide, sequences are unavailable.

Dasyatispora Diamant, Goren, Yokes, Galil, Klopman, Huchon, Szitenberg & Karhan, 2010, *Pleistophoridae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, one species, type: *D. levantinae* Diamant, Goren, Yokes, Galil, Klopman, Huchon, Szitenberg & Karhan, parasites of stringrays, aquatic, Europe, see Diamant et al. (2010; taxonomy), sequences are available.

Desmozon Freeman & Sommerville 2009, *Enterocytozoonidae*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, one species, type: *D. lepeophtherii* Freeman & Sommerville, parasites of sea lice, Europe, see Freeman and Sommerville (2009, 2011; taxonomy), Matthews et al. (2013; pathology), Tokarev et al. (2016; synonymy with *Paranucleospora*), Gunnarsson et al. (2017; pathology), Weli et al. (2017; pathology), sequences are available.

Desportesia Issi & Voronin 1986, *Metchnikovellidae*, *Metchnikovellida*, *Rudimicrosporea*, *Rozellomycota*, one species, type: *D. laubieri* (Desportes & Théodorides) Issi & Voronin, parasites of gregarines, aquatic, Europe, sequences are unavailable.

Dictyocoela Terry, Smith, Sharpe, Rigaud, Littlewood, Ironside, Rollinson, Bouchon, MacNeil, Dick & Dunn 2004, *Unikaryonidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, eight species, type: need typification, parasites of gammarids, aquatic, worldwide, see Wilkinson et al. (2011; genetic diversity), Winters and Faisal (2014; new species), sequences are available.

Dimeiospora Simakova, Pankova & Issi 2003, *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *C. palustris* Simakova, Pankova & Issi, parasites of mosquitoes, aquatic, Asia, see Simakova et al. (2003; taxonomy), sequences are unavailable.

Duboscqia Pérez 1908, *Duboscqiidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, eleven species, type: *D. legeri* Pérez, parasites of arthropods, Europe, sequences are unavailable.

Edhazardia Becnel, Sprague & Fukuda 1989, *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *E. aedis* (Kudo) Becnel, Sprague & Fukuda, parasites of mosquitoes, aquatic, worldwide, see Becnel et al. (1989; taxonomy), Williams et al. (2008; genome sequencing), sequences are available.

Encephalitozoon Levaditi, Nicolau & Schoen 1923, *Encephalitozoonidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, twelve species, type: *E. cuniculi* Levaditi, Nicolau & Schoen, parasites of insects and vertebrates, worldwide, see Levaditi et al. (1923; generic description), Wilson (1979; review), Sprague et al. (1992; taxonomic review), Vossbrinck et al. (1993; phylogeny), Didier et al. (1995; identification), Moss et al. (1999; flow cytometry), Vivarès and Méténier (2000; review on genome), Vivarès and Méténier (2001; review), Akerstedt (2002; ELISA-based detection),

- Wolk et al. (2002; Real-time PCR), Hoffman et al. (2003; populations of *E. intestinalis*), Menotti et al. (2003; real-time PCR assay), Valencáková et al. (2005; diagnosis), Furuya (2009; review), Corradi et al. (2010; whole genome), Valencakova et al. (2012; molecular identification), Němejc et al. (2013; diversity), Tsukada et al. (2013; parasitology), Myšková et al. (2014; in archaeological material), sequences are available.
- Endoreticulatus** Brooks, Becnel & Kennedy 1988, *Microsporidea* genera incertae sedis, *Rozellomycota*, five species, type: *E. fidelis* (Hostounský & Weiser) Brooks, Becnel & Kennedy, parasites of insects, worldwide, see Brooks et al. (1988; generic description), Sprague et al. (1992; taxonomic revision), Dong et al. (2010a, b; phylogeny), Xu et al. (2012; phylogeny), Pilarska et al. (2015; taxonomic review), sequences are available.
- Enterocytozpora** Rode, Landes, Lievens, Flaven, Segard, Jabbour-Zahab, Michalakis, Agnew, Vivarés & Lenormand 2013, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *E. artemiae* Rode, Landes, Lievens, Flaven, Segard, Jabbour-Zahab, Michalakis, Agnew, Vivarés & Lenormand, parasites of shrimps, aquatic, Europe, see Rode et al. (2013; taxonomy), sequences are available.
- Enterospora** Stentiford, Bateman, Longshaw & Feist 2007, *Enterocytozoonidae*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, two species, type: *E. canceri* Stentiford, Bateman, Longshaw & Feist, parasites of crabs, aquatic, Europe, see Stentiford et al. (2017; taxonomy), Palenzuela et al. (2014; new species), sequences are available.
- Episeptum** Larsson 1986, *Gurleyidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, six species, type: *E. inversum* Larsson, parasites of caddisflies, aquatic, Europe, see Larsson (1986a, b; taxonomy), Hylis et al. (2007; phylogeny), sequences are available.
- Euplotespora** Fokin, Di Giuseppe, Erra & Dini 2008, *Mrazekiidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *E. binucleata* Fokin, Di Giuseppe, Erra & Dini, parasites of ciliates, aquatic, Europe, see Fokin et al. (2008; taxonomy), sequences are available.
- Evlachovaia** Voronin 1986, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *E. chironomi* Voronin & Issi, parasites of chironomids, aquatic, Europe, see Sokolova et al. (2018; Microsporidia described from USSR in twentieth century), sequences are unavailable.
- Facilispora** Jones, Prosperi-Porta & Kim 2012, *Facilisporidae*, *Microsporidea* families incertae sedis, *Rozellomycota*, one species, type: *F. margolisi* Prosperi-Porta & Kim, parasites of sea lice, worldwide, see Jones et al. (2012a, b; taxonomy), Poley et al. (2017; biology, reported as parasites of pacific salmon louse), sequences are available.
- Fibrillanosema** Slothouber Galbreath, Smith, Terry, Becnel, & Dunn 2004, *Berwaldiidae*, *Microsporidea* families incertae sedis, *Rozellomycota*, two species, type: *F. crangonycis* Slothouber Galbreath, Smith, Terry, Becnel, & Dunn, parasites of crustaceans, Europe, see Slothouber Galbreath et al. (2004; taxonomy), Simakova et al. (2018a; phylogeny), sequences are available.
- Flabelliforma** Canning, Killick-Kendrick & Killick-Kendrick 1991, *Caudosporidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, four species, type: *F. montana* Canning, Killick-Kendrick & Killick-Kendrick, parasites of sand flies, aquatic, Europe, see Canning et al. (1991; taxonomy), sequences are available.
- Geusia** Rühl & Korn 1979, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *G. gamocystis* Rühl & Korn, parasites of mayflies, aquatic, Europe, sequences are unavailable.
- Globulispora** Vávra, Hylis, Viala, Nebesarova 2016, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *G. mitoporiens* Vávra, Hylis, Viala, Nebesarova, parasites of daphniids, aquatic, Europe, see Vávra et al. (2016; taxonomy), sequences are available.
- Glugea** Thélohan 1891, *Glugeidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, 40 species, type: *G. microspora* Thélohan, parasites of fishes, aquatic, worldwide, see Thélohan (1891; generic description), Voronin (1976; type description), Sprague et al. (1992; taxonomic revision), Lovy et al. (2009; new species, phylogeny), Su et al. (2014; new species, phylogeny), Abdel-Baki et al. (2015; new species, phylogeny), Azevedo et al. (2016; new species, phylogeny), sequences are available.
- Glugoides** (Chatton) Larsson, Ebert, Vávra & Voronin 1996, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *G. intestinalis* (Chatton) Larsson, Ebert, Vávra & Voronin, parasites of daphniids, Europe, see Larsson et al. (1996a, b; generic description), Refardt et al. (2002; phylogeny), Refardt and Ebert (2006; quantitative PCR), Refardt and Mouton (2007; phylogeny), sequences are available.
- Golbergia** Weiser 1977, *Golbergiidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *G. spinosa* (Golberg) Weiser, parasites of insects, aquatic, Europe, sequences are unavailable.
- Gurleyides** Voronin 1986, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *G. biformis* Voronin, parasites of crustaceans, aquatic, Europe, see Voronin (1986a, b; taxonomy), Sokolova et al. (2018; Microsporidia described from USSR in twentieth century), sequences are unavailable.
- Hamiltosporidium** Haag, Larsson, Refardt, and Ebert, 2011, *Microsporidea* genera incertae sedis, *Rozellomycota*, two species, type: *H. tvaerminnensis* Haag, Larsson,

- Refardt, and Ebert, 2011. Parasites of daphniids, see Haag et al. (2011: taxonomy), sequences are available.
- Hazardia** Weiser 1977, *Microsporidea* genera incertae sedis, *Rozellomycota*, two species, type: *H. milleri* (Hazard & Fukuda) Weiser, parasites of mosquitoes, aquatic, worldwide, see Simakova (2014; comparison with other mosquito parasitic *Microsporidea*), sequences are available.
- Helmichia** Larsson 1982, *Mrazekiidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, five species, type: *H. aggregata* Larsson, parasites of dipterans, aquatic, worldwide, see Tokarev et al. (2012; phylogeny of *H. lacustris*), sequences are available.
- Hepatospora** Stentiford, Bateman, Dubuffet, Chambers & Stone 2011, *Enterocytozoonidae*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, one species, type: *H. eriocheir* (Wang & Chen) Stentiford, Bateman, Dubuffet, Chambers & Stone, parasites of crabs, aquatic, Asia, see Stentiford et al. (2011; taxonomy), Bateman et al. (2016; phylogeny), Ding et al. (2017, 2018; PCR assays for the detection, metabolic consequences), sequences are available.
- Hessea** Ormières & Sprague 1973, *Hesseidae*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, one species, type: *H. squamosa* Ormières & Sprague, parasites of gnats, France, sequences are unavailable.
- Heterosporis** Schubert 1969, *Pleistophoridae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, four species, type: *H. finki* Schubert., parasites of fishes, aquatic, worldwide, see Al-Quraishy et al. (2012; new species), Phelps et al. (2015; new species), Saleh et al. (2016a, b; in-vitro studies on antimicrosporidial activity of gold nanoparticles against *H. saurida*, in-vitro gene slicing), sequences are available.
- Heterovesicula** Lange, Macvean, Henry & Streett 1995, *Heterovesiculidae*, *Microsporidea* families incertae sedis, *Rozellomycota*, one species, type: *H. cowani* Lange, Macvean, Henry & Streett, parasites of Mormon crickets, *Anabrus simplex*, North America, see Lange et al. (1995; taxonomy), Sokolova et al. (2008; phylogeny), sequences are available.
- Hirsutosporos** Batson 1983, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *H. austrosimulii* Batson, parasites of blackflies, Australasia, see Batson (1983; taxonomy), sequences are unavailable.
- Holobispora** Voronin 1986, *Microsporidea* genera incertae sedis, *Rozellomycota*, one species, type: *H. thermocyclopis* Voronin, parasites of cyclops, aquatic, Europe, see Voronin (1986a, b; taxonomy), Sokolova et al. (2018; Microsporidia described from USSR in twentieth century), sequences are unavailable.
- Hrabyeia** Lom & Dyková 1990, *Mrazekiidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *H. xerkophora* Lom & Dyková, parasites of oligochaetes, aquatic, Europe, see Stentiford et al. (2013; pathogens in aquatic systems), sequences are available.
- Hyalinocysta** Hazard & Oldacre 1975, *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, two species, type: *C. chapmani* Hazard & Oldacre, parasites of mosquitoes, aquatic, North America, see Hazard and Oldacre (1975; taxonomy), sequences are available.
- Hyperspora** Stentiford, Ramilo, Abollo, Kerr, Bateman, Feist, Bass & Villalba 2017, *Thelohaniidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *H. aquatica* Stentiford, Ramilo, Abollo, Kerr, Bateman, Feist, Bass & Villalba, parasites of paramyxids, aquatic, Europe, see Stentiford et al. (2017; taxonomy), sequences are available.
- Ichthyosporidium** Caullery & Mesnil 1905, *Glugeidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, five species, type: *I. giganteum* (Thélohan) Swarczewsky, parasites of fishes, aquatic, worldwide, see Verma (2008; diagnosis, treatment), Sanders et al. (2012; new species), sequences are available.
- Inodosporus** Overstreet & Weidner 1974, *Spragueidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, two species, type: *C. spraguei* Overstreet & Weidner, parasites of crustaceans, aquatic, worldwide, see Overstreet and Weidner (1974; taxonomy), Stentiford et al. (2018; trophic transfer, synonymy with *Kabatana*), sequences are available.
- Intexta** Larsson, Steiner & Bjørnson 1997, *Chytridiopsida*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, one species, type: *I. acarivora* Larsson, Steiner & Bjørnson, parasites of mites, Europe, see Larsson et al. (1997a, b; taxonomy), Larsson (2014a, b; taxonomy, notes), Radek et al. (2015; compare with *Acarispora*), sequences are unavailable.
- Intrapredatorus** Chen, Kuo & Wu 1998, *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, two species, type: *I. barri* Chen, Kuo & Wu, parasites of mosquitoes, Asia, see Chen et al. (1998; taxonomy), sequences are available.
- Issia** Weiser 1977, *Microsporidea* genera incertae sedis, *Rozellomycota*, three species, type: *I. trichopterae* (Weiser) Weiser, parasites of caddisflies, aquatic, Europe, see Weiser (1977; taxonomy), Sokolova et al. (2018; Microsporidia described in the Former Soviet Union and Russia in twentieth century), sequences are unavailable.
- Janacekia** Larsson 1983, *Microsporidea* genera incertae sedis, *Rozellomycota*, six species, type: *J. debaisieuxi* (Jírovec) Larsson, parasites of insects, Europe, see Larsson (1983; taxonomy), sequences are available.
- Jirovecia** Weiser 1977, *Mrazekiidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, seven species, type: *J. caudata* (L. Léger & Hesse) Weiser, parasites of invertebrates, Europe, sequences are unavailable.

- 4669 **Jiroveciana** Larsson 1981, *Buxtehudiidae*, *Chytridiopsida*,
4670 *Microsporidea*, *Rozellomycota*, one species, type: *J. lim-*
4671 *nodrili* (Jírovec) Larsson, parasites of oligochaetes, Eur-
4672 ope, sequences are unavailable.
- 4673 **Johenrea** Lange, Becnel, Razafindratiana, Przybyszewski
4674 & Razafindrafara 1996, *Glugeidae*, *Glugeida*, *Micro-*
4675 *sporidea*, *Rozellomycota*, one species, type: *J. locustae*
4676 Lange, Becnel, Razafindratiana, Przybyszewski &
4677 Razafindrafara, parasites of locusts, Africa, see Lange et al.
4678 (1996; generic description), sequences are unavailable.
- 4679 **Kabatana** Lom, Dyková & Tonguthai 2000, *Spragueidae*,
4680 *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*,
4681 four species, type: *K. arthuri* Lom, Dyková & Tonguthai,
4682 parasites of fishes, aquatic, worldwide, sequences are
4683 available.
- 4684 **Kinorhynchospora** Adrianov & Rybakov 1991, *Micro-*
4685 *sporidea* genera *incertae sedis*, *Rozellomycota*, one
4686 species, type: *K. japonica* Adrianov & Rybakov, parasites
4687 of fishes, aquatic, Asia, see Adrianov and Rybakov (1991;
4688 taxonomy), sequences are unavailable.
- 4689 **Kneallhazia** Y.Y. Sokolova & Fuxa 2008 *Tubulinose-*
4690 *matidae*, *Microsporidea* families *incertae sedis*, *Rozel-*
4691 *lomycota*, two species, type: *K. solenopsae* (J.D. Knell,
4692 G.E. Allen & Hazard) Y.Y. Sokolova & Fuxa, parasites of
4693 ants, North America, see Sokolova and Fuxa (2008; tax-
4694 onomy), Oi et al. (2009; decapitating flies as vectors),
4695 Ascunce et al. (2010; molecular diversity), Valles et al.
4696 (2011; new species), sequences are available.
- 4697 **Krishtalia** Kilochitskii 1997, *Golbergiidae*, *Dissociodi-*
4698 *haplophasida*, *Microsporidea*, *Rozellomycota*, one species,
4699 type: *K. pipiens* Kilochitskii, parasites of mosquitoes,
4700 aquatic, Europe, see Kilochitskii (1997; taxonomy),
4701 Andreadis (2007; as biological control agent of mosqui-
4702 toes), sequences are unavailable.
- 4703 **Lanatospora** Voronin 1986, *Gurleyidae*, *Glugeida*, *Micro-*
4704 *sporidea*, *Rozellomycota*, four species, type: *L. macro-*
4705 *cyclopis* (Voronin) Voronin, parasites of crustaceans,
4706 aquatic, Europe, see Voronin (1986a, b; taxonomy), Vávra
4707 et al. (2016; new species), sequences are available.
- 4708 **Larssonia** Vidtmann & Sokolova 1994, *Gurleyidae*, *Gluge-*
4709 *ida*, *Microsporidea*, *Rozellomycota*, two species, type: *L.*
4710 *obtusa* (Moniez) Vidtmann & Sokolova, parasites of
4711 daphniids, aquatic, Europe, see Vidtmann and Sokolova
4712 (1994; taxonomy), sequences are available.
- 4713 **Larssoniella** Weiser & David 1997, *Unikaryonidae*, *Gluge-*
4714 *ida*, *Microsporidea*, *Rozellomycota*, two species, type: *L.*
4715 *resinellae* Weiser & David, parasites of insects, Europe,
4716 see Weiser and David (1997; taxonomy), Lukášová and
4717 Holuša (2013; host specificity of *L. duplicati*), sequences
4718 are unavailable.
- 4719 **Liebermannia** Sokolova, Lange & Fuxa 2006, *Micro-*
4720 *sporidea* genera *incertae sedis*, *Rozellomycota*, three
4721 species, type: *L. patagonica* Sokolova, Lange & Fuxa,
parasites of orthopterans, South America, see Sokolova
et al. (2009; new species), sequences are available.
- Loma** Morrison & Sprague (1981), *Glugeidae*, *Glugeida*,
Microsporidea, *Rozellomycota*, twelve species, type: *L.*
branchialis (Nemeczek) Morrison & Sprague, parasites of
fishes, aquatic, worldwide, see Morrison and Sprague
(1981; generic description), Sprague et al. (1992; taxo-
nomic revision), Casal et al. (2009; new species), Brown
et al. (2010; new species, phylogeny, species boundaries),
sequences are available.
- Mariona** Stempell 1909, *Microsporidea* genera *incertae*
sedis, *Rozellomycota*, one species, type: *M. marionis*
(Thélohan, 1895) Stempell, parasites of myxosporeans,
aquatic, Europe, sequences are unavailable.
- Marssoniella** Lemmermann 1900, *Gurleyidae*, *Glugeida*,
Microsporidea, *Rozellomycota*, one species, type: *M. ele-*
gans Lemmermann, parasites of cyclops, aquatic, Europe,
see Dong et al. (2010a, b; phylogeny), González-Tortuero
et al. (2016; compare with *Daphnia*), sequences are
available.
- Merocinta** Pell & Canning 1993, *Microsporidea* genera
incertae sedis, *Rozellomycota*, one species, type: *M. davidii*
Pell & Canning, parasites of mosquitoes, aquatic, Africa,
see Pell and Canning (1993; taxonomy), sequences are
unavailable.
- Metchnikovella** Caullery & Mesnil 1897, *Metchnikovelli-*
dae, *Metchnikovellida*, *Rudimicrosporea*, *Rozellomycota*,
21 species, type: *M. spionis* Caullery & Mesnil, parasites of
gregarines, worldwide, see Sokolova et al. (2013, 2014;
fine structure of *Metchnikovella incurvata*, new species),
sequences are unavailable.
- Microfilum** Faye, Toguebaye & Bouix 1991, *Microfilidae*,
Glugeida, *Microsporidea*, *Rozellomycota*, one species,
type: *M. lutjani* Faye, Toguebaye & Bouix, parasites of
fishes, aquatic, Europe, see Faye et al. (1991; taxonomy),
sequences are unavailable.
- Microgemma** Ralphs & Matthews 1986, *Spragueidae*,
Dissociodihaplophasida, *Microsporidea*, *Rozellomycota*,
six species, type: *M. hepaticus* Ralphs & Matthews, para-
sites of fishes, aquatic, worldwide, see Ralphs and Mat-
thews (1986; generic description), Sprague et al. (1992;
taxonomic review), Amigó et al. (1996; reassignment of
the genus), Pomport-Castillon et al. (1997; ribotyping),
Leiro et al. (1999; new combination, phylogeny), Cheney
et al. (2000; phylogeny), Canning et al. (2005; new spe-
cies), Mansour et al. (2005; new species), Casal et al.
(2012; new species, phylogeny), sequences are available.
- Microsporidiopsis** Schereschewsky 1925, *Metchnikovelli-*
dae, *Metchnikovellida*, *Rudimicrosporea*, *Rozellomycota*,
one species, type: *M. nereidis* Schereschewsky, parasites of
gregarines, aquatic, Europe, sequences are unavailable.
- Microsporidium** Balbiani 1884, *Microsporidea* genera *in-*
certae sedis, *Rozellomycota*, 118 species epithets are listed

- in Index Fungorum (2018), type: need typification, parasites of animals, worldwide, sequences are available.
- Mitoplastophora** Codreanu 1966, *Duboscqiidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *M. angularis* Codreanu, parasites of mayflies, aquatic, worldwide, sequences are unavailable.
- Mitosporidium** Haag, James, Pombert, Larsson, Schaer, Refardt & Ebert 2014, *Rozellomycota*, genera *incertae sedis*, one species, type: *M. daphniae* Haag, James, Pombert, Larsson, Schaer, Refardt & Ebert, parasites of daphniids, aquatic, Europe, see Haag et al. (2014; taxonomy), Corsaro et al. (2016; phylogeny), sequences are available.
- Mockfordia** Sokolova, Sokolov & Carlton 2010, *Enccephalitozoonidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, one species, type: *M. xanthocaeciliae* Sokolova, Sokolov & Carlton, parasites of bark lice, North America, see Sokolova et al. (2010a, b; generic description), sequences are available.
- Mrazekia** Léger & Hesse 1916, *Mrazekiidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, 17 species, type: *M. argoisi* Léger and Hesse, parasites of crustaceans, aquatic, worldwide, see Issi et al. (2010; new species), sequences are available.
- Multilamina** Becnel, Scheffrahn, Vossbrinck & Bahder, 2013, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, one species, type: *M. teevani* Becnel, Scheffrahn, Vossbrinck & Bahder, parasites of termites, South America, see Becnel et al. (2013; taxonomy), sequences are available.
- Myospora** Stentiford, Bateman, Small, Moss, Shields, Reece & Tuck 2010, *Myosporidae*, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, one species, type: *M. metanephrops* Stentiford, Bateman, Small, Moss, Shields, Reece & Tuck, parasites of lobsters, aquatic, Australasia, see Stentiford et al. (2010; taxonomy), sequences are available.
- Myosporidium** Baquero, Rubio, Moura, Pieniazek & Jordana 2005, *Pleistophoridae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, one species, type: Baquero, Rubio, Moura, Pieniazek & Jordana, parasite of fishes, aquatic, Africa, see Baquero et al. (2005; taxonomy), sequences are available.
- Myrmecomorba** Plowes, Becnel, LeBrun, Oi, Valles, Jones, & Gilbert 2015, *Caudosporidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *M. nylanderiae* Plowes, Becnel, LeBrun, Oi, Valles, Jones, & Gilbert, parasites of ants, North America, see Plowes et al. (2015; taxonomy), sequences are available.
- Myxocystis** Mrazek, 1897, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, one species, type: *M. ciliata* Mrazek, 1897, parasites of oligochaetes, aquatic, Europe, sequences are unavailable.
- Nadelspora** Olson, Tiekotter & Reno 1994, *Pereziiidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *N. canceri* Olson, Tiekotter & Reno, parasites of crabs, aquatic, North America, see Olson et al. (1994; taxonomy), sequences are available.
- Napamichum** Larsson 1990, *Thelohaniidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, three species, type: *N. dispersum* (Larsson) Larsson, parasites of chironomids, aquatic, Europe, see Larsson (1990a; taxonomy), sequences are unavailable.
- Nellielmelba** Larsson 1983, *Tuzetiidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, one species, type: *L. boeckella* (Milner & J.A. Mayer) Larsson, parasites of copepods, aquatic, worldwide, see Larsson (1983; taxonomy), sequences are unavailable.
- Nematocenor** Sapir, Dillman, Connon, Grupe, Ingels, Mundo-Ocampo, Levin, Bladwin, Orphan & Sternberg 2014, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, one species, type: *N. marisprofundi* Sapir, Dillman, Connon, Grupe, Ingels, Mundo-Ocampo, Levin, Bladwin, Orphan & Sternberg, parasites of nematodes, aquatic, North America, see Sapir et al. (2014; taxonomy, ecology), sequences are available.
- Nematocida** Troemel, Félix, Whiteman, Barrière & Ausubel 2008, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, one species, type: *N. parisii* Troemel, Félix, Whiteman, Barrière & Ausubel, parasites of nematodes, Europe, see Haag et al. (2014; taxonomy), Corsaro et al. (2016; phylogeny), sequences are available.
- Neoflabelliforma** Morris & Freeman 2010, *Caudosporidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, two species: type: *N. aurantiae* Morris & Freeman, parasites of myxosporeans and oligochaetes, aquatic, Europe, sequences are available.
- Neonosemoides** Faye & Toguebaye 1992, *Neonosemoididae*, *Microsporidea* families *incertae sedis*, *Rozellomycota*, four species, type: *N. tilapiae* (Sakiti & Bouix) Faye & Toguebaye, parasites of fishes, worldwide, see Faye et al. (1996; taxonomy), Reda (2010; reported from Egypt), sequences are unavailable.
- Neoperezia** Issi & Voronin 1979, *Neopereziiidae*, *Microsporidea* families *incertae sedis*, *Rozellomycota*, two species, type: *N. chironomi* Issi & Voronin, parasites of chironomids, Europe, see Issi et al. (2012; taxonomy, synonymy with *Semenovaia*), sequences are available.
- Nolleria** Beard, Butler & Becnel 1990, *Chytridiopsidae*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, one species, type: *N. pulicis* C Beard, Butler & Becnel, parasites of fleas, North America, see Larsson (2014a, b; taxonomy, notes), Radek et al. (2015; compare with *Acarispora*), sequences are unavailable.
- Norlevinea** Vávra 1984, *Gurleyidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, one species, type: *N. daphniae* (Weiser) Vávra, parasites of daphniids, aquatic, Europe, see Vávra (1984; taxonomy), Stentiford et al.

- (2013; pathogens in aquatic systems), sequences are unavailable.
- Nosema** Nägeli 1857, *Nosematidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, 20 species, type: *N. bombycis* Nägeli, parasites of insects, worldwide, see Iwano and Ishihara (1991: dimorphic development), Baker et al. (1994: relationships with *Vairimorpha*), Ni et al. (1995: new species), Kyei-Poku et al. (2008, 2012: molecular data and phylogeny), Kyei-Poku and Sokolova (2017: spore dimorphism), Tokarev et al. (2016: species redefinition), Hopper et al. (1996: pathogenicity), Hajek et al. (2018: new species from bugs), Grushevaya et al. (2018: spore dimorphism), sequences are available.
- Nosemoides** Vinckier 1975, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, five species, type: *N. vivieri* (Vinckier, Devauchelle & Prensier) Vinckier, parasites of gregarines, aquatic, Europe, see Vinckier (1975; taxonomy), sequences are unavailable.
- Novothelohania** Andreadis, Simakova, Vossbrinck, Shepard & Yurchenko, 2012. *Amblyosporidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *N. ovalae* Andreadis, Simakova, Vossbrinck, Shepard & Yurchenko, parasites of mosquitoes, aquatic, Asia, see Andreadis et al. (2012: taxonomy), sequences are available.
- Nucleospora** Hedrick, Groff & Baxa 1991, *Enterocytozoonidae*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, three species, type: *N. salmonis* Hedrick, Groff & Baxa, parasites of fishes, worldwide, see Foltz et al. (2009; detection in in steelhead trout (*Oncorhynchus mykiss*), Sakai et al. (2009; in cutthroat trout (*Oncorhynchus clarki*) and rainbow trout (*Oncorhynchus mykiss*), Freeman and Kristmundsson (2013; infecting the Atlantic lumpfish (*Cyclopterus lumpus*), Freeman et al. (2013; new species), Alarcón et al. (2016; infection in farmed lumpfish, *Cyclopterus lumpus*), sequences are available.
- Nudispora** Larsson 1990, *Thelohaniidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *N. biformis* Larsson, parasites of dragonflies, Europe, see Larsson (1990b; taxonomy), sequences are unavailable.
- Obruspora** Diamant, Rothman, Goren, Galil, Yokes, Szitenberg & Huchon 2014. *Enterocytozoonidae*, *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, one species, type: *O. papernae* Diamant, Rothman, Goren, Galil, Yokes, Szitenberg & Huchon, parasites of fishes, aquatic, Europe, see Diamant et al. (2010: taxonomy), sequences are available.
- Octosporea** Flu 1911, *Caudosporidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, 18 species, type: *O. muscadomesticae* Flu, parasites of daphniids, aquatic, worldwide, see Roth et al. (2008; parasites of *Daphnia magna*), Corradi et al. (2009; genome study of *O. bayeri*), Vossbrinck et al. (2010; phylogeny), sequences are available.
- Octotetrastora** Issi, Kadyrova, Pushkar, Khodzhaeva & Krylova 1990, *Thelohaniidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *O. paradoxo* Issi, Kadyrova, Pushkar, Khodzhaeva & Krylova, parasites of blackflies, Asia, sequences are unavailable.
- Oligosporidium** Codreanu-Balcescu, Codreanu & Traciuc 1981, *Nosematidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, two species, type: *O. arachnicolum* (Codreanu-Bălcescu, Codreanu, & Traciuc) Codreanu-Bălcescu, Codreanu, and Traciuc, parasites of spiders and mites, worldwide, see Codreanu-Bălcescu et al. (1981; taxonomy), Becnel et al. (2002; parasites of mites), sequences are available.
- Ordospora** Larsson, Ebert & Vávra 1997, *Ordosporidae*, *Microsporidea* families *incertae sedis*, *Rozellomycota*, two species, type: *O. colligata* Larsson, Ebert & Vávra, parasites of crustaceans, aquatic, worldwide, see Larsson et al. (1997a, b; taxonomy), Pombert et al. (2015; genome study), sequences are available.
- Ormieresia** Vivarès, Bouix & Manier 1977, *Thelohaniidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *O. carcini* Vivarès, Bouix & Manier, parasites of crabs, aquatic, Europe, see Vivarès et al. (1977; taxonomy), sequences are unavailable.
- Orthosomella** Canning, Wigley & Barker 1991, *Microsporidea* genera *incertae sedis*, *Rozellomycota*, three species, type: *O. operophtherae* (Canning) Canning, Wigley & Barker, parasites of insects, Europe, see Ovcharenko et al. (2013; new species), sequences are available.
- Orthothelohania** Codreanu & Codreanu-Balcescu 1974, *Thelohaniidae*, *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *O. octospora* (Heneguy) Codreanu & Codreanu-Balcescu, parasites of prawns, aquatic, Europe, see Codreanu et al. (1974), sequences are unavailable.
- Ovavesicula** Andreadis & Hanula 1987, *Ovavesiculidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*, one species, type: *O. popilliae* Andreadis & Hanula, parasites of grubs, North America), see Andreadis and Hanula (1987; taxonomy), Sprague et al. (1992; taxonomic review), Vossbrinck and Andreadis (2007; phylogeny), sequences are available.
- Ovipleistophora** Pekkarinen, Lom & Nilsen 2002, *Pleistophoridae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, two species, type: *O. mirandellae* (Vaney & Conte) Pekkarinen, Lom & Nilsen, parasites of fishes, Europe, see Pekkarinen et al. (2002; taxonomy), Phelps and Goodwin (2008; vertical transmission), sequences are available.
- Pankovaia** Simakova, Tokarev & Issi 2009, *Tuzetiidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, one species, type: *P. semitubulata* Simakova, Tokarev & Issi, parasites of mayflies, aquatic, Asia, see Simakova et al. (2009a, b; taxonomy), sequences are unavailable.

- 4986 **Paradoxium** Stentiford, Ross, Kerr, Bass & Bateman 2015, *Thelohaniidae*, *Meiodihaplophasida*, *Microsporidea*, 5039
 4987 *Rozellomycota*, one species, type: *P. irvingi* Stentiford, 5040
 4988 Ross, Kerr, Bass & Bateman, parasites of shrimps, aquatic, 5041
 4989 Europe, see Stentiford et al. (2015; taxonomy), sequences 5042
 4990 are available. 5043
 4991 **Paraepiseptum** Hyliš, Oborník, Nebesářová & Vávra 2007, 5044
 4992 *Gurleyidae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, four 5045
 4993 species, type: *P. plectrocnemiae* Hyliš, Oborník, Nebesář- 5046
 4994 ová & Vávra, parasites of insects, aquatic, Europe, see 5047
 4995 Hyliš et al. (2007, 2013; taxonomy, host taxa), sequences 5048
 4996 are available. 5049
 4997 **Paramicrosporidium** Corsaro, Walochnik, Venditti, 5050
 4998 Steinmann, Müller & Michel 2014, *Rozellomycota*, genera 5051
 4999 *incertae sedis*, two species, type: *P. saccamoebae* Corsaro, 5052
 5000 Walochnik, Venditti, Steinmann, Müller & Michel, para- 5053
 5001 sites of amoebae, aquatic, Europe, see Corsaro et al. (2014; 5054
 5002 taxonomy), Quandt et al. (2017; genome study), sequences 5055
 5003 are available. 5056
 5004 **Paranosema** Sokolova, Dolgikh, Morzhina, Nassonova, 5057
 5005 Issi, Terry, Ironside, Smith & Vossbrinck 2003, *Ovavesi-* 5058
 5006 *culidae*, *Dissociodihaplophasida*, *Microsporidea*, *Rozel-* 5059
 5007 *lomycota*, four species, type: *P. grylli* (Sokolova, 5060
 5008 Selezniev, Dolgikh & Issi) Sokolova, Dolgikh, Morzhina, 5061
 5009 Nassonova, Issi, Terry, Ironside, Smith & Vossbrinck, 5062
 5010 parasites of insects, worldwide, see Lange and Azzaro 5063
 5011 (2008; persistence), Shi et al. (2009; parasites of 5064
 5012 grasshoppers), Senderskiy et al. (2014; protein secretion in 5065
 5013 to host cells), Chen et al. (2017; novel wall protein), Pyle 5066
 5014 et al. (2017; Amalga-like virus), sequences are available. 5067
 5015 **Paranucleospora** Nylund, Watanabe, Nylund, Sævareid, 5068
 5016 Erik Arnesen & Karlsbakk 2009, *Enterocytozoonidae*, 5069
 5017 *Chytridiopsida*, *Microsporidea*, *Rozellomycota*, three spe- 5070
 5018 cies, type: *N. theridion* Nylund, Watanabe, Nylund, 5071
 5019 Sævareid, Erik Arnesen & Karlsbakk, parasites of sea lice 5072
 5020 and fishes, aquatic, worldwide, see Nylund et al. 5073
 5021 (2010, 2011; taxonomy), Sveen et al. (2012; infection 5074
 5022 dynamics), sequences are available. 5075
 5023 **Parapleistophora** Issi, Kadyrova, Pushkar, Khodzhaeva & 5076
 5024 Krylova 1990, *Glugeidae*, *Glugeida*, *Microsporidea*, 5077
 5025 *Rozellomycota*, one species, type: *P. ectospora* Issi, 5078
 5026 Kadyrova, Pushkar, Khodzhaeva & Krylova, parasites of 5079
 5027 blackflies, Asia, see Issi et al. (1990; generic description), 5080
 5028 Sokolova et al. (2018; taxonomic revision), sequences are 5081
 5029 unavailable. 5082
 5030 **Parastempellia** Khodzhaeva 1988, *Amblyosporidae*, 5083
 5031 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, two 5084
 5032 species, type: *P. odagmiae* Khodzhaeva, parasites of 5085
 5033 blackflies, Asia, see Sokolova et al. (1998; taxonomy), 5086
 5034 sequences are unavailable. 5087
 5035 **Parathelohania** Codreanu 1966, *Amblyosporidae*, 5088
 5036 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, 25 5089
 5037 species, type: *P. legeri* (Hesse) Codreanu, parasites of 5090
 5038 mosquitoes, worldwide, see Codreanu (1966; taxonomy), 5091
 Simakova et al. (2014, phylogeny), sequences are 5092
 available. 5093
Paratuzetia Poddubnaya, Tokarev & Issi 2006, *Tuzetiidae*, 5094
Glugeida, *Microsporidea*, *Rozellomycota*, one species, 5095
 type: *P. kupermani* Poddubnaya, Tokarev & Issi, parasites 5096
 of cestodes, aquatic, Europe, see Poddubnaya et al. (2006; 5097
 taxonomy), sequences are unavailable. 5098
Pegmatheca Hazard & Oldacre 1975, *Thelohaniidae*, 5099
Meiodihaplophasida, *Microsporidea*, *Rozellomycota*, two 5100
 species, type: *P. simulii* Hazard & Oldacre, parasites of 5101
 blackflies, aquatic, North America, see Hazard and Oldacre 5102
 (1975; taxonomy), sequences are unavailable. 5103
Perezia Léger & Duboscq 1909, *Pereziiidae*, *Meiodihap-* 5104
lophasida, *Microsporidea*, *Rozellomycota*, twelve species, 5105
 type: *P. lankesteriae* L. Léger & Duboscq, parasites of 5106
 gregarines and crustaceans, aquatic, worldwide, see Can- 5107
 ning et al. (2002a, b; ultrastructure), Stentiford et al. (2010; 5108
 taxonomy), sequences are available. 5109
Pernicivesicula Bylén & Larsson 1994, *Pereziiidae*, 5110
Meiodihaplophasida, *Microsporidea*, *Rozellomycota*, one 5111
 species, type: *P. gracilis* E.K.C. Bylén & Larsson, parasites 5112
 of chironomids, aquatic, Europe, see Bylén and Larsson 5113
 (1994; taxonomy), sequences are unavailable. 5114
Pilosorella Hazard & Oldacre 1975, *Burenellidae*, 5115
Meiodihaplophasida, *Microsporidea*, *Rozellomycota*, two 5116
 species, type: *P. fishi* Hazard & Oldacre, parasites of 5117
 insects, North America, see Hazard and Oldacre (1975; 5118
 taxonomy), sequences are unavailable. 5119
Pleistophora Gurley 1893, *Pleistophoridae*, *Glugeida*, 5120
Microsporidea, *Rozellomycota*, c. 10 species, type: *P.* 5121
typicalis Gurley, parasites of fishes, aquatic, worldwide, 5122
 see Canning and Hazard (1982; genus redefinition), San- 5123
 ders et al. (2010; infecting zebrafish), sequences are 5124
 available. 5125
Pleistosporidium Codreanu-Balcescu and Codreanu 1982, 5126
Pleistosporidiidae, *Microsporidea* families *incertae sedis*, 5127
Rozellomycota, one species, type: *P. hyperparasiticum* 5128
 (Codreanu-Balcescu and Codreanu) Codreanu-Balcescu 5129
 and Codreanu, parasites of gregarines, aquatic, Europe, 5130
 sequences are unavailable. 5131
Polydispyrenia Canning & Hazard 1982, *Caudosporidae*, 5132
Dissociodihaplophasida, *Microsporidea*, *Rozellomycota*, 5133
 two species, type: *P. simulii* (Lutz & Splendore) Canning 5134
 & Hazard, parasites of blackflies, aquatic, worldwide, see 5135
 Canning and Hazard (1982; taxonomy), Vossbrinck et al. 5136
 (2004; phylogeny), sequences are available. 5137
Potasporea Casal, Matos, Teles-Grilo & Azevedo 2008, 5138
Spragueidae, *Dissociodihaplophasida*, *Microsporidea*, 5139
Rozellomycota, two species, type: *P. morhaphis* Casal, 5140
 Matos, Teles-Grilo & Azevedo, parasites of fishes, aquatic, 5141
 South America, see Casal et al. (2008; taxonomy), Videira 5142
 et al. (2015; new species), sequences are available. 5143

- 5092 **Pseudoloma** Matthews, Brown, Larison, Bishop-Stewart,
5093 Rogers & Kent 2001, *Glugeidae*, *Glugeida*, *Microsporidea*,
5094 *Rozellomycota*, one species, type: *P. neurophilia* Mat-
5095 thews, Brown, Larison, Bishop-Stewart, Rogers & Kent,
5096 parasites of fishes, aquatic, worldwide, see Matthews et al.
5097 (2001; generic description), Whipps and Kent (2006; PCR
5098 detection), Sander and Kent (2011; sensitive assay), Cali
5099 et al. (2012; taxonomic revision), Sanders et al. (2016; host
5100 range), Ndikumana et al. (2017; genome analysis),
5101 sequences are available.
- 5102 **Pseudonosema** Canning, Refardt, Vossbrinck, Okamura &
5103 Curry 2002, *Neopereziiidae*, *Microsporidea* families in-
5104 *certae sedis*, *Rozellomycota*, one species, type: *P.*
5105 *crisatellae* (Canning, Okamura & Curry) Canning,
5106 Refardt, Vossbrinck, Okamura & Curry, parasites of bry-
5107 ozoans, Europe, see Canning et al. (2002a, b; taxonomy),
5108 sequences are available.
- 5109 **Pseudopleistophora** Sprague 1977, *Pseudopleistophoridae*,
5110 *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*,
5111 one species, type: *P. szollosi* Sprague, parasites of poly-
5112 chaetes, aquatic, North America, see Sprague (1977a, b;
5113 taxonomy), Sprague et al. (1992; taxonomic review),
5114 sequences are unavailable.
- 5115 **Pulicispora** Vedmed, Krylova & Issi 1991, *Duboscqiidae*,
5116 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one
5117 species, type: *P. xenopsyllae* Vedmed, Krylova & Issi,
5118 parasites of fleas, Eurasia, see Vedmed et al. (1991; tax-
5119 onomy), sequences are unavailable.
- 5120 **Pyrotheca** Hesse 1935, *Gurleyidae*, *Glugeida*, *Microsporidea*,
5121 *Rozellomycota*, eight species, type: *P. cyclo-*
5122 *pis* (Leblanc) Poisson, parasites of cyclops, aquatic,
5123 Europe, see Hyliš et al. (2007; notes), sequences are
5124 unavailable.
- 5125 **Rectispora** Larsson 1990, *Mrazekiidae*, *Dissociodihap-*
5126 *lophasida*, *Microsporidea*, *Rozellomycota*, one species,
5127 type: *R. reticulata* Larsson, parasites of oligochaetes,
5128 aquatic, Europe, see Larsson et al. (1990c; taxonomy),
5129 sequences are unavailable.
- 5130 **Resiomeria** Larsson 1986, *Thelohaniidae*, *Meiodihap-*
5131 *lophasida*, *Microsporidea*, *Rozellomycota*, one species,
5132 type: *R. odonatae* Larsson, parasites of dragonflies, aquatic,
5133 Europe, see Larsson (1986a, b; taxonomy), sequences are
5134 unavailable.
- 5135 **Ringueletium** Garcia 1990, *Caudosporidae*, *Dissociodi-*
5136 *haplophasida*, *Microsporidea*, *Rozellomycota*, one species,
5137 type: *R. pillosa* Garcia, parasites of blackflies, aquatic,
5138 Europe, see Garcia (1990; taxonomy), sequences are
5139 unavailable.
- 5140 **Schroedera** Morris & Adams 2002, *Neopereziiidae*, *Microsporidea*
5141 families *incertae sedis*, *Rozellomycota*, two
5142 species, type: *S. plumatellae* Morris & Adams 2002, pa-
5143 rasites of bryozoans, aquatic, Europe, see Morris and
5144 Adams (2002; taxonomy), sequences are available.
- Scipionospora** Bylén & Larsson 1996, *Caudosporidae*,
Dissociodihaplophasida, *Microsporidea*, *Rozellomycota*,
one species, type: *R. pillosa* Garcia, parasites of chirono-
mids, aquatic, Europe, see Bylén and Larsson (1996; tax-
onomy), sequences are unavailable.
- Senoma** Simakova, Pankova, Tokarev & Issi 2005, *Gur-*
leyidae, *Glugeida*, *Microsporidea*, *Rozellomycota*, one
species, type: *S. globulifera* (Issi & Pankova) Simakova,
Pankova, Tokarev & Issi, parasites of mosquitoes, aquatic,
Asia, see Simakova et al. (2005; taxonomy), sequences are
available.
- Sheriffia** Larsson 2014, *Microsporidea* genera *incertae*
sedis, *Rozellomycota*, one species, type: *S. brachynema*
(Richards and Sheffield) Larsson, parasites of molluscs,
aquatic, Europe, see Larsson (2014a, b; taxonomy),
sequences are unavailable.
- Simuliospora** Khodzhaeva, Krylova & Issi 1990, *Gol-*
bergiidae, *Dissociodihaplophasida*, *Microsporidea*, *Rozel-*
lomycota, two species, type: *S. uzbekistanica* Khodzhaeva,
Krylova & Issi, parasites in insects, Asia, sequences are
unavailable.
- Spherospora** Garcia 1991, *Thelohaniidae*, *Meiodihap-*
lophasida, *Microsporidea*, *Rozellomycota*, one species,
type: *S. andinae* Garcia, parasites of blackflies, aquatic,
South America, see Garcia (1991; taxonomy), sequences
are unavailable.
- Spiroglugea** Léger & Hesse 1924, *Microsporidea* genera
incertae sedis, *Rozellomycota*, one species, type: *S. octos-*
pora (Léger & Hesse) Léger & Hesse, parasites of biting
midges, aquatic, Europe, sequences are available.
- Sporanauta** Ardila-Garcia & Fast 2012, *Microsporidea*
genera *incertae sedis*, *Rozellomycota*, one species, type: *S.*
perivermis Ardila-Garcia & Fast, parasites of nematodes,
aquatic, North America, see Ardila-Garcia and Fast (2012;
taxonomy), sequences are available.
- Spraguea** Weissenberg 1976, *Spragueidae*, *Dissociodi-*
haplophasida, *Microsporidea*, *Rozellomycota*, two species,
type: *S. lophii* (Doflein) Weissenberg, parasites of fishes,
aquatic, worldwide, see Weissenberg (1976; generic
description), Sprague et al. (1992; taxonomic review),
Pomport-Castillon et al. (2000; phylogenetic reconstruc-
tion), Freeman et al. (2004; phylogeny), Campbell et al.
(2013; genome of *S. lophii*), Colmenero et al. (2015; *S.*
lophii in Mediterranean lophiids), Xiang et al. (2015;
comparative genomics), sequences are available.
- Steinhausia** Sprague, Ormières & Manier 1972, *Pseudo-*
pleistophoridae, *Dissociodihaplophasida*, *Microsporidea*,
Rozellomycota, four species, type: *S. mytilovum* (Field)
Sprague, Ormières & Manier, parasites of molluscs,
aquatic, worldwide, see Sprague et al. (1972; generic
description), Kalavati and Narasimhamurti (1977; new
species), Sprague et al. (1992; taxonomic review), Cun-
ningham and Daszak (1998; Extinction of land snail),

- 5198 Sagristà et al. (1998; ultrastructural data of *S. mytilovum*),
5199 sequences are unavailable.
- 5200 **Stempellia** Léger & Hesse 1910, *Microsporidea* genera
5201 *incertae sedis*, *Rozellomycota*, 19 species epithets are listed
5202 in Index Fungorum (2018), type: *S. mutabilis* Léger &
5203 Hesse, parasites of mosquitoes, aquatic, worldwide,
5204 sequences are unavailable.
- 5205 **Striatospora** Issi & Voronin 1986, *Striatosporidae*,
5206 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one
5207 species, type: *S. chironomi* Issi & Voronin, parasites of
5208 chironomids, aquatic, Europe, see Sokolova et al. (2018;
5209 *Microsporidia* from USSR in twentieth century, descrip-
5210 tion), sequences are unavailable.
- 5211 **Systemostrema** Hazard & Oldacre 1975, *Microsporidea*
5212 genera *incertae sedis*, *Rozellomycota*, five species, type: *S.*
5213 *tabani* Hazard & Oldacre, parasites of insects, aquatic,
5214 worldwide, see Hazard and Oldacre (1975; taxonomy),
5215 Sokolova et al. (2006; phylogeny), sequences are available.
- 5216 **Tabanispora** Bykova, Sokolova & Issi 1987, *Burenellidae*,
5217 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, two
5218 species, type: *T. bacillifera* Bykova, Sokolova & Issi,
5219 parasites of insects, Europe, see Sokolova et al. (2018;
5220 *Microsporidia* from USSR in twentieth Century), sequen-
5221 ces are unavailable.
- 5222 **Takaokaspora** Andreadis, Takaoka, Otsuka & Vossbrinck
5223 2013, *Microsporidea* genera *incertae sedis*, *Rozellomycota*,
5224 one species, type: *T. nipponicus* T.G. Andreadis, Takaoka,
5225 Otsuka & Vossbrinck, parasites of mosquitoes, aquatic,
5226 Asia, see Andreadis et al. (2013; taxonomy), sequences are
5227 available.
- 5228 **Tardivesicula** Larsson & Bylén 1992, *Duboscqiidae*,
5229 *Meiodihaplophasida*, *Microsporidea*, *Rozellomycota*, one
5230 species, type: *T. duplicata* Larsson & Bylén, parasites of
5231 caddisflies, aquatic, Europe, see Larsson and Bylén (1992;
5232 taxonomy), sequences are unavailable.
- 5233 **Telomyxa** Léger & Hesse 1910, *Telomyxidae*, *Micro-*
5234 *sporidea* families *incertae sedis*, *Rozellomycota*, four
5235 species, type: *T. glugeiformis* Léger & Hesse, parasites of
5236 mayflies, aquatic, Europe, sequences are unavailable.
- 5237 **Tetramicra** Matthews & Matthews 1980, *Spragueidae*,
5238 *Dissociodihaplophasida*, *Microsporidea*, *Rozellomycota*,
5239 one species, type: *T. brevifilum* Matthews & Matthews,
5240 parasites of fishes, aquatic, Europe, see Matthews and
5241 Matthews (1980; generic description), Sprague et al. (1992;
5242 taxonomic review), Leiro et al. (2002; PCR detection),
5243 Alonso et al. (2013; Real-time PCR assay), Scholz et al.
5244 (2017; phylogeny), sequences are available.
- 5245 **Thelohania** Henneguy 1892, *Thelohaniidae*, *Meiodihap-*
5246 *lophasida*, *Microsporidea*, *Rozellomycota*, c. 50 species,
5247 type: *T. giardi* Henneguy, parasites of arthropods, world-
5248 wide, see Vossbrinck and Debrunner-Vossbrinck (2005;
5249 phylogeny), sequences are available.
- Toxoglugea** Léger & Hesse 1924, *Thelohaniidae*,
Meiodihaplophasida, *Microsporidea*, *Rozellomycota*, c. 15
species, type: need typification, parasites of insects, aqua-
tic, Europe, sequences are unavailable.
- Toxospora** Voronin 1993, *Toxoglugeidae*, *Microsporidea*
families *incertae sedis*, *Rozellomycota*, two species, type:
T. volgae Voronin, parasites of chironomids, aquatic,
Europe, see Voronin (1993; taxonomy), sequences are
unavailable.
- Trachipleistophora** Hollister, Canning, Weidner, Field,
Kench & Marriott 1996, *Pleistophoridae*, *Glugeida*, *Micro-*
sporidea, *Rozellomycota*, three species, type: *T. hominis*
Hollister, Canning, Weidner, Field, Kench & Marriott,
parasites of humans, worldwide, see Hollister et al. (1996;
taxonomy), Weinder et al. (1999; mosquito vector com-
petence), Heinz et al. (2012; genome dynamics and
reductive evolution), sequences are available.
- Trichoctosporea** Larsson 1994, *Amblyosporidae*, *Meiodi-*
haplophasida, *Microsporidea*, *Rozellomycota*, one species,
type: *T. pygopellita* Larsson, parasites of mosquitoes and
cyclops, aquatic, Eurasia, see Larsson (1994; taxonomy),
Simakova et al. (2011; parasites of cyclops), Andreadis
et al. (2012; phylogeny), sequences are available.
- Trichoduboscqia** Léger 1926, *Duboscqiidae*, *Meiodihap-*
lophasida, *Microsporidea*, *Rozellomycota*, one species,
type: *P. epeori* Léger, parasites of mayflies, aquatic, Eur-
ope, see Weiser et al. (2015; compare with *Agglomerata*),
sequences are unavailable.
- Trichonosema** Canning, Refardt, Vossbrinck, Okamura &
Curry 2002, *Neopereziidae*, *Microsporidea* families *in-*
certae sedis, *Rozellomycota*, two species, type: *T. pecti-*
natellae Canning, Refardt, Vossbrinck, Okamura & Curry,
parasites of bryozoans, aquatic, Europe, see Canning et al.
(2002a, b; taxonomy), sequences are available.
- Trichotuzetia** Vávra, Larsson & Baker 1997, *Micro-*
sporidea genera *incertae sedis*, one species, type: *T.*
guttata Vávra, Larsson & Baker, parasites of cyclops,
aquatic, Europe, see Vávra et al. (1997; taxonomy),
sequences are available.
- Tricornia** Pell & Canning 1992, *Amblyosporidae*,
Meiodihaplophasida, *Microsporidea*, *Rozellomycota*, one
species, type: *T. muhezeae* Pell & Canning, parasites of
mosquitoes, aquatic, Africa, see Pell and Canning (1992;
taxonomy), sequences are unavailable.
- Triwangia** Wang, Nai, Chih Wang, Solter, Hsu, Wang &
Lo 2013, *Microsporidea* genera *incertae sedis*, *Rozel-*
lomycota, one species, type: *T. caridinae* Wang, Nai, Chih
Wang, Solter, Hsu, Wang & Lo, parasites of shrimps,
aquatic, Asia, see Wang et al. (2013a, b, c, d; taxonomy),
sequences are available.
- Tubulinosema** Franzen, Fischer, Schröder, Schölmerich &
Schneuwly 2005, *Tubulinosematidae*, *Microsporidea* fam-
ilies *incertae sedis*, *Rozellomycota*, five species, type: *T.*

- 5303 *ratisbonensis* Franzen, Fischer, Schröder, Schölmerich & 5355
 5304 Schneuwly, parasites of insects, worldwide, see Franzen 5356
 5305 et al. (2005; taxonomy), Vijendravarma et al. (2008; 5357
 5306 infection of *Drosophila melanogaster*), Bjørnson et al. 5358
 5307 (2011; new species), Choudhary et al. (2011: human 5359
 5308 infection), Meissner et al. (2012: human infection), Malys 5360
 5309 et al. (2013; new species), sequences are available. 5361
 5310 **Tuzetia** Maurand, Fize, Vernick & Michel 1971, *Tuzeti-* 5362
 5311 *idae*, *Glugeida*, *Microsporidea*, *Rozellomycota*, seven 5363
 5312 species, type: *Tuzetia infirma* (Kudo 1921) Maurand, Fize, 5364
 5313 Fenwick, and Michel, 1971 parasites of aquatic arthropods, 5365
 5314 worldwide, see Larsson (1983; taxonomy), Canning et al. 5366
 5315 (2002a, b: ultrastructure), Simakova et al. (2009b: new 5367
 5316 species), sequences are unavailable. 5368
 5317 **Unikaryon** Canning, Lai & Lie 1974, *Unikaryonidae*, 5369
 5318 *Glugeida*, *Microsporidea*, *Rozellomycota*, c. 18 species, 5370
 5319 type: *U. piriformis* Canning, Lai & Lie, parasites of 5371
 5320 invertebrates, worldwide, see Yaman et al. (2010; new 5372
 5321 species), sequences are available. 5373
 5322 **Vairimorpha** Pilley 1976, *Nosematidae*, *Dissociodihap-* 5374
 5323 *lophasida*, *Microsporidea*, *Rozellomycota*, 15 species, 5375
 5324 type: *V. necatrix* (Kramer) Pilley, parasites of insects, 5376
 5325 worldwide, see Fowler and Reeves (1974: spore dimor- 5377
 5326 phism), Fuxa and Brooks (1979: application in pest con- 5378
 5327 trol), Mitchell and Cali (1993: ultrastructure), Baker et al. 5379
 5328 (1994: relationships with *Nosema*), Down et al. (2008: host 5380
 5329 pathology), Wang et al. (2009; new species), Ironside et al. 5381
 5330 (2013: genetic diversity), Luo et al. (2014; morphological 5382
 5331 and molecular study), Baki and Bekircan (2018; new spe- 5383
 5332 cies), sequences are available. 5384
 5333 **Vavraia** Weiser 1977, *Pleistophoridae*, *Glugeida*, *Micro-* 5385
 5334 *sporidea*, *Rozellomycota*, c. 10 species, type: *V. culicis* 5386
 5335 (Weiser) Weiser, parasites of insects, worldwide, see 5387
 5336 Weiser (1977; taxonomy), Bargielowski and Koella (2009; 5388
 5337 application), Lorenz and Koella (2011; mosquitoes biocon- 5389
 5338 trol), sequences are available. 5390
 5339 **Vittaforma** Silveira & Canning 1995, *Microsporidea* genera 5391
 5340 *incertae sedis*, *Rozellomycota*, one species, type: *V.* 5392
 5341 *corneae* (Shadduck, Meccoli, Davis & Font) Silveira & 5393
 5342 Canning, parasites of human, worldwide, Silveira and 5394
 5343 Canning (1995; taxonomy), Vossbrinck and Debrunner- 5395
 5344 Vossbrinck (2005: phylogeny), sequences are available. 5396
 5345 **Weiseria** Doby & Saguez 1964, *Caudosporidae*, *Disso-* 5397
 5346 *ciodihaplophasida*, *Microsporidea*, *Rozellomycota*, three 5398
 5347 species, type: *W. laurentii* Doby & Saguez, parasite of 5399
 5348 blackflies, worldwide, see Doby and Saguez (1964; tax- 5400
 5349 onomy), Vossbrinck and Debrunner-Vossbrinck (2005: 5401
 5350 phylogeny), sequences are available. 5402
 5351 **Wittmannia** Czaker 1997, *Microsporidea* families *incertae* 5403
 5352 *sedis*, *Rozellomycota*, *Rozellomycota*, one species, type: *W.* 5404
 5353 *antarctica* Czaker, parasites of mesozoans, Antarctica, see 5405
 5354 Czaker (1997; taxonomy), sequences are unavailable. 5406
- Zelenkaia** Hyliš, Oborník, Nebesářová & Vávra 2013, 5355
Gurleyidae, *Glugeida*, *Microsporidea*, *Rozellomycota*, one 5356
 species, type: *Z. trichopterae* Hyliš, Oborník, Nebesářová 5357
 & Vávra, parasites of caddisflies, aquatic, Europe, Hyliš 5358
 et al. (2013; taxonomy), sequences are available. 5359
- Zoopagomycota** Gryganskyi et al. 5360
 Spatafora et al. (2016) introduced the phylum 5361
Zoopagomycota with *Zoopage* Drechsler (1935) as type 5362
 genus to accommodate three subphyla: *Entomoph-* 5363
thoromycotina Humber (Hibbett et al. 2007), *Kickellomy-* 5364
cotina Benny (Hibbett et al. 2007), and *Zoopagomycotina* 5365
 Benny (Hibbett et al. 2007). The phylum comprises early 5366
 diverging terrestrial fungi mainly associating with animals. 5367
 However, numerous mycoparasites are also included in this 5368
 group (Spatafora et al. 2016). 5369
 We accept *Zoopagomycota* as a distinct phylum which 5370
 comprises only two subphyla (we accept *Entomoph-* 5371
thoromycota as a distinct phylum agreeing with Tedersoo 5372
 et al. 2016), one class, five orders, ten families and 90 5373
 genera. 5374
- Notes for genera** 5375
Acaulopage Drechsler 1935, *Zoopagaceae*, *Zoopagales*, 5376
Zoopagomycetes, *Zoopagomycota*, 27 species, type: *A.* 5377
rhapidospora Drechsler, parasitic, aquatic, see Kirk et al. 5378
 (2008; genus accepted) but Kirk et al. (2013; not listed), 5379
 Hirotani-Akabane and Saikawa (2010; zygospore germi- 5380
 nation), Saikawa (2011; ultrastructural information), Sei- 5381
 fert et al. (2011; mentioned that the genus resembles 5382
 hyphomycetes), Michel et al. (2014, 2015; sequences, 5383
 isolation, prey pattern), Corsaro et al. (2018; DNA, phy- 5384
 logeny), cultures and sequences are available. 5385
Amoebophilus P.A. Dang. 1910, *Cochlonemataceae*, 5386
Zoopagales, *Zoopagomycetes*, *Zoopagomycota*, four spe- 5387
 cies, type: *A. penardii* P.A. Dang., parasitic on amoeboids, 5388
 Europe, North America, see Mrva (2011; infect *Mayorella* 5389
vespertoides), Saikawa (2011; accepted as in *Cochlone-* 5390
mataceae), Kirk et al. (2013; genus accepted), cultures and 5391
 sequences are unavailable. 5392
Aplectosoma Drechsler 1951, *Cochlonemataceae*, *Zoopa-* 5393
gales, *Zoopagomycetes*, *Zoopagomycota*, one species, type: 5394
A. microsporum Drechsler, amoebae endoparasites, USA, 5395
 see Saikawa (2011; accepted as in *Cochlonemataceae*), 5396
 Kirk et al. (2013; genus accepted), Benny et al. (2016b; 5397
 classification), cultures and sequences are unavailable. 5398
Basidiolum Cienk. 1861, *Zoopagomycotina* genera *incer-* 5399
tae sedis, *Kickxellomycetes*, *Zoopagomycota*, one species, 5400
 type: *B. fimbriatum* Cienk., saprobes?, distribution 5401
 unknown, see Kirk et al. (2013; genus accepted), Benny 5402
 et al. (2016b; classification), cultures and sequences are 5403
 unavailable. 5404

- 5405 **Bdellospora** Drechsler 1935, *Cochlonemataceae*, *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, one species, type: 5406
5407 *B. helicoides* Drechsler, endoparasites, North America, see 5408
5409 Kirk et al. (2013; genus accepted), Benny et al. (2016b; 5410
5411 classification), cultures and sequences are unavailable. 5412
5413 **Brachymyces** G.L. Barron 1980, *Helicocephalidaceae*, 5414
5415 *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, one spe- 5416
5417 cies, type: *B. megasporus* G.L. Barron, from soil, Canada, 5418
5419 see Kirk et al. (2013; genus accepted), Benny et al. (2016b; 5420
5421 classification), cultures and sequences are unavailable. 5422
5423 **Cystopage** Drechsler 1941, *Zoopagaceae*, *Zoopagales*, 5424
5425 *Zoopagomycetes*, *Zoopagomycota*, nine species, type: *C.* 5426
5427 *lateralis* Drechsler, nematode trapping, worldwide, see 5428
5429 Kelly et al. (2009; Ireland), Kirk et al. (2013; genus 5430
5431 accepted), Ho et al. (2015; new species), cultures and 5432
5433 sequences are unavailable. 5434
5435 **Endocochlus** Drechsler 1935, *Cochlonemataceae*, *Zoopaga-* 5436
5437 *les*, *Zoopagomycetes*, *Zoopagomycota*, four species, 5438
5439 type: *E. microsporum* Drechsler, endoparasites, cosmopoli- 5440
5441 tan, see Saikawa (2011; accepted as in *Cochlonemataceae*), 5442
5443 Kirk et al. (2013; genus accepted), Benny et al. (2016b; 5444
5445 classification), cultures and sequences are unavailable. 5446
5447 **Helicocephalum** Thaxt. 1891, *Helicocephalidaceae*, 5448
5449 *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, six species, 5450
5451 type: *H. sarcophilum* Thaxt., parasites, cosmopolitan, see 5452
5453 Kirk et al. (2013; genus accepted), Tretter et al. (2014; 5454
5455 notes), Benny et al. (2016b; classification), cultures and 5456
5457 sequences are unavailable. 5458
5459 **Kuzuhaea** R.K. Benj. 1985, *Piptocephalidaceae*, *Zoopaga-* 5460
5461 *les*, *Zoopagomycetes*, *Zoopagomycota*, one species, type: 5462
5463 *K. moniliformis* R.K. Benj., from soil, cosmopolitan, see 5464
5465 Hoffmann et al. (2013; notes), Kirk et al. (2013; genus 5466
5467 accepted), Penton et al. (2013; diversity), Benny et al. 5468
5469 (2016b; classification), Corsaro et al. (2018, phylogeny), 5470
5471 cultures unavailable, sequences available. 5472
5473 **Lecophagus** M.W. Dick 1990, *Zoopagaceae*, *Zoopagales*, 5474
5475 *Zoopagomycetes*, *Zoopagomycota*, three species, type: *L.* 5476
5477 *fasciculatus* M.W. Dick, hyphomycetous, predator, 5478
5479 cosmopolitan, see Seifert et al. (2011; morphology), Kirk 5480
5481 et al. (2013; genus accepted), Arenz et al. (2014; Antarc- 5482
5483 tica), Magyar et al. (2016; new species), Fialkowska et al. 5484
5485 (2018; interactions with prey), cultures and sequences are 5486
5487 available. 5488
5489 **Massartia** De Wild. 1897, *Zoopagales* genera *incertae* 5490
5491 *sedis*, *Zoopagomycetes*, *Zoopagomycota*, one species, type: 5492
5493 *M. javanica* De Wild., cosmopolitan, see Kirk et al. (2013; 5494
5495 genus accepted), cultures and sequences are unavailable. 5496
5497 **Piptocephalis** de Bary 1865, *Piptocephalidaceae*, *Zoopaga-* 5498
5499 *les*, *Zoopagomycetes*, *Zoopagomycota*, c. 25 species, 5500
5501 type: *P. freseniana* de Bary, mycoparasites, worldwide, see 5502
5503 Ho and Kirk (2009; new species), Hou and Ho (2010; new 5504
5505 species), Hoffmann et al. (2013; notes), Kirk et al. (2013; 5506
5507 genus accepted), Benny et al. (2016b; classification), 5508
5509 Corsaro et al. (2018, phylogeny), cultures and sequences 5510
5511 are available, genome available: *P. cylindrospora* RSA 5512
5513 2659 unpublished genome at JGI portal (Grigoriev et al. 5514
5515 2014). 5516
5517 **Reticulocephalis** Benny, R.K. Benj. & P.M. Kirk 1992, 5518
5519 *Sigmoideomycetaceae*, *Zoopagales*, *Zoopagomycetes*, 5520
5521 *Zoopagomycota*, two species, type: *R. gyrosus* Benny, R.K. 5522
5523 Benj. & P.M. Kirk, from soil, cosmopolitan, see Hoffmann 5524
5525 et al. (2013; notes), Benny et al. (2016b; classification), 5526
5527 cultures and sequences are unavailable. 5528
5529 **Rhopalomycetes** Corda 1839, *Helicocephalidaceae*, *Zoopaga-* 5530
5531 *les*, *Zoopagomycetes*, *Zoopagomycota*, eleven species, 5532
5533 type: *R. elegans* Corda, parasites, cosmopolitan, see Kirk 5534
5535 et al. (2013; genus accepted), Tretter et al. (2014; notes), 5536
5537 Benny et al. (2016b; classification), Corsaro et al. (2018, 5538
5539 phylogeny), cultures unavailable, sequences are available. 5540
5541 **Sigmoideomyces** Thaxt. 1891, *Sigmoideomycetaceae*, 5542
5543 *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, one spe- 5544
5545 cies, type: *S. dispiroides* Thaxt., saprobes, cosmopolitan, 5546
5547 see Kirk et al. (2013; genus accepted), Benny et al. (2016b; 5548
5549 classification), cultures and sequences are unavailable. 5550
5551 **Sphondylocephalum** Stalpers 1974, *Sigmoideomycetaceae*, 5552
5553 *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, one spe- 5554
5555 cies, type: *S. verticillatum* (Thaxt.) Stalpers, hyphomyce- 5556
5557 tous, coprophilous, North America, see Seifert et al. (2011; 5558
5559 morphology), Kirk et al. (2013; genus accepted), Suyama 5560
5561 and Degawa (2013; accepted as in *Sigmoideomycetaceae*), 5562
5563 Benny et al. (2016b; notes), cultures and sequences are 5564
5565 unavailable. 5566
5567 **Stylopaga** Drechsler 1935, *Zoopagaceae*, *Zoopagales*, 5568
5569 *Zoopagomycetes*, *Zoopagomycota*, 17 species, type: *S.* 5570
5571 *lepte* Drechsler, predator, cosmopolitan, see Kirk et al. 5572
5573 (2013; genus accepted), Michel et al. (2014; isolation, 5574
5575 characterization), Corsaro et al. (2018; DNA, phylogeny), 5576
5577 cultures and sequences are available. 5578
5579 **Syncephalis** Tiegh. & G. Le Monn. 1873, *Piptocephali-* 5580
5581 *daceae*, *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, c. 5582
5583 55 species, type: *S. cordata* Tiegh. & G. Le Monn., 5584
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mycoparasites, worldwide, see Ho and Benny (2008; new species), Santiago et al. (2011a, b; new species), Hoffmann et al. (2013; notes), Kirk et al. (2013; genus accepted), Benny et al. (2016a; classification, ecology), Melo et al. (2016; neotropics), Lazarus et al. (2017, systematics) *S. fuscata* S228 unpublished genome at JGI portal (Grigoriev et al. 2014), *S. plumigaleata* NRRL S24 unpublished genome at JGI portal (Grigoriev et al. 2014), *S. pseudoplumigaleata* Benny S71-1 unpublished genome at JGI portal (Grigoriev et al. 2014). ***Tentaculophagus*** Doweld 2014, *Zoopagaceae*, *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, one species, type: *T. karlingii* see Index Fungorum (2018), cultures and sequences are unavailable. ***Thamnocephalis*** Blakeslee 1905, *Sigmoideomycetaceae*, *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, three species, type: *T. quadrupedata* Blakeslee, saprobes, cosmopolitan, see Kirk et al. (2013; genus accepted), Ho and Chiang (2014; Taiwan), Benny et al. (2016b; classification), Corsaro et al. (2018, phylogeny), cultures unavailable, *T. sphaerospora* RSA 1356 unpublished genome at JGI portal (Grigoriev et al. 2014). ***Verrucocephalum*** Degawa 2013, *Helicocephalidaceae*, *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, one species, type: *H. latericorvinisporum* Degawa, from dung, nematophagous, Asia, see Degawa (2014; taxonomy), cultures and sequences are unavailable. ***Zoopage*** Drechsler 1935, *Zoopagaceae*, *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, eleven species, type: *Z. phanera* Drechsler, in amoeba, cosmopolitan, see Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), cultures and sequences are unavailable. ***Zoophagus*** Sommerst. 1911, *Zoopagaceae*, *Zoopagales*, *Zoopagomycetes*, *Zoopagomycota*, four species, type: *Z. insidians* Sommerst., on algae, cosmopolitan, see Kirk et al. (2013; genus accepted), Benny et al. (2016b; classification), Corsaro et al. (2018, phylogeny), a sequence is available.

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Affiliations

Nalin N. Wijayawardene^{1,2} · Julia Pawłowska³ · Peter M. Letcher⁴ · Paul M. Kirk⁵ · Richard A. Humber⁶ · Arthur Schüßler¹⁴ · Marta Wrzosek³ · Anna Muszewska⁸ · Alicja Okrańska³ · Łukasz Istel³ · Aleksandra Gęsiora³ · Paul Mungai¹² · Adebola Azeez Lateef¹¹ · Kunhiraman C. Rajeshkumar⁷ · Rajshree V. Singh⁷ · Renate Radek¹³ · Grit Walther⁹ · Lysett Wagner⁹ · Christopher Walker^{15,16} · D. Siril A. Wijesundara¹⁸ · Moslem Papizadeh^{19,20} · Somayeh Dolatabadi¹⁰ · Belle D. Shenoy²¹ · Yuri S. Tokarev²² · Saisamorn Lumyong¹⁷ · Kevin D. Hyde^{1,2}

¹ Key Laboratory for Plant Diversity and Biogeography of East Asia, Kunming Institute of Botany, Chinese Academy of Science, Kunming 650201, Yunnan, People's Republic of China

² Center of Excellence in Fungal Research and School of Science, Mae Fah Luang University, Chiang Rai 57100, Thailand

³ Department of Molecular Phylogenetics and Evolution, Institute of Botany, Faculty of Biology, Biological and Chemical Research Center, University of Warsaw, ul. Zwirki i Wigury 101, 02-089 Warsaw, Poland

⁴ Department of Biological Sciences, The University of Alabama, Tuscaloosa, AL 35487, USA

⁵ Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3DS, UK

⁶ USDA-ARS Emerging Pests and Pathogens Research, Robert W. Holley Center for Agriculture and Health, Tower Road, Ithaca, NY 14853-2901, USA

⁷ National Fungal Culture Collection of India (NFCCI), Biodiversity and Palaeobiology (Fungi) Group, Agharkar Research Institute, Pune, Maharashtra 411 004, India

⁸ Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Pawlowskiego 5A, 02-106 Warsaw, Poland

⁹ National Reference Center for Invasive Mycoses (NRZMyk), Leibniz Institute for Natural Product Research and Infection Biology – Hans Knoell Institute, Jena, Germany

¹⁰ Faculty of Engineering, Sabzevar University of New Technology, Sabzevar, Iran

¹¹ Department of Plant Biology, Faculty of Life Sciences, University of Ilorin, Ilorin, Nigeria

¹² Ecological Monitoring Unit, Biodiversity Research and Monitoring Division, Kenya Wildlife Service, P.O. Box 40241, Nairobi 00100, Kenya

¹³ Evolutionary Biology, Institute for Biology/Zoology, Freie Universität Berlin, 14195 Berlin, Germany

¹⁴ Symbiosis and Plant-Microbe Association Research Laboratory, SYMPLANTA GmbH & Co. KG, 64287 Darmstadt, Germany

¹⁵ School of Agriculture and Environment, Faculty of Science, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Australia

¹⁶ Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh EH3 5LR, UK

¹⁷ Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand

¹⁸ National Institute of Fundamental Studies, Hantane Road, Kandy, Sri Lanka

¹⁹ Department of Microbiology, Pasteur Institute of Iran, Tehran, Iran

²⁰ Microorganisms Bank, Academic Center for Education, Culture and Research (ACECR), Tehran, Iran

²¹ CSIR-National Institute of Oceanography Regional Centre, 176, Lawson's Bay Colony, Visakhapatnam, Andhra Pradesh 530017, India

²² Laboratory of Microbiological Control, All-Russian Institute of Plant Protection, Shosse Podbelskogo 3, Pushkin, St. Petersburg, Russia 196608

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