

Checklist of the gasteral and secotioid *Basidiomycetes* of Europe, Africa, and the Middle East

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Abstract: 492 Taxa (476 species and 16 infraspecific taxa) of gasteral and secotioid *Basidiomycetes* are recognized from Europe, Africa, and the Middle East. Moreover, 73 species are listed, whose occurrence in the considered area is erroneously indicated, or which are doubtful taxa.

Type localities, details on distribution and ecology are communicated for all taxa recognized. A list of fundamental and essential recent literature for particular taxa and territories is added.

Zusammenfassung: Aus Europa, Afrika und dem Nahen Osten werden 492 Taxa (476 Arten und 16 infraspezifische Taxa) von gasteralen und secotioiden Basidiomyzeten anerkannt. Ferner werden 73 Arten aufgelistet, deren Vorkommen im Gebiet irrtümlich angegeben wurde, oder deren taxonomische Position zweifelhaft ist.

Für alle anerkannten Taxa werden Typuslokalitäten sowie Einzelheiten über Verbreitung und Habitat mitgeteilt. Ein Verzeichnis der grundlegenden und wesentlichen aktuellen Publikationen zu Taxonomie und Ökologie, gegliedert nach Territorien und nach taxonomischen Gruppen, ist hinzugefügt.

This checklist is intended as an account of all "*Gasteromycetes*" in the classic concept, i. e. hymenial and secotioid *Basidiomycetes*, of Europe, Africa, and the Middle East. It includes 476 recognized species. As an appendix, a long (and nevertheless incomplete) enumeration of doubtful taxa, doubtful and erroneous records indicates that there remains much taxonomic work to be done by future generations of mycologists.

The **political territories** (countries, provinces, etc.) mentioned correspond to the structures of the year 2000, as given, e.g., in Internationaler Atlas. Die Welt in Karten. RV Verlag, Ostfildern (2000). The attribution of type localities to countries and their subunits also corresponds to this standard.

State of knowledge within the considered area is very unequal. Well explored are the *Gasteromycetes* of most parts of Europe (except Russia and the Balkan States), most of the Mediterranean area and some of the Canary Islands (especially Tenerife and La Palma). Rather well explored are South Africa and some parts of tropical ("black") Africa, Mauritius, Israel, and Iran. Few informations are available about *Gasteromycetes* of Russia, Turkey, Cyprus, Crete, Egypt, Libya, Algeria, Tunisia, Madeira, Madagascar, Seychelles, and most of the Middle East, as well as all the European dwarf states. Epigeal groups are generally better explored than hypogeous *Gasteromycetes*, and there is a lack of monographs and worldwide revisions of many genera, in particular, of *Hymenogaster*.

An unsolved problem form the numerous species of epigeous *Gasteromycetes* described by SOSIN (1952) from Ukraine, which cannot be interpreted at present.

Biodiversity

The area considered is not too rich in gasteral and secotioid *Basidiomycetes*. Higher numbers of species are known from the surroundings of the Pacific Ocean, including China, SE Asia, Indonesia, eastern Australia, California and the whole western N America, and the Andean territories of S America, and discovery of many more taxa may be expected in the circumpacific territories. Definite numbers of species are not available at present.

The total number of taxa recognized in the area covered by this checklist is 492 (476 species and 16 infraspecific taxa). After our present knowledge it seems that the greatest richness in taxa has been registered from the Iberian Peninsula and from C Europe.

Distribution

Most *Gasteromycetes* are easily distributed by their air-borne basidiospores (anemochory) able to form aerosols which circulate the earth and reach far distance. Such fungi reach nearly all sites where they can germinate and grow under adequate conditions of climate and soil or substrates, respectively. Therefore, many *Gasteromycetes* have large areas of zonal character, e.g., in the northern temperate zone (*Lycoperdon perlatum* PERS.: PERS., *Bovista plumbea* PERS.: PERS., *Handkea excipuliformis* SCOP.: PERS., *Scleroderma citrinum* PERS.), or in the tropical and subtropical belt (*Lycogalopsis solmsii* E. FISCHER, *Geastrum javanicum* LÉV. agg., *Phallus indusiatus* VENT.). Nevertheless, real **cosmopolitic distribution** is rare, (e.g., *Geastrum saccatum* FR., *Myriostoma coliforme* WITH.: PERS.). Supposed cases of approximate cosmopolitism in *Gasteromycetes* are either due to taxonomic uncertainty [e.g., *Bovista pusilla* BATSCH: PERS. agg., *Pisolithus arhizos* (SCOP.: PERS.) RAUSCHERT agg., *Podaxis pistillaris* (L.: PERS.) FR. agg.] and need further study, or they are due to anthropochoric distribution [e.g., with cattle: *Handkea utrififormis* (BULL.: PERS.) KREISEL, *Vascellum pratense* (PERS.: PERS.) KREISEL, *Bovista plumbea*; or with infected earth, plant roots, flower pots etc.: *Scleroderma* spp.].

In some cases it was possible to observe step by step the continuous expansion of certain species in Europe or elsewhere: *Clathrus archeri* (BERK.) D. M. DRING, *Ileodictyon cibarium* TUL., *Mutinus elegans* (MONT.) E. FISCHER, *M. ravenelii* (BERK. & CURT.) E. FISCHER (true "**neomycetes**" in their recently occupied areas). Other species have been introduced sporadically to northern localities, but did not expand further and disappeared after one or several years [*Lysurus cruciatus* (LEPR. & MONT.) LLOYD, *Endoptychum agaricoides* CZERN., *Tulostoma giovanellae* BRES.] or after decenniums (*Clathrus ruber* BATTARRA); those should be called "**ephemeromycetes**".

Difficult to understand are cases of species widely distributed in N America, but known from only one or two localities in Europe [*Calvatia rugosa* (BERK. & CURT.) REID, *Handkea lloydii* (ZELLER & COKER) KREISEL, *Morganella subincarnata* (PECK) KREISEL & DRING], although their habitats do not suggest introduction by human acti-

vities. In contrary, *Queletia mirabilis* FR. has been found rather frequently in western Europe, but only once in N America.

Endemic distribution has been supposed in many cases of *Gasteromycetes*, but in general a more thorough study revealed that such species have a larger area than assumed originally. For instance, *Geastrum pouzarii* V. J. STANĚK has been supposed to be endemic in C Europe, but has been discovered recently in Spain; *Tulostoma niveum* KERS has been considered as endemic of C Sweden, but has been discovered in Scotland recently. *Calvatia pachyderma* (PECK) MORGAN originally was considered as endemic of N America, but after recent studies has a wide distribution in cool xerothermic parts of Asia and S Europe as well.

Classic cases of endemism within the area considered in the present paper seem to be, e.g., *Clathrus mauritanus* (LLOYD) D. M. DRING on Mauritius, *Handkea capensis* (LLOYD) KREISEL & MORENO in southernmost Africa, *Torrendia pulchella* BRES. in the western Mediterranean, or *Bovista cretacea* T. C. E. FRIES in northern Scandinavia.

Disjunctions (disjunct areas) are excellently illustrated by *Gasteromycetes* of arctic/alpine distribution or of tropical/subtropical high mountains (see below under "elevation"). Northern/southern temperate disjunctions may be due to anthropochory (*Handkea utrififormis* etc., see above).

Vicariance of related taxa has been observed in several groups of *Gasteromycetes*. Classic cases of Eurasian/N American vicariance are *Lycoperdon foetidum* BONORD./*L. peckii* MORGAN, or *Lycoperdon echinatum* PERS.: PERS./*L. americanum* DEMOULIN (DEMOULIN 1972), *Bovista ochrotricha* KREISEL/*B. acuminata* (BOSC: FR.) KREISEL (KREISEL 1967), while *Morganella* seems to be composed world-wide of several vicariant species (KREISEL & DRING 1967). A warm temperate/subtropical vicariance may be the case of *Montagnea radiosa* (PALLAS) ŠEBEK/*M. haussknechtii* RABENH., although both species have been collected on the same locality in southern Yemen.

In general, distribution limits in higher fungi are not so sharp and well-pronounced as in plants, and the author is convinced that fungi are able to react very quickly on changes (negative or positive) of environment conditions by expansion or retraction of their area limits.

Elevation

Rather few information is available with regard of *Gasteromycetes* in different elevations. It can be said that most gasteroid and secotioid *Basidiomycetes* have been recorded from sea level and lower elevations.

In the **Eastern Alps** (Austria, Bavaria, northern Italy) *Bovista nigrescens* PERS.: PERS. ascends to 2650 m s. m., followed by *Bovista bovistoides* (COOKE & MASSEE) S. AHMAD, *Calvatia turneri* (ELL. & EV.) DEMOULIN & M. LANGE, *Lycoperdon decipiens* DUR. & MONT., *L. niveum* KREISEL (all to 2300 m s. m.), *Handkea lloydii* (2100 m s. m.), *H. utrififormis* (2000 m s. m.), *Lycoperdon frigidum* DEMOULIN (1950 m s. m.), *L. foetidum* BONORD., *L. perlatum* (1900 m s. m.), *Rhizopogon pumilionus* (ADE) ex BATAILLE (1870 m s. m.), *Handkea excipuliformis* (1850 m s. m.), and *Calvatia arctica* FERD. & WINGE (1600 m s. m.).

In the **Western Alps** (Switzerland, France) *Bovista nigrescens* reaches 2850 m s. m., followed by *Lycoperdon umbrinum* PERS.: PERS. (2750 m s. m.), *Bovista glacialis*

KREISEL (2650 m s. m.), *Geastrum minimum* SCHW. (2500 m s. m.), *Handkea utrifor-
mis* (2400 m s. m.), *Bovista limosa* ROSTRUP (2300 m s. m.), *Bovista paludosa* LÉV.
(2250 m s. m.), *Rhizopogon marchii* (BRES.) ZELLER & DODGE (2200 m s. m.), *Lycoperdon pyriforme* SCHAEFF.: PERS., *Vascellum pratense* (both 2000 m s. m.), *Bovista tomentosa* (VITT.) QUÉL., *B. plumbea* (both 1950 m s. m.), *Geastrum quadrifidum* PERS.: PERS. and *Rhizopogon obtextus* (SPRENGEL) R. RAUSCHERT (1900 m s. m.).

Few data are available from the **Pyrenees**: *Bovista nigrescens* and *Handkea utri-
formis* (2000 m s. m.), *Lycoperdon echinatum* (1400 m s. m.), *Geastrum fimbriatum* FR. (800 m s. m.), *Bovista plumbea* (750 m s. m.).

In the **Balkan mountains**, *Bovista nigrescens* has been recorded in 2400 m s. m., and *Lycoperdon perlatum* in 2100 m s. m. No adequate data are available from the Carpathians.

In the **Caucasus** *Bovista nigrescens* was collected in 2400 m s. m., *Lycoperdon perlatum* in 2100 m s. m.

On **Canary Islands**, *Scleroderma polyrhizum* GMELIN: PERS. was found in 1500 m s. m., *Lycoperdon lambinonii* DEMOULIN in 1450 m s. m., *Astraeus hygrometricus* (PERS.) MORGAN and *Geastrum minimum* in 1400 m s. m., *Geastrum triplex* JUNGH. in 1042 m s. m.

In the high mountains of **tropical Africa**, *Bovista fusca* LÉV. ascends to ca. 4000 m s. m., *Bovista abyssinica* MONT. to 3650 m s. m., *Lycoperdon asperum* (LÉV.) SPEG. to 3000 m s. m., *Bovista aenea* KREISEL to 2400 m s. m., and *Phallus caliendricus* DRING & RAYNER was found at 2000 m s. m.

These records show that in whole Europe *Bovista nigrescens* ascends from sea level to the highest elevations, and also *Handkea utrififormis* and *Geastrum minimum* have a similarly wide span of distribution. Further, there is a series of species characteristic of (arctic and) alpine sites such as *Bovista glacialis*, *B. bovistoides*, *Calvatia turneri*, *C. cretacea* (BERK.) LLOYD, *C. arctica*, *Handkea lloydii*, *Lycoperdon niveum*, and *L. frigidum*. The African high mountains have a quite characteristic set of species, some of which have been collected as well in high elevations of Mexico and S America (Andes).

For comparison one should consider that in the **Himalaya** a number of *Gasteromycetes* has been collected in extraordinary high elevations: *Bovista albosquamosa* KREISEL 5400 m s. m., *B. substerilis* KREISEL and *Disciseda alpina* KREISEL 5300 m s. m., *Geastrum spec.*, *Lycoperdon niveum*, *L. lambinonii*, *Bovista bovistoides*, *B. fulva* MASSEE all 5200 m s. m., *Bovistella poeltii* KREISEL 5146 m s. m., *Bovista glacialis* 5120 m s. m., *Geastrum recolligens* (WOODW.) DESV. and *Lycoperdon altimontanum* KREISEL both 5200 m s. m., *Disciseda ochrochalconea* KREISEL 4800 m s. m., *Bovista vascelloides* KREISEL 4700 m s. m., *Calvatia pachyderma* and *Lycoperdon yetisodale* KREISEL both 4600 m s. m.

Ecology

Many species of *Gasteromycetes* are **terricolous saprobionts**. Those are most of the enumerated species of *Agaricales*, nearly all *Geastrales* and *Lycoperdales*, a few *Nidulariales* [*Cyathus olla* BATSCH: PERS., *Nidularia deformis* (WILLD.: PERS.) FR., *Sphaerobolus terrestris* (ALB. & SCHW.) W. G. SMITH], most species of *Phallales*, all

Sclerogaster spp. *Tulostoma*, with some doubts, may be added to this category, although there seem to be relations to mosses in a few species.

Terricolous saprobionts may be found in and outside forests, in gardens, fields, steppes and semideserts, in arctic and alpine vegetation. A few species show a certain preference for **haline soils**: *Bovista halophila* KREISEL & HAUSKN. ined., *Dictyocephalos attenuatus* (PECK) LONG & PLUNKETT, *Tulostoma giovanellae*, and *T. pseudopulchellum* MORENO, ALTÉS & WRIGHT can be regarded as halophilic *Gasteromyces*, while *Bovista plumbea* is halotolerant in certain degree.

Lignicolous saprobionts are more infrequent in *Gasteromyces*, but most species of *Nidulariales* are lignicolous (and/or herbicolous), moreover *Geastrum schweinitzii* (BERK. & CURT.) ZELLER, *Lycogalopsis solmsii* E. FISCHER, *Lycoperdon pyriforme*, *Morganella afra* KREISEL & DRING and *M. subincarnata*, *Mutinus caninus*, *M. bambusinus* (ZOLLINGER) E. FISCHER and *M. zenkeri* (P. HENN.) E. FISCHER, *Phallogaster saccatus* MORGAN, *Phallus tenuis* agg., and *Tulostoma exasperatum* MONT. A special case is *Bovista ochrotricha* KREISEL which grows on bark of living trees.

Only a few species are **fimicolous (coprophilous) saprobionts**: *Cyathus pallidus* BERK. & CURT., *C. rudis* PAT., *C. stercoreus* (SCHW.) DE TONI. Occasionally *Bovista coprophila* (COOKE & MASSEE) G. H. CUNN., *Phallus novae-hollandiae* CORDA, and *Sphaerobolus stellatus* TODE: PERS. have been collected on dung.

Some groups of saprobic *Gasteromyces* have been cultured successfully: many *Lycoperdales*, *Nidulariales*, *Phallales*, and *Podaxis*. *Cyathus* spp. and *Mutinus caninus* have fructified in pure cultures.

Bryophilous (muscolous) *Gasteromyces* are found either in tufts of *Sphagnum*, *Polytrichum*, *Dicranum*, and so-called "brown mosses" (*Acrocladium*, *Drepanocladus*, etc.): *Bovista paludosa*, *Lycoperdon caudatum* SCHROETER, *L. muscorum* MORGAN and ?*Morganella subincarnata*; other species grow among arenicolous mosses [*Rhacomitrium canescens* (TIMM. ap. HEDW.) BRID., *Tortula ruralis* (L.) EHRH.]: *Tulostoma brumale* PERS.: PERS.; or among calciphilous rock mosses [*Tortella tortuosa* (L.) LIMPR., *Ditrichum flexicaule* (SCHLEICHER) HAMPE]: *Tulostoma niveum* KERS.

As all the bryophilous *Gasteromyces* mentioned are closely related to saprobic species, they are supposed to grow as saprobionts on dead parts of mosses and not to be involved in any kind of symbiosis or parasitism on mosses.

Glasshouses (botanical and commercial ones) may harbour some species of exotic *Gasteromyces*: *Aseroë rubra* LABILL. has been found in a glasshouse in Kew, *Clathrus ruber* in Hamburg, Moscow, and St. Petersburg, *Descomyces albus* (KLOTZSCH) BOUGHER & CASTELLANO in Berlin and Glasgow, *Hydnangium carneum* WALLR. in Amsterdam, Dresden, Leipzig, Uppsala, and Helsinki, *Lysurus cruciatus* in Jekaterinburg, Göteborg, and The Netherlands; *Mutinus elegans* in Frankfurt and Surrey; *Mycocalia reticulata* (PETCH) J. T. PALMER in Lyon; *Pseudocolus fusiformis* (E. FISCHER) LLOYD in Prague and St. Petersburg. Most of the species mentioned are saprobic representatives of *Phallales*, but *Hydnangium* and *Descomyces* are probably mycorrhizal symbionts of *Eucalyptus*. Buttons of some indetermined *Geastrales* have been collected recently in a greenhouse in Stuttgart.

Aquatic Gasteromyces are very rare. In Europe only *Limnoperdon incarnatum* ESCOBAR is known from limnic habitats, and two or three species of *Nia* are known from marine and estuarine habitats. They are lignicolous and herbicolous saprobionts;

their closer taxonomic position is uncertain, although relations to the lignicolous *Nidulariales* may be suspected.

Phytoparasitism is very rare in *Gasteromycetes*. *Gastrosporium simplex* MATTIROLO and *Phallus hadriani* VENT.: PERS. are supposed to be root parasites on grasses and other herbaceous plants, and the same may be true for the *Phallus rubicundus* agg., but exact phytopathological studies have been carried out in no case.

Ectomycorrhizal fungi include many groups of *Gasteromycetes*. In particular, all or nearly all species of *Boletales*, *Hymenogastrales* (excepted *Sclerogaster*), *Russulales*, and *Sclerodermatales* are supposed to be ectomycorrhizal, and the same holds for some genera of *Agaricales*: *Hydnangium*, *Leucogaster*, *Leucophleps*, *Torrendia*; possibly *Rhodogaster*, *Richoniella*, and *Setchelliogaster*. Nevertheless, only *Pisolithus arhizos* has been the object of successful experimental studies on physiology of ectomycorrhiza.

The **host specificity** of ectomycorrhizal *Gasteromycetes* is different. Many species are specific to certain genera of host trees: e.g., many *Rhizopogon* species are specific to certain genera of conifers, in particular to *Pinus*; *R. rocabrunae* M. P. MARTÍN to *Abies*, *R. villosulus* ZELLER and *R. vinicolor* A. H. SMITH to *Pseudotsuga*; *Chamonixia caespitosa* ROLLAND to *Picea*; *Descomyces albus*, *Chondrogaster pachysporus* MAIRE, *Hydnangium carneum* WALLR., and *Setchelliogaster* spp. are specific to *Eucalyptus*; *Alpova diplophloeus* (ZELLER & DODGE) TRAPPE & A. H. SMITH and *A. klikae* (MATTIROLO) TRAPPE to *Alnus*; many *Hymenogastraceae* to *Fagaceae*; *Macowanites agaricinus* KALCHBR. and (?) *Broomeia congregata* BERK. to *Acacia*. On the other hand, there are many ectomycorrhizal *Gasteromycetes* with a broad host spectrum, such as *Astraeus hygrometricus*, *Hymenogaster* spp., *Scleroderma* spp., *Torrendia pulchella*. *Pisolithus arhizos* agg., too, has a very broad host spectrum, but possibly there are several microspecies specific to certain hosts or to biogeographical regions involved.

Almost nothing is known about host specificity of tropical representants of ectomycorrhizal genera.

Literature

Mainly fundamental publications and some more recent additional papers are listed. They are arranged once after countries and territories concerned, and then after the gasteromycete genera and families dealt with.

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Enumeration of territories concerned

Abbr.	English	German	other idioms/former names
Arct:	Arctic Territories	arktische Gebiete	
FAE	Faeroer Islands	Färöer-Inseln	
GRE	Greenland	Grönland	Groenlandia, Kalaallit Nunaat Islandia
ISL	Iceland	Island	
JAM	Jan Mayen	Jan Mayen	
SVA	Svalbard	Spitzbergen	
Euro:	Europe	Europa	
ALB	Albania	Albanien	
AUS	Austria	Österreich	Autriche, Rakousko
BEL	Belgium	Belgien	Belgique
BER	Belorussia	Weißrußland	Belarus
BRI	British Islands	Großbritannien	UK (United Kingdom), Gran Bretaña
BUL	Bulgaria	Bulgarien	
CRO	Croatia	Kroatien	Hrvatsko
CZE	Czech Republic	Tschechien	Česká Republika
DAN	Denmark	Dänemark	Danmark
EST	Estonia	Estland	Eesti
FIN	Finland	Finnland	Suomi
FRA	France	Frankreich	Francia
GER	Germany	Deutschland	Allemagne, Alemania
GRE	Greece	Griechenland	Hellas, Grecia
HUN	Hungary	Ungarn	Magyarország, Hungría
IRL	Ireland	Irland	Eire, Irlanda
ITA	Italy	Italien	Italia
LAT	Latvia	Lettland	Latvija
LIT	Lithuania	Litauen	Lietuva
LUX	Luxembourg	Luxemburg	
MAC	Macedonia	Mazedonien	
MOL	Moldavia	Moldawien	
NED	The Netherlands	Niederlande, Holland	Pays-Bas, Países Bajos, Holanda
NOR	Norway	Norwegen	Norge, Noreg, Noruega
POR	Portugal	Portugal	
RUM	Rumania	Rumänien	Roumania, Romania
RUS	Russia (Europ. part)	Rußland	Rossija, Rusia
SLK	Slovakia	Slowakei	Slovensko, Eslovaquia
SLV	Slovenia	Slowenien	
SPA	Spain	Spanien	España, Espagne
SWE	Sweden	Schweden	Sverige
SWI	Switzerland	Schweiz	Suisse, Suiza
UKR	Ukraine	Ukraine	Ucrania
YUG	Yugoslavia	Jugoslawien	

European dwarf states:**Europäische Zwergstaaten**Nearly no data on *Gasteromycetes* available:

AND	Andorra	
GIB	Gibraltar	
LIE	Liechtenstein	
MON	Monaco	
SMA	San Marino	
VAT	Vatican	Vatikan

Medi:**Mediterranean Isl.****Mittelmeerinseln**

BAL	Balearic Islands	Balearen	Islas Baleares
COR	Corse	Korsika	
CRE	Crete	Kreta	
CYP	Cyprus	Zypern	Chipre
MAL	Malta	Malta	
SAR	Sardinia	Sardinien	
SIC	Sicily	Sizilien	Sicilia

Maca:**Macaronesia****Makaronesien**

AZO	Azores	Azoren	
CAP	Cape Verde Islands	Kapverdische Inseln	Cabo Verde Ilhas
CAN	Canary Islands	Kanarische Inseln	Islas Canarias
MAD	Madeira	Madeira	

NAfr:**Northern Africa –
north of 13°N****nördliches Afrika**

ALG	Algeria	Algerien	Argelia
DJI	Djibouti	Dschibuti	
EGY	Egypt	Ägypten	Egipto
ERI	Eritrea	Eritrea	
ETI	Ethiopia	Äthiopien	
LBY	Libya	Libyen	
MAL	Mali	Mali	
MAR	Morocco	Marokko	Marruecos
MAU	Mauretania	Mauretanien	
NGR	Niger	Niger	
SEN	Senegal	Senegal	
SOM	Somalia	Somaliland	
SUD	Soudan	Sudan	
TCH	Tchad	Tschad	
TUN	Tunesia	Tunesien	Túnez

W Afr:**West Africa****Westafrika**

BEN	Benin	Dahomey	
BUR	Burkina Faso	Obervolta	Haute-Volta
CAM	Cameroon	Kamerun	
COT	Ivory Coast	Elfenbeinküste	Côte d'Ivoire, Costa de Marfil
GAM	Gambia	Gambia	
GHA	Ghana	Ghana	
GUI	Guinea and Guinea-Bissau	Guinea und Guinea-Bissau	
LIB	Liberia	Liberia	
NIG	Nigeria	Nigeria	
SIE	Sierra Leone	Sierra Leone	
TOG	Togo	Togo	

CAfr:	Central and East Africa	Mittel- und Ostafrika	
ANG	Angola	Angola	
BRA	Congo Brazzaville	Kongo (Brazzaville)	French Congo
BUR	Burundi	Burundi	
CON	Congo Kinshasa	Kongo (Kinshasa)	Zaire
GAB	Gabun	Gabun	
GAE	Guinea Equatorial	Äquatorialguinea	Guinea Ecuatorial
KEN	Kenya	Kenia	
MWI	Malawi	Nyassaland	
RCA	Central African Rep.	Zentralafrikanische Republik	Republique Centrafricaine
RWA	Rwanda	Ruanda	
TAN	Tanzania	Tansania	(Deutsch-Ostafrika)
UGA	Uganda	Uganda	
ZAM	Zambia	Sambia	North Rhodesia
SAfr:	Southern Africa	südliches Afrika	
BOT	Botswana	Betschuanaland	
LES	Lesotho	Lesotho	Basutoland
MOC	Moçambique	Mosambik	
NAM	Namibia	South West Africa	(Deutsch-Südwestafrika)
SAF	South African Rep.	Republik Südafrika	Suid Afrika, Sudáfrica
SWA	Swaziland	Swasiland	
ZIM	Zimbabwe	Simbabwe	South Rhodesia
WIsl:	Islands west of Africa	Inseln westlich von Afrika	
ASC	Ascension		Ascensión
BIO	Bioko	Bioko	Fernando Póo
SAO	Sao Tomé e Príncipe	São Tomé und Príncipe	Santo Tomás
STH	Saint Helena	St. Helena	
TRI	Tristan da Cunha	Tristan da Cunha	
EIsl:	Islands east of Africa	Inseln östlich von Afrika	
COM	Comores	Komoren	
MAY	Mayotte	Mayotte	
MDG	Madagascar	Madagaskar	Republique Malgache
MTS	Mauritius	Mauritius	Mauricio
REU	Réunion	Reunion	La Réunion
SEY	Seychelles	Seychellen	
SOC	Socotra (Yemen)	Sokotra (Jemen)	Suqtra
	Zanzibar	Sansibar	see Tanzania
Oric:	Middle East, Orient	Naher Osten	
ARM	Armenia	Armenien	
AZE	Azerbaidjan	Aserbaidshan	
GEO	Georgia	Georgien	Grusinien
IRN	Iran	Iran	Persien
IRQ	Iraq	Irak	
ISR	Israel	Israel	
JOR	Jordania	Jordanien	
KUW	Kuwait	Kuweit	
LIB	Libanon	Libanon	
OMA	Oman	Oman	
PAL	Palestina	Palästina	
SAU	Saudi Arabia	Saudi-Arabien	
SYR	Syria	Syrien	

TUR	Turkey	Türkei
UAR	United Arab Emirates	Vereinigte Arabische Emirate
YEM	Yemen	Jemen

Other abbreviations:

- agg.** = aggregate species, collective species, to be studied more thoroughly in future
assoc. = associated (with certain plant species, by ectomycorrhiza, parasitism, or otherwise)
introd. = probably introduced (with year of first observation)
T: = type locality of the name = locus typi (not indicated for pseudonyms)
 = true synonym
 # = pseudonym, wrong interpretation
 + = now extinct in the following territory

Checklist*Agaricales, secotioid/gasteroid (incl. Leucogastrales, Podaxales)*

- 001 *Endoptychum agaricoides* CZERN. 1845 – **T:** Ukraine, Charkov
 = *Secotium agaricoides* (CZERN.) HOLLÓS 1904
 = *Secotium acuminatum* MONT. 1849 – **T:** Algeria
Euro: AUS (Burgenland), BUL, CZE (S Moravia), HUN, ITA, RUM, RUS (Mari-ASSR), SLK, UKR;
introd. Euro: 1922 FRA (Côte d'Or), 1941 SWE (Uppland), 1974 LIT (Vilnius), 1986 GER (Potsdam);
MedI: COR;
NAfr: ALG;
Orie: ARM, GEO, ISR.
 [terricolous in dry pastures and steppes on light soils; warm-temperate to mediterranean; a few temporary records in the north]
- 002 *Galeropsis aporos* COURTECUISSE 1992 – **T:** France, Chartres
Euro: FRA (Eure-et-Loir).
 [terricolous in lawns; temperate]
- 003 *Galeropsis desertorum* VELEN. & DVOŘÁK in VELENOVSKÝ 1930 – **T:** Czechia, Moravia, Mohelno
Euro: + CZE (S Moravia), HUN, SLK (Zahorie), SPA, UKR (Askania Nova).
 [terricolous in dry pastures and steppes, on sandy and stony (serpentinite) ground; warm-temperate]
- 003 a – var. *bispora* (VASSILKOV 1954) MORENO, HEYKOOP & ILLANA 1989 – **T:** Uzbekistan, Fergana
 = *Gastrocybe iberica* MORENO, ILLANA & HEYKOOP 1987 – **T:** Spain
Euro: RUS (Chechenia, Dagestan), SPA.
- 004 *Galeropsis lateritia* (WATL. 1968) MORENO, HEYKOOP & ILLANA 1989 – **T:** USA, Michigan
 = *Gastrocybe lateritia* WATL. 1968
Euro: HUN, ITA, SPA;
NAfr: TUN.
 [terricolous on lawns in gardens, parks; warm-temperate]
- 005 *Galeropsis liberata* (KALCHBR. 1876) HEIM 1950 – **T:** S Africa, Cape, Somerset East
 = *Bolbitius liberatus* KALCHBR. in THÜMEN 1876
SAfr: SAF (Western Cape).
 [terricolous; warm-temperate]

006 *Galeropsis mitriformis* (BERK. 1844) HEIM 1950 – T: S Africa, Cape Town, Devil's Mount
 = *Bolbitius mitriformis* BERK. 1844 "mitraeformis"
SAfr: SAF (Western Cape).
 [terricolous on clay; south warm-temperate]

007 *Galeropsis paradoxa* (MATTIROLO 1924) PILÁT 1948 – T: Ethiopia, Addis-Ababa
 = *Galera besseyi* PECK var. *madagascariensis* PAT. (?1928) – T: Madagascar
 = *Galeropsis madagascariensis* (PAT.) SINGER 1955, comb. inval.
NAfr: ETI;
CAfr: ?KEN;
EIsl: MDG.
 [terricolous in pastures, lawns and gardens on sandy soil; subtropical to tropical]

008 *Galeropsis plantaginiformis* (LEBEDEVA 1932) SINGER 1936 – T: Russia, Caucasus, Terek
 = *Psammomyces plantaginiformis* LEBEDEVA 1932
Euro: RUS (Chechenia, Dagestan).
 [terricolous in dry steppes; warm-temperate]

Considered conspecific with *G. desertorum* by some recent authors (e.g., WASSER 1979, MORENO & al. 1989), but regarded as different by HEIM (1950) and SINGER (1955).

009 *Galeropsis polytrichoides* (ZELLER 1941) ZELLER 1943 – T: USA, California, Mt Shasta
Euro: ITA.
 [terricolous in moist meadows; mediterranean]

010 *Gyrophragmium dunalii* (FR. 1838) ZELLER 1943 – T: France, Montpellier
 = *Montagnites dunalii* FR. 1838
 = *Gyrophragmium delilei* MONT. 1843 – T: Algeria
 = ?*Gyrophragmium italicum* PETRI 1909 – T: S Italy
Euro: FRA (south), GRE (Karpathos), ITA (south), RUS (1949 Astrachan), SPA;
MedI: COR, SAR, SIC;
Maca: CAN (Graciosa, Tenerife);
NAfr: ALG, EGY, MAR;
SAfr: SAF (Northern Cape);
Orie: IRN, ISR.
 [terricolous in dry open places, sandy soils; mediterranean to subtropical]

011 *Gyrophragmium inquinans* (BERK. 1843) LLOYD 1904 – T: S Africa, Orange River
 = *Polyplocium inquinans* BERK. 1843
SAfr: SAF (Eastern Cape, Mpumalanga);
Orie: ISR.
 [terricolous on dry open places; subtropical]

012 *Hydnangium aculeatosporum* SOEHNER 1941 – T: Germany, Oberbayern
 = *Octaviania aculeatospora* (SOEHNER) SVRČEK in PILÁT 1958
Euro: GER (Bayern).
 [hypogeous in mixed forest; temperate]

013 *Hydnangium aurantiacum* HEIM & MALENÇON 1934 – T: Spain, near Barcelona
Euro: ITA, SPA.
 [hypogeous in dry to fresh forests, under *Quercus ilex* L. and *Cupressus*; mediterranean]

014 *Hydnangium carneum* WALLR. in DIETRICH 1839 – T: Germany
 = *Octaviania carnea* (WALLR.) CORDA 1854
 = *Octaviania mollis* DE NOT. 1869 – T: Italy
 = *Octavianina mollis* (DE NOT.) KUNTZE 1898

introd. Euro: 1839 GER, 1862 ITA, 1865 NED, 1875 BRI, 1910 POR, 1920 CZE, 1984 SPA, BEL, FIN (Helsinki), NOR, RUS (St. Petersburg), SWE (Uppsala);

MedI: SAR;

Maca: CAN, MAD;

NAfr: MAR;

SAfr: SAF (Western Cape).

[hypogeous, assoc. with *Eucalyptus* spp., also in greenhouses in flowerpots; probably introduced from Australia before 1839; now warm-temperate to mediterranean]

015 *Hydnangium cereum* SOEHNER 1924 – T: Germany, Oberbayern, Ehrharting
= *Octaviania cerea* (SOEHNER) SVRČEK in PILÁT 1958

Euro: GER.

[hypogeous in *Fagus* forests on calcareous soil; temperate]

016 *Hydnangium monosporum* BOUD. & PAT. 1888 – T: France, Nice
= *Octaviania monospora* (BOUD. & PAT.) LLOYD 1922

Euro: CZE (C Bohemia), FRA, GER (Bayern), UKR.

[hypogeous in clear dry *Pinus* forests; warm-temperate]

017 *Hydnangium neuhoffii* SOEHNER 1941 – T: Poland, Marienwerder
= *Octaviania neuhoffii* (SOEHNER) SVRČEK in PILÁT 1958

Euro: POL (former Westpreussen), RUS, ?GER.

[hypogeous; temperate]

018 *Leucogaster badius* MATTIROLLO 1903 – T: Italy, C Italia

Euro: GER (Bayern), ITA.

[doubtful species; hypogeous in deciduous forests; warm-temperate]

019 *Leucogaster nudus* (HAZSLINSZKY 1875) HOLLÓS 1980 – T: Slovakia
= *Leucogaster floccosus* HESSE 1889 – T: Germany

Euro: BRI, CZE, FRA, GER, HUN, ITA, LIT, SLK, SWE, SWI (Ticino), TUR, UKR.

[hypogeous in *Fagus*, *Quercus*, and *Abies* forests on calcareous and sandy soils; in Italy up to 1000 m s. m.; temperate]

020 *Leucogaster tozzianus* (CAVARA & SACC. 1900) MATT. in ZELLER & DODGE 1924 – T: Italy
= *Leucogaster fragrans* MATTIROLLO 1900 – T: Italy

Euro: CZE (Moravia), ITA, SPA.

[hypogeous in deciduous forests; temperate to mediterranean]

021 *Leucophleps aculeatispora* FOGEL 1979 – T: Austria

= *Octaviania silesiaca* BECKER 1886 – T: Poland, Silesia

Leucogaster liosporus HESSE 1882 ss. ZELLER & DODGE (1924), SVRČEK in PILÁT (1958)

Euro: AND, AUS, CZE, GER, POL, SPA.

[hypogeous in coniferous mountain forests and under *Betula*, acidophilous; in the Pyrenees up to 1600 m s. m.; temperate]

022 *Leucophleps magnata* HARKNESS 1899 – T: USA, California, Napa County

= *Leucogaster magnatus* (HARKNESS) ZELLER 1941

Euro: SWI (Biel, Jura).

[hypogeous in coniferous forests; warm-temperate]

023 *Montagnea haussknechtii* RABENH. 1870 – T: Iran, Enzeli

= *Montagnites elliottii* MASSEE 1892 – T: Egypt, Nile valley

= *Montagnites tenuis* PAT. 1894 – T: Tunisia, Gabés

= *Montagnites candollei* FR. var. *minor* P. HENN. 1901 – T: Egypt, Hekian

= *Montagnites candollei* FR. var. *somala* BACCARINI 1916 – T: Somalia

- = *Montagnites spagazzinii* SACC. & TROTTER 1925 – **T:** Canaries, Las Palmas
Maca: CAN (Gran Canaria);
NAfr: ALG, EGY, ERI, SOM, SUD, TUN;
SAfr: ANG, SAF;
Orie: BAH, IRN, ISR, JOR, OMA, YEM.
[terricolous in semidesertic areas; subtropical]
- 024 *Montagnea radiosa* (PALLAS) ŠEBEK 1954 – **T:** Sibiria, Irtytsch
= *Montagnites radiosus* (PALLAS) P. HENN. 1901
= *Montagnea arenaria* (DC. 1815) ZELLER 1943 – **T:** France, Montpellier
= *Montagnites candollei* FR. 1838 – **T:** France, Montpellier
= *Montagnites pallasii* FR. 1838 – **T:** Sibiria, Irtytsch
= *Montagnites radiosus* (PALLAS) P. HENN. var. *isosporus* BELLII 1908 – **T:** Italy, Sardinia
Euro: AUS (Burgenl., Niederösterreich), CZE, FRA (Pyren-Médit.), GER, GRE, ITA, HUN, RUM, RUS (SE Bashkiria, S Russia), SPA, UKR;
Medl: CRE, SAR, SIC;
Maca: CAN, ?CAP;
NAfr: ALG, EGY, LIB, MAR, MAU, TCH, TUN;
CAfr: ?KEN;
SAfr: SAF;
Orie: ARM, GEO, IRN, IRQ, ISR, SAU, TUR, YEM.
[terricolous in dunes, steppes, semideserts; warm-temperate to subtropical]
- 024 a – var. *macrospora* REID & EICKER 1991 – **T:** C Australia, Ernabella
Orie: IRN (Rafsanjan).
- 025 *Podaxis africanus* DE VILLIERS & al. 1989 – **T:** S Africa, Pretoria
Maca: CAP;
SAfr: SAF (North Prov.).
[terricolous in dry habitats, in termitaries; subtropical]
- 026 *Podaxis pistillaris* (L. 1767: PERS. 1801) FR. 1829 em. MORSE 1933 **agg.** – **T:** India
= *Podaxon carcinomale* (L. fil. 1781: PERS. 1801) FR. 1829 – **T:** S Africa, Cape Pr., Ganssekraal
= *Podaxis senegalensis* DESV. 1809 – **T:** Senegal
= *Podaxis axatus* (BOSC 1811) MASSEE 1890 – **T:** Senegal
= *Podaxon calypttratus* FR. 1829 – **T:** at Senegal river
= *Podaxon aegypticus* MONT. 1843 – **T:** Egypt
= *Podaxon loandensis* WELW. & CURREY 1850 – **T:** Angola
= *Podaxon elatus* WELW. & CURREY 1850 – **T:** Angola
= *Podaxon mossamedensis* WELW. & CURREY 1850 – **T:** Angola
= *Podaxon arabicus* PAT. 1887 – **T:** Yemen
= *Podaxon deflersii* PAT. 1890 – **T:** ?
= *Podaxon schweinfurthii* PAT. 1890 – **T:** Egypt
= *Podaxon pistillaris* f. *abyssinica* P. HENN. 1893 – **T:** Etiopia
= *Podaxon perraldieri* PAT. 1897 – **T:** Tunis
= *Podaxon ghattensis* P. HENN. 1898 – **T:** Sudan, Ghatts
= *Podaxon algericus* PAT. 1904 – **T:** Algeria
= *Podaxon termitophilus* JUN. & PERR. 1907 – **T:** ?
Maca: MAD, ?CAP;
NAfr: EGY, ETI, SEN, SUD;
WAfr: GHA, NIG, TOG;
CAfr: ANG, KEN;
SAfr: MOC, NAM, SAF (continental parts);
Orie: IRN, IRQ, ISR, YEM; Caucasus.
[terricolous in semideserts, wasteland, on sandy and clayey soil and on termitaries; subtropical to tropical]

- 027 *Podaxis rugosporus* DE VILLIERS & al. 1989 – T: S Africa, Rustenburg
SAfr: SAF (North Prov.).
 [terricolous on wasteland; subtropical]
- 028 *Podaxis saharianus* MORENO & MORNAND 1997 – T: Morocco, Sahara, Merzouga
NAfr: MAR.
 [terricolous in semidesert with sparse *Gramineae* and *Cyperus*; subtropical]
- 029 *Rhodogaster calongei* E. HORAK & MORENO 1998 – T: Spain, San Sebastián, Tolosa
 # *Rhodogaster chilensis* E. HORAK 1964 ss. CALONGE & PASABÁN (1995)
Euro: SPA (Madrid, San Sebastián).
 [terricolous, semihypogeous in mixed forests; warm-temperate]
- 030 *Richoniella leptoniispora* (RICHON 1887) COST. & DUFOUR 1891 – T: France, Marne
Euro: FRA (north), ITA.
 [hypogeous in deciduous forests and coppices; warm-temperate]
- 031 *Secotium gueinzii* G. KUNZE 1840 – T: S Africa, Cape Flats
SAfr: SAF (Western Cape).
 [terricolous on open ground; warm-temperate]
- 032 *Secotium obtusum* LLOYD in STEVENSON & CASH 1936 – T: S Africa, Knapdaar
SAfr: SAF (Eastern Cape).
 [terricolous on open ground; subtropical]
- 033 *Setchelliogaster rheophyllus* (BERTAULT & MALENÇON 1970) MORENO & KREISEL 1997 – T:
 Morocco, Tanger, Cherf-el-Akab
 = *Naucoria rheophylla* BERTAULT & MALENÇON in MALENÇON & BERTAULT 1970
 = *Descolea rheophylla* (BERTAULT & MALENÇON) MALENÇON 1979
introd. Euro: 1995 SPA;
introd. NAfr: 1964 MAR.
 [terricolous, assoc. with *Eucalyptus*; probably introduced from Australia before 1964; now west-
 mediterranean]
- 034 *Setchelliogaster tenuipes* (SETCHELL 1907) POUZAR 1958 – T: USA, California, Alameda Co.
introd. Euro: 1989 ITA, 1994 SPA, 1998 POR;
introd. MedI: SAR.
 [terricolous, assoc. with *Eucalyptus*; probably introduced from Australia before 1989, now west-
 mediterranean]
- 035 *Torrendia pulchella* BRES. 1902 – T: Portugal, Setubal
Euro: FRA (Les Landes), POR, SPA;
MedI: COR;
NAfr: ALG, MAR.
 [terricolous in clear forests (*Quercus suber* L., *Pinus pinaster* AIT.); west-mediterranean]
- Boletales, secotioid/gasteroid (incl. *Melanogastrales*)**
- 036 *Alpova diplophloeus* (ZELLER & DODGE 1918) TRAPPE & A. H. SMITH 1975 – T: ?
 = *Melanogaster microsporus* MATTIROLO 1935 – T: Italy
Euro: GER (Alps, Baar), ITA, SWE, SWI;
MedI: COR.
 [hypogeous in deciduous forests, assoc. with *Alnus viridis* DC.; temperate to mediterranean]
- 037 *Alpova klikae* (MATTIROLO 1934) TRAPPE 1975 – T: Italy, Piemont
 = *Cremeogaster klikae* MATTIROLO 1934

- = *Leucophleps klikae* (MATTIROLLO 1934) FOGEL 1979
Euro: CZE (Prague), ITA (Piemont), GER (Alps).
 [hypogeous in deciduous forests and subalpine coppices of *Alnus viridis*; temperate]
- 038 *Alpova microsporus* (VELEN. 1922) TRAPPE 1975 – **T:** Czechia, C Bohemia
 = *Melanogaster microsporus* VELEN. 1922
Euro: AUS (Steiermark), CZE, GER (Bayern), NOR (Oslo), SWE, SWI (Arosa, Engadin).
 [subhypogeous in deciduous forests; assoc. with *Fagus*, *Alnus viridis*; in the Alps up to 1950 m s. m.; temperate]
- 039 *Alpova rubescens* (VITT. 1831) TRAPPE 1975 – **T:** N Italy
Euro: ITA (north), SPA; ?GER (München).
 [hypogeous in forests, assoc. with *Fagaceae*; submediterranean]
- 040 *Alpova pseudostipitatus* CALONGE & SQUIER 1998 – **T:** Spain
Euro: SPA.
 [hypogeous]
- 041 *Chamonixia caespitosa* ROLLAND 1899 – **T:** France, Alps, Chamonix
 = *Hymenogaster coeruleus* SOEHNER 1922 – **T:** Germany, Bayern
Euro: AUS, FIN, FRA (Alps), GER (S and Thüringen), ITA (Alps, Apennines), NOR, POL, RUS, SLO, SWE, SWI.
 [hypogeous in coniferous forests, assoc. with *Picea*; in Germany 470–780 m s. m., in Switzerland 1200 m s. m.; temperate]
- 042 *Corditubera bovonei* (MATT. 1922) DEMOULIN & DRING 1975 – **T:** Congo, Katanga
 = *Scleroderma bovonei* MATT. 1922
CAfr: CON (Katanga).
 [hypogeous; tropical]
- 043 *Corditubera kiuvensis* DEMOULIN & DRING 1975 – **T:** Congo, Irangi
CAfr: CON.
 [hypogeous; tropical]
- 044 *Corditubera staudtii* P. HENN. 1897 – **T:** Cameroon, Lolodorf, Mt Mbange
WAfr: CAM.
 [hypogeous; tropical]
- 045 *Descomyces albus* (KLOTZSCH 1839) BOUGHER & CASTELLANO 1993 – **T:** Britain, Glasgow
 = *Hymenangium album* KLOTZSCH in DIETRICH 1839
 = *Hymenogaster albus* (KLOTZSCH) BERK. 1844
 = *Hymenogaster klotzschii* TUL. & C. TUL. 1851 – **T:** France
 = *Hymenogaster maurus* MAIRE 1931 – **T:** Algeria, Staouéli
 = *Hymenogaster weibelianus* MAIRE 1931 – **T:** Algeria, Staouéli
 # *Rhizopogon albus* (BULL. 1791) FR. 1823 ss. FRIES (1823), non CORDA (1841), nec *Tuber album* BULL. 1791
introd. Euro: 1830 BRI (Scotl.), FRA, 1839 GER, 1906 POR, 1914 CZE (Praha); ITA, POR, RUS, SPA, SWE;
Medl: SAR;
Maca: AZO, CAN (Tenerife), MAD;
NAfr: ALG, MAR.
 [hypogeous; assoc. with *Eucalyptus*; probably introduced from Australia before 1830; now warm-temperate to mediterranean]
- 046 *Gautieria dubia* E. FISCHER 1938 – **T:** Switzerland, Neuchâtel
Euro: GER (Schwarzwald), SWI, ?CZE.

[hypogeous in *Fagus* and *Picea* forests in mountains; temperate]

- 047 *Gautieria graveolens* VITT. 1831 – T: Italy, Milano
Euro: FIN, ITA (Alps, Apennines), RUS, SWE, Caucasus.
 [hypogeous in deciduous and coniferous forests; temperate]
- 048 *Gautieria morchelliformis* VITT. 1831 – T: Italy, Milano
 = *Gautieria villosa* QUÉL. 1878 – T: France
 = *Gautieria morillaeformis* QUÉL. 1886 – T: France
Euro: AUS, BRI (Engl.), BUL, CZE, DAN, FRA, GER, HUN, ITA (Alps, Apennines), + NED, NOR, POR, RUM, RUS, SLK, SPA.
 [hypogeous in deciduous forests, assoc. with *Fagus*, *Quercus*; in Germany (Bavaria) up to 1575 m s. m.; temperate]
- 049 *Gautieria othii* TROG 1857 (sensu PILÁT 1958) – T: Switzerland, Hardlisberg
 = *Gautieria graveolens* VITT. var. *othii* (TROG) ZELLER & DODGE 1934
 = *Gautieria pallida* (HARKNESS 1899) HARKNESS 1934 – T: USA, California
 # *Gautieria graveolens* VITT. ss. WINTER (1884), HESSE, HOLLÓS
 # *Gautieria mexicana* (E. FISCHER 1899) ZELLER & DODGE 1934 ss. auct. europ.
Euro: AUS, CZE, DAN, FRA, GER, HUN, ITA (Alps, Apennines), + NED, NOR, RUS, SLK, SPA, SWE (Uppland), SWI;
Orie: Caucasus.
 [hypogeous in forests, assoc. with *Picea*, *Fagus*, *Quercus*; temperate, even in high mountains]
- 050 *Gautieria pseudovestita* MALENÇON 1975 – T: Morocco, Rif "Mauritania"
NAfr: ALG (Rif), MAR.
 [hypogeous; west-mediterranean]
- 051 *Gautieria retirugosa* TH. M. FRIES 1909 – T: Sweden, Gotland
Euro: SWE (Gotl., Uppl.).
 [hypogeous in *Picea* forests under mosses; temperate]
- 052 *Gautieria trabutii* (CHATIN 1891) PAT. 1897 – T: Algeria, Atlas de Blida
Euro: FRA (Jura), ITA, SPA, ?GER (Bayern);
NAfr: ALG, MAR.
 [hypogeous in deciduous and mixed forests, assoc. with *Quercus cerris* L., *Cedrus*, *Picea*, *Pinus*; warm-temperate to mediterranean]
- 053 *Melanogaster ambiguus* (VITT. 1831) TUL. 1843 – T: Italy, Milano
 = *Octaviania ambigua* VITT. 1831
 = *Argyllum liquaminosum* WALLR. 1833 – T: Germany, Nordhausen
 = *Melanogaster klotzschii* CORDA 1842 – T: ?
Euro: BEL, BRI, CZE, DAN, FIN, FRA, GER, HUN, ITA, LIT, NED, NOR, RUS (Moscow), SLK, SPA, SWE, SWI;
SAfr: SAF (Kw.-Natal).
 [subhypogeous in deciduous and mixed forests; assoc. with *Quercus*, *Corylus* etc.; temperate to subtropical]
- 054 *Melanogaster intermedius* (BERK. 1844) ZELLER & DODGE 1934 – T: Britain, England, Wiltshire
 = *Melanogaster ambiguus* (VITT.) TUL. var. *intermedius* BERK. 1844
Euro: BRI (Engl.), CZE (Bohemia), GER, NED, SPA.
 [subhypogeous in parks and gardens; temperate]
- 055 *Melanogaster macrosporus* VELEN. 1922 – T: Czechia, Bohemia, Roblín
Euro: CZE, DAN, GER (Schwáb. Alb), ITA, SPA, SWI.
 [subhypogeous in deciduous forests; assoc. with *Fagus*, *Quercus*; temperate to mediterranean]

- 056 *Melanogaster odoratissimus* (VITT. 1831) TUL. & C. TUL. – T: Italy, Milano
Euro: GER, ITA, RUM, UKR.
 [subhypogeous in deciduous forests, assoc. with *Fagus*, *Quercus*; warm-temperate]
- 057 *Melanogaster rubescens* (VITT. 1831) TUL. & C. TUL. 1851 – T: Italy
Euro: CZE, ITA, UKR.
 [subhypogeous in deciduous forests; warm-temperate]
- 058 *Melanogaster tuberiformis* CORDA in STURM 1821 – T: Czechia, Praha
Euro: CZE, DAN, FRA, GER, ITA, LUX, MAC, NED, NOR (Vestfold), SWE (southw.).
 [subhypogeous in deciduous and mixed forests, assoc. with *Fagus*; temperate]
- 059 *Melanogaster variegatus* (VITT. 1831) TUL. 1843 – T: Italy, Lombardia
 = *Melanogaster broomeanus* BERK. in TUL. 1843 – T: Britain, England
Euro: AUS, BEL, BRI, CZE, DAN, FRA, GER, HUN, ITA, LIT, NED, NOR, POR, RUS, SPA, SWE, SWI, UKR;
MedI: BAL (Mallorca), COR, SAR.
 [subhypogeous in deciduous and mixed forests, assoc. with *Quercus*, *Pinus*; temperate to mediterranean]
- 060 *Melanogaster vittadinii* SOEHNER & KNAPP 1934 – T: Italy
Euro: GER (Bayern), ITA, SWI.
 [hypogeous in forests; warm-temperate to submediterranean]
- 061 *Rhizopogon abietis* A. H. SMITH in SMITH & ZELLER 1966 – T: USA, Idaho
Euro: AUS, DAN, FRA, ITA, SPA (northea.), SWE.
 [subhypogeous in coniferous forests; temperate]
- European collections listed by MARTÍN (1996) belong to *R. marchii* (BRES.) ZELLER & DODGE
- 062 *Rhizopogon angustisepta* ZELLER & DODGE 1918 – T: Russia, Tilsit
Euro: LIT, RUS (former Eastern Prussia).
 [subhypogeous in forests; temperate]
- 063 *Rhizopogon aromaticus* CALONGE & M. P. MARTÍN 2000 – T: Spain, Ciudad Real, Valle de Perales
Euro: SPA.
 [subhypogeous, assoc. with *Pinus*, *Quercus*, *Cistus*; submediterranean]
- 064 *Rhizopogon aurantiacus* A. H. SMITH in SMITH & ZELLER 1966 – T: USA, Idaho
Euro: SWE.
 [subhypogeous in coniferous forests, assoc. with *Picea*, *Pinus*; north temperate]
- 065 *Rhizopogon capensis* LLOYD ex VERWOERD 1925 – T: S Africa, Stellenbosch
SAfr: SAF (Western Cape).
 [subhypogeous, assoc. with *Pinus*; warm-temperate]
- 066 *Rhizopogon corsicus* DEMOULIN & MOYERSONEN in MARTÍN 1996 – T: France, Corsica
Euro: BEL, SPA;
MedI: COR.
 [subhypogeous, assoc. with *Pinus*; mediterranean]
- 067 *Rhizopogon ellenae* A. H. SMITH in SMITH & ZELLER 1966 – T: USA
Euro: SPA.
 [subhypogeous, assoc. with *Pinus*; mediterranean]

- 068 *Rhizopogon evadens* A. H. SMITH in SMITH & ZELLER 1966 – T: USA, Idaho
Euro: FRA;
MedI: COR.
 [subhypogeous, assoc. with *Pinus*; mediterranean]
- 069 *Rhizopogon fuscorubens* A. H. SMITH in SMITH & ZELLER 1966 – T: USA, Oregon
Euro: SPA.
 [subhypogeous in coniferous forests; mediterranean]
- 070 *Rhizopogon marchii* (BRES. 1892) ZELLER & DODGE 1929 – T: Italy, Trento, Verla
 = *Hysterangium marchii* BRES. 1892
 = *Rhizopogon comatus* VELEN. 1922 – T: Czechia, Mnichovice, Myslín
Euro: AUS, CZE, FIN, FRA, GER, ITA, SPA, SWE, SWI.
 [subhypogeous in coniferous forests, assoc. with *Larix*, *Picea*, *Pinus*; in Germany up to 640 m s. m.; the Alps up to 2200 m s. m.; temperate]
- 071 *Rhizopogon melanogastroides* M. LANGE 1956 – T: Czechia, Moravia, Weißkirchen = Hranice
Euro: CZE.
 [subhypogeous in mixed forest, assoc. with *Pinus*; temperate]
- 072 *Rhizopogon niger* (LLOYD 1923) ZELLER & DODGE 1929 – T: S Africa, Knysna
 = *Hysterangium niger* LLOYD 1923
SAfr: SAF (Western Cape).
 [hypogeous; warm-temperate]
- 073 *Rhizopogon obtextus* (SPRENGEL 1815) R. RAUSCHERT 1984 – T: Germany, Halle
 = *Rhizopogon virens* (ALB. & SCHW. 1805) FR. 1823, non ss. KARSTEN 1871 – T: Germany, Niesky
 = *Rhizopogon luteolus* FR. in FR. & NORDH. 1817 – T: Sweden, Femsjö
Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, GRE, ITA, LIT, NED, NOR, POL, POR, RUS, SLK, SPA, SWE, SWI;
MedI: BAL (Mallorca), COR;
Maca: CAN (Gran Canaria, Tenerife, El Hierro, La Palma);
CAfr: SAM;
SAfr: SAF (Western and Eastern Cape, North Prov.);
Orie: GEO, ISR, Caucasus.
 [subhypogeous, assoc. with *Pinus* spp. on poor sandy soil; in Germany up to 910 m s. m.; the Alps up to 1900 m s. m.; temperate to subtropical]
- 074 *Rhizopogon occidentalis* ZELLER & DODGE 1918 – T: USA, Idaho, Moscow
Euro: AUS, CZE, DAN, FIN, GER, GRE, ITA, NED, NOR, POR, SPA, SWE, SWI;
MedI: BAL.
 [subhypogeous, assoc. with *Pinus*; temperate to mediterranean]
- 075 *Rhizopogon ochraceorubens* A. H. SMITH in SMITH & ZELLER 1966 – T: USA, Idaho, Payette National Forest
Euro: BEL, BRI, GER (Oberbayern), NED, NOR, SWE.
 [subhypogeous in coniferous forests, assoc. with *Pinus*; temperate]
- 076 *Rhizopogon pumilionus* (ADE 1908) ex BATAILLE 1923 – T: Germany, Allgäuer Alpen
 # *Rhizopogon pannosus* ZELLER & DODGE ss. MARTÍN (1996), MOSER & al. (1999)
Euro: AUS (Tirol, Niederösterreich), GER (Alps).
 [subhypogeous, assoc. with *Pinus mugo* TURRA; in the Alps (Bavaria) at 1870 m s. m.; temperate on high mountains]

- 077 *Rhizopogon rocabrunae* M. P. MARTÍN 1996 – **T:** Spain, Girona
Euro: ITA (Alps), SPA (Catalaunia).
 [hypogeous in mountain forests, assoc. with *Abies*; warm-temperate]
- 078 *Rhizopogon roseolus* (CORDA 1837) T. C. E. FRIES 1909 **agg.** – **T:** Czechia, C Bohemia
 = *Rhizopogon rubescens* (TUL. 1843) TUL. 1844 – **T:** France
 = *Rhizopogon vulgaris* (VITT. 1844) M. LANGE 1956 – **T:** Italy
 = *Rhizopogon provincialis* TUL. & C. TUL. 1851 – **T:** France
 = *Rhizopogon briardii* BOUD. 1885 – **T:** France
 = *Rhizopogon lapponicus* P. KARST. 1889 – **T:** Finland
 = *Rhizopogon roseolus* var. *vittadini* TUL. 1909 – **T:** Sweden
 = *Rhizopogon hymenogastrosporus* SOEHNER 1956 – **T:** Germany, Schwenningen
 = *Rhizopogon vulgaris* var. *intermedius* SVRČEK in PILÁT 1958 – **T:** Czechia, S Moravia, Bzenec
 = *Rhizopogon luteorubescens* A. H. SMITH in SMITH & ZELLER 1966 – **T:** USA, Idaho
 = *Rhizopogon ventricisporus* A. H. SMITH in SMITH & ZELLER 1966 – **T:** USA, Idaho
 = *Rhizopogon sardous* G. PACIONI 1984 – **T:** Italy, Sardinia
 # *Rhizopogon aestivus* (WULFEN) FR. ss. BUCHHOLZ (1901), SZEMERE (1965)
Euro: AUS, BEL, BRI, BUL, CRO, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, ITA, LAT, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI, Caucasus;
MedI: BAL, COR, SAR, SIC;
Maca: CAN (Gran Canaria, Tenerife, El Hierro, La Gomera), MAD;
NAfr: MAR, TUN;
SAfr: SAF (Western Cape, Transvaal);
Orie: ISR.
 [subhypogeous in forests and coppices, assoc. with *Pinus* spp., *Larix*, *Picea*, *Cistus*, *Castanea*, *Olea*, and *Quercus* on poor sand and limestone soils; in the Alps up to the *Pinus mugo* zone; temperate to mediterranean, probably introduced in southern warm-temperate areas]
- 079 *Rhizopogon rubrocorticatus* ZELLER & DODGE 1918 – **T:** Mauritius
ELsl: MTS.
 [subhypogeous; tropical]
- 080 *Rhizopogon subalpinus* A. H. SMITH in SMITH & ZELLER 1966 – **T:** USA, Oregon
Euro: SWE.
 [subhypogeous in boreal coniferous forests; north temperate]
- 081 *Rhizopogon subolivascens* A. H. SMITH in SMITH & ZELLER 1966 – **T:** USA, Idaho
Euro: BEL.
 [subhypogeous in coniferous forests, assoc. with *Pinus nigra* ARNOLD; temperate]
- 082 *Rhizopogon subsalmoneus* A. H. SMITH in SMITH & ZELLER 1966 – **T:** USA, Idaho
Euro: SPA.
 [subhypogeous in coniferous forests, assoc. with *Pinus pinaster*; mediterranean]
- 083 *Rhizopogon verii* G. PACIONI 1984 – **T:** Tunisia, Tabarka
Euro: ITA, SPA;
NAfr: TUN.
 [hypogeous in coniferous and mixed forests, assoc. with *Pinus pinaster*; mediterranean]
- 084 *Rhizopogon villosulus* ZELLER 1941 **agg.** – **T:** USA, Oregon
 = *Rhizopogon reticulatus* HAWKER 1955 – **T:** Britain, England, Somerset
 = *Rhizopogon hawkeriae* A. H. SMITH in SMITH & ZELLER 1966 – **T:** USA, Washington
 = *Rhizopogon parksii* A. H. SMITH in SMITH & ZELLER 1966 – **T:** USA, California
 = *Rhizopogon subareolatus* A. H. SMITH in SMITH & ZELLER 1966 – **T:** USA, Oregon
introd. Euro: 1953 BRI (S Engl.), 1967 GER (Saarland, 1995 Schwarzwald), 1986 ITA (Apenines); FRA, NED, POR, SPA (northea.), SWI (Ticino);

introd. Maca: 1976 MAD.

[subhypogeous in forests; assoc. with *Pseudotsuga menziesii* (MIRB.) FRANCO; introduced from western N America before 1953; now temperate to mediterranean]

085 *Rhizopogon vinicolor* A. H. SMITH in SMITH & ZELLER 1966 – T: USA, Idaho

Euro (introd. ?): BRI, FRA, ITA.

[subhypogeous in coniferous forests, assoc. with *Pseudotsuga menziesii*; probably introduced from western N America; temperate]

Gastrosporales

086 *Gastrosporium simplex* MATTIROLI 1903 – T: Italy, S. Giuliano

= *Calvatia defodioidis* LLOYD 1913 – T: USA, Wyoming

= *Gastrosporium beccarianum* LLOYD 1924 – T: Italy

= *Leucorhizon nidificum* VELEN. 1925 – T: Czechia, Slaný

Euro: AUS, BUL, CZE, FRA, GER, ITA, POL, SLK, SPA, SWE (Västergötland, + Skåne), SWI;

introd. Euro: 1973 BRI (Harpenden in S England);

MedI: SAR;

EIsl: MTS.

[hypogeous; assoc. with *Gramineae*, *Carex*, and perennial dicot plants in rock and sand steppes; in C Germany up to 480 m s. m., the Alps up to 1650 m s. m.; temperate to tropical]

Geastrales

087 *Geasteropsis conrathii* HOLLÓS 1903 – T: S Africa, Johannesburg

= *Trichaster conrathii* (HOLLÓS) LONG 1945

= *Geastrum conrathii* (HOLLÓS) P. PONCE DE LEÓN 1968

SAfr: SAF (widespread).

[terricolous on grassy slopes and on termitaries; subtropical]

088 *Geastrum arenarium* LLOYD 1902 – T: USA, Florida, Jupiter

SAfr: SAF (Eastern and Northern Cape).

[terricolous on sandy places under *Acacia* and *Eucalyptus* trees; warm-temperate]

089 *Geastrum berkeleyi* MASSEE 1889 – T: Britain, England, Notts., Lambley

= *Geastrum pseudostriatum* HOLLÓS 1901 – T: Hungary, Nagybugac

= *Geastrum hollosii* V. J. STANĚK in PILÁT 1958 – T: Slovakia, Stará D'ala

Euro: AUS, BRI (Engl.), CZE, DAN (Sjaelland), GER, HUN, NED, SLK, SPA, SWE;

MedI: BAL (Mallorca);

Orie: TUR.

[terricolous in dry forests; in Germany up to 280 m s. m.; temperate to mediterranean]

090 *Geastrum campestre* MORGAN 1887 – T: USA, Nebraska, Lincoln

= *Geastrum pedicellatum* (BATSCH 1783) DÖRFELT & MÜLLER-URI 1983 – T: Italy

= *Geastrum pseudomamosum* P. HENN. 1900 – T: Germany

= *Geastrum asperum* LLOYD 1901 – T: Italy

Euro: AUS, BRI (Engl.), CZE, DAN (Fanø island), FRA, GER, HUN, LIT, NED, NOR (Akershus), RUM, RUS, SLK, SPA, SWE;

Maca: CAN;

MedI: COR;

Orie: GEO (Tbilissi).

[terricolous in dry forests and steppes, *Syringa* shrubs in gardens; temperate to mediterranean]

091 *Geastrum congolense* DISSING & M. LANGE 1962 – T: Congo, Eala

CAfr: CON.

[terricolous; tropical]

- 092 *Geastrum corollinum* (BATSCH 1783) HOLLÓS 1903 – **T:** Italy
 = *Geastrum recolligens* (WOODW. 1792) DESV. 1809 – **T:** Britain, England
 = *Geastrum mammosum* CHEV. 1836 – **T:** France
 = *Geastrum lugubre* KALCHBR. 1884 – **T:** ?Hungary
Euro: AUS, BEL, BRI (Engl.), BUL, CZE, DAN, GER, ITA, NED, POR, RUM, SLK, SPA, SWE (south);
CAfr: TAN;
SAfr: NAM;
Orie: GEO (Tbilissi), IRN, ISR.
 [terricolous in dry deciduous forests and steppes; in Germany up to 250 m s. m.; temperate to tropical]
- 093 *Geastrum coronatum* PERS. 1801 – **T:** Germany
 = *Geastrum limbatum* FR. 1829 – **T:** Sweden, Östergötland
 = *Geastrum atratum* F. ŠMARDÁ 1947 – **T:** Czechia, Bohemia, Karlštejn
Euro: AUS, BRI, BUL, CZE, DAN, EST, FRA, GER, GRE, HUN, LIT, NED, NOR (Akershus), POL, POR, RUM, SLK, SPA, SWE;
MedI: COR;
Maca: CAN (Tenerife);
SAfr: SAF (widespread);
Orie: ARM.
 [terricolous in deciduous forests on rich soil, often synanthropic in gardens under ornamental shrubs; nitrophilous; temperate to subtropical]
- 094 *Geastrum dissimile* BOTTOMLEY 1948 – **T:** S Africa, Pretoria, Fountains
CAfr: KEN;
SAfr: SAF (North Prov.).
 [terricolous under trees and shrubs; subtropical to tropical]
- 095 *Geastrum dubowskii* PAT. 1902 – **T:** Congo
CAfr: CON.
 [terricolous and lignicolous in dry forest; tropical]
- 096 *Geastrum elegans* VITT. 1842 – **T:** Italy
 # *Geastrum badium* PERS. ss. STANĚK et auct., non PERSON (1809)
 # *Geastrum umbilicatum* FR. ss. auct., non FRIES (1829, nomen dubium)
Euro: AUS, BEL, BRI (Scilly), CZE, DAN, EST, FIN (Åland), FRA, GER, HUN, ITA, LIT, NED, NOR, RUM, RUS, SPA, SWE;
MedI: COR.
 [terricolous in dry coniferous and oak forests; in Germany up to 350 m s. m.; temperate to mediterranean]
- 097 *Geastrum fimbriatum* FR. 1829 – **T:** Sweden, Gotland
 = *Geastrum rufescens* PERS. var. *minor* PERS. 1801 – **T:** ?Germany
 = *Geastrum sessile* (SOW. 1809) POUZ. 1971 – **T:** Britain, England
 = *Geastrum tunicatum* VITT. 1842 – **T:** Italy
 # *Geastrum rufescens* PERS. ss. KITS VAN WAVEREN (1926), PALMER (1968)
Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, GER, GRE, IRL, ITA, LAT, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI;
MedI: BAL, COR;
Maca: CAN (Tenerife, La Palma);
SAfr: SAF;
Orie: ARM, AZE, GEO, IRN.
 [terricolous in coniferous and deciduous forests, in gardens under *Syringa* shrubs; in Germany up to 860 m s. m., the Alps 1850 m s. m., Bulgaria 2000 m s. m., Pyrenees 800 m s. m.; temperate to mediterranean]

- 098 *Geastrum floriforme* VITT. 1842 – T: Italy
 = *Geastrum delicatum* MORGAN 1887 – T: USA, ?Ohio
 = *Geastrum pazschkeanum* P. HENN. 1900 – T: S Africa, Cape Pr.
 = *Geastrum sibiricum* PILÁT 1935 – T: Russia, Sibiria
Euro: AUS, BRI (Engl.), CZE, DAN (Jylland), FIN (Åland and south), FRA, GER, ITA, NED,
 POR, RUM, RUS, SLK, SPA, SWE;
Medl: BAL (Menorca), COR;
SAfr: SAF (Western and Eastern Cape, North Prov.).
 [terricolous in lawns on light soils, in sparse stands of *Robinia*, *Syringa* and other trees; in Germany up to 200 m s. m.; temperate to mediterranean]
- 099 *Geastrum fornicatum* (HUDS. 1762) HOOK. in CURTIS 1819 – T: Britain, England
 = *Geastrum fenestratum* (BATSCH 1786) LLOYD 1901 – T: Germany
Euro: AUS, BEL, BRI, BUL, CZE, DAN, GER, IRL, LIT, NED, NOR (Østfold), RUM, RUS,
 SLK, SPA, SWE;
Maca: CAN (Hierro);
SAfr: SAF (widespread);
EIsl: MTS;
Orie: ISR.
 [terricolous in deciduous forests, often synanthropic in gardens, cemeteries, under *Syringa*,
Robinia etc.; temperate to subtropical]
- 100 *Geastrum hieronymi* P. HENN. 1897 – T: Argentine, Córdoba
SAfr: SAF (Western and Eastern Cape, North Prov.).
 [terricolous; south subtropical]
- 101 *Geastrum hungaricum* HOLLÓS 1901 – T: Hungary, Budapest, Sükösd
Euro: CZE, GER, HUN, RUS (Caucasus, Ucskulan).
 [terricolous in rock steppes; warm-temperate]
- 102 *Geastrum javanicum* LÉV. 1845 **agg.** – T: Indonesia, Java
 = *Geastrum velutinum* MORGAN 1895 – T: USA, Ohio
 = ?*Lycoperdon golungense* WELW. & CURREY 1870 – T: Angola
 = ?*Geastrum lloydii* BRES. & PAT. in LLOYD 1901 – T: Samoa
WAfr: GHA, NIG;
CAfr: KEN, UGA;
SAfr: SAF (Eastern Cape), ?ANG;
EIsl: ?MTS.
 [terricolous in forests; up to 1200 m s. m.; subtropical to tropical]
- 103 *Geastrum kotlabae* V. J. STANĚK in PILÁT 1958 – T: Hungary
 # *Geastrum drummondii* BERK. ss. HOLLÓS (1902), non BERKELEY (1845)
 # *Geastrum ambiguum* MONT. ss. HOLLÓS (1904), an MONTAGNE (?1839)
Euro: GER (Dresden), HUN, SPA, UKR;
Orie: Caucasus.
 [terricolous in clear forests and steppes; warm-temperate]
- 104 *Geastrum lageniforme* VITT. 1842 – T: Italy, Roma
Euro: BRI (Engl.), BUL, CZE, FRA, HUN, ITA, NED, POL (Gdańsk), POR, RUM, SPA;
Medl: BAL (Menorca);
WAfr: GHA, NIG, ?CAM;
CAfr: KEN;
SAfr: ?SAF;
Orie: ARM.
 [terricolous in clear dry forests; temperate to tropical]

- 105 *Geastrum lloydianum* RICK 1906 – **T:** Brazil
 = *Geastrum hariotii* LLOYD 1907 – **T:** tropical America
CAfr: TAN, ZAM;
EIsr: MDG, MTS.
 [terricolous in forests; tropical]
- 106 *Geastrum melanocephalum* (CZERN. 1845) V. J. STANĚK 1956 – **T:** Ukraine
 = *Trichaster melanocephalus* CZERN. 1845
 = *Geastrum marchicum* P. HENN. 1892 – **T:** Germany, Potsdam
Euro: AUS, BEL, CZE, DAN, FRA, GER, LIT, POL, RUM, RUS (Pjatigorsk), SLK, SPA, SWE, SWI, UKR;
Orie: ARM, GEO, IRN.
 [terricolous in deciduous and *Cedrus* forests and gardens on rich soils; nitrophilous; in Germany up to 440 m s. m., southern France 900 m s. m., Russia 570 m s. m.; temperate to submediterranean]
- 107 *Geastrum minimum* SCHW. 1822 – **T:** USA, N Carolina
 = *Geastrum marginatum* VITT. 1842 – **T:** Italy
 = *Geastrum cesatii* RABENH. 1851 – **T:** Italy
 = *Geastrum granulolum* FÜCKEL 1860 – **T:** Germany
 = *Geastrum victorinii* PONCE DE LEÓN 1946 – **T:** Cuba, Moa
 = *Geastrum alpinum* SCHLEICHER in herb. – **T:** Switzerland
Arct: GRL;
Euro: AUS, BEL, BOS, BRI (Norfolk), CZE, DAN, EST, FIN, FRA, GER, ITA, LAT, LIT, NED, NOR, POR, RUM, SLK, SPA, SWE, SWI;
MedI: BAL (Ibiza);
Maca: CAN (Tenerife, Hierro), CAP;
WAfr: NIG;
CAfr: CON;
SAfr: SAF (Western and Eastern Cape, North Prov.);
EIsr: MDG, REU;
Orie: AZE (Tbilissi), IRN, ISR.
 [terricolous in dry lawns, steppes, grassy dunes, in clear forests of *Pinus*, *Acacia*, on sandy and calcareous soil; in Germany up to 400 m s. m., the Alps 2500 m s. m., Canaries 1400 m s. m.; subarctic to tropical]
- 108 *Geastrum morgani* LLOYD 1901 – **T:** USA, ?Ohio
Euro (introd.?): <1976 FRA (Vendée), 1987 SPA (Gerona);
Maca (introd.?): 1998 CAN (La Palma).
 [terricolous in mediterranean forests and shrubs; introduced from temperate N America before 1976]
- 109 *Geastrum pectinatum* PERS. 1801 – **T:** Germany
 = *Geastrum plicatum* BERK. 1839 – **T:** India, Madras
 = *Geastrum tenuipes* BERK. 1848 – **T:** Tasmania
 = *Geastrum calyculatum* FÜCKEL 1869 – **T:** Germany
Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, LAT, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI;
MedI: BAL;
SAfr: SAF (widespread).
 [terricolous in deciduous and coniferous forests; in Germany up to 785 m s. m., the Alps >1200 m s. m., southern France 1000 m s. m., Greece (Rhodos) 800 m s. m.; temperate to subtropical]
- 110 *Geastrum pouzarii* V. J. STANĚK 1954 – **T:** Czechia, C Bohemia, Radotín
Euro: CZE (C and N Bohemia), SPA (Teruel).
 [terricolous in rock steppes, e.g., on diabas, spilite; warm-temperate to mediterranean]

- 111 *Geastrum pseudolimbatum* HOLLÓS 1901 – T: Hungary, Kecskemét, Bugac
Euro: AUS, CZE, FRA, GER, HUN, LIT, NED, POL, SLK, SWE, UKR, Caucasus;
MedI: COR;
Orie: GEO.
 [terricolous in clear forests and coppices, in northern areas synanthropic; temperate to submediterranean]
- 112 *Geastrum pulverulentum* WAKEF. 1916 – T: Nigeria
WAfr: NIG, SIE.
 [terricolous; tropical]
- 113 *Geastrum quadrididum* PERS. 1794: Pers. 1801 – T: Germany
 = *Geastrum coronatum* (SCOP. 1772) SCHROET. 1889 – T: Germany; non PERS. 1801
Euro: AUS, BEL, BRI (Engl.), CZE, DAN, EST, FIN, GER, HUN, LAT, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SWE, SWI;
MedI: BAL (Mallorca);
SAfr: SAF (Kw.-Natal).
 [terricolous in deciduous and coniferous forests; in Germany up to 935 m s. m., the Alps 1900 m s. m.; temperate to subtropical]
- 114 *Geastrum rhizophorum* DISSING & M. LANGE 1962 – T: Congo, Yangambi
CAfr: CON.
 [terricolous in moist to dry virgin forests; tropical]
- 115 *Geastrum rufescens* PERS. 1794: Pers. 1801 – T: Germany, Bayern
 = *Geastrum vulgatum* VITT. 1841 – T: Italy
 = *Geastrum schaefferi* VITT. 1842 – T: ?
Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, GER, GRE, HUN, IRL, ITA, LIT, NED, NOR, POR, RUM, RUS, SLK, SPA, SWE, SWI;
MedI: BAL (Mallorca), COR;
Maca: CAN (Tenerife, La Palma).
 [terricolous in deciduous and coniferous forests on rich soils; in Germany up to 920 m s. m., the Alps 1150 m s. m., Greece (Rhodos) 800 m s. m.; temperate to mediterranean]
- 116 *Geastrum rugulosum* DISSING & M. LANGE 1962 – T: Congo, Binga
CAfr: CON.
 [on termitaries; tropical]
- 117 *Geastrum saccatum* FR. 1829 – T: Brazil
Euro: BRI, BUL, CZE, DAN (Fyn), GER, HUN, ITA, LIT, MAC, NED, POL, POR, SPA, SWE (south), UKR;
MedI: BAL;
WAfr: GHA, NIG;
CAfr: KEN, TAN, UGA;
SAfr: SAF (widespread).
 [terricolous in deciduous and evergreen forests; only in low elevations (Toscana 270 m s. m.); temperate to tropical]
- 118 *Geastrum schmidelii* VITT. 1842 – T: Germany
 = *Geastrum rabenhorstii* KUNZE in RABENH. 1875 – T: Germany, Eisleben
 # *Geastrum nanum* PERS. ss. STANĚK (1958) et auct. plur.
Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN (southw., Åland), FRA, GER, IRL, ITA, LAT, LIT, NED, NOR (Rogaland), POL, RUM, RUS, SLK, SPA, SWE;
MedI: BAL (Mallorca), COR;
CAfr: KEN, TAN;
SAfr: SAF (widespread).

[terricolous in grassy dunes, dry lawns and pastures, in *Eucalyptus* plantations; in Germany up to 350 m s. m.; temperate to tropical]

- 119 *Geastrum schweinfurthii* P. HENN. 1891 – T: Sudan, Djurland, Seriba-Ghattas
 # *Geastrum ambiguum* MONT. ss. BOTTOMLEY (1948) et auct. afric.
 # *Geastrum drummondii* BERK. ss. DRING (1964), DRING & RAYNER (1967), CALONGE & al. (1997)
Maca: CAP;
NAfr: SUD;
WAfr: NIG;
CAfr: BUR, CON, KEN, TAN;
SAfr: NAM, SAF (Western and Eastern Cape, Kw.-Natal).
 [terricolous in savannas; subtropical to tropical]
- 120 *Geastrum schweinitzii* (BERK. & CURT. 1853) ZELLER 1948 **agg.** – T: French Guyana
 = *Coilomyces schweinitzii* BERK. & CURT. 1853
 = *Geastrum mirabile* MONT. 1855 – T: Guyana
 = *Geastrum lignicola* BERK. 1881 – T: Australia, Queensland, Rockingham Bay
 = *Geastrum subiculosum* COOKE & MASSEE 1887 – T: Australia, Queensland, Trinity Bay
WAfr: BEN, GHA, NIG;
CAfr: CON, UGA;
SAfr: SAF (North Prov.).
 [lignicolous, rarely terricolous, in rain and mountain forests, also on termitaries; subtropical to tropical]
- 121 *Geastrum simulans* LLOYD 1905 – T: Australasia
Orie: ISR.
 [terricolous; mediterranean]
- 122 *Geastrum smardae* V. J. STANĚK 1956 – T: Czechia, Moravia, Brno
 # *Geastrum limbatum* FR. ss. COKER & COUCH (1928), SMITH (1951)
 # *Geastrum coronatum* PERS. ss. KAMBLY & LEE (1936)
introd. Euro: 1952 SLK, 1955 CZE, 1956 POL, 1960 DAN (Copenhagen), 1962 GER, 1992 NED.
 [terricolous in gardens; introduced from temperate N America before 1952; temperate]
- 123 *Geastrum stipitatum* SOLMS ex E. FISCHER 1893 – T: Indonesia, Java
WAfr: CAM;
CAfr: CON.
 [lignicolous in tropical forests]
- 124 *Geastrum striatum* DC. 1805 – T: France
 = *Geastrum badium* PERS. 1809, non auct. plur. – T: ?
 = *Geastrum bryantii* BERK. 1860 – T: Britain, England
 = *Geastrum orientale* HAZSLINSZKY 1878 – T: Rumania, Cluj = Kolozsvár
 = *Geastrum bryantii* ssp. *kunzei* WINTER in RABENH. 1884 – T: Germany, Berlin
Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, HUN, IRL, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE;
SAfr: SAF (Pretoria).
 [terricolous in deciduous and coniferous forests and gardens; nitrophilous; in Germany up to 440 m s. m.; temperate to subtropical]
- 125 *Geastrum triplex* JUNGH. 1840 – T: Indonesia, Java
 = *Geastrum michelianum* W. G. SMITH 1873 – T: Britain, Castle Ashby
 # *Geastrum indicum* (KLOTZSCH) S. RAUSCHERT ss. RAUSCHERT (1959)
Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, IRL, ITA, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI;
Medl: BAL, COR, SAR;

- Maca:** CAN;
CAfr: CON, KEN, TAN;
SAfr: SAF (widespread);
Orie: ARM, GEO.
 [terricolous in deciduous forests and hedges on rich soil, nitrophilous; in Germany up to 600 m s. m., the Alps 1400 m s. m., Pyrenees up to 800 m s. m., Canaries 1040 m s. m.; temperate to tropical]
- 126 *Geastrum welwitschii* MONT. 1856 – **T:** Portugal, Lisboa
Euro (introd.?): + POR (1848 Lisboa).
 [terricolous in Botanical Garden; origin unknown]
- 127 *Myriostoma coliforme* (WITH. 1776: PERS. 1801) CORDA 1842 – **T:** Britain, England
 = *Myriostoma anglicum* DESV. 1809 – **T:** Britain, England
 = *Geastrum columnatum* LÉV. 1846 – **T:** France
Euro: AUS (Marchegg), BEL, BRI (Channel Isl., + Engl.), BUL, CZE, DAN, FRA, GER, GRE, HUN, ITA, NED, POL, POR, RUM, SLK (two loc.), SPA, SWE (south, + Gotland), UKR, YUG;
Maca: CAN (Tenerife);
CAfr: KEN;
SAfr: SAF (widespread);
EIsl: SOC;
Orie: GEO, IRN, ISR.
 [terricolous in clear forests and coppices, under *Acacia*, mainly on sandy soils; in Bohemia up to 330 m s. m.; temperate to tropical]
- 128 *Phialastrum barbatum* (DISSING & M. LANGE) SUNHEDE 1989 – **T:** Congo, Binga
 = *Geastrum barbatum* DISSING & M. LANGE 1962
CAfr: CON.
 [on termitaries and mud walls; tropical]
- 129 *Pyrenogaster atrogleba* (ZELLER 1944) DOMINGUEZ & CASTELLANO 1996 – **T:** USA, Oregon
 = *Radiigera atrogleba* ZELLER 1944
Euro: ITA (Ravenna), SWE (Uppl.).
 [hypogeous in rich and sandy soils, assoc. with *Pinus* spp. and deciduous trees; temperate to sub-mediterranean]
- 130 *Pyrenogaster pityophilus* MALENÇON & RIOUSSET 1977 – **T:** France
Euro: FRA (south), ITA, SPA;
MedI: SAR (Oristano).
 [terricolous, assoc. with *Pinus halepensis* MILL., *P. pinaster* and *P. pinea* L.; mediterranean]
- 131 *Pyrenogaster romanus* (QUADRACIA 1996) CALONGE 1997 – **T:** Italy: Roma
Euro: ITA (Roma).
 [terricolous; mediterranean]

Hymenogastrales

- 132 *Chondrogaster pachysporus* MAIRE 1925 – **T:** Algeria, Staouéli
 = *Hysterangium incarceratum* MALENÇON 1975 – **T:** Morocco, Tanger
introd. Euro: FRA (south), POR, SPA;
introd. NAfr: ALG, MAR.
 [hypogeous; assoc. with *Eucalyptus*; probably introduced from Australia before 1925]
- 133 *Hymenogaster albellus* MASSEE & RODWAY 1898 – **T:** Tasmania
SAfr: SAF (Western Cape).
 [subhypogeous; warm-temperate]

- 134 *Hymenogaster aromaticus* VELEN. 1922 – T: Czechia, C Bohemia
 = *Hymenogaster remyi* DODGE & ZELLER 1934 – T: France, Briançon
 = *Rhizopogoniella haasii* SOEHNER 1953 – T: Germany, Schweningen
 # *Hymenogaster arenarius* TUL. & C. TUL. ss. VELENOVSKÝ (1922)
Euro: AUS (Niederösterreich), CZE, FRA (Nice), GER (Baar), ITA, SPA.
 [hypogeous, assoc. with conifers (*Picea*) on calcareous soils; warm-temperate to mediterranean]
- 135 *Hymenogaster bulliardii* VITT. 1831 – T: Italy
Euro: CZE, FRA, GER (south), ITA, SPA, SWI;
 [hypogeous, assoc. with *Carpinus*, *Fagus*, *Ostrya*, *Quercus*, on calcareous and heavy soils; temperate to mediterranean]
- 136 *Hymenogaster calosporus* TUL. & C. TUL. 1851 – T: Italy
Euro: ITA, SPA.
 [hypogeous in mixed forests (*Quercus*, *Pinus*, *Picea*) on calcareous and clayey soils; mediterranean]
- 137 *Hymenogaster cerebellum* CAVARA 1893 – T: Italy, Pavia
Euro: FRA, ITA (Lombardia), SPA.
 [hypogeous; submediterranean]
- 138 *Hymenogaster cereus* HESSE 1891 – T: Germany, Hessen
Euro: GER (Hessen).
 [hypogeous in deciduous forests, assoc. with *Fagus*, *Quercus*; temperate]
- 139 *Hymenogaster citrinus* VITT. 1831 – T: Italy, Lombardia
 = *Hymenogaster tomentellus* HESSE 1891 – T: Germany
Euro: AUS, BRI, CZE, EST, FRA, GER, HUN, ITA, POR, RUS, SPA, SWE (Uppland).
 [subhypogeous, assoc. with conifers and deciduous trees on calcareous and clay soils, rarely on sandy soil, temperate to submediterranean; see also the related *Hymenogaster olivaceus* VITT.]
- 140 *Hymenogaster connectens* (BUCHHOLZ 1901) A. H. SMITH 1966 – T: Russia, Moscow
 = *Dendrogaster connectens* BUCHHOLZ 1901
 = *Gymnoglossum connectens* (BUCHHOLZ) ZELLER 1948
Euro: RUS (Moscow).
 [hypogeous; temperate]
- 141 *Hymenogaster decorus* TUL. & C. TUL. 1843 **agg.** – T: France
 = *Hymenogaster verrucosus* BUCHHOLZ 1901 – T: Russia, Moscow
 = *Hymenogaster bucholtzii* SOEHNER 1924 – T: Germany, Bayern
Euro: CZE, DAN, FIN (south), FRA, GER, ITA, NED, NOR (south), RUS, SPA.
 [hypogeous, assoc. with deciduous trees on calcareous soils; temperate to mediterranean]
- 142 *Hymenogaster griseus* VITT. 1831 – T: Italy, Lombardia
Euro: BRI (Engl.), DAN, FIN (south), ITA, NOR (south), ?GER, ?SPA.
 [hypogeous in deciduous forests, assoc. with *Populus*, *Salix*, *Tilia*; temperate to submediterranean]
- 143 *Hymenogaster hessei* SOEHNER 1923 – T: Germany, Hessen
 # *Hymenogaster vulgaris* TUL. in BERK. & BR. ss. HESSE (1891)
Euro: BRI, GER, ITA, NED, POR, SPA;
MedI: BAL (Ibiza).
 [hypogeous in deciduous and coniferous forests on sandy soils; temperate to mediterranean]
- 144 *Hymenogaster knappii* SOEHNER 1952 – T: Switzerland, Basel
Euro: GER, SPA, SWI.
 [hypogeous in deciduous and coniferous forests on calcareous soils; temperate]

- 145 *Hymenogaster levisporus* MASSEE & RODWAY 1912 – T: Tasmania
 = *Octaviania levispora* (MASSEE & RODWAY) RODWAY 1924
SAfr: SAF (Cape Pr.).
 [subhypogeous; warm-temperate]
- 146 *Hymenogaster luteus* VITT. 1831 – T: Italy
Euro: BRI, CZE, FRA, GER, HUN, ITA, NED, SPA, SWE, SWI, UKR.
 [hypogeous in deciduous and coniferous forests on calcareous and clayey soils, assoc. with *Carpinus*, *Quercus*, and other trees; temperate to mediterranean]
- 146 a – var. *subfuscus* SOEHNER 1924 – T: Italy
Euro: ITA.
 [hypogeous, assoc. with deciduous trees; submediterranean]
- 147 *Hymenogaster lycoperdineus* VITT. 1831 – T: Italy, Lombardia
Euro: FIN, FRA, GER, ITA, RUS, SPA.
 [hypogeous in deciduous forests on calcareous soils, assoc. with *Fagus*, *Populus*, *Quercus*; temperate to mediterranean]
- 148 *Hymenogaster megasporus* SOEHNER 1952 – T: Germany, Allgäu
Euro: GER, NED.
 [hypogeous in deciduous and coniferous forests on calcareous soils; temperate]
- 149 *Hymenogaster muticus* BERK. & BR. 1848 – T: Britain, Avon
Euro: BRI (Avon), CZE, DAN, FRA, GER, HUN, ITA, NOR, SPA, SWE (Upland).
 [hypogeous in deciduous forests, assoc. with *Fagus*, *Quercus*; temperate to mediterranean]
- 150 *Hymenogaster niveus* VITT. 1831 **agg.** – T: Italy, Milano
 = *Hymenogaster arenarius* TUL. & C. TUL. 1844 – T: France, Seine, Bois de Boulogne
 = *Hymenogaster argenteus* TUL. & C. TUL. 1844 – T: ?
 = *Hymenogaster tener* BERK. & BR. 1844 – T: Britain, England
 = *Hymenogaster pusillus* BERK. & BR. 1846 – T: Britain
 = *Hymenogaster suzukianus* P. HENN. 1902 – T: Japan
 = *Hymenogaster mutabilis* (SOEHNER 1923) ZELLER & DODGE 1934 – T: Germany, München
Euro: BRI, CZE, DAN, FIN, FRA, GER, HUN, IRL, ITA, NED, NOR, RUM, RUS, SPA, SWE, SWI, ?POR;
Medl: SAR.
 [subhypogeous in deciduous and coniferous forests, assoc. with deciduous trees, rarely with *Pinus pinaster* and *Pseudotsuga*, on calcareous and sandy soils; temperate to mediterranean]
- 151 *Hymenogaster olivaceus* VITT. 1831 **agg.** – T: Italy, Lombardia
 = *Hymenogaster pallidus* BERK. & BR. 1846 – T: Britain, Northants
 = *Hymenogaster sulcatus* HESSE 1891 – T: Germany, Hessen
 = *Hymenogaster suevicus* SOEHNER 1932 – T: Germany, Pfaffenhausen
Euro: BRI, CZE, DAN, FRA, GER, HUN, ITA, NED, NOR, RUM, RUS, SPA, SWE.
 [subhypogeous in deciduous and coniferous forests on calcareous soils, temperate to mediterranean; see also the closely related *Hymenogaster citrinus*]
- 152 *Hymenogaster populetorum* TUL. & C. TUL. 1843 – T: France
 = *Hymenogaster lilacinus* TUL. & C. TUL. 1843 – T: France, Seine
 # *Hymenogaster muticus* BERK. & BR. ss. SOEHNER
Euro: CZE, FRA, GER, HUN, ITA, NED, POR, SPA, UKR.
 [hypogeous in deciduous and coniferous (*Larix*, *Picea*) forests on calcareous and clay soils, assoc. with *Quercus*, *Cistus* etc.; temperate to mediterranean]

- 153 *Hymenogaster radiatus* LLOYD 1922 – T: Zimbabwe, Salisbury = Harare
SAfr: ZIM.
[hypogeous; subtropical]
- 154 *Hymenogaster rehsteineri* BUCHHOLZ 1901 – T: ?Russia
Hymenogaster verrucosus BUCHHOLZ ss. ZELLER & DODGE (1934)
Euro: GER, ITA, NED, SPA (Girona, Navarra), ?RUS.
[hypogeous in deciduous and coniferous forests on calcareous soils, more rarely on sandy soils; temperate to submediterranean]
- 155 *Hymenogaster spictensis* PAT. 1914 – T: France, Jura
Euro: AUS, FRA, GER (Bayern), HUN, ITA, SPA.
[hypogeous in deciduous and coniferous (*Picea*) forests on sandy and calcareous soils; temperate]
- 156 *Hymenogaster submacrosporus* SVRČEK 1958 – T: Germany, Schwenningen
= *Hymenogaster macrosporus* KNAPP & SOEHNER 1952, non CUNNINGHAM 1944
Euro: GER (Baden-Württemberg, Bayern), SWI.
[hypogeous in deciduous and coniferous forests, assoc. with *Carpinus*, *Fagus*, *Picea*, on calcareous soils; temperate]
- 157 *Hymenogaster thwaitesii* BERK. & BR. 1846 – T: Britain, Avon
Euro: BRI (Avon), GER (Bayern), HUN, ITA, SPA, ?POR;
MedI: SAR.
[hypogeous in forests on calcareous and sandy soils, assoc. with *Picea*, *Pseudotsuga*, *Castanea*, *Carpinus*, *Fagus*, *Quercus*, mainly in mountains; warm-temperate to mediterranean]
- 158 *Hymenogaster uliginosus* SOEHNER 1924 – T: Germany, Bayern, Ismaning
Euro: GER (Bayern).
[hypogeous in calcareous bogs, assoc. with *Picea*; temperate]
- 159 *Hymenogaster vulgaris* TUL. in BERK. & BR. 1846 **agg.** – T: France, Seine
= *Hymenogaster gilvus* HESSE 1891 – T: Germany, Hessen
= *Hymenogaster limosus* HESSE 1891 – T: Germany, Hessen
= *Hymenogaster cinereus* HESSE 1891 – T: Germany, Hessen
= *Hymenogaster disciformis* HESSE 1891 – T: Germany, Hessen
Euro: BRI, CZE, DAN, EST, FIN, FRA, GER, HUN, IRL, NED, NOR, RUS, SPA (Barcelona, Navarra), SWE.
[hypogeous, assoc. with *Fagus*, *Quercus* and other deciduous trees, and with conifers, on calcareous and sandy soils; temperate to submediterranean; see also the related *Hymenogaster decorus*, *H. griseus* and *H. knappii*]
- 159 a – var. *madeirensis* TORREND 1912 – T: Madeira, Funchal
Maca: MAD.
- 160 *Hymenogaster zeylanicus* PETCH 1917 – T: Ceylon = Sri Lanka
SAfr: ?SAF (Kw.-Natal).
[hypogeous (?) on damp sandstone wall in a cave; subtropical]
- 161 *Octaviania africana* LLOYD 1922 – T: S Africa, Knysna
= *Arcangeliella africana* (LLOYD) ZELLER & DODGE 1936
SAfr: SAF (Western Cape).
[subhypogeous in humus; warm-temperate]
- 162 *Octaviania flava* (RODWAY 1918) G. H. CUNN. 1938 – T: Tasmania
= *Gymnomyces flavus* RODWAY 1918
SAfr: SAF (Kw.-Natal).

[hypogeous (?) on damp sandstone wall in a cave; subtropical]

- 163 *Octavianina asterosperma* (VITT. 1831) O. KUNTZE 1898 – T: Italy
 = *Octaviania asterosperma* VITT. 1831
 = *Arcangeliella asterosperma* (VITT.) ZELLER & DODGE 1935
 = *Octaviania asterospora* (QUÉL. 1873) TH. M. FRIES 1909 – T: France
 = *Octavianina mutabilis* (ROUMEG. 1885) O. KUNTZE 1898 – T: France
 = *Octaviania brunnea* HESSE 1891 – T: Germany
Euro: BEL, BRI, CZE (Moravia), DAN, FRA, GER, HUN, ITA, LIT, NED, NOR (Oslo), SLK, SPA (Cáceres, Catalonia, Navarra), SWE (Uppland), UKR.
 [subhypogeous in deciduous forests on calcareous and sandstone soils, assoc. with *Corylus*, *Fagus*, *Quercus*, *Erica arborea* L.; temperate to mediterranean]
- 164 *Octavianina laevis* (HESSE 1891) O. KUNTZE 1898 – T: Germany
 = *Octaviania laevis* HESSE 1891
 = *Hymenogaster pisiformis* VELEN. 1947 – T: Czechia, C Bohemia
Euro: CZE, GER, UKR.
 [hypogeous in deciduous forests; temperate]
- 165 *Octavianina lutea* (HESSE 1885) SINGER & SMITH 1960 – T: Germany, Hessen
 = *Octaviania lutea* HESSE 1885
 = *Hydnangium luteum* (HESSE) ZELLER & DODGE 1935
Euro: GER (Bayern, Hessen), HUN, LIT, SLK, UKR.
 [hypogeous in deciduous forests (*Fagus*); temperate]
- 166 *Octavianina spec.*
E!sl: REU.
 [subhypogeous in rain forest; tropical]
- 167 *Sclerogaster candidus* (TUL. 1843) ZELLER & DODGE 1935 – T: France, Vienne
Euro: FRA, HUN, ITA, ?SPA.
 [hypogeous in deciduous forests; temperate]
- 168 *Sclerogaster compactus* (TUL. & C. TUL. 1844) SACC. 1895 – T: France, Var
 = *Octaviania compacta* TUL. & C. TUL. 1844
 = *Octavianina compacta* (TUL. & C. TUL.) KUNTZE 1898
 = *Sclerogaster lanatus* HESSE 1891 – T: Germany, Kassel
 = *Sclerogaster broomeanus* ZELLER & DODGE 1935 – T: Britain, S England
Euro: BRI, CZE, FIN (southwest), FRA, GER (south), ITA, RUS, SPA, SWE (Öland);
NAfr: MAR.
 [hypogeous in deciduous and *Picea* forests, probably saprophytic; temperate to mediterranean]
- 169 *Sclerogaster gastrosporioides* PILÁT & SVRČEK 1955 – T: Czechia, C Bohemia
Euro: CZE, SPA (Gerona).
 [hypogeous in steppes, assoc. with *Gramineae* roots; temperate]
- 170 *Sclerogaster hysterangioides* (TUL. & C. TUL. 1851) ZELLER & DODGE 1935 – T: Italy, Roma
 = *Octaviania hysterangioides* (TUL. & C. TUL.) LLOYD 1922
Euro: GER, ITA, SPA (Gerona).
 [hypogeous in deciduous (*Fagus*) and coniferous (*Picea*) forests, probably saprophytic; warm-temperate]
- 171 *Sclerogaster liospermus* (TUL. & C. TUL. 1851) SOEHNER 1924 – T: France
Euro: FRA, GER (Baar, Bayern).
 [hypogeous in deciduous (*Quercus*) forests on loamy soils; temperate]

- 172 *Sclerogaster salisburyensis* VERWOERD 1926 – **T:** Zimbabwe, Salisbury = Harare
SAfr: ZIM.
 [hypogeous in "bushveld"; subtropical]
- 173 *Sclerogaster siculus* ZELLER & DODGE 1935 – **T:** Italy, Sicily
MedI: SIC.
 [probably hypogeous; mediterranean]
- 174 *Wakefieldia macrospora* (HAWKER 1951) HAWKER 1954 – **T:** Britain, Gloucestershire
 = *Hymenogaster vacckii* SVRČEK in PILÁT 1958 – **T:** Czechia, C Bohemia
Euro: BRI (Glos.), CZE, GER (Bayern), ITA, SPA.
 [hypogeous in deciduous forests on calcareous soil, assoc. with *Ostrya*, *Quercus*, *Cistus*; temperate to mediterranean]

Lycoperdales

- 175 *Abstoma reticulatum* G. H. CUNN. 1926 – **T:** Australia, New South Wales
Orie: IRN.
 [terricolous in open areas; warm-temperate, continental]
- 176 *Arachnion lazoi* DEMOULIN 1972 – **T:** Chile, Valparaiso
Euro: POR (Algarve), SPA;
MedI: COR.
 [terricolous in open areas, sandy soil; west-mediterranean]
- 177 *Arachnion lloydianum* DEMOULIN 1972 – **T:** Italy, Salussola
Euro: FRA (Maine-et-Loire, Var), ITA, SPA;
MedI: COR.
 [terricolous in open areas, sandy soil; west-mediterranean]
- 178 *Bovista abyssinica* MONT. 1836 – **T:** Ethiopia, Mt Selki
NAfr: ETI;
WAfr: CAM (Cameroon Mts);
CAfr: CON, RWA.
 [terricolous in herbaceous vegetation of high mountains; about 2500-3850 m s. m.; tropical]
- 179 *Bovista acocksii* DE VILLIERS, EICKER & WESTH. 1989 – **T:** S Africa, Cape Pr., Lokenburg
SAfr: SAF (Cape Pr.).
 [terricolous; subtropical]
- 180 *Bovista aenea* KREISEL 1967 – **T:** Kenya, Mt Kenya, Nyeri
CAfr: KEN, RWA.
 [terricolous in mountain forests; 2300–2400 m s. m.; tropical]
- 181 *Bovista aestivalis* (BONORD. 1851) DEMOULIN 1979 – **T:** Germany, Baden (and Mosel)
 = *Bovista colorata* (PECK 1879) KREISEL 1964 ss. orig., non KREISEL 1967 – **T:** USA, New York, Sandlake
 = *Bovista dakotensis* (BRENCKLE 1910) KREISEL 1964 – **T:** USA, N Dakota, Kulm
Euro: GER, ITA, ?FRA;
MedI: BAL;
Maca: CAN;
Orie: IRN.
 [terricolous in fields, pastures and uncultivated open areas, on poor soils; temperate to mediterranean; the distribution of this species needs further study]

- B. colorata* ss. KREISEL (1967), ULVINEN (1969), ECKBLAD (1971), MAAS G. (1971), GROSS & al. (1980) see *B. dryina* (MORGAN) DEMOULIN.
- 182 *Bovista africana* KREISEL 1967 – T: Zimbabwe, Salisbury = Harare
Bovista citrina (BERK. & BR.) BOTTOMLEY ss. BOTTOMLEY (1948)
Lycoperdon asperum (LÉV.) DE TONI ss. DISSING & LANGE (1962)
CAfr: CON, KEN;
SAfr: ZIM.
[terricolous in dry forests; subtropical to tropical]
- 183 *Bovista bovistoides* (COOKE & MASSEE 1888) S. AHMAD 1952 – T: India
Euro: GER (Alps), SPA.
[terricolous in alpine vegetation in high mountains; temperate]
- 184 *Bovista coprophila* (COOKE & MASSEE 1892) G. H. CUNN. 1942 – T: Australia, Queensland, Brisbane
SAfr: SAF (Kw.-Natal Drakensberge).
[terricolous in pastures and uncultivated open areas; subtropical]
- 185 *Bovista cretacea* T. C. E. FRIES 1914 – T: Sweden, Abisko
Arct: ISL;
Euro: FIN, NOR (Finnmark, Troms), SWE (north).
[among mosses on moist, calcareous sand close to the sea; subarctic]
- 186 *Bovista cunninghamii* KREISEL 1967 – T: Australia, Victoria
Euro: SPA (Madrid, Teruel);
MedI: BAL (Mallorca, Menorca);
EIsl: ?MTS.
[terricolous in mixed forests, clear bushland; mediterranean to tropical]
- 187 *Bovista delicata* BERK. & CURT. 1856 – T: China, Hong Kong
Euro: SPA;
Maca: CAN (Gran Canaria).
[terricolous in *Quercus* forests on rich soils; mediterranean]
- 188 *Bovista dermoxantha* (VITT. 1843) DE TONI in SACC. 1888 emend. DEMOULIN – T: Italy, Milano
= ?*Lycoperdon ericetorum* PERS. 1809, nom. inval. et dub. – T: ?France
= *Lycoperdon hungaricum* HOLLÓS 1904 – T: Rumania, Máramaros
Bovista pusilla (BATSCH): PERS. ss. KREISEL (1967) p.p.
Euro: CZE, GER, ITA, POR, RUM, SLK, SPA, SWE;
MedI: BAL;
Maca: CAN (Gran Canaria, Tenerife, La Palma).
[terricolous in steppes, dry slopes on more rich soils; temperate to mediterranean]
- 189 *Bovista dryina* (MORGAN 1895) DEMOULIN 1979 – T: USA, Ohio, Preston
= *Bovista aestivalis* var. *perverrucispora* ORTEGA & BUENDIA 1998 – T: Spain, Huelva, Coto Doñana
Bovista colorata (PECK) KREISEL ss. COKER & COUCH (1928), KREISEL (1967) et auct. europ. plur.
Euro: FIN, GER, NED, NOR, SPA, ?SWE;
Maca: CAN (Tenerife).
[terricolous in forests; temperate to mediterranean]
- 190 *Bovista fulva* MASSEE 1888 – T: India, Simla
Euro: ?POR (Estremadura).
[terricolous in open areas in higher mountains]

- 191 *Bovista fusca* LÉV. 1846 – **T:** Columbia (“Nouvelle Grenade”)
 = *Bovista membranacea* H. LOHWAG 1931 – **T:** Tanzania, Kilimanjaro
 = *Bovista umbrina* BOTTOMLEY 1948 – **T:** S Africa, North Prov., Zoutpansberg
CAfr: CON, KEN, RWA, TAN;
SAfr: SAF (North Prov.).
 [terricolous in mountain forests; 1830–4000 m s. m.; tropical]
- 192 *Bovista glacialis* KREISEL 1964 – **T:** Nepal, Himalaya
Euro: FRA (Alps).
 [terricolous in alpine vegetation of high mountains, in Europe assoc. with *Salix herbacea* L., in the Alps 2500–2650 m s. m.; temperate]
- 193 *Bovista graveolens* K. SCHWALB 1893 – **T:** Czechia, Bohemia
 = *Bovista hungarica* HOLLÓS 1901 – **T:** Slovakia, Horka nad Vahem
Euro: AUS, BEL (Flandres), CZE, GER, GRE, ITA, LAT, LIT, NED, POL, RUM, RUS (Archangelsk), SLK, UKR (Vinnitza);
Orie: ARM, GEO, IRN.
 [terricolous in fields, meadows, and clear deciduous forests on poor soils; temperate]
- 194 *Bovista halophila* KREISEL & HAUSKN. ined. – **T:** Réunion
EIsl: REU
 [terricolous in salt-influenced coastal vegetation; tropical]
- 195 *Bovista limosa* ROSTRUP 1894 – **T:** E Greenland, Gaasefjord
 # *Bovista echinella* (PAT.) LLOYD ss. H. LOHWAG (1933), ECKBLAD (1955)
Arct: GRL, ISL;
Euro: AUS, BEL, BRI, FIN, FRA, GER, NED, NOR, SWE;
MedI: BAL (Mallorca).
 [terricolous in meadows on poor sandy soils; in Germany up to 500 m s. m., France (Haute-Garonne) 2300 m s. m.; subarctic to mediterranean, suboceanic]
- 196 *Bovista nigrescens* PERS. 1794: PERS. 1801 – **T:** Germany
Arct: GRL, ISL;
Euro: AUS, BRI, BUL, CZE, DAN, FIN, FRA, GER, GRE, IRL, ITA, LIT, NED, NOR, POL, RUM, RUS, SLK, SWE, SWI, UKR;
MedI: COR;
Orie: ARM, AZE, GEO, ISR.
 [terricolous in meadows, pastures, and rich deciduous forests; also in higher mountains above timberline; in Germany up to 1200 m s. m., the Alps up to 2850 m s. m., Bulgaria up to 2400 m s. m., Caucasus up to 3200 m s. m.; subarctic to submediterranean]
- 197 *Bovista oblongispora* (LLOYD 1917) BOTTOMLEY 1948 – **T:** S Africa, Belvidere, Knysna
SAfr: SAF (Western Cape).
 [terricolous; warm-temperate]
- 198 *Bovista ochrotricha* KREISEL 1967 – **T:** Sri Lanka = Ceylon, Peradeniya
Euro: ITA, POR, SPA;
Maca: CAN (Tenerife).
 [lignicolous on bark of living deciduous trees; west-mediterranean]
- 199 *Bovista paludosa* LÉV. 1846 – **T:** France, Malesherbes
 = *Bovistella paludosa* (LÉV.) LLOYD 1902
 = *Lycoperdon bubakii* BRES. 1908 – **T:** Yugoslavia, Montenegro
Euro: AUS, BRI (Engl.), CZE, EST, FIN, FRA, GER, LIT, NOR (Oppland), POL, SLK, SWE, UKR (Carpatas), YUG.

[muscicolous in calcareous bogs, among "brown" mosses: *Acrocladium*, *Campyllum*, *Climacium*, *Drepanocladus*, *Sphagnum*; in Germany up to 675 m s. m., the Alps up to 2250 m s. m.; temperate]

- 200 *Bovista plumbea* PERS. 1796: PERS. 1801 – T: Germany
 = *Lycoperdon arrhizon* BATSCH 1786 – T: Germany, Jena
 = *Lycoperdon ardesiacum* BULL. 1791 – T: France
 = *Bovista tunicata* FR. 1829 – T: Sweden, Skåne
 = *Bovista nuciformis* WALLR. 1833 – T: Germany, Harz, Breitenstein
 = *Bovista ovalispora* COOKE & MASSEE 1887 – T: Britain, England, Kew
 = *Bovista brevicauda* VELEN. 1922 – T: Czechia, Bohemia
 = *Bovista purpurea* LLOYD 1923 – T: New Zealand, Nelson
 = *Bovista sulphurea* VELEN. 1947 – T: Czechia, Bohemia
 = *Bovista macrospora* PERDECK 1950 – T: The Netherlands, Dordrecht
Arct: ISL;
Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, LIT, MAZ, NED, NOR, POL, POR, RUM, SLK, SPA, SWE, SWI, UKR, YUG;
MedI: BAL, COR;
Maca: AZO, CAN;
NAfr: ALG;
introd. CAfr: 1974 RWA;
Orie: ARM, AZE, GEO, IRN, IRQ, ISR, TUR.
 [terricolous in meadows, steppes, and dunes, mainly on pastured soils; somewhat nitrophilous; in the Alps up to 2530 m s. m., Tatry 1300 m s. m., Armenia >3200 m s. m., but generally beyond 750 m s. m.; subarctic to mediterranean]
- 201 *Bovista polymorpha* (VITT. 1843) KREISEL 1964 – T: Italy
 # *Bovista aestivalis* (BONORD.) ss. DEMOULIN (1979 ff.), PEGLER & al. (1995) p.p.
Arct: ?ISL;
Euro: AUS, BRI, DAN, EST, FIN, GER, ITA, NED, NOR, POL;
Orie: ARM.
 [terricolous in steppes and open fields on more rich soils; temperate]
- 202 *Bovista promontorii* KREISEL 1967 – T: S Africa, Cape of Good Hope
 # *Lycoperdon polymorphum* ss. BOTTOMLEY (1948)
Euro: SPA;
Maca: CAN;
SAfr: SAF (Western Cape).
 [terricolous on lawns and under trees and bushes; mediterranean and warm-temperate]
- 203 *Bovista pusilla* (BATSCH 1789): PERS. 1801 emend. SCHUMACHER 1803, HOLLÓS 1904 – T: Germany, Jena
 = *Bovista furfuracea* (J. F. GMELIN 1791): PERS. 1801 emend. DEMOULIN 1970 – T: ?Germany
Arct: GRL;
Euro: BRI, CZE, GER, HUN, SWE;
MedI: COR;
Elsl: MTS.
 [terricolous in open fields and dunes on poor sand and limestone soils; subarctic to tropical]
- *Bovista pusilla* agg. (incl. *B. dermoxantha*)
Euro: AUS, DAN, EST, FIN, FRA, GRE, ITA, LIT, NED, NOR, POL, RUS;
Maca: CAN, CAP;
WAfr: GHA, TOG;
CAfr: CON;
SAfr: SAF (widespread), ZIM;
Orie: ARM, GEO, ISR.

- 204 *Bovista pusilliformis* (KREISEL 1962) KREISEL 1964 – T: Germany, Quedlinburg
= ?*Bovista rollandii* PAT. 1897 – T: France, Corsica, Corte
Euro: AUS, BEL, CZE, EST, FIN, FRA, GER, ITA, NOR, POL, RUS (Karelia), SWE (Stockholm);
Medl: ?COR;
Maca: CAN.
[terricolous in deciduous forests; temperate to submediterranean]
- 205 *Bovista tomentosa* (VITT. 1843) QUÉL. 1875 – T: Italy, Milano
= *Bovista fusca* DVOŘÁK 1930 – T: Czechia, S Moravia, Mohelno
Arct: GRL, ISL;
Euro: AUS, BEL, CZE, EST, FIN, FRA, ITA, NOR, POL, RUM, SPA, SWE, SWI;
Orie: ARM.
[terricolous in rock steppes, dry lawns, clear forests, preferably on limestone and loess soils on south-exposed slopes; in Germany and Moravia up to 500 m s. m., in mountains up to 2600 m s. m.; subarctic to submediterranean]
- 206 *Bovista verrucosa* (G. H. CUNN. 1925) G. H. CUNN. 1942 – T: Australia, S Australia
Euro: ITA (Piemont).
[terricolous; submediterranean]
- 207 *Bovistella radicata* (DUR. & MONT. 1846) PAT. 1937 – T: Algeria, La Calle
= *Bovistella ammophila* (LÉV. 1850) PAT. & HARIOT 1902 – T: France, Gironde, Bordeaux
= *Bovistella ohiensis* (ELLIS & MORGAN 1885) MORGAN 1892 – T: USA, Ohio
= *Calvatiella sinensis* CHOW 1936 – T: China
= *Bovistella karstenii* NYBERG 1945, nomen nudum – T: Finland, Mustiala
Euro: BRI (Engl.), BUL, FIN (Tammela), FRA, GER, GRE, NED, POL, POR, RUS, SPA, YUG;
NAfr: ALG, MAR.
[terricolous in meadows and clear forests on poor acidic soils; in Germany up to 205 m s. m., Macedonia at 350 m s. m., Spain up to 1200 m s. m.; temperate to mediterranean]
- 208 *Bovistella reticulata* P. SOSIN 1959 – T: Armenia, Kirovakan
Orie: ARM.
[terricolous in deciduous forest; warm-temperate]
- 209 *Broomeia congregata* BERK. 1844 – T: S Africa
CAfr: KEN;
SAfr: NAM, SAF (Eastern and Northern Cape, Kw.-Natal, North Prov., Free State), ZIM.
[terricolous at the base of *Acacia* and other trees in savannas; subtropical to tropical]
- 210 *Broomeia ellipsospora* HÖHN. 1905 – T: S Africa, Albany Distr.
= *Diplocystis junodii* POLE EVANS & BOTTOMLEY 1919 – T: Mozambique, Lourenço Marques = Maputo
CAfr: ANG;
SAfr: MOC, NAM, SAF (Northern Cape, Free State).
[terricolous on sandy soil in semideserts; subtropical]
- 211 *Calvatia arctica* FERD. & WINGÉ 1910 – T: E Greenland
Arct: GRL, ISL, SVA;
Euro: AUS (Lunz), NOR, ?FIN.
[terricolous in arctic-alpine and subalpine vegetation; in the Alps at 1600 m s. m.; arctic to temperate]
- 212 *Calvatia bellii* (PECK 1885) M. LANGE 1990 – T: Canada, Baffin Land
Arct: GRL, ISL, SVA.
[terricolous in arctic vegetation; arctic to subarctic]

- 213 *Calvatia bicolor* (LÉV. 1846) KREISEL 1992 – **T:** India, Bombay
 = *Bovista bicolor* LÉV. 1846
 = *Langermannia bicolor* (LÉV.) DEMOULIN & DRING 1975
 = *Lanopila wahlbergii* FR. 1848 – **T:** S Africa, Natal
 = *Langermannia wahlbergii* (FR.) DRING 1964
 = *Lasiosphaera fenzlii* REICHARDT 1874 – **T:** Indonesia, Nicobar Islands
 = *Langermannia fenzlii* (REICHARDT) KREISEL 1962
 = *Lanopila radloffiana* VERWOERD 1925 – **T:** S Africa, Oranje F. S.
WAfr: BEN, GHA, NIG;
CAfr: CON, KEN, RWA, TAN, UGA;
SAfr: SAF (Kw.-Natal, Free State).
 [terricolous in meadows and dunes; subtropical to tropical]
- 214 *Calvatia booniana* A. H. SMITH in ZELLER & SMITH 1964 – **T:** USA, Oregon
 # *Calvatia pachyderma* (PECK) MORGAN ss. SWOBODA (1940), KREISEL (1992)
Euro: SPA;
Orie: IRN.
 [terricolous in poor meadows and coppices in higher elevations; in Spain 1000–1250 m s. m., Iran up to 2000 m s. m.; submediterranean]
- 215 *Calvatia candida* (ROSTK. 1839) HOLLÓS 1902 – **T:** Poland, Szczecin
Euro: CZE, GER, LIT, NED, POL, POR, RUM, RUS (Dagestan), SLK, SWI (Engadin);
Medl: COR;
Maca: CAN (Tenerife);
SAfr: SAF (Kw.-Natal, North Prov.);
Orie: ARM, GEO, IRN.
 [terricolous in steppes and dry coppices; warm-temperate to subtropical]
- 216 *Calvatia complutensis* MORENO, KREISEL & ALTÉS 1996 – **T:** Spain, Alcalá
 = *Langermannia complutensis* (MORENO & al.) CALONGE 1998
Euro: SPA (Madrid, Alcalá de Henares).
 [terricolous in gardens and dry coppices; about 530 m s. m.; submediterranean]
- 217 *Calvatia connivens* M. LANGE 1990 – **T:** W Greenland
 = *Calvatia tatrensis* HOLLÓS var. *groenlandica* M. LANGE 1948 – **T:** W Greenland
Arct: GRL, ISL.
 [terricolous in arctic vegetation; arctic to subarctic]
- 218 *Calvatia craniiformis* (SCHW. 1822) FR. 1849 – **T:** USA, N Carolina
Euro: ?UKR;
Orie: ARM.
 [terricolous in forests; warm-temperate]
- 219 *Calvatia cretacea* (BERK. 1878) LLOYD 1917 – **T:** Canada, Bellot Island
Arct: GRL, ISL, ?SVA;
Euro: AUS, FIN (north), LIT, NOR, SWE (north), ?UKR (Poltava).
 [terricolous in arctic and alpine meadows, mainly on acidic soils; in the Alps up to 2500 m s. m.; arctic to north temperate]
- 220 *Calvatia cyathiformis* (BOSC 1811) MORGAN 1890 – **T:** USA, S Carolina
 = *Bovista glaucocinerea* SPEG. 1881 – **T:** Argentina, Tuyú
 = *Lycoperdon pseudolilacinum* SPEG. 1884 – **T:** Paraguay, Paraguari
Euro: FRA (probably introduced);
Maca: ?CAN (Gran Canaria, Tenerife);
WAfr: ?GHA;
CAfr: ?TAN.

[terricolous in clear subtropical forests and coppices; in France at 610 m s. m.; warm temperate to tropical]

221 *Calvatia fragilis* (VITT. 1842) MORGAN 1890 – T: Italy, Milano

= *Bovista cinerea* ELLIS in CRAGIN 1885 – T: USA, Kansas, Ford County

= *Bovista amethystina* COOKE & MASSEE 1888 – T: Nigeria, Jeba Kinowa

= ?*Calvatia lilacina* (MONT. & BERK. in BERK. 1845) P. HENN. 1904 – T: W Australia, Swan River

Euro: CZE, GER (southwest), GRE, HUN, ITA, LIT, POR, RUM, RUS, SLK, SPA;

MedI: COR;

Maca: CAN (La Palma);

WAfr: NIG;

SAfr: ?SAF.

Orie: ARM, GEO, IRN, TUR.

[terricolous in dry slopes, rock steppes, clear coppices; in Germany up to 425 m s. m., Spain 530 m s. m., Canaries up to 860 m s. m.; warm-temperate to subtropical]

222 *Calvatia gigantea* (BATSCH 1786: PERS. 1801) LLOYD 1904 – T: Germany, Bad Köstritz

= *Langermannia gigantea* (BATSCH: PERS.) ROSTK. 1839

= *Calvatia bovista* (L. 1753) MACBRIDE 1896 – T: Sweden

= *Lycoperdon maximum* (DILL. 1719) ex SCHAEFF. 1774 – T: Germany, Giessen

Euro: AUS, BRI, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LIT, NED, NOR, POR, RUM, RUS (St. Petersburg), SLK, SWE, SWI;

MedI: BAL (Mallorca), COR;

SAfr (introd.?): + SAF (Cape Town);

Orie: ARM, GEO.

[terricolous in meadows, manured gardens, rich deciduous forests; in mountains up to 900 m s. m.; temperate to mediterranean; in S Africa possibly introduced]

223 *Calvatia horrida* M. LANGE 1990 – T: Svalbard, Adventsdal

Arct: GRL, SVA.

[terricolous in arctic vegetation; arctic]

224 *Calvatia lepidophora* (ELL. & EV. 1885) LLOYD 1905/08 – T: USA, S Dakota

Orie: ARM.

[terricolous in forests; warm-temperate]

225 *Calvatia longicauda* (P. HENN. 1887) LLOYD 1908 – T: Cameroon

= *Calvatia agaricoides* DISSING & M. LANGE 1962 – T: Congo, Yangambi

WAfr: CAM;

CAfr: CON, UGA;

EIsl: MDG.

[terricolous in moist to dry virgin forests, in coffee plantations and botanic gardens; tropical]

226 *Calvatia pachyderma* (PECK 1882) MORGAN 1890 – T: USA, Arizona, Santa Catalina Mts

= *Gastropila fragilis* (LÉV. 1844) HOMRICH & WRIGHT 1973 – T: Uruguay, Montevideo

= *Calvatia pilula* KREISEL 1992 (nom. nov.) – T: Uruguay, Montevideo

Euro: FRA (Pyren.-médit.), GRE, SPA;

Orie: IRN;

SAfr: + ?SAF ("Cape Prov.").

[terricolous in clear forests, gardens, on cultivated and uncultivated soils; submediterranean to mediterranean]

227 *Calvatia pyriformis* (LÉV. 1846) KREISEL 1992 – T: Indonesia, Java

= *Hippoperdon pyriforme* LÉV. 1846

= *Calvatia gardneri* (BERK. 1873) LLOYD 1904 – T: Ceylon = Sri Lanka

= *Calvatia gautierioides* (BERK. & BR. 1873) PETCH 1919 – T: Ceylon = Sri Lanka

CAfr: RWA, UGA;

EIsl: MRT.

[terricolous in mountain forests and botanical gardens; up to 2150 m s. m.; tropical]

- 228 *Calvatia rugosa* (BERK. & CURT. 1869) REID 1976 – **T:** Cuba
 = *Calvatia rubroflava* (CRAGIN 1885) MORGAN 1890 – **T:** USA, Kansas
 = *Bovista cisneroi* SPEG. 1881 – **T:** Argentina, Concordia
 = *Bovista antarctica* SPEG. 1887 – **T:** Chile, Punta Arenas

Euro: ITA (Liguria);

SAfr: SAF (Cape; Pietermaritzburg).

[terricolous in gardens and on cultivated soils; mediterranean to subtropical]

- 229 *Calvatia septentrionalis* M. LANGE 1990 – **T:** W Greenland

Arct: GRL, ISL, SVA.

[terricolous in arctic vegetation; arctic to subarctic]

- 230 *Calvatia subtomentosa* DISSING & M. LANGE 1962 – **T:** Congo

CAfr: CON.

[terricolous in forests and tree plantations; tropical]

- 231 *Calvatia turneri* (ELL. & EV. 1885) DEMOULIN & M. LANGE 1990 – **T:** Canada, Labrador
 = *Calvatia tatrensis* HOLLÓS 1901 – **T:** Slovakia, Vysoke Tatry, Široka

Arct: GRL, ISL;

Euro: FIN, GER (Alps), MAC, NOR, POL (Tatry, Babia Góra), SLK (Tatry), SWE, ?RUS (Rostov on Don)

Orie: ARM.

[terricolous in arctic and alpine meadows; mainly on limestone soils; in C Europe 1600–2000 m s. m.; arctic to temperate]

- 232 *Disciseda africana* (HARIOT & PAT. 1909) DRING 1964 – **T:** RCA, Oubangui
 = *Catastoma africanum* HARIOT & PAT. 1909

CAfr: RCA (Oubangui).

[terricolous; tropical]

- 233 *Disciseda arida* VELEN. 1939 – **T:** Czechia, C Bohemia, Stránčice

Euro: CZE, SLK, ?SWE.

[terricolous, hypogeous in open sandy soil; temperate]

- 234 *Disciseda bovista* (KLOTZSCH 1843) P. HENN. 1903 – **T:** Peru

= *Bovista defossa* (VITT. 1842) DE TONI in SACC. 1888 – **T:** Italy

= *Bovista debreceniensis* (HAZSL. 1876) DE TONI in SACC. 1888 – **T:** Hungary, Debrecen

Euro: AUS, CZE, DAN, FRA, GER, HUN, ITA, NED, RUM, RUS, SLK (Zahorie), SPA, SWE (+ Öland, south), SWI (Engadin);

Orie: IRN, ISR.

[terricolous in dunes and dry slopes; in the Alps up to 1400 m s. m., but generally in low elevations; temperate to mediterranean]

- 235 *Disciseda candida* (SCHW. 1822) G. H. CUNN. 1927 – **T:** USA, Carolina

= *Disciseda circumscissa* (BERK. & CURT. 1873) HOLLÓS 1902 – **T:** USA

= *Disciseda calva* (Z. MORAVEC 1954) Z. MORAVEC in PILÁT 1958 – **T:** Czechia, C Bohemia, Hlubočepy near Prague

Arct: GRL, + ISL (1900);

Euro: AUS, CZE, DAN, FRA, GER, HUN, LIT, NED, NOR (Oslo), POL, RUM, RUS, SLK, SPA, SWE;

MedI: COR;

Maca: CAP;

Orie: ARM, IRN.

[terricolous in dunes and dry slopes; subarctic to mediterranean]

- 236 *Disciseda castanea* (LÉV. 1846) BOTTOMLEY 1948 – **T:** S Africa, Cape of Good Hope
 = *Bovista castanea* LÉV. 1846
 = *Catastoma castaneum* (LÉV.) LLOYD 1906
SAfr: SAF (Western Cape, Kw.-Natal).
 [terricolous; warm-temperate to subtropical]
- 237 *Disciseda juglandiformis* (BERK. ex MASSEE 1888) HOLLÓS 1903 – **T:** Sri Lanka
 = *Bovista juglandiformis* BERK. ex MASSEE 1888
 = *Catastoma juglandiforme* (BERK.) LLOYD 1904
SAfr: ?SAF (Western Cape).
 [terricolous; warm-temperate]
- 238 *Disciseda maculata* (HARIOT & PAT. 1909) ined. – **T:** RCA, Oubangui
 = *Catastoma maculatum* HARIOT & PAT. 1909
CAfr: RCA (Oubangui).
 [terricolous; tropical]
- 239 *Disciseda minima* D. M. DRING 1964 – **T:** Togo, Baguida Plantation
WAfr: TOG.
 [terricolous in plantation; tropical]
- 240 *Disciseda zeyheri* (BERK. ex MASSEE 1888) HOLLÓS 1903 – **T:** S Africa
 = *Bovista zeyheri* BERK. ex MASSEE 1888
SAfr: SAF (Western Cape).
 [terricolous; warm-temperate]
- 240 A *Handkea capensis* (LLOYD) KREISEL & MORENO 1996 – **T:** S Africa, Stellenbosch, Papegaisberg
 = *Lanopila capensis* LLOYD 1923
SAfr: SAF (Western Cape).
 [terricolous; warm-temperate]
- 241 *Handkea excipuliformis* (SCOP. 1772: PERS. 1801) KREISEL 1989 – **T:** France, Paris
 = *Calvatia excipuliformis* (SCOP.: PERS.) PERDECK 1950
 = *Calvatia saccata* (VAHL 1799) MORGAN 1890 – **T:** Denmark
 = *Lycoperdon macrorhizon* PERS. 1809 – **T:** France, Paris
 = *Lycoperdon pistilliforme* BONORD. 1857 – **T:** Germany
 = *Calvatia elata* (MASSEE 1887) MORGAN 1890 – **T:** Britain, England
Arct: ISL;
Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, LIT, MAC, NED,
 NOR, POL, POR, RUM, RUS, SLK, SWE, SWI;
MedI: BAL, COR;
Maca: CAN (La Palma);
SAfr: + SAF (Eastern Cape);
Orie: ARM, GEO.
 [terricolous in coniferous and deciduous forests, on clearings, on poor and rich soils; in Germany
 up to 1050 m s. m., the Alps 1850 m s. m.; temperate to mediterranean]
- 242 *Handkea lloydii* (ZELLER & COKER 1947) KREISEL 1989 – **T:** USA, California
 = *Calvatia lloydii* ZELLER & COKER 1947
Euro: AUS (Lienz).
 [terricolous in alpine meadow, near timberline; 2100 m s. m.; temperate]

- 243 *Handkea utrififormis* (BULL. 1791: PERS. 1801) KREISEL 1989 – T: France
 = *Calvatia utrififormis* (BULL.: PERS.) JAAP 1917
 = *Lycoperdon areolatum* SCHAEFF. 1774 – T: Germany, Bayern
 = *Lycoperdon caelatum* BULL. 1791 – T: France
 = *Lycoperdon bovista* PERS. 1796: PERS. 1891 – T: Germany
 = *Bovista officinarum* DILL. 1719 ex ROSTK. in STURM 1839 – T: Germany, Giessen
 = *Calvatia hungarica* HOLLÓS 1901 – T: Slovakia, Brezno
 = *Handkea utrififormis* (BULL.: PERS.) KREISEL var. *hungarica* (HOLLÓS) KREISEL 1989
 = *Calvatiella lioui* CHOW 1936 – T: China
 = *Calvatia tatrensis* HOLLÓS var. *gruberi* A. H. SMITH 1964 – T: USA, Oregon
Arct: ISL;
Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI, YUG;
MedI: COR;
Maca: CAN (Tenerife);
CAfr: ?MWI;
SAfr: 1919 SAF (Pretoria);
Orie: ARM, AZE, GEO, IRN.
 [terricolous in meadows, dunes, and dry slopes; in Germany up to 1100 m s. m., the Alps 2400 m s. m., Pyrenees up to 2000 m s. m.; subarctic to mediterranean]
- 244 *Lycogalopsis solmsii* E. FISCHER 1886 – T: Indonesia
 = *Lycoperdon albinum* COOKE in MASSEE 1887 – T: Brazil, Barruras de Jutahi
 = ?*Lycogalopsis africana* HARIOT & PAT. 1909 – T: RCA, Upper Oubangui
WAfr: GHA;
CAfr: CON, RWA.
 [lignicolous in forests; subtropical to tropical]
- 245 *Lycoperdon asperum* (LÉV. 1846) SPEG. 1881 – T: Chile, Santiago
 = *Bovista aspera* LÉV. 1846
WAfr: CON;
SAfr: SAF (Pretoria, Western Cape);
EIsl: REU.
 [terricolous in heaths and mountain forests; in mountains up to 3000 m s. m.; subtropical to tropical]
- 246 *Lycoperdon atropurpureum* VITT. 1842 – T: Italy
 = *Lycoperdon asterospermum* DUR. & MONT. 1849 – T: Algeria, La Calle
Euro: AUS, BRI, BUL, CZE, FRA, GER, GRE, HUN, ITA, POR, RUM, SPA, SWI;
MedI: BAL, COR;
NAfr: ALG;
Maca: ?CAN.
 [terricolous in forests, often assoc. with *Quercus*; only at low elevations; warm-temperate to mediterranean]
- 247 *Lycoperdon caudatum* SCHROETER 1889 – T: Poland, Silesia, Löwenberg
 = *Lycoperdon candidum* PERS.: PERS 1801 – T: Germany (nomen ambiguum)
 = *Lycoperdon pedicellatum* PECK 1874, non BATSCH 1783 – T: USA, New York, Center
Euro: AUS, BRI (Scotl.), DAN, EST, FIN, GER, HUN, ITA, LIT, NOR (Oslo), POL, RUM, SWE, SWI;
Orie: ARM, ?IRN.
 [musci-colous in bogs and moist meadows, among mosses: *Acrocladium*, *Aulacomnium*, *Climacium*, *Fissidens*, *Mnium*, *Polytrichum*, *Scleropodium*; in Germany up to 700 m s. m., Switzerland 900 m s. m.; temperate]

- 248 *Lycoperdon decipiens* DUR. & MONT. 1848 – **T:** Algeria
 = *Bovista cepiformis* WALLR. 1833 – **T:** Germany, Nordhausen
 = *Lycoperdon sphaerale* LÉV. ex HARIOT 1902 – **T:** France, Corsica
Euro: AUS, BEL, BRI (Engl.), CZE, DAN, FRA, GER, GRE, HUN, ITA, LIT, NOR, POL, POR, RUS, SLK, SWE (southw.), SWI, YUG;
MedI: COR;
Maca: CAN;
NAfr: ALG, TUN.
 [terricolous in clear forests and alpine meadows; in Germany up to 920 m s. m., Austria 2300 m s. m., Switzerland 1830 m s. m., Canaries 650 m s. m.; temperate to mediterranean]
- 249 *Lycoperdon echinatum* PERS. 1797; PERS. 1801 – **T:** ?Germany
 = *Lycoperdon constellatum* FR. 1829 – **T:** Sweden, Femsjö
 = *Lycoperdon hoylei* BERK. & BR. 1871 – **T:** Britain, Reading
 = *Lycoperdon retinosum* VELEN. 1922 – **T:** Czechia
Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN (south), FRA, GER, GRE, HUN, ITA, LIT, LUX, NED, NOR (Vestfold), POL, POR, RUM, RUS, SLK, SPA, SWE, SWI, YUG;
MedI: BAL (Mallorca), COR;
Orie: ARM.
 [terricolous in deciduous forests, often assoc. with *Fagus*, mainly on calcareous soils; in Germany up to 925 m s. m., the Alps >1450 m s. m., Pyrenees 1100 m s. m.; temperate to mediterranean]
- 250 *Lycoperdon ericaeum* BONORD. 1857 – **T:** Germany
 # *Lycoperdon muscorum* MORGAN ss. auct. p.p.
Euro: AUS, DAN, EST, FIN, FRA, GER, ITA, NED, NOR, POL, POR, SPA, SWE, ?BRI;
MedI: BAL (Mallorca).
 [terricolous in lawns, pastures, and heaths on poor acidic soils; in Germany up to 950 m s. m.; temperate to mediterranean]
- 251 *Lycoperdon estonicum* DEMOULIN 1972 – **T:** Estonia, Jõgiva
Euro: EST.
 [terricolous in moist coniferous forest; temperate]
- 252 *Lycoperdon foetidum* BONORD. 1851 – **T:** Germany
 = *Lycoperdon perlatum* PERS.: PERS. var. *nigrescens* PERS. 1794; PERS. 1801 – **T:** Germany
 = *Lycoperdon nigrescens* (PERS.: PERS.) LLOYD 1905, non POIRET 1808
 = *Lycoperdon montanum* QUÉL. 1875 – **T:** France, Jura
Arct: GRL;
Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LUX, NED, NOR, POL, POR, SLK, SPA, SWE, SWI;
MedI: COR.
 [terricolous in forests and heaths, mainly on poor acidic soils; in Germany up to 1250 m s. m., the Alps 1900 m s. m.; subarctic to mediterranean]
- 253 *Lycoperdon frigidum* DEMOULIN 1972 – **T:** Canada, NW Territories
Arct: ISL, SVA;
Euro: AUS, FIN, NOR, SWE.
 [terricolous arctic and subalpine vegetation on calcareous soils; in the Alps at 1950 m s. m.; arctic to temperate]
- 254 *Lycoperdon lambinonii* DEMOULIN 1972 – **T:** Belgium, Hachy
Arct: ISL (north);
Euro: AUS, BEL, CZE, FIN, FRA, GER, GRE, IRL, NOR, POR, RUS, SWE;
Maca: CAN (Gran Canaria, Tenerife, El Hierro, La Palma).

[terricolous in deciduous and coniferous forests; in Canaries typical of *Pinus canariensis* SW. ex SPRENG. forests in 1000–1500 m s. m., in northern Scandinavia in moist *Alnus incana* (L.) MOENCH forests; subarctic to submediterranean]

255 *Lycoperdon lividum* PERS. 1809 – T: ?

= *Lycoperdon spadiceum* PERS. 1809 – T: France, Paris; non SCHAEFF. 1774

= *Lycoperdon fuscum* BONORD. 1857 – T: Germany

Arct: GRL, ISL (north);

Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI, YUG;

MedI: BAL, COR;

Maca: CAN (Lanzarote, Gran Canaria);

Orie: ARM, ISR.

[terricolous in dry lawns, dunes, steppes, and pastures on sandy soils, loess, limestone, and gyps; in the Alps up to 2400 m s. m., Spain at 1300 m s. m.; subarctic to mediterranean]

256 *Lycoperdon mammiforme* PERS. 1801 "mammaeforme" – T: Italy

= *Lycoperdon stellatum* BAUMG. 1790 – T: Germany; non L. 1753, BULL. 1785

= *Lycoperdon velatum* VITT. 1842 – T: Italy

= *Lycoperdon laxum* BONORD. 1857 – T: Germany

Euro: AUS, BEL, BRI, BUL, CZE, DAN, FRA, GER, HUN, IRL, ITA, NED, NOR, POL, POR, RUM, RUS, SLK, SWE, SWI;

Orie: ARM.

[terricolous in deciduous forests on calcareous soils; in Germany up to 780 m s. m., Poland 800 m s. m., Switzerland 660 m s. m.; temperate to submediterranean]

257 *Lycoperdon marginatum* VITT. ex MORIS & DE NOT. 1839 – T: Italy

= *Lycoperdon cruciatum* ROSTK. in STURM 1839 – T: Poland, Szczecin = Stettin

= *Vascellum cruciatum* (ROSTK.) PONCE DE LEÓN 1970

= *Lycoperdon muricatum* BONORD. 1857 – T: Germany

= *Lycoperdon separans* PECK 1874 – T: USA, Worcester

Lycoperdon papillatum SCHAEFF. ss. HOLLÓS (1904), non SCHAEFFER 1774

Lycoperdon candidum PERS. ss. auct. plur., non PERSON 1801

Euro: AUS, CZE, FRA, GER, GRE, ITA, LIT, NED, POL, RUM, SLK, SPA, YUG, + BRI;

Orie: ARM.

[terricolous in dry lawns, heaths, clear coniferous forests, on acidic sandy soil; only at low elevations, in Bohemia up to 375 m s. m.; warm-temperate to mediterranean]

258 *Lycoperdon* spec. aff. *marginatum* VITT. ex MORIS & DE NOT.

EIsl: SEY (Mahé).

[terricolous in rain forest; tropical]

259 *Lycoperdon molle* PERS. 1801 – T: ?Germany

= *Lycoperdon cupricum* BONORD. 1851 – T: Germany

Arct: ISL, ?SVA;

Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LIT, NED, NOR, POL, POR, RUM, SLK, SWE, SWI, YUG;

MedI: BAL (Mallorca), COR;

Orie: IRN.

[terricolous in deciduous and coniferous forests on poor and (mainly) rich soils; in Germany up to 975 m s. m., the Alps >1540 m s. m., Caucasus 1750 m s. m.; subarctic to mediterranean]

260 *Lycoperdon muscorum* MORGAN 1891 – T: USA, New York, Albany or Summit

= *Lycoperdon ericaeum* BONORD. var. *subareolatum* (KREISEL 1962) DEMOULIN 1977 – T: Czechia, Moravia, Radostín

Euro: AUS, CZE, DAN, FIN, GER, LIT, NOR, RUS, SLK, SWE;

Orie: ARM.

[musci-colous in moist meadows and moist mossy forests, assoc. with *Aulacomnium*, *Dicranum*, *Polytrichum*, *Sphagnum*; in Germany up to 675 m s. m., Moravia 700 m s. m.; temperate]

261 *Lycoperdon niveum* KREISEL 1969 – **T:** Nepal

Arct: ISL (north), SVA;

Euro: FIN, GER (Alps).

[terricolous in arctic and alpine vegetation on limestone; in the Alps at 2200-2300 m s. m.; arctic to temperate]

262 *Lycoperdon norvegicum* DEMOULIN 1971 – **T:** Norway, Oppland, Ringebu

Euro: AUS (St. Egyden), CZE, FIN, GER, LAT, NOR, POL, SWE, SWI.

[terricolous in forests; in Switzerland up to 400 m s. m.; north temperate]

263 *Lycoperdon perlatum* PERS. 1797: PERS. 1801 – **T:** Germany

= *Lycoperdon gemmatum* BATSCH 1783 emend. QUÉLET 1873 – **T:** Germany, Jena

= *Lycoperdon hirtum* BULL. 1788 – **T:** France

= *Lycoperdon bonordenii* MASSEE 1887 – **T:** Germany

= *Lycoperdon albidum* VELEN. 1922 – **T:** Czechia

Arct: ISL (north);

Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LIT, LUX, NED, NOR, POL, POR, RUM, RUS, SLO, SPA, SWE, SWI, YUG;

MedI: BAL, COR;

Maca: CAN (Gran Canaria, La Gomera, Tenerife, La Palma);

CAfr: CON;

SAfr: SAF (widespread);

Orie: ARM, AZE, GEO, IRN.

[terricolous in deciduous and coniferous forests, parks, coppices, and alpine heaths, on poor and rich soils, on sand, moraine, limestone, granite, syenite, gneiss, etc.; in Germany up to 1150 m s. m., the Alps up to 2200 m s. m., Tatry 1300 m s. m., Bulgaria 2100 m s. m.; subarctic to tropical]

264 *Lycoperdon pyriforme* SCHAEFF. 1774: PERS. 1801 – **T:** Germany, Bayern

= *Lycoperdon ovoideum* BULL. 1790 – **T:** France

= *Lycoperdon serotinum* BONORD. 1857 – **T:** Germany

= *Lycoperdon desmazierei* LLOYD 1905 – **T:** France

Arct: ISL;

Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LIT, LUX, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI, YUG;

MedI: BAL, COR;

Orie: ARM, GEO, IRN.

[lignicolous in deciduous and (more rarely) coniferous forests, parks, mainly over rich soils; in Germany up to 1100 m s. m., the Alps up to 2000 m s. m., Tatry 1100 m s. m., southern France 1000 m s. m.; subarctic to mediterranean]

265 *Lycoperdon rimulatum* PECK ex TRELEASE 1889 – **T:** USA, Lyndonville

= *Bovistella atrobrunnea* ZELLER 1948 – **T:** USA

Euro: ITA, SPA (Barcelona), UKR, ?CZE (Beroun).

[terricolous in forests and open areas, on sandy soil; warm-temperate to submediterranean]

266 *Lycoperdon umbrinoides* DISSING & M. LANGE 1962 – **T:** Congo, Binga

= *Lycoperdon ashantiense* D. M. DRING 1964 – **T:** Ghana, Jamasi

Lycoperdon atrum PAT. ss. VIDAL & CALONGE (1996)

Euro: SPA (Gerona);

WAfr: GHA;

CAfr: CON, ?MWI.

[terricolous on decaying debris of *Elaeis* and other plants; in Malawi at 1100–1400 m s. m.; mediterranean to tropical]

267 *Lycoperdon umbrinum* PERS. 1797: PERS. 1801 – T: Germany

Arct: GRL;

Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, IRL, ITA, LIT, LUX, NED, NOR, POL, POR, RUM, RUS, SWE, SWI;

MedI: BAL (Mallorca), COR;

Maca: CAN (Gran Canaria);

Orie: ARM.

[terricolous and on very rotten wood in coniferous and deciduous forests and subalpine meadows; in Germany up to 970 m s. m., the Alps up to 2750 m s. m., Tatry 1100 m s. m., France up to 1100 m s. m.; subarctic to mediterranean]

268 *Morganella afra* KREISEL & DRING 1967 – T: Ghana, Astanti, Yinahin

Lycoperdon golungense WELW. & CURREY ss. BEELI (1926)

?*Lycoperdon subincarnatum* PECK ss. BOTTOMLEY (1948)

Lycoperdon pyriforme PERS. var. *tesselatum* PERS. ss. DISSING & M. LANGE (1962)

Lycoperdon fuligineum BERK. & CURT. ss. DRING (1964)

WAfr: GHA;

CAfr: BRA, CON, KEN, UGA;

SAfr: ?SAF (Kw.-Natal);

WIsl: SAO;

EIsl: REU.

[lignicolous in moist forests; tropical]

269 *Morganella subincarnata* (PECK 1872) KREISEL & DRING 1967 – T: USA, New York, Sandlake
= *Lycoperdon subincarnatum* PECK 1872

Euro: AUS (Fornach), GER (Bayern).

[muscolous (?), e.g., among *Sphagnum*, in prealpine bogs; in southern Germany at 910 m s. m.; temperate]

270 *Mycenastrum corium* (GUERSENT in LAM. & DC. 1805) DESV. 1842 – T: France, Rouen

= *Bovista suberosa* FR. 1829 – T: unknown

= *Mycenastrum radicum* DUR. 1849 – T: Algeria

= *Mycenastrum leptodermeum* DUR. 1849 – T: Algeria

= *Mycenastrum beccarii* PASSERINI 1875 – T: Italy

= *Bovista spinulosa* PECK 1879 – T: USA, New Mexico

Euro: AUS, BEL, BUL, CZE, DAN, FIN (Åland-Isl. and south), FRA, GER, HUN, ITA, LIT, NED, NOR (Akershus), POL, RUM, RUS, SLK, SPA, SWE, UKR;

MedI: BAL;

Maca: CAN (Hierro, La Palma);

NAfr: ALG, ETI, TUN;

CAfr: KEN, TAN, UGA;

SAfr: SAF (widespread);

EIsl: SOC;

Orie: ARM, GEO, ISR.

[terricolous in dry to moist meadows, pastures, waysides, manured forests and ruderal places, nitrophilous, in more northern countries; synanthropic; in Germany up to 330 m s. m., Canaries up to 820 m s. m.; warm-temperate to subtropical, mainly in more continental climates]

271 *Vascellum asperrimum* (WELW. & CURREY 1870) KREISEL 1993 – T: Angola, Mossamedes

= *Lycoperdon asperrimum* WELW. & CURREY 1870

= *Lycoperdon angulatum* DISSING & M. LANGE 1972 – T: Congo, Haut-Katanga, Keyberg, Arboretum Étoile

= *Vascellum angulatum* (DISSING & M. LANGE) P. PONCE DE LEÓN 1970

CAfr: ANG, CON.

[terricolous on sand dunes and in arboretum; tropical]

272 *Vascellum bicolor* (WELW. & CURREY 1868) KREISEL 1993 – **T:** Angola, Huilla

= *Lycoperdon bicolor* WELW. & CURREY 1868

CAfr: ANG, CON, RWA.

[terricolous in savannas, pastures; tropical]

273 *Vascellum endotephrum* (PAT. 1902) DEMOULIN & DRING 1975 – **T:** Madagascar, Tananarivo = Antananarivo

= *Lycoperdon endotephrum* PAT. 1902

= *Lycoperdon todayense* COPELAND 1905 – **T:** Philippines

= *Lycoperdon vanderystii* BRES. 1911 – **T:** Congo, Kasai, Wombali

Lycoperdon djurense P. HENN. ss. BOTTOMLEY (1948)

CAfr: CON, RWA;

EIsl: MDG, MTS.

[terricolous in moist places, pastures, lawns and *Casuarina* plantations; tropical]

274 *Vascellum floridanum* A. H. SMITH 1974 – **T:** USA, Florida

Euro: ITA (Ravenna).

[terricolous in lawns, meadows, pastures; mediterranean to subtropical]

275 *Vascellum intermedium* A. H. SMITH 1974 – **T:** USA, Texas

Euro: SLK.

[terricolous in xerothermic steppe; warm-temperate, continental]

276 *Vascellum pratense* (PERS. 1797: PERS. 1801) KREISEL 1962 – **T:** Germany

= *Calvatia hyemalis* (BULL. 1781/82) KLIKA 1936 – **T:** France

= *Vascellum depressum* (BONORD. 1857) F. ŠMARDÁ in PILÁT 1958 – **T:** Germany

Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, IRL, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SWE, SWI;

MedI: BAL, COR;

Maca: AZO, CAN (Tenerife, La Palma), ?CAP;

introd. CAfr: 1974 RWA;

SAfr: SAF (widespread), SWA;

Orie: ARM, AZE, GEO, IRN, ISR.

[terricolous in pastures, meadows, dry lawns, uncultivated soils, nitrophilous; in Germany up to 920 m s. m., the Alps 2000 m s. m.; temperate to mediterranean, probably introduced in tropical and southern subtropical climates]

277 *Vascellum qudenii* (BOTTOMLEY 1948) P. PONCE DE LEÓN 1970 – **T:** S Africa, Natal, Zululand

= *Lycoperdon qudenii* BOTTOMLEY 1948

SAfr: SAF (Kw.-Natal).

[terricolous in forests; subtropical]

278 *Vascellum rhodesianum* (VERWOERD 1928) P. PONCE DE LEÓN 1970 – **T:** Zimbabwe

= *Lycoperdon rhodesianum* VERWOERD 1928

SAfr: ZIM.

[terricolous; subtropical]

Nidulariales

279 *Crucibulum laeve* (HUDS. 1778) KAMBLY in KAMBLY & LEE 1936 – **T:** Britain

= *Crucibulum crucibuliforme* (SCOP. 1772) V. S. WHITE 1902 – **T:** Germany, Regensburg

= *Cyathus cylindricus* WILLD. 1787 – **T:** Germany, Berlin

= *Cyathus crucibulum* HOFFM. 1790: PERS. 1801 – **T:** Germany

= *Crucibulum vulgare* TUL. 1844 – **T:** France
 = *Cyathus atrofuscus* VELEN. 1947 – **T:** Czechia

Arct: GRL, ISL;

Euro: BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, IRL, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI;

Medl: BAL, COR;

Maca: CAN;

SAfr: SAF (Western Cape);

Orie: ARM, GEO, IRN, ISR, TUR.

[terricolous on plant debris, straw, lignicolous on wood chips and twigs of deciduous and coniferous trees, on potatoe herb, straw and other plant remnants in light forests, gardens, waysides; in Germany up to 1010 m s. m., the Alps 1500 m s. m.; subarctic to mediterranean]

280 *Cyathus africanus* BRODIE 1967 – **T:** Tanzania, Mt Kilimandjaro

CAfr: KEN, RWA, TAN.

[lignicolous in secondary vegetation in high altitudes; tropical]

281 *Cyathus berkeleyanus* (TUL. & C. TUL. 1844) LLOYD 1906 – **T:** Brazil, Rio de Janeiro

SAfr: SAF (Western Cape, Kw.-Natal);

EIsl: MTS (widespread).

[lignicolous in forests; subtropical to tropical]

282 *Cyathus canna* LLOYD 1906 – **T:** Barbados

EIsl: MTS.

[terricolous; tropical]

283 *Cyathus chevalieri* HARIOT & PAT. 1909 – **T:** RCA, Oubangui

CAfr: RCA (Oubangui).

[tropical]

284 *Cyathus crassimurus* BRODIE 1971 – **T:** Hawaii

EIsl: REU.

[subtropical to tropical]

285 *Cyathus crispus* BRODIE 1974 – **T:** Ghana

WAfr: GHA;

CAfr: CON.

[lignicolous; tropical]

286 *Cyathus limbatus* TUL. & C. TUL. 1844 – **T:** British Guiana = Guyana

WAfr: BEN, CAM, GHA, NIG, SIE;

CAfr: CON, KEN, TAN, UGA, ZAM;

EIsl: MTS.

[lignicolous on wood debris and herbaceous culms in rain forests; subtropical to tropical]

287 *Cyathus microsporus* TUL. & C. TUL. 1844 – **T:** San Domingo

CAfr: KEN;

SAfr: SAF (Western Cape, Kw.-Natal).

[lignicolous and on soil close to rotten timber; subtropical to tropical]

288 *Cyathus montagnei* TUL. & C. TUL. 1844 – **T:** Brazil

CAfr: CON, TAN;

SAfr: SAF (Western Cape).

[subtropical to tropical]

289 *Cyathus nigroalbus* LLOYD 1906 – T: Samoa

CAfr: CON.

[tropical]

290 *Cyathus olla* BATSCH 1783: PERS. 1801 – T: ?Germany

= *Cyathia lentifera* (L. 1763) V. S. WHITE 1902 – T: Sweden

= *Cyathus laevis* WILLD. 1787 – T: Germany

= *Cyathus vernicosus* (BULL. 1790) DC. 1805 – T: France

= *Nidularia campanulata* WITH. 1792 – T: Britain, England

= *Crucibulum albosaccum* LLOYD 1922 – T: Argentina

Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI;

MedI: BAL, COR;

Maca: CAN;

SAfr: BOT, SAF (widespread);

Orie: AZE, GEO, IRN, ISR.

[terricolous on soil mixed with plant remnants, on compost, in manured fields, lawns, dunes, lignicolous on wood chips, bark, in lawns, fields, dunes, on roadsides, in gardens, on ruderal places outside forests; in Germany up to 810 m s. m., the Alps 1450 m s. m.; temperate to mediterranean]

290 a – f. *anglicus* (LLOYD 1906) BRODIE 1952 – T: Britain, England

Euro: BRI.

291 *Cyathus pallidus* BERK. & CURT. 1869 – T: Cuba

SAfr: SAF (widespread).

[lignicolous on twigs and wood chips, coprophilous on dung and compost, also terricolous; subtropical]

292 *Cyathus poeppigii* TUL. & C. TUL. 1844 – T: Cuba

WAfr: CAM, GHA, SIE;

CAfr: KEN, RWA, TAN, UGA;

SAfr: SAF (Kw.-Natal, North Prov.).

[lignicolous and terricolous; subtropical to tropical]

293 *Cyathus pygmaeus* LLOYD 1906 – T: USA, Washington

Euro: SPA (Murcia).

[lignicolous; on fallen branch of *Pinus halepensis*; mediterranean]

294 *Cyathus rudis* PAT. 1927 – T: Madagascar

CAfr: TAN;

EIsl: MDG.

[fimicolous; tropical]

295 *Cyathus stercoreus* (SCHW. 1834) DE TONI 1888 – T: USA

= *Cyathus lesueurii* TUL. & C. TUL. 1844 – T: France

Euro: AUS, BRI (Wales), CZE, DAN, FRA, GER, GRE, ITA, LIT, NED, NOR (south), POR, RUM, RUS, SLK, SPA, SWI, ?HUN;

MedI: COR;

SAfr: SAF (widespread), ZIM;

Orie: IRN, ISR.

[fimicolous on dung and manured soil in ruderal places, fields, gardens, flower pots, dunes, etc.; warm-temperate to subtropical]

- 296 *Cyathus striatus* (HUDS. 1778: PERS. 1801) WILLD. 1787 – **T:** Britain, England
 = *Cyathus hirsutus* (SCHAEFF. 1774) QUÉL. 1886 – **T:** Germany, Bayern
Euro: AUS, BEL, BRI, BUL, DAN, EST, FIN, FRA, GER, GRE, HUN, IRL, ITA, LIT, NED,
 NOR, POL, POR, RUM, RUS, SPA, SWE, SWI;
MedI: BAL, COR;
WAfr: CAM;
SAfr: SAF (Western Cape);
Orie: IRN, TUR.
 [lignicolous on dead trunks, stumps, and fallen twigs of deciduous trees in forests and gardens; in
 Germany up to 1010 m s. m., the Alps and Pyrenees 700 m s. m.; temperate to mediterranean]
- 297 *Cyathus triplex* LLOYD 1906 – **T:** Mauritius
EAfr: TAN;
EIsl: MTS.
 [lignicolous; subtropical to tropical]
- 298 *Mycocalia denudata* (FR. 1817) J. T. PALMER 1961 – **T:** Sweden
 = *Nidularia denudata* FR. in FR. & NORDH. 1817
 = *Nidularia fusispora* MASSEE 1898 – **T:** Britain
 = *Nidularia arundinacea* VELEN. 1939 – **T:** Czechia, C Bohemia
Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN (south), FRA, GER, IRL, NED, NOR (south),
 SPA, SWE, SWI.
 [lignicolous and herbicolous on *Juncus* and *Cyperaceae* culms, fimicolous on dung; temperate]
- 299 *Mycocalia duriaeana* (TUL. & C. TUL. 1844) J. T. PALMER 1961 – **T:** Algeria
Euro: BRI (Lancashire), CZE, GER (Langeoog), NED, SPA;
NAfr: ALG.
 [lignicolous, herbicolous, and fimicolous on plant debris, *Ammophila* culms, mosses, dung, in
 dunes; temperate to mediterranean]
- 300 *Mycocalia minutissima* (J. T. PALMER 1957) J. T. PALMER 1961 – **T:** Britain, Lancashire
Euro: BRI, CZE, GER, IRL, SWE.
 [lignicolous and herbicolous on plant debris, *Juncus* culms, fallen leaves, *Polytrichum*, *Sphagnum*
 etc.; temperate]
- 301 *Mycocalia reticulata* (PETCH 1919) J. T. PALMER 1961 – **T:** Ceylon = Sri Lanka
introd. Euro: FRA (Lyon, year unknown).
 [introduced in greenhouse, on woody debris; tropical and subtropical]
- 302 *Mycocalia sphagneti* J. T. PALMER in CEJP & PALMER 1963 – **T:** Britain, England, Derbyshire
Euro: BRI (England), SWE (Västergötland).
 [herbicolous on *Juncus* culms, *Eriophorum*, *Nardus*, *Polytrichum* in *Sphagnum* bogs; in England
 up to 700 m s. m.; temperate]
- 303 *Nidula emodensis* (BERK. 1854) LLOYD 1906 – **T:** India, Himalaya
 # *Nidula niveotomentosa* (P. HENN. 1898) LLOYD 1910 ss. DEMOULIN & DRING (1975)
CAfr: CON, TAN.
 [lignicolous on fallen twigs in forests; tropical]
- 304 *Nidularia deformis* (WILLD. 1788: PERS. 1801) FR. 1817 – **T:** Germany, Berlin
 = *Nidularia farcta* (ROTH 1797: PERS. 1801) FR. 1823 – **T:** Germany, Bremen
 = *Nidularia pisiformis* (ROTH 1797) TUL. & C. TUL. 1844 – **T:** Germany
 = *Nidularia radicata* FR. in FR. & NORDH. 1817 – **T:** Sweden
 = *Nidularia globosa* (EHRENB. 1818) FR. 1823 – **T:** Germany, Berlin
Arct: ISL;

Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, IRL, LIT, NED, NOR, POL, POR, ROM, RUS, SLK, SPA, SWE, SWI.

[terricolous in light coniferous forests on poor soils; in Germany up to 935 m s. m.; subarctic to submediterranean]

305 *Nidulariopsis iowensis* (WALKER 1927) ZELLER 1948 – **T:** USA, Iowa

– var. *europaea* (GREIS 1935) CEJP in PILÁT 1958 – **T:** Germany, Oberpfalz, Wolfsbuch

Euro: + GER (Bayern).

[on decaying fabric in a coniferous forest; temperate; only known from the type]

306 *Nidulariopsis melanocarpa* GREIS 1935 – **T:** Germany, Regensburg

Euro: + GER (Bayern).

[lignicolous; temperate; only known from the type]

307 *Sphaerobolus stellatus* TODE 1790: PERS. 1801 **agg.** – **T:** Germany

= *Lycoperdon carpobolus* L. 1753 – **T:** Sweden

= *Carpobolus albicans* WILLD. 1787 – **T:** Germany

= *Sphaerobolus solen* ALB. & SCHW. 1805 – **T:** Germany, Niesky

Arct: GRL, ISL;

Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN, GER, IRL, LIT, NED, NOR, POR, RUM, RUS, SLK, SPA, SWE, SWI;

MedI: BAL (Mallorca, Menorca), COR;

Maca: CAN (Tenerife, La Gomera);

WAfr: BEN, CAM, GHA, NIG;

SAfr: SAF (Eastern Cape, Kw.-Natal, North Prov.);

Orie: ARM.

[lignicolous on deciduous and coniferous wood in forests and gardens, rarely fimicolous on dung on pastures; in Germany up to 1020 m s. m.; subarctic to subtropical, in subarctic regions only on imported timber]

308 *Sphaerobolus terrestris* (ALB. & SCHW. 1805) W. G. SMITH 1908 – **T:** Germany, Niesky

Euro: + GER (Niesky).

[terricolous on forest soil and plant debris; temperate]

Phallales

309 *Aseroë arachnoides* E. FISCHER 1890 – **T:** Laos

= *Aseroë rubra* LABILL. var. *bogoriensis* PAT. 1898 – **T:** Indonesia, Java, Bogor = Buitenzorg

WAfr: SIE.

[terricolous; tropical]

310 *Aseroë rubra* LABILL. 1806 – **T:** Tasmania

introd. Euro: 1829 and 1992 BRI (England);

CAfr: TAN (Usambara);

SAfr: SAF (Kw.-Natal), SWA;

EIs: MTS.

[terricolous in forests, gardens, greenhouses; subtropical to tropical]

311 *Blumenavia angolensis* (WELW. & CURREY 1870) D. M. DRING 1980 – **T:** Angola, Pungo Andongo

= *Blumenavia usambarensis* P. HENN. 1902 – **T:** Tanzania, Usambara

CAfr: ANG, RWA, TAN;

SAfr: ?SAF (Transvaal);

[terricolous; tropical]

- 312 *Clathrus archeri* (BERK. 1860) D. M. DRING 1980 – **T:** southern Tasmania
 = *Lysurus archeri* BERK. in HOOKER 1860
 = *Anthurus archeri* (BERK.) E. FISCHER 1886
 = *Anthurus muellerianus* KALCHBR. in KALCHBR. & COOKE 1880 – **T:** Australia
 = *Anthurus aseroëformis* (E. FISCHER 1890) MCALPINE in LLOYD 1908 – **T:** ?
introd. Euro: 1920 FRA, 1934 GER, 1942 SWI, 1942 NOR, 1945 BRI (Engl. Guernsey), 1948 AUS, 1963 CZE, ca. 1968 BEL, 1973 NED, SPA, 1976 POL, 1985 SLK, 1988 DAN (Fyn), HUN;
introd. SAfr: about 1907 SAF (Cape Town);
WIsl: 1965 STH.
 [terricolous in deciduous and mixed forests, cemeteries, gardens, mainly on acid soils; in Germany up to 1100 m s. m., Slovakia up to 1000 m s. m.; introduced to Europe from Australia before 1920, now temperate to warm-temperate, in expansion]
- 313 *Clathrus baumii* P. HENN. 1903 – **T:** Angola, Lopalanka
CAfr: ANG, CON, KEN, TAN, UGA.
 [terricolous; tropical]
- 314 *Clathrus camerunensis* P. HENN. 1899 – **T:** Cameroon, Balimba
WAfr: CAM.
 [terricolous; tropical]
- 315 *Clathrus columnatus* BOSC 1811 – **T:** USA, S Carolina
 = *Linderiella columnata* (BOSC) G. H. CUNN. 1942
 = *Clathrus trilobatus* COBB 1906 – **T:** Hawaii
NAfr: ETI (Addis Abbeba);
CAfr: CON, KEN, RWA.
 [terricolous in grass fields and clearings; tropical]
- 316 *Clathrus mauritianus* (LLOYD 1917) D. M. DRING 1980 – **T:** Mauritius
EIsl: MTS.
 [terricolous near bamboo roots and in tropical rain forest; <400 m s. m.; tropical]
- 317 *Clathrus preussii* (P. HENN. 1895) P. HENN. 1897 – **T:** Cameroon, Victoria station
WAfr: CAM, GHA, NIG;
CAfr: ANG, CON.
 [terricolous; tropical]
- 318 *Clathrus ruber* BATTARRA 1755: PERS. 1801 – **T:** Italy
 = *Clathrus cancellatus* L. 1753 – **T:** France
 = *Clathrus volvaceus* BULL. 1784 – **T:** France
 = *Clathrus flavescens* TOURNEF. ex PERS. 1801 – **T:** France
 = *Clathrus nicaeensis* BARLA in LUERSSON 1879 – **T:** France, Nice
Euro: AUS, BUL, CZE, FRA, GRE, ITA, POR, SLV, SPA, SWI (Ticino), UKR (Crimea);
introd. Euro: ca. 1800 GER, 1843 BRI, 1886 SLK, 1910 CZE, 1912 BEL, 1933 POL, 1935 NED; IRL, LIT, RUS (in glasshouses: Moscow; 1947 St. Petersburg);
MedI: BAL (Ibiza, Mallorca, Menorca), COR;
Maca: AZO, CAN (Tenerife, La Palma), MAD;
NAfr: ALG;
Orie: IRN, Transcaucasia.
 [terricolous in gardens, cemeteries, parks; only in low elevations: in Germany up to 275 m s. m., Ticino 300 m s. m., but Slovakia 1284 m s. m.; warm-temperate to mediterranean; in more northern regions sometimes introduced and consistent for decenniums on isolated stations]

- 318 a – var. *albus* FR. 1823 – T: ?
= ?*Clathrus flavescens* TOURNEF. ex PERS. 1801 – T: France
Euro: FRA (1989 St. Géréon), ITA.
- 319 *Clathrus transvaalensis* EICKER & REID about 1994 – T: S Africa, Pretoria
SAfr: SAF (North Prov.).
[terricolous among grass and leaf litter in broad-leaved forests; subtropical]
- 320 *Colus hirudinosus* CAVALIER & SÉCHIER 1835 – T: France, Toulon
"hirudinosus" (e.g., PILÁT 1958, SOSIN 1973) is a spelling error
= *Clathrus hirudinosus* (CAVALIER & SÉCHIER) TUL. 1849
Euro: FRA, ITA, POR, SPA, **introd.** 1943 SWI (Ticino);
MedI: BAL (Mallorca, Menorca), COR;
Maca: CAN (Tenerife, La Gomera);
WAfr: NIG;
Orie: ISR.
[terricolous in gardens, parks, on uncultivated soils, in flower pots; submediterranean to mediterranean]
- 321 *Colus subpusillus* D. M. DRING 1980 – T: Ghana, N'Kontrodu marsh
Clathrus treubii (BERNARD 1906) LLOYD 1909 ss. DRING (1964)
Clathrus pusillus BERK. 1845 ss. DRING & ROSE (1976)
WAfr: GHA, NIG.
[terricolous in bogs, amongst wet grasses and sedges, in fields; tropical]
- 322 *Gelopellis rufus* D. M. DRING 1976 – T: Ivory Coast, Prov. Ouest, Forêt de Douékoué
WAfr: COT.
[terricolous in forest; tropical]
- 323 *Hysterangium calcareum* HESSE 1891 – T: Germany
Euro: CZE, GER, ITA (Emilia), SPA.
[hypogeous in deciduous forests, also under *Abies* and *Picea*, on calcareous soils; temperate to mediterranean]
- 324 *Hysterangium clathroides* VITT. 1831 – T: Italy
= *Hysterangium thwaitesii* BERK. & BR. 1848 – T: Britain, Bristol
= *Hysterangium siculum* MATTIROLO 1900 – T: Italy, Sicily
= *Hysterangium rickenii* SOEHNER 1921 – T: Germany, München
Euro: AUS (Salzburg), BRI (Avon), GER (Bayern), ITA, NOR, POR, SPA, ?SWE;
MedI: SIC.
[hypogeous in deciduous forests and mediterranean shrub, assoc. with *Quercus*, *Cistus*, *Pinus*, preferably on siliceous soil; warm-temperate to mediterranean]
- 324 a – var. *cistophilum* TUL. & C. TUL. 1851 – T: France, Montpellier
= *Hysterangium cistophilum* (TUL. & C. TUL.) ZELLER & DODGE 1929
Euro: AUS, CZE, FRA, GER, SPA;
NAfr: ALG, MAR.
[hypogeous in forests and coppices; assoc. with *Cistus*, *Abies*, *Picea*; warm-temperate to mediterranean]
- 325 *Hysterangium coriaceum* HESSE 1891 – T: Germany, Hessen-Nassau
Rhizopogon virens (ALB. & SCHW.) FR. ss. KARSTEN (1871)
Euro: BRI (Engl.), CZE, DAN, FIN, ITA, GER, NOR, SPA, SWE, SWI, UKR.
[hypogeous in deciduous and coniferous forests on calcareous soil; temperate to mediterranean]

- 326 *Hysterangium crassum* (TUL. & C. TUL. 1851) E. FISCHER 1938 – T: France
 = *Hysterangium graveolens* VELEN. 1939 – T: Czechia, C Bohemia
 = *Hysterangium separabile* ZELLER 1941 – T: France
 = *Hysterangium coriaceum* HESSE var. *knappii* SOEHNER 1941 – T: ?
Euro: BEL, CZE, FIN, FRA, GER, HUN, ITA, NED, POR, RUS, SLO, SPA;
Maca: CAN (La Gomera).
 [hypogeous in deciduous (*Fagus*) and coniferous forests, on acidic and calcareous soils; temperate to mediterranean]
- 327 *Hysterangium epiroticum* PACIONI 1984 – T: Albania, Elbasan, Labinot-mal
Euro: ALB.
 [hypogeous, assoc. with *Quercus trojana* WEBB, on clayey soil; mediterranean]
- 328 *Hysterangium gardneri* E. FISCHER 1909 – T: USA, California
Euro: SPA (Asturias).
 [hypogeous in mixed forest, 575 m s. m.; submediterranean]
- 329 *Hysterangium hessei* SOEHNER 1949 – T: Germany
 # *Hysterangium fragile* VITT. ss. HESSE (1891)
Euro: AUS, GER, HUN, POL, RUS, SLK.
 [hypogeous in deciduous (*Fagus*) and coniferous (*Picea*) forests, on calcareous soil; temperate]
- 330 *Hysterangium inflatum* RODWAY 1918 – T: Tasmania, Mt Wellington
 = *Hysterangium eucalyptorum* LLOYD 1921 – T: Ecuador, Quito
 = *Hysterangium pterosporum* DONADINI & RIOUSSET 1979 – T: S France
introd. Euro: FRA (south), ITA, SPA;
introd. MedI: SAR.
 [hypogeous, assoc. with *Eucalyptus*; mediterranean; probably introduced from Tasmania before 1970]
- 331 *Hysterangium membranaceum* VITT. 1831 – T: Italy, Milano
Euro: GER (Bayern), ITA, SPA, ?POR.
 [hypogeous in forests; warm-temperate to mediterranean]
- 332 *Hysterangium nephriticum* BERK. 1844 – T: Britain, England
Euro: AUS, BRI (Engl.), CZE (Brno), GER, HUN, ITA (*Emilia*), SPA, UKR.
 [hypogeous in deciduous forests, mainly on calcareous soil; warm-temperate to submediterranean]
- 333 *Hysterangium obtusum* RODWAY in ZELLER & DODGE 1929 – T: Tasmania
Euro: POR, SPA.
 [hypogeous; mediterranean]
- 334 *Hysterangium pompholyx* TUL. & C. TUL. 1843 – T: France
 = *Hysterangium rubricatum* HESSE 1884 – T: Germany
Euro: CZE, FRA, GER, HUN, ITA, SLK, UKR.
 [hypogeous in deciduous forests, assoc. with *Fagus*, mainly on acidic soils; up to 1300 m s. m.; temperate]
- 335 *Hysterangium stoloniferum* TUL. & C. TUL. 1843 – T: France
 = *Hysterangium clathroides* var. *rubescens* QUÉL. 1886 – T: France
 = *Hysterangium rubescens* PAT. 1914 – T: France
Euro: AUS, CZE, DAN (Lolland), FRA, GER, HUN, ITA, NOR, RUS, SLK, SPA, SWE.
 [hypogeous in deciduous forests, assoc. with *Quercus* spp., *Corylus*, on calcareous soil; temperate to submediterranean]

336 *Hysterangium spec. aff. coriaceum* HESSE

EIsl: MTS.

[subhyphogeous on bare soil in rain forest; tropical]

337 *Ileodictyon cibarium* TUL. 1844 – **T:** New Zealand, Banks Peninsula

introd. Euro: 1955 BRI (Engl.);

introd. SAfr: 1885 MOC (Rabai Hills).

[terricolous in gardens under trees; introduced from Australia or New Zealand, but inconsistent]

338 *Ileodictyon gracile* BERK. in HOOKER 1845 – **T:** W Australia, Swan River

introd. Euro: 1941 POR, 1988 SPA (Huelva, Barcelona, Gerona);

MedI: 1990 BAL (Menorca);

Maca: 1998 CAN (La Palma);

NAfr: MAR;

WAfr: 1973 GHA;

CAfr: 1977 BUR;

SAfr: SAF (Western Cape).

[terricolous under deciduous trees, *Cistus*, *Eucalyptus* and *Pinus* on wet sandy and marshy soils, in Canaries in "Fayal-Brezal"; introduced from Australia before 1942; now tropical to mediterranean, in expansion]

339 *Lysurus corallocephalus* WELW. & CURREY 1868 – **T:** Angola, Pungo Andongo

= *Kalchbrennera corallocephala* (WELW. & CURREY) KALCHBR. 1880

= *Kalchbrennera tuckii* BERK. 1876 – **T:** S Africa, Eastern Cape, Somerset East

= *Kalchbrennera clathrata* (LLOYD 1909) LLOYD 1923 – **T:** Nigeria, Old Calabar

WAfr: CAM, GHA, NIG, TOG;

CAfr: ANG, CON, KEN;

SAfr: SAF (Eastern Cape, Kw.-Natal);

EIsl: MTS.

[terricolous in fields, botanical gardens, and natural woodland; subtropical to tropical]

340 *Lysurus cruciatus* (LEPR. & MONT. 1845) LLOYD 1909 – **T:** French Guyana

= *Anthurus borealis* BURT 1895 – **T:** USA, Massachusetts

= *Lysurus borealis* var. *klitzingii* P. HENN. 1902 – **T:** Germany, Ludwigslust

Lysurus gardneri BERK. ss. CUNNINGHAM (1944), PILÁT (1958)

introd. Euro: 1902 BRI, GER, 1925 FRA, 1931 NED, 1936 SWE (Göteborg), 1942 NOR, 1972 CZE, 1976 RUS (Jekaterinburg), 1981 IRL, 1992 NED; SPA;

introd. Maca: 1972 CAN (Tenerife);

SAfr: SAF (W and E Cape, Kw.-Natal, Johannesburg);

introd. Orië: 1968 ISR.

[terricolous on rich cultivated and uncultivated soils, also in glasshouses; introduced from N America and Carribean; now unsteady in temperate to mediterranean climates]

340 a – var. *nanus* CALONGE & MARCOS 1992 – **T:** Spain

Euro: SPA.

341 *Lysurus gardneri* BERK. 1846 – **T:** Ceylon = Sri Lanka, Peradeniya

= *Lysurus congolensis* BEELI 1927 – **T:** Congo

CAfr: CON;

SAfr: SAF

[terricolous in damp shady places; subtropical to tropical]

342 *Lysurus mokusin* (L. 1781: PERS. 1801) FR. 1823 – **T:** China

= *Lysurus quadrangularis* (CHOW 1935) LIU & HWANG 1935 – **T:** China, Peiping = Peking

introd. (?)Euro: 1979 FRA (Pyr. Or.), 1987 SPA (Gerona);

Maca: 1994 CAN (Tenerife);

Orie: GEO (Gagra).

[terricolous in gardens; submediterranean to mediterranean; possibly introduced from China]

- 343 *Lysurus periphragmoides* (KLOTZSCH 1831) D. M. DRING 1980 – **T:** Mauritius, Bois Chéry
 = *Simblum periphragmoides* KLOTZSCH 1831
 = *Simblum sphaerocephalum* SCHLECHT. 1861 – **T:** America
CAfr: TAN (incl. Zanzibar);
Elsl: MTS, SEY.
 [terricolous in gardens, riversides, often assoc. with bamboo and *Cyperus* roots, also under papaya; tropical]
- 344 *Mutinus argentinus* SPEG. 1887 – **T:** Argentina
 # *Mutinus bambusinus* (ZOLL.) E. FISCHER ss. DRING (1964)
 # *Mutinus simplex* LLOYD ss. DISSING & M. LANGE (1962, 1963)
WAfr: GHA;
CAfr: CON, KEN, ?TAN.
 [terricolous in gardens, palm plantations, up to 1650 m s. m.; tropical]
- 345 *Mutinus bambusinus* (ZOLLINGER 1854) E. FISCHER 1887 – **T:** Indonesia
WAfr: NIG;
CAfr: CON;
SAfr: SAF (Western Cape).
 [lignicolous in tropical rain forests, in bamboo thickets; subtropical to tropical]
- 346 *Mutinus caninus* (HUDS. 1762: PERS. 1801) FR. 1849 – **T:** Britain, Shropsh., Shrewsbury
 = *Phallus inodorus* SOW. 1801 – **T:** Britain
Euro: BEL, BRI, BUL, CZE, DAN, FIN (southwest), GER, GRE, IRL, ITA, LIT, NED, POL, POR, RUM, RUS, SLK, SPA, SWI, UKR (Crimea); **introd. (?)** <1922 SWE (south), 1931 NOR (south);
Maca: CAN (La Palma);
Orie: ARM, GEO, IRN.
 [lignicolous in deciduous forests; in Germany up to 825 m s. m.; temperate to submediterranean; in expansion to Scandinavia]
- 347 *Mutinus elegans* (MONT. 1856) E. FISCHER in SACC. 1888 – **T:** USA
 = *Mutinus curtisii* (BERK. 1873) E. FISCHER 1886 – **T:** USA, Connecticut
 = *Mutinus bovinus* MORGAN 1889 – **T:** USA
 = *Mutinus inopinatus* ULBRICH 1937 – **T:** Germany, Ringenberg
introd. Euro: 1929 ITA, 1936 GER, 1940 SWI, 1957 SPA, 1977 FRA, 1989 NED;
introd. SAfr: 1930 SAF (Western Cape: Rondebosch);
Orie: 1991 IRN.
 [terricolous in gardens, often associated with *Miscanthus* grasses, on rich soils; in Germany up to 200 m s. m., N Italy up to 400 m s. m.; introduced before 1929 from temperate N America, now temperate to submediterranean, in expansion]
- 348 *Mutinus ravenelii* (BERK. & CURT. 1853) E. FISCHER 1886 – **T:** USA, S Carolina
 # *Mutinus bambusinus* (ZOLLINGER) E. FISCHER ss. M. C. COOKE (1888)
introd. Euro: 1888 BRI (Engl.), 1942 GER, ca. 1950 NED, 1961 FIN, LAT, 1964 CZE, 1965 NOR, 1967 POL, 1985 DAN, 1985 SWE.
 [terricolous in gardens and moist deciduous forests; introduced from temperate N America; now north temperate to temperate, in expansion]
- 349 *Mutinus simplex* LLOYD 1919 – **T:** S Africa, Brenton, Knysna
SAfr: SAF (Western Cape).
 [terricolous in bushland; subtropical]

- 350 *Mutinus zenkeri* (P. HENN.) E. FISCHER 1900 – T: Cameroon
= *Floccomutinus zenkeri* P. HENN. 1885
WAfr: CAM, GHA;
CAfr: CON.
[lignicolous in rain forest; tropical]
- 351 *Phallogaster saccatus* MORGAN 1893 – T: USA
Euro: AUS, FRA, GER (Bayern, Schwaben), HUN, ITA (north), POL (south), SLK, SPA (Barcelona, Huelva), SWI, UKR.
[subhypogeous, lignicolous on decaying wood debris of coniferous and deciduous trees; mainly in mountains: in Germany up to 740 m s. m., the Alps 1100 m s. m.; temperate]
- 352 *Phallus caliendricus* DRING & RAYNER 1967 – T: Kenya, Mt Kenya
CAfr: KEN.
[terricolous in mountains; about 2000 m s. m.; tropical]
- 353 *Phallus callichrous* (A. MÖLLER 1895) LLOYD 1907 – T: Brazil, Blumenau
= *Dictyophora chlorocephala* DE SEYNES 1897 – T: Congo Brazzaville
CAfr: BRA.
[terricolous in forests; tropical]
- 354 *Phallus duplicatus* BOSC 1811 – T: USA, Carolina inferior
= *Dictyophora duplicata* (BOSC) E. FISCHER 1886
= *Phallus togatus* (KALCHBR. 1884) FARLOW 1885 – T: USA, Pennsylvania
= *Phallus mauritianus* LLOYD 1909 – T: Mauritius
introd. Euro: 1975 SPA (Cadiz), 1983 FRA (Var);
introd. CAfr: ?KEN;
introd. SAfr: 1925 SAF (Western Cape, Kw.-Natal), SWA;
introd. EIsl: MTS.
[terricolous in coniferous forests and gardens on rich soil; introduced from warm-temperate N America; now submediterranean to subtropical]
- 355 *Phallus galericulatus* (A. MÖLLER 1895) KREISEL 1996 – T: Brazil, Blumenau
= *Itajahya galericulata* A. MÖLLER 1895
SAfr: SAF (North Prov. around Pretoria).
[terricolous in gardens, assoc. with *Jacaranda*; subtropical; possibly introduced from S America]
- 356 *Phallus hadriani* VENT. 1798: PERS. 1801 – T: Europa australis
= *Phallus iosmus* BERK. 1836 – T: Britain, England
= *Phallus imperialis* (S. SCHULZER 1866) S. SCHULZER 1873 – T: Hungary, Mohács
= *Phallus purpuratus* CRAGIN 1895 – T: USA, Kansas
= *Ithyphallus impudicus* var. *carneus* LEMMERMANN 1901 – T: Germany, Juist
= *Phallus impudicus* var. *americanus* ULBRICH 1932 – T: USA
= *Phallus arenarius* KALLENBACH 1936, nom. nud. – T: Germany, Darmstadt
Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FRA, GER, HUN, IRL, LAT, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE (Gotland, Skåne, Halland), SWI (Ticino);
Maca: CAN;
SAfr: SAF (Western Cape);
EIsl: SEY (Mahé Brillant);
Orie: ISR.
[terricolous in steppes, dunes, cultivated soils outside forests, assoc. with grasses and vine; only in low elevations: Germany up to 110 m s. m.; temperate to mediterranean]
- 357 *Phallus impudicus* L. 1753: PERS. 1801 – T: Sweden, Småland, Växjö
= *Ithyphallus impudicus* (L.: FR.) E. FISCHER 1886
= *Phallus vulgaris* MICHELI 1729, nom. inval. – T: Italy

= *Phallus volvatus* ROTHMAN 1742 ex BATSCH 1783 – T: Sweden, Småland, Växjö

= *Phallus foetidus* SOW. 1801 – T: Britain

Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN (south), GER, GRE, IRL, ITA, LIT, NED, NOR, POL, POR, RUM, RUS, SLK, SPA, SWE, SWI;

MedI: BAL (Ibiza, Mallorca), COR;

Maca: ?CAN;

SAfr: ?SAF, ?ZIM;

Orie: ARM, AZE, GEO, ?IRN, ?ISR.

[terricolous in deciduous and coniferous forests, parks, and gardens; in Germany up to 1050 m s. m.; temperate to mediterranean; records from southern regions may often refer to *P. hadriani*]

357 a – var. *obliteratus* (MALENÇON 1957) KREISEL 1996 – T: Morocco, Rabat

= *Dictyophora duplicata* var. *obliterata* MALENÇON 1957

= *Phallus impudicus* f. *subindusiatus* PILÁT 1958 – T: Czechia, C Bohemia

Euro: BUL, CZE, GER, POL;

NAfr: MAR.

357 b – var. *pseudoduplicatus* O. ANDERSSON 1989 – T: Sweden, Skåne

= *Phallus subuculatus* MONT. 1842 – T: Algeria, Blidah

Phallus duplicatus BOSC ss. ULBRICH et auct. europ. plur.

Phallus togatus KALCHBR. ss. auct. brit.

Euro: AUS, BRI (Engl.), CZE, DAN, FRA, GER, IRL, LIT, NED, NOR, POL, SLK, SPA, SWE;

NAfr: ALG, MAR.

[this taxon was formerly thought to be *P. duplicatus* (see 354), introduced from N America; but see ANDERSSON (1989)]

358 *Phallus* spec. aff. *impudicus* L.: PERS.

Phallus impudicus L.: PERS. ss. LIU (1984), CALONGE & al. (1997)

CAfr: TAN (Usambara Mts).

[terricolous in forest on rich soil, 1400 m s. m.; tropical]

359 *Phallus indusiatus* VENTENAT 1798: PERS. 1801 – T: Surinam

= *Dictyophora indusiata* (VENT.: PERS.) DESV. 1809

= *Dictyophora phalloidea* DESV. 1809 – T: Surinam

= *Dictyophora braunii* P. HENN. in SACC. 1891 – T: ?

WAfr: CAM, GHA;

CAfr: CON, RCA, UGA, TAN;

EIsl: MDG, MTS, SEY;

WIsl: BIO.

[terricolous in evergreen forests and bamboo thickets; subtropical to tropical]

359 a – var. *roseus* LLOYD 1909 – T: French Guyana

WAfr: CAM.

360 *Phallus moelleri* LLOYD 1909 – T: Brazil, Blumenau

Dictyophora phalloides DESV. ss. A. MÖLLER (1895)

Dictyophora indusiata (VENT.: PERS.) DESV. ss. DISSING & LANGE (1963)

CAfr: CON.

[terricolous in forests; tropical]

361 *Phallus novae-hollandiae* CORDA 1854 – T: Australia, New South Wales

= *Phallus truncatus* BERK. 1866 – T: ?

= *Phallus sanguineus* P. HENN. 1901 – T: Cameroon

Phallus aurantiacus MONT. ss. DRING & ROSE (1976)

WAfr: CAM, GHA, NIG;

SAfr: SAF (widespr.).

[terricolous, occasionally fimicolous, in pastures, fields, cultivated soils; subtropical to tropical]

362 *Phallus roseus* DELILE 1813 – T: Egypt, Damiette and Siut

= *Itajahya rosea* (DELILE) E. FISCHER 1929

Euro: FRA (1984 Alp. Mar.);

NAfr: EGY, MAR;

CAfr: GHA;

Orie: ISR.

[terricolous in dry insolated soils; mediterranean to tropical]

363 *Phallus rubicundus* (BOSC 1811) FR. 1823 – T: USA, Carolina

= *Phallus aurantiacus* MONT. 1841 – T: southern India

WAfr: GHA, NIG;

CAfr: RWA;

SAfr: SAF (widespr.).

[terricolous in grassland, bushland; subtropical to tropical]

364 *Phallus rugulosus* (E. FISCHER 1986) O. KUNTZE 1891 – T: Japan

Phallus rubicundus (BOSC) FR. ss. CALONGE & al. (1992)

introd. Euro: 1991 SPA (Cáceres).

[terricolous in garden; submediterranean; introduced probably from E Asia]

365 *Phallus* spec. aff. *tenuis* (E. FISCHER 1886) O. KUNTZE 1891 – T: Indonesia, Java

Phallus tenuis (E. FISCHER) O. KUNTZE ss. CALONGE & al. (1997)

CAfr: TAN.

[lignicolous in forest, 1860 m s. m.; tropical]

366 *Phlebogaster laurisylvicola* FOGEL 1980 – T: Canaries, Tenerife, Las Yedras

Maca: CAN (Tenerife).

[hypogeous in Canarian laurel forest, assoc. with *Laurus azorica* (SEUB.) FRANCO]

367 *Protuberia clathroides* D. M. DRING 1964 – T: Togo, Akodessawa

WAfr: TOG.

[hypogeous; tropical]

368 *Pseudocolus fusiformis* (E. FISCHER 1890) LLOYD 1909 – T: Réunion

= *Colus javanicus* PENZIG 1899 – T: Indonesia, Java

= *Anthurus javanicus* (PENZIG) G. H. CUNN. 1931

= *Pseudocolus jaczewskii* VORONOV 1918 – T: Georgia, Suchumi

Euro: UKR (Crimea);

EIsl: REU;

Orie: GEO (Suchumi, 1917 & 1948 Batum).

introd. in glasshouses Euro: 1947 RUS (St. Petersburg), 1958 CZE (Praha).

[terricolous in gardens; submediterranean to tropical]

369 *Staurophallus senegalensis* MONT. 1845 (incertae sedis) – T: Senegal

NAfr: SEN.

[habitat unknown; tropical]

370 *Trappea darkeri* (ZELLER ?1939) CASTELLANO 1990 – T: USA

= *Hysterangium darkeri* ZELLER ?1939

– var. *lazzarii* RUINI 1991 – T: Switzerland, Ticino

Euro: SPA, SWI (Ticino).

[terricolous in coniferous forests, particularly *Picea abies* (L.) KARST., *Pinus*; submediterranean]

Poriales (Aphylophorales), gasteroid

- 371 *Stephanospora caroticolor* (BERK. 1844) PAT. 1914 – **T:** Britain, England, Bristol
 = *Hydnangium caroticolor* BERK. 1844 "carotaecolor"
 = *Octaviania caroticolor* (BERK.) CORDA 1854
Euro: AUS, BRI (Engl.), FRA, GER, ITA, RUS, SPA (Guipuzcoa), SWI.
 [subhypogeous in deciduous and mixed forests, often assoc. with *Taxus*, on calcareous soils; in Germany up to 520 m s. m., Switzerland 600 m s. m.; warm-temperate]

Russulales, secotioid/gasteroid

- 372 *Arcangeliella borziana* CAVARA 1900 – **T:** Italy, Etruria, Vallombrosa
Euro: GER, ITA (Emilia, Etruria).
 [subhypogeous in coniferous forests, assoc. with *Abies alba* MILL., *Picea abies*, in Italy up to 1600 m s. m.; temperate]
- 373 *Arcangeliella volemoides* K. & A. MADER 1992 – **T:** Austria
 # *Hydnangium stephensii* BERK. ss. SOEHNER 1923
Euro: AUS (Waldviertel), GER.
 [hypogeous near *Picea abies*; temperate]
- 374 *Elasmomyces krjukowensis* (BUCHOLTZ 1901) SACC. & D. SACC. 1905 – **T:** Russia, Moscow, Krjukovo
 = *Secotium krjukowense* BUCHOLTZ 1901
 = *Macowanites krjukowensis* (BUCHOLTZ) SINGER & A. H. SMITH 1960
 = *Secotium michailowskianum* BUCHOLTZ 1901 – **T:** Russia, Moscow
 = *Octaviania moravica* VELEN. 1947 – **T:** Czechia, Moravia, Bučovice
Euro: AUS (Steierm., Vorarlberg), CZE, RUS (Moscow), SWE (Upl.), UKR.
 [subhypogeous in deciduous forests; temperate]
- 375 *Elasmomyces mattirolianus* CAVARA 1897 – **T:** Italy
Euro: ?AUS (Burgenl.), BEL, GER, HUN, ITA, RUS (Moscow), SWI.
 [terricolous in coniferous and deciduous forests; assoc. with *Abies*, *Picea*, *Fagus*; temperate]
- 376 *Gymnomyces ammophilus* VIDAL & CALONGE 1999 – **T:** Portugal, Pinhal de Albufeira
Euro: POR.
 [hypogeous, assoc. with *Pinus pinea*; mediterranean]
- 377 *Gymnomyces dominguezii* MORENO-ARROYO, GÓMEZ & CALONGE 1999 – **T:** Spain
Euro: SPA.
 [hypogeous, assoc. with *Quercus*, *Cistus*, *Pistacia*; mediterranean]
- 378 *Gymnomyces ferruginascens* SINGER & A. H. SMITH 1960 – **T:** USA
Euro: SPA (Córdoba).
 [hypogeous; mediterranean]
- 379 *Gymnomyces ilicis* VIDAL & LLISTOSELLA 1995 – **T:** Spain
Euro: FRA (south), SPA (Catalonia, Navarra).
 [hypogeous in forests of *Quercus ilex*; mediterranean]
- 380 *Gymnomyces xanthosporus* (HAWKER 1952) A. H. SMITH 1962 – **T:** Britain
Euro: BRI (Engl., Wales), SPA (Navarra, Andalucía).
 [hypogeous, in deciduous forests and under *Picea abies*; warm-temperate to mediterranean]

- 381 *Macowanites agaricinus* KALCHBR. 1876 – **T:** S Africa, Somerset East
SAfr: SAF (Eastern Cape).
 [terricolous amongst grass at foot of *Acacia* trees; subtropical]
- 382 *Macowanites messapicoides* LLISTOSELLA & VIDAL 1995 – **T:** Spain, Gerona
Euro: SPA.
 [terricolous, in forests of *Quercus ilex*; mediterranean]
- 383 *Martellia ellipsozona* (ZELLER 1939) SINGER & A. H. SMITH 1960 – **T:** USA
Euro: ITA (Emilia).
 [hypogeous, in coniferous forests; submediterranean]
- 384 *Martellia mediterranea* MORENO, GALÁN & MONTECCHI 1991 – **T:** Spain
Euro: SPA.
 [hypogeous; mediterranean]
- 385 *Martellia mistiformis* MATTIROLO 1900 – **T:** Italy, Sardinia
 = *Hydnangium pila* PAT. 1910 – **T:** France, Jura, Lepinay
 = *Octaviana pila* (PAT.) SVRČEK in PILÁT 1958
 = *Martellia pila* (PAT.) VIDAL 1991
 = ?*Martellia soehneri* (ZELLER & DODGE) SINGER & A. H. SMITH var. *ettenbergii* SOEHNER
 1935 – **T:** ?
Euro: FRA (Jura), GER (Saarland, ?Schwarzwald), SPA (Gerona);
MedI: SAR, SIC.
 [hypogeous in *Pinus*, *Picea*, and *Quercus* forests, on calcareous and sandy soils; warm-temperate to mediterranean]
- 386 *Martellia stephensii* (BERK. 1844) K. & A. MADER 1992 – **T:** Britain, England, Avon
 = *Hydnangium stephensii* BERK. 1844
 = *Octaviana stephensii* (BERK.) TUL. & C. TUL. 1851
 = *Arcangeliella stephensii* (BERK.) ZELLER & DODGE in DODGE 1931
 = *Zelleromyces stephensii* (BERK.) A. H. SMITH 1962
 = *Hydnangium soehneri* ZELLER & DODGE 1935 – **T:** Germany, Bayern, Wolfratshausen
 = *Octaviana soehneri* (ZELLER & DODGE) SVRČEK in PILÁT 1958
 = *Octaviana galatheja* (QUÉL. 1886) DE TONI in SACC. 1888 – **T:** France
Euro: BRI, FRA, GER (Bayern); ?CZE (C Bohemia).
 [subhypogeous in rich deciduous forests on calcareous soil; temperate]
- Records from BEL, CZE (Moravia), GER (central parts), ITA, UKR and **Orie:** ARM should be confirmed for possible confusion with *Arcangeliella volemoides* (see No. 373).
- 387 *Zelleromyces giennensis* MORENO-ARROYO, GÓMEZ & CALONGE 1998 – **T:** Spain, Jaen
Euro: SPA.
 [terricolous, in *Pinus halepensis* forest; mediterranean]
- 388 *Zelleromyces hispanicus* CALONGE & PEGLER 1998 – **T:** Spain, Madrid
Euro: SPA (Madrid).
 [terricolous, in *Pinus sylvestris* L. forest; submediterranean]
- 389 *Zelleromyces josserandii* MALENÇON 1975 – **T:** Morocco, Katma
MedI: COR;
NAfr: MAR (Rif).
 [terricolous; mediterranean]

390 *Zelleromyces meridionalis* CALONGE, MORENO-ARROYO & GÓMEZ 1998 – T: Spain, Córdoba

Euro: SPA.

[terricolous in *Quercus ilex* forest; mediterranean]

Sclerodermatales

391 *Astraeus hygrometricus* (PERS. 1801) MORGAN 1889 – T: ?Germany

= *Astraeus stellatus* (SCOP. 1777) E. FISCHER 1900 – T: Slovenia, Krain

= *Gastrum commune* DESV. 1809 – T: France

= *Gastrum vulgare* CORDA 1842 – T: Czechia

Euro: AUS, BEL, BRI, BUL, CZE, FRA, GER, GRE, HUN, ITA, NED, POL, POR, RUM, RUS, SLK, SLV, SPA, Caucasus;

MedI: BAL (Ibiza), COR;

Maca: CAN (Gran Canaria, Tenerife, La Gomera, La Palma);

CAfr: ZAM;

SAfr: SAF (Eastern Cape, Pretoria);

Orie: ARM, GEO, IRN, ISR.

[terricolous in clear, dry forests and coppices; assoc. with *Carpinus*, *Fagus*, *Quercus*, *Cedrus*, *Picea*, *Pinus*, and other trees; in Germany up to 675 m s. m., Pyrenees 700 m s. m., Canaries 1400 m s. m.; temperate to subtropical]

392 *Pisolithus arhizos* (SCOP. 1786; PERS. 1801) S. RAUSCHERT 1959 **agg.** – T: ?

= *Pisolithus tinctorius* (PERS. 1801) DESV. ?1809 – T: Italy

= *Lycoperdon granuliteum* BROTERO 1804 – T: Portugal, Coimbra

= *Pisolithus granuliteus* (BROTERO) P. COUTINHO in SOUSA DA CAMARA 1958

= *Pisolithus arenarius* ALB. & SCHW. 1805 – T: Germany, Niesky

= *Pisolithus crassipes* (DC. & DESPORT 1807) PETRI 1909 – T: France

= *Polysaccum pisocarpium* FR. 1829 – T: Switzerland

Euro: AUS, BEL, BRI, CZE, DAN (Sjaelland, Bornholm), EST, FIN, FRA, GER, IRL, ITA, NED, NOR (Buskerud), POL, POR, RUS, SPA, SWE, Caucasus;

MedI: BAL (Mallorca, Menorca), COR;

Maca: CAN, CAP;

CAfr: ZAM;

SAfr: SAF (widespread);

EIsl: MTS;

Orie: ISR (Golan).

[terricolous, ectomycorrhizal, assoc. with *Pinus sylvestris* and deciduous trees on very poor soils, mine wasts, etc.; in Africa assoc. with *Acacia*, *Cistus*, and *Eucalyptus*; in Germany up to 700 m s. m., Canaries (El Hierro) 970 m s. m.; temperate to subtropical]

Possibly the African populations are a taxon for its own.

393 *Scleroderma albidum* PAT. & TRABUT 1899 – T: Algeria, El Biod

= *Scleroderma radicans* LLOYD 1908 – T: Australia, Melbourne

= *Scleroderma cepa* PERS. s. l.

Euro: CZE, FRA, SWE;

NAfr: ALG, MAR;

CAfr: CON;

SAfr: SAF.

[terricolous, subhypogeous in forests, assoc. with *Quercus*, *Pinus*, *Eucalyptus*; temperate to tropical]

394 *Scleroderma areolatum* EHRENB. 1818 – T: Germany, Berlin

= *Scleroderma lycoperdoides* SCHW. 1822 – T: USA, Carolina

Euro: AUS, BEL, BRI, CZE, DAN, FIN, FRA, GER, HUN, IRL, ITA, NED, NOR, POL, POR, RUS (Maikop), SPA, SWE (south), SWI, UKR, YUG;

MedI: BAL, COR;**Maca:** CAN (La Palma);**NAfr:** TUN;**SAfr:** SAF (North Prov.).

[terricolous in deciduous forests; in Germany up to 680 m s. m.; temperate to mediterranean]

395 *Scleroderma bovista* FR. 1829 – **T:** Sweden, Norrbotten= *Scleroderma macrorrhizon* WALLR. 1833 – **T:** Germany, Nordhausen**Euro:** AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, IRL, ITA, NED, NOR, POL, POR, RUS, SPA, SWE, SWI, YUG;**Maca:** AZO, CAN (Tenerife, La Gomera, La Palma);**NAfr:** ALG;**SAfr:** SAF (Western Cape, North Prov.);**Orie:** ARM, IRN, ISR.

[terricolous in deciduous and coniferous forests; in Germany up to 950 m s. m., Austria 1150 m s. m., Canaries 1100 m s. m.; temperate to subtropical]

cf. *Scleroderma fuscum* (CORDA) E. FISCHER.396 *Scleroderma cepa* PERS. 1801 – **T:** France, Paris= *Scleroderma cepoides* S. F. GRAY 1821 – **T:** Britain**Euro:** AUS, BEL, BRI, DAN, FRA, GER, ITA, NED, POR, RUM, SPA, SWE (south);**MedI:** BAL (Mallorca), COR;**Maca:** CAN;**CAfr:** MWI, RWA, TAN;**SAfr:** SAF (widespr.);**Elsl:** MTS.

[terricolous in forests; in Germany at 320 m s. m., Canaries up to 800 m s. m.; warm-temperate to tropical]

397 *Scleroderma chevalieri* GUZMÁN 1967 – **T:** Congo**CAfr:** CON.

[terricolous; tropical]

398 *Scleroderma citrinum* PERS. 1801 – **T:** Germany= *Scleroderma vulgare* HORNEMANN in FR. 1829 – **T:** Denmark# *Scleroderma aurantium* (L.) PERS. ss. HOLLÓS (1904), PILÁT (1958), non L. 1753**Euro:** AUS, BEL, BRI, CZE, DAN, EST, FIN, FRA, GER, IRL, ITA, LIT, MOL, NED, NOR, POL, POR, RUM, RUS, SPA, SWE, SWI, Caucasus;**MedI:** BAL (Mallorca);**Maca:** CAN (Tenerife, La Palma);**introd. WAfr:** GHA;**introd. CAfr:** BUR, CON, RWA;**SAfr (introd.?):** SAF (Cape Pr., Transvaal);**Orie:** ARM, AZE, GEO.

[terricolous in deciduous and coniferous forests, acidophilic; temperate to mediterranean; in Germany up to 1100 m s. m.; apparently introduced from Europe to subtropical regions]

399 *Scleroderma congolense* DEMOULIN & DRING 1971 – **T:** Congo, Bokuma**CAfr:** CON.

[terricolous and lignicolous in virgin forest and garden lawns; tropical]

400 *Scleroderma dictyosporum* PAT. 1896 – **T:** French Guyana**WAfr:** CAM, GHA, TOG;**CAfr:** CON.

[terricolous; tropical]

- 401 *Scleroderma echinatum* (PETRI 1909) GUZMÁN 1967 – **T:** Borneo
= *Scleroderma violaceum* LLOYD 1924 – **T:** Congo
CAfr: CON.
[terricolous; tropical]
- 402 *Scleroderma flavidum* ELLIS & EVERH. 1885 – **T:** USA, New Jersey, Willow Grove
Scleroderma cepa PERS. ss. GUZMÁN (1970), non DEMOULIN
Euro: BEL, BRI, CZE, FRA, ITA;
Maca: CAN (La Gomera, La Palma);
CAfr: KEN, TAN, UGA;
SAfr: SAF;
Elsl: MTS, REU.
[terricolous in deciduous and rain forests, in Italy assoc. with *Eucalyptus*; on Réunion up to 1400 m s. m.; temperate to tropical]
- 403 *Scleroderma fuscum* (CORDA 1841) E. FISCHER 1900 – **T:** Czechia, Praha
= *Phlyctospora fusca* CORDA in STURM 1841
Euro: AUS, BEL, CZE, EST, FRA, GER, HUN, ITA, LIT, POL, RUS, SWE;
NAfr: MAR;
SAfr: SAF (Kw.-Natal, Pretoria).
[terricolous, subhypogeous in coniferous forests; temperate to mediterranean]
- Good species, teste GUZMÁN (1970), COCCIA & al. (1990), but considered as synonymous with *S. bovista* by PEGLER & al. (1995), CALONGE (1998). Possibly to be treated as a variety of *S. bovista*.
- 404 *Scleroderma laeve* LLOYD 1916 emend. GUZMÁN – **T:** S Africa, Stellenbosch
NAfr: MAR;
SAfr: SAF (Western Cape, Transvaal).
[terricolous in forests and shrubs, assoc. with *Acacia*, *Eucalyptus*, etc.; warm-temperate to sub-tropical]
- 405 *Scleroderma meridionale* DEMOULIN & MALENÇON 1970 – **T:** Portugal, Alcacer do Sal
Scleroderma macrorrhizon WALLR. ss. A. H. SMITH (1963)
Euro: FRA (south), ITA, POR, SPA;
MedI: COR;
Maca: CAN (La Palma);
NAfr: MAR.
[terricolous in forests (*Quercus*, *Pinus*) on sandy soil; only at low elevations; west-mediterranean]
- 406 *Scleroderma polyrhizum* (J. F. GMELIN 1796): PERS. 1801 – **T:** Italy
= *Sclerangium polyrhizum* (J. F. GMELIN: PERS.) LÉV. 1848
= *Scleroderma geaster* FR. 1829 – **T:** Italy
= *Scleroderma multiloculare* D. M. DRING & RAYSS 1963 – **T:** Israel
Euro: BRI (SE Engl.), FRA, GER (Saarland), IRL, ITA, POR, RUS, SPA, UKR;
MedI: BAL (Menorca), COR, SIC;
Maca: CAN;
NAfr: ALG, MAR;
Orie: ISR.
[terricolous, subhypogeous in meadows and forests, often ruderal; able to destroy asphalt; in France up to 200 m s. m., Canaries up to 1500 m s. m.; warm-temperate to mediterranean]
- 407 *Scleroderma reae* GUZMÁN 1967 – **T:** USA, California, Santa Barbara
Euro (introd.?): RUS (Maikop).
[terricolous in ruderal places; possibly introduced from N America]

- 408 *Scleroderma sapidiformis* P. SOSIN 1959 – **T:** Armenia, Liczkvaz
Orie: ARM.
 [terricolous in deciduous forest; warm-temperate]
- 409 *Scleroderma schmitzii* DEMOULIN & DRING 1971 – **T:** Congo, Katanga, Kipopo
CAfr: CON, TAN.
 [terricolous in clear forests; tropical]
- 409 A *Scleroderma septentrionale* JEPPSON 1998 – **T:** Finland, Oulu
Arct: ISL;
Euro: DAN, FIN, SWE.
 [terricolous on sand dunes and sandy heaths in coastal regions, assoc. with *Pinus*, *Salix repens* L.; only at low elevations; north temperate to subarctic]
- 410 *Scleroderma sinnamariense* MONT. 1840 – **T:** French Guyana
 = *Scleroderma pisiforme* P. HENN. 1895 – **T:** Cameroon, Jaundestation
 = *Scleroderma pantherinum* MATTIROLO 1931 – **T:** Congo, Banalia
 = *Scleroderma chrysastrum* G. W. MARTIN 1954 – **T:** Panama, Barro Colorado
WAfr: CAM;
CAfr: CON, RCA.
 [terricolous on plant debris and decayed wood in herbaceous vegetation; tropical]
- 411 *Scleroderma texense* BERK. in HOOK. 1845 – **T:** USA, Texas
 = *Scleroderma patens* LLOYD 1906 – **T:** Mauritius
introd. Euro: 1910 FRA (Mondoubleau);
introd. Elsl: 1906 MRT.
 [terricolous in coniferous forests; warm-temperate to tropical; possibly introduced with N American conifers]
- 412 *Scleroderma verrucosum* (BULL. 1780/81): PERS. 1801 – **T:** France
Euro: AUS, BEL, BRI, CZE, DAN, EST, FIN (Tampere), FRA, GER, IRL, ITA, LIT, MOL, NED, NOR, POL, POR, RUM, RUS, SPA, SWE;
MedI: BAL (Mallorca), COR;
Maca: AZO, CAN (Tenerife), MAD;
NAfr: MAR;
WAfr: CAM, SIE;
CAfr: CON, KEN, TAN;
SAfr: SAF (widespread), ZIM;
Elsl: REU;
Orie: ISR, ?ARM, ?AZE, ?GEO.
 [terricolous in deciduous and rain forests on rich soils; in Germany up to 725 m s. m., Pyrenees 600 m s. m., Canaries 700 m s. m.; temperate to tropical]
- 413 *Veligaster leptopodium* (HARIOT & PAT. 1909) GUZMÁN 1970 – **T:** Republique Centrafricaine, Oubangui
 = *Scleroderma leptopodium* HARIOT & PAT. 1909
 = *Lycoperdon roseocarneum* BEELI 1927 – **T:** Congo, Lisala
 = *Scleroderma verrucosum* (BULL.): PERS. f. *angustistipitatum* DISSING & M. LANGE 1962 – **T:** Congo
CAfr: CON, RCA.
 [terricolous; tropical]

Tulostomatales

- 414 *Battarrea phalloides* (DICKS. 1785): PERS. 1801 – **T:** Britain, England
 = *Lycoperdon phalloides* DICKS. 1785

Euro: BRI (Engl., Jersey), FRA (widespread), ITA, SPA;

MedI: BAL (Mallorca, Menorca), COR.

[terricolous in dry sandy soils in semidesertic climate; warm-temperate to mediterranean]

- 415 *Battarrea stevenii* (LIBOSCHITZ 1814) FR. 1832 – **T:** Russia, Lower Volga valley
 = *Sphaericeps lignipes* WELW. & CURREY 1868 – **T:** Angola, Mossamedes
 = *Battarrea guicciardiniana* CESATI 1875 – **T:** Italy, Firenze
Euro: AUS (Burgenl., Niederösterreich), CZE (S Moravia, N Bohemia), FRA (Pyren. Or.), GER, HUN, ITA, RUM, RUS (Astrachan), SLK (Danube valley), SPA;
MedI: BAL (Mallorca);
Maca: CAN, CAP;
NAfr: MAU, SOM;
CAfr: ANG, BUR, KEN;
SAfr: SAF (widespread);
EIsl: SOC;
Orie: ARM, AZE, GEO, IRN, ISR, YEM.
 [terricolous in dry clear forests, steppes, semideserts on sandy and clay soils, in C Europa under overhangig sandstone rocks; warm-temperate to tropical]
- 416 *Battarreoides diguetii* (PAT. & HARIOT 1895) HEIM & T. HERRERA 1961 – **T:** USA
 = *Battarrea diguetii* PAT. & HARIOT 1895
 = *Battarreoides potosinus* T. HERRERA 1953 – **T:** Mexico, San Luis Potosí
SAfr: BOT, SAF (1925 North Prov.: Dongola Reserve).
 [terricolous on poor sandy soils and termitaries; subtropical]
- 417 *Chlamydropus meyenianus* (KLOTZSCH 1843) LLOYD 1903 – **T:** Peru
Orie: Kazakhstan (W Caucasus, Gurjevsk);
SAfr: locality unknown.
 [terricolous in semideserts; warm-temperate]
- 418 *Dictyocephalos attenuatus* (PECK 1895) LONG & PLUNKETT 1940 – **T:** USA
 = *Dictyocephalos curvatus* UNDERW. in V. S. WHITE 1901 – **T:** USA, Colorado
 = *Battarreopsis artini* P. HENN. 1902 – **T:** Egypt
 = *Whetstonia strobiliformis* LLOYD 1906 – **T:** USA, Minnesota
 = *Phellorinia gigantea* MAIRE & PAT. 1929 – **T:** Algeria, Oran
Euro: SPA;
NAfr: ALG, EGY, MAR;
SAfr: ZIM (Wankie Distr.).
 [terricolous in semideserts and at margins of halophilous vegetation on sandy and argillaceous, gypsiferous soils; mediterranean to subtropical]
- 419 *Phellorinia herculea* (PALLAS 1776: PERS. 1801) KREISEL 1961 – **T:** Kazakhstan, Inder Lake E of Wolgograd
 = *Lycoperdon herculeum* PALLAS 1776
 = *Scleroderma "herculeanum"* (PALLAS 1776): PERS. 1801
 = *Phellorinia saharae* PAT. & TRABUT 1896 – **T:** ?
 # *Phellorinia squamosa* KALCHBR. & MCOWAN ss. REICHERT (1921)
 # *Phellorinia delestrei* (DUR. & MONT.) E. FISCHER ss. ULBRICH (1952)
Euro: ITA, POR, RUS (Wolgograd), SPA, UKR (Crimea);
introd. Euro: 1925 HUN, 1950-1978 C GER;
MedI: SAR;
Maca: CAN (Fuerteventura, Lobos, Alegranza etc.);
NAfr: EGY, MAR, SOM, TUN;
SAfr: NAM (Gibeon);
Orie: IRQ, ISR, KUW, YEM.

[terricolous in semideserts; submediterranean to subtropical; in C Europe introduced on urban deposits, inconsistent]

- 420 *Phellorinia inquinans* BERK. 1843 – **T:** S Africa, Uitenhage
 = *Phellorinia delestrei* (DUR. & MONT. 1845) E. Fischer 1900 – **T:** Algeria, Mostaga
 = *Phellorinia strobilina* (KALCHBR. 1875) DRING & RAYSS 1963 – **T:** Australia, Queensland
 = *Phellorinia squamosa* KALCHBR. & MCOWAN in KALCHBR. 1882 – **T:** Australia
NAfr: ALG;
SAfr: SAF (widespread), ZIM;
Orie: ISR.
 [terricolous in semideserts; mediterranean to subtropical]
- 421 *Queletia mirabilis* FR. 1871 – **T:** France, Port-de-Sochaux (Doubs)
introd. Euro: 1868 ff FRA (six localities), 1893 & 1941 BRI, 1976 ITA.
 [terricolous on self-heating substrates as compost and tan; introduced from unknown origin to warm-temperate climates, inconsistent]
- 422 *Queletia spec. aff. andina* J. E. WRIGHT 1989
Orie: YEM.
 [terricolous on uncultivated soil in semidesertic climate]
- 423 *Schizostoma laceratum* (EHRENB.: Fr. 1829) LÉV. 1846 – **T:** Sudan, Nubia
 = *Queletia turkestanica* M. PETROV 1931 – **T:** C Asia, Repetek
Euro: RUS (Astrachan), SPA;
Medl: BAL (Ibiza);
Maca: CAP;
NAfr: MAL, SOM, SUD;
SAfr: ?SAF;
Orie: IRN.
 [terricolous in dunes and semideserts, on sandy soil; mediterranean to subtropical]
- 424 *Tulostoma adhaerens* LLOYD 1923 – **T:** Australia, Adelaide
 # *Tulostoma purpusii* P. HENN. 1898 ss. BOTTOMLEY (1948)
SAfr: LES (“Basutoland”), SAF (Bloemfontein);
EIsl: MDG.
 [terricolous on sandy soil, in plantations; subtropical]
- 425 *Tulostoma albicans* WHITE 1901 – **T:** USA, Texas
Euro: SPA (Valladolid, Zaragoza), ?SWE (Skåne);
SAfr: SAF (Kimberley, Free State, Pretoria).
 [terricolous on sandy and heavy soils; mediterranean to subtropical]
- 426 *Tulostoma angolense* WELW. & CURREY 1868 – **T:** Angola, Mossamedes
CAfr: ANG.
 [terricolous on sandy soil; tropical]
- 427 *Tulostoma armillatum* BRES. in PETRI 1904 – **T:** Italy, Rovereto
 = *Tulostoma fulvellum* BRES. in PETRI 1904 – **T:** Italy, Trento
Euro: AUS (Wien), FRA, GER, ITA, SPA (Vitoria); SWI.
 [terricolous on sandy and calcareous soils, on walls; in Germany at 430 m s. m.; warm-temperate to mediterranean]
- 428 *Tulostoma australianum* LLOYD 1906 – **T:** Australia, Melbourne
SAfr: SAF (Free State).
 [terricolous on sandy soil in forest; subtropical]

- 429 *Tulostoma beccarianum* BRES. in PETRI 1904 – **T:** Italy, Pisa
 = *Tulostoma simulans* LLOYD 1906 – **T:** USA, Texas
 # *Tulostoma montanum* PAT. ss. CALONGE & DEMOULIN (1975), CALONGE & WRIGHT (1988)
Euro: HUN, ITA (Pisa), RUS (Astrachan), SPA;
SAfr: ?SAF (Transvaal);
Orie: ISR.
 [terricolous in forests and nurseries; on humiferous sandy soil; warm-temperate to mediterranean]
- 430 *Tulostoma bruchi* SPEG. 1927 – **T:** Argentina, La Plata
introd. Euro: 1991 SPA (Cáceres).
 [terricolous on humiferous soil in a *Ficus* pot indoors; probably introduced from S America before 1991]
- 431 *Tulostoma brumale* PERS. 1794: PERS. 1801 – **T:** Germany
 = *Tulostoma pedunculatum* (L. 1753 emend. HUDS. 1762) SCHROET. 1877 – **T:** ?
 = *Tulostoma mammosum* FR. 1826 – **T:** Italy
Euro: AUS, BEL, BRI, BUL, CZE, DAN, EST, FIN (southw., Åland), FRA, GER, GRE, HUN, IRL, ITA, LIT, NED, NOR (south), POL, RUM, RUS, SLK, SPA, SWE (south), SWI;
MedI: BAL, COR;
Maca: CAN;
NAfr: TUN;
SAfr: ?SAF (Western Cape);
Orie: ARM, AZE, GEO, IRN.
 [terricolous in dunes, dry lawns, steppes on rich sandy, calcareous, argillaceous soils, on rock soils of limestone, gyms, quarcite, or porphyr, on earth-covered walls, often assoc. with mosses as *Tortula ruralis* and *Rhacomitium canescens*; in Germany up to 800 m s. m., Spain up to 900 m s. m., the Alps at 1870 m s. m.; temperate to mediterranean]
- 431 a – var. *pallidum* (LLOYD 1906) J. E. WRIGHT 19878 – **T:** France, Angers
 = *Tulostoma pallidum* LLOYD 1906
Euro: FRA (south).
 [terricolous in dunes, lawns; submediterranean]
- 432 *Tulostoma caespitosum* TRABUT in SACC. 1891 – **T:** Algeria
 = ?*Tulostoma aurasicum* PAT. 1905 – **T:** Algeria, Batna
 # *Tulostoma adhaerens* LLOYD ss. BOTTOMLEY (1948)
Euro: FRA (southwest), HUN, RUS (Chechenia), SPA (Madrid, Almería), YUG (Serbia);
MedI: BAL (Mallorca, Menorca), COR;
NAfr: ALG, TUN;
SAfr: SAF (Western Cape).
 [terricolous on dry sandy soil; warm-temperate to mediterranean]
- 433 *Tulostoma chevalieri* HARIOT & PAT. 1911 – **T:** Dahomey = Benin, Cotonau
WAfr: BEN, TOG;
SAfr: SAF (locality unknown).
 [terricolous on sandy soil; subtropical to tropical]
- 434 *Tulostoma chudaei* PAT. 1907 – **T:** "Soudan"
NAfr: ?
 [terricolous in dry sandy soil; subtropical]
- 435 *Tulostoma cyclophorum* LLOYD 1906 – **T:** S Africa, Cape Prov.
 = *Tulostoma pampeanum* (SPEG. 1898) J. E. WRIGHT 1977 – **T:** Argentina, Buenos Aires
Euro: FRA, ITA, SPA;
SAfr: LES ("Basutoland"), SAF (Western and Eastern Cape);
Orie: ISR.

[terricolous in forests and gardens, in shady places, on humiferous argillaceous soils; warm-temperate to mediterranean]

436 *Tulostoma exasperatosporum* J. E. WRIGHT 1983 – **T:** S Africa, East Cape

Tulostoma albicans V. S. WHITE 1901 ss. BOTTOMLEY (1948) p.p.

SAfr: SAF (Eastern Cape, Pretoria).

[terricolous; subtropical]

437 *Tulostoma exasperatum* MONT. 1837 – **T:** Cuba

WAfr: COT;

CAfr: CON, RWA.

[lignicolous on rotten wood in rain forests; subtropical to tropical]

438 *Tulostoma fimbriatum* FR. 1829 – **T:** Sweden

= *Tulostoma granulosum* LÉV. 1842 – **T:** southern Russia

= *Tulostoma campestre* MORGAN 1890 – **T:** USA, Nebraska

= *Tulostoma petrii* BRES. in PETRI 1904 – **T:** Italy, Trento

= *Tulostoma readeri* LLOYD 1906 – **T:** Australia

Euro: AUS, CZE, DAN, FRA, GER, HUN, ITA, LIT, MAC, NED, NOR (Oslo), POL, POR, RUM, RUS, SLK, SPA, SWE (Skåne, Uppl.), SWI;

MedI: BAL (Ibiza), COR;

Maca: CAN (Tenerife);

Orie: IRN.

[terricolous in dunes, dry lawns and pastures, gardens, clear forests, on sandy soil, limestone, gyps; often in great amounts but unsteady, sometimes forming striking "fairy rings"; in Germany up to 440 m s. m., in mountains up to 2000 m s. m.; temperate to mediterranean]

438 a – var. *campestre* (MORGAN 1890) G. MORENO 1980 – **T:** USA, Nebraska

Euro: AUS (Burgenl.), FRA, ITA, POR, RUM, SPA, SWE;

MedI: COR;

NAfr: ALG, MAR.

[terricolous in dry lawns and clear coppices on sandy soil; temperate to mediterranean]

438 b – var. *egranulosum* (LLOYD 1906) J. E. WRIGHT 1987 – **T:** Australia

Euro: RUS (Astrachan).

[terricolous in semideserts on sandy soil; warm-temperate]

438 c – var. *heterosporum* J. E. WRIGHT 1987 – **T:** The Netherlands, Wassenaar

Euro: CZE, FRA, HUN, NED, NOR (Oslo), SPA, SWE (Skåne);

Orie: Caucasus.

[terricolous in dunes, dry slopes, on sandy and rocky soils; temperate to submediterranean]

439 *Tulostoma fusipes* HARIOT & PAT. 1910 – **T:** Mali, Timbuctou, Bon Djéhéba

NAfr: MAL;

Orie: JOR.

[terricolous on dry sandy soils; subtropical]

440 *Tulostoma giovanellae* BRES. 1881 – **T:** Italy, Trento

= *Tulostoma moellerianum* BRES. & ROUM. 1890 – **T:** Sao Tomé

Euro: FRA (1974 Angers, 1993 Aude), HUN, ITA, POR, SPA;

introd. Euro: 1927 AUS (Wiener Neustadt), 1971 ff GER (Potsdam);

MedI: BAL, CRE;

Maca: CAN (Lobos, Alegranza, Fuerteventura);

CAfr: BUR;

WIsl: SAO;

Orie: SYR.

[terricolous in dry lawns and dunes, also in salt-influenced vegetation and unsteadily in towns at the foot of decaying mortar walls; warm-temperate to tropical]

- 441 *Tulostoma gracilipes* J. E. WRIGHT 1987 – **T:** S Africa, Lockenburg
SAfr: SAF (Northern Cape).
 [terricolous on sandy soil; south subtropical]
- 442 *Tulostoma involucreatum* LONG 1947 – **T:** USA, New Mexico
 # *Tulostoma albicans* V. S. WHITE 1901 ss. BOTTOMLEY (1948) p.p.
SAfr: SAF (Kimberley).
 [terricolous on dry sandy soil; south warm-temperate to subtropical]
- 443 *Tulostoma jourdani* PAT. 1886 – **T:** Algeria, El Goleah
NAfr: ALG;
Orie: JOR.
 [terricolous in semideserts on sandy soil; subtropical]
- 444 *Tulostoma kollabae* POUZAR in PILÁT 1958 – **T:** Slovakia, Zahorie
Euro: AUS, FRA (south), GER, HUN, ITA, SLK, SPA, SWE;
MedI: BAL;
NAfr: TUN.
 [terricolous in dry lawns and dunes on sandy and calcareous soils; only in low elevations; temperate to mediterranean]
- 445 *Tulostoma lactipes* BRES. 1920 – **T:** Mozambique
SAfr: MOC, SAF (Northern Cape, Pretoria).
 [terricolous on sandy soil; subtropical]
- 446 *Tulostoma lesliei* VAN DER BIJL 1921 – **T:** S Africa, Durban
 # *Tulostoma album* MASSEE ss. BOTTOMLEY (1948)
SAfr: SAF (Eastern Cape, Kw.-Natal);
EIs: MDG.
 [terricolous on sandy soil; subtropical to tropical]
- 447 *Tulostoma lloydii* BRES. in PETRI 1904 – **T:** USA
Euro: SPA;
MedI: BAL (Ibiza, Mallorca).
 [terricolous in dunes and clear *Pinus* forests; mediterranean]
- 448 *Tulostoma lusitanicum* CALONGE & ALMEIDA 1992 – **T:** Portugal, Estremadura
Euro: POR (Estremadura).
 [terricolous in dunes and clear *Pinus pinea* forest; mediterranean]
- 449 *Tulostoma macowanii* BRES. in PETRI 1904 (“MacOwani”) – **T:** S Africa, Cape of Good Hope
SAfr: SAF (Western Cape).
 [terricolous; warm-temperate]
- 450 *Tulostoma macrocephalum* LONG 1944 – **T:** USA, New Mexico
Euro: SPA;
Maca: CAN (Tenerife).
 [terricolous on dry sandy soil; mediterranean]
- 451 *Tulostoma macrosporum* G. H. CUNN. 1925 – **T:** Australia, New South Wales
SAfr: NAM (Otjivarongo Distr.).
 [terricolous in *Acacia* thornwald on sandy soil; subtropical]

- 452 *Tulostoma melanocyclum* BRES. in PETRI 1904 – **T:** Italy, Trento
Euro: AUS, BEL, BRI, CZE, DAN (E Jylland), FRA, GER, HUN, ITA, LUX, MAC, NED, POR, RUM, RUS (Astrachan), SLK, SWE (Skåne, Öland);
Maca: CAN (Tenerife).
 [terricolous in dry lawns, steppes, and clear coppices on sandy and argillaceous soils, on gyps and limestone; in Germany up to 300 m s. m.; warm-temperate to submediterranean]
- 453 *Tulostoma montanum* PAT. 1897 – **T:** Algeria, Tebessa
NAfr: ALG.
 [terricolous on dry sandy soil, sometimes forming large "fairy rings"; in mountains and high plateaus; submediterranean]
- 454 *Tulostoma moravecii* POUZAR in PILÁT 1958 – **T:** Czechia, Praha
 # *Tulostoma albicans* V. S. WHITE ss. Z. MORAVEC (1953)
Euro: AUS (Burgenl., Marchegg), CZE, HUN, SLK, SPA.
 [terricolous in dry lawns and rock steppes, on calcareous soils; warm-temperate to submediterranean]
- 455 *Tulostoma nanum* (PAT. 1897) J. E. WRIGHT 1987 – **T:** Tunesia, Periana
 = *Tulostoma carneum* PAT. var. *nanum* PAT. 1897
Euro: HUN;
NAfr: TUN;
SAfr: SAF (widespread);
Orie: ISR.
 [terricolous on dry sandy soil; warm-temperate to subtropical]
- 456 *Tulostoma nigeriense* J. E. WRIGHT in DRING 1964 – **T:** Nigeria, Samuru
WAfr: NIG.
 [terricolous on gravelly lateritic soil; subtropical]
- 457 *Tulostoma niveum* KERS 1978 – **T:** Sweden, Uppland, Munkö Isl.
Euro: BRI (Scotland), FIN (south), SWE (C, Öland)
 [musciolous, in tufts of *Tortella tortuosa* and *Ditrichum flexicaule*, on bare limestone rocks; north temperate]
- 458 *Tulostoma obesum* COOKE & ELLIS 1878 – **T:** USA, Colorado
 = *Tulostoma barbeyanum* P. HENN. 1893 – **T:** Yemen, Hodedah
 = *Tulostoma volvulatum* BORSZCZ. var. *elatum* PAT. 1910 – **T:** Sudan
 = *Tulostoma giolanum* BECCARINI in CHIOVENDA 1916 – **T:** Italy
 # *Tulostoma volvulatum* BORSZCZ. ss. HOLLÓS (1904), DRING, WRIGHT, MORNAND et auct. mult.
Euro: FRA (Perpignan), RUS (Astrachan), SPA;
MedI: BAL (Ibiza);
NAfr: ALG, EGY, MAL, MAR, MAU, SOM, SUD, TUN;
Orie: ARM, AZE, GEO, IRN, ISR, JOR, YEM.
 [terricolous in semideserts on sandy and rocky soil; mediterranean to subtropical]
- 459 *Tulostoma opacum* LONG 1944 – **T:** USA, New Mexico
NAfr: MAR.
 [terricolous in semideserts on dry sandy soils; subtropical]
- 460 *Tulostoma pseudopulchellum* MORENO, ALTÉS & WRIGHT 1992 – **T:** Spain, Alcalá de Henares
Euro: SPA (Alcalá de Henares).
 [terricolous in halophilic vegetation on gyps soil; submediterranean]

- 461 *Tulostoma pulchellum* SACC. 1889 – **T:** Australia
 = *Tulostoma hollosii* Z. MORAVEC 1956 – **T:** Czechia, Praha
Euro: CZE, FRA (Var), RUM, SLK (Zahorie);
NAfr: NGR;
Orie: ISR.
 [terricolous in steppes and semideserts on sandy and calcareous soils; warm-temperate to subtropical]
- 461 a – var. *subfuscum* (V. S. WHITE 1901) WRIGHT, MORENO & ALTÉS 1992 – **T:** USA, Colorado
 = *Tulostoma subfuscum* V. S. WHITE 1901
Euro: SLK, SPA (Granada);
SAfr: SAF (Western Cape);
Orie: ISR.
 [terricolous on dry, sandy soil; warm-temperate to mediterranean]
- 462 *Tulostoma purpusii* P. HENN. 1891 – **T:** USA, Colorado
 # *Tulostoma cyclophorum* LLOYD 1906 ss. BOTTOMLEY (1948)
SAfr: SAF (Western Cape).
 [terricolous on sandy soil; warm-temperate]
- 463 *Tulostoma pygmaeum* LLOYD 1906 – **T:** USA, Texas
SAfr: SAF (Western Cape).
 [terricolous; warm-temperate]
- 464 *Tulostoma rufum* LLOYD 1906 – **T:** USA, Alabama
Euro: BEL, FRA;
SAfr: SAF (Western and Eastern Cape).
 [terricolous; warm-temperate]
- 465 *Tulostoma scrupososporum* ALTÉS, MORENO & HAUSKN. 1994 – **T:** Morocco
NAfr: ALG, MAR.
 [terricolous on sandy soil with plant remains; subtropical]
- 466 *Tulostoma squamosum* J. F. GMELIN 1791: PERS. 1801 – **T:** Italy
 = *Tulostoma barlae* QUÉL. 1880 – **T:** France, Alpes maritimes
 = *Tulostoma verrucosum* MORGAN 1890 – **T:** USA, Ohio
 = *Tulostoma mussooriense* P. HENN. 1901 – **T:** India, Mussoorie
 = *Tulostoma bresadolae* PETRI 1904 – **T:** Italy, Firenze
Euro: AUS, BEL, BUL, CZE, FRA, GER, HUN, ITA, LAT, LIT, NED, POR, RUM, RUS, SLK, SPA, SWE;
MedI: BAL (Ibiza, Mallorca);
NAfr: MAR;
SAfr: SAF (Eastern Cape);
Orie: ARM, AZE, GEO.
 [terricolous in rock steppes, dry lawns, clear forests and coppices (*Robinia*, *Spiraea*), in alpine dwarf bush (*Dryas*), on limestone, gyms, and sandy soils; in Germany up to 300 m s. m., the Alps (Switzerland) up to 2300 m s. m.; warm-temperate to subtropical, in more northern regions synanthropic and inconsistent]
- 467 *Tulostoma striatum* G. H. CUNN. 1925 – **T:** Australia, New South Wales
Euro: SPA (Madrid);
SAfr: LES (“Basutoland”);
Orie: ISR.
 [terricolous in semideserts, dunes, waysides, on sandy soil; submediterranean to subtropical]

- 468 *Tulostoma subsquamosum* LONG & S. AHMAD 1947 – **T:** India
Euro: SPA.
 [terricolous on dry sandy soil; mediterranean]
- 469 *Tulostoma transvaali* LLOYD 1921 – **T:** S Africa, Pretoria, Warmbath
SAfr: SAF (North Prov.).
 [terricolous on sandy clayey soil; subtropical]
- 470 *Tulostoma xerophilum* LONG 1946 – **T:** USA, Arizona
Euro: SPA (Lérida, Tarragona);
Orie: IRN.
 [terricolous in dry coppices in litoral and continental dunes; warm-temperate to mediterranean]
- 471 *Tulostoma spec.*
SAfr: SAF (Eastern Cape: Port Elizabeth).
 [terricolous in forest clearing; subtropical]

Gasteromycetes aquatici, incertae sedis

- 472 *Limnoperdon incarnatum* ESCOBAR 1976 – **T:** USA
Euro: AUS (Oberösterreich).
 [aquatic on rotting leaves in freshwater ponds and marshes; temperate]
- 473 *Nia epidermoidea* ROSSELLÓ & DESCALS 1993 – **T:** Balears, Palma de Mallorca
MedI: BAL (Mallorca).
 [aquatic in marine water; mediterranean]
- 474 *Nia vibrissa* MOORE & MEYERS 1959 – **T:** USA
Euro: BRI (Man), DAN (Seeland, Skagerrak), FRA (atl.), SPA (mediterr.).
 [aquatic in marine water; temperate to mediterranean]

Erroneous or doubtful records

- A01 *Arachnion album* SCHW. 1822 – **T:** USA, N Carolina
Euro: ITA (Novara), POL (Gdynia) – doubtful records.
- A02 *Bovista acuminata* (BOSC in FR. 1851) KREISEL 1964 – **T:** Costa Rica
Euro: CZE, RUM, SLV;
Orie: GEO (Lagodechi) – doubtful records; cf. *Bovista ochrotricha*.
Euro: HUN, SLK – records erroneous for *Bovista pusilla*.
- A03 *Bovista echinella* PAT. 1891 – **T:** Ecuador
Euro: AUS, NED – records erroneous for *B. limosa*.
- A04 *Bovista pila* BERK. & CURT. 1873 – **T:** USA, Wisconsin
Euro: GER, HUN, LIT, RUM, RUS (Moscow, Ural), SLK, SWE – doubtful records, see *B. nigrescens*.
- A05 *Bovista ucrainica* P. SOSIN 1952 – **T:** Ukraine
Euro: UKR – doubtful taxon.
- A06 *Calvatia fulvida* P. SOSIN 1952 – **T:** ?Ukraine
Euro: ?UKR – doubtful taxon.
- A07 *Calvatia fumana* P. SOSIN 1952 – **T:** Ukraine, Póltava
Euro: UKR – doubtful taxon.

- A08 *Calvatia heterospora* P. SOSIN 1952 – T: Ukraine
Euro: UKR – doubtful taxon.
- A09 *Calvatia incerta* BOTTOMLEY 1948 – T: S Africa, Bononi
SAfr: SAF – doubtful taxon.
- A10 *Calvatiopsis bovistoides* HOLLÓS 1929 – T: Hungary, Szekszard
Euro: HUN – taxon of doubtful position.
- A11 *Clathrus fischeri* PAT. & HARIOT 1893 – T: Congo francais, rather frequent
CAfr: BRA – doubtful taxon.
- A12 *Clathrus parvulus* BRES. & ROUMEGUÈRE 1899 – T: Sao Tomé
Wisl: SAO – doubtful taxon.
- A13 *Clathrus pseudocancellatus* (E. FISCHER 1900) LLOYD 1909 – T: Lake Nyasa
CAfr: TAN (Kondo Plain);
SAfr: SAF (Transvaal) – doubtful taxon.
- A14 *Cyathus brazlaviensis* P. SOSIN 1952 – T: Ukraine, Vinnitza
Euro: UKR – doubtful taxon.
- A15 *Cyathus graminicola* BUCH in BUCH & KREISEL 1957 – T: Germany, Taucha
Euro: GER (Saxonia) – doubtful species, no type left.
- A16 *Disciseda cervina* (BERK. 1842) HOLLÓS 1903 – T: Argentina, Patagonia, Río Negro
Euro: RUM – record erroneous for *D. bovista*.
- A17 *Disciseda pedicellata* (MORGAN 1892) HOLLÓS 1902 – T: USA
Euro: SWE – doubtful record.
- A18 *Geastrum ambiguum* MONT. 1839 – T: Peru
Euro: HUN – see *G. schweinfurthii*.
- A19 *Geastrum charkovense* P. SOSIN 1952 – T: Ukraine, Charkov
Euro: UKR – doubtful taxon.
- A20 *Geastrum drummondii* BERK. 1845 – T: W Australia, Swan River
Euro: HUN;
Maca: CAP – see *G. schweinfurthii*.
- A21 *Geastrum indicum* (KLOTZSCH 1832) S. RAUSCHERT 1959 – T: West Indies
= *Cycloderma indicum* KLOTZSCH 1832
Euro: GER, LIT, UKR, etc. – records erroneous for *G. triplex*.
- A22 *Geastrum komarovii* P. SOSIN 1952 – T: Ukraine
Euro: UKR – doubtful taxon.
- A23 *Geastrum macowanii* KALCHBR. 1882 („MacOwani“) – T: S Africa, Cape B. Sp.
SAfr: SAF (Western Cape) – doubtful taxon.
- A24 *Geastrum sovieticum* P. SOSIN 1952 – T: Ukraine, Poltava
Euro: UKR – doubtful taxon.
- A25 *Glischroderma cinctum* FÜCKEL 1870 – T: Germany
Euro: BEL, BRI, GER, UKR – no gasteromycete: *Deuteromycetes*.

- A26 *Hydnangium font-queri* HEIM & MALENÇON in herb. – T: France, Montpellier
Euro: FRA (south), SPA (Barcelona) – insufficiently known taxon.
- A27 *Hydnangium nigricans* KALCHBR. 1882 – T: S Africa, Somerset East
SAfr: SAF (Eastern Cape) – doubtful taxon.
- A28 *Hymenogaster arenarius* TUL. & C. TUL. 1844 – T: France, Seine
SAfr: SAF (locality unknown) – doubtful record.
- A29 *Hymenogaster asterigmatus* SOEHNER 1952 – T: Germany, München
Euro: GER (Bayern) – doubtful species.
[hypogeous, assoc. with *Picea* on calcareous soil; temperate]
- A30 *Hymenogaster eurysporus* SOEHNER 1924 – T: Germany, Bayern
Euro: GER (Bayern) – doubtful species.
[hypogeous, assoc. with *Quercus*; temperate]
- A31 *Hymenogaster pilosiusculus* HESSE 1891 – T: Germany, Hessen
Euro: GER – doubtful species.
[hypogeous in deciduous and coniferous (*Picea*) forests on calcareous and loamy soils; temperate]
- A32 *Hymenogaster pruinatus* HESSE 1891 – T: Germany, Hessen
Euro: GER – doubtful species.
[hypogeous in forests, assoc. with *Picea* and *Fagus* on sandy soils; temperate]
- A33 *Hymenogaster reniformis* HESSE 1891 – T: Germany, Hessen, Marburg
Euro: GER – doubtful species.
[hypogeous in deciduous forests on loamy soils, assoc. with *Fagus*; temperate]
- A34 *Hypoblema negrii* MATTIROLI 1924 – T: southern Ethiopia
NAfr: ETI – doubtful taxon.
- A35 *Hysterangium fragile* VITT. 1831 – T: Italy, Padova
Euro: ITA – doubtful species (cf. *H. hessei*).
- A36 *Leucogaster liosporus* HESSE 1882 – T: Germany, Hessen
Euro: GER – doubtful species (cf. *Leucophleps aculeatispora*).
- A37 *Lycoperdon atrum* PAT. 1902 – T: Martinique
Euro: ITA – doubtful record; SPA – see *Lycoperdon umbrinoides*.
- A38 *Lycoperdon curtisiiforme* (HOLLÓS 1904) P. SOSIN 1952 – T: Rumania, South Carpathians, Kras-só-Szörény
Euro: RUM, UKR (Poltava) – doubtful taxon.
- A39 *Lycoperdon echinulatum* BERK. & Br. 1875 – T: Ceylon = Sri Lanka
Euro: HUN, RUS – doubtful records.
- A40 *Lycoperdon floccosum* LLOYD 1905 – T: USA
Euro: CZE, FIN – doubtful records.
- A41 *Lycoperdon glabellum* PECK 1879 – T: USA, New York
Euro: RUM – doubtful record.
- A42 *Lycoperdon kerense* PASSERINI 1875 – T: Ethiopia, Keren
NAfr: ETI – doubtful taxon.

- A43 *Lycoperdon pisiforme* P. HENN. 1897 – **T:** Cameroon, Bipinde
WAfr: CAM – doubtful taxon, type lost.
- A44 *Lycoperdon verrucosum* P. SOSIN 1952 – **T:** Ukraine, Poltava
Euro: UKR – doubtful taxon.
- A45 *Lycoperdon weinmannii* P. SOSIN 1952 – **T:** Ukraine
Euro: UKR – doubtful taxon.
- A46 *Maccagnia carnica* MATTIROLO 1922 – **T:** Italy, Udine
Euro: ITA – taxon insufficiently known, of doubtful position.
- A47 *Melanogaster mollis* LLOYD 1921 – **T:** N America
Euro: POR – doubtful record.
- A48 *Mutinus bambusinus* (ZOLL. 1854) E. FISCHER 1886 – **T:** Indonesia, Java
Euro: BRI – records erroneous for *M. ravenelii*.
- A49 *Mycenastrum lejospermum* MONT. 1847 – **T:** S Africa, Witpoortberg
SAfr: SAF (North-West) – doubtful taxon, no type left.
- A50 *Nidularia pulvinata* (SCHW. 1818) FR. 1823 – **T:** USA, N Carolina
Euro: BRI, CZE, LIT, RUS, SLK – records erroneous for *N. deformis*.
- A51 *Octavianina hessei* O. KUNTZE 1898 – **T:** Germany, Hessen
Euro: GER (Bayern, Hessen) – doubtful species.
[hypogeous; temperate]
- A52 *Octavianina lanigera* (HESSE 1891) O. KUNTZE 1898 – **T:** Germany, Hessen
Euro: GER (Bayern, Hessen) – doubtful species.
[hypogeous in deciduous forests (*Fagus*); temperate]
- A53 *Octavianina tuberculata* (HESSE 1891) O. KUNTZE 1898 – **T:** Germany, Hessen
Euro: GER (Bayern, Hessen), HUN – doubtful species.
[hypogeous in *Fagus* forests; temperate]
- A54 *Phallus canariensis* MONT. 1840 – **T:** Canaries, Gran Canaria
Maca: CAN – doubtful taxon, possibly synonym of *P. rubicundus*.
- A55 *Phallus multicolor* (BERK. & BR. 1883) LLOYD 1907 – **T:** Australia, Queensland
= *Dictyophora echinata* P. HENN. & NYMAN 1900 – **T:** Indonesia, Java
CAfr: CON – doubtful record.
- A56 *Phallus rubicundus* (BOSC 1811) FR. 1822 – **T:** USA, S Carolina
Euro: SPA – record erroneous for *P. rugulosus*.
- A57 *Pompholyx sapidum* CORDA in STURM 1841 – **T:** Czechia, Bohemia
= *Scleroderma sapidum* (CORDA) ZEROVA 1955
Euro: CZE, RUS – doubtful taxon, probably *Scleroderma* spec.
- A58 *Protuberera africana* LLOYD 1920 – **T:** S Africa, Stellenbosch
SAfr: SAF (Western Cape) – doubtful taxon (phalloid egg).
- A59 *Rhizopogon maculatus* ZELLER & DODGE 1918 – **T:** USA
Euro: POR – doubtful record.

- A60 *Rhizopogon nigrescens* COKER & COUCH 1928 – T: USA, N Carolina
Euro: POR – doubtful records.
- A61 *Rhizopogon pannosus* ZELLER & DODGE 1918 – T: USA, California
Euro: SPA – doubtful record.
- A62 *Rhizopogon radicans* LLOYD 1923 – T: S Africa, Knysna
SAfr: SAF (Western Cape) – doubtful taxon.
- A63 *Scleroderma macrosporum* BRANDZA & SOLACOLU 1932 – T: Rumania, Monastirea Neamt
Euro: RUM – doubtful taxon.
- A64 *Scleroderma pottavense* P. SOSIN 1952 – T: Ukraine, Poltava
Euro: UKR – doubtful taxon.
- A65 *Scleroderma rhodesicum* VERWOERD 1926 – T: Zimbabwe, Salisbury = Harare
SAfr: ZIM – doubtful taxon.
- A66 *Scleroderma stellenbosiensis* VERWOERD 1926 – T: S Africa, Stellenbosch
SAfr: SAF (Western Cape) – doubtful taxon.
- A67 *Scleroderma torrendii* BRES. 1902 – T: Portugal, Setubal
Euro: POR – doubtful taxon (nomen ambiguum).
- A68 *Tulostoma albicans* V. S. WHITE 1901 – T: USA, Texas
Euro: CZE – record erroneous for *T. moravecii*.
- A69 *Tulostoma chersonense* P. SOSIN 1952 – T: Ukraine, Cherson
Euro: UKR – doubtful taxon.
- A70 *Tulostoma hygrophilum* LONG & S. AHMAD 1947 – T: India, Sheikhpura Distr.
Ori: IRN (Mozanderan) – doubtful record.
- A71 *Tulostoma pottavense* P. SOSIN 1952 – T: Ukraine, Poltava
Euro: UKR – doubtful taxon.
- A72 *Tulostoma pusillum* BERK. 1842 – T: Philippines
= *Tulostoma bonianum* PAT. 1892 – T: Vietnam, Kien Khe
SAfr: SAF (Western Cape, Pretoria) – doubtful records.
[terricolous in rain forests; subtropical to tropical]
- A73 *Tulostoma vulgare* LONG & S. AHMAD 1947 – T: India
SAfr: SAF (Eastern Cape) – doubtful record.
[terricolous in flooded areas]

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Yemen

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