

## A world key to the species of *Anthracothecium* and *Pyrenula*

André APTROOT

**Abstract:** An identification key is presented for the accepted species of the lichen genera *Anthracothecium* (comprising 5 species) and *Pyrenula* (with 169 species, including 7 still undescribed). The key also contains some similar taxa and is complete for *Blastodesmia* (1 species), *Sulcopyrenula* (4 species), and *Eopyrenula* (6 species), but not for others such as *Aptrootia*, *Architrypethelium*, and *Lithothelium*, of which only the corticolous brown-spored taxa are treated. The following new combinations were found to be necessary: *Anthracothecium interlatens* (Nyl.) Aptroot, *Pyrenula breutelii* (Müll. Arg.) Aptroot, *Pyrenula ceylonensis* (Ajay Singh & Upreti) Aptroot, *Pyrenula fusispora* (Malme) Aptroot, *Pyrenula gibberulosa* (Vain.) Aptroot, *Pyrenula lyoni* (Zahlbr.) Aptroot, *Pyrenula papillifera* (Nyl.) Aptroot, *Pyrenula platystoma* (Müll. Arg.) Aptroot, *Pyrenula schiffneri* (Zahlbr.) Aptroot, *Pyrenula wetwitschii* (Upreti & Ajay Singh) Aptroot, and *Sulcopyrenula subglobosa* (Riddle) Aptroot. *Pyrenula sexluminata* Aptroot is a new name for *Pyrenula quinqueseptata* Aptroot, and *Pyrenula neosandwicensis* Aptroot is a new name for *Anthracothecium sandwicense* Zahlbr. In addition, all known and many novel synonyms are cited, and the disposition of all other taxa in the two genera *Anthracothecium* (with 155 names) and *Pyrenula* (with 745 names) and their generic synonyms. *Bogoriella* was found to be an older name for *Mycomicrothelia*.

**Key words:** *Aptrootia*, *Architrypethelium*, *Blastodesmia*, *Bogoriella*, *Eopyrenula*, lichen, lichenized fungi, *Lithothelium*, *Mycomicrothelia*, *Pyrenulaceae*, *Sulcopyrenula*, taxonomy

### Introduction

The genus *Pyrenula* is a group of crustose lichens typically growing on smooth, shaded bark. It comprises *c.* 745 named taxa worldwide (Aptroot 1991), though this includes some taxa now excluded from the genus as well as many synonyms. It is most speciose in the tropics, with 42 species in Australia (Aptroot 2009) and 55 species known from the small country of Costa Rica alone (Aptroot *et al.* 2008), but with only 10 species in the whole of Europe (Smith *et al.* 2009), with an extra one on the Azores (Aptroot *et al.* 2010). Here, 169 species are recognized in the genus. The genus *Anthracothecium* is a probably related group in which 155 taxa have been described, of which only five species are currently accepted (Aptroot 2009).

The genera have never been monographed, but several recent regional revisions

are in existence, notably for North America (Harris 1989, 1995), Costa Rica (Aptroot *et al.* 2008), India (Upreti 1998), Papua New Guinea (Aptroot *et al.* 1997), New Zealand (Galloway 2007), and Australia (Aptroot 2009). More or less complete species lists exist from the above-mentioned countries, various European countries, as well as from the Azores (Aptroot *et al.* 2010), Japan (Harada *et al.* 2004; Kashiwadani & Aptroot 2009), South Korea (Moon & Aptroot 2009), Hong Kong (Aptroot & Sipman 2001), Taiwan (Aptroot 2003), the Seychelles (Schumm & Aptroot 2010) and Panama (Etayo & Aptroot 2006).

While working on the *Pyrenula* species from such widely separated countries as Costa Rica, the Seychelles, Papua New Guinea and Australia, it was striking that a significant proportion of the flora is shared between them. There are a handful of very common and widespread species, and many more which are much rarer but also widespread. It is surprising that recently described species from one continent often

A. Aptroot: ABL Herbarium, Gerrit van der Veenstraat 107, NL-3762 XK Soest, The Netherlands. Email: andreaptroot@gmail.com

turn up on other continents when the *Pyrenulas* of that region are studied in detail. Apparently, relatively few species are much more local and only rarely are they locally common.

In the process of making the local revisions, many types were investigated as it is usually not enough to rely only upon the original description. In addition, published reports on type studies can be used. At least some species are pantropical and could thus have been described first from a distant corner of the earth (as seen from the viewpoint of the local revision). A further reason was that most descriptions of *Pyrenula* and *Anthracothecium* species miss one or more, or even all, of the following characters, which are generally necessary for a certain identification: UV-reaction, hamathecium inspersion, shape of the ascospore lumina (especially whether there is an endospore between the end lumina and the wall) and disto- or euseptation (essential to distinguish *Pyrenula* and *Anthracothecium* s. str.). None of the publications from the 18th and 19th centuries cite any of these characters, except sometimes a description or illustration of the ascospore lumina. In the first half of the 20th century, the inspersion was often noted, but UV-reactions were only noted in the second half of the 20th century. In some cases, the type needed could not be borrowed but curators kindly checked the UV-reaction.

Still, not all types have been recently studied. In the recent papers mentioned above, or in the relatively few other modern papers dealing with these genera, less than half of the described taxa are treated in some way.

Over the years, several thousands of specimens belonging to these genera have been studied, and information about distribution and morphology, including specimens sent for identification and isotypes of described species, kept accumulating.

It remained unclear whether the recently published local treatments dealt with all accepted species, or whether a vast number of additional species exist, for which in general only the original description (often in latin, and with one or more of the key characters

missing) and the type specimen (rarely more) are in existence. This paper endeavours to answer this question, by keying out all species that are known and summarizing the recognized synonymy, while adding to the synonymy all taxa that can be reliably interpreted on the basis of original observations or of published type studies. In order to make the treatment comprehensive, all taxa that are excluded from *Pyrenula* and *Anthracothecium* and its generic synonyms have also been listed. This still leaves some taxa with unknown or uncertain disposition. They are partly listed at the end but partly listed as a synonym of the most likely species, preceded by a question mark. In two cases, this hinges on only one character that is unknown (one hamathecium inspersion, the other the UV-reaction). Some of these names may take priority when clarified.

Synonyms are listed roughly by date of the basionym; all combinations and other homotypic names are grouped together; if their disposition is uncertain, they together are preceded by only one question mark. No further details are given as to place of publication, type specimens and so forth, as this would make the key much longer and less focused. New synonyms are not noted explicitly, but a few explanatory notes are added, such as where a lectotype is designated. All valid names in *Pyrenula* and *Anthracothecium* are treated, also those below species level. The treatment of invalid and illegitimate names is less comprehensive; such names are marked as 'nom. inval.' or 'nom. illeg.' respectively. A complication is that sometimes in the past there was often no intention to propose a new name. New names were sometimes the result of mistakes, and in some cases were meant to replace previous names, but a direct reference was missing as it was considered superfluous. The authors could not know that direct citation of the replaced name would be retroactively imposed upon them by future designers of the *Code*.

During the research, many type and other specimens have been photographed. A selection of these illustrations will be made available to all on [www.tropicallichens.net](http://www.tropicallichens.net).

In order to make the key more accessible, it also contains some species and genera that are often confused with *Pyrenula* and *Anthracothecium*, and for these taxa the synonymy is given as well. In fact, the key is also complete for *Blastodesmia*, *Sulcopyrenula* and *Eopyrenula*, but not for others such as *Aptrootia*, *Architrypethelium*, and *Lithothelium*, of which only the corticolous brown-spored taxa are treated.

Only six studied species were undescribed, and these are included as ‘ined.’ with a provisional name. They will be described elsewhere in the near future. A few new combinations were necessary. New combinations and new names are formalized in a separate section, nomenclatural novelties, following the key. The taxonomy of the species is mostly that of the recent published treatments, which apply a rather robust species concept. Notable exceptions to the currently accepted taxonomy are noted in the key. At first glance, the systematics of this group might seem rather schematic, with a few characters that in combination define schematic groups. However, there are often additional characters or rather trends associated with these key characters, and the accepted species seem to make sense also in terms of ecology and distribution. The known distribution is noted in each instance.

The generic concept applied here is that in current use since Harris (1989) and Aptroot (1991). Table 1 gives some characteristics of all genera currently accepted in the family *Pyrenulaceae*, as well as *Granulopyrenis*, a species of which turned out to group inside the family in a recent phylogenetic study (Gueidan *et al.* 2008). Most genera are well characterized morphologically, and all but *Pyrenula* contain few species. The family has so far received little attention in phylogenetic studies, and in most genera so far not a single species has been sequenced. The available phylogenetic trees (e.g. Gueidan *et al.* 2008) do, however, suggest that at least some of the well-characterized small genera (notably *Anthracothecium*, *Granulopyrenis* and *Pyrgillus*) are ingroups of *Pyrenula* in the current sense, making *Pyrenula* currently paraphyletic. A wider species sampling is needed to

evaluate this. It is not inconceivable that some of the genera currently recognized in the *Pyrenulaceae* are ingroups of *Pyrenula*, but it should be noted here that the species of, for example, *Pyrgillus* and *Mazaediothecium* are not treated in the keys below because they are not pyrenocarpous. In any case, the focus of the present paper is on species and their identification, not on genera and their delimitation.

### Materials and Methods

The morphology of all specimens was studied with an Olympus SZX7 stereomicroscope and an Olympus BX50 compound microscope with differential interference contrast optics. Chemistry was investigated using short-wave UV light. Names were mostly checked in the original literature.

### Morphology of *Pyrenula* and *Anthracothecium*

In general, pyrenocarpous lichens are poor in key characters, as they have a very simple thallus and a uniform, carbonized ascoma wall structure. Species of *Pyrenula* and *Anthracothecium* are constant in certain characters, while they are quite plastic in others. This can be deduced for instance from the variation within large specimens that grow all around a tree, especially when this tree is at the margin of a forest or at the seashore, where situations differ on different sides.

The thallus is in close contact with the substratum, and therefore is much influenced by its differences. Significant thallus characters are the following: 1) thallus eorticate or corticate; 2) thallus with or without pseudocyphellae (also called maculae or pockets of hyaline crystals); 3) thickness (0.3 mm is often a relevant border); 4) UV-reaction (yellow or negative; whitish reflection is scored as negative); 5) coloration by anthraquinones (KOH+ purple, is occasionally orange, red or yellow, and superficial or in the medulla). The KOH+ brown reaction often noticed in older descriptions is an artefact of an interaction with the bark. A few species have special thallus characters, such

TABLE 1. *Some characteristics of genera currently accepted in the Pyrenulaceae and the genus Granulopyrenis*

	<i>Anthracothecium</i>	<i>Blastodesmia</i>	<i>Clypeopyrenis</i>	<i>Distopyrenis</i>	<i>Eopyrenula</i>	<i>Granulopyrenis</i>	<i>Lithothelium</i>	<i>Mazaedi- thecium</i>	<i>Pyrenula</i>	<i>Pyrgillus</i>	<i>Sulcopyrenula</i>
Hamathecium	paraphyses	paraphyses	paraphyses	paraphyses	paraphyses	pseudo- paraphyses	paraphyses	paraphyses	paraphyses	paraphyses	paraphyses
Eu-/ distoseptate	distoseptate	euseptate	euseptate (?, tiny)	distoseptate	euseptate	distoseptate	distoseptate	distoseptate	distoseptate	distoseptate	distoseptate
Ascospore septation	muriform	transverse	1-septate	1-septate	transverse	1-septate	transverse to sub- muriform	submuriform	transverse to muriform	transverse	submuriform, lozenge- shaped
Ascospore colour	grey to brown	grey to brown	grey to brown	grey to brown	grey to brown	grey to brown	hyaline or red-brown	grey to brown	grey to brown	grey to brown	grey to brown
Ascoma	pyenocarp	pyenocarp	pyenocarp	pyenocarp	pyenocarp	pyenocarp	pyenocarp	mazaedioid	pyenocarp	mazaedioid	pyenocarp
Ascoma wall	carbonized	carbonized	carbonized	carbonized	cellular	carbonized	carbonized	carbonized	carbonized	carbonized	carbonized
Treated in present key	yes	yes	no	no	yes	no	partially	no	yes	no	yes
Number of species	5	1	2	7	6	5	28	3	169	4	4

as a bullate thallus or a silvery or creamy colour. In general, thallus colour is variable within a species (and indeed within a thallus). No significant characters have been noted in the algae (all trentepohlioid) or the hyphal structure. A black prothallus is often present, but is not a reliable character. Soredia and isidia are always absent.

The ascomata are closed pseudothecia with a uniformly carbonized wall. The shape varies from conical to globose, and these extremes are fixed species characters, but more subtle differences in shape (e.g. elongation) are generally induced by the substratum. The amount of wall material underneath the ascoma is also largely correlated with the primary shape and, furthermore, substratum-induced, so it does not represent an independent key character. The presence of anthraquinones (KOH+ purple) is a useful character, just as with the thallus. A red, orange or yellow coloration can be present outside the ascomata, and red crystals are sometimes present inside. The size class of the ascomata is usually a reliable character; at least four classes can be distinguished: up to 0.4 mm diam., 0.4–0.7 mm diam., 0.7–2.0 mm diam. and over 2.0 mm diam. These measurements relate to the outward extension of the carbonization.

The organization of the ascomata on the other hand is an important, and usually constant, character. Ascomata can be simple (only aggregated as if by chance when crowded), or mostly sideways aggregated with common walls but separate ostioles (formerly often classified in *Melanotheca*) or joined with partly common ostioles (species formerly mainly in *Parmentaria* or *Pleurotheciopsis* when ascospores muriform, or in *Pyrenastrum* when ascospores transversely septate). In the latter case, the ostioles are not apical but lateral or eccentric. Ostioles can also be eccentric to lateral while the ascomata are not joined (species formerly mainly in *Parathelium*). This is a reliable character for most species, but one or two species are variable in this respect. When the ostioles are skewed but all point in roughly the same direction, it is an environmentally-induced form of a species with apical ostioles,

usually a collection from a slanting tree. The shape and colour of the ostioles, which has been given much attention in descriptions, is on the other hand quite variable, even within one specimen, and differences are mostly age-related.

The hamathecium can be inspersed with oil droplets or not (or only in the upper half), and there are no distinguishing characters in the filaments. Iodine reactions with IKI can be orange, blue or absent, somewhat correlated with inspersation but also depending on development. A fleeting KOH+ green reaction has been noted in one species only.

The number of ascospores per ascus is more or less constant. Asci can have the ascospores strictly uniseriate or more or less biseriata. No variation has been observed in the ascus structure and size differences are fully dependent on size and number of the ascospores.

The ascospores provide the majority of the key characters. In order to evaluate the ascospore characters, fully developed but not overmature ascospores should be investigated. Measurements should be taken from some of the larger, most coloured ascospores with intact lumina. A section often also contains many smaller, immature ascospores, as well as very large, overmature ascospores in which the lumina are starting to disintegrate. There is considerable variation in ascospore size within and between collections, more so in the species with large, muriform ascospores, where a chance reduction in the number of ascospores per ascus (one suppressed mitotic division) can cause a near doubling of ascospore size.

Other notable ascospore characters are: cilia (rare); colour (grey or brown; orange oil in postmature ascospores or not); transverse, submuriform or muriform septation; number of septa; overall shape (broadly ellipsoid, ellipsoid or fusiform to elongated); curvature (straight or bent); shape of the ends (rounded, pointed or acuminate at one or two ends); shape of the lumina (rounded, angular, diamond-shaped, some or all elongated); the position of the end lumina (directly against the exospore wall or separated from the wall by a layer of endo-

spore); presence or absence of eusepta or bands of dark granules at the tips or between the lumina (not always a reliable character); or the presence of an additional layer of endospore around the lumina.

### World key to the species of *Pyrenula*, *Anthracothecium* and similar genera

Ascospores submuriform to muriform . . . . . Key A  
Ascospores only transversely septate . . . . . Key B

### Key A. Corticolous pyrenocarpous lichens with brown, (sub)muriform ascospores

#### Synopsis for quick access (only first alternative given except at the end)

- 1 Hamathecium filaments distinctly branched to anastomosing . . . . . 2  
4 Hamathecium filaments unclear or absent . . . . . **Agonimia allobata**  
5 Young ascospores with euseptata only; mature ascospores still mainly euseptate  
. . . . . **Anthracothecium s. str.**, 6  
10 Ascospores strongly flattened, with two rows of lumina (lozenge-shaped)  
. . . . . **Sulcopyrenula**, 11  
14 Ascospores submuriform . . . . . 15  
22 Ascomata and/or thallus or medulla with yellow, orange or red anthraquinones .  
. . . . . 23  
28 Ostioles lateral . . . . . 29  
36 Ascospores <25 µm long . . . . . 37  
40 Old ascospores filled with orange oil . . . . . **Pyrenula breutelii**  
41 Ascospores >80 µm long, mostly 2 per ascus . . . . . 42  
Ascospores <80 µm long, mostly 4–8 per ascus . . . . . 45

### Main Key

- 1 Hamathecium filaments distinctly branched to anastomosing over their whole  
length . . . . . 2  
Hamathecium filaments mostly unbranched or unclear . . . . . 4  
2(1) Ascospores 200–330 µm long; New Zealand . . . . .  
. . . . . **Aptrootia elatior (Stirt.) Aptroot**  
[*Ascidium elatius* Stirt., *Leptotrema elatius* (Stirt.) Müll. Arg., *Thelotrema elatius* (Stirt.) Hellb.,  
*Laurera elatior* (Stirt.) D. J. Galloway, *Anthracothecium monosporum* Müll. Arg., *Polyblastiopsis*  
*monospora* (Müll. Arg.) Upreti & Ajay Singh, *Julella monospora* (Müll. Arg.) D.D. Awasthi]  
Ascospores 20–40 µm long . . . . . 3

- 3(2) Ascospores smooth, with pointed ends; California; . . . . .  
 . . . . . **Thelenella hassei (Zahlbr.) H. Magn.**  
 (*Microglæna hassei* Zahlbr., *Microglæna sychnogonoides* Zahlbr.)
- Ascospores warted, with rounded ends; pantropical. . . . .  
 . . . . . **Mycomicrothelia decipiens (Müll. Arg.) R.C. Harris**  
 (*Anthracothecium decipiens* Müll. Arg., *Bogoriella subpersicina* Zahlbr., *Anthracothecium corcovadense*  
 Malme, *Ornatopyrenis muriformis* Aptroot)
- Note: The new synonym *Bogoriella subpersicina* Zahlbr. is the type and only species of *Bogoriella*  
*Zahlbr.*, which antedates *Mycomicrothelia* Rehm by a decade, necessitating either conservation of  
 the little-used generic name *Mycomicrothelia*, or a transfer of the currently accepted species to  
*Bogoriella*.
- 4(1) Hamathecium filaments unclear or absent. . . . .  
 . . . . . **Agonimia allobata (Stizenb.) P. James**  
 [*Verrucaria allobata* Stizenb., *Polyblastia allobata* (Stizenb.) Zsch.]
- Hamathecium filaments mostly unbranched. . . . . 5
- 5(4) Young ascospores with euseptata only; mature ascospores still mainly euseptate  
 . . . . . **Anthracothecium s. str.**, 6  
 Septation only or mostly distoseptate, with notably thickened endospore . . 10
- 6(5) Ascomata mostly single. . . . . 7  
 Ascomata mostly aggregated with a shared ostiole. . . . . 9
- 7(6) Ostiole apical . . . . . 8  
 Ostiole lateral; pantropical . . . . .  
 . . . . . **Anthracothecium australiense (Müll. Arg.) Aptroot**  
 [*Pleurothelium australiense* Müll. Arg., *Pleurotheliopsis australiense* (Müll. Arg.) Zahlbr., *Bottaria*  
*collospora* Vain., *Anthracothecium collosporium* (Vain.) Zahlbr., *Pleurotheliopsis nanam* Zahlbr., *Anthra-*  
*cothecium nanum* (Zahlbr.) R.C. Harris, *Parmentaria nana* (Zahlbr.) R.C. Harris, *Parmentaria*  
*subastroidea* var. *subsimplex* Müll. Arg., *Astrothelium congregans* Eckf. (nom. inval.), ? *Verrucaria*  
*guineensis* Nyl., *Anthracothecium guineense* (Nyl.) Müll. Arg., *Pleurotheliopsis erigens* Kashiw., *Anthra-*  
*cothecium erigens* (Kashiw.) H. Harada]
- 8(7) Ascospores 6–8 per ascus; pantropical . . . . .  
 . . . . . **Anthracothecium prasinum (Eschw.) R.C. Harris**  
 [*Verrucaria prasina* Eschw., *Acrorixis prasina* (Eschw.) Trevis., *Anthracothecium eschweileri* Müll.  
 Arg., *Verrucaria praelustris* Krempelh., *Anthracothecium praelustre* (Krempelh.) Müll. Arg., *Trypethel-*  
*ium pallidum* C. Knight, *Parmentaria pallida* (C. Knight) Shirley, *Verrucaria thwaitesii* Leight.,  
*Verrucaria borbonica* Nyl., *Sporodictyon borbonicum* (Nyl.) Trevis., *Anthracothecium borbonicum* (Nyl.)  
 Müll. Arg., *Anthracothecium angulatum* Zahlbr., *Anthracothecium angulatum* var. *majus* Zahlbr.,  
*Anthracothecium majus* (Zahlbr.) Kashiw. & Kurok., *Julella luzonensis* P. Henn., *Titanella luzonensis*  
 (P. Henn.) Syd. & P. Syd., *Pleamphisphaera luzonensis* (P. Henn.) Höhnelt, ? *Anthracothecium*  
*speciosum* f. *iturupiense* O. B. Blum, *Anthracothecium pseudoborbonicum* Upreti & Ajay Singh]
- Ascospores 1–4 per ascus; pantropical . . . . .  
 . . . . . **Anthracothecium macrosporium (Hepp) Müll. Arg.**  
 [*Verrucaria macrospora* Hepp, *Anthracothecium doleschallii* A. Massal., *Verrucaria andamanica* Nyl.,  
*Anthracothecium andamanicum* (Nyl.) Müll. Arg., *Bottaria columellata* Vain., *Anthracothecium colu-*  
*mellatum* (Vain.) Zahlbr., *Anthracothecium manipurensis* Müll. Arg., ? *Verrucaria luteonitens* Nyl.,  
*Anthracothecium luteonitens* (Nyl.) Zahlbr., *Julella dactylospora* Rehm, *Anthracothecium japonicum*  
 Kashiw. & Kurok., *Pyrenula neojaponica* H. Harada, *Anthracothecium megaspermum* Patw. &  
 Makhija, *Anthracothecium indicum* Ajay Singh]
- 9(6) Ascospores 6–8 per ascus; Australasian, possibly also Africa . . . . .  
 . . . . . **Anthracothecium gregale (C. Knight) Aptroot**  
 [*Trypethelium gregale* C. Knight, *Parmentaria gregalis* (C. Knight) Müll. Arg., *Trypethelium subpla-*  
*num* C. Knight, *Parmentaria subplana* (C. Knight) Müll. Arg.]
- Ascospores 1–2 per ascus; pantropical . . . . .  
 . . . . . **Anthracothecium interlatens (Nyl.) Aptroot comb. nov.**

- 10(5) Ascospores strongly flattened, with two rows of lumina (lozenge-shaped) . . . . . **Sulcopyrenula**, 11  
 Ascomata not flattened, circular in transverse section . . . . . 14
- 11(10) Thallus UV- . . . . . 12  
 Thallus UV+ yellow . . . . . 13
- 12(11) Hamathecium inspersed; neotropical . . . . .  
 . . . . . **Sulcopyrenula canellae-albae (Fée) H. Harada**  
 [*Pyrenula canellae-albae* Fée, *Verrucaria canellae-albae* (Fée) Nyl., *Sporodictyon canellae-albae* (Fée) Trevis., also as *Sporodictyon canellae* (Fée) Trevis., *Anthracothecium canellae-albae* (Fée) Müll. Arg., *Bottaria canellae-albae* (Fée) Vain., *Verrucaria punctuliformis* Stizenb., *Anthracothecium punctuliforme* (Stizenb.) Müll. Arg.]  
 Hamathecium not inspersed; pantropical . . . . .  
 . . . . . **Sulcopyrenula staurospora (Tuck.) H. Harada**  
 [*Pyrenula staurospora* Tuck., *Anthracothecium staurosporum* (Tuck.) Zahlbr., *Anthracothecium tetraspernum* Riddle]
- 13(11) Ascospores ellipsoid, *c.* 2 times as long as wide; neotropical . . . . .  
 . . . . . **Sulcopyrenula cruciata Aptroot**  
 Ascospores nearly globose; neotropical. . . . .  
 . . . . . **Sulcopyrenula subglobosa (Riddle) Aptroot comb. nov.**
- 14(10) Ascospores submuriform, only one or a few of the median cells with longitudinal septa . . . . . 15  
 Ascospores muriform (when ascospores small, logically only few septa can be present; when in doubt, start with the first alternative) . . . . . 22
- 15(14) Ostiole lateral . . . . . 16  
 Ostiole apical . . . . . 18
- 16(15) Ascospores <35 µm long . . . . . 17  
 Ascospores 45–65 µm long; neotropical . . **Pyrenula erumpens R.C. Harris**
- 17(16) Ascospores 15–22 µm long; Australasian . . . . .  
 . . . . . **Lithothelium hieroglyphicum Aptroot**  
 Ascospores 24–32 µm long; Australasian . . . . .  
 . . . . . **Pyrenula subumbilicata (C. Knight) Aptroot**  
 [*Trypethelium subumbilicatum* C. Knight, *Parmentaria subumbilicata* (C. Knight) Müll. Arg., *Pyrenastrum knightii* Müll. Arg. *Pyrenula immersa* Müll. Arg.]
- 18(15) Ascospores <35 µm long . . . . . 19  
 Ascospores 34–72 µm long . . . . . 21
- 19(18) Ascospores 14–23 µm long, hamathecium not inspersed; eastern palaeotropical (Australia to Japan). . . **Lithothelium nanosporum (C. Knight) Aptroot**  
 [*Trypethelium nanosporum* C. Knight, ? *Verrucaria pusilla* Ach., *Anthracothecium pusillum* (Ach.) Müll. Arg., *Parmentaria microspora* Müll. Arg., *Anthracothecium laevigatum* Müll. Arg., *Pyrenula neolaevigata* H. Harada, *Lithothelium submuriforme* R.C. Harris & Aptroot]  
 Ascospores 23–35 µm long . . . . . 20
- 20(19) Ascospores 23–35 µm long, hamathecium not inspersed; eastern palaeotropical. . . . . **Pyrenula gibberulosa (Vain.) Aptroot comb. nov.**  
 Ascospores 23–33 µm long, hamathecium inspersed; eastern palaeotropical (India) . . . . . **Pyrenula darjeelingensis Jagadeesh Ram & G.P. Sinha**

- 21(18) Ascospores with pointed ends, hamathecium not inspersed; eastern palaeotropical (Australia to Japan). . . . . **Pyrenula subvariolosa (C. Knight) Aptroot**  
 [*Anthracothecium subvariolosum* C. Knight, *Verrucaria subvariolosa* C. Knight, *Trypethelium planum* C. Knight, *Parmentaria plana* (C. Knight) Shirley, *Trypethelium umbilicatum* C. Knight, *Parmentaria umbilicata* (C. Knight) Shirley, *Bottaria umbilicata* (C. Knight) Müll. Arg., *Anthracothecium asahinae* Kashiw. & Kurok., *Pyrenula asahinae* (Kashiw. & Kurok.) H. Harada]  
 Ascospores with rounded ends, hamathecium inspersed; neotropical. . . . .  
 . . . . . **Pyrenula novemseptata Vain.**  
 [*Anthracothecium novemseptatum* (Vain.) R.C. Harris, *Anthracothecium varians* R.C. Harris]  
 Note: All specimens examined, including some studied by Harris, have distoseptate spores.
- 22(14) Ascomata and/or thallus or medulla with yellow, orange or red anthraquinones . . . . . 23  
 Anthraquinones absent . . . . . 28
- 23(22) Thallus warts internally with soft orange medulla; Philippines . . . . .  
 . . . . . **Pyrenula endocrocea Aptroot ined.**  
 Anthraquinone outside . . . . . 24
- 24(23) Ascomata and/or thallus red . . . . . 25  
 Ascomata and/or thallus yellow to orange . . . . . 27
- 25(24) Ostiole apical, hamathecium inspersed; neotropical. . . . .  
 . . . . . **Pyrenula cruentata (Müll. Arg.) R.C. Harris**  
 [*Bottaria cruentata* Müll. Arg., *Anthracothecium cruentatum* (Müll. Arg.) Müll. Arg., *Trypethelium cruentatum* Nyl. (nom. nud.), *Bottaria cruentata* var. *chlorotica* Müll. Arg.]  
 Ostiole lateral, hymenium not inspersed . . . . . 26
- 26(25) Ascomata partly fused with joint ostioles, ascospores with up to 6 lumina per tier; Caribbean. . . . . **Pyrenula kermesina R.C. Harris**  
 Ascomata solitary, ascospores with up to 2 lumina per tier; Pacific . . . . .  
 . . . . . **Pyrenula palmarum (Krempelh.) R.C. Harris**  
 [*Verrucaria palmarum* Krempelh., *Anthracothecium palmarum* (Krempelh.) Vain., *Bottaria palmarum* (Krempelh.) Vain.]
- 27(24) Ascospores 10–23 µm long, with 3 primary septa; pantropical . . . . .  
 . . . . . **Pyrenula ochraceoflava (Nyl.) R.C. Harris**  
 [*Verrucaria ochraceoflava* Nyl., *Anthracothecium ochraceoflavum* (Nyl.) Müll. Arg., *Sporodictyon ochraceoflavum* (Nyl.) Trevis., *Verrucaria ochraceoflava* f. *nudior* Nyl., *Anthracothecium ochraceoflavum* f. *nudius* (Nyl.) Zahlbr., *Bottaria nudior* (Nyl.) Vain., *Verrucaria denudata* f. *ochrotropa* Nyl., *Bottaria ochrotropa* (Nyl.) Vain., *Anthracothecium denudatum* var. *ochrotropum* (Nyl.) Zahlbr., *Anthracothecium ochrotropum* (Nyl.) Zahlbr., *Bottaria ochraceoflava* var. *ochrotropa* (Nyl.) Vain., *Verrucaria albescens* ssp. *subochracea* Nyl., *Bottaria subochracea* (Nyl.) Vain., *Bottaria albescens* ssp. *subochracea* (Nyl.) Vain., *Anthracothecium albescens* var. *subochraceum* (Nyl.) Zahlbr., *Anthracothecium subochraceum* (Nyl.) Zahlbr., *Anthracothecium coccineum* Müll. Arg., *Bottaria coccinea* (Müll. Arg.) Vain., *Verrucaria vitellina* Stizenb., *Anthracothecium vitellinum* (Stizenb.) Müll. Arg., *Anthracothecium ochroxanthum* Müll. Arg., *Bottaria ochrotropa* var. *cruenta* Räsänen, *Bottaria ochrotropa* var. *cinnamomea* Räsänen]  
 Note: Specimens with small ascospores with two layers of lumina are . . . . .  
 . . . . . **Pyrenula ochraceoflava var. pacifica P.M. McCarthy**  
 [*Bottaria rosea* Vain., *Anthracothecium roseum* (Vain.) Zahlbr.]  
 Ascospores 23–35 µm long, with 5–7 primary septa; neotropical . . . . .  
 . . . . . **Pyrenula ochraceoflavens (Nyl.) R.C. Harris**  
 [*Verrucaria ochraceoflavens* Nyl., *Anthracothecium ochraceoflavens* (Nyl.) Zahlbr., *Bottaria ochraceoflava* ssp. *ochraceoflavens* (Nyl.) Vain.]
- 28(22) Ostioles lateral . . . . . 29  
 Ostioles apical (here species of the non-pyrenocarpous genus *Leptotrema* would key out also, characterized by stiff paraphyses in a dense layer) . . . . . 36

- 29(28) Ascospores <70  $\mu\text{m}$  long . . . . . 30  
 Ascospores >70  $\mu\text{m}$  long . . . . . 32
- 30(29) Ascomata at least partly fused with a more or less joint ostiole . . . . . 31  
 Ascomata all single, ascospores 15–33  $\mu\text{m}$  long; eastern palaeotropical (Andaman Islands) . . . . . **Pyrenula microspora (Nagarkar & Patw.) Upreti**  
*(Pleurothelium microsporum Nagarkar & Patw., Pleurotheliopsis andamanensis Ajay Singh & Upreti, Pyrenula subandamanica Upreti)*
- 31(30) Ascospores 25–45  $\mu\text{m}$  long; pantropical . . . . .  
 . . . . . **Pyrenula astroidea (Fée) R.C. Harris**  
*[Parmentaria astroidea Fée, Verrucaria aspistea var. astroidea (Fée) Nyl., Pyrenastrum astroideum (Fée) Eschw., Verrucaria astroidea (Fée) Nyl., Parmentaria cinchonarum Fée, Verrucaria libricola var. cinchonarum (Fée) Nyl., ? Pyrenastrum album Eschw., Pyrenastrum album ssp. coronatum (Eschw.) Eschw., Pyrenastrum americanum Spreng., Pyrenastrum astroideum var. duplicatum Nyl., Heufleridium pentagastricum Müll. Arg., Parmentaria baileyana Müll. Arg., also as Parmentaria baileyi Müll. Arg., Parmentaria zenkeri Müll. Arg., Pleurotheliopsis asahinae Zahlbr., Parmentaria pluricarpa Ajay Singh, Pyrenula pluricarpa (Ajay Singh) Upreti, Parmentaria mamillata Ajay Singh, Pyrenula mamillata (Ajay Singh) Upreti, Anthracothecium immersum Patw. & Makhija, Parmentaria immersa (Patw. & Makhija) Ajay Singh, Pyrenula karnatakensis Upreti, Parmentaria andamanica Upreti & Ajay Singh, Pyrenula bicarpa Upreti]*
- Ascospores 45–70  $\mu\text{m}$  long; pantropical . . . . .  
 . . . . . **Pyrenula ravenelii (Tuck.) R.C. Harris**  
*[Pyrenastrum ravenelii Tuck., Parmentaria ravenelii (Tuck.) Müll. Arg., Pyrenastrum gemmeum Tuck., Verrucaria pyrenastroides C. Knight, Astrothelium pyrenastroides (C. Knight) C. Knight, Parmentaria pyrenastroides (C. Knight) Müll. Arg., Pyrenula pyrenastroides (C. Knight) D.J. Galloway, Astrothelium prostratum Stirt., Parmentaria prostrata (Stirt.) Müll. Arg., Heufleridium prostratum (Stirt.) Müll. Arg., Parmentaria consanguinea Müll. Arg., ? Pleurothelium inclinatum Müll. Arg., Anthracothecium inclinatum (Müll. Arg.) Kashw., Parmentaria prostrata (Stirt.) Müll. Arg., Pyrenula prostrata (Stirt.) D. J. Galloway, Astrothelium ochroleistum Nyl., Bathelium megaspermum var. tasmanicum Jatta, ? Parmentaria chevallieri B. de Lesd., Laurera megasperma var. tasmanica (Jatta) Zahlbr., Parmentaria ceylonensis Upreti & Ajay Singh, Pyrenula nova-granadensis Upreti & Ajay Singh]*
- 32(29) Ascospores 2 per ascus, 135–200  $\mu\text{m}$  long; pantropical . . . . .  
 . . . . . **Pyrenula lyoni (Zahlbr.) Aptroot comb. nov.**  
 Ascospores 4–8 per ascus . . . . . 33
- 33(32) Ascospores 100–135  $\mu\text{m}$  long . . . . . 34  
 Ascospores 50–110  $\mu\text{m}$  long . . . . . 35
- 34(33) Ascomata mostly fused; pantropical . . . . .  
 . . . . . **Pyrenula schiffneri (Zahlbr.) Aptroot comb. nov.**  
 Ascomata rarely fused; neotropical. . . **Pyrenula chilensis (Fée) R.C. Harris**  
*(Parmentaria chilensis Fée)*
- 35(33) Ascospores 70–110  $\mu\text{m}$  long; N. Atlantic (W. Europe & Macaronesia). . . . .  
 . . . . . **Pyrenula hibernica (Nyl.) Aptroot**  
*[Verrucaria hibernica Nyl., Verrucaria pyrenuloides var. hibernica (Nyl.) Carroll, Anthracothecium hibernicum (Nyl.) A.L. Sm., Polyblastia hibernica (Nyl.) Arnold]*  
 Ascospores 50–90  $\mu\text{m}$  long; eastern palaeotropical (India) . . . . .  
 . . . **Pyrenula ceylonensis (Ajay Singh & Upreti) Aptroot comb. nov.**
- 36(28) Ascospores <25  $\mu\text{m}$  long . . . . . 37  
 Ascospores >25  $\mu\text{m}$  long . . . . . 40
- 37(36) Hamathecium inspersed, ascospores 20–25  $\mu\text{m}$  long; Borneo. . . . .  
 . . . . . **Pyrenula borneensis Aptroot ined.**  
 Hamathecium not inspersed . . . . . 38

- 38(37) Thallus UV+yellow; pantropical . . . . . **Pyrenula confinis (Nyl.) R.C. Harris**  
 [*Verrucaria confinis* Nyl., *Sporodictyon confine* (Nyl.) Trevis., *Anthracotheceum confine* (Nyl.) Müll. Arg., *Bottaria confinis* (Nyl.) Vain., *Anthracotheceum corticatum* Müll. Arg., *Pyrenula corticata* (Müll. Arg.) R. C. Harris, *Verrucaria albescens* Nyl., *Sporodictyon albescens* (Nyl.) Trevis., *Anthracotheceum albescens* (Nyl.) Müll. Arg., *Bottaria connectens* Vain.]  
 Thallus UV- . . . . . 39
- 39(38) Ascospores 15–22 µm long; pantropical . . . . .  
 . . . . . **Pyrenula parvinuclea (Meyen & Flot.) Aptroot**  
 [*Verrucaria parvinuclea* Meyen & Flot., *Anthracotheceum parvinucleum* (Meyen & Flot.) Zahlbr., *Bottaria parvinuclea* (Meyen & Flot.) Vain., *Verrucaria denudata* Nyl., *Sporodictyon denudatum* (Nyl.) Trevis., *Anthracotheceum denudatum* (Nyl.) Zahlbr., *Bottaria denudata* (Nyl.) Vain., *Bottaria parameroides* Vain., *Anthracotheceum parameroides* (Vain.) Müll. Arg., *Bottaria subconnectens* Vain., *Anthracotheceum avasthii* Ajay Singh, *Anthracotheceum angolense* Upreti & Ajay Singh]  
 Ascospores 7–10 µm long; India . **Pyrenula nanospora (Ajay Singh) Upreti**  
 (*Anthracotheceum nanosporum* Ajay Singh)
- 40(36) Old ascospores filled with orange oil . . . . .  
 . . . . . **Pyrenula breutelii (Müll. Arg.) Aptroot comb. nov.**  
 Old ascospores without orange oil . . . . . 41
- 41(40) Ascospores >80 µm long, mostly 2/ascus . . . . . 42  
 Ascospores <80 µm long, mostly 4–8/ascus . . . . . 45
- 42(41) Hamathecium inspersed, ascospores 90–200 µm long; pantropical . . . . .  
 . . . . . **Pyrenula globifera (Eschw.) Aptroot**  
 [*Verrucaria globifera* Eschw., *Sporodictyon globiferum* (Eschw.) Trevis., *Anthracotheceum globiferum* (Eschw.) Müll. Arg., ? *Pyrenula variolosa* Pers., *Anthracotheceum variolosum* (Pers.) Müll. Arg., *Verrucaria variolosa* (Pers.) Mont., *Polyblastia variolosa* (Pers.) Trevis., *Sporodictyon variolosum* (Pers.) Trevis., *Bottaria variolosa* (Pers.) Vain., *Verrucaria epapillata* Nyl., *Sporodictyon epapillatum* (Nyl.) Trevis., *Anthracotheceum epapillatum* (Nyl.) Müll. Arg., *Bottaria epapillata* (Nyl.) Vain., *Verrucaria aperta* Nyl., *Anthracotheceum opertum* (Nyl.) Müll. Arg., *Anthracotheceum paraguayense* Malme, ? *Anthracotheceum globiferum* var. *microsporum* Ajay Singh, *Anthracotheceum austroindicum* Ajay Singh]  
 Note: neotropical specimens are rarely UV+ yellow. Such specimens are possibly worth recognition at species level. For the time being, the UV- reaction of specimens of this species should be noted.  
 Hamathecium not inspersed . . . . . 43
- 43(42) Thallus without pseudocyphellae, ascospores 80–140(–155) µm long; pantropical . . . . . **Pyrenula platystoma (Müll. Arg.) Aptroot comb. nov.**  
 Thallus with pseudocyphellae . . . . . 44
- 44(43) Ascospores 80–110 µm long; neotropical . . . . .  
 . . . . . **Pyrenula neosandwicensis Aptroot nom. nov.**  
 Ascospores 115–180 µm long; pantropical . . . . .  
 . . . . . **Pyrenula duplicans (Nyl.) Aptroot**  
 [*Verrucaria duplicans* Nyl., *Anthracotheceum duplicans* (Nyl.) Müll. Arg., *Anthracotheceum exsertum* (Krempelh.) Müll. Arg., *Verrucaria exserta* Krempelh., *Verrucaria interponens* Nyl., *Polyblastia interponens* (Nyl.) Müll. Arg., *Anthracotheceum interponens* (Nyl.) Müll. Arg., *Anthracotheceum maculatum* Nagarkar & Patw., *Verrucaria assamiensis* Stirt., *Parmentaria assamiensis* (Stirt.) Zahlbr., *Anthracotheceum assamiense* (Stirt.) Ajay Singh, *Anthracotheceum pseudocyphellatum* Ajay Singh, *Anthracotheceum pustuliferum* Ajay Singh]
- 45(41) Hamathecium inspersed, ascospores 30–45 µm long; India . . . . .  
 . . . . . **Pyrenula sublaevigata (Patw. & Makhija) Upreti**  
 (*Anthracotheceum sublaevigatum* Patw. & Makhija)  
 Hamathecium not inspersed . . . . . 46

- 46(45) Lumina relatively large and angular, with up to 6 between 2 primary septa; pantropical . . . . . **Pyrenula leucostoma Ach.**  
 [*Anthracothecium leucostomum* (Ach.) Malme, *Sporodictyon feei* var. *leucostomum* (Ach.) Trevis., ? *Pyrenula subcutanea* Fée (nom. illeg.), *Anthracothecium subcutaneum* Müll. Arg., *Pyrenula libricola* Fée, *Verrucaria libricola* (Fée) Nyl., *Anthracothecium libricolum* (Fée) Müll. Arg., *Bottaria libricola* (Fée) Vain., *Sporodictyon feei* var. *libricolum* (Fée) Trevis., *Sporodictyon feei* Trevis., ? *Anthracothecium javanicum* (Hepp) Zahlbr., *Verrucaria javanica* Hepp, *Verrucaria paramera* Nyl., *Bottaria paramera* (Nyl.) Vain., *Anthracothecium paramerum* (Nyl.) Müll. Arg., *Verrucaria analepta* var. *americana* Ach., *Anthracothecium americanum* (Ach.) Müll. Arg., *Verrucaria emergens* Leight., *Anthracothecium emergens* (Leight.) Zahlbr., *Bottaria paramera* f. *pallidoalba* Vain., *Anthracothecium paramerum* f. *pallidoalbum* (Vain.) Zahlbr., *Bottaria endococcinea* Vain., *Anthracothecium endococcineum* (Vain.) Zahlbr., *Bottaria submucosa* Vain., *Anthracothecium submucosum* (Vain.) Zahlbr., *Bottaria erythrinae* Vain., *Anthracothecium erythrinae* (Vain.) Zahlbr., *Pyrenula pachycheila* Tuck., *Anthracothecium pachycheilum* (Tuck.) Zahlbr., *Parmentaria rappii* Zahlbr., *Anthracothecium fraternale* Zahlbr., *Anthracothecium obscuratum* Upreti & Ajay Singh]
- Lumina mostly round, at least in the central part of the ascospore with more than 6 between 2 primary septa . . . . . 47
- 47(46) Ascospores >50 µm long . . . . . 48  
 Ascospores <50 µm long . . . . . 49
- 48(47) Ascospores with rounded ends; pantropical . . . . .  
 . . . . . **Pyrenula pyrenuloides (Mont.) R.C. Harris**  
 [*Trypethelium pyrenuloides* Mont., *Bathelium pyrenuloides* (Mont.) Trevis., *Verrucaria pyrenuloides* (Mont.) Nyl., *Pyrenastrum pyrenuloides* (Mont.) Nyl., *Anthracothecium pyrenuloides* (Mont.) Müll. Arg., *Bottaria pyrenuloides* (Mont.) Vain., ? *Pyrenula cinerosa* Ach., *Anthracothecium cinerosum* (Ach.) Müll. Arg., *Verrucaria pyrenoica* Ach., also as *Verrucaria pyrinoica* Ach., *Sporodictyom pyrenoicum* (Ach.) Trevis., also as *Sporodictyom pyrinoicum* (Ach.) Trevis., *Parmentaria pyrenoica* (Ach.) Müll. Arg., also as *Parmentaria pyrinoica* (Ach.) Müll. Arg., *Verrucaria variolosa* f. *pyrenoica* (Meyen & Flot.) Nyl., *Anthracothecium goniostomum* Müll. Arg., *Anthracothecium amphitropum* Müll. Arg., *Verrucaria globifera* ssp. *depressa* Eschw., *Verrucaria depressa* (Eschw.) Meyen & Flot., *Spermatodium depressum* (Eschw.) Trevis., *Anthracothecium depressum* (Eschw.) Müll. Arg., *Anthracothecium sandwicense* var. *convexum* Zahlbr., *Anthracothecium cristatellum* Nagarkar & Patw., *Anthracothecium leightonii* Patw. & Makhijja]
- Ascospores with pointed ends; pantropical . . . . .  
 . . . . . **Pyrenula papillifera (Nyl.) Aptroot comb. nov.**
- 49(47) Ascospores 25–35 µm long; palaeotropical. . . . .  
 . . . . . **Pyrenula welwitschii (Upreti & Ajay Singh) Aptroot comb. nov.**  
 Ascospores >35 µm long . . . . . 50
- 50(49) Ascospores 11–15 µm wide; pantropical . . . . . **Pyrenula thelomorpha Tuck.**  
 [also as *Pyrenula thelomorpha* Tuck., *Bottaria thelomorpha* (Tuck.) Vain., also as *Bottaria thelomorpha* (Tuck.) Vain., *Anthracothecium thelomorphum* (Tuck.) Zahlbr., also as *Anthracothecium thelomorphum* (Tuck.) Zahlbr., *Verrucaria cellulosa* C. Knight, *Anthracothecium cellulosum* (C. Knight) Müll. Arg.]
- Ascospores 14–22 µm wide. . . . . 51
- 51(50) Old ascospores filled with colourless oil; neotropical . . . . .  
 . . . . . **Pyrenula oleosa R.C. Harris**  
 Old ascospores without oil, shriveling when old; neotropical . . . . .  
 . . . . . **Pyrenula dissimulans (Müll. Arg.) R.C. Harris**  
 (*Pleurothelium dissimulans* Müll. Arg., *Anthracothecium cascarillae* Müll. Arg.)

**Key B. Corticolous pyrenocarpous lichens with brown, transversely septate ascospores**

**Synopsis for quick access (only first alternative given except at the end)**

1	Ascospores 2-septate . . . . .	2
3	Hamathecium anastomosing, ascospores >90 µm long . <b>Architrypethelium</b> , 4	
5	Ascospores nearly only euseptate, lumina rectangular . . . . .	6
15	Ascospores red-brown and lumina at least becoming rounded when older . . . . .	<b>Lithothelium</b> , 16
20	Ostioles pointing in various directions, mostly eccentric to lateral . . . . .	21
39	Ascospores with many hyaline cilia at the ends . . . . .	40
41	Ascospores at least partly or seemingly with more than 3 septa . . . . .	42
53	Ascospores mostly >50 µm long . . . . .	54
59	Lumina not in a straight line, somewhat to strongly zig-zag. . . . .	60
61	Ascomata and/or thallus with yellow, orange or red anthraquinones on the outside . . . . .	62
70	Ascomata mostly aggregated, with fused walls but with separate ostioles. . . . .	71
80	Thallus ecorticate, whitish . . . . .	81
85	Old ascospores with orange oil . . . . .	86
87	Terminal lumina all directly against the exospore wall . . . . .	88
107	Hamathecium interspersed . . . . .	108
119	Thallus UV+yellow . . . . .	120
123	Ascospores mostly >25 µm long . . . . .	124
135	Ascospores mostly 21–25 µm long . . . . .	136
–	Ascospores mostly <21 µm long . . . . .	142

**Main Key**

1	Ascospores 2-septate (no <i>Pyrenula</i> species with 1-septate ascospores are known, corticolous pyrenocarpous lichens with 1-septate brown ascospores include species of <i>Clypeopyrenis</i> , <i>Distopyrenis</i> , <i>Distothelia</i> , <i>Parapyrenis</i> , <i>Granulopyrenis</i> , and <i>Mycomicrothelia</i> ) . . . . .	2
	Ascospores at least 3-septate . . . . .	3
2(1)	Ascospore septation symmetrical; pantropical . . . . .	<b>Pyrenula lineatostroma Aptroot</b> ( <i>Melanotheca indica</i> Nyl., <i>Pyrenula subindica</i> Upreti, <i>Melanotheca indica</i> var. <i>vaga</i> Nyl.)
	Ascospore septation strongly asymmetrical; Madagascar . . . . .	<b>Lacrymospora parasitica Aptroot</b>
3(1)	Hamathecium anastomosing, ascospores >90 µm long . . . . .	<b>Architrypethelium</b> , 4
	Hamathecium mostly unbranched, ascospores <90 µm long . . . . .	5

- 4(3) Ostioles eccentric; neotropical . . . **Architrypethelium nitens (Fée) Aptroot**  
 [Verrucaria nitens Fée, Pyrenula nitens (Fée) Fée, Pyrenula nitida var. americana Fée (nom. inval.),  
 Pyrenastrum seminudum Mont., Architrypethelium pyrenuloides (Mont.) Aptroot, Parathelium ern-  
 stianum Müll. Arg., Pleurothelium ernstianum (Müll. Arg.) Müll. Arg., Parathelium superans Müll.  
 Arg., Splanchnonema superans (Müll. Arg.) O. Erikss.]
- Ostioles apical; neotropical . . **Architrypethelium uberinum (Fée) Aptroot**  
 [Porina uberina Fée, Porophora uberina (Fée) Spreng., Pyrenula uberina (Fée) Fée, Pertusaria uberina  
 (Fée) A. Massal., Trypethelium uberinum (Fée) Nyl., Verrucaria uberina (Fée) Trevis., Stromatothel-  
 ium uberinum (Fée) Trevis., Verrucaria megalospora Krempelh., Parathelium megalosporum (Krem-  
 pelh.) Müll. Arg., Trypethelium uberinoides Nyl.]
- 5(3) Ascospores nearly only euseptate, lumina rectangular, at most a bit rounded in the  
 corners, end cells often paler than middle cells (here would also key out the  
 fungus *Hysterium pulicare*, which has a slit-like ostiole) . . . . . 6  
 Ascospores clearly distoseptate, lumina of different shape than the outer wall . .  
 . . . . . 15
- 6(5) Ascospores only 3-septate, macroconidia 3-septate or unknown . . . . . 7  
 Ascospores 3–7-septate, macroconidia either 1–7-septate or unknown . . . . 12
- 7(6) Ascoma wall dense . . . . . 8  
 Ascoma wall cellular . . . . . **Eopyrenula**, 10
- 8(7) Ascospores smooth, 14–17 µm long; neotropical . . . . .  
 . . . . . **Pyrenula tenuisepta R.C. Harris**  
 Ascospores verrucose, 30–47 µm long . . . . . **Mycomicrothelia**, 9
- 9(8) Ascomata at least partly fused with a more or less joint ostiole; Japan . . . . .  
 . . . . . **Mycomicrothelia collospora (Vain.) Aptroot**  
 [Pyrenula collospora Vain., Melanotheca collospora (Vain.) Zahlbr.]  
 Ascomata all single; Australasian . . . . .  
 . . . . **Mycomicrothelia queenslandica (Müll. Arg.) Sipmn & Aptroot**  
 [Microthelia queenslandica Müll. Arg., Ornatopyrenis queenslandica (Müll. Arg.) Aptroot]
- 10(7) Ascospores 4–5 µm wide; New World temperate . . . . .  
 . . . . . **Eopyrenula parvispora R.C. Harris & Aptroot**  
 Ascospores 5·5–7·5 µm wide . . . . . 11
- 11(10) Ascospores mostly <15 µm long; Atlantic (W. Europe) . . . . .  
 . . . . . **Eopyrenula avellanae Coppins**  
 Ascospores mostly >15 µm long; Atlantic (W. Europe) . . . . .  
 . . . . . **Eopyrenula grandicula Coppins**
- 12(6) Ascospores 3(–5)-septate, macroconidia 1-septate; Old World temperate . . . . .  
 . . . . . **Eopyrenula leucoplaca (Wallr.) R.C. Harris**  
 [Verrucaria leucoplaca Wallr., Pyrenula leucoplaca (Wallr.) Körb., also as Pyrenula leucophaea (Wallr.)  
 Körb., Pyrenula alba var. leucoplaca (Wallr.) Schaer., Spermatodium leucoplacum (Wallr.) Trevis.,  
 Leptosphaeria leucoplaca (Wallr.) Vain., ? Pyrenula alni A. Massal., Pyrenula alba A. Massal., Pyrenula  
 quercus A. Massal., Verrucaria quercus (A. Massal.) Garov., Pyrenula schaeferi A. Massal., Pyrenula  
 leucoplaca var. umbrosa Körb., Pyrenula farrea var. umbrosa (Körb.) Zahlbr., Pyrenula leucoplaca f.  
 umbrosa (Körb.) Migula, Pyrenula leucoplaca var. chrysoleuca Körb., Pyrenula leucoplaca f. chrysoleuca  
 (Körb.) Migula, Sagedia chiomela Norm., Porina chiomela (Norm.) Zahlbr., Pyrenula glabrata f.  
 cinerea Haszl., Pyrenula laevigata f. cinerea (Haszl.) Zahlbr., ? Blastodesmia albonigra Zahlbr.]  
 Ascospores (3–)5–7-septate, macroconidia 3–7-septate or unknown . . . . . 13
- 13(12) Ascospores mostly 37–47 µm long, constricted at the septa; Europe . . . . .  
 . . . . . **Blastodesmia nitida A. Massal.**  
 [Polyblastia nitida (A. Massal.) Tevis., Verrucaria massalongoi Garov., Verrucaria circumfusa Nyl.,  
 Pyrenula circumfusa (Nyl.) Trevis., Sagedia circumfusa (Nyl.) Haszl.]  
 Ascospores mostly <35 µm long . . . . . **Eopyrenula**, 14

- 14(13) Ascospores >6 µm wide, macroconidia (5–)7-septate; Atlantic (W. Europe). . . . . **Eopyrenula septemseptata Coppins**  
 Ascospores <6 µm wide, macroconidia 3(–4)-septate; New world temperate . . . . . **Eopyrenula intermedia Coppins**  
 [Pyrenula leucoplaca var. pluriloculata Fink, Pyrenula farrea var. pluriloculata (Fink) Zahlbr.]
- 15(5) Ascospores red-brown and lumina at least becoming rounded when older (species on rock not keyed out here) . . . . . **Lithothelium**, 16  
 Ascospores grey to brown, rarely red-brown and then lumina angular . . . . . **Pyrenula**, 20
- 16(15) Thallus UV+yellow; neotropical (Costa Rica) . . . . . **Lithothelium fluorescens Aptroot & Sipman**  
 Thallus UV– . . . . . 17
- 17(16) Ascospores 3-septate . . . . . 18  
 Ascospores 7-septate . . . . . 19
- 18(17) Ascospores 15–20 µm long; eastern palaeotropical . . . . . **Lithothelium decumbens (Müll. Arg.) Aptroot**  
 [Parathelium decumbens Müll.Arg., Pyrenula decumbens (Müll.Arg.) Upreti]  
 Ascospores 25–40 µm long; northern temperate. . . . . **Lithothelium phaeosporum (R.C. Harris) Aptroot**  
 (Plagiocarpa phaeospora R.C. Harris)
- 19(17) Ascospores 30–40 µm long; northern temperate. . . . . **Lithothelium septemseptatum (R.C. Harris) Aptroot**  
 (Plagiocarpa septemseptata R.C. Harris)  
 Ascospores 55–80 µm long; New World temperate . . . . . **Lithothelium macrosporum (R.C. Harris) Aptroot**  
 (Plagiocarpa macrospora R.C. Harris)
- 20(15) Ostioles pointing in various directions, mostly eccentric to lateral . . . . . 21  
 Ostioles apical or, when eccentric, all pointing in the same direction. . . . . 39
- 21(20) Ascospores 5–15-septate . . . . . 22  
 Ascospores 3-septate . . . . . 24
- 22(21) Ascospores 5-septate, 42–55 µm long; neotropical (Colombia). . . . . **Pyrenula pleiomera (Nyl.) Zahlbr.**  
 (Verrucaria pleiomera Nyl.)  
 Ascospores 9–15-septate . . . . . 23
- 23(22) Ascospores 9–13-septate, 65–90 × 17–22 µm ascomata single . . . . . **Pyrenula fusispora (Malme) Aptroot comb. nov.**  
 Ascospores 11–15-septate, 50–70 × 4.5–6 µm, ascomata with 5–15 ostioles fused. . . . . **Pyrenula tokyensis (Müll. Arg.) H. Harada**  
 (Pyrenastrum tokyense Müll. Arg., also as Pyrenastrum tokyoense Müll. Arg.)
- 24(21) Thallus UV+yellow . . . . . 25  
 Thallus UV– . . . . . 26
- 25(24) Ascospores 21–23 µm long; Hawaii . . . . . **Pyrenula hawaiiensis Aptroot ined.**  
 Ascospores 32–45 µm long; neotropical (Brazil). . . . . **Pyrenula crassiuscula (Malme) Aptroot**  
 (? Pyrenula copalchina Fée, Parathelium crassiusculum Malme, Parathelium crassiusculum f. chlorophorae Malme)

- 26(24) Terminal lumina directly against the exospore wall . . . . . 27  
 Terminal lumina separated from the exospore wall by endospore thickening . . . . . 31  
 . . . . . 31
- 27(26) Ascomata at least partly fused with joint ostioles . . . . .  
 . . . . . **Pyrenula subregantula Müll. Arg.**  
 [*Pyrenastrum personatum* Malme, *Pyrenula personata* (Malme) R.C. Harris, *Pyrenastrum fulvum*  
 Malme, *Pyrenula fulvella* R.C. Harris]
- Ascomata single . . . . . 28
- 28(27) Ascospores 13–25 µm long . . . . . 29  
 Ascospores 25–65 µm long . . . . . 30
- 29(28) Ascospores 16–25 µm long; pantropical . . . . . **Pyrenula circumfiniens Vain.**  
 [*Parathelium subferrugineum* Malme, *Parathelium subferrugineum* f. *expallescens* Malme, *Pyrenula subferruginea* (Malme) R.C. Harris]
- Note: the completely lateral position of the ostiole in the type of *Pyrenula circumfiniens* was not noticed before.
- Ascospores 13–16 µm long; neotropical . . . . . **Pyrenula elliptica Müll. Arg.**  
 (Lectotype (designated here): Cuba, Wright, Verr. Cub. 218a p.p. (G); the specimen in G of 218b p.p. under the name *Pyrenula elliptica* is *Pyrenula mamillana*)
- 30(28) Ascospores 45–65 µm long; neotropical . . . . . **Pyrenula erumpens R.C. Harris**  
 (*Parathelium emergens* Nyl. ex Müll. Arg.)
- Ascospores 25–35 µm long; pantropical . . . . .  
 . . . . . **Pyrenula cuyabensis (Malme) R.C. Harris**  
 (*Parathelium cuyabense* Malme)
- 31(26) Ostiole outside with a red ring; New world temperate. . . . .  
 . . . . . **Pyrenula wetmorei R.C. Harris**  
 Ostiole without red colour . . . . . 32
- 32(31) Ascomata mostly aggregated with a shared ostiole. . . . . 33  
 Ascomata nearly all single . . . . . 35
- 33(32) Ascospores 12–24 µm long; pantropical . . . . .  
 . . . . . **Pyrenula septicollaris (Eschw.) R.C. Harris**  
 [*Pyrenastrum septicollare* Eschw., *Parmentaria septicollare* (Eschw.) Trevis., *Astrothelium septicollare* (Eschw.) Leight., *Pyrenula irregularis* Fée, *Pyrenastrum irregulare* (Fée) Müll. Arg., *Pyrenastrum fuscum* Mont., *Porodothion acharii* Mont., *Astrothelium pyrenastraeum* Nyl., *Pyrenastrum pyrenastraeum* (Nyl.) Zahlbr., *Pyrenastrum depressum* Müll. Arg., *Pyrenastrum bicolor* Vain., *Pyrenula polillensis* Vain., *Melanotheca polillensis* (Vain.) Zahlbr., *Pyrenastrum microsporum* Malme, *Pyrenastrum pruinosum* C.W. Dodge, *Pyrenastrum erumpens* C.W. Dodge, *Pyrenastrum parathelioides* C.W. Dodge, *Pyrenula laureriformis* Aptroot]
- Notes. The new synonym *Pyrenula irregularis* (holotype: G-FEE seen) was described in the same year as *Verrucaria septicollare* but seems to be the younger name. The completely lateral position of the ostiole and the joint ostioles in the type of *Pyrenula polillensis* were not noticed before. Study of additional specimens showed that *Pyrenula laureriformis* falls within the variation of *Pyrenula septicollare*.
- Ascospores >25 µm long . . . . . 34
- 34(33) Ascospores 30–45 µm long; neotropical . . . . .  
 . . . . . **Pyrenula cryptothelia (Müll. Arg.) Aptroot & Etayo**  
 [*Pyrenastrum cryptothelium* Müll. Arg., *Astrothelium cryptothelium* (Müll. Arg.) Nyl., *Pyrenastrum depauperatum* Malme]
- Ascospores 25–35 µm long; neotropical . . . . .  
 . . . . . **Pyrenula cubana (Müll. Arg.) R.C. Harris**  
 (*Pyrenastrum cubanum* Müll. Arg., *Pyrenastrum cubanum* var. *obtectum* Malme, *Pyrenastrum cubanum* var. *intermedium* Malme)

- 35(32) Ascospores 13–17  $\mu\text{m}$  long, hamathecium inspersed; neotropical (Florida) . . . . .  
 . . . . . **Pyrenula wheeleri R.C. Harris**  
 Ascospores >17  $\mu\text{m}$  long, hamathecium not inspersed . . . . . 36
- 36(35) Ascospores 28–45  $\mu\text{m}$  long (compare also *Pyrenula minarum*, with partly eccentric ostioles) . . . . . 37  
 Ascospores 17–28  $\mu\text{m}$  long . . . . . 38
- 37(36) Ascospores 35–45  $\mu\text{m}$  long; pantropical (America and Africa) . . . . .  
 . . . . . **Pyrenula adacta Fée**  
 [*Verrucaria punctella* var. *adacta* (Fée) Nyl., *Pyrenula punctella* var. *adacta* (Fée) Müll. Arg., *Parathelium indutum* Nyl., *Pleurothelium indutum* (Nyl.) Müll. Arg., *Parathelium martinicanum* Vain., *Pyrenula martinicana* (Vain.) R.C. Harris (nom. illeg.), *Pyrenula caraibica* Aptroot, ? *Pyrenula pulchella* Müll. Arg., *Pyrenula marginatula* Müll. Arg., *Pyrenula acaciae* Vain., *Parathelium dilutum* Malme]  
 Ascospores 28–32  $\mu\text{m}$  long; probably pantropical (only known from Brazil and Papua New Guinea) . . . . . **Pyrenula gahavisukana Aptroot**  
 (*Parathelium dilutum* var. *catervaria* Malme)
- 38(36) Ascospores with at least one pointed end; temperate Northern Hemisphere, extending to the tropics . . . . . **Pyrenula acutispora Kalb & Hafellner**  
 [*Pyrenula kakouettae* Sérus. & Diederich, *Pyrenula albicola* R.C. Harris (nom. inval.)]  
 Ascospores with rounded ends; New World . . . . .  
 . . . . . **Pyrenula microtheca R.C. Harris**  
 (*Parathelium microcarpum* Riddle)
- 39(20) Ascospores with many hyaline cilia at the ends (not to be confused with germ tubes which are one per lumen) . . . . . 40  
 Ascospores without cilia . . . . . 41
- 40(39) Ascospores 3-septate; Australasian (Papua New Guinea) . . . . .  
 . . . . . **Pyrenula ciliata Aptroot**  
 Ascospores 5–7-septate; neotropical (Panama) . . . . . **Pyrenula hirsuta Etayo**
- 41(39) Ascospores at least partly with more than 3 septa, or with 3 septa and long tails at one or both ends, thus seemingly more than 3-septate . . . . . 42  
 Ascospores all 3-septate. . . . . 52
- 42(41) Ascospores at least seemingly 4–7-septate . . . . . 43  
 Ascospores 7–17-septate, more than 4 times as long as wide . . . . . 48
- 43(42) Ascospores with tails at both ends; Australia. . . . .  
 . . . . . **Pyrenula bicuspidata Müll. Arg.**  
 (*Melanotheca oxyspora* Müll. Arg.)  
 Ascospore without tails, at most pointed. . . . . 44
- 44(43) Ascospores more than 4 times as long as wide; neotropical . . . . .  
 . . . . . **Pyrenula melanophthalma (Mont.) Trevis.**  
 [*Verrucaria melanophthalma* Mont., *Melanotheca melanophthalma* (Mont.) Müll. Arg., *Trypethelium melanophthalmum* (Mont.) Nyl., *Stromatohelium melanophthalma* (Mont.) Trevis., *Verrucaria infida* Nyl., *Pyrenula infida* (Nyl.) Müll. Arg.]  
 Ascospores less than 4 times as long as wide. . . . . 45
- 45(44) Ascospores <30  $\mu\text{m}$  long . . . . . 46  
 Ascospores >29  $\mu\text{m}$  long . . . . . 47

- 46(45) Old ascospores with orange oil, thallus often with pseudocyphellae; pantropical.  
 . . . . . **Pyrenula sexlocularis (Nyl.) Müll. Arg.**  
 [*Verrucaria sexlocularis* Nyl., ? *Verrucaria cyrtospora* Stirt., *Pyrenula cyrtospora* (Stirt.) Nyl., *Verrucaria concaterfans* Nyl., *Melanotheca concaterfans* (Nyl.) Zahlbr., *Pyrenula concaterfans* (Nyl.) R.C. Harris, *Anthracotheceum seminudum* Müll. Arg., *Anthracotheceum hexamerum* Müll. Arg., *Pyrenula atroalbella* Vain., *Pyrenula flavofulvescens* Vain., *Melanotheca cinerata* Zahlbr., *Pyrenula sexlocularis* var. *xanthoplaca* Zahlbr.]  
 Note: the specimens until recently called *Pyrenula concaterfans* with 3-septate ascospores are now kept separate as *Pyrenula bahiana*; therefore a name-change of the 5-septate specimens from *Pyrenula concaterfans* to *Pyrenula sexlocularis* is welcome.  
 Ascospores without orange oil, thallus without pseudocyphellae; South Africa . . . . .  
 . . . . . **Pyrenula wilmsiana Müll. Arg.**
- 47(45) Ascospores 29–35 µm long, hamathecium not inpersed; Australasian (Papua New Guinea) . . . . . **Pyrenula sexluminata Aptroot nom. nov.**  
 Ascospores 30–55 µm long, hamathecium inpersed; pantropical . . . . .  
 . . . . . **Pyrenula caracasana Müll. Arg.**  
 (*Pyrenula mangiferae* Vain., *Pyrenula megapotamica* Malme)
- 48(42) Ascospores with a long tail at one end; Pacific (Mariana Islands) (here the temperate fungal genus *Rebentischia* keys out) . . . . .  
 . . . . . **Pyrenula flagellata H. Harada**  
 Ascospores without tails (here the common fungal genus *Navicella* keys out, characterized by elongate ostioles) . . . . . 49
- 49(48) Ascospores 7–17-septate . . . . . 50  
 Ascospores (5–)7-septate . . . . . 51
- 50(49) Ascospores 12–17-septate; eastern palaeotropical (Ryukyu Islands, Japan) . . . . .  
 . . . . . **Pyrenula cylindrica Kashiw.**  
 Ascospores 7–11-septate; eastern palaeotropical (India) . . . . .  
 . . . . . **Pyrenula subcylindrica Jagadeesh Ram & Upreti**  
 Note: the enigmatic *Melanotheca pusilla* (Jatta) C.W. Dodge from Ethiopia would key out here. It is reported to have 9-septate ascospores.
- 51(49) Ascospores 30–38 µm long; pantropical . . . **Pyrenula montagnei Müll. Arg.**  
 Ascospores 53–70 µm long; Australasian (New Zealand), also neotropical? . . . . .  
 . . . . . **Pyrenula moniliformis (C. Knight) Müll. Arg.**  
 (*Verrucaria moniliformis* C. Knight)
- 52(41) Ascospores more than 4 times as long as wide; neotropical (Brazil) . . . . .  
 . . . . . **Pyrenula fusoluminata Aptroot**  
 Ascospores less than 4 times as long as wide. . . . . 53
- 53(52) Ascospores mostly >50 µm long . . . . . 54  
 Ascospores mostly <50 µm long . . . . . 59
- 54(53) Lumina not in a straight line, somewhat zig-zag; neotropical (Brazil) . . . . .  
 . . . . . **Pyrenula hoehneliana Zahlbr.**  
 Lumina in a straight line or ascospores bent, not zig-zag . . . . . 55
- 55(54) Terminal lumina directly against the exospore wall . . . . . 56  
 Terminal lumina separated from the exospore wall by endospore thickening . . . . .  
 . . . . . 58
- 56(55) Thallus UV+ yellow; neotropical. . . . **Pyrenula praelucida (Mont.) Trevis.**  
 (*Verrucaria praelucida* Mont.)  
 Thallus UV– . . . . . 57

- 57(56) Hamathecium not inspersed; pantropical . . . . . **Pyrenula rockii** Zahlbr.  
Hamathecium inspersed; neotropical . . **Pyrenula subpraelucida** Müll. Arg.  
[?(inspersed?) *Pyrenula quadruplans* Vain.]
- 58(55) Ascospores 75–90 µm long, thallus with crystalline papillae; neotropical (Costa Rica) . . . . . **Pyrenula montocensis** Lücking  
Ascospores (45–)50–60 µm long., thallus without papillae but with pseudocyphellae; pantropical . . . . . **Pyrenula immissa** (Stirt.) Zahlbr.  
(*Verrucaria immissa* Stirt., *Pyrenula cuprescens* A. Zahlbr., *Pyrenula laii* Aptroot)
- 59(53) Lumina not in a straight line, somewhat to strongly zig-zag. . . . . 60  
Lumina in a straight line, not zig-zag. . . . . 61
- 60(59) Thallus UV+ yellow; pantropical. . . . . **Pyrenula aggregans** Vain.  
Thallus UV–; pantropical . . . . **Pyrenula papilligera** (Leight.) Müll. Arg.  
(*Verrucaria papilligera* Leight., *Anthracothecium fulvum* Müll. Arg., *Pyrenula neofulva* Ajay Singh)
- 61(59) Ascomata and/or thallus with yellow, orange or red anthraquinones on the outside . . . . . 62  
Ascomata and thallus without external pigments . . . . . 70
- 62(61) Terminal lumina directly against the exospore wall . . . . . 63  
Terminal lumina separated from the exospore wall by endospore thickening . . . . . 66
- 63(62) Ascomata at least partly yellow, hamathecium not inspersed; neotropical (Panama, Costa Rica, Puerto Rico, Hawaii) . . . . .  
. . . . . **Pyrenula luteopruinosa** Etayo & Aptroot  
Ascomata or thallus orange or red, hamathecium inspersed. . . . . 64
- 64(63) Ascomata red, thallus UV–; Australasian (Lord Howe Island) . . . . .  
. . . . . **Pyrenula howeana** Aptroot  
Thallus or ascomata orange, thallus UV+yellow (when thallus patchily orange brown and UV–, see *Pyrenula occidentalis*) . . . . . 65
- 65(64) Ascomata orange, ascospores 17–20 µm long; eastern palaeotropical (Korea) . . . . .  
. . . . . **Pyrenula sipmanii** Aptroot & K. H. Moon  
Thallus orange, ascospores 19–22 µm long; eastern palaeotropical (Thailand) . . . . .  
. . . . . **Pyrenula aurantiopileata** Aptroot
- 66(62) Thallus orange; neotropical. . . . . **Pyrenula cerina** Eschw.  
[*Verrucaria cerina* Eschw., *Spermatodium cerinum* (Eschw.) Trevis., *Pyrenula aurantiaca* Fée, *Verrucaria aurantiaca* (Fée) Nyl., *Pyrenula cerina* var. *expallens* Zahlbr.]  
Thallus and/or ascomata at least partly red . . . . . 67
- 67(66) Ascospores 15–19 µm long, hamathecium not inspersed . . . . . 68  
Ascospores >19 µm long, hamathecium inspersed . . . . . 69
- 68(67) Ascospores 15–17 µm long, ascomata mostly aggregated, with fused walls but with separate ostioles; neotropical (Costa Rica) . . . . .  
. . . . . **Pyrenula rubroanomala** Aptroot & Lücking  
Ascospores 17–19 µm long, ascomata simple, red coloration only around the ostiole; neotropical . . . . . **Pyrenula rubrostoma** R.C. Harris

- 69(67) Ascospores 19–22  $\mu\text{m}$  long; eastern palaeotropical (Java) . . . . .  
 . . . . . **Pyrenula rubrojavanica Aptroot ined.**  
 Ascospores 27–35  $\mu\text{m}$  long; pantropical . . . **Pyrenula cruenta (Mont.) Vain.**  
 [*Trypethelium cruentum* Mont., *Stromatohelium cruentum* (Mont.) Trevis., *Melanotheca cruenta* (Mont.) Müll. Arg., ? *Verrucaria sinapisperma* Fée, *Sphaeromphale sinapisperma* (Fée) Trevis., *Anthracotheicum sinapispermum* (Fée) Müll. Arg., *Trypethelium rubrum* C. Knight, *Melanotheca rubra* (C. Knight) C. Knight, *Trypethelium cinnabrinum* C. Knight, *Melanotheca cinnabarina* (C. Knight) C. Knight, *Melanotheca rubescens* C. Knight, *Verrucaria circumrubens* Nyl., *Pyrenulia circumrubens* (Nyl.) B de Lesd., *Pyrenulia circumrubens* var. *erythrinosa* B de Lesd., *Verrucaria circumrubens* var. *rubrotecta* Stirt., *Pyrenulia circumrubens* var. *rubrotecta* (Stirt.) Shirley, *Trypethelium cruentum* var. *subdecolor* Nyl., *Melanotheca cruenta* f. *subdecolor* (Nyl.) Zahlbr., *Pyrenula subdecolor* (Nyl.) R.C. Harris, *Trypethelium subincruentum* Nyl., *Melanotheca subincruentum* (Nyl.) Zahlbr., ? *Trypethelium coccinatum* Stizenb., *Trypethelium purpurascens* Stizenb., *Melanotheca purpurascens* (Stizenb.) Müll. Arg., *Trypethelium connivens* Stirt. (nom. illeg.), *Melanotheca connivens* Zahlbr., *Trypethelium cruentulum* Nyl., *Melanotheca cruentula* (Nyl.) Zahlbr., *Melanotheca ornata* Müll. Arg., *Trypethelium ornatum* (Müll. Arg.) Hellb. (nom. illeg.), *Trypethelium oblitescens* Stirt., *Pyrenastrum oblitescens* (Stirt.) Makhija & Patw., *Pyrenula gravenreuthii* Stein, *Pyrenula rubromaculata* Vain., *Melanotheca rubromaculata* (Vain.) Zahlbr.]
- 70(61) Ascomata mostly aggregated, with fused walls but with separate ostioles. . . . . 71  
 Ascomata mostly simple, only aggregated as by chance when crowded (if difficult to decide, start with the first alternative) . . . . . 80
- 71(70) Old ascospores with red oil; neotropical (Puerto Rico) . . . . .  
 . . . . . **Pyrenula concastroma R.C. Harris**  
 Old ascospores without red oil . . . . . 72
- 72(71) Terminal lumina directly against the exospore wall; Australasian (Papua New Guinea) . . . . . **Pyrenula pyrenastrospora Aptroot**  
 Terminal lumina separated from the exospore wall by endospore thickening . . . . . 73
- 73(72) Hamathecium inspersed, ostioles sometimes partly eccentric, ascospores 25–40  $\mu\text{m}$  long; pantropical . . . . . **Pyrenula minarum Vain.**  
 (*Pyrenula minarum* var. *colorans* Malme)  
 Hamathecium not inspersed . . . . . 74
- 74(73) Ascospores mostly >21  $\mu\text{m}$  long . . . . . 75  
 Ascospores mostly <20  $\mu\text{m}$  long . . . . . 78
- 75(74) Ascospores mostly >25  $\mu\text{m}$  long . . . . . 76  
 Ascospores mostly <25  $\mu\text{m}$  long . . . . . 77
- 76(75) Thallus with pseudocypbellae; neotropical (Cuba) . . . . .  
 . . . . . **Pyrenula wrightii (Müll. Arg.) R.C. Harris**  
 (*Melanotheca wrightii* Müll. Arg.)  
 Thallus without pseudocypbellae; eastern palaeotropical (Sri Lanka) . . . . .  
 . . . . . **Pyrenula zeylanica Upreti & Ajay Singh**
- 77(75) End lumina elongated; neotropical (Costa Rica) . . . . .  
 . . . . . **Pyrenula subsoluta (Müll. Arg.) Aptroot**  
 (*Melanotheca subsoluta* Müll. Arg.)  
 All lumina more or less rounded; eastern palaeotropical . . . . .  
 . . . . . **Pyrenula leucotrypa (Nyl.) Upreti**  
 [*Trypethelium leucotrypum* Nyl., *Melanotheca leucotrypa* (Nyl.) Müll. Arg., ? *Trypethelium erumpens* Stirt. (nom. illeg.), *Melanotheca stirtoniana* Müll. Arg., *Trypethelium stirtonianum* (Müll. Arg.) Hellb., *Melanotheca negrosensis* Herre]

- 78(74) Ascospores with dark bands between the lumina; neotropical (Florida) . . . . .  
 . . . . . **Pyrenula atrolaminata R.C. Harris**  
 Ascospores without dark bands. . . . . 79
- 79(78) Ascospores mostly >15 µm long; pantropical . . . . .  
 . . . . . **Pyrenula anomala (Ach.) Vain.**  
 [*Trypethelium anomalum* Ach., *Melanothecha anomala* (Ach.) A. Massal., *Melanothecha achariana* Fée, *Pyrenula achariana* (Fée) Vain., *Mycoporum acharii* G. Mey., *Porodithion acharii* (G. Mey.) Mont., *Trypethelium nudum* Fée, *Coenoicia nuda* (Fée) Trevis., *Celothelium nudum* (Fée) Trevis., *Trypethelium favulosum* Ach., *Trypethelium scoria* Fée (nom. illeg.), *Pseudopyrenula scoria* (Fée) Vain. (nom. illeg.)? *Trypethelium inconspicuum* C.F.W. Meissn., *Trypethelium fuscum* Krempelh., *Pyrenula fusca* (Krempelh.) Vain., *Melanothecha fusca* (Krempelh.) Müll. Arg., *Melanothecha aggregata* Müll. Arg., *Melanothecha arthonioides* var. *grisea* Müll. Arg., *Melanothecha eschweileri* var. *grisea* (Müll. Arg.) Zahlbr., *Melanothecha foveolata* Müll. Arg., *Trypethelium nigrutulum* Nyl., *Melanothecha achariana* var. *angolensis* Vain., *Melanothecha angolensis* (Vain.) C. W. Dodge, *Melanothecha subdissidens* (Vain.) Zahlbr., *Pyrenula obscurascens* Vain., *Trypethelium anomalum* var. *obscurascens* (Vain.) Zahlbr., *Melanothecha achariana* var. *obscurascens* (Vain.) Zahlbr., *Melanothecha obscurascens* (Vain.) C. W. Dodge, *Pyrenula anomaloides* Vain., *Melanothecha irregularis* Zahlbr., *Melanothecha arthonioides* var. *machaerii* Malme, *Melanothecha arthonioides* var. *lueheae* Malme, *Melanothecha cameroonensis* C. W. Dodge, *Melanothecha porosa* C. W. Dodge, *Trypethelium microsporium* Makhija & Patw.]  
 Ascospores mostly <15 µm long; pantropical . . . . .  
 . . . . . **Pyrenula arthoniotheca Upreti**  
 [*Porothelium arthonioides* Eschw., *Verrucaria arthonioides* (Eschw.) Eschw., *Porodithion arthonioides* (Eschw.) Trevis., *Melanothecha arthonioides* (Eschw.) Müll. Arg., *Pyrenula arthonioides* (Eschw.) Vain. (nom. illeg.), *Syngenosorus eschweileri* Trevis., *Melanothecha eschweileri* (Trevis.) Zahlbr., ? *Pyrenula subdissidens* Vain., *Melanothecha nigeriensis* C.W. Dodge]  
 Note: it remains uncertain whether this species is not mostly immature material of the previous species.
- 80(70) Thallus ecorticate, whitish . . . . . 81  
 Thallus corticate (may be difficult to observe in poor specimens; when in doubt try first alternative) . . . . . 85
- 81(80) Thallus UV+yellow; pantropical . . . . . **Pyrenula cocoes Müll. Arg.**  
 (*Pyrenula rugulosa* Müll. Arg., *Pyrenula insularum* H. Magn.)  
 Thallus UV− . . . . . 82
- 82(81) Hamathecium interspersed; eastern paleotropical (Philippines) . . . . .  
 . . . . . **Pyrenula albohallina Vain.**  
 Hamathecium not interspersed . . . . . 83
- 83(82) Thallus white to grey, dull, ascomata <0.7 mm diam; pantropical . . . . .  
 . . . . . **Pyrenula microcarpa Müll. Arg.**  
 (*Pyrenula melaleuca* Müll. Arg., *Pyrenula albella* Müll. Arg., *Pyrenula microcarpoides* Müll. Arg., *Pyrenula conspurcata* Müll. Arg., *Pyrenula alboostiolata* Vain., ? *Pyrenula laevigata* var. *meizospora* Vain., *Pyrenula cinerea* Zahlbr., *Pyrenula texana* Tuck. ex R.C. Harris)  
 Thallus cream to silvery or unapparent, smooth; temperate. . . . . 84

- 84(83) Ascospores <18 µm long, hamathecium KOH–, pycnidia present; known from temperate regions in the Northern Hemisphere and reported from Chile, so probably cosmopolitan in temperate regions . . . **Pyrenula coryli A. Massal.**  
 [Verrucaria coryli (A. Massal.) Nyl., Arthopyrenia coryli (A. Massal) Müll. Arg., Arthopyrenia glabrata var. coryli (A. Massal.) H. Olivier, Microthelia glabrata var. coryli (A. Massal.) Boistel, Mycopyrenula coryli (A. Massal.) Vain.]
- Ascospores >18 µm long, hamathecium sometimes KOH+blue (fleeting), pycnidia absent; temperate Northern Hemisphere . . . . . **Pyrenula laevigata (Pers.) Arnold**  
 [Verrucaria laevigata Pers., Pyrenula alba var. laevigata (Pers.) Trevis., Verrucaria glabrata Ach., Microthelia glabrata (Ach.) Boistel, Arthopyrenia glabrata (Ach.) H. Olivier, Pyrenula glabrata (Ach.) A. Massal., Porina glabrata (Ach.) Sandst., Verrucaria nitida f. albolutea Grognot, Verrucaria gemmata var. minor Nyl., Pyrenula glabrata f. major Krempelh., Pyrenula laevigata f. major (Krempelh.) Zahlbr., Pyrenula glabrata f. microcarpa Hepp, Pyrenula laevigata f. microcarpa (Hepp) Arnold, Pyrenula alba var. microcarpa (Hepp) Trevis.]
- 85(80) Old ascospores with orange oil . . . . . 86  
 Old ascospores without orange oil . . . . . 87
- 86(85) Ascospores 25–35 µm long; pantropical . . . . . **Pyrenula bahiana Malme**  
 (Pyrenula crystalligera H. Magn.)  
 Note: this species has until recently been called *Pyrenula concatervans*, including material now called *Pyrenula sexlocularis*. Although a few specimens of *Pyrenula sexlocularis* are known that contain both 3- and 5-septate ascospores, the majority of the specimens in this group have either only 3- (in *Pyrenula bahiana*) or 5-septate ascospores (in *Pyrenula sexlocularis*).  
 Ascospores (30–)35–51 µm long; eastern palaeotropical (India, Thailand). . . . .  
 . . . . . **Pyrenula thailandica Aptroot ined.**
- 87(86) Terminal lumina all directly against the exospore wall (if anthraquinones present on thallus and/or ascomata, compare 55) . . . . . 88  
 Terminal lumina mostly (at least in mature ascospores) separated from the exospore wall by endospore thickening . . . . . 107
- 88(87) Thallus UV+ yellow . . . . . 89  
 Thallus UV– . . . . . 90
- 89(88) Hamathecium inspersed; northern temperate . . . . .  
 . . . . . **Pyrenula pseudobufonia (Rehm) R.C. Harris**  
 (*Glypeosphaeria pseudobufonia* Rehm, *Pyrenula neglecta* R.C. Harris, *Pyrenula shirabeicola* Kurok. & S. Nakan.)
- Hamathecium not inspersed; pantropical . . . . . **Pyrenula cocoes Müll. Arg.**  
 (*Pyrenula rugulosa* Müll. Arg., *Pyrenula insularum* H. Magn.)
- 90(88) Hamathecium inspersed (in some cases only in the upper part) . . . . . 91  
 Hamathecium not inspersed . . . . . 101
- 91(90) End lumina elongated . . . . . 92  
 All lumina more or less rounded to angular . . . . . 94
- 92(91) Ascospores >25 µm long . . . . . 93  
 Ascospores 20–25 µm long; pantropical (compare also *Pyrenula acutalis* which is inspersed only in the upper part) . . . . . **Pyrenula maravalensis Vain.**  
 (*Pyrenula subacutalis* Upreti)
- 93(92) Ascospores 26–30 µm long; Australasian (Papua New Guinea). . . . .  
 . . . . . **Pyrenula rinodinospora Aptroot ined.**  
 Ascospores 30–50 µm long; eastern palaeotropical (India) . . . . .  
 . . . . . **Pyrenula kurzii Ajay Singh & Upreti**

- 94(91) Ascospores all <16 µm long; pantropical. . . **Pyrenula cayennensis Müll. Arg.**  
(*Pyrenula humana* Zahlbr.)  
Ascospores partly >16 µm long. . . . . 95
- 95(94) Ascospores >40 µm long . . . . . 96  
Ascospores <40 µm long . . . . . 97
- 96(95) Ascospores 42–50 µm long, mostly straight; eastern palaeotropical (India) . . .  
. . . . . **Pyrenula subcamptospora Upreti**  
Note: the description describes the ascospores as curved, but they were mostly straight in the  
isotype.  
Ascospores 45–52 µm long, mostly curved; neotropical . . . . .  
. . . . . **Pyrenula cryptostoma (Nyl.) Müll. Arg.**  
(*Verrucaria cryptostoma* Nyl., *Pyrenula camptospora* Malme)
- 97(95) Ascospores partly >30 µm long. . . . . 98  
Ascospores all <30 µm long . . . . . 99
- 98(97) Ascospores with black granular material around the ends; Australasian (Papua  
New Guinea) . . . . . **Pyrenula grossa Aptroot**  
Ascospores without black granular material; palaeotropical (Seychelles) . . . . .  
. . . . . **Pyrenula fulva (Krempelh.) Müll. Arg**  
(*Pyrenula marginata* var. *fulva* Krempelh., *Pyrenula supracongruens* Aptroot & Schumm)
- 99(97) Thallus with patches of orange-brown coloration which are KOH+ purple.  
Known from temperate regions on the Northern Hemisphere and South Africa,  
so probably cosmopolitan . . . . .  
. . . . . **Pyrenula occidentalis (R.C. Harris) R.C. Harris**  
[*Pyrenula neglecta* ssp. *occidentalis* R.C. Harris, *Pyrenula glabrata* f. *incusa* Flot., *Pyrenula laevigata* f.  
*incusa* (Flot.) Zahlbr., *Pyrenula harrisii* Hafellner & Kalb]  
Thallus without coloured, KOH+ purple patches . . . . . 100
- 100(99) Hamathecium interspersed only in the upper part; neotropical . . . . .  
. . . . . **Pyrenula acutalis R.C. Harris**  
Hamathecium totally interspersed; pantropical . . . . .  
. . . . . **Pyrenula fetivica (Krempelh.) Müll. Arg.**  
[*Verrucaria fetivica* Krempelh., *Pyrenula subcongruens* Müll. Arg., *Verrucaria fibrata* Stirt., *Pyrenula*  
*fibrata* (Stirt.) Zahlbr., *Pyrenula albida* Müll. Arg., *Verrucaria obtusior* Nyl., *Pyrenula obtusior* (Nyl.)  
Zahlbr., *Verrucaria glabriuscula* Nyl., *Pyrenula glabriuscula* (Nyl.) Vain., ? *Pyrenula truncata* Müll.  
Arg., *Pyrenula lamprocarpa* Müll. Arg., *Pyrenula rhombospora* Müll. Arg., *Pyrenula approximata*  
Vain., *Pyrenula feracissima* Vain., *Pyrenula mastospora* Vain., ? *Pyrenula samarana* Vain., *Pyrenula*  
*transparens* Zahlbr., *Pyrenula sandwicensis* Zahlbr., *Pyrenula sublateritia* Zahlbr., *Pyrenula quercuum*  
Zahlbr., *Pyrenula dussii* Malme, *Pyrenula subcremea* Malme, *Pyrenula commixta* Malme, *Pyrenula*  
*japonica* Kurok., *Pyrenula citrififormis* R.C. Harris]  
Note: specimen H-NYL 1403 is here selected as the lectotype of *Verrucaria obscurior*, although  
specimen 1402 is identical.
- 101(90) End lumina elongated (all three species rare and possibly not clearly separ-  
ated) . . . . . 102  
All lumina more or less rounded to angular . . . . . 104
- 102(101) Ascospores 20–29 µm long, ascomata <0.7 mm diam. . . . . 103  
Ascospores 27–40 µm long, ascomata >0.7 mm diam; pantropical. . . . .  
. . . . . **Pyrenula vernicosa (Krempelh.) Müll. Arg.**  
(*Verrucaria vernicosa* Krempelh., ? *Pyrenula tricolor* Müll. Arg.)

- 103(102) Ascospores 20–29  $\mu\text{m}$  long, ascomata 0.5–0.7 mm diam; eastern palaeotropical  
 . . . . . **Pyrenula finitima Müll. Arg.**  
 (*Pyrenula oxyspora* Müll. Arg., *Pyrenula oxysporiza* Zahlbr.)  
 Ascospores 20–29  $\mu\text{m}$  long, ascomata <0.5 mm diam; eastern palaeotropical . .  
 . . . . . **Pyrenula approximans (Krempelh.) Müll. Arg.**  
 [*Verrucaria approximans* Krempelh., *Verrucaria nodulata* Stirt., *Pyrenula nodulata* (Stirt.) Zahlbr.]
- 104(101) Ascomata > 2 mm diam; eastern palaeotropical (Philippines) . . . . .  
 . . . . . **Pyrenula irosina Vain.**  
 Ascomata < 2 mm diam. . . . . 105
- 105(104) Ascospores 11–13  $\mu\text{m}$  long; palaeotropical (Seychelles). . . . .  
 . . . . . **Pyrenula infracongruens Aptroot & Schumm**  
 Ascospores >13  $\mu\text{m}$  long . . . . . 106
- 106(105) Ascospores at least partly >16  $\mu\text{m}$  long; pantropical. . . . .  
 . . . . . **Pyrenula nitidula (Bres.) R.C. Harris**  
 [*Melanomma nitidulum* Bres., ? *Verrucaria dealbata* C. Knight, *Pyrenula dealbata* (C. Knight) Müll.  
 Arg., *Verrucaria glabrata* var. *cinereoalba* C. Knight, *Pyrenula marginata* f. *diminuens* Nyl., *Verrucaria*  
*marginata* f. *diminuens* (Nyl.) Nyl., *Pyrenula mamillana* f. *diminuens* (Nyl.) Zahlbr., *Pyrenula*  
*paraensis* Müll. Arg., *Verrucaria inflata* Stirt., *Pyrenula cinereoglauca* Zahlbr., *Bottaria dimorpha*  
 Vain., *Anthracotheceum dimorphum* (Vain.) Zahlbr., *Pyrenula laevigata* var. *microspora* Vain., *Pyrenula*  
*subsimplex* Vain., *Pyrenula griseola* Vain., *Melanotheca griseola* (Vain.) Zahlbr., *Pyrenula platysporella*  
 Zahlbr., *Pyrenula plittii* R.C. Harris, *Pyrenula andamanica* Ajay Singh & Upreti]  
 Note: the bands of dark granular material mentioned as a distinguishing character of *Pyrenula plittii*  
 are in this ascospore type only a development state (postmature ascospores), visible also in some  
 other species, notably often in *Pyrenula finitima*.  
 Ascospores 14–16  $\mu\text{m}$  long; eastern palaeotropical . . . . .  
 . . . . . **Pyrenula mastophoriza (Nyl.) Zahlbr.**  
 (*Verrucaria mastophoriza* Nyl., *Anthracotheceum peltophorum* Müll. Arg., *Pyrenula neopeltophora* Ajay  
 Singh, *Pyrenula glabrescens* Vain.)  
 Note: the ascospore size shows much variation in this and the previous species, also within one  
 section. They might be one species.
- 107(87) Hamathecium inspersed . . . . . 108  
 Hamathecium not inspersed . . . . . 119
- 108(107) Central lumina strongly elongated; northern temperate. . . . .  
 . . . . . **Pyrenula subelliptica (Tuck.) R.C. Harris**  
 [*Clypeosphaeria imperfecta* Ellis & Everh., *Pyrenula imperfecta* (Ellis & Everh.) R.C. Harris, *Anthra-*  
*cethecium pauciloculare* Herre]  
 Central lumina not strongly elongated . . . . . 109
- 109(108) Ascospores constricted at the central septum; neotropical (Costa Rica) . . . . .  
 . . . . . **Pyrenula minae Aptroot & Lücking**  
 Ascospores not constricted, at most becoming constricted when post mature . .  
 . . . . . 110
- 110(109) Ascomata mostly <0.7 mm diam. . . . . 111  
 Ascomata mostly >0.7 mm diam. . . . . 114
- 111(110) Ascospores 27–50  $\mu\text{m}$  long; eastern palaeotropical (India) . . . . .  
 . . . . . **Pyrenula oculata Ajay Singh & Upreti**  
 Ascospores <25  $\mu\text{m}$  long . . . . . 112
- 112(111) Ascospores 13–18  $\mu\text{m}$  long; neotropical. . . . . **Pyrenula laetior Müll. Arg.**  
 (*Pyrenula gregantula* Müll. Arg.)  
 Ascospores 18–25  $\mu\text{m}$  long . . . . . 113

- 113(112) Ascospores 18–25  $\mu\text{m}$  long; thallus and/or acomata with patches of rusty anthraquinone; known from temperate regions on the Northern Hemisphere and South Africa, so probably cosmopolitan . . . . .  
 . . . . . **Pyrenula occidentalis (R.C. Harris) R.C. Harris**  
 [*Pyrenula neglecta* ssp. *occidentalis* R.C. Harris, *Pyrenula glabrata* f. *incusa* Flot., *Pyrenula laevigata* f. *incusa* (Flot.) Zahlbr., *Pyrenula harrisii* Hafellner & Kalb]  
 Ascospores 18–20  $\mu\text{m}$  long; thallus and ascomata without any anthraquinone; eastern palaeotropical (Singapore) . . . . .  
 . . . . . **Pyrenula subglabrata (Nyl.) Müll. Arg.**  
 (*Verrucaria subglabrata* Nyl.)
- 114(110) Ascospores 30–45  $\mu\text{m}$  long . . . . . 115  
 Ascospores <30  $\mu\text{m}$  long . . . . . 116
- 115(114) Ascomata conical, emergent, sides spreading; eastern palaeotropical . . . . .  
 . . . . . **Pyrenula interducta (Nyl.) Zahlbr.**  
 (*Verrucaria interducta* Nyl.)  
 Ascomata globose, immersed; neotropical . . . . .  
 . . . . . **Pyrenula mastophoroides (Nyl.) Zahlbr.**  
 [*Verrucaria mastophoroides* Nyl., *Verrucaria mastophoroides* var. *flavicans* Nyl., *Pyrenula mastophoroides* var. *flavicans* (Nyl.) Zahlbr.]
- 116(114) Ascospores mostly <21  $\mu\text{m}$  long . . . . . 117  
 Ascospores mostly >20  $\mu\text{m}$  long . . . . . 118
- 117(116) Ascospores mostly <17  $\mu\text{m}$  long, biseriate in the ascus; pantropical . . . . .  
 . . . . . **Pyrenula castanea (Eschw.) Müll. Arg.**  
 (*Verrucaria hymnothora* ssp. *castanea* Eschw., *Spermatodium amazonicum* Trevis., *Pyrenula limae* Vain., *Pyrenula mamillana* var. *bataana* Vain., *Pyrenula limayensis* Vain., *Pyrenula submarginata* Vain.)  
 Notes: *Pyrenula submarginata* is lectotypified here with specimen no. 23 (TUR-Vainio 31312); the other two original specimens do not have an interspersed hymenium. The ascospores of *Pyrenula limayensis* are shorter than in the description, up to 15  $\mu\text{m}$  long.  
 Ascospores mostly 17–21  $\mu\text{m}$  long, uniseriate in the ascus; pantropical . . . . .  
 . . . . . **Pyrenula mamillana (Ach.) Trevis.**  
 [*Verrucaria mamillana* Ach., *Verrucaria kunthii* Fée., *Pyrenula kunthii* (Fée) Fée, *Verrucaria cinchonae* Fée, *Pyrenula cinchonae* (Fée) Fée (nom. illeg.), *Verrucaria phaea* Eschw. (nom. illeg.), *Trypethelium ocellatum* Zenker, *Verrucaria marginata* Hook., *Pyrenula marginata* (Hook.) Trevis., *Verrucaria xyloides* Eschw., *Pyrenula xyloides* (Eschw.) Müll. Arg., *Melanomma subconicum* Ellis & Everh., *Pyrenula velata* Müll. Arg., *Verrucaria punctiformis* Eschw. (nom. illeg.), ? *Verrucaria papilligera* Krempelh. (nom. illeg.), *Verrucaria imitans* Nyl., *Pyrenula imitans* (Nyl.) Zahlbr., *Pyrenula lagoensis* Müll. Arg., *Verrucaria warmingii* Krempelh., *Melanotheca subsimplex* Müll. Arg., *Pyrenula warmingii* (Krempelh.) Müll. Arg., ? *Pyrenula mamillana* var. *subconfluens* Vain., *Pyrenula subconfluens* (Vain.) Vain., *Pyrenula subglabriuscula* Vain., ? *Pyrenula subglabriuscula* var. *natalensis* Vain., *Pyrenula philippina* Vain., *Pyrenula comirana* Vain., *Pyrenula marginata* var. *australasiatica* Vain., *Pyrenula fuscolurida* Vain., *Pyrenula atrofuscescens* Vain., *Pyrenula cinereovelata* Vain., *Pyrenula affinis* Malme, *Pyrenula oligocarpa* Malme, ? *Pyrenula philippina* var. *oceanica* Räsänen ex Sbarbaro, *Pyrenula columellata* Upreti & Ajay Singh, *Pyrenula elegans* Ajay Singh & Upreti]
- 118(116) Ascospores rounded, uniseriate in the ascus; pantropical . . . . .  
 . . . . . **Pyrenula massariospora (Starb.) R.C. Harris**  
 [*Clypeosphaeria massariospora* Starb., *Starbaeckiella massariospora* (Starb.) H. Syd. & Syd., *Pyrenula pachyspora* Vain., *Pseudopyrenula majuscula* H. Magn.]  
 Ascospores at least at one end pointed, biseriate in the ascus; neotropical . . . . .  
 . . . . . **Pyrenula acutalis R.C. Harris**
- 119(107) Thallus UV+yellow (when material well preserved, sometimes only part of the thallus reacting) . . . . . 120  
 Thallus UV– or greenish/whitish reflecting . . . . . 123

- 120(119) Ascospores mostly >24  $\mu\text{m}$  long . . . . . 121  
 Ascospores mostly <24  $\mu\text{m}$  long . . . . . 122
- 121(120) Ascospores 25–40  $\mu\text{m}$  long, without black granules; neotropical (Costa Rica) . .  
 . . . . . **Pyrenula andina Aptroot**  
 Ascospores 36–45  $\mu\text{m}$  long, with black granules at the tips; temperate America .  
 . . . . . **Pyrenula caryae R.C. Harris**
- 122(120) Ascospores 9–11  $\mu\text{m}$  long, ellipsoid; Australian . . . . .  
 . . . . . **Pyrenula xanthominuta Aptroot**  
 Ascospores 14–21  $\mu\text{m}$  long, fusiform, pointed; cosmopolitan . . . . .  
 . . . . . **Pyrenula dermatodes (Borrer) Schaer.**  
 [*Verrucaria dermatodes* Borrer, *Verrucaria nitida* var. *dermatodes* (Borrer) Leight., *Pyrenula nitida* var.  
*dermatodes* (Borrer) Trevis., ? *Pyrenula viridescens* Fée, *Spermatodium viridescens* (Fée) Trevis.,  
*Pyrenula mollis* Fée, ? *Pyrenula porinoides* Fée (nom. illeg.), *Melanotheca feeana* Müll. Arg., *Pseu-*  
*dopyrenula galactina* Shirley, *Pyrenula galactina* (Shirley) Kantvilas, *Pyrenula chloroplaca* Shirley,  
*Chroocia inconspicua* (C.F.W. Meissn.) Trevis., *Melanotheca inconspicua* (C.F.W. Meissn.) Müll.  
 Arg., *Pyrenula hypophyta* (Nyl.) Müll. Arg., *Verrucaria hypophyta* Nyl., *Verrucaria micromma* Nyl.  
 (nom. illeg.), *Pyrenula micromma* Shirley (nom. illeg.), *Verrucaria micromma* var. *leucomma* Nyl.,  
*Pyrenula micromma* var. *leucomma* (Nyl.) Trevis., *Pyrenula occulta* var. *leucomma* (Nyl.) Zahlbr.,  
*Verrucaria punctella* var. *exstans* Nyl., *Pyrenula punctella* var. *exstans* (Nyl.) Müll. Arg., *Pyrenula*  
*pinguis* var. *exstans* (Nyl.) Zahlbr., *Verrucaria arverna* Nyl., *Melanotheca arverna* (Nyl.) Boistel,  
*Verrucaria arthoniza* C. Knight, *Pyrenula arthoniza* (C. Knight) Müll. Arg., *Verrucaria nitida* var.  
*pseudonitidella* C. Knight, *Pyrenula pseudonitidella* (C. Knight) D.J. Galloway, *Pyrenula annulata*  
 Müll. Arg., *Pyrenula subimmersa* Müll. Arg., *Pyrenula diffracta* Müll. Arg., *Verrucaria occulta* C.  
 Knight, *Pyrenula occulta* (C. Knight) Müll. Arg., *Pyrenula hypophytoides* Harm., *Verrucaria obvoluta*  
 Nyl., *Pseudopyrenula obvoluta* (Nyl.) Zahlbr., *Pyrenula obvoluta* (Nyl.) R.C. Harris & Aptroot,  
*Verrucaria achroopora* Nyl., *Pyrenula achroopora* (Nyl.) Arnold, *Verrucaria glabrata* Nyl., *Pyrenula*  
*glabrata* (Nyl.) Arnold, *Verrucaria subtrahens* Nyl., *Pyrenula subtrahens* (Nyl.) Müll. Arg., *Pyrenula*  
*porinella* Vain., ?(UV test needed) *Pyrenula nitidella* var. *exstantior* Vain., *Pyrenula stramineoatra*  
 Vain., ? *Pyrenula chondrina* Zahlbr., *Pyrenula tumicata* Zahlbr., *Pyrenula stramineosens* Zahlbr.,  
*Pyrenula schutschensis* Zahlbr., *Pyrenula lucifera* R.C. Harris]  
 Note: somewhat variable, especially in UV-reaction, but always with pointed ascospores and thallus  
 at least partly covering the ascomata. The oldest name found for specimens that are not reacting  
 with UV is *Pyrenula subtrahens* (Nyl.) Müll. Arg.
- 123(119) Ascospores mostly >25  $\mu\text{m}$  long . . . . . 124  
 Ascospores mostly <25  $\mu\text{m}$  long . . . . . 135
- 124(123) Ascospores 36–45  $\mu\text{m}$  long, with or without black granules at the tips . . . . 125  
 Ascospores <40  $\mu\text{m}$  long, without black granules at the tips . . . . . 126
- 125(124) Ascospores 36–45  $\mu\text{m}$  long, with black granules at the tips; temperate America .  
 . . . . . **Pyrenula caryae R.C. Harris**  
 Ascospores 36–45  $\mu\text{m}$  long, without black granules at the tips; neotropical . . .  
 . . . . . **Pyrenula subducta (Nyl.) Müll. Arg.**  
 [*Verrucaria subducta* Nyl., ? *Verrucaria subducta* var. *retracta* Nyl., *Pyrenula subducta* var. *retracta*  
 (Nyl.) Zahlbr., *Verrucaria marginata* var. *convexa* Nyl., *Verrucaria convexa* (Nyl.) Nyl., *Pyrenula*  
*convexa* (Nyl.) Müll. Arg.]
- 126(124) End lumina elongated, ascospores 24–29  $\mu\text{m}$  long; neotropical (Virgin Islands) .  
 . . . . . **Pyrenula spectata R.C. Harris**  
 (also as *Pyrenula expectata* R.C. Harris)  
 End lumina not elongated . . . . . 127
- 127(126) Growing on rock, ascospores with dark bands between the lumina, 25–30  $\mu\text{m}$   
 long; neotropical (Brazil) . . . . . **Pyrenula quarzitica Aptroot**  
 Note: the only *Pyrenula* species that is known from rock.  
 Growing on bark, ascospores without dark bands . . . . . 128

- 128(127) Ascomata mostly >0.7 mm diam. . . . .129  
 Ascomata mostly <0.7 mm diam. . . . .131
- 129(128) Thallus with pseudocyphellae; temperate regions of the old world . . . . .  
 . . . . . **Pyrenula macrospora (Degel.) Coppins & P. James**  
 [*Verrucaria nitida* f. *elaeodes* Leight., *Pyrenula nitida* f. *elaeodes* (Leight.) A.L. Sm., *Pyrenula nitida*  
 var. *macrospora* Degel., *Pyrenula chlorospila* var. *macrospora* (Degel.) Maas Geest., *Pyrenula nitida*  
 var. *grandispora* Barchalov]  
 Thallus without pseudocyphellae. . . . .130
- 130(129) Ascospores 24–29 µm long, thallus thick; eastern palaeotropical (Papua New  
 Guinea) . . . . . **Pyrenula media Aptroot**  
 Ascospores 29–40 µm long, thallus thin; pantropical . . . . .  
 . . . . . **Pyrenula complanata (Mont.) Trevis.**  
 [*Verrucaria complanata* Mont., *Spermatodium complanata* (Mont.) Trevis., *Pyrenula macrocarpa* A.  
 Massal., *Verrucaria ectypa* Krempelh., *Pyrenula ectypa* (Krempelh.) Zahlbr., *Verrucaria introducta*  
 Stirt., *Pyrenula introducta* (Stirt.) Zahlbr., *Pyrenula cordatula* Zahlbr.]
- 131(128) Ascospores with diamond-shaped lumina; temperate regions on both hemispheres  
 . . . . . **Pyrenula chlorospila (Nyl.) Arnold**  
 [*Verrucaria chlorospila* Nyl., *Pyrenula nitida* var. *nitidella* f. *chlorospila* (Nyl.) Keissl., *Pyrenula nitidella*  
 var. *chlorospila* (Nyl.) Szatala, *Pyrenula pinguis* Chevall. (nom. illeg.), *Verrucaria nitida* var. *pinguis*  
 (Westr.) Nyl., *Verrucaria pinguis* Westr., *Pyrenula nitens* f. *pinguis* (Westr.) Zahlbr., *Pyrenula nitida* f.  
*pinguis* (Westr.) Zahlbr., *Arthopyrenia nitida* f. *pinguis* (Westr.) H. Olivier, *Arthopyrenia nitida* var.  
*nitidella* f. *pinguis* (Westr.) Boistel, *Verrucaria chlorospiloides* Nyl., *Verrucaria nitida* var. *phaeospila*  
 Nyl., *Pyrenula nitida* var. *phaeospila* (Nyl.) Zahlbr., ? *Verrucaria olivaceofusca* C. Knight, *Pyrenula*  
*knightiana* Müll. Arg., *Pyrenula mamillana* var. *erubescens* Zahlbr., ? *Verrucaria glabrata* var. *deprimens*  
 C. Knight, *Pyrenula deprimens* (C. Knight) D.J. Galloway, *Pyrenula nitidella* var. *maculata* R.C.  
 Harris, *Pyrenula maculata* (R.C. Harris) R.C. Harris]  
 Note: specimen H-NYL 1165 (Portugal, *Welwitsch* 1840) is selected as the lectotype of *Verrucaria*  
*nitida* var. *phaeospila* Nyl. It also includes (and even more) *Pyrenula macrospora*, but the smaller  
 syntype H-NYL 1166 shows what element was meant.  
 Ascospores with somewhat rounded or quadrangular lumina . . . . .132
- 132(131) Ascospores with dark granules between the lumina; temperate American . . . . .  
 . . . . . **Pyrenula macounii R.C. Harris**  
 Ascospores without dark bands. . . . .133
- 133(132) Ascospores 32–42 µm long; temperate America, extending to Japan . . . . .  
 . . . . . **Pyrenula punctella (Nyl.) Trevis.**  
 (*Verrucaria punctella* Nyl., *Pyrenula impressa* Müll. Arg.)  
 Ascospores mostly 25–37 µm long; tropical . . . . .134

- 134(133) Central lumina much wider than long, ascomata conical, emergent, thallus without pseudocyphellae; pantropical . . . . . **Pyrenula mastophora (Nyl.) Müll. Arg.**  
*(Verrucaria mastophora Nyl., Pyrenula mastophora var. australis Malme, ? Pyrenula sessilis H. Magn.)*  
 Central lumina more or less rounded, ascomata somewhat rounded, often partly immersed in the thallus, thallus often with (generally sparse) pseudocyphellae; pantropical . . . . . **Pyrenula quassiaeicola (Fée) Fée**  
*[also as Pyrenula quassiiicola (Fée) Fée, Verrucaria quassiaeicola Fée, also as Verrucaria quassiiicola Fée, Verrucaria nitida var. quassiaeicola (Fée) Nyl., also as Verrucaria nitida var. quassiiicola (Fée) Nyl., Pyrenula pinguis Fée, Verrucaria pinguis (Fée) Spreng., ? Pyrenula vitrea (Eschw.) Müll. Arg., Verrucaria vitrea Eschw., Leiophloea vitrea (Eschw.) Trevis., Pyrenula flaventior Müll. Arg., Verrucaria flaventior (Müll. Arg.) Stirt., ? Verrucaria crassescens Stirt., Pyrenula crassescens (Stirt.) Müll. Arg., Stigmatidium confluens C. Knight, Stigmatidium prominulum C. Knight, ? Pyrenula mammillaris (Hepp) Zahlbr., Verrucaria mammillaris Hepp, Verrucaria subpunctella Nyl., Pyrenula subpunctella (Nyl.) Müll. Arg., Verrucaria mastophora Nyl., ? Verrucaria subnitida Nyl. (nom. inval.), Pyrenula subnitida Müll. Arg., ? Verrucaria glabrata var. homalisma C. Knight, Pyrenula homalisma (C. Knight) D.J. Galloway, Verrucaria baileyi C. Knight, Pyrenula baileyi (C. Knight) Shirley, Trypethelium papillatum C. Knight, Parmentaria papillata (C. Knight) Shirley, Pyrenula glaziovii Müll. Arg., Pyrenula ferax Müll. Arg., Pyrenula olivaceofusca Müll. Arg., Pyrenula nitidans Müll. Arg., Pyrenula pulchella var. cinerascens Müll. Arg., Pyrenula adacta var. cinerascens (Müll. Arg.) Zahlbr., Pyrenula punctella var. emergens Müll. Arg., Pyrenula pinguis var. emergens (Müll. Arg.) Müll. Arg., Verrucaria pinguis var. emergens (Müll. Arg.) Stizenb., Pyrenula emergens (Müll. Arg.) Vain., Pyrenula subcuprea Müll. Arg., Pyrenula virescens Müll. Arg., Pyrenula endostega Müll. Arg., Pyrenula parvula Müll. Arg., Pyrenula mastophorizans Müll. Arg., Pyrenula marmorata Müll. Arg., Pyrenula defossa Müll. Arg., Pyrenula caeruleascens Müll. Arg., also as Pyrenula caeruleascens Müll. Arg., Pyrenula obscurata Müll. Arg., Pyrenula subvelata Müll. Arg. (nom. illeg.), Pyrenula pseudovelata M. Choisy, Pyrenula gibberosa Vain., Pyrenula eucalypta Vain., ? Pyrenula mozambica Vain., Pyrenula orofensis Vain., Pyrenula euphorbiae Vain., Pyrenula martinicana Vain., Pyrenula rizalensis Vain., Melanotheca rizalensis (Vain.) Zahlbr., Pyrenula punctifera Vain., Pyrenula pallidofulvescens Vain., Anthracothecium olivaceocinereum Vain., Pyrenula vanoverberghii Vain., Pyrenula trombetana Vain., Pyrenula pallidofulvescens var. fulvostraminea Vain., Pyrenula oculifera Vain., Pyrenula obscurior Vain., Pyrenula pudica Zahlbr., Pyrenula manhaviensis Zahlbr., Pyrenula pertusarina Zahlbr., Pyrenula kelungana Zahlbr., Pyrenula chungii Zahlbr., Pyrenula nebulosa Zahlbr., Pyrenula albidopunctata Zahlbr., Pyrenula emersa Malme, Pyrenula bonariensis Malme, Pyrenula fulvescens Malme, Pyrenula emersa var. rissoensis Malme, Pyrenula plumbea Malme, Pyrenula fissa H. Magn., Pyrenula obscura Räsänen]*
- 135(123) Ascospores mostly 21–25 µm long . . . . . 136  
 Ascospores mostly <21 µm long . . . . . 142
- 136(135) Ascomata c. 3–4 mm diam; Japan . . . . . **Pyrenula gigas Zahlbr.**  
 Ascomata <3 mm diam . . . . . 137
- 137(136) Ascomata with red, KOH+ purple crystals inside . . . . . 138  
 Ascomata without red crystals . . . . . 139

- 138(137) Ascomata <0.5 mm diam; temperate regions of Europe and Asia . . . . .  
 . . . . . **Pyrenula nitidella (Flörke ex Schaer.) Müll. Arg.**  
 [*Verrucaria nitida* var. *nitidella* Flörke ex Schaer., *Verrucaria nitidella* (Flörke ex Schaer.) Nyl.,  
*Bunodea nitida* var. *nitidella* (Flörke ex Schaer.) Beltr., *Pyrenula nitida* var. *nitidella* (Flörke ex  
 Schaer.) Schaer., *Arthopyrenia nitida* var. *nitidella* (Flörke ex Schaer.) H. Olivier, *Pyrenula nitidella*  
 var. *cintrana* Welw., *Pyrenula nitida* var. *minor* Hepp, also as *Pyrenula nitida* var. *minima* Hepp  
*Pyrenula nitida* var. *minor* f. *pinicola* Hepp, also as *Pyrenula nitida* var. *minima* f. *pinicola* Hepp,  
*Pyrenula nitidella* f. *pinicola* (Hepp) Zahlbr., *Pyrenula nitidella* var. *nigrescens* B. de Lesd., *Pyrenula*  
*nitida* var. *nitidella* f. *nigrescens* (B. de Lesd.) Keissl., *Pyrenula nitida* var. *aequata* Zahlbr., *Pyrenula*  
*nitida* var. *nitidella* f. *fuscata* Suza]
- Ascomata >0.5 mm diam; temperate regions of Europe and Asia . . . . .  
 . . . . . **Pyrenula nitida (Weigel) Ach.**  
 [*Lichen alveolatus* Scop., *Sphaeria nitida* Weigel, *Lichen nitidus* (Weigel) Ach., *Verrucaria nitida*  
 (Weigel) Schrad., *Bunodea nitida* (Weigel) Beltr., *Arthopyrenia nitida* (Weigel) H. Olivier., *Verru-*  
*caria maxima* DC., *Verrucaria nitida* var. *maxima* (DC.) March., *Lichen populneus* Ach., *Verrucaria*  
*populnea* (Ach.) DC., *Pyrenula glabrata* f. *pachyderma* Haszl., *Pyrenula laevigata* f. *pachyderma*  
 (Haszl.) Zahlbr., *Pyrenula nitida* f. *pachyderma* (Haszl.) Szatala, *Pyrenula nitida* f. *chevalieri* M.  
 Choisy, *Verrucaria nitida* var. *populi* Saint-Amans, *Verrucaria nitida* f. *flavescens* Malbr., *Arthopyrenia*  
*nitida* f. *flavescens* (Malbr.) H. Olivier, *Arthopyrenia nitida* var. *nitidella* f. *flavescens* (Malbr.) Boistel,  
*Pyrenula nitida* f. *flavescens* (Malbr.) Zahlbr., *Verrucaria nitida* f. *squamata* Malbr., *Arthopyrenia*  
*nitida* f. *squamata* (Malbr.) H. Olivier, *Pyrenula nitida* f. *squamata* (Malbr.) Zahlbr., *Verrucaria nitida*  
 var. *major* Schaer., *Pyrenula nitida* var. *major* (Schaer.) Schaer., *Pyrenula nitida* f. *virens* Servit &  
 Nádvořník, *Pyrenula nitida* f. *diffRACTA* Erichs., *Pyrenula nitida* f. *crassa* Barchalov]
- 139(137) Ascospores with angular diamond-shaped lumina; temperate America . . . . .  
 . . . . . **Pyrenula micheneri R.C. Harris**  
 Ascospores with rounded or quadrangular lumina. . . . . 140
- 140(139) Ascospores with bands of dark granules between the lumina; pantropical . . . . .  
 . . . . . **Pyrenula pyrgillospora Aptroot**  
 Ascospores without bands of dark granules . . . . . 141
- 141(140) Ascospores with at least one pointed end; temperate Northern Hemisphere,  
 extending to the tropics . . . . . **Pyrenula acutispora Kalb & Hafellner**  
 [*Pyrenula kakouettae* Sérus. & Diederich, *Pyrenula alnicola* R.C. Harris (nom. inval.)]  
 Ascospores with rounded ends; eastern palaeotropical (India) . . . . .  
 . . . . . **Pyrenula submastophora Ajay Singh & Upreti**
- 142(135) Ascospores 7–10 µm long; Iran. . . . .  
 . . . . . **Pyrenula minutissima Aptroot, Valadbeigi & Sipman ined.**  
 Ascospores >10 µm long . . . . . 143
- 143(142) Ascospores mostly <15 µm long . . . . . 144  
 Ascospores mostly >15 µm long . . . . . 146
- 144(143) Ascomata >0.7 mm diam; pantropical . . . . .  
 . . . . . **Pyrenula atropurpurea (Eschw.) Müll. Arg.**  
 (*Verrucaria atropurpurea* Eschw.)  
 Ascomata <0.7 mm diam. . . . . 145

- 145(144) Ascospores 6–8  $\mu\text{m}$  wide; pantropical . . . . . **Pyrenula brunnea Fée**  
 [*Microthelia shirleyana* Müll. Arg., *Pyrenula shirleyana* (Müll. Arg.) Aptroot, ? *Pyrenula subgriseola* Vain., *Melanotheca subgriseola* (Vain.) Zahlbr.]  
 Ascospores 4–6  $\mu\text{m}$  wide; pantropical . . . . . **Pyrenula aspistea (Ach.) Ach.**  
 [*Verrucaria aspistea* Ach., *Polyblastia aspistea* (Ach.) Trevis., *Pyrenula nitida* var. *aspistea* (Ach.) Trevis., ? *Pyrenula porinoides* Ach., *Ocellularia porinoides* (Ach.) Spreng., *Verrucaria porinoides* (Ach.) Mont., *Segestria porinoides* (Ach.) Trevis., *Pyrenula heteroclita* Ach., *Verrucaria heteroclita* (Ach.) Spreng., *Verrucaria aggregata* f. *heteroclita* (Ach.) Nyl., *Pyrenula heteroclita* ssp. *minuscule* Ach., *Pyrenula heteroclita* ssp. *denigrata* Ach., *Pyrenula glauca* (Fée) Müll. Arg., *Verrucaria glauca* Fée, *Spermatodium glaucum* (Fée) Trevis., ? *Verrucaria viridescens* Fée, *Spermatodium viridescens* (Fée) Trevis., *Verrucaria decolorata* Fée, *Verrucaria bonplandiae* Fée, *Pyrenula bonplandiae* (Fée) Fée, *Pyrenula subtrahens* var. *microspora* (Krempelh.) Zahlbr., *Verrucaria subtrahens* var. *microspora* Krempelh., *Verrucaria seriata* Hepp, *Pyrenula seriata* (Hepp) Müll. Arg., *Verrucaria aggregata* Nyl., *Verrucaria aggregata* f. *segregata* Nyl., *Pyrenula segregata* (Nyl.) Müll. Arg., *Pyrenula subaggregata* Müll. Arg., *Pyrenula velatior* Müll. Arg., *Pyrenula nigrocincta* Müll. Arg., *Pyrenula umbilicatula* Müll. Arg., *Pyrenula atrofusca* Müll. Arg., *Pyrenula minutula* Müll. Arg., *Pyrenula exigua* Müll. Arg., *Pyrenula dispersa* Müll. Arg., *Pyrenula peltophora* Müll. Arg., *Pyrenula indusiata* Müll. Arg., *Massaria bataanensis* Rehm, *Pyrenula bataanensis* (Rehm) Shoemaker & P.M. LeClair, *Pyrenula apayaensis* Vain., *Pyrenula guimarana* Vain., *Pyrenula bilirana* Vain., *Pyrenula ochracea* Szatala, *Pyrenula rubidopunctata* Szatala, *Pyrenula aquila* R.C. Harris, *Pyrenula subrizalensis* Ajay Singh & Upreti]  
 Note: only the lectotype (designated here) of *Pyrenula umbilicatula*: (Cuba, Wright, Verr. Cub. 218a p.p.; G, as *Pertusaria umbilicatula*) is *Pyrenula aspistea*; the specimen in G of 218b p.p. under the name *Pertusaria umbilicatula* is *Pyrenula mamillana*.
- 146(143) Thallus at least partly 0.3 mm thick . . . . . 147  
 Thallus thinner . . . . . 148
- 147(146) Ascospores at least partly constricted at the septa; Australasian (Papua New Guinea) . . . . . **Pyrenula montana Aptroot**  
 Ascospores not constricted; neotropical (Puerto Rico) . . . . .  
 . . . . . **Pyrenula psoriformis Zahlbr.**
- 148(146) Ascomata >0.7 mm diam. . . . . 149  
 Ascomata <0.7 mm diam. . . . . 151
- 149(148) Thallus with pseudocyphellae; New Zealand . . . . .  
 . . . . . **Pyrenula deliquescens (C. Knight) Müll. Arg.**  
 (*Verrucaria deliquescens* C. Knight, *Verrucaria astata* C. Knight, *Pyrenula consociata* Zahlbr.)  
 Thallus without pseudocyphellae. . . . . 150
- 150(149) Lumina rounded; eastern palaeotropical (India). . . . .  
 . . . . . **Pyrenula scutata (Stirt.) Zahlbr.**  
 (*Verrucaria scutata* Stirt., *Pyrenula pileata* Vain.)  
 Note: examination of the type showed that the name *Pyrenula pileata* has recently been incorrectly used for *Pyrenula fetivica*.
- Lumina angular; pantropical . . . . . **Pyrenula balia (Krempelh.) R.C. Harris**  
 [*Verrucaria balia* Krempelh., *Pseudopyrenula balia* (Krempelh.) Müll. Arg., *Verrucaria marginata* var. *santensis* Nyl., *Verrucaria santensis* (Nyl.) Nyl., *Pyrenula mamillana* var. *santensis* (Nyl.) Trevis., *Pyrenula marginata* var. *santensis* (Nyl.) Tuck., *Pyrenula santensis* (Nyl.) Müll. Arg., *Pyrenula nitida* var. *commutata* Trevis., *Verrucaria hymnothora* Krempelh. (nom. illeg.), *Pyrenula deplanata* Müll. Arg., *Pyrenula longislandica* Ajay Singh & Upreti]
- 151(148) Ascospores with extra endospore layer around lumina; neotropical (Florida, Louisiana) . . . . . **Pyrenula rubrostoma R.C. Harris**  
 Ascospores without extra endospore layers . . . . . 152
- 152(151) Ascospores with dark bands between the lumina; North America extending to Japan . . . . . **Pyrenula confoederata R.C. Harris**  
 Ascospores without dark bands. . . . . 153

- 153(152) Ascomata <0.4 mm diam. . . . . 154  
 Ascomata >0.4 mm diam; pantropical (UV– material of *Pyrenula dermatodes* keys out here as well) . . . . . ***Pyrenula aggregata* (Fée) Fée**  
 [*Verrucaria aggregata* Fée, *Spermatodium aggregatum* (Fée) Trevis., *Melanotheca aggregata* (Fée) Müll. Arg. (nom. illeg.), *Verrucaria subnitidella* Nyl., *Pyrenula subnitidella* (Nyl.) Müll. Arg., *Pyrenula costaricensis* Müll. Arg., *Pyrenula gracilior* Müll. Arg., *Pyrenula virens* Müll. Arg., *Pyrenula tenella* Müll. Arg., *Pyrenula fuscoolivacea* Vain., *Pyrenula aspisteoides* Vain., *Pyrenula parva* Vain., *Pyrenula irrubescens* Vain., *Pseudopyrenula awajiensis* Vain., *Pyrenula awajiensis* (Vain.) Kashiw., *Pyrenula oblonga* Zahlbr., *Pyrenula athallina* H. Magn., *Pyrenula nuda* Ajay Singh & Upreti]  
 Note: the type of *Pyrenula aggregata* shows only crowded ascomata, no joint walls.
- 154(153) Ascospores 18–20 µm long; neotropical . . . . . ***Pyrenula tristissima* Vain.**  
 Ascospores <18 µm long; neotropical . . . . . ***Pyrenula minor* Fée**  
 [*Spermatodium minus* (Fée) Trevis.]

### Nomenclatural novelties

#### ***Anthracothecium interlatens* (Nyl.) Aptroot comb. nov.**

Mycobank No.: MB563101

Basionym: *Astrothelium interlatens* Nyl., *Bull. Soc. Linn. Normand.*, ser. 2, 2: 134 (1868); type: New Caledonia, Lifu, 1864, *Thiébaud* (H-NYL 82 —lectotype, selected here).

*Parmentaria interlatens* (Nyl.) Müll. Arg., *Parmentaria toowoombensis* Müll. Arg., *Anthracothecium toowoombense* (Müll. Arg.) Aptroot, *Astrothelium interlatens* var. *nudatum* Nyl., *Parmentaria interlatens* var. *nudatum* (Nyl.) Zahlbr., *Parmentaria grossa* Müll. Arg., *Parmentaria subastroidea* Müll. Arg., *Parmentaria denudata* Zahlbr., *Plagiothelium australiense* Stirt., *Parmentaria australiense* (Stirt.) Müll. Arg., *Parmentaria chungii* Zahlbr., *Parmentaria obtecta* Zahlbr., *Parmentaria capensis* Zahlbr., *Anthracothecium capense* (Zahlbr.) K.P. Singh & G.P. Singha, *Parmentaria nilamburensis* Makhija & Patw., *Parmentaria indica* Upreti & Ajay Singh.

Note: specimen H-NYL 80 (New Caledonia, Lifu, *Thiébaud* 1864) is selected as lectotype. The specimens H-NYL 77, 78 and 82 are identical.

#### ***Pyrenula breutelii* (Müll. Arg.) Aptroot comb. nov.**

Mycobank No.: MB563102

Basionym: *Anthracothecium breutelii* Müll. Arg., *Flora* 68: 339 (1885); holotype: St Thomas, *Breutel*, ex hb. Hampe 1877 (G).

*Anthracothecium maculare* Zahlbr.; *Pyrenula macularis* (Zahlbr.) R.C. Harris, *Anthracothecium speciosum* Zahlbr.

Notes. *Anthracothecium breutelii* is the oldest epithet for this distinctive species. It was not surprising that an older name should be

found for this common and widespread pantropical species. The holotype of *Anthracothecium speciosum* is mixed and contains also *Pyrenula leucostoma*, but the material distributed in Zahlbruckner's *Lichenes Rariores Exsiccati* 252 is all *Pyrenula macularis*.

#### ***Pyrenula ceylonensis* (Ajay Singh & Upreti) Aptroot comb. nov.**

Mycobank No.: MB563103

Basionym: *Pleurotheliopsis ceylonensis* Ajay Singh & Upreti, *Geophytology* 16: 262 (1986).

*Parmentaria anamalaiensis* Upreti & Ajay Singh, *Pyrenula anamalaiensis* (Upreti & Ajay Singh) Upreti, *Parmentaria oligocarpa* Ajay Singh, *Pyrenula suboligocarpa* Upreti.

#### ***Pyrenula fusispora* (Malme) Aptroot comb. nov.**

Mycobank No.: MB563104

Basionym: *Parathelium fusisporum* Malme, *Ark. Bot.* 19(1): 17 (1924); holotype: Brazil, Matto Grosso, Curumbá, *Malme*, 19 July 1894 (S).

#### ***Pyrenula gibberulosa* (Vain.) Aptroot comb. nov.**

Mycobank No.: MB563105

Basionym: *Bottaria gibberulosa* Vain., *Annal. Acad. Sci. Fenn.*, ser. A, 15(6): 329 (1921).

*Anthracothecium gibberulosum* (Vain.) Zahlbr., *Pyrenula subochraceoflavens* Upreti, *Anthracothecium goaense* Ajay Singh.

Note: an isotype studied of *Pyrenula subochraceoflavens* revealed the submuriform ascospores and the lack of orange pigmentation (it is not more pigmented than *Pyrenula occidentalis*).

**Pyrenula lyoni (Zahlbr.) Aptroot comb. nov.**

Mycobank No.: MB563106

Basionym: *Parmentaria lyoni* Zahlbr., *Ann. Mycol.* 10: 363 (1912).

*Parmentaria lyoni* f. *stramineascens* Zahlbr., *Polyblastiopsis negrosensis* Herre, *Anthracothecium keralense* Patw. & Makhija, *Parmentaria keralensis* (Patw. & Makhija) Ajay Singh.

**Pyrenula neosandwicensis Aptroot nom. nov.**

Mycobank No.: MB563107

Nom. nov. pro: *Anthracothecium sandwicense* Zahlbr., *Ann. Mycol.* 10: 361 (1912).

*Anthracothecium sandwicense* var. *globosum* Zahlbr.

**Pyrenula papillifera (Nyl.) Aptroot comb. nov.**

Mycobank No.: MB563108

Basionym: *Verrucaria papillifera* Nyl., *Espos. Synopt. Pyrenocarp.* 42 (1858).

*Anthracothecium papilliferum* (Nyl.) Müll. Arg., *Sporodictyon papilliferum* (Nyl.) Trevis., *Verrucaria thwaitesii* Leight., *Anthracothecium thwaitesii* (Leight.) Müll. Arg., *Bottaria thwaitesii* (Leight.) Vain., *Bottaria mucosa* Vain., *Anthracothecium mucosum* (Vain.) Zahlbr., *Pyrenula mucosa* (Vain.) R.C. Harris, *Bottaria albidopallens* Vain., *Anthracothecium albidopallens* (Vain.) Zahlbr., *Anthracothecium chrysophorum* Zahlbr., *Anthracothecium badiotrum* Ajay Singh.

Note: *Anthracothecium chrysophorum* Zahlbr. was described as having a yellow medulla, but there is no pigment present in the type and only specimen.

**Pyrenula platystoma (Müll. Arg.) Aptroot comb. nov.**

Mycobank No.: MB563109

Basionym: *Anthracothecium platystomum* Müll. Arg., *Revue Mycol.* 10: 124 (1888); lectotype: Paraguay, Guarapi, 1878 *Balansa* 4172, (G, also 2 identical isolecotypes).

*Anthracothecium oculatum* Müll. Arg., *Pyrenula neoculata* Aptroot, *Bottaria impressa* Vain., *Anthracothecium impressum* (Vain.) Zahlbr., *Anthracothecium biferum* Zahlbr., *Bottaria himalayensis* Räsänen, *Anthracothecium himalayense* (Räsänen) D.D. Awasthi, *Anthracothecium vermiculare* Kashiw. & Kurok., also as *Anthracothecium vermicularis* Kashiw. & Kurok., *Pyrenula vermicularis* (Kashiw. & Kurok.) H. Harada, *Anthracothecium pseudohimalayense* Ajay Singh, *Anthracothecium himalayense* var. *pseudohimalayense* (Ajay Singh) Ajay Singh, *Anthracothecium mulleri* Patw. & Makhija, *Polyblastiopsis muelleri*

Upreti & Ajay Singh, *Anthracothecium lifuense* Upreti & Ajay Singh, *Anthracothecium bengalense* Ajay Singh.

**Pyrenula schiffneri (Zahlbr.) Aptroot comb. nov.**

Mycobank No.: MB563110

Basionym: *Parmentaria schiffneri* Zahlbr., *Denkschr. math.-naturw. Classe, Akad. Wissensch. Wien* 83: 95 (1909).

*Anthracothecium falsarium* Zahlbr., *Pyrenula falsaria* (Zahlbr.) R.C. Harris, *Pyrenula verruculosa* Upreti & Ajay Singh.

Note: the ascospores of *Parmentaria schiffneri* are much smaller than mentioned in the original description.

**Pyrenula sexluminata Aptroot nom. nov.**

Mycobank No.: MB563111

Nom. nov. pro: *Pyrenula quinqueseptata* Aptroot, *Bibliotheca Lichenologica* 64: 167 (1997).

**Pyrenula welwitschii (Upreti & Ajay Singh) Aptroot comb. nov.**

Mycobank No.: MB563112

Basionym: *Anthracothecium welwitschii* Upreti & Ajay Singh, *Feddes Repert. Spec. Nov. Regni Veg.* 99: 151 (1988).

*Pyrenula himalayana* Upreti.

Note: an isotype studied of *Pyrenula himalayana* showed that it contains no anthraquinones on the thallus or ascomata.

**Sulcopyrenula subglobosa (Riddle) Aptroot comb. nov.**

Mycobank No.: MB563113

Basionym: *Anthracothecium subglobosum* Riddle, in Riddle & Millspaugh, *Bahama Fl.*: 527 (1920).

The curators of the lichen herbaria of B, BM, BRI, CANB, G, GZU, H, HO, L, LI, M, S, TNS, TUR, UPS and W are warmly thanked for their often prompt cooperation. Robert Lücking is thanked for putting his pictures of lichen types (TROPILIT project) at my disposal.

REFERENCES

- Aptroot, A. (1991) A monograph of the *Pyrenulaceae* (excluding *Anthracothecium* and *Pyrenula*) and the *Requienellaceae*, with notes on the *Pleomassariaceae*, the *Trypetheliaceae* and *Mycomicrothelia* (lichenized

- and non-lichenized ascomycetes). *Bibliotheca Lichenologica* **44**: 1–178.
- Aptroot, A. (2003) Pyrenocarpous lichens and related non-lichenized ascomycetes from Taiwan. *Journal of the Hattori Botanical Laboratory* **93**: 155–173.
- Aptroot, A. (2009) Pyrenulaceae. *Flora of Australia* **57**: 449–480.
- Aptroot, A. & Sipman, H. J. M. (2001) New Hong Kong lichens, ascomycetes and lichenicolous fungi. *Journal of the Hattori Botanical Laboratory* **91**: 317–343.
- Aptroot, A., Diederich, P., Sérusiaux, E. & Sipman, H. J. M. (1997) Lichens and lichenicolous fungi from New Guinea. *Bibliotheca Lichenologica* **64**: 1–220.
- Aptroot, A., Lücking, R., Sipman, H. J. M., Umaña, L. & Chaves, J. L. (2008) Pyrenocarpous lichens with bitunicate asci. A first assessment of the lichen biodiversity inventory in Costa Rica. *Bibliotheca Lichenologica* **98**: 1–162.
- Aptroot, A., Rodrigues, A. F., Schumm, F., Camara, S. & Gabriel, R. (2010) Lista dos líquenes e fungos liquenícolas (Fungi). In *Listagem dos Organismos Terrestres e Marinhos dos Açores*. [A List of the Terrestrial and Marine Biota of the Azores] (P. A. V. Borges, A. Costa, R. Cunha, R. Gabriel, V. Gonçalves, A. F. Martins, I. Melo, M. Parente, P. Raposeiro, P. Rodrigues *et al.*, eds): 59–79. Parede: Principia.
- Etayo, J. & Aptroot, A. (2006) Líquenes epífitos y hongos liquenícolas de Bahía Honda (Veraguas, Panama). [Epiphytic lichens and lichenicolous fungi from Bahía Honda (Veraguas, Panama)]. In *Estudios Sobre la Bioversidad de la Region de Bahía Honda (Veraguas, Panama)* [Studies on the Biodiversity of the Bahía Honda Region (Veraguas, Panama)] (S. Castroviejo & A. Ibanez, eds): 63–94. Madrid: Consejo Superior de Investigaciones Científicas.
- Galloway, D. J. (2007) *Flora of New Zealand Lichens*. 2nd ed. Lincoln, New Zealand: Manaaki Whenua Press.
- Gueidan, C., Villaseñor, C. R., Hoog, G. S. de Gorbushina, A. A., Untereiner, W. A. & Lutzoni, F. (2008) A rock-inhabiting ancestor for mutualistic and pathogen-rich fungal lineages. *Studies in Mycology* **61**: 111–119.
- Harada, H., Okamoto, T. & Yoshimura, I. (2004) A checklist of lichens and lichen-allies of Japan. *Lichenology* **2**: 47–165.
- Harris, R. C. (1989) A sketch of the family Pyrenulaceae in eastern North America. *Memoirs of the New York Botanical Garden* **49**: 74–107.
- Harris, R. C. (1995) *More Florida Lichens. Including the 10c tour of the Pyrenolichens*. New York: Published by the author.
- Kashiwadani, H., Aptroot, A. & Moon, K. H. (2009) Pyrenocarpous lichens of Japan, with the resurrection of the genus *Trypetheliopsis*. *Bibliotheca Lichenologica* **99**: 247–258.
- Moon, K. H. & Aptroot, A. (2009) Pyrenocarpous lichens in Korea. *Bibliotheca Lichenologica* **99**: 297–314.
- Schumm, F. & Aptroot, A. (2010) *Seychelles Lichen Guide*. Privately published, Wangen & Soest.
- Smith, C. W., Aptroot, A., Coppins, B. J., Fletcher, A., Gilbert, O. L., James, P. W. & Wolseley, P. A., (eds) (2009) *The Lichens of Great Britain and Ireland*. London: British Lichen Society.
- Upreti, D. K. (1998) A key to the lichen genus *Pyrenula* from India, with nomenclatural notes. *Nova Hedwigia* **66**: 557–576.

Accepted for publication 28 June 2011

## Index with all names in *Anthracothecium* and *Pyrenula*, with their disposition (A and B refer to the two keys, numbers to the key entries)

- Anthracothecium albescens* (Nyl.) Müll. Arg. A38 = *Pyrenula confinis* (Nyl.) R.C. Harris  
*Anthracothecium albescens* var. *subochraceum* (Nyl.) Zahlbr. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium albidopallens* (Vain.) Zahlbr. A48 = *Pyrenula papillifera* (Nyl.) Aptroot  
*Anthracothecium americanum* (Ach.) Müll. Arg. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium amphitropum* Müll. Arg. A48 = *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Anthracothecium andamanicum* (Nyl.) Müll. Arg. A8 = *Anthracothecium macrosporum* (Hepp) Müll. Arg.  
*Anthracothecium angolense* Upreti & Ajay Singh A39 = *Pyrenula parvinuclea* (Meyen & Flot.) Aptroot  
*Anthracothecium angulatum* Zahlbr. A8 = *Anthracothecium prasinum* (Eschw.) R.C. Harris  
*Anthracothecium angulatum* var. *majus* Zahlbr. A8 = *Anthracothecium prasinum* (Eschw.) R.C. Harris  
*Anthracothecium anoistum* (Stirt.) Zahlbr. = *Polymeridium proponens* (Nyl.) R.C. Harris  
*Anthracothecium asahinae* Kashiw. & Kurok. A21 = *Pyrenula subvariola* (C. Knight) Aptroot  
*Anthracothecium ashamiense* (Stirt.) Ajay Singh A44 = *Pyrenula duplicans* (Nyl.) Aptroot  
*Anthracothecium aurantiacum* (Eschw.) Müll. Arg. (nom. illeg.) = *Astrothelium conicum* aggr.  
*Anthracothecium aurantium* (Eschw.) Müll. Arg. = *Astrothelium conicum* aggr.  
*Anthracothecium australiense* (Müll. Arg.) Aptroot A7  
*Anthracothecium astroindicum* Ajay Singh A42 = *Pyrenula globifera* (Eschw.) Aptroot  
*Anthracothecium awasthii* Ajay Singh A39 = *Pyrenula parvinuclea* (Meyen & Flot.) Aptroot

- Anthracothecium badioatrum* Ajay Singh A48 = *Pyrenula papillifera* (Nyl.) Aptroot  
*Anthracothecium bengalense* Ajay Singh A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium biferum* Zahlbr. A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium borbonicum* (Nyl.) Müll. Arg. A8 = *Anthracothecium prasinum* (Eschw.) R.C. Harris  
*Anthracothecium brasilianum* M. Choisy = *Astrothelium conicum* aggr.  
*Anthracothecium breutelii* Müll. Arg. A40 = *Pyrenula breutelii* (Müll. Arg.) Aptroot  
*Anthracothecium capense* (Zahlbr.) K. P. Singh & G. P. Sinha A9 = *Anthracothecium interlatens* (Nyl.) Aptroot  
*Anthracothecium canellae-albae* (Fée) Müll. Arg. A12 = *Sulcopyrenula canellae-albae* (Fée) H. Harada  
*Anthracothecium cascarillae* Müll. Arg. A51 = *Pyrenula dissimulans* (Müll. Arg.) R.C. Harris  
*Anthracothecium cellulatum* (C. Knight) Müll. Arg. A50 = *Pyrenula thelomorpha* Tuck.  
*Anthracothecium chrysophorum* Zahlbr. A48 = *Pyrenula papillifera* (Nyl.) Aptroot  
*Anthracothecium cinerosum* (Ach.) Müll. Arg. A48 = ? *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Anthracothecium coccineum* Müll. Arg. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium corticatum* (Vain.) Zahlbr. A7 = *Anthracothecium australiense* (Müll. Arg.) Aptroot  
*Anthracothecium columellatum* (Vain.) Zahlbr. A8 = *Anthracothecium macrosporum* (Hepp) Müll. Arg.  
*Anthracothecium confine* (Nyl.) Müll. Arg. A38 = *Pyrenula confinis* (Nyl.) R.C. Harris  
*Anthracothecium corcovadense* Malme A3 = *Mycomicrothelia decipiens* (Müll. Arg.) R.C. Harris  
*Anthracothecium corticatum* Müll. Arg. A38 = *Pyrenula confinis* (Nyl.) R.C. Harris  
*Anthracothecium cristatellum* Nagarkar & Patw. A48 = *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Anthracothecium cruentatum* (Müll. Arg.) Müll. Arg. A25 = *Pyrenula cruentata* (Müll. Arg.) R.C. Harris  
*Anthracothecium decipiens* Müll. Arg. A3 = *Mycomicrothelia decipiens* (Müll. Arg.) R.C. Harris  
*Anthracothecium denudatum* (Nyl.) Zahlbr. A39 = *Pyrenula parvinuclea* (Meyen & Flot.) Aptroot  
*Anthracothecium denudatum* var. *ochrotropum* (Nyl.) Müll. Arg. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium depressum* (Eschw.) Müll. Arg. A48 = *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Anthracothecium desquamans* Müll. Arg. = a thelotremoid *Graphidaceae*, most recently as *Leptotrema desquamans* (Müll. Arg.) Patw. & Makhija  
*Anthracothecium dimorphum* (Vain.) Zahlbr. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Anthracothecium doleschallii* A. Massal. A8 = *Anthracothecium macrosporum* (Hepp) Müll. Arg.  
*Anthracothecium duplicans* (Nyl.) Müll. Arg. A44 = *Pyrenula duplicans* (Nyl.) Aptroot  
*Anthracothecium emergens* (Leight.) Zahlbr. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium eminentior* (Nyl.) Müll. Arg. = *Porina eminentior* Nyl.  
*Anthracothecium endococcineum* (Vain.) Zahlbr. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium epapillatum* (Nyl.) Müll. Arg. A42 = *Pyrenula globifera* (Eschw.) Aptroot  
*Anthracothecium erigens* (Kashiw.) H. Harada A7 = *Anthracothecium australiense* (Müll. Arg.) Aptroot  
*Anthracothecium erythrinae* (Vain.) Zahlbr. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium eschweileri* Müll. Arg. A8 = *Anthracothecium prasinum* (Eschw.) R.C. Harris  
*Anthracothecium euthelium* (Nyl.) Zahlbr., *Verrucaria euthelia* Nyl. = *Astrothelium* sp.  
*Anthracothecium exsertum* (Krempeh.) Müll. Arg. A44 = *Pyrenula duplicans* (Nyl.) Aptroot  
*Anthracothecium falsarium* Zahlbr. A34 = *Pyrenula schiffneri* (Zahlbr.) Aptroot  
*Anthracothecium fraternale* Zahlbr. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium fulvum* Müll. Arg. B60 = *Pyrenula papilligera* (Leight.) Müll. Arg.  
*Anthracothecium gibberulosum* (Vain.) Zahlbr. A20 = *Pyrenula gibberulosa* (Vain.) Aptroot  
*Anthracothecium globiferum* (Eschw.) Müll. Arg. A42 = *Pyrenula globifera* (Eschw.) Aptroot  
*Anthracothecium globiferum* var. *microsporium* Ajay Singh A42 = ? *Pyrenula globifera* (Eschw.) Aptroot  
*Anthracothecium goaense* Ajay Singh A20 = *Pyrenula gibberulosa* (Vain.) Aptroot  
*Anthracothecium goniostomum* Müll. Arg. A48 = *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Anthracothecium gregale* (C. Knight) Aptroot A9  
*Anthracothecium guineense* (Nyl.) Müll. Arg. A7 = *Anthracothecium australiense* (Müll. Arg.) Aptroot  
*Anthracothecium hexamerum* Müll. Arg. B46 = *Pyrenula sexocularis* (Nyl.) Müll. Arg.  
*Anthracothecium hians* Müll. Arg. = a thelotremoid *Graphidaceae*, recently known as *Thelotrema neohians* Patw. & Makhija  
*Anthracothecium hibernicum* (Nyl.) A.L. Sm. A35 = *Pyrenula hibernica* (Nyl.) Aptroot  
*Anthracothecium himalayense* (Räsänen) D.D. Awasthi A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium himalayense* var. *pseudohimalayense* (Ajay Singh) Ajay Singh A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium immersum* Patw. & Makhija A31 = *Pyrenula astroidea* (Fée) R.C. Harris  
*Anthracothecium impressum* (Vain.) Zahlbr. A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium inclinatum* (Müll. Arg.) Kashiw. A31 = ? *Pyrenula ravenelii* (Tuck.) R.C. Harris  
*Anthracothecium indicum* Ajay Singh A8 = *Anthracothecium macrosporum* (Hepp) Müll. Arg.  
*Anthracothecium interlatens* (Nyl.) Aptroot A9  
*Anthracothecium interponens* (Nyl.) Müll. Arg. A44 = *Pyrenula duplicans* (Nyl.) Aptroot  
*Anthracothecium japonicum* Kashiw. & Kurok. A8 = *Anthracothecium macrosporum* (Hepp) Müll. Arg.

- Anthracothecium javanicum* (Hepp) Zahlbr. A6 = ? *Pyrenula leucostoma* Ach.  
*Anthracothecium keralense* Patw. & Makhija A32 = *Pyrenula lyoni* (Zahlbr.) Aptroot  
*Anthracothecium laevigatum* Müll. Arg. A19 = *Lithothelium nanosporum* (C. Knight) Aptroot  
*Anthracothecium leightonii* Patw. & Makhija A48 = *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Anthracothecium leucostomum* Ach. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium libricolum* (Fée) Müll. Arg. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium lifuense* Upreti & Ajay Singh A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium lugescens* (Nyl.) Zahlbr. = *Campylothelium lugescens* (Nyl.) Upreti & Ajay Singh  
*Anthracothecium luteonitens* (Nyl.) Zahlbr. A8 = ? *Anthracothecium macrosporum* (Hepp) Müll. Arg.  
*Anthracothecium macrosporum* (Hepp) Müll. Arg. A8  
*Anthracothecium maculare* Zahlbr. A40 = *Pyrenula breutelii* (Müll. Arg.) Aptroot  
*Anthracothecium maculatum* Nagarkar & Patw. A44 = *Pyrenula duplicans* (Nyl.) Aptroot  
*Anthracothecium majus* (Zahlbr.) Kashiw. & Kurok. A8 = *Anthracothecium prasinum* (Eschw.) R.C. Harris  
*Anthracothecium manipurense* Müll. Arg. A8 = *Anthracothecium macrosporum* (Hepp) Müll. Arg.  
*Anthracothecium megaspermum* Patw. & Makhija A8 = *Anthracothecium macrosporum* (Hepp) Müll. Arg.  
*Anthracothecium melasporum* (Taylor) Müll. Arg. = *Henrica melaspora* (Taylor) Savić & Tibell  
*Anthracothecium monosporum* Müll. Arg. A2 = *Aptrootia elatior* (Stirt.) Aptroot  
*Anthracothecium mucosum* (Vain.) Zahlbr. A48 = *Pyrenula papillifera* (Nyl.) Aptroot  
*Anthracothecium mulleri* Patw. & Makhija A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium nanosporum* Ajay Singh A39 = *Pyrenula nanospora* (Ajay Singh) Upreti  
*Anthracothecium nanum* (Zahlbr.) R.C. Harris A7 = *Anthracothecium australiense* (Müll. Arg.) Aptroot  
*Anthracothecium novemseptatum* (Vain.) R.C. Harris A21 = *Pyrenula novemseptata* Vain.  
*Anthracothecium obscuratum* Upreti & Ajay Singh A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium ochraceoflavens* (Nyl.) Zahlbr. A27 = *Pyrenula ochraceoflavens* (Nyl.) R.C. Harris  
*Anthracothecium ochraceoflavum* (Nyl.) Müll. Arg. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium ochraceoflavum* f. *nudius* (Nyl.) Zahlbr. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium ochrotropum* (Nyl.) Zahlbr. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium ochroxanthum* Müll. Arg. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium oligatum* Müll. Arg. A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium oligosporum* Müll. Arg. = a thelotremoid *Graphidaceae*, recently known as *Leptotrema oligosporum* (Müll. Arg.) Patw. & Makhija  
*Anthracothecium olivaceocinereum* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Anthracothecium opertum* (Nyl.) Müll. Arg. A42 = *Pyrenula globifera* (Eschw.) Aptroot  
*Anthracothecium pachycheilum* (Tuck.) Zahlbr. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium palmarum* (Krempelh.) Vain. A26 = *Pyrenula palmarum* (Krempelh.) R.C. Harris  
*Anthracothecium papilliferum* (Nyl.) Müll. Arg. A48 = *Pyrenula papillifera* (Nyl.) Aptroot  
*Anthracothecium paraguayense* Malme A42 = *Pyrenula globifera* (Eschw.) Aptroot  
*Anthracothecium parameroides* (Vain.) Müll. Arg. A39 = *Pyrenula parvinuclea* (Meyen & Flot.) Aptroot  
*Anthracothecium paramerum* (Nyl.) Müll. Arg. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium paramerum* f. *pallidoalbum* (Vain.) Zahlbr. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium parvinucleum* (Meyen & Flot.) Zahlbr. A39 = *Pyrenula parvinuclea* (Meyen & Flot.) Aptroot  
*Anthracothecium pauciloculare* Herre B108 = *Pyrenula subelliptica* (Tuck.) R.C. Harris  
*Anthracothecium peltophorum* Müll. Arg. B106 = *Pyrenula mastophoriza* (Nyl.) Zahlbr.  
*Anthracothecium planiusculum* (Nyl.) Müll. Arg. = *Anisomeridium planiusculum* (Nyl.) R.C. Harris  
*Anthracothecium platystomum* Müll. Arg. A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium praelustre* (Krempelh.) Müll. Arg. A8 = *Anthracothecium prasinum* (Eschw.) R.C. Harris  
*Anthracothecium prasinum* (Eschw.) R.C. Harris A8  
*Anthracothecium pseudoborbonicum* Upreti & Ajay Singh A8 = *Anthracothecium prasinum* (Eschw.) R.C. Harris  
*Anthracothecium pseudocypbellatum* Ajay Singh A44 = *Pyrenula duplicans* (Nyl.) Aptroot  
*Anthracothecium pseudohimalayense* Ajay Singh A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium punctuliforme* (Stizenb.) Müll. Arg. A12 = *Sulcopyrenula canellae-albae* (Fée) H. Harada  
*Anthracothecium pusillum* (Ach.) Müll. Arg. A19 = *Lithothelium nanosporum* (C. Knight) Aptroot  
*Anthracothecium pustuliferum* Ajay Singh A44 = *Pyrenula duplicans* (Nyl.) Aptroot  
*Anthracothecium pyrenuloides* (Mont.) Müll. Arg. A48 = *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Anthracothecium rhodesianum* C.W. Dodge = unknown  
*Anthracothecium roseum* (Vain.) Zahlbr. A27 = *Pyrenula ochraceoflava* var. *pacifica* P. M. McCarthy  
*Anthracothecium sandwicense* Zahlbr. A44 = *Pyrenula neosandwicensis* Aptroot  
*Anthracothecium sandwicense* var. *convexum* Zahlbr. A48 = *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Anthracothecium sandwicense* var. *globosum* Zahlbr. A44 = *Pyrenula neosandwicensis* Aptroot  
*Anthracothecium seminudum* Müll. Arg. B46 = *Pyrenula sexlocularis* (Nyl.) Müll. Arg.  
*Anthracothecium sinapispermum* (Fée) Müll. Arg. B69 = ? *Pyrenula cruenta* (Mont.) Vain.  
*Anthracothecium speciosum* Zahlbr. A40 = *Pyrenula breutelii* (Müll. Arg.) Aptroot

- Anthracothecium speciosum* f. *iturupiense* O.B. Blum A8 = ? *Anthracothecium prasinum* (Eschw.) R.C. Harris  
*Anthracothecium staurosporum* (Tuck.) Zahlbr. A12 = *Sulcopyrenula staurospora* (Tuck.) H. Harada  
*Anthracothecium subcutaneum* Müll. Arg. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium subglobosum* Riddle A13 = *Sulcopyrenula subglobosa* (Riddle) Aptroot  
*Anthracothecium sublaevigatum* Patw. & Makhija A45 = *Pyrenula sublaevigata* (Patw. & Makhija) Upreti  
*Anthracothecium submucosum* (Vain.) Zahlbr. A46 = *Pyrenula leucostoma* Ach.  
*Anthracothecium subochraceum* (Nyl.) Zahlbr. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium subvariolosum* C. Knight A21 = *Pyrenula subvariolosa* (C. Knight) Aptroot  
*Anthracothecium tetraspermum* Riddle A12 = *Sulcopyrenula staurospora* (Tuck.) H. Harada  
*Anthracothecium thelemorphum* (Tuck.) Zahlbr. A50 = *Pyrenula thelemorpha* Tuck.  
*Anthracothecium thelemorphum* (Tuck.) Zahlbr. A50 = *Pyrenula thelemorpha* Tuck.  
*Anthracothecium thwaitesii* (Leight.) Müll. Arg. A48 = *Pyrenula papillifera* (Nyl.) Aptroot  
*Anthracothecium toowoombense* (Müll. Arg.) Aptroot A9 = *Anthracothecium interlatens* (Nyl.) Aptroot  
*Anthracothecium varians* R.C. Harris A21 = *Pyrenula novemseptata* Vain.  
*Anthracothecium variolosum* (Pers.) Müll. Arg. A42 = ? *Pyrenula globifera* (Eschw.) Aptroot  
*Anthracothecium vermiculare* Kashiw. & Kurok. A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium vermicularis* Kashiw. & Kurok. A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Anthracothecium vitellinum* (Stizenb.) Müll. Arg. A27 = *Pyrenula ochraceoflava* (Nyl.) R.C. Harris  
*Anthracothecium welwitschii* Upreti & Ajay Singh A49 = *Pyrenula welwitschii* (Upreti & Ajay Singh) Aptroot  
*Pyrenula acaciae* Vain. B37 = *Pyrenula adacta* Fée  
*Pyrenula achariana* (Fée) Vain. B79 = *Pyrenula anomala* (Ach.) Vain.  
*Pyrenula achroopora* (Nyl.) Arnold B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula acutalis* R.C. Harris B100, B118  
*Pyrenula acutispora* Kalb & Hafellner B38, B141  
*Pyrenula adacta* Fée B37  
*Pyrenula adacta* var. *cinerascens* (Müll. Arg.) Zahlbr. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula addubitans* (Stirt.) Zahlbr. = fungus, cf. *Pleospora*  
*Pyrenula aenea* (Wallr.) Rabenh. = *Porina aenea* (Wallr.) Zahlbr.  
*Pyrenula aethiobola* (Wahlenb.) Ach. = *Verrucaria aethiobola* Wahlenb.  
*Pyrenula affinis* Malme B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula aggregans* Vain. B60  
*Pyrenula aggregata* (Fée) Fée B153  
*Pyrenula alba* A. Massal. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula alba* var. *laevigata* (Pers.) Trevis. B84 = *Pyrenula laevigata* (Pers.) Arnold  
*Pyrenula alba* var. *leucoplaca* (Wallr.) Schaer. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula alba* var. *microcarpa* (Hepp) Trevis. B84 = *Pyrenula laevigata* (Pers.) Arnold  
*Pyrenula albella* Müll. Arg. B83 = *Pyrenula microcarpa* Müll. Arg.  
*Pyrenula albida* Müll. Arg. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula albidopunctata* Zahlbr. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula albissima* (Fée) Trevis. = *Polypyrenula albissima* (A. Massal.) Aptroot  
*Pyrenula alboostiolata* Vain. B83 = *Pyrenula microcarpa* Müll. Arg.  
*Pyrenula albothallina* Vain. B82  
*Pyrenula alni* A. Massal. B12 = ? *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula alnicola* R.C. Harris B38, B141 = *Pyrenula acutispora* Kalb & Hafellner  
*Pyrenula alutacea* (Wallr.) Schaer. = *Verrucaria fuscella* (Turner) Winch & Thornhill  
*Pyrenula americana* (A. Massal.) Trevis. = *Anisomeridium americanum* (A. Massal.) R.C. Harris  
*Pyrenula analepta* (Ach.) Trevis. (nom. illeg.) = *Arthopyrenia analepta* (Ach.) A. Massal.  
*Pyrenula analepta* Fée = ? *Anisomeridium americanum* (A. Massal.) R.C. Harris  
*Pyrenula analepta* var. *americana* Fée = ? *Anisomeridium americanum* (A. Massal.) R.C. Harris  
*Pyrenula anamalaiensis* (Upreti & Ajay Singh) Upreti A35 = *Pyrenula ceylonensis* (Ajay Singh & Upreti) Aptroot  
*Pyrenula andamanica* Ajay Singh & Upreti B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula andina* Aptroot B121  
*Pyrenula annularis* (Spreng.) Fée = *Trypethelium annulare* (Spreng.) Mont.  
*Pyrenula annulata* Müll. Arg. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula anomala* (Ach.) Vain. B79  
*Pyrenula anomaloides* Vain. B79 = *Pyrenula anomala* (Ach.) Vain.  
*Pyrenula antoniae* (Krempelh.) van Overeem-de Haas = *Trypethelium cinereorosellum* Krempelh.  
*Pyrenula apayaensis* Vain. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula approximans* (Krempelh.) Müll. Arg. B103  
*Pyrenula approximata* Vain. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula aquila* R.C. Harris B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula arctecincta* Fée = unknown

- Pyrenula areolata* Ach. = *Staurothele areolata* (Ach.) Lettau  
*Pyrenula arthonioides* (A. Massal.) Trevis. = *Tomasellia arthonioides* (A. Massal.) A. Massal.  
*Pyrenula arthonioides* (Eschw.) Vain. B79 = *Pyrenula arthoniotheca* Upreti  
*Pyrenula arthoniotheca* Upreti B79  
*Pyrenula arthoniza* (C. Knight) Müll. Arg. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula asahinae* (Kashiw. & Kurok.) H. Harada A21 = *Pyrenula subvariolosa* (C. Knight) Aptroot  
*Pyrenula aspistea* (Ach.) Ach. B145  
*Pyrenula aspisteoides* Vain. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula astroidea* (Fée) R.C. Harris A31  
*Pyrenula athallina* H. Magn. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula atroalbella* Vain. B46 = *Pyrenula sexlocularis* (Nyl.) Müll. Arg.  
*Pyrenula atrofusca* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula atrofuscescens* Vain. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula atrolaminata* R.C. Harris B78  
*Pyrenula atropurpurea* (Eschw.) Müll. Arg. B144  
*Pyrenula aurantiaca* Fée B66 = *Pyrenula cerina* Eschw.  
*Pyrenula aurantiopileata* Aptroot B65  
*Pyrenula bataanensis* (Vain.) Kashiw. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula bahiana* Malme B86  
*Pyrenula bailevi* (C. Knight) Shirley B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula balia* (Krempelch.) R.C. Harris B150  
*Pyrenula bataanensis* (Rehm) Shoemaker & P.M. LeClair B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula bayrhorfferi* (Zwackh) Hepp = *Thelopsis rubella* Nyl.  
*Pyrenula betulae* (A. Massal.) Trevis. = *Arthopyrenia grisea* (Schleich. ex Schaer.) Körb.  
*Pyrenula bicarpa* Upreti A31 = *Pyrenula astroidea* (Fée) R.C. Harris  
*Pyrenula bicuspidata* Müll. Arg. B43  
*Pyrenula biformis* (Borrer) Hepp = *Anisomeridium biforme* (Borrer) R.C. Harris  
*Pyrenula bilirana* Vain. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula boberskiana* Körb. = fungus, cf. *Leptosphaeria*  
*Pyrenula bonariensis* Malme B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula bonplandiae* (Fée) B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula borneensis* Aptroot ined. A37  
*Pyrenula brachysperma* Müll. Arg. = mixture of fungi, earlier classified in *Dipyrenis*  
*Pyrenula breutelii* (Müll. Arg.) Aptroot A40  
*Pyrenula brunnea* Fée B145  
*Pyrenula caeruleascens* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula campospora* Malme B96 = *Pyrenula cryptostoma* (Nyl.) Müll. Arg.  
*Pyrenula canellae-albae* Fée A12 = *Sulcopyrenula canellae-albae* (Fée) H. Harada  
*Pyrenula caraibica* Aptroot B37 = *Pyrenula adacta* Fée  
*Pyrenula carcasana* Müll. Arg. B47  
*Pyrenula carpinea* (Wallr.) Trevis. = *Porina aenea* (Wallr.) Zahlbr.  
*Pyrenula cartilaginea* Fée = *Trypethelium cartilagineum* (Fée) Aptroot  
*Pyrenula cartilaginea* A. Massal. (nom. illeg.) = nomen nudum  
*Pyrenula caryae* R.C. Harris B121, B125  
*Pyrenula castanea* (Eschw.) Müll. Arg. B117  
*Pyrenula catalepta* Schaer. = *Verrucaria fuscella* (Turner) Winch & Thornhill  
*Pyrenula catervaria* (Fée) A. Massal. = *Astrothelium variolosum* (Ach.) Müll. Arg.  
*Pyrenula cayennensis* Müll. Arg. B94  
*Pyrenula cerasi* (Schr.) Trevis. = *Arthopyrenia cerasi* (Schr.) A. Massal.  
*Pyrenula cerasi* var. *vera* Naeg. = *Arthopyrenia cerasi* (Schr.) A. Massal.  
*Pyrenula ceratina* Fée = *Trypethelium ceratinum* (Fée) R.C. Harris  
*Pyrenula cerina* Eschw. B66  
*Pyrenula cerina* f. *expallens* Zahlbr. B66 = *Pyrenula cerina* Eschw.  
*Pyrenula ceylonensis* (Ajay Singh & Upreti) Aptroot A35  
*Pyrenula chilensis* (Fée) R.C. Harris A34  
*Pyrenula chionea* (Mont.) Trevis. = *Polymeridium chioneum* (Mont.) R.C. Harris  
*Pyrenula chloroplaca* Shirley B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula chlorospila* (Nyl.) Arnold B131  
*Pyrenula chlorospila* var. *macrospora* (Degel.) Maas Geest. B129 = *Pyrenula macrospora* (Degel.) Coppins & P. James  
*Pyrenula chlorotica* (Ach.) Trevis. = *Porina chlorotica* (Ach.) Müll. Arg.  
*Pyrenula chondrina* Zahlbr. B122 = ? *Pyrenula chondrina* Zahlbr.  
*Pyrenula chungii* Zahlbr. B134 = *Pyrenula quassiaecola* (Fée) Fée

- Pyrenula ciliata* Aptroot B40  
*Pyrenula cinchonae* Fée B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula cinchonae* (Ach.) Tuck. = *Arthopyrenia cinchonae* (Ach.) Müll. Arg.  
*Pyrenula cinerea* Zahlbr. B83 = *Pyrenula microcarpa* Müll. Arg.  
*Pyrenula cinerella* (Flot. ex Zwackh) Branth & Rostrup = *Mycomicrothelia melanospora* (Hepp) D. Hawksw.  
*Pyrenula cinerella* var. *quadriloculata* Fink = a coelomycete  
*Pyrenula cinerella* ssp. *quadriloculata* (Fink) Fink = a coelomycete  
*Pyrenula cinereoglauca* Zahlbr. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula cinereovelata* Vain. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula cinerosa* Ach. A48 = ? *Pyrenula pyrenuloides* (Mont.) R.C. Harris  
*Pyrenula cinnamomea* (Mont.) Trevis. = *Astrothelium* sp.  
*Pyrenula circumfiniens* Vain. B29  
*Pyrenula circumfusa* (Nyl.) Trevis. B13 = *Blastodermia nitida* A. Massal.  
*Pyrenula circumrubens* (Nyl.) B. de Lesd. B69 = *Pyrenula cruenta* (Mont.) Vain.  
*Pyrenula circumrubens* var. *erythrinosa* B. de Lesd. B69 = *Pyrenula cruenta* (Mont.) Vain.  
*Pyrenula circumrubens* var. *rubrotecta* (Stirt.) Shirley B69 = *Pyrenula cruenta* (Mont.) Vain.  
*Pyrenula citrififormis* R.C. Harris B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula clandestina* Ach. = *Ocellularia clandestina* (Ach.) Müll. Arg.  
*Pyrenula clopima* (Wahlenb.) Ach. = *Staurothele clopima* (Wahlenb.) Th. Fr.  
*Pyrenula coactella* (Stirt.) Upreti = *Melanothecopsis coactella* (Stirt.) C.W. Dodge  
*Pyrenula cocoes* Müll. Arg. B81, B89  
*Pyrenula coerulescens* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula collospora* Vain. B9 = *Mycomicrothelia collospora* (Vain.) Aptroot  
*Pyrenula columellata* Upreti & Ajay Singh B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula comirana* Vain. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula commixta* Malme B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula complanata* (Mont.) Trevis. B130  
*Pyrenula composita* Ach. = a non-lichenized fungus  
*Pyrenula concastroma* R.C. Harris B71  
*Pyrenula concatervans* (Nyl.) R.C. Harris B46 = *Pyrenula sexocularis* (Nyl.) Müll. Arg.  
*Pyrenula confinis* (Nyl.) R.C. Harris A38  
*Pyrenula confederata* R.C. Harris B152  
*Pyrenula congregans* Nyl. = nomen nudum  
*Pyrenula conica* Müll. Arg. = *Saccardoella* sp. (a non-lichenized fungus)  
*Pyrenula consociata* Zahlbr. B149 = *Pyrenula deliquescens* (C. Knight) Müll. Arg.  
*Pyrenula conspurcata* Müll. Arg. B83 = *Pyrenula microcarpa* Müll. Arg.  
*Pyrenula convexa* (Nyl.) Müll. Arg. B125 = *Pyrenula subducta* (Nyl.) Müll. Arg.  
*Pyrenula copalchina* Fée B25 = ? *Pyrenula crassiuscula* (Malme) Aptroot  
*Pyrenula cordatula* Zahlbr. B130 = *Pyrenula complanata* (Mont.) Trevis.  
*Pyrenula corticata* (Müll. Arg.) R.C. Harris A38 = *Pyrenula confinis* (Nyl.) R.C. Harris  
*Pyrenula corticola* R.K. Verma & Kamal = unknown  
*Pyrenula coryli* A. Massal. B84  
*Pyrenula costaricensis* Müll. Arg. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula crassescens* (Stirt.) Müll. Arg. B134 = ? *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula crassiuscula* (Malme) Aptroot B25  
*Pyrenula cruenta* (Mont.) Vain. B69  
*Pyrenula cruentata* (Müll. Arg.) R.C. Harris A25  
*Pyrenula cryptostoma* (Nyl.) Müll. Arg. B96  
*Pyrenula cryptothelia* (Müll. Arg.) Aptroot & Etayo B34  
*Pyrenula crystalligera* H. Magn. B86 = *Pyrenula bahiana* Malme  
*Pyrenula cubana* (Müll. Arg.) R.C. Harris B34  
*Pyrenula cuprescens* Zahlbr. B58 = *Pyrenula immissa* (Stirt.) Zahlbr.  
*Pyrenula cuyabensis* (Malme) R.C. Harris B30  
*Pyrenula cylindrica* Kashw. B50  
*Pyrenula cyrtospora* (Stirt.) Nyl. B46 = *Pyrenula sexocularis* (Nyl.) Müll. Arg.  
*Pyrenula darjeelingensis* Jagadeesh Ram & G.P. Sinha A20  
*Pyrenula dealbata* (C. Knight) Müll. Arg. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula decumbens* (Müll. Arg.) Upreti B18 = *Lithothelium decumbens* (Müll. Arg.) Aptroot  
*Pyrenula defossa* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula deliquescens* (C. Knight) Müll. Arg. B149  
*Pyrenula deplanata* Müll. Arg. B150 = *Pyrenula balia* (Krempelh.) R.C. Harris  
*Pyrenula deprimens* (C. Knight) D.J. Galloway B131 = ? *Pyrenula chlorospila* (Nyl.) Arnold

- Pyrenula dermatodes* (Borrer) Schaer. B122  
*Pyrenula diffracta* Müll. Arg. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula diluta* (Fée) Tuck. = *Pseudopyrenula diluta* (Fée) Müll. Arg.  
*Pyrenula discissa* (Nyl.) Zahlbr. = *Melanotrema meiospermum* (Nyl.) A. Frisch  
*Pyrenula discolor* Ach. = *Amphiotrema discolor* (Ach.) Kalb  
*Pyrenula dispersa* (Wallr.) Schaer. = *Verrucaria* sp.  
*Pyrenula dispersa* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula dissimulans* (Müll. Arg.) R.C. Harris A51  
*Pyrenula duplicans* (Nyl.) Aptroot A44  
*Pyrenula dussii* Malme B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula ectypa* (Krempelh.) Zahlbr. B130 = *Pyrenula complanata* (Mont.) Trevis.  
*Pyrenula elaeina* (Borrer) Schaer. = *Verrucaria elaeina* Borrer  
*Pyrenula elegans* Ajay Singh & Upreti B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula elliptica* Müll. Arg. B29  
*Pyrenula emergens* (Müll. Arg.) Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula emersa* Malme B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula emersa* var. *rissoensis* Malme B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula endococcinea* (Nyl.) Willey = *Stigmatidium tabacinae* (Arnold) Triebel  
*Pyrenula endocrocea* Aptroot ined. A23  
*Pyrenula endoleuca* Fée = unknown  
*Pyrenula endostega* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula endoxantha* Vain. = *Pseudopyrenula endoxantha* (Vain.) Zahlbr.  
*Pyrenula enteroleuca* Spreng. = *Stictis urceolatum* (Ach.) Gilenstam  
*Pyrenula epapillata* Fée = *Astrothelium variolosum* (Ach.) Müll. Arg.  
*Pyrenula epidermidis* (Ach.) Trevis. = *Leptorhaphis epidermidis* (Ach.) Th. Fr.  
*Pyrenula erumpens* R.C. Harris A16, B30  
*Pyrenula eschweileri* (Mont.) Trevis. = *Phaeographis lobata* (Eschw.) Müll. Arg.  
*Pyrenula eucalypta* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula euphorbiae* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula exigua* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula exaristata* R.C. Harris B126 = *Pyrenula spectata* R.C. Harris  
*Pyrenula falklandica* (Nyl.) Zahlbr. = *Lithothelium falklandicum* (Nyl.) Aptroot  
*Pyrenula fallaciosa* (Stizenb. ex Arnold) Willey = *Julella fallaciosa* (Stizenb. ex Arnold) R.C. Harris  
*Pyrenula falsaria* (Zahlbr.) R.C. Harris A34 = *Pyrenula schiffneri* (Zahlbr.) Aptroot  
*Pyrenula farrea* (Ach.) Branth & E. Rostrup = *Verrucaria* sp.  
*Pyrenula farrea* var. *pluriloculata* (Fink) Zahlbr. B14 = *Eopyrenula intermedia* Coppins  
*Pyrenula farrea* var. *umbrosa* (Körb.) Zahlbr. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula feeana* Trevis. = ? *Anisomeridium americanum* (A. Massal.) R.C. Harris  
*Pyrenula feracissima* Vain. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula ferax* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula fetivica* (Krempelh.) Müll. Arg. B100  
*Pyrenula fibrata* (Stirt.) Zahlbr. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula fimbriata* Fée = a non-lichenized fungus  
*Pyrenula finitima* Müll. Arg. B103  
*Pyrenula fissa* H. Magn. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula flagellata* H. Harada B48  
*Pyrenula flaventior* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula flavofulvescens* Vain. B46 = *Pyrenula sexocularis* (Nyl.) Müll. Arg.  
*Pyrenula fraxini* (A. Massal.) Trevis. = *Arthopyrenia fraxini* A. Massal.  
*Pyrenula friesii* Trevis. = nomen nudum  
*Pyrenula fuliginea* Ach. = *Thelignya fuliginea* (Ach.) A. Massal.  
*Pyrenula fulva* (Krempelh.) Müll. Arg. B98  
*Pyrenula fulvella* R.C. Harris B27 = *Pyrenula subgregantula* Müll. Arg.  
*Pyrenula fulvescens* Malme B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula funckii* Spreng. = *Verrucaria funckii* (Spreng.) Zahlbr.  
*Pyrenula fusca* (Krempelh.) Vain. B79 = *Pyrenula anomala* (Ach.) Vain.  
*Pyrenula fuscata* Pers. = unknown, type lost  
*Pyrenula fuscolurida* Vain. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula fuscoolivacea* Vain. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula fusiformis* Hepp = *Porina aenea* (Wallr.) Zahlbr.  
*Pyrenula fusispora* (Malme) Aptroot B23  
*Pyrenula fusoluminata* Aptroot B52

- Pyrenula gahavisukana* Aptroot B37  
*Pyrenula galactina* (Shirley) Kantvilas B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula gaudichaldii* (Fée) Pers. = *Trypethelium tropicum* (Ach.) Müll. Arg.  
*Pyrenula gaudichaudii* (Fée) Pers. = *Trypethelium tropicum* (Ach.) Müll. Arg.  
*Pyrenula gelatinosa* (Ach.) Schaer. = *Agonimia gelatinosa* (Ach.) M.A. Brand & Diederich  
*Pyrenula gemmata* (Ach.) Naeg. = *Acrocordia gemmata* (Ach.) A. Massal.  
*Pyrenula gemmata* var. *macrocarpa* (Körb.) Willey = *Anisomeridium macrocarpum* (Körb.) V. Wirth.  
*Pyrenula gemmata* var. *sphaeroides* (Wallr.) Hepp = *Acrocordia gemmata* (Ach.) A. Massal.  
*Pyrenula gemmata* var. *tersa* (Krempelh.) Kickx = *Acrocordia gemmata* (Ach.) A. Massal.  
*Pyrenula gemmifera* (Tayl.) Willey = *Endococcus propinquus* (Körb.) D. Hawksw  
*Pyrenula gibberosa* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula gibberulosa* (Vain.) Aptroot A20  
*Pyrenula gibbosa* Ach. = *Rimularia gibbosa* (Ach.) Coppins, Hertel & Rambold.  
*Pyrenula gigas* Zahlbr. B136  
*Pyrenula glabrata* (Ach.) A. Massal. B84 = *Pyrenula laevigata* (Pers.) Arnold  
*Pyrenula glabrata* f. *cinerea* Haszl. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula glabrata* f. *grisea* Nyl. = unknown  
*Pyrenula glabrata* f. *incusa* Flot. B99, B113 = *Pyrenula occidentalis* (R.C. Harris) R.C. Harris  
*Pyrenula glabrata* f. *major* Krempelh. B84 = *Pyrenula laevigata* (Pers.) Arnold  
*Pyrenula glabrata* f. *microcarpa* Hepp B84 = *Pyrenula laevigata* (Pers.) Arnold  
*Pyrenula glabrata* f. *pachyderma* Haszl. B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula glabrata* (Nyl.) Arnold B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula glabrescens* Vain. B106 = *Pyrenula mastophoriza* (Nyl.) Zahlbr.  
*Pyrenula glabriuscula* (Nyl.) Vain. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula glauca* (Fée) Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula glaziovii* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula globifera* (Eschw.) Aptroot A42  
*Pyrenula globosa* Pers. = unknown, type lost  
*Pyrenula gracilior* Müll. Arg. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula gravenreuthii* Stein B69 = *Pyrenula cruenta* (Mont.) Vain.  
*Pyrenula gregantula* Müll. Arg. B112 = *Pyrenula laetior* Müll. Arg.  
*Pyrenula griseola* Vain. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula grossa* Aptroot B98  
*Pyrenula guayaci* (Fée) Trevis. = *Parapyrenis guayaci* (Fée) Aptroot  
*Pyrenula guimarana* Vain. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula hagmannii* Redinger = unknown  
*Pyrenula harrimannii* (Sm.) Trevis. = *Verrucaria hochstetteri* Fr.  
*Pyrenula harrisii* Hafellner & Kalb B99, B113 = *Pyrenula occidentalis* (R.C. Harris) R.C. Harris  
*Pyrenula hawaiiensis* Aptroot ined. B25  
*Pyrenula henatomma* (Ach.) Ach. = *Ocellularia henatomma* (Ach.) Müll. Arg.  
*Pyrenula heppii* (Naeg.) Müll. Arg. = a non-lichenized fungus  
*Pyrenula heppii* ssp. *carpineae* Hepp = a non-lichenized fungus  
*Pyrenula heppii* ssp. *fraxini* Hepp = a non-lichenized fungus  
*Pyrenula herrei* Fink = *Arthopyrenia plumbaria* (Stizenb.) R.C. Harris  
*Pyrenula heterochroa* (Mont.) Trevis. = *Trypethelium aeneum* (Eschw.) Zahlbr.  
*Pyrenula heteroclita* Ach. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula heteroclita* ssp. *demigrata* Ach. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula heteroclita* ssp. *minuscule* Ach. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula hiascens* Ach. = *Verrucaria hochstetteri* Fr  
*Pyrenula hibernica* (Nyl.) Aptroot A35  
*Pyrenula himalayana* Upreti A49 = *Pyrenula welwitschii* (Upreti & Ajay Singh) Aptroot  
*Pyrenula hirsuta* Etayo B40  
*Pyrenula hoehneliana* Zahlbr. B54  
*Pyrenula homalisma* (C. Knight) D.J. Galloway B134 = ? *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula howeana* Aptroot B64  
*Pyrenula humana* Zahlbr. B94 = *Pyrenula cayennensis* Müll. Arg.  
*Pyrenula hyalospora* (Nyl.) Tuck. = *Lithothelium hyalosporum* (Nyl.) Aptroot  
*Pyrenula hydrela* (Ach.) Schaer. = *Verrucaria denudata* Zschacke  
*Pyrenula hypophyta* (Nyl.) Müll. Arg. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula hypophytoides* Harm. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula imitans* (Nyl.) Zahlbr. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula immersa* Müll. Arg. A17 = *Pyrenula subumbilicata* (C. Knight) Aptroot

- Pyrenula immissa* (Stirt.) Zahlbr. B58  
*Pyrenula imperfecta* (Ellis & Everh.) R.C. Harris B108 = *Pyrenula subelliptica* (Tuck.) R.C. Harris  
*Pyrenula impressa* Müll. Arg. B133 = *Pyrenula punctella* (Nyl.) Trevis.  
*Pyrenula incrustans* Körb. = *Phaeospora parasitica* Arnold  
*Pyrenula indica* A. Massal. = unknown  
*Pyrenula indusiata* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula infernalis* (Mont.) Trevis. = *Anisomeridium infernale* (Mont.) R.C. Harris  
*Pyrenula infida* (Nyl.) Müll. Arg. B44 = *Pyrenula melanophthalma* (Mont.) Trevis.  
*Pyrenula infracongruens* Aptroot & Schumm B105  
*Pyrenula insularum* H. Magn. B81, B89 = *Pyrenula cocoes* Müll. Arg.  
*Pyrenula interducta* (Nyl.) Zahlbr. B115  
*Pyrenula introducta* (Stirt.) Zahlbr. B130 = *Pyrenula complanata* (Mont.) Trevis.  
*Pyrenula irosina* Vain. B104  
*Pyrenula irregularis* Fée B33 = *Pyrenula septicollaris* (Eschw.) R.C. Harris  
*Pyrenula irrubescens* Vain. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula isabellina* Vain. (as *isabellinum*) = unknown  
*Pyrenula japonica* Kurok. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula kakouettae* Sérus. & Diederich B38, B141 = *Pyrenula acutispora* Kalb & Hafellner  
*Pyrenula kamatii* Muthukumar & Tarar = nom. inval.  
*Pyrenula kamatakensis* Upreti A31 = *Pyrenula astroidea* (Fée) R.C. Harris  
*Pyrenula kelungana* Zahlbr. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula kermesina* R.C. Harris A26  
*Pyrenula knightiana* Müll. Arg. B131 = ? *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula kunthii* (Fée) Fée B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula kurzii* Ajay Singh & Upreti B93  
*Pyrenula lactea* (A. Massal.) Tuck. = *Fulella lactea* (A. Massal.) M.E. Barr  
*Pyrenula laetior* Müll. Arg. B112  
*Pyrenula laevigata* (Pers.) Arnold B84  
*Pyrenula laevigata* f. *cinerea* (Haszl.) Zahlbr. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula laevigata* f. *grisea* (Nyl.) Zahlbr. = unknown  
*Pyrenula laevigata* f. *incusa* (Flot.) Zahlbr. B99, B113 = *Pyrenula occidentalis* (R.C. Harris) R.C. Harris  
*Pyrenula laevigata* f. *major* (Krempelh.) Zahlbr. B84 = *Pyrenula laevigata* (Pers.) Arnold  
*Pyrenula laevigata* f. *microcarpa* (Hepp) Arnold B84 = *Pyrenula laevigata* (Pers.) Arnold  
*Pyrenula laevigata* f. *pachyderma* (Haszl.) Zahlbr. B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula laevigata* var. *meizospora* Vain. B83 = ? *Pyrenula microcarpa* Müll. Arg.  
*Pyrenula laevigata* var. *microspora* Vain. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula lagoensis* Müll. Arg. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula laii* Aptroot B58 = *Pyrenula immissa* (Stirt.) Zahlbr.  
*Pyrenula lamprocarpa* Müll. Arg. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula laureriformis* Aptroot B33 = *Pyrenula septicollaris* (Eschw.) R.C. Harris  
*Pyrenula leightontii* Muthukumar & Tarar = nom. inval.  
*Pyrenula leprieurii* Trevis. = a *Celothelium* sp.  
*Pyrenula leucocephala* (Ach.) Ach. = *Schismatomma abietinum* (Erhr.) A. Massal.  
*Pyrenula leucocephala* var. *amphibola* Ach. = *Schismatomma abietinum* (Erhr.) A. Massal.  
*Pyrenula leucochlora* (Müll. Arg.) Willey = *Anisomeridium leucochlorum* (Müll. Arg.) R.C. Harris  
*Pyrenula leucophaea* (Wallr.) Körb. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula leucoplaca* (Wallr.) Körb. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula leucoplaca* f. *chrysoleuca* (Körb.) Migula B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula leucoplaca* f. *umbrosa* (Körb.) Migula B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula leucoplaca* var. *chrysoleuca* Körb. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula leucoplaca* var. *pluriloculata* Fink B14 = *Eopyrenula intermedia* Coppins  
*Pyrenula leucoplaca* var. *umbrosa* Körb. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula leucostoma* Ach. A46  
*Pyrenula leucostoma* Fée = *Arthopyrenia planorbis* (Ach.) Müll. Arg.  
*Pyrenula leucotrypa* (Nyl.) Upreti B77  
*Pyrenula libricola* Fée A46 = *Pyrenula leucostoma* Ach.  
*Pyrenula limae* Vain. B117 = *Pyrenula castanea* (Eschw.) Müll. Arg.  
*Pyrenula limayensis* Vain. B117 = *Pyrenula castanea* (Eschw.) Müll. Arg.  
*Pyrenula lineatostroma* Aptroot B2  
*Pyrenula lithina* (Ach.) Ach. = *Staurothele* sp.  
*Pyrenula longislandica* Ajay Singh & Upreti B150 = *Pyrenula balia* (Krempelh.) R.C. Harris  
*Pyrenula lucifera* R.C. Harris B122 = *Pyrenula dermatodes* (Borrer) Schaer.

- Pyrenula luteopruinosa* Etayo & Aptroot B63  
*Pyrenula lyoni* (Zahlbr.) Aptroot A32  
*Pyrenula macounii* R.C. Harris B132  
*Pyrenula macrocarpa* A. Massal. B130 = *Pyrenula complanata* (Mont.) Trevis.  
*Pyrenula macrocarpa* (Fée) A. Massal. = *Astrothelium variolosum* (Ach.) Müll.Arg  
*Pyrenula macrospora* (Degel.) Coppins & P. James B129  
*Pyrenula macularis* (Zahlbr.) R.C. Harris A40 = *Pyrenula breutelii* (Müll. Arg.) Aptroot  
*Pyrenula maculata* (R.C. Harris) R.C. Harris B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula mamillana* (Ach.) Trevis. B117  
*Pyrenula mamillana* f. *diminuens* (Nyl.) Zahlbr. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula mamillana* var. *bataana* Vain. B117 = *Pyrenula castanea* (Eschw.) Müll. Arg.  
*Pyrenula mamillana* var. *erubescens* Zahlbr. B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula mamillana* var. *santensis* (Nyl.) Trevis. B150 = *Pyrenula balia* (Krempelh.) R.C. Harris  
*Pyrenula mamillana* var. *subconfluens* Vain. B117 = ? *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula mamillata* (Ajay Singh) Upreti A31 = *Pyrenula astroidea* (Fée) R.C. Harris  
*Pyrenula mammillaris* (Hepp) Zahlbr. B134 = ? *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula mangiferae* Vain. B47 = *Pyrenula carcasana* Müll. Arg.  
*Pyrenula manhavienensis* Zahlbr. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula maravalensis* Vain. B92  
*Pyrenula marcida* Fée = *Trypethelium marcidum* (Fée) Müll.Arg.  
*Pyrenula margacea* (Wahlenb.) Ach. = *Verrucaria margacea* (Wahlenb.) Wahlenb.  
*Pyrenula marginata* Hook. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula marginata* f. *diminuens* Nyl. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula marginata* var. *australasiatica* Vain. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula marginata* var. *fulva* Krempelh. B98 = *Pyrenula fulva* (Krempelh.) Müll. Arg.  
*Pyrenula marginata* var. *santensis* (Nyl.) Tuck. B150 = *Pyrenula balia* (Krempelh.) R.C. Harris  
*Pyrenula marginatula* Müll. Arg. B37 = *Pyrenula adacta* Fée  
*Pyrenula marmorata* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula martinicana* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula martinicana* (Vain.) R.C. Harris B37 = *Pyrenula adacta* Fée  
*Pyrenula massalongiana* Trevis. = *Strigula stigmatella* (Ach.) R.C. Harris  
*Pyrenula massariospora* (Starb.) R.C. Harris B118  
*Pyrenula mastoidea* Ach. = *Porina mastoidea* (Ach.) Müll. Arg.  
*Pyrenula mastophora* (Nyl.) Müll. Arg. B134  
*Pyrenula mastophora* var. *australis* Malme B134 = *Pyrenula mastophora* (Nyl.) Müll. Arg.  
*Pyrenula mastophoriza* (Nyl.) Zahlbr. B106  
*Pyrenula mastophorizans* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula mastophoroides* (Nyl.) Zahlbr. B115  
*Pyrenula mastophoroides* var. *flavicans* (Nyl.) Zahlbr. B115 = *Pyrenula mastophoroides* (Nyl.) Zahlbr.  
*Pyrenula mastospora* Vain. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula maura* (Wahlenb.) Schaer. = *Verrucaria maura* Wahlenb.  
*Pyrenula media* Aptroot B130  
*Pyrenula megalospora* Fink = *Acrocordia megalospora* (Fink) R.C. Harris  
*Pyrenula megapotamica* Malme B47 = *Pyrenula carcasana* Müll. Arg.  
*Pyrenula melaleuca* Müll. Arg. B83 = *Pyrenula microcarpa* Müll. Arg.  
*Pyrenula melanophthalma* (Mont.) Trevis. B44  
*Pyrenula melanospora* Hepp = *Mycomicrothelia melanospora* (Hepp) D. Hawksw.  
*Pyrenula micheneri* R.C. Harris B139  
*Pyrenula microcarpa* Müll. Arg. B83  
*Pyrenula microcarpoides* Müll. Arg. B83 = *Pyrenula microcarpa* Müll. Arg.  
*Pyrenula microciba* Ach. = *Catapyrenium cinereum* (Pers.) Körb.  
*Pyrenula micromma* Shirley B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula micromma* var. *leucomma* Nyl. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula microscopica* Müll. Arg. = *Mycoporopsis microscopica* (Müll. Arg.) Riedl  
*Pyrenula microspora* (Nagarkar & Patw.) Upreti D30  
*Pyrenula microtheca* R.C. Harris B38  
*Pyrenula minae* Aptroot & Lücking B109  
*Pyrenula minarum* Vain. B73  
*Pyrenula minarum* var. *colorans* Malme B73 = *Pyrenula minarum* Vain.  
*Pyrenula minor* Fée B154  
*Pyrenula minuta* Naeg. = *Strigula affinis* (A. Massal.) R.C. Harris  
*Pyrenula minutissima* Aptroot, Valadbeigi & Sipman ined. B142

- Pyrenula minutula* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula mollis* Fée B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula moniliformis* (C. Knight) Müll. Arg. B51  
*Pyrenula montagnei* Müll. Arg. B51  
*Pyrenula montana* Aptroot B147  
*Pyrenula montocensis* Lücking B58  
*Pyrenula mozambica* Vain. B134 = ? *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula mucosa* (Vain.) R.C. Harris A48 = *Pyrenula papillifera* (Nyl.) Aptroot  
*Pyrenula muscorum* (A. Massal.) Hepp = *Strigula stigmatella* (Ach.) R.C. Harris  
*Pyrenula muscorum* var. *faginea* (Schaer.) Hepp = *Strigula stigmatella* (Ach.) R.C. Harris  
*Pyrenula myriocarpa* Fée = *Mycomicrothelia wallrothii* (Hepp) D. Hawksw.  
*Pyrenula naegelii* Hepp = *Strigula glabra* (A. Massal.) V. Wirth  
*Pyrenula nanospora* (Ajay Singh) Upreti A39  
*Pyrenula nebulosa* Zahlbr. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula neglecta* R.C. Harris B89 = *Pyrenula pseudobufonia* (Rehm) R.C. Harris  
*Pyrenula neglecta* ssp. *occidentalis* R.C. Harris B99, B113 = *Pyrenula occidentalis* (R.C. Harris) R.C. Harris  
*Pyrenula neoculata* Aptroot A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot  
*Pyrenula neofulva* Ajay Singh B60 = *Pyrenula papilligera* (Leight.) Müll. Arg.  
*Pyrenula neojaponica* H. Harada A8 = *Anthracothecium macrosporium* (Hepp) Müll. Arg.  
*Pyrenula neolaevigata* H. Harada A19 = *Lithothelium nanosporum* (C. Knight) Aptroot  
*Pyrenula neopeltophora* Ajay Singh B106 = *Pyrenula mastophoriza* (Nyl.) Zahlbr.  
*Pyrenula neosandwicensis* Aptroot A44  
*Pyrenula netrospora* Naeg. = *Strigula affinis* (A. Massal.) R.C. Harris  
*Pyrenula nigrescens* (Pers.) Ach. = *Verrucaria nigrescens* Pers.  
*Pyrenula nigrescens* var. *areolata* Schaer. = *Verrucaria nigrescens* Pers.  
*Pyrenula nigrocincta* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula nitens* (Fée) Fée = unknown  
*Pyrenula nitens* f. *pinguis* (Chevall.) Zahlbr. B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula nitida* (Weigel) Ach. B138  
*Pyrenula nitida* f. *chevallieri* M. Choisy B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula nitida* var. *commutata* Trevis. B150 = *Pyrenula bahia* (Krempelh.) R.C. Harris  
*Pyrenula nitida* f. *crassa* Barchalov B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula nitida* f. *diffRACTA* Erichsen B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula nitida* f. *elaeodes* (Leight.) A.L. Sm. B129 = *Pyrenula macrospora* (Degel.) Coppins & P. James  
*Pyrenula nitida* f. *flavescens* (Malbr.) Zahlbr. B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula nitida* f. *pachyderma* (Hazsl.) Szatala B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula nitida* f. *pinguis* (Westr.) Zahlbr. B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula nitida* f. *squamata* (Malbr.) Zahlbr. B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula nitida* f. *virens* Servit & Nádvořník B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula nitida* var. *aequata* Zahlbr. B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitida* var. *americana* Fée B4 = *Architrypethelium nitens* (Fée) Aptroot  
*Pyrenula nitida* var. *aspistea* (Ach.) Trevis. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula nitida* var. *dermatodes* (Borrer) Trevis. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula nitida* var. *grandispora* Barchalov B129 = *Pyrenula macrospora* (Degel.) Coppins & P. James  
*Pyrenula nitida* var. *macrospora* Degel. B129 = *Pyrenula macrospora* (Degel.) Coppins & P. James  
*Pyrenula nitida* var. *major* (Schaer.) Schaer. B138 = *Pyrenula nitida* (Weigel) Ach.  
*Pyrenula nitida* var. *minima* Hepp B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitida* var. *minima* f. *pinicola* Hepp B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitida* var. *minor* Hepp B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitida* var. *minor* f. *pinicola* Hepp B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitida* var. *nitidella* (Flörke ex Schaer.) Schaer. B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitida* var. *nitidella* f. *chlorospila* (Nyl.) Keissl. B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula nitida* var. *nitidella* f. *fuscata* Suza B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitida* var. *nitidella* f. *nigrescens* (B. de Lesd.) Keissl. B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitida* var. *phaeospila* (Nyl.) Zahlbr. B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula nitidans* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg. B138  
*Pyrenula nitidella* f. *pinicola* (Hepp) Zahlbr. B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitidella* var. *chlorospila* (Nyl.) Szatala B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula nitidella* var. *cintrana* Welw. B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitidella* var. *maculata* R.C. Harris B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula nitidella* var. *exstantior* Vain. B122 = ? *Pyrenula dermatodes* (Borrer) Schaer.

- Pyrenula nitidella* var. *nigrescens* B. de Lesd. B138 = *Pyrenula nitidella* (Flörke ex Schaer.) Müll. Arg.  
*Pyrenula nitidula* (Bres.) R.C. Harris B106  
*Pyrenula nodulata* (Stirt.) Zahlbr. B103 = *Pyrenula approximans* (Krempelh.) Müll. Arg.  
*Pyrenula nova-granadensis* Upreti & Ajay Singh A31 = *Pyrenula ravenelii* (Tuck.) R.C. Harris  
*Pyrenula novemseptata* Vain. A21  
*Pyrenula nuda* Ajay Singh & Upreti B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula oblonga* Zahlbr. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula oblongata* (Müll. Arg.) Willey = *Mycomicrothelia wallrothii* (Hepp) D. Hawksw.  
*Pyrenula obovata* (Stirt.) Shirley = *Mycomicrothelia obovata* (Stirt.) D. Hawksw.  
*Pyrenula obscura* Räsänen B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula obscurascens* Vain. B79 = *Pyrenula anomala* (Ach.) Vain.  
*Pyrenula obscurata* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula obscurior* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula obtecta* G. Merr. = nomen nudum  
*Pyrenula obtusior* (Nyl.) Zahlbr. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula obvoluta* (Nyl.) R.C. Harris & Aptroot B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula occidentalis* (R.C. Harris) R.C. Harris B99, B113  
*Pyrenula occulta* (C. Knight) Müll. Arg. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula occulta* var. *leucomma* (Nyl.) Zahlbr. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula ocellata* (Ach.) Ach., *Verrucaria ocellata* Ach. = type lost  
*Pyrenula ocellata* (Leight.) Zahlbr. (nom. illeg.), *Verrucaria ocellata* Leight. (nom. illeg.) = all illeg.  
*Pyrenula ochracea* Szatala B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula ochraceoflava* (Nyl.) R.C. Harris A27  
*Pyrenula ochraceoflava* var. *pacifica* P.M. McCarthy A27  
*Pyrenula ochraceo flavens* (Nyl.) R.C. Harris A27  
*Pyrenula oculata* Ajay Singh & Upreti B111  
*Pyrenula oculifera* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula oleagina* Fée = unknown  
*Pyrenula oleosa* R.C. Harris A51  
*Pyrenula oligocarpa* Malme B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula olivacea* (Pers.) Hepp = *Porina borveri* (Trevis.) D. Hawksw. & P. James  
*Pyrenula olivacea* (Fr.) Schaer. = *Thelidium olivaceum* (Fr.) Körb.  
*Pyrenula olivaceofusca* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula olivaceofusca* C. Knight B131 = ? *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula orafensis* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula oxyspora* (Nyl.) Körb. = *Leptorhaphis epidermidis* (Ach.) Th. Fr.  
*Pyrenula oxyspora* Müll. Arg. B103 = *Pyrenula finitima* Müll. Arg.  
*Pyrenula oxysporiza* Zahlbr. B103 = *Pyrenula finitima* Müll. Arg.  
*Pyrenula pachycheila* Tuck. A46 = *Pyrenula leucostoma* Ach.  
*Pyrenula pachyspora* Vain. B118 = *Pyrenula massariospora* (Starb.) R.C. Harris  
*Pyrenula pallidofulvescens* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula pallidofulvescens* var. *fulvostraminea* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula palmarum* (Krempelh.) R.C. Harris A26  
*Pyrenula papillifera* (Nyl.) Aptroot A48  
*Pyrenula papilligera* (Leight.) Müll. Arg. B60  
*Pyrenula papularis* (Fr.) Schaer. = *Thelidium papulare* (Fr.) Arnold  
*Pyrenula papuliformis* Eckf. = *Arthopyrenia papuliformis* (Eckf.) Zahlbr.  
*Pyrenula paraensis* Müll. Arg. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula parva* Vain. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula parvinuclea* (Meyen & Flot.) Aptroot A39  
*Pyrenula parvula* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula peltophora* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula perpusilla* (Nyl.) Willey = *Endococcus perpusillus* Nyl.  
*Pyrenula personata* (Malme) R.C. Harris B27 = *Pyrenula subgregantula* Müll. Arg.  
*Pyrenula pertusarina* Zahlbr. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula pertusarioidea* Krempelh. = ? *Polymeridium proponens* (Nyl.) R.C. Harris  
*Pyrenula philippina* Vain. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula philippina* var. *oceanica* Räsänen ex Sbarbaro B117 = ? *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula pileata* Vain. B150 = *Pyrenula scutata* (Stirt.) Zahlbr.  
*Pyrenula pinguis* Fée B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula pinguis* Chevall. B131 = *Pyrenula chlorospila* (Nyl.) Arnold  
*Pyrenula pinguis* var. *emergens* (Müll. Arg.) Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée

- Pyrenula pinguis* var. *exstans* (Nyl.) Zahlbr. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula planiuscula* (Nyl.) Tuck. = *Anisomeridium planiusculum* (Nyl.) R.C. Harris  
*Pyrenula planorbis* (Ach.) Trevis. = *Arthopyrenia planorbis* (Ach.) Müll.Arg.  
*Pyrenula platysporella* Zahlbr. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula platystoma* (Müll. Arg.) Aptroot A43  
*Pyrenula pleiomeria* (Nyl.) Zahlbr. B22  
*Pyrenula pleiomeriza* (Nyl.) Zahlbr. = *Polymeridium* sp.  
*Pyrenula plütii* R.C. Harris B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula plumbea* Malme B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula pluricarpa* (Ajay Singh) Upreti A31 = *Pyrenula astroidea* (Fée) R.C. Harris  
*Pyrenula polillensis* Vain. B33 = *Pyrenula septicollaris* (Eschw.) R.C. Harris  
*Pyrenula polycarpa* (Körb.) Hepp = *Anisomeridium bifforme* (Borrer) R.C. Harris  
*Pyrenula porinella* Vain. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula porinoides* Ach. B145 = ? *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula porinoides* Fée B122 = ? *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula porphyria* G. Mey. = *Staurothele* sp.  
*Pyrenula porphyria* Schaer. = *Staurothele* sp.  
*Pyrenula porrecta* (Krempelh.) Müll. Arg. = unknown  
*Pyrenula praelucida* (Mont.) Trevis. B56  
*Pyrenula prorecta* (Krempelh.) Müll. Arg. = unknown  
*Pyrenula prostans* (Mont.) Trevis. = *Arthopyrenia cinchonae* (Ach.) Müll. Arg.  
*Pyrenula prostrata* (Stirt.) D.J. Galloway A31 = *Pyrenula ravenelii* (Tuck.) R.C. Harris  
*Pyrenula pseudobufonia* (Rehm) R.C. Harris B89  
*Pyrenula pseudonitidella* (C. Knight) D.J. Galloway B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula pseudovelata* M. Choisy B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula psoriformis* Zahlbr. B147  
*Pyrenula pudica* Zahlbr. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula pulchella* Müll. Arg. B37 = ? *Pyrenula adacta* Fée  
*Pyrenula pulchella* var. *cinerascens* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula punctella* (Nyl.) Trevis. B133  
*Pyrenula punctella* var. *adacta* (Fée) Müll. Arg. B37 = *Pyrenula adacta* Fée  
*Pyrenula punctella* var. *emergens* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula punctella* var. *exstans* (Nyl.) Müll. Arg. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula punctifera* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula punctiformis* (A. Massal.) Trevis. = *Arthopyrenia punctiformis* A. Massal.  
*Pyrenula punctiformis* f. *lactea* (Anzi) Rabenh. = *Strigula stigmatella* (Ach.) R.C. Harris  
*Pyrenula punctiformis* var. *analepta* (Ach.) Naeg. = *Arthopyrenia analepta* (Ach.) A. Massal.  
*Pyrenula punctiformis* var. *analepta* f. *coryli* Hepp = *Arthopyrenia analepta* (Ach.) A. Massal.  
*Pyrenula punctiformis* var. *atomaria* (Ach.) Hepp = *Leptorhaphis atomaria* (Ach.) Szatala  
*Pyrenula punctiformis* var. *cinereopruinosa* (Schaer.) Hepp = *Arthopyrenia cinereopruinosa* (Schaer.) A. Massal.  
*Pyrenula punctiformis* var. *cinereopruinosa* f. *buxicola* Hepp (nom. inval.) = *Arthopyrenia cinereopruinosa* (Schaer.) A. Massal.  
*Pyrenula punctiformis* var. *cinereopruinosa* f. *galactites* Hepp = *Arthopyrenia cinereopruinosa* (Schaer.) A. Massal.  
*Pyrenula punctiformis* var. *cinereopruinosa* f. *hederae* Hepp = *Arthopyrenia cinereopruinosa* (Schaer.) A. Massal.  
*Pyrenula punctiformis* var. *cinereopruinosa* f. *lactea* Hepp = *Arthopyrenia cinereopruinosa* (Schaer.) A. Massal.  
*Pyrenula punctiformis* var. *cinereopruinosa* f. *pinicola* Hepp = *Arthopyrenia cinereopruinosa* (Schaer.) A. Massal.  
*Pyrenula punctiformis* var. *fallax* (Nyl.) Willey = *Arthopyrenia analepta* (Ach.) A. Massal.  
*Pyrenula punctiformis* var. *fallax* f. *betulae* Hepp = *Arthopyrenia analepta* (Ach.) A. Massal.  
*Pyrenula punctiformis* var. *vera* f. *acerina* Hepp = *Arthopyrenia analepta* (Ach.) A. Massal.  
*Pyrenula punctiformis* var. *vera* f. *fraxini* Hepp = *Arthopyrenia fraxini* A. Massal.  
*Pyrenula punctiformis* ssp. *lactea* (Anzi) Hepp = *Strigula stigmatella* (Ach.) R.C. Harris  
*Pyrenula pupula* Ach. = *Trypethelium pupula* (Ach.) R.C. Harris  
*Pyrenula pygmaea* (Körb.) Tuck. = *Muellerella pygmaea* (Körb.) D. Hawksw.  
*Pyrenula pyrenastroides* (C. Knight) D.J. Galloway A31 = *Pyrenula ravenelii* (Tuck.) R.C. Harris  
*Pyrenula pyrenastrospora* Aptroot B72  
*Pyrenula pyrenuloides* (Mont.) R.C. Harris A48  
*Pyrenula pyrgillospora* Aptroot B140  
*Pyrenula quadruplans* Vain. B57 = ? *Pyrenula subpraelucida* Müll. Arg.  
*Pyrenula quarzatica* Aptroot B127  
*Pyrenula quassiaecola* (Fée) Fée B134  
*Pyrenula quassicola* (Fée) Fée B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula quercus* (A. Massal.) Trevis. = *Cyrtidula quercus* (A. Massal.) Minks

- Pyrenula quercus* A. Massal. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula quercuum* Zahlbr. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula quinqueseptata* (Hepp) Tuck. = *Thelidium quinqueseptatum* (Hepp) Arnold  
*Pyrenula quinqueseptata* Aptroot B47 = *Pyrenula sexluminata* Aptroot  
*Pyrenula ravenelii* (Tuck.) R.C. Harris A31  
*Pyrenula rhombospora* Müll. Arg. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula rhyponota* (Ach.) Trevis. = *Arthopyrenia rhyponota* (Ach.) A. Massal.  
*Pyrenula rimicola* Müll. Arg. = *Phaeospora rimosicola* (Leight. ex Mudd) Hepp ex Stein  
*Pyrenula rinodinospora* Aptroot ined. B93  
*Pyrenula rizalensis* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula rockii* Zahlbr. B57  
*Pyrenula rubidopunctata* Szatala B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula rubroanomala* Aptroot & Lücking B68  
*Pyrenula rubrojavonica* Aptroot ined. B69  
*Pyrenula rubromaculata* Vain. B69 = *Pyrenula cruenta* (Mont.) Vain.  
*Pyrenula rubrostoma* R.C. Harris B68, B151  
*Pyrenula rudis* Fée = unknown, type lost  
*Pyrenula rugulosa* Müll. Arg. B81, B89 = *Pyrenula cocoes* Müll. Arg.  
*Pyrenula salicis* (A. Massal.) Trevis. = *Arthopyrenia salicis* A. Massal.  
*Pyrenula samarana* Vain. B100 = ? *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula sandwicensis* Zahlbr. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula santensis* (Nyl.) Müll. Arg. B150 = *Pyrenula balia* (Krempelh.) R.C. Harris  
*Pyrenula schaeferi* A. Massal. B12 = *Eopyrenula leucoplaca* (Wallr.) R.C. Harris  
*Pyrenula schiffneri* (Zahlbr.) Aptroot A34  
*Pyrenula schutschensis* Zahlbr. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula scutata* (Stirt.) Zahlbr. B150  
*Pyrenula segregata* (Nyl.) Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula septicollaris* (Eschw.) R.C. Harris B33  
*Pyrenula seriata* (Hepp) Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula sessilis* H. Magn. B134 = ? *Pyrenula mastophora* (Nyl.) Müll. Arg.  
*Pyrenula sexlocularis* (Nyl.) Müll. Arg. B46  
*Pyrenula sexlocularis* var. *xanthoplaca* Zahlbr. B46 = *Pyrenula sexlocularis* (Nyl.) Müll. Arg.  
*Pyrenula sexluminata* Aptroot B47  
*Pyrenula shirabeicola* Kurok. & S. Nakan. B89 = *Pyrenula pseudobufonia* (Rehm) R.C. Harris  
*Pyrenula shirleyana* (Müll. Arg.) Aptroot B145 = *Pyrenula brunnea* Fée  
*Pyrenula sipmanii* Aptroot & K.H. Moon B65  
*Pyrenula spectata* R.C. Harris B126  
*Pyrenula spadicea* (Wallr.) Schaer. = *Staurothele* sp.  
*Pyrenula sphaerica* Pers. = unknown, type lost  
*Pyrenula sphaeroides* (Wallr.) Hepp = *Acrocordia gemmata* (Ach.) A. Massal.  
*Pyrenula stauospora* Tuck. A12 = *Sulcopyrenula stauospora* (Tuck.) H. Harada  
*Pyrenula stictica* Link = *Arthonia cinereopruinosa* (Körb.) Schaer.  
*Pyrenula stramineoatra* Vain. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula stramineus* Zahlbr. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula subacutalis* Upreti B92 = *Pyrenula maravalensis* Vain.  
*Pyrenula subaggregata* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula subandamanica* Upreti B30 = *Pyrenula microspora* (Nagarkar & Patw.) Upreti  
*Pyrenula subaperta* Ach. = arthonialean pycnidia  
*Pyrenula subcamptospora* Upreti B96  
*Pyrenula subcinerea* (Nyl.) Tuck. = *Polymeridium subcinereum* (Nyl.) R.C. Harris  
*Pyrenula subconfluens* (Vain.) Vain. B117 = ? *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula subcongruens* Müll. Arg. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula subcremea* Malme B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula subcuprea* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula subcutanea* Fée A46 = *Pyrenula leucostoma* Ach.  
*Pyrenula subcylindrica* Jagadeesh Ram & Upreti B50  
*Pyrenula subdecolor* (Nyl.) R.C. Harris B69 = *Pyrenula cruenta* (Mont.) Vain.  
*Pyrenula subdissidens* Vain. B79 = ? *Pyrenula arthoniotheca* Upreti  
*Pyrenula subducta* (Nyl.) Müll. Arg. B125  
*Pyrenula subducta* var. *retracta* (Nyl.) Zahlbr. B125 = *Pyrenula subducta* (Nyl.) Müll. Arg.  
*Pyrenula subelliptica* (Tuck.) R.C. Harris B108  
*Pyrenula subfarinosa* Fée = a non-lichenized fungus

- Pyrenula subferruginea* (Malme) R.C. Harris B29 = *Pyrenula circumfiniens* Vain.  
*Pyrenula subglabrata* (Nyl.) Müll. Arg. B113  
*Pyrenula subglabriuscula* Vain. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula subglabriuscula* var. *natalensis* Vain. B117 = ? *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula subgregantula* Müll. Arg. B27  
*Pyrenula subgriseola* Vain. B145 = ? *Pyrenula brunnea* Fée  
*Pyrenula subimmersa* Müll. Arg. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula subindica* Upreti B2 = *Pyrenula lineatostroma* Aptroot  
*Pyrenula sublaevigata* (Patw. & Makhija) Upreti A45  
*Pyrenula sublateritia* Zahlbr. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula submarginata* Vain. B117 = *Pyrenula castanea* (Eschw.) Müll. Arg.  
*Pyrenula submastophora* Ajay Singh & Upreti B141  
*Pyrenula submersa* (Borrer) Schaer. = *Verrucaria denudata* Zschacke  
*Pyrenula subnitida* Müll. Arg. B134 = ? *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula subnitidella* (Nyl.) Müll. Arg. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula subochraceoflavens* Upreti A20 = *Pyrenula gibberulosa* (Vain.) Aptroot  
*Pyrenula suboligocarpa* Upreti A35 = *Pyrenula ceylonensis* (Ajay Singh & Upreti) Aptroot  
*Pyrenula subpraelucida* Müll. Arg. B57  
*Pyrenula subprostans* (Nyl.) Tuck. = *Anisomeridium subprostans* (Nyl.) R.C. Harris  
*Pyrenula subpunctella* (Nyl.) Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula subpunctiformis* (Nyl.) Eckf. = *Arthopyrenia atomarioides* Müll. Arg.  
*Pyrenula subrizalensis* Ajay Singh & Upreti B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula subsimplex* Vain. B106 = *Pyrenula nitidula* (Bres.) R.C. Harris  
*Pyrenula subsoluta* (Müll. Arg.) Aptroot B77  
*Pyrenula subtrahens* (Nyl.) Müll. Arg. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula subtrahens* var. *microspora* (Krempelh.) Zahlbr. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula subumbilicata* (C. Knight) Aptroot A17  
*Pyrenula subvariolosa* (C. Knight) Aptroot A21  
*Pyrenula subvelata* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula sulphurea* (Mont.) Zahlbr. = arthonialean crust cf. *Herpothallon*  
*Pyrenula supracongruens* Aptroot & Schumm B98 = *Pyrenula fulva* (Krempelh.) Müll. Arg.  
*Pyrenula tenella* Müll. Arg. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula tenuisepta* R.C. Harris B8  
*Pyrenula tessellata* (Turner) Ach. = *Verrucaria viridula* (Schrad.) Ach.  
*Pyrenula tetracerae* Ach. = *Porina tetracerae* (Ach.) Müll. Arg.  
*Pyrenula texana* Tuck. ex R.C. Harris B83 = *Pyrenula microcarpa* Müll. Arg.  
*Pyrenula thailandica* Aptroot ined. B86  
*Pyrenula thelemorpha* Tuck. A50 = *Pyrenula thelemorpha* Tuck.  
*Pyrenula thelena* (Ach.) Trevis. = *Mycomicrothelia thelena* (Ach.) D. Hawksw.  
*Pyrenula thelemorpha* Tuck. A50  
*Pyrenula tokyensis* (Müll. Arg.) H. Harada B23  
*Pyrenula transparentis* Zahlbr. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula tremulae* (Körb.) Hepp = *Leptorhaphis tremulae* Körb.  
*Pyrenula tricolor* Müll. Arg. B102 = ? *Pyrenula vernicosa* (Krempelh.) Müll. Arg.  
*Pyrenula triphracta* (Nyl.) Willey = *Phaeospora parasitica* (Lönnr.) Arnold  
*Pyrenula tristissima* Vain. B154  
*Pyrenula trombetana* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula tropica* (Ach.) Trevis. = *Trypethelium tropicum* (Ach.) Müll. Arg.  
*Pyrenula truncata* Müll. Arg. B100 = *Pyrenula fetivica* (Krempelh.) Müll. Arg.  
*Pyrenula trypanea* Ach. = *Ocellularia terebrata* (Ach.) Müll. Arg.  
*Pyrenula tunicata* Zahlbr. B122 = *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula uberina* (Fée) Fée B4 = *Architypethelium uberinum* (Fée) Aptroot  
*Pyrenula umbilicata* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula umbonata* Ach. = *Pyrenocarpon thelostomum* (Ach. ex J. Harriman) Coppins & Aptroot  
*Pyrenula unbrata* Ach. = sterile crust  
*Pyrenula vanoverberghii* Vain. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula variolosa* Pers. A42 = ? *Pyrenula globifera* (Eschw.) Aptroot  
*Pyrenula velata* Müll. Arg. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula velatior* Müll. Arg. B145 = *Pyrenula aspistea* (Ach.) Ach.  
*Pyrenula ventosicola* (Mudd) Willey = *Muellerella ventosicola* (Mudd) D. Hawksw.  
*Pyrenula vermicellifera* (Kunze) Link = *Opegrapha vermicellifera* (Kunze) J.R. Laundon  
*Pyrenula vermicularis* (Kashiw. & Kurok.) H. Harada A43 = *Pyrenula platystoma* (Müll. Arg.) Aptroot

- Pyrenula vernicosa* (Krempelh.) Müll. Arg. B102  
*Pyrenula verrucarioides* Fée (nom. illeg.) = *Anisomeridium*  
*Pyrenula verrucosa* Ach. = *Polyblastia verrucosa* (Ach.) Lönnr.  
*Pyrenula verruculosa* Upreti & Ajay Singh A34 = *Pyrenula schiffneri* (Zahlbr.) Aptroot  
*Pyrenula virens* Müll. Arg. B153 = *Pyrenula aggregata* (Fée) Fée  
*Pyrenula virescens* Müll. Arg. B134 = *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula viridescens* Fée B122 = ? *Pyrenula dermatodes* (Borrer) Schaer.  
*Pyrenula vitrea* (Eschw.) Müll. Arg. B134 = ? *Pyrenula quassiaecola* (Fée) Fée  
*Pyrenula volvarioides* Fée = *Stictis* sp.  
*Pyrenula wallrothii* Hepp = *Mycomicrothelia wallrothii* (Hepp) D. Hawksw.  
*Pyrenula warmingii* (Krempelh.) Müll. Arg. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula welwitschii* (Upreti & Ajay Singh) Aptroot A49  
*Pyrenula wetmorei* R.C. Harris B31  
*Pyrenula wheeleri* R.C. Harris B35  
*Pyrenula willeyana* Müll. Arg. = *Mycomicrothelia willeyana* (Müll. Arg.) D. Hawksw.  
*Pyrenula wilmsiana* Müll. Arg. B46  
*Pyrenula wrightii* (Müll. Arg.) R.C. Harris B76  
*Pyrenula xanthominuta* Aptroot B122  
*Pyrenula xyloides* (Eschw.) Müll. Arg. B117 = *Pyrenula mamillana* (Ach.) Trevis.  
*Pyrenula zeylanica* Upreti & Ajay Singh B76  
*Pyrenula zwackhii* Hepp = *Mycoporum antecellans* (Nyl.) R.C. Harris

### Disposition of the excluded taxa in genera which are synonymous to *Pyrenula*

- Melanotheca acervulans* Nyl. = *Zwackhiomyces dispersus* (J. Lahm ex Körb.) Triebel & Grube  
*Melanotheca aciculifera* Nyl. = *Celothelium aciculiferum* (Nyl.) Vain.  
*Melanotheca agminella* Nyl. = *Celothelium* sp.  
*Melanotheca apogyra* Nyl. = *Anthostomaria apogyra* (Nyl.) Theiss. & Syd.  
*Melanotheca arthoniella* Nyl. = *Dermatina arthoniella* (Nyl.) Riedl  
*Melanotheca arthonioides* (A. Massal.) Nyl. = *Tomasellia arthonioides* (A. Massal.) A. Massal.  
*Melanotheca brasiliensis* Nyl. = *Tomasellia brasiliensium* (Nyl.) Zahlbr.  
*Melanotheca coactella* Stirt. = *Melanothecopsis coactella* (Stirt.) C.W. Dodge  
*Melanotheca coarctella* Stirt. = *Melanothecopsis coarctella* (Stirt.) C.W. Dodge  
*Melanotheca collospora* (Vain.) Zahlbr. = *Mycomicrothelia collospora* (Vain.) Aptroot (keyed out though)  
*Melanotheca cumingiana* (Stirt.) Müll. Arg. = *Laurera cumingii* (Mont.) Zahlbr.  
*Melanotheca diffusa* Leight. = *Tomasellia diffusa* (Leight.) J. Lahm  
*Melanotheca esenbeckiana* Fée = *Arthopyrenia esenbeckiana* (Fée) R.C. Harris  
*Melanotheca gelatinosa* (Chev.) Nyl. = *Tomasellia gelatinosa* (Chevall.) Zahlbr.  
*Melanotheca glomerulosa* Arnold = alpine calcicolous fungus  
*Melanotheca homostegia* (Nyl.) H. Olivier = *Homostegia piggottii* (Berk. & Broome) P. Karst.  
*Melanotheca insularis* Hult. = *Melanopsamma lettauiana* (Keissl.) Vouaux  
*Melanotheca ischnobela* Nyl. = *Celothelium ischnobelum* (Nyl.) M.B. Aguirre  
*Melanotheca leightonii* (Hepp) Garov. = *Tomasellia gelatinosa* (Chevall.) Zahlbr.  
*Melanotheca macularis* (Hampe ex A. Massal.) Th. Fr. = *Mycomicrothelia macularis* (Hampe ex A. Massal) Keissl.  
*Melanotheca raphidiza* Stirt. = *Celothelium aciculiferum* (Nyl.) Vain.  
*Melanotheca simplicella* Nyl. = *Celothelium* sp.  
*Melanotheca sinensis* Krempelh. = *Melanothecopsis sinensis* (Krempelh.) C.W. Dodge  
*Melanotheca subpuncta* Nyl. = *Melanopsamma lettauiana* (Keissl.) Vouaux  
*Melanotheca superveniens* Nyl. = *Perigrapha superveniens* (Nyl.) Hafellner  
*Parathelium oblongulum* Stizenb. = *Anisomeridium* sp.  
*Parathelium polysemum* Nyl. = *Lithothelium polysemum* (Nyl.) Aptroot  
*Parathelium trichosporum* Stizenb. = *Celothelium* sp.  
*Pyrenastrum album* ssp. *verrucarioides* Eschw. = *Polymeridium catapastum* (Nyl.) R.C. Harris  
*Pyrenastrum cinnamomeum* Eschw. = *Astrothelium cinnamomeum* (Eschw.) Müll. Arg.  
*Pyrenastrum clandestinum* (Fée) Müll. Arg. = *Astrothelium crassum* (Fée) Aptroot  
*Pyrenastrum eustomum* Mont. = *Astrothelium eustomum* (Mont.) Müll. Arg.  
*Pyrenastrum gallicum* Spreng. = a non-lichenized fungus  
*Pyrenastrum lageniferum* (Ach.) Müll. Arg. = description refers to a mixture of 2 taxa  
*Pyrenastrum plicatum* Eschw. (orth. variant) = *Astrothelium pyrenastrosulphureum* nom. nov. ined.

*Pyrenastrum sulphureum* Eschw. = *Astrothelium pyrenastrosulphureum* nom. nov. ined.

*Pyrenastrum sulphureum* ssp. *plicatum* Eschw. = *Astrothelium pyrenastrosulphureum* nom. nov. ined.

**Not recently studied, of unknown identity:**

*Melanotheca coccorum* (A. Massal.) Zahlbr., *Micromma coccorum* A. Massal.

*Melanotheca crotonoidea* Hue

*Melanotheca ocullea* Stizenb.

*Parathelium brodiei* Stirt.

*Parathelium nidificans* Stirt.

*Pleurotheliopsis salvata* (Müll. Arg.) Zahlbr., *Pleurothelium salvatum* Müll. Arg.

*Pyrenastrum chilense* Mont., *Verrucaria chilensis* (Mont.) Nyl.

*Pyrenastrum compositum* Hampe, *Bottaria composita* (Hampe) A. Massal.

*Pyrenastrum echinatum* Eschw.

*Pyrenastrum macrospermum* Mont.

*Pyrenastrum tryptelioides* Eschw.