Key to hysterioid fungi on bark and wood in Scandinavia

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NØKKELORD
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KEYWORDS
Dothideomycetes, neglected taxa, identification key

ABSTRACT
The lack of useful determination keys is often a major obstacle for naming species of Ascomycota, especially for the amateur mycologist. One group of fungi in need of a key are species of Dothideomycetes with hysterioid ascomata on bark and wood in Scandinavia, and we present such a key encompassing 31 species in 14 genera. Hysterothecia are commonly found on bark and wood, and most species with hysterothecia are saprophytes. Since several lichenized, doubtfully lichenized, and other species have ascomata resembling hysterothecia we also mention several such cases of possible misidentification.

SAMMENDRAG
Mangelen på nyttige bestemmelsesnøkler er ofte et stort hinder for å navngi arter av Ascomycota, spesielt for amatørmykologen. En gruppe sopper som har behov for en nøkkel er arter av Dothideomycetes med hysterioide ascomata på bark og tre i Skandinavia, og vi presenterer en slik nøkkel som omfatter 31 arter i 14 slekter. Hysterioide ascomata finnes ofte på bark og tre, og de fleste arter med hysterioide ascomata er saprofytter. Siden flere licheniserte, tvilsomt licheniserte og andre arter har ascomata som ligner på hysterioide ascomata, nevner vi også flere slike tilfeller av mulig feilidentifisering.

INTRODUCTION

Most fungal species are Ascomycota, and most of them belong to the class Dothideomycetes. Non–lichenized dothideomycetes are poorly known regarding taxonomy, ecology and distribution, largely because of the lack of comprehensive and recent literature. Another reason is that microscopic identification is often needed to identify a fungus as belonging to the Dothideomycetes rather than to the Sordariomycetes, making surveys more difficult to perform. However, some groups within the dothideomycetes have easily recognizable ascomata and a limited number of species, and one such morphological group consist of species with hysterioid ascomata (hysterothecia). The hysterothecium is a strongly carbonized and thick–walled, elongated, lip–shaped ascoma with a central slit. The ascospores are released through the slit rather than through a pore as in perithecioid ascomata. Hysterothecia have developed independently several times within the Dothideomycetes (Boehm et al. 2009, Jayasiri et al. 2018); in the Hysteriales, Acrogenosporaceae (Minutisphaerales), Anteagloniaceae (Pleosporales), Gloniaceae (currently in Mytilinidiales), Patellariales (Boehm et al. 2015), and Stigmatodiscales (Voglmayr et al.

2016), as well as in *Glyphium* (Patellariales) and Mytilinidiaceae (Mytilinidiales), which have upright, shell–, ax–, or chisel–shaped, thin–walled, laterally compressed hysterothecia.

Hysterothecia are commonly found on bark and wood, and most species are probably saprophytes. Many species also occur as endophytes within living trees, and one of the most common ectomycorrhizal fungi (Peter et al. 2016), *Cenococcum geophilum*, belong to the Gloniaceae. Many hysteriothecia are long-lived and capable of surviving periods of drought.

We here provide a key to the non–lichenized species with hysteriothecia in Scandinavia. Several lichenized, doubtfully lichenized, and saprophytic species of other taxa on wood and bark have ascomata resembling hysterothecia, often referred to as lirellate apothecia. Fungi with lirellate apothecia may sometimes strongly resemble hysterioid fungi.

A possible case of confusion is species of the lichen genus *Opegrapha* (Arthoniales, Arthoniomycetes), e.g. *O. atra, herbarum, ochrocheila* and *varia*. These species are mainly found on the bark of deciduous trees and the sessile lirellate apothecia have a black true exciple, continuous under the hypothecium, which is not as thick and hard as in a true hysterothecium. Further, the disc is often somewhat exposed, and in some species bear yellow–green, orange or white pruina. The hamathecium consists of septate and branched paraphysoids and the ascospores are multiseptate, fusiform or acicular, hyaline or become ornamented and red–brown when old.

On dead wood, some lichenized fungi with a sometimes indistinct thallus and black lirellate apothecia such as *Xylographa* spp. (Baeomycetales), and *Ptychographa xylographoides* (Trapeliales; Nordén et al. 2019) may also cause confusion. *Xylographa* spp. have unbranched, linear apothecia, while *P. xylographoides* have sometimes branching ascomata. The exciple of *Xylographa* is brown and the hypothecium is colourless, while the exciple is black and friable and the hypothecium is dark brown in *P. xylographoides.* Both have simple or sparingly branched paraphyses, with brown apices and simple, hyaline ascospores. It may also be possible to confuse ascomata of Rhytismatales (Leotiomycetes) with hysteriothecia at a quick glance, for instance ascomata of *Colpoma crispum,* but these are soft–textured apothecia, with filiform paraphyses and hyaline, rod–shaped to filiform ascospores.

Another taxon not included in the key is *Melaspilea lentiginosula* (Dothideomycetes, Eremithallales; Jordal et al. 2017). This doubtfully lichenized species occurs on the bark of old pine trees and has small, black, lirelliform, and sometimes branched apothecia with exposed or slit–like discs. The hamathecium consists of sparsely branched paraphyses and the ascospores are 1–septate, sole–shaped, brown and ± warted. In addition, *Wadeana minuta* (Ascomycota incertae sedis) has lirellate apothecia with glossy margins and simple spores in multispored, non–fissitunicate asci. It occurs on rough bark of old deciduous trees. The mentioned species are all stated to be lichenized with *Trentepohlia* as photobiont in the literature but the thallus can be hard to discern, or is indeed lacking.

Further hysterioid fungi occur on other substrates, for example *Hypoderma* (Rhytismatales; on herbs et c), *Hysteropeltella* (Patellariales; on ferns), *Leptopeltis* (Microthyriales; on ferns), *Lophodermium* (Rhytismatales; on herbs, needles etc).

Determination key to hysterioid fungi on bark and wood in Scandinavia

1a. Hysteriothecia higher than broad, shell–, ax–, or chisel–shaped. Peridium thin, almost papery. Ascospores 1–9–septate, or filiform. On conifers, or in the case of *Glyphium*, on deciduous trees.....2

1b. Hysteriothecia broader than high, *either* short ellipsoid, elongated or beanshaped *or* repeatedly dichotomously branched, forming patches. Exciple thick, often hard and brittle. Ascospores 1–3–septate, or muriform. On deciduous trees or conifers.....13

2a. Hysterothecia in star–like configuration (Fig. 1). Ascospores 1–septate, symmetric, light olive– to reddish–brown, 11–14 × 2–3 µm.....***Actidium hysterioides***

2b. Ascomata not in star–like configuration, ascospores different.....3

3a. Ascomata shell–shaped, <1 mm high. Ascospores not filiform. On conifers.....4

3b. Ascomata ax–, or chisel–shaped, 1–2 mm high. On deciduous trees. Ascospores filiform. On dead branches et c of deciduous trees.....11

4a. Ascospores filiform.....5

4b. Ascospores 1– 9– septate.....6

5a. Ascospores parallel in ascus; 170–250 × 1–2 µm.....
.....***Lophium mytilinum***

5b. Ascospores spirally arranged in ascus; 260–280 × 2 µm.....
.....***Lophium elegans***

6a. Ascospores 1–septate, on *Juniperus* and other conifers.....
.....***Actidium nitidum***

6b. Ascospores with more than one septum.....7

7a. Ascomata low. Ascospores 3–septate, shorter than <16 µm. On small branches and needles of *Juniperus*.....
.....***Mytilinidion decipiens***

7b. Ascomata high. Ascospores with 3 or more septate, longer than 16 µm. On various conifer.....8

8a. Ascospores 3–septate, 16–22 × 3–4 µm.....
.....***Mytilinidion mytilinellum***

8b. Ascospores with more septa, or longer than 22 µm.....9

9a. Ascomata low, ascospores 3–5 septate. On small branches and needles of *Juniperus*.....***Mytilinidion acicola***
9b. Ascomata higher, standing on edge. On various conifers...10

10a. Ascospores 3–5–septa, 30–42 × 3–5 µm.....
.....***Mytillinidion rhenanum***
10b. Ascospores slightly bent and assymetric, 7–9–septate, 32–38 × 5–6 µm.....***Mytilinidion gemmigenum***

11a. Ascomata obpyriform in outline (Fig. 4). Asci 340–460 × 12–19 µm. Known from North Norway on *Salix*, and from the Swiss alps on *Betula*.....***Glyphium grisonense***
11b. Ascomata narrow (Fig. 3). Asci narrower.....12

12a. Asci 7–9 µm broad. Ascospores disarticulating into part–spores within the ascus. (Not yet recorded from the Nordic countries).....***Glyphium schizosporum***
12b. Asci 9–10 µm broad. Ascospores not disarticulating into part–spores in the ascus. On dead branches of deciduous trees in the lowland.....***Glyphium elatum***

13a. Hysterothecia progressively dichotomously branched, with or without brown subiculum, forming patches of several cm^2 (Fig. 2). Peridium thick and three–layered, fragile. Ascospores 1–septate, hyaline.....14
13b. Hysterothecia not progressively dichotomously branched. Peridium thick and three–layered, hard. Ascospores varying. 15

14a. Ascospores 15–18 × 5–6 µm.....***Glonium graphicum***
14b. Ascospores 21–26 × 5–6 µm.....***Glonium stellatum***

15a. Ascospores 1–septate.....16
15b. Ascospores with more than one septum.....20

16a. Ascomata somewhat upright, mytilinidiform (Fig. 12). Asci obovoid. Ascospores brown, with median septum.....
.....***Poetschia buellioides***
16b. Ascomata not upright, mytilinidiform. Asci not obovoid. Ascospores with one large brown cell and one much smaller hyaline cell, or hyaline.....17

17a. Ascospores with one large brown cell and one much smaller hyaline cell.....***Acrogenospora carmichaeliana***
17b. Ascospores with two slightly unequally sized hyaline cells, +/– constricted at the septum.....18

18a. Ascospores fusiform, with both ends acuminate ca 45 × 9 µm .....***Psiloglonium hysterinum***
18b. Ascospores obovoid, with at least one, often both, ends obtuse.....19

19a. Ascomata in parallel rows, semi–immersed to erumpent. Ascospores with rounded ends 12–14 × 5–7 µm..... .....***Psiloglonium lineare***
19b. Ascomata scattered to closely aggregated, superficial. Ascospores with pointed ends, 22–27 × 7–10 µm..... .....***Psiloglonium araucanum***

20a. Ascospores 3–septate, or 5–7–septate.....21
20b. Ascospores muriform.....24

21a. Ascospores 3–septate.....22
21b. Ascospores with 5–7 septa and bulging epispore/gelatinous coating, 25–30 × 7–9 µm. On dead branches and bark of living *Taxus baccata*.....***Hysterium* sp**

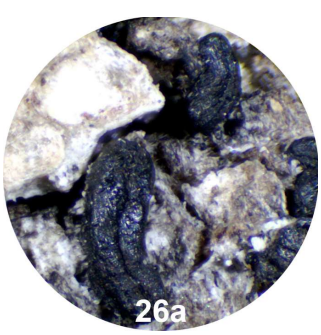
22a. Hysterothecia partly open, exposing a disc (Fig. 8). Exciple two–layered, the outer layer of black and thick–walled cells and the inner layer of thin–walled, pallid and compressed cells..... ***Hysteropatella elliptica***
22. Hysterothecia closed. Exciple three–layered, the outer layer bblack and thick–walled and often, the middle layer lighter in pigmentation, and the inner layer distinctly thin–walled, with pallid and compressed cells.....23

23a. Ascospores 20–40 × 6–12 µm, usually with inner spore cells brown and end cells hyaline.....***Hysterium pulicare***
23b. Ascospores 14–21 × 4–8 µm, all cells usually brown..... .....***Hysterium acuminatum***

24a. Ascospores hyaline to yellowish.....25
24b. Ascospores brown.....27

25a. Ascospores 20–32 x 9–12 µm long, with obtuse ends, 5–7–septate.....***Gloniopsis praelonga***
25b. Ascospores 17.5 –25 x 7.5–8.75 µm, 4–6–septate.....26

26a. Ascomata oblong, often sinuouse with narrow ends (Fig. 5). Ascospores ellipsoid (or narrower in one end) but with constricted septa, 'bumpy' in outline..... .....***Hysterobrevium curvatum***



26b. Ascomata fusiform with pointed ends. Ascospores obovoid to subfusiform, not clearly constricted at septa and not 'bumpy' in outline.....***Hysterobrevium smilacis***

27a. Ascospores usually shorter than 30 µm.....28
27b. Ascospores usually longer than 30 µm.....29

28a. Ascospores with 3–5 transverse septa and 1–2 vertical septa, 14–22 x 7–10 µm.....***Hysterobrevium mori***
28b. Ascomata without striation. Ascospores with 7–9 transverse septa, 32–45 × 12–15 µm.....***Hysterographium fraxini***

29a. Ascospores with 9–12 transverse septa, 37–56 × 13–20 µm .....***Hysterographium elongatum***
29b. Ascospores with ca 15 transverse septa, 45–65 × 11–17 µm… .....***Hysterographium flexuosum***

Other genera not yet found in Scandinavia include *Actidiographium, Anteaglonium, Ericboehmia, Gloniella, Hysterocarina, Oedohysterium, Ostreichnion, Rhytidhysteron* and *Stigmatodiscus*.

Notes on the species
Acrogenospora carmichaeliana (Berk.) Rossman & Crous.
Important synonyms: *Hysterium carmichaelianum* Berk, *Farlowiella carmichaeliana* (Berk.) Sacc.
Substrate: deciduous wood.
Distribution in Scandinavia: a few finds in SW Norway, Denmark, Sweden.
Selected descriptions: Zogg (1962): 85, Dennis (1981): 473, Ellis & Ellis (1997): 28, Læssøe & Petersen (2019): 1617. Wergen (2017a): 367, as *F. carmichaeliana.*

Actidium hysterioides Fr.
Substrate: coniferous wood.
Distribution Scandinavia: Rather common in SE, SW and N Norway, Sweden.
Selected descriptions: Zogg (1962): 124, Dennis (1981): 477, Ellis & Ellis (1985): 185.

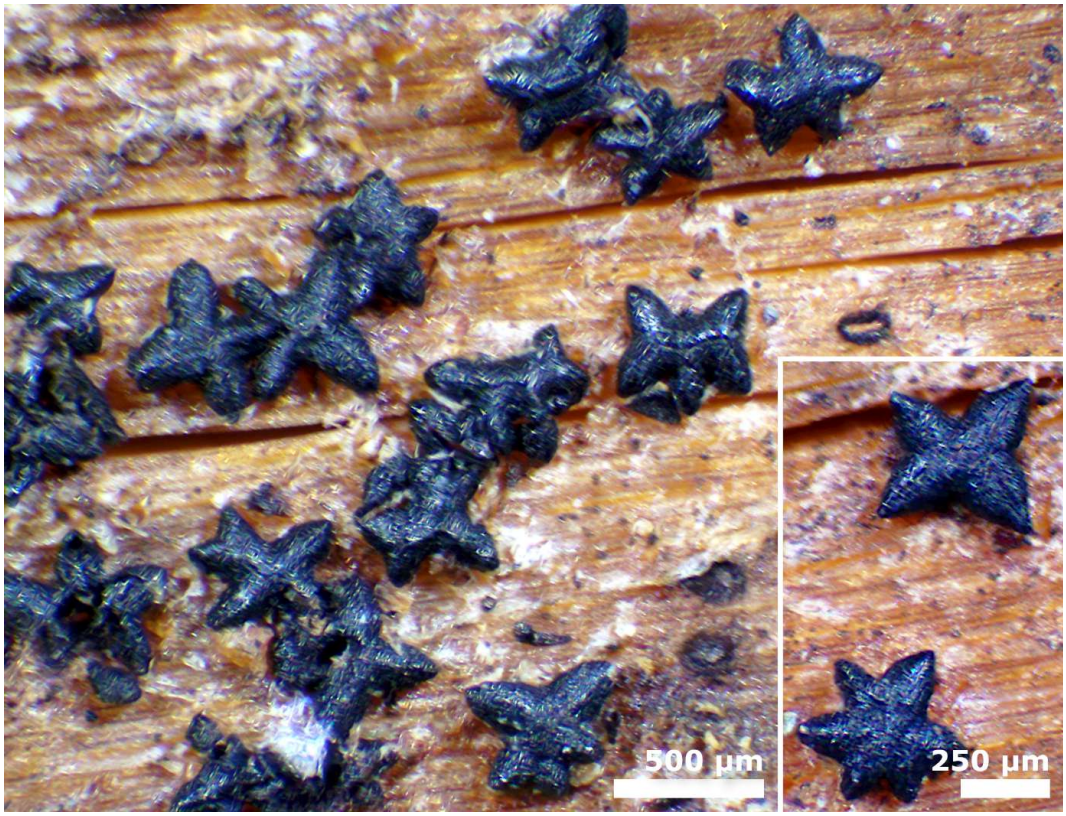


Figure 1. *Actidium hysterioides* (O-F-88600). Photo: M. Andreasen.

Gloniopsis praelonga (Schwein.) Underw. & Earle
Important synonyms: *Hysterium praelongum* Schwein., *Hysterographium praelongum* (Schwein.) Sacc.
Substrate: Deciduous wood.
Distribution in Scandinavia: Rare in Norway (SW), Denmark, Sweden.
Selected descriptions: Zogg (1962): 50, Ellis & Ellis (1985): 238, Mathiassen & Granmo (2012): 22, Læssøe & Petersen (2019): 1619, Wergen (2017b): 707.

Glonium graphicum (Fr.) Duby
Important synonyms: *Hysterium graphicum* Fr.: Fr.
Substrate: Coniferous wood.
Distribution in Scandinavia: Rare in Norway (SE), Denmark, Sweden.
Selected descriptions: Zogg (1962): 69.

Glonium stellatum Muhl.
Substrate: Old wood.
Distribution in Scandinavia: Rare in Norway (SE), Sweden.
Selected descriptions: Zogg (1962): 71, Boehm et al. (2009): 466.

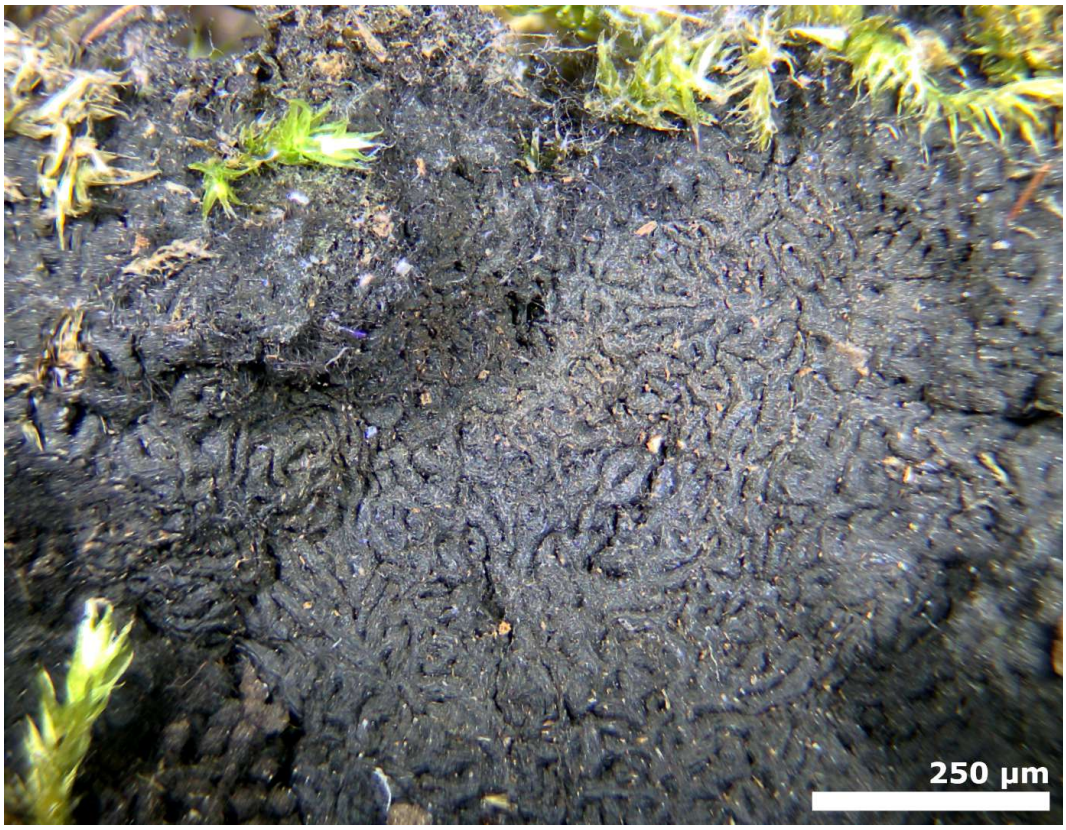


Figure 2. *Glonium stellatum* on decayed wood of *Quercus* sp. Photo: Mathias Andreasen.

Glyphium elatum (Grev.) H. Zogg
Important synonyms: *Lophium elatum* Grev.: Fr.
Substrate: Decideous wood, mostly on branches.
Distribution in Scandinavia: Common in Norway (SE, SW, N), Denmark, Sweden.
Selected descriptions: Ellis & Ellis (1985): 160, Boehm et al. (2015): 8, Læssøe & Petersen (2019): 1619, Wergen (2017b): 700.

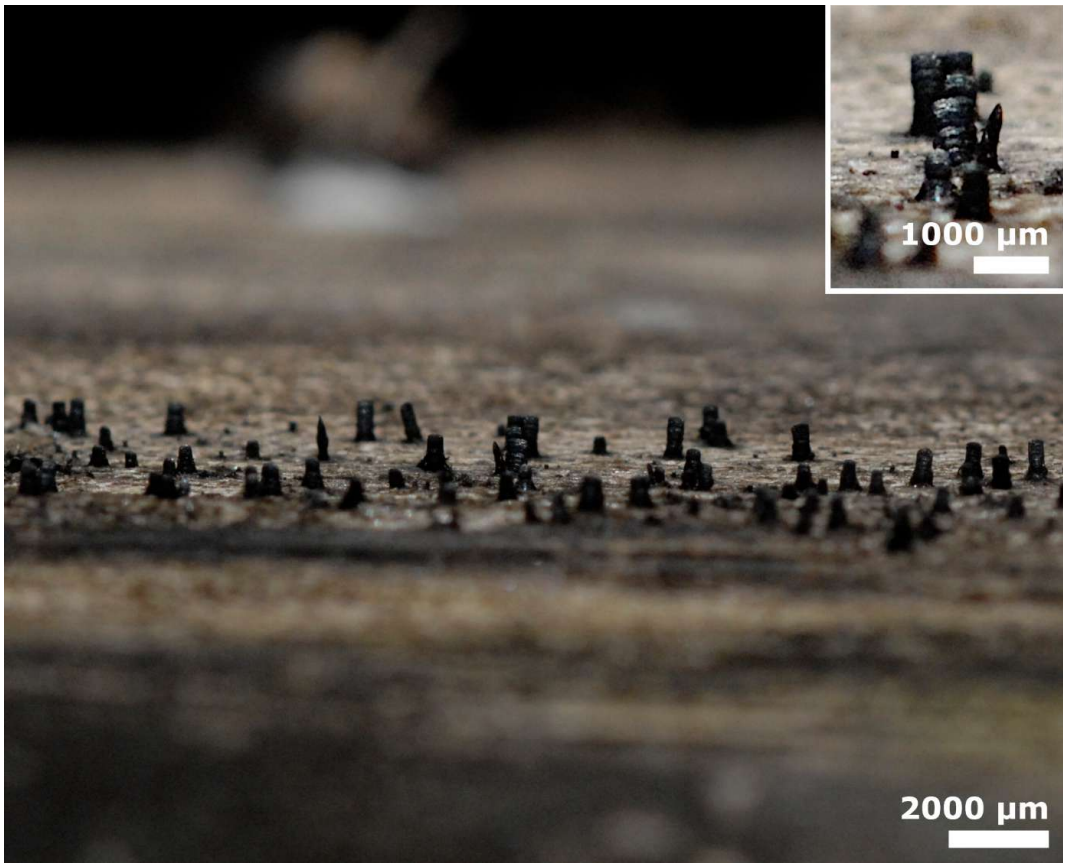


Figure 3. *Glyphium elatum* on *Fraxinus excelsior* branch. Photo: Leif Andersson.

Glyphium grisonense Math.
Substrate: Deciduous wood.
Distribution in Scandinavia: Quite common in N Norway.
Selected descriptions: Boehm et al. (2015): 9, Mathiassen 1993: 89

Glyphium schizosporum (Maire) H. Zogg
Important synonyms: *Lophium schizosporum* Maire
Substrate: Deciduous wood.
Distribution in Scandinavia: Not yet found in the Scandinavian countries.
Selected descriptions: Boehm et al. (2015): 8.

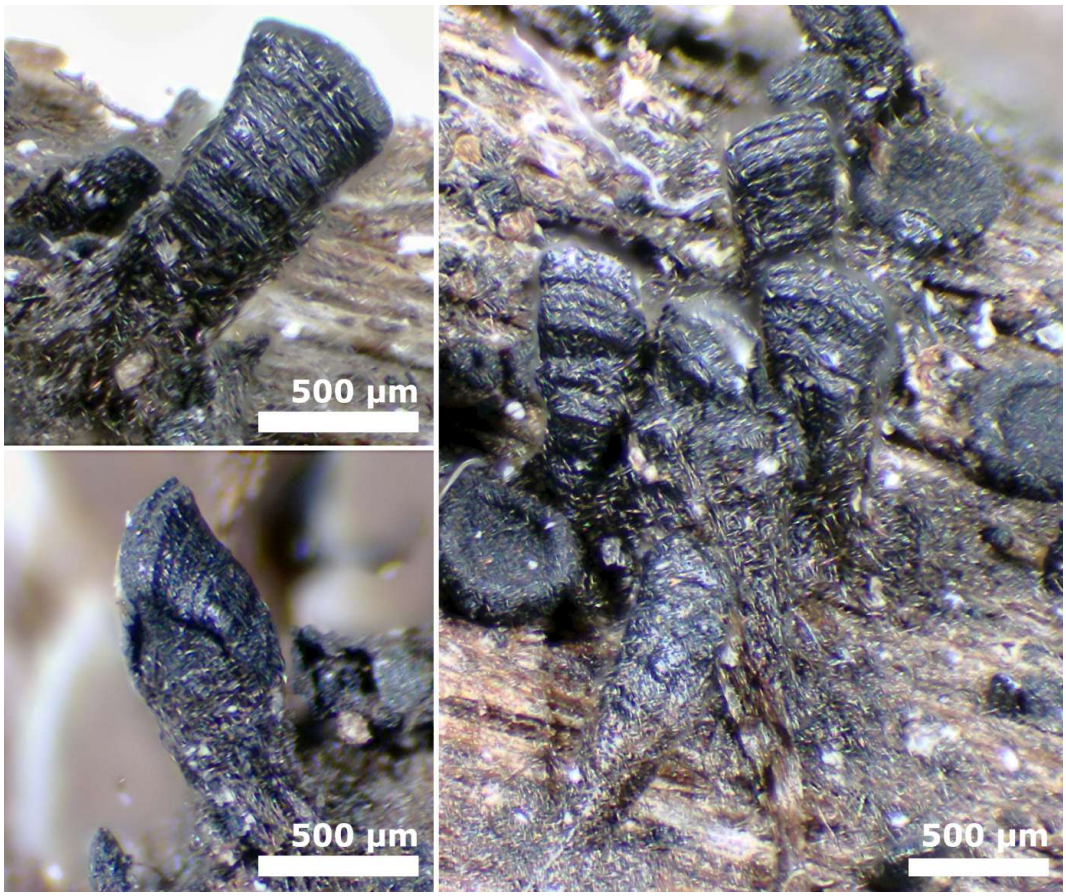


Figure 4. *Glyphium grisonense* on *Salix* sp. Photo: Mathias Andreasen.

Hysterium acuminatum Fr.
Important synonyms: *Hysterium angustatum* Alb. & Schwein.
Substrate: Bark of living deciduous trees.
Distribution in Scandinavia: Common in Norway (SE, SW, N), Denmark, Sweden.
Selected descriptions: Zogg (1962): 26 (as *H. angustatum*), Dennis (1981): 475 (as *H. angustatum* and *H. acuminatum*, Ellis & Ellis (1985): 31, Læssøe & Petersen (2019): 1617, Wergen (2017b): 495, as *H. angustatum*.

Hysterium pulicare Pers.: Fr.
Important synonyms: *Hysterium biforme* Fr.
Substrate: Bark of living deciduous trees.
Distribution in Scandinavia: Common in Norway (SE, SW, N), Denmark, Sweden.
Selected descriptions: Zogg (1962): 22, Dennis (1981): 475, Breitenbach & Kränzlin (1981): 300, Ellis & Ellis (1985): 31, Læssøe & Petersen (2019): 1617, Wergen (2017b): 482.

Hysterium sp.
This probably undescribed species resembles *H. pulicare* in macroscopic appearance. It was found by us a few times in the SW part of Norway. We would be grateful to receive more material of this species. It may or may not be specific to yew *Taxus baccata*.

Hysterobrevium curvatum (Fr.: Fr.) Math. & Granmo
Important synonyms: *Hysterium curvatum* (Fr.).
Substrate: Deciduous wood.
Distribution in Scandinavia: Rare in Norway (SE, SW), Denmark, Sweden.
Selected descriptions: Mathiassen & Granmo 2012: 25, Wergen (2017b): 708, as *H. smilacis*.

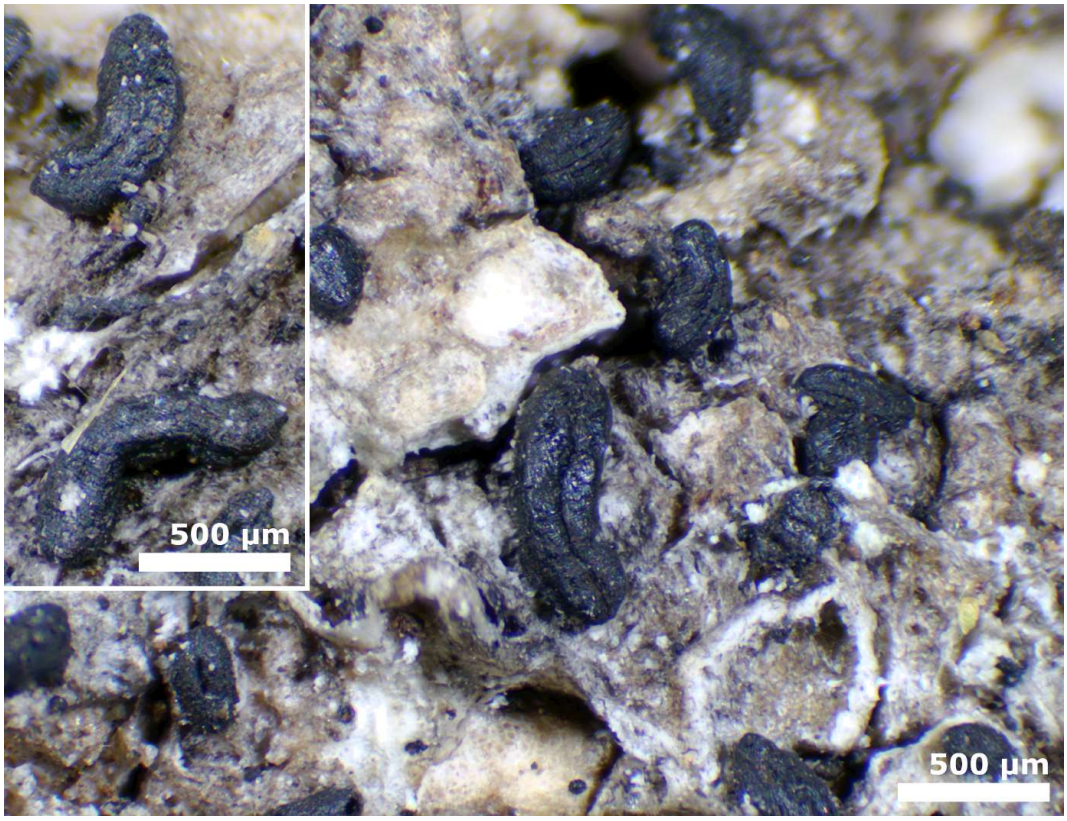


Figure 5. *Hysterobrevium curvatum* on *Populus tremula*. Photo: Mathias Andreasen.

Hysterobrevium mori (Schwein.) E.W.A. Boehm & C.L. Schoch
Important synonyms: *Hysterographium mori* (Schwein.) Rehm, *Hysterium mori* Schwein.
Substrate: Wood.
Distribution in Scandinavia: Rare in Norway, Denmark, Sweden.
Selected descriptions: Zogg (1962): 41, Barr (1990): 14, Ellis & Ellis (1985): 31, Læssøe & Petersen (2019): 1616.

Hysterobrevium smilacis (Schwein.) E.W.A. Boehm & C.L. Schoch
Important synonyms: *Hysterium smilacis* Schwein., *Gloniopsis smilacis* (Schwein.) Underw. & Earle.
Substrate: Deciduous wood.
Distribution in Scandinavia: Uncertain.
Selected descriptions: Boehm et al. (2009): 63.

Hysterographium elongatum (Wahlenb.: Fr.) Corda
Important synonyms: *Hysterium elongatum* Wahlenb.: Fr.
Substrate: Deciduous wood.
Distribution in Scandinavia: Common in Norway (SE, SW, N), Sweden.
Selected descriptions: Mathiassen (1993): 101, Ellis & Ellis (1985): 251.

Figure 6. *Hysterographium elongatum* on wood of *Populus tremula*. Photo: Mathias Andreasen.

Hysterographium flexuosum (Schwein.: Fr.) Sacc.
Important synonyms: *Hysterium flexuosum* Schwein.: Fr.
Substrate: Deciduous wood.
Distribution in Scandinavia: Rare in Norway(SW), Sweden.
Selected descriptions: Zogg (1962): 39.

Hysterographium fraxini (Pers.: Fr.) De Not.
Important synonyms: *Hysterium fraxini* Pers.: Fr.
Substrate: Deciduous wood.
Distribution in Scandinavia: Common in Norway (SE, SW, N), Denmark, Sweden.
Selected descriptions: Zogg (1962): 35, Dennis (1981): 476, Breitenbach & Kränzlin (1981): 302, Barr (1990): 12, Ellis & Ellis (1985): 141. Læssøe & Petersen (2019): 1615, Wergen (2017b): 768.

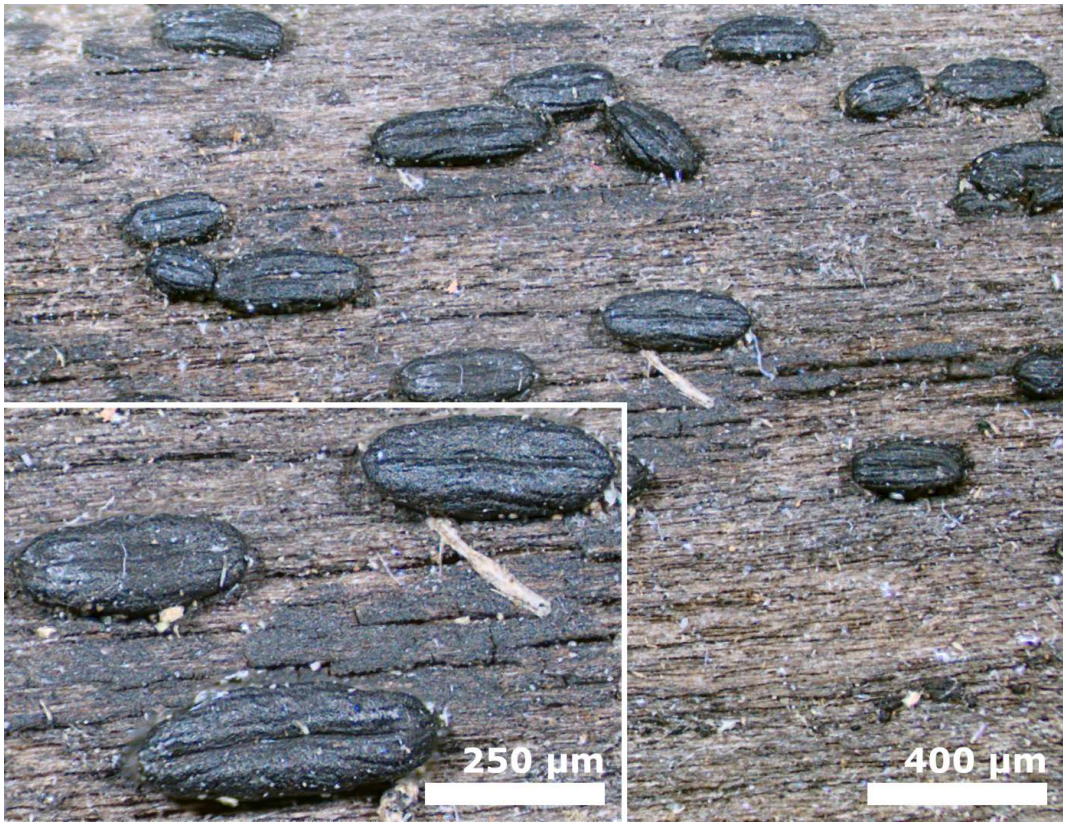


Figure 7. *Hysterographium flexuosum* on *Quercus* sp. Photo: Mathias Andreasen.

Hysteropatella elliptica (Fr.: Fr.) Rehm
Important synonyms: *Hysterium ellipticum* Fr.: Fr.
Substrate: Wood.
Distribution in Scandinavia: Rare in Norway (SE), Sweden.
Selected descriptions: Sherwood-Pike (1986): 267.

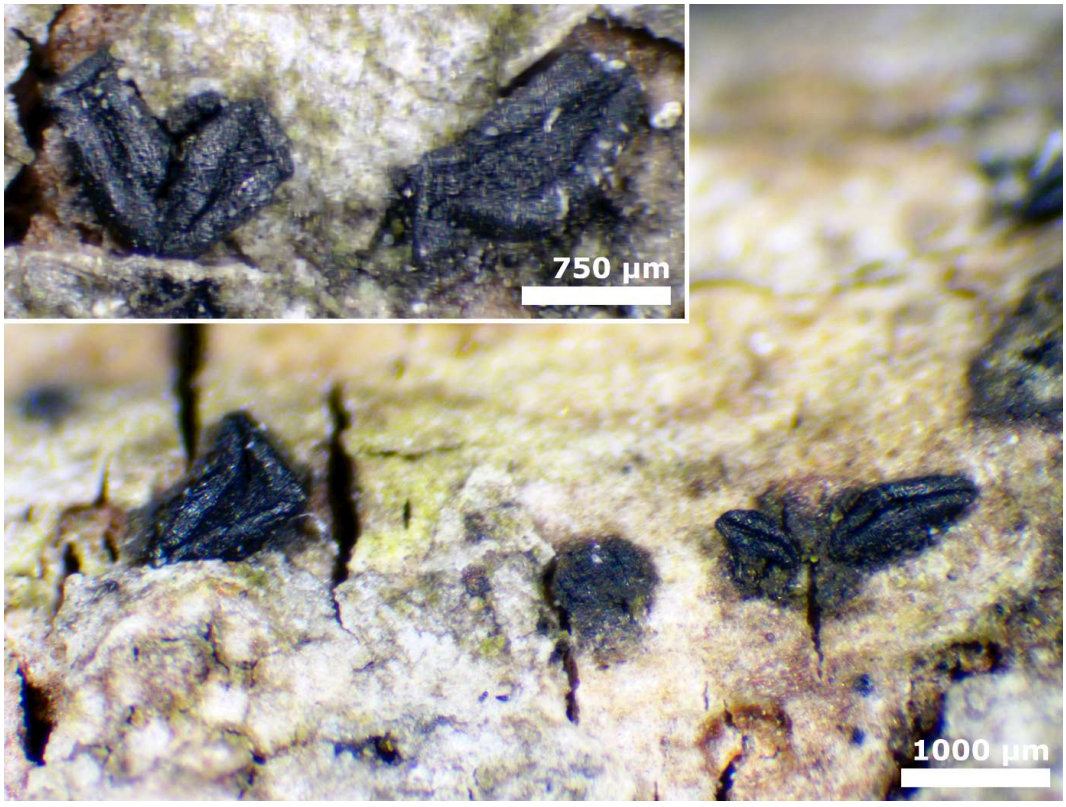


Figure 8. *Hysteropatella elliptica* on *Salix caprea*. Photo: Mathias Andreasen.

Lophium elegans H. Zogg
Substrate: branches of coniferous trees.
Distribution in Scandinavia: Uncommon in Norway (SE, SW, N).
Selected descriptions: Zogg (1954): 141.

Lophium mytilinum Pers.: Fr.
Important synonyms: *Hysterium mytilinum* Pers.
Substrate: Branches of coniferous trees.
Distribution in Scandinavia: Common in Norway (SE, SW, N), Denmark, Sweden.
Selected descriptions: Zogg (1962): 92, Dennis (1981): 477, Schmid (1990): 43, Ellis & Ellis (1985): 186, Læssøe & Petersen (2019): 1618, Wergen (2017b): 699.

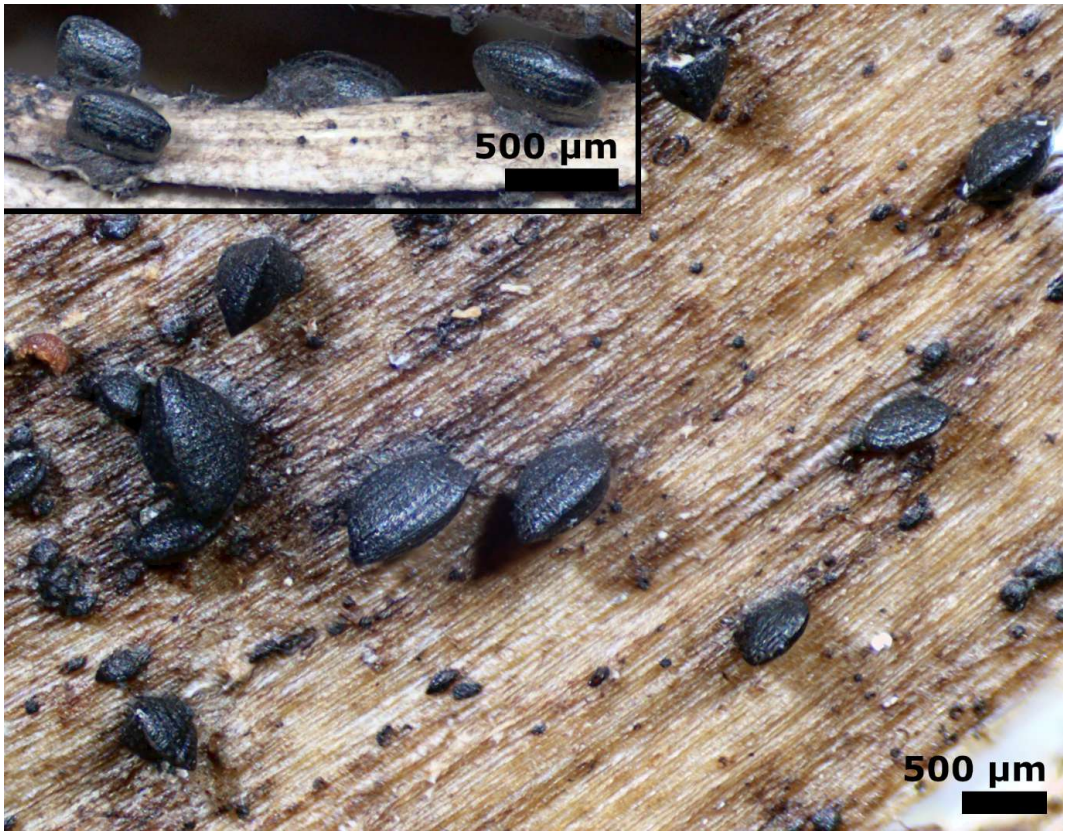


Figure 9. *Lophium mytilinum* on *Picea abies*. Top: on needles; Bottom: on decaying wood. Photo: Mathias Andreasen.

Mytilinidion acicola G. Winter
Substrate: Needles and bark on coniferous trees including *Juniperus communis*.
Distribution in Scandinavia: Rather common in Norway (SE, SW, N), Sweden.
Selected descriptions: Zogg (1962): 119, Holm & Holm (1977): 44, Ellis & Ellis (1985): 152, Læssøe & Petersen (2019): 1618, Wergen (2017b): 492.

Mytilinidion decipiens (P. Karst.) Sacc.
Important synonyms: *Lophium decipiens* P. Karst.
Substrate: Coniferous bark, wood.
Distribution in Scandinavia: Rare in Norway (SE, N), Denmark.
Selected descriptions: Boehm et al. (2009): 77, Læssøe & Petersen (2019): 1618.

Mytilinidion gemmigenum Fuckel
Substrate: Coniferous bark, wood.
Distribution in Scandinavia: Rare in Norway (SE, SW), Sweden.
Selected descriptions: Zogg (1962): 111, Mathiassen & Granmo (2012): 77.

Figure 10. *Mytilinidion acicola* on *Juniperus communis* needles. Photo: Mathias Andreasen.

Mytilinidion mytilinellum (Fr.: Fr.) H. Zogg
Important synonyms: *Lophium mytilinellum* Fr.: Fr.
Substrate: Coniferous bark, wood.
Distribution in Scandinavia: Rare in Norway (SW), Sweden.
Selected descriptions: Zogg (1962): 106, Breitenbach & Kränzlin (1981): 302, Ellis & Ellis (1985): 186, Wergen (2017b): 493.

Mytilinidion rhenanum Fuckel
Important synonyms: *Mytilinidion karstenii* Sacc.
Substrate: Coniferous bark, wood.
Distribution in Scandinavia: Rare in Norway (two collections from 1840 by Nils Green Moe), Sweden.
Selected descriptions: Zogg (1962): 109, Ellis & Ellis (1985): 186.

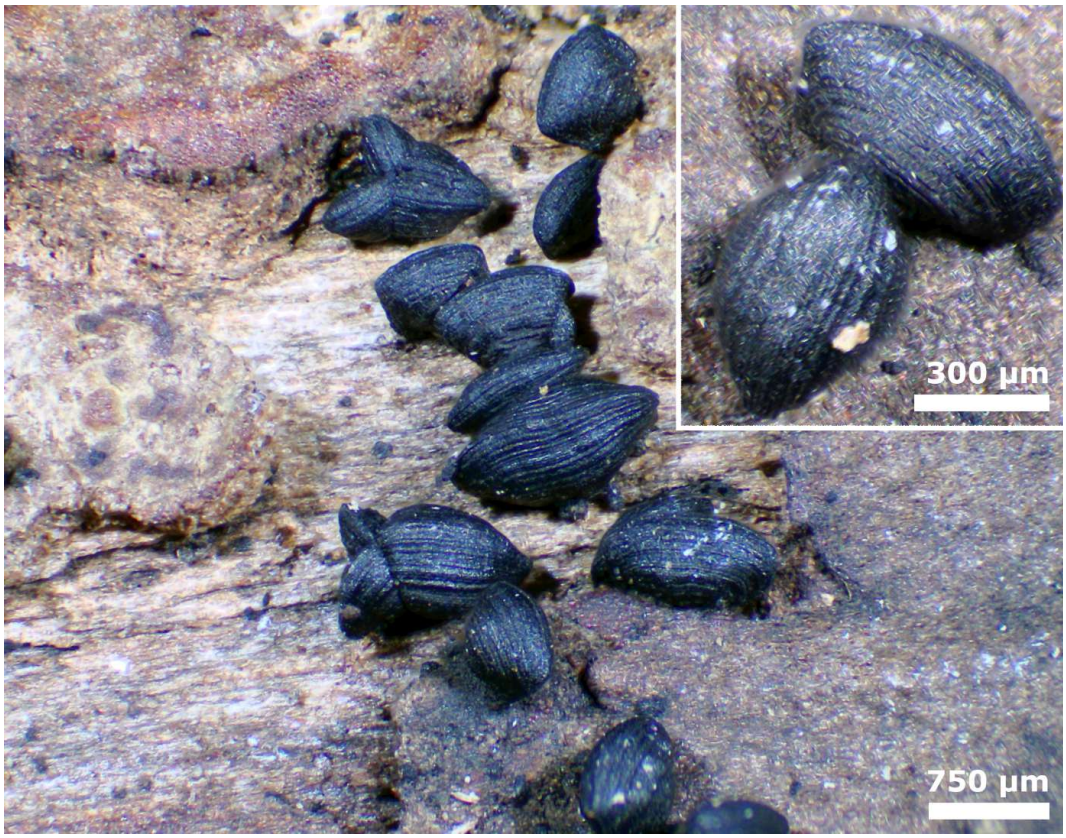


Figure 11. *Mytilinidion mytilinellum* on bark of *Pinus sylvestris*. Photo: Mathias Andreasen.

Poetschia buellioides Körb.
Substrate: Bark of *Pinus silvestris*.
Distribution in Scandinavia: Probably rather common in Norway (SE, SW).
Selected descriptions: Yacharoen et al. (2015): 311, Wergen (2017a): 402.

Poetschia buellioides Körb.
Substrate: Bark of *Pinus silvestris*.
Distribution in Scandinavia: Probably rather common in Norway (SE, SW).
Selected descriptions: Yacharoen et al. (2015): 311, Wergen (2017a): 402.

Psiloglonium araucanum (Speg.) E.W.A. Boehm, Marinc. & Schoch
Important synonyms: *Glonium araucanum* Speg.
Substrate: Bark of coniferous tree.
Distribution in Scandinavia: Found once in Denmark.
Selected descriptions: Boehm et al. (2009): 71.

Psiloglonium hysterinum (Rehm) E.W.A. Boehm & Schoch
Important synonyms: *Glonium hysterinum* Rehm
Substrate: Old wood.
Distribution in Scandinavia: Rare in Sweden.
Selected descriptions: Zogg (1962): 68.

Psiloglonium lineare (Fr.: Fr.) Petr.
Important synonyms: *Hysterium lineare* Fr.: Fr., *Glonium lineare* (Fr.: Fr.) De Not.
Substrate: Old wood.
Distribution in Scandinavia: Rather uncommon in Norway (SE, SW, N), Denmark, Sweden.
Selected descriptions: Zogg (1962): 63, Dennis (1981): 474, Ellis & Ellis (1985): 28, Boehm et al. (2009): 68.

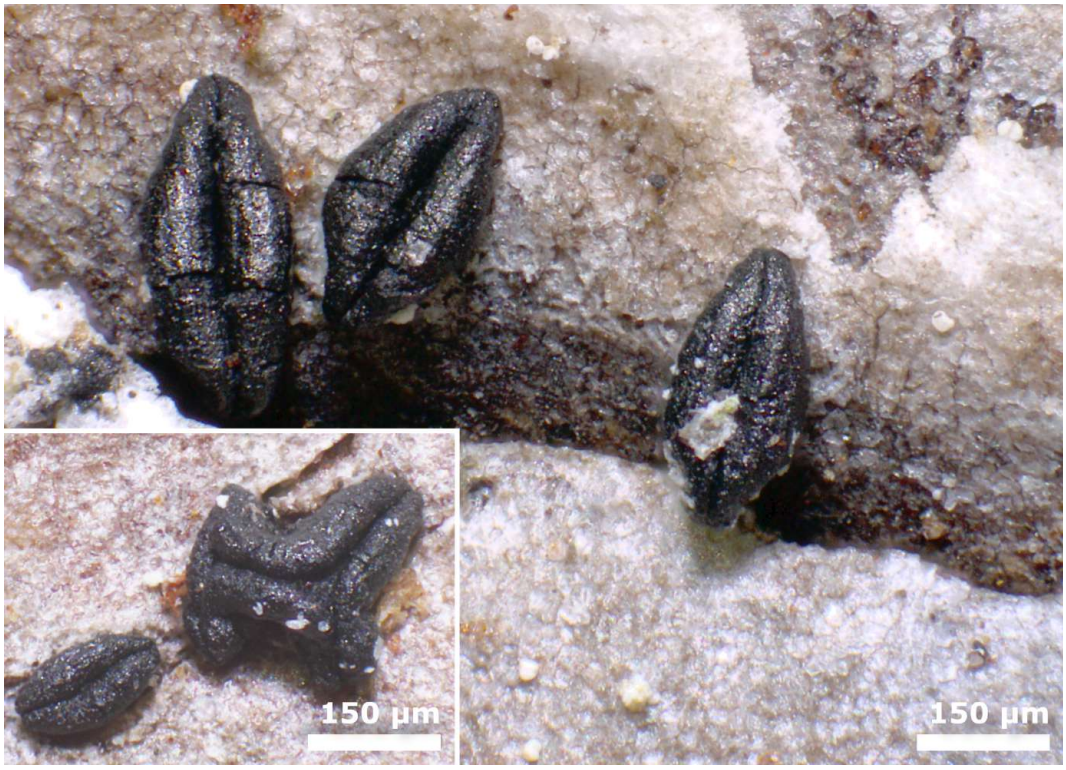


Figure 12. *Poetschia buellioides* on bark of *Pinus sylvestris*. Photo: Mathias Andreasen.

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