

# Four uncommon hairy discomycetes (Ascomycota, Pezizales) from Norway

Roy Kristiansen

P.O. Box 32 NO-1650 Sellebakk, Norway

Corresponding author:  
mykosof@online.no/roykri70@gmail.com

Norsk tittel: Fire uvanlige hårbevekste discomyceter (Ascomycota, Pezizales) fra Norge

Kristiansen R, 2014. Four uncommon hairy discomycetes (Ascomycota, Pezizales) from Norway. *Agarica* 2014, vol. 35: 49-57.

## KEYWORDS

Ascomycota, Pezizales, Pyronemataceae, *Tricharina*, *Wilcoxina*, *Cheilymenia*, *Spooneromyces*

## NØKKELOORD

Ascomycota, Pezizales, Pyronemataceae, *Tricharina*, *Wilcoxina*, *Cheilymenia*, *Spooneromyces*

## SAMMENDRAG

Fire mindre kjente hårbevekste discomyceter (Pyronemataceae, Pezizales) rapporteres fra Norge: *Tricharina ascophanoides* og *Cheilymenia fraudans* fra Torp, Fredrikstad, *Wilcoxina rehmi* fra Kråkerøy ved Fredrikstad og Asmaløy i Hvaler, samt *Spooneromyces laeticolor* fra Forra naturreservat i Nord-Trøndelag. Beskrivelser og illustrasjoner følger sammen med økologiske data.

## ABSTRACT

Four less common hairy discomycetes (Pyronemataceae, Pezizales) are reported from Norway: *Tricharina ascophanoides*, and *Cheilymenia fraudans* from Torp, Fredrikstad, *Wilcoxina rehmi* from Kråkerøy, Fredrikstad and Asmaløy, Hvaler, besides *Spooneromyces*

*laeticolor* from Forra nature reserve, Nord-Trøndelag. Descriptions and illustrations are provided along with their ecological data.

## INTRODUCTION

The four present species all belong to the family Pyronemataceae (Perry et al. 2007). The genus *Tricharina* was erected by Eckblad (1968), because the genus *Tricharia* was a late homonym of a lichen genus. In the extensive monograph by Yang and Korf (1985 b) *Tricharina* was split into two genera, *Tricharina* emend. and the new genus *Wilcoxina* (Yang and Korf 1985 b).

We are speaking of five species in the genus *Tricharina* in the Nordic countries (Hansen and Knudsen 2000), but thirteen worldwide (Lindemann 2013). The rarest is *T. ascophanoides*, earlier mentioned briefly by Yang and Kristiansen (1989) from Torp, Fredrikstad as a new species to the Scandinavian peninsula, but never characterized. Preceding that paper Yang and Korf (1985a) had erected the anamorph genus *Ascorhizoctonia* for the telemorph *Tricharina*. However, they did not succeed in obtaining an anamorph on the material they had. Shortly after, however, I consulted Chin Yang as I had several collections of *Tricharina* collected 1982, and three of them turned out to be *T. ascophanoides*. Dr. Yang managed to get one of my collections in culture on agar medium and the anamorph was described as *Ascorhizoctonia ascophanoides* (Yang and Kristiansen 1989). *Tricharina* is probably saprobic.

The genus *Wilcoxina* can be distinguished from *Tricharina* by its morphology and structure, like habitus, hairs, asci, ascospores

and habitat (Yang and Korf 1985 b), and it seems as *Wilcoxina* species are mycorrhizal in association with pinaceous conifers, and my two collections are both with conifers. Species of *Tricharina*, however, occurs differently, like burnt ground or clayey soil, while *T. ascophanoides* prefer rotten paper, dead or rotten wood of *Salix*, *Fagus*, small twigs of *Quercus* according to Kirk and Cooper (2014), based on several findings in UK.

The genus *Cheilymenia* is a large and complex genus which comprises 38 species world-wide, mostly coprophilous with a few terrestrial, and is a cosmopolitan genus. Most of them prefer excrements of herbivores with some carnivores.

The genus became highly improved by the detailed monograph of Moravec (2005), which enabled us to better identify the different species.

Thirteen different species are registered from Norway and the majority are coprophilous except for the terrestrial *Cheilymenia vitellina*, and the two subalpine-alpine species *C. chionophila* and *C. sclerotiorum* originally described by Schumacher (1992) and Schumacher and Mohn Jensen (1992).

*Spooneromyces* was erected by Schumacher and Moravec (1989) to accommodate Karsten's *Peziza laeticolor* (Karsten 1870) from Mustiala in Finland, described as a medium sized, reddish hairy discomycete. The genus comprises two species in Scandinavia: *S. laeticolor* and *S. helveticus* (Olariaga and Hansen 2011).

In the following the four species are described in more details provided with comments.

#### MATERIALS AND METHODS

Microscopical characters were observed using squash-mounts in both water and Cotton Blue in lactic acid, and Melzer's reagent, on living and dried material.

#### *Tricharina ascophanoides* Yang & Korf

Fig. 1, 2 a, b, c.



Figure 1. *Tricharina ascophanoides*. Ascocarps *in situ*. Scale bar 6 mm. Photo R. Kristiansen.

#### Icones

Boudier 1908 pl. 351

Engel & Haffner, Pilztafel 1986, nr. 53, fig. 200

Dougoud 2002, p. 41

Lindemann 2013, p. 43

#### Synonyms

*Ascorhizoctonia ascophanoides* Chin S. Yang & R. Kristiansen 1989.

*Ryparobius ascophanoides* Sacc. 1892.

*Tricharia ascophanoides* Boud. 1903.

*Helotium ascophanoides* (Boud.) Sacc. & Traverso 1910.

*Pachydisca ascophanoides* Boud.

*Lachnea ascophanoides* (Boud.) Sacc. & D. Sacc. 1905.

#### Description

Apothecia shallowly cupulate to disc-like and finally convex, light brown, pale brownish orange to ochraceous brown, 3-6 mm diameter, gregarious. Receptacle beset with hyaline hairs, which are pointed, multiseptate, and thin-walled. Marginal hairs 250-300 x 7-9  $\mu$ m.

Hymenium: 180-250  $\mu$ m thick.

Asci 8-spored, cylindrical, narrow toward the base, 150-90 x 10-18  $\mu$ m.

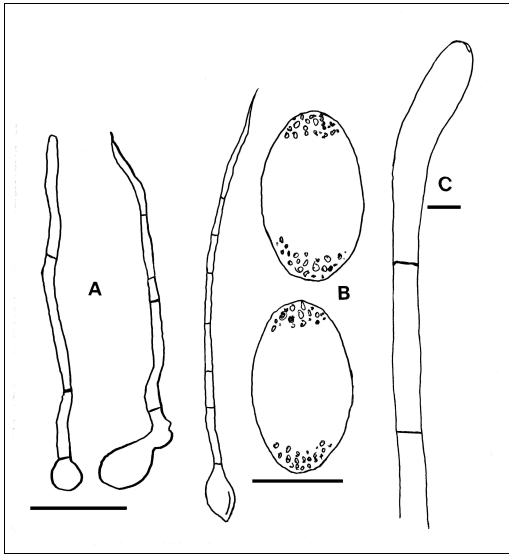


Figure 2. *Tricharina ascophanoides*. A: Marginal hairs, scale bar 50 µm. B: Ascospores, with strong granules, scale bar 10 µm. C: Tip of paraphyse, scale bar 5 µm. Ill. R. Kristiansen.

Ascospores ellipsoid, uniseriate, smooth, aguttulate, but when mature with fine polar granules, hyaline, 14-16 x 9-11 µm.

Paraphyses slender, septate, hyaline, slightly tapering at apex to 5-6 µm, irregular and partly curved.

#### Habitat

On rotten wood and wet or burnt balls of cellulose.

#### Material examined

Østfold, Fredrikstad, Borge, Torp. Among mosses growing on wet and/or burnt balls of cellulose in a rubbish dump, 3.07.1982 (RK 145/82); ibid (RK 146/82); ibid. (RK 148/82); ibid. (RK 151/82). 59° 14' 26.01" N 11° 0' 38.20" E Herb. CSY ex RK82.146, TRH, CUP, K, PRM, S.

#### Comments

All four collections were found on the same day, all within a diameter of 4 to 5 meter, and they turned out to be the same species. Several

other operculate discomycetes occurred in the same spot, like *Tricharina gilva*, *T. ochroleuca*, *Pulvinula constellatio*, *Chalazion helveticum* (Kristiansen 1991) *Trichophaea paludosa*, and *Trichophaeopsis bicuspis* (Kristiansen 1985).

The samples were sent to Dr. Yang, who succeeded to produce a culture of the anamorph *Ascorhizoctonia ascophanoides*, described by Yang and Kristiansen (1989).

The species is characterised by its relatively inconspicuous hairs, but is easily recognized by being colorless, as well as its large ascospores with distinct polar granules.

Yang and Korf (1985b) mentioned only *T. ascophanoides* from the Czech Republic and France, but it has later been recorded in Sweden (Eriksson 2009), United Kingdom (Kirk and Cooper 2014), Switzerland (Dougoud 2002), and Germany (Engel and Häffner 1986, Lindemann, 2013).

An updated key to the *Tricharina* species is published by Lindemann (2013).

#### *Wilcoxina rehmii* Yang & Korf

Fig. 3, 4 a, b, c.

Norwegian name: Mørkhåret lurvebeger.

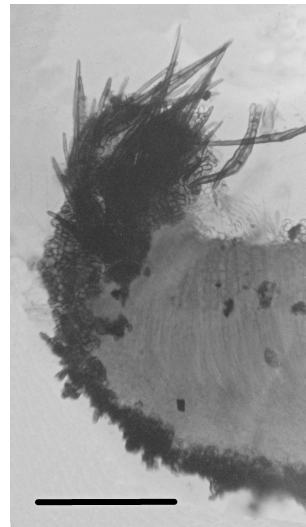


Figure 3. *Wilcoxina rehmii*. Part of median thin section showing marginal hairs, scale bar 1 mm. Photo: R. Kristiansen.

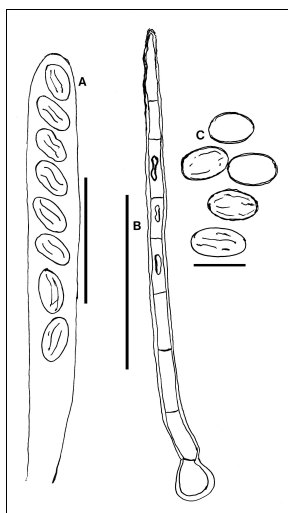


Figure 4. *Wilcoxina rehmii*. A: Asci with spores, scale bar 50 µm. B: marginal hair, scale bar 100 µm. C: Ascospores, scale bar 15 µm. Ill. R. Kristiansen.

#### Icones

Dougoud 2002, p.42.

#### Synonyms

*Humaria gilva* (Boud. in Cooke) Sydow, 1884.

*Humaria melaloma* (Alb. & Schw.:Fr.) Kanouse, 1947.

*Lachnea gilva* (Boud. in Cooke) Rehm, 1895.

#### Description

Apothecia occurs gregarious, at first subglobose, then expanded and become turbinate to shallowly cupulate, rarely 2 mm diameter, 1-1.5 mm high, centrally attached, sessile.

Hymenium grey to greyish white, receptacle brown beset with golden brown hairs.

Asci cylindrical, narrow toward base, 8-spored, 220-250 x 11-12 µm.

Ascospores ellipsoid, smooth, 12-14 x 7-8 µm, and usually lined up in the upper part of the ascus.

Paraphyses straight, slender, septate, equal or slightly enlarged at apex to 2-3 µm.

Hairs pointed or blunt at apex, up to 350 x 10-15 µm, septate.

#### Habitat

On rich soil, forming mycorrhiza in association with pinaceous conifers.

#### Material examined

**Østfold**, Fredrikstad, Kråkerøy, Fuglevik. In a slope with exposed shell bed close to a spruce forest with minor *Salix* and *Betula*, 10.06.1982 (RK 122/82); *ibid.* 06.07.1985. Associated with *Pulvinula constellatio*, *Trichophaea hybrida* and *Helvella queletii*. 59° 11' 16.41" N. 10° 56' 55.25" E.

**Østfold**, Hvaler, Asmaløy, Enerstad. Beneath *Pinus sylvestris* on black soil among *Anemone nemorosa*, *Hepatica nobilis*, and cherries in a garden, 3.07.1988 (RK 88/03); *ibid.* 29.06.1989 (RK 89/26). 59° 3' 58.20" N 10° 56' 12.02" E Herb. CUP.

#### Comments

This species is previously reported from Rana in Nordland by Yang and Korf (1985 b), collected by Dissing, Sivertsen and Erlandsen several times in the period 1972-1975 (Herb. TRH). Originally found in Germany 1885; later reported from France, Italy, Canary Island (Yang and Korf 1985b) and Switzerland (Dougoud 2002).

This is the most common species in the genus *Wilcoxina*, which comprises three species, and all seem to fruit in the same site for more than one season as Yang and Korf (1985b) emphasized, which is confirmed in the present paper from both locations.

Phylogenetic analyses shows that *Wilcoxina rehmii* and *Tricharina ascophanoides* are not closely related. There are differences in the arrangement of the excipular hairs, excipulum structure, proportion of the asci occupied by spores, etc., and the presence of anamorph referable to *Complexipes* C. Walker versus *Tricharina* with its *Ascorhizoctonia* anamorph (Perry et al. 2007). Interestingly, the common species *Trichophaea hybrida* forms a sister group to *Wilcoxina*.

***Cheilymenia fraudans* (P. Karst.) Boud.**

Fig. 5, 6, 7 a, b, c.



Figure 5. Ascocarps of *Cheilymenia fraudans*. Field of view 3 cm. Photo: R. Kristiansen.



Figure 6. Ascocarps of *Cheilymenia fraudans* (to the right) associated with *Iodophanus testaceus*. Field of view 4 cm. Photo: R. Kristiansen.

**Icones**

Moravec 2005, p.180-181.

**Synonyms**

*Peziza fraudans* P. Karst. 1871.

*Peziza fraudans* (P. Karst.) P. Karst., 1871.

*Humaria fraudans* (P. Karst.) P. Karst., 1885.

*Neottiella fraudans* (P. Karst.) Saccardo, 1889.

**Description**

Apothecia gregarious, first turbinate to subglobular becoming shallowly cupulate to discoid, sessile, 1-2 mm in diameter, 1-1.5 mm high. Hymenium yellow red to orange, outer surface and margin beset with incon-

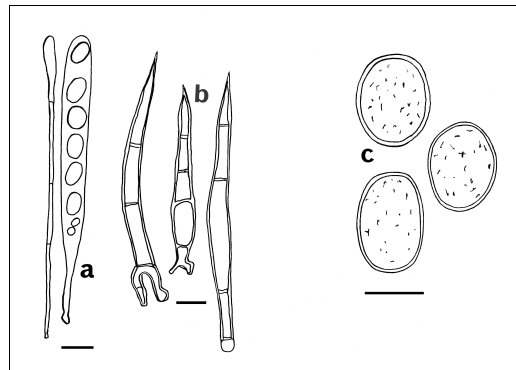


Figure 7. *Cheilymenia fraudans*. a: Ascus with spores and paraphyse, scale bar 2  $\mu$ m. b: Marginal hairs, scale bar 20  $\mu$ m. c: ascospores, scale bar 10  $\mu$ m. Ill. R. Kristiansen.

spicuous pale hairs.

Asci cylindric, 8-spored, some aborted, 200-250 x 17-20  $\mu$ m with blunt apex and attenuated base.

Ascospores broadly ellipsoid, subglobose to almost globose, 13-15 x 10-12  $\mu$ m, hyaline with yellow, refractive content; perispore sparsely covered with fine irregular cyanophilous short warts. deBary bubbles observed on fresh material.

Paraphyses filiform, straight, 3-4  $\mu$ m wide, rarely septate, equal or slightly enlarged at apex to 8-9  $\mu$ m, clavate or pyriform.

Marginal hairs short, 80-250 (300)  $\mu$ m, mixed with hyaline and light brown hairs, septate, irregularly curved or straight with pointed or blunt apex and rooting base.

**Habitat**

On rotten grass with green algae, cow dung.

**Material examined**

**Østfold**, Fredrikstad, Borge, Torp, close to Torp stadium. Growing on rotten grass with green algae mixed with sawdust and horse dung near heaps of waste from garden associated with *Iodophanus testaceus*, *Coprinus* sp. and *Conocybe* sp. 2.06.1982 (RK 103/82); ibid. 04.06.1982. 59° 14' 27.78" N 11° 0'

37.78 " E. Herb. J. Moravec, TRH.

### Comments

*Cheilymenia fraudans* was first found by the Finnish mycologist P. A. Karsten in Finland in 1869. Today the species is known from United Kingdom, Switzerland, Italy, Spain, Taiwan and Norway as well as the type locality in Finland, and considered rare by Moravec (2005).

The apothecia of *C. fraudans* are of similar appearance as those of *C. rubra*, but are generally larger, at maturity more flattened and more similar to *C. stercoraria*. For further details, consult Moravec (2005).

Results of molecular and morphological analyses suggest a close relationship between *Cheilymenia* and *Spooneromyces* (Perry et al. 2007), as also suggested by Schumacher and Moravec (1989).



Figure 8. *Spooneromyces laeticolor*. Ascocarp *in situ*. Field of view 2 cm. Photo: R. Kristianen.

***Spooneromyces laeticolor* (P. Karst.) T. Schumach. & J. Moravec** Fig. 8, 9 a, b, c, 10.

### Icones

<https://www.sites.google.com/site/funghiparadise/ascomycota/pezizales/pyronemataceae/spooneromyces-laeticolor-p-karst-t-schumach-j-moravec-1989>.

Olariaga and Hansen 2011.

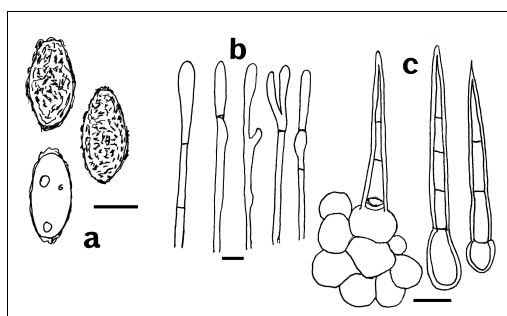


Figure 9. *Spooneromyces laeticolor*. a: Ascospores. Scale bar 10  $\mu$ m. b: Different habit of paraphyses. Scale bar 5  $\mu$ m. c: Excipular cells with hairs. Scale bar 50  $\mu$ m. Ill. R. Kristiansen.

### Synonyms

*Peziza laeticolor* P. Karst., 1870, non *Peziza laeticolor* Berk. & Br. 1875.

*Lachnea laeticolor* (P. Karst.) Sacc. 1889.

*Scutellinia laeticolor* (P. Karst.) O. Kuntze, 1891.

*Ciliaria laeticolor* (P. Karst) Boud., 1907.

*Melastiza laeticolor* (P. Karst.) T. Schumach., 1988.

*Melastiza asperula* Spooner, 1981.

### Description

Apothecia scattered, shallowly cupulate to discoid to flattened, sessile, 1-4 mm in diameter, 1-1.5 mm high. Hymenium and outer surface reddish orange to intensely red,

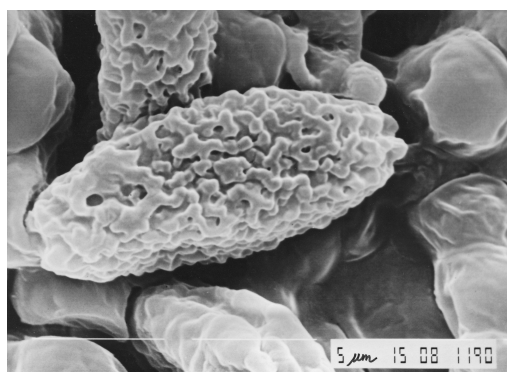


Figure 10. *Spooneromyces laeticolor*. Scanning electron micrograph of ascospore.

outer surface and margin beset with stiff brown hairs.

Asci cylindrical, 8-spored, 200-270 x 12-15  $\mu\text{m}$ . Ascospores uniseriate, ellipsoid, biguttulate, 19-24.5 x 9-12  $\mu\text{m}$  excluding spore ornamentation, which appear in the form of warts and crests <1  $\mu\text{m}$  high and 0.5  $\mu\text{m}$  broad, slightly pointed ends, with crests interconnecting and forming a fine reticulum in SEM.

Paraphyses simple or rarely branched, slightly clavate at apices, 4-6  $\mu\text{m}$  diameter, septate, filled with orange granules which turns greenish in Melzer's reagent.

Margin beset with brown scattered hairs, 200-250 (-350) x 18-24  $\mu\text{m}$ , multi-septate, stiff, thick-walled, not forked at the base, arising from superficial excipular cells.

#### Habitat

On plant debris among pine and spruce needles in August - September.

#### Material examined

**Sør-Trøndelag:** Trondheim: Byneset, Onsøy, rotten grass on wet shaded grassland terrain in coniferous wood, ca 200 m asl, associated with *Trichophaea hybrida*, 09.08.1982. Herb. (O). Included in Schumacher and Moravec (1989). Co-ordinates unknown.

**Nord-Trøndelag:** Levanger: Roknesvollen, Forra naturreservat, 390 m asl, on sandy soil at the riverbank close to Heståa river, in spruce wood (RK 106/98), associated with the very rare *Trichophaea velenovskyi* (RK105/98), both 22.08.1998, and the rare *Pseudographis pinicola* on a dead branch of spruce. 63° 36' 36" N 11° 32' 52" E.

#### Comments

This species is known from 5 locations in Norway, from the counties of Akershus to Nord-Trøndelag.

Known from Finland (type), Denmark, England, France and Spain (Schumacher and Moravec 1989), Austria (Jeannerot 2010) and

recently from Sweden (Olariaga and Hansen 2011). The latter is from Swedish Lapland and represents the northernmost occurrence, while the Norwegian locality in Nord-Trøndelag is fairly close to it.

In addition to *S. helveticus* (Schumacher and Moravec 1989) two additional new species have been assigned to *Spooneromyces*, viz. *S. microsporus* from Italy (Jamoni 2008), and *S. daliensis* in China (Zhuang 2005).

Schumacher and Moravec (*loc.cit*) noted the similarity of *Spooneromyces* to *Scutellinia* and *Cheilymenia*, and the molecular analyses by Perry et al. (2007) indicate a close relationship between *Spooneromyces* and *Cheilymenia*.

#### EPILOGUE

There are several genera (and species) within the family Pyronemataceae with hairy apothecia, although with clearly distinguishing characters. The large genus *Scutellinia* (Schumacher 1990) as well as the genera *Cheilymenia*, *Parascutellinia* and *Spooneromyces* all contain carotenoids with variable colors of red, orange and yellow of the ascocarps, while genera like *Trichophaea*, *Humaria*, *Leucoscypha*, *Trichophaeopsis*, as well as *Wilcoxina* and *Tricharina* mentioned herein have whitish or greyish ascocarps without carotenoids. Besides, there are clear differences in morphology, anatomy and ecology, and phylogenetic analyses have disclosed that they appear in different clades.

The present paper gives examples of four genera related to this subject.

Figure 11 shows the locations of the species from the Østfold county presented in this paper.

#### ACKNOWLEDGEMENT

I am indebted to Chin S. Yang, Prestige EnviroMicrobiology, Inc., NJ, USA for previous collaboration on *Tricharina* and *Wilcoxina*.



Figure 11. Location of *Tricharina ascophanoides* and *Cheilymenia fraudans* (square), and *Wilcoxina rehmlii* (circles) in the vicinity of Fredrikstad, Østfold.

## REFERENCES

- Boudier E, 1908. Icones Mycologicae. Tome II. Principalement discomycetes. Planches 194 à 421. Paris 1905-1910.
- Eckblad F-E, 1968. The genera of the operculate discomycetes: A re-evaluation of their taxonomy, phylogeny and nomenclature. *Nytt magasin for botanikk* 15: 1-92.
- Engel H, Häffner J, 1986. *Tricharina ascophanoides* (Boud.) Yang & Korf, ein seltene Ascomycet für die Bundesrepublik gefunden in Nordwestoberfrankens. *Die Pilzflora Nordwest-oberfrankens*, 10/A, 47-49.
- Eriksson OE, 2009. The non-lichenized ascomycetes of Sweden. KBC-tryckeriet, Umeå University. 461 sider.
- Dougoud R, 2002. Contribution à la connaissance de quelques Discomycètes operculés rares ou méconnus. *Fungi non Delineati*, pars XVIII, 1-69.
- Hansen L, Knudsen H, 2000. Nordic Macro-mycetes. Volume I. Ascomycetes.



- Jeannerot B, 2010. Notes on scutellinioid fungi in collections of the Vienna University herbarium (WU). *Österreichische Zeitschrift für Pilzkunde* 19: 10-29.
- Jamoni G, 2008. Una nuova entità dalla Valsesia: *Spooneromyces microsporus* sp.nov. *Funghi e Ambiente* 108: 5-9.
- Karsten P, 1870. *Fungi Fenniae Exsiccati*. Cent. 10, no. 901-1000.
- Kirk P, Cooper J, 2014. FRDBI. Record details. British mycological society. consult: <http://www.fieldmycology.net/FRDBI/FRDBIrecord.asp?IntGBNum=47653>
- Kristiansen R, 1985. Sjeldne og interessante discomyceter (Pezizales) fra Syd-Norge. *Agarica* 6 (12): 487-453.
- Kristiansen R, 1991. New records of species of the genus *Chalazion* (Pezizales) in Norway. *Agarica*, 10/11(19/20): 83-97.
- Lindemann U, 2013. Ärger mit *Tricharina* Eckblad Über eine schwierige Gattung operculater Discomyceten. *Mycologica Bavarica* 14: 37-51.
- Moravec J, 2005. A world monograph of the genus *Cheilymenia* (Discomycetes, Pezizales, Pyronemataceae ). *Libri Botanici* 21: 1-256. IHW-Verlag.
- Olariaga I, Hansen K, 2011. New and noteworthy records of Pezizomycetes in Sweden and Nordic countries. *Karstenia* 51: 1-16.
- Perry B, Hansen K, Pfister DH, 2007. A phylogenetic overview of the family Pyronemataceae (Ascomycota, Pezizales). *Mycological Research* 111: 1-23.
- Schumacher T, 1990. The genus *Scutellinia* (Pyronemataceae). *Opera Botanica* 101: 1-107.
- Schumacher T, 1992. New or noteworthy discomycetes. 2. Five new operculate discomycetes (Pezizales) from the Dovre mountains, Central South Norway. *Mycotaxon* 43: 33-47.
- Schumacher T, Mohn Jensen K, 1992. Arctic and Alpine fungi. 4. Soppkonsulenten A/S. 66 pp.
- Schumacher T, Moravec J, 1989. *Spooneromyces*, a new genus to accomodate *Peziza laeticolor* and the new species *S. helveticus*. *Nordic Journal of Botany, Section Mycology* 9: 425-430.
- Zhuang W-Y, 2005. Some new species and new records of discomycetes in China. *Mycotaxon* 93: 99-104.
- Yang CS, Korf RP, 1985a. *Ascorhizoctonia* gen. nov. and *Complexipes* emend., two genera for anamorphs of species assigned to *Tricharina* (discomycetes). *Mycotaxon* 23: 457-481.
- Yang CS, Korf RP, 1985b. A monograph of the genus *Tricharina* and of a new segregate genus *Wilcoxina* (Pezizales). *Mycotaxon* 24: 467-531.
- Yang CS, Kristiansen R, 1989. *Ascorhizoctonia ascophanoides* sp. nov.: anamorph of *Tricharina ascophanoides*. *Mycotaxon* 35: 313-516.