

Notes on vernal cupfungi (Pezizales) in Norway

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NØKKELOORD

Vårbeggersopper, Pezizales, sarcoscyphaceer, Norge, Østfold.

SAMMENDRAG

Denne artikkelen omhandler nye observasjoner og registreringer av vårsopper, vesentlig sarcoscyphaceer, gjort i Norge i senere tid. Den omfatter tolv arter fordelt på åtte slekter og tre familier. Forfatteren beskriver noen uregistrerte funn og diskuterer taksonomiske forhold basert på utviklingen innen fylogenetiske analyser, og har spesiell fokus på den lille diskomyceten *Desmazierella acicola* som vokser på døde nåler av furu. Arten er nå endelig plassert i en nyopprettet familie Chorioactidaceae. Et kart viser utbredelsen av arten i Norge. Forfatteren spekulerer i om flere sarcoscyphaceer kan finnes i Norge.

ABSTRACT

This note deals with new observations and records of vernal cup fungi (Pezizales) in Norway, mainly sarcoscyphaceous species. The author presents some unrecorded collections and discusses taxonomic issues based on recent development in phylogenetic analyses. Twelve species distributed among

eight genera and three families are treated. Special attention is given to the features of the small discomycete *Desmazierella acicola* that grows on dead needles of pine and recently has found its place in the new family Chorioactidaceae. A distribution map of the species in Norway is provided. The author speculates in potential finds in Norway of other sarcoscyphaceous fungi.

INTRODUCTION

There are few vernal cup fungi in the families Sarcoscyphaceae and Sarcosomataceae (Pezizales) in Norway. One of the most exciting surprises in spring 2009 was the rediscovery of the extremely rare (at least in Norway) *Sarcosoma globosum*, the first finding in 72 years, but still only the third in Norway. It was found at Prestmoen, Ringesrike, SE Norway (Nilsen 2009).

Eckblad (1957) summarized the sarcoscyphaceous species in Norway, but about 50 years ago it was very few findings of such fungi in our country. For instance, the small *Desmazierella acicola*, growing on dead needles of *Pinus sylvestris* was unknown in Norway, and at that time only known from one locality in Denmark in Scandinavia. Over the years I have made observations of sarcoscyphaceous fungi in Norway (Kristiansen 1983, 1984, 1990). In the last three decades, however, the number of findings has increased since more mushroom-pickers are aware of the vernal funga.

Progress in molecular biology with phylogenetic analyses have resulted in changes in taxonomy. One of the most 'revolutionary' changes in recent time is the erection of a new family, segregated from

Sarcosomataceae, *namely* Chorioactidaceae (Pfister et al. 2008), to include the four genera *Chorioactis*, *Wolfina*, *Neournula* and *Desmazierella*. Only the latter occurs in Norway.

On this background I feel tempted to refresh the knowledge of these fungi in Norway and to present some new observations, primarily from the county of Østfold in SE Norway. In the following, bear in mind that all sarcoscyphaceous fungi develop slowly (in spring, or for some species possibly the preceding autumn), and that even fully expanded ascocarps may have asci with immature ascospores. This may cause problems with identification of critical species. The nomenclature follows Index fungorum. Some collections reported on are kept in my private herbarium (RK), others in the herbaria of University of Oslo (O) and University of Tromsø (TROM).

Microstoma protracta

The distribution of this very nice vernal fungus in Norway was shown by Schumacher

(1979), with 5 collections from river banks and 27 collections from other locations. Additional finds have been reported later, and a recent distribution map now indicates a clearly eastern distribution of this species in S Norway continuing northwards as far as Troms in N Norway (map and more than 70 records are available from the Norwegian Mycological Database). In the county of Østfold *M. protracta* is recorded only once, in 1955 (Eckblad 1957).

An unregistered collection of mine from an alpine site may be the highest elevation record for this species. This was found in Oppland: Vågå, Bessheim, close to Bessvatn, 1300 m asl, among *Pulsatilla vernalis*, *Juniperus communis*, *Betula nana*, heather, lichens and mosses. 15.06.1986, *leg. & det.* RK.

Spooner (2002) regarded both *M. protracta* and the next species *Pithya vulgaris* as extinct in Britain.

Pithya vulgaris* and *Pithya cupressina

Figs. 1-2

These small, but conspicuous orange yellow discomycetes are quite rare in Norway. Most collections were done 40 to 60 years ago, mainly on dead twigs and branches of cultivated *Juniperus* spp. in the counties of Akershus and Sør-Trøndelag (Norwegian Mycological Database); one collection was made on dead needles of spruce. Typically the apothecia are turbinate and sessile, with

Sarcoscyphaceae Legal ex Eckblad 1968	Abundance
<i>Microstoma protracta</i> (Fr.) Kanouse	uncommon
<i>Pithya vulgaris</i> Fuckel	rare
<i>Pithya cupressina</i> Fuckel	rare
<i>Sarcoscypha austriaca</i> (O. Beck ex Sacc.) Boud.	common
<i>Sarcoscypha coccinea</i> (Jacq.) Sacc. <i>s.str.</i>	rare?
Sarcosomataceae Kobayasi	
<i>Plectania melastoma</i> (Sowerby) Fuckel	very rare
<i>Pseudoplectania nigrella</i> (Pers.: Fr.) P. Karst.	very common
<i>Pseudoplectania sphagnophila</i> (Pers.: Fr.) Kreisel	rare
<i>Sarcosoma globosum</i> (Schmidel. : Fr.) Rehm	extremely rare
<i>Urnula hiemalis</i> Nannf.	rare
Chorioactidaceae Pfister	
<i>Desmazierella acicola</i> Lib.	occasional

Table 1. The sarcoscyphaceous fungi in Norway.



Figure 1. *Pithya vulgaris*, Norway: Hvaler, Asmaløy, RK 90.01. Apothecia ca 5 mm, on needles of *Pinus sylvestris*. Photo: R. Kristiansen.

an orange yellow to pale orange hymenium in a whitish yellow pruinose receptacle. The asci are cylindrical with eight spherical/globose smooth ascospores, 11-14 μm wide, each with one large central guttule.

Several authors (e.g. Benkert 2008, Dissing et al. 2000, Nannfeldt 1949, Otani 1980, Spooner 2002) distinguish two species, viz., *P. cupressina* growing on *Cupressaceae* and *P. vulgaris* on dead needles of *Picea* and *Pinus*, which apparently can be recognized by the size of the apothecium and the ascospores, see table 2, based on Benkert (2008). Further, *P. vulgaris* does not produce an anamorph while *P. cupressina* does: *Molliardiomyces cupressina* Paden (Paden 1984).

On the other hand, I have found one collection on dead needles of *Pinus sylvestris* (Kristiansen 1990) which had rather small apothecia (6 mm). However, in spite of the small size Harrington and Potter (1997) retained the name *P. vulgaris* for it in their phylogenetic analyses (Genbank no.66008, voucher culture mh # 210).

I have two more collections of *Pithya*,

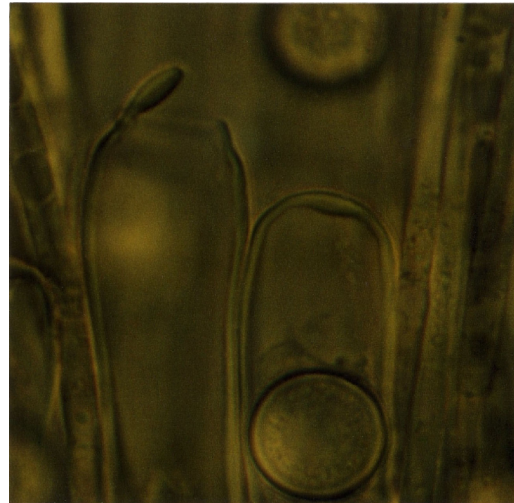


Figure 2. *Pithya vulgaris*, Norway: Hvaler, Asmaløy, RK 90.01. Distinct operculum at apex of ascus and part of ascus with ascospore. Field of view 50 μm . Photo: R. Kristiansen.

not yet recorded: *P. vulgaris* - Troms: Lervik/Lauvik, Brekkskum gård, on dead needles of introduced spruce (*Picea abies*), leg. R. Elven, 23.05.1976 (TROM).

P. cupressina - Aust-Agder: Kristiansand, Augland i Vågsbygd, on dead branches of *Juniperus virginianus* in a garden, leg. & det. Tore Torjesen, 10.04.1999, (Herb. RK). The material has small ascospores and apothecia, and matches this species.

Talgø and Stensvand (2003) found *P. cupressina* on *Juniperus x media* at Ås in Akershus county in autumn 2001.

***Sarcoscypha austriaca* and *S. coccinea* s. str.**

Baral (1984) distinguished between *Sarcoscypha austriaca* and *S. coccinea*, and this was accepted by Dissing et al. (2000). Microscopical differences relate to incrustat-

Species	Apothecium size	Ascospore size	Substrate
<i>Pithya cupressina</i>	2-5 mm	(9-)10-12 (-12.5) μm	<i>Cupressaceae</i>
<i>Pithya vulgaris</i>	10-15 mm	12-15 μm	<i>Pinaceae</i>

Table 2.

ion of the hairs and ascospore characteristics. Both species occur in Norway, but *S. austriaca* seems to be the more common.

According to Baral (1984), and more modified by Harrington (1990), it seems that *S. austriaca* have a more montan distribution, and most frequently appears on dead sticks from *Alnus*, *Acer*, and *Salix*, while *S. coccinea* is more restricted to deciduous forests with *Fagus*, *Ulmus*, *Quercus*, and Rosaceae, at less than 500 m altitude.

This beautiful bright red cup fungus is not rare in Norway, but not common in the county of Østfold.

There are only seven records of *S. austriaca* in the Norwegian Mycological Database from Østfold, and the first find was done by Gro Gulden in 1973 at Visterflo, Sarpsborg. I have additional records from Alby and Rambergbukta on Jeløya, Moss from 1985 (Herb. RK). In 1998 I succeeded to find a new locality, much further south in the county, in the Hvaler archipelago south of Fredrikstad. It was, however, only a single apothecium growing on a buried stick on a shadowy roadside, beneath *Rosa canina*, *Juniperus communis*, *Alnus incana*, and *Ulmus glabra*, close to the sea. A rich collection was collected the next year in the same spot. But, regrettably, in fall 1999 the spot was completely destroyed. A pristine environment had been ruined by the construction of a tap water and sewage system.

Østfold, Hvaler, Asmaløy, Håbu. 10.05.1998; ibid. 2.04.1999, (Herb. RK).

Another location was reported and pictured by Steinar Myhr at www.samfoto.no from a swampy *Alnus* forest (Arekilen), Kirkøy, Hvaler, Østfold, May 2000.

The latest finding was done by Øyvind Weholt in an ex military field in Gansrød, Fredrikstad 23.04.2010 (32VPL 1402, 6257).



Figure 3. *Desmazierella acicola* in situ on needles of *Pinus sylvestris*. Norway: Hvaler, Spjærøy, RK 95.40. Largest apothecium 4 mm. Photo:R. Kristiansen.

THE NEW FAMILY CHORIOACTIDACEAE Pfister

Desmazierella acicola

Figs. 3-4

This peculiar, rather inconspicuous small dark brown hairy vernal fungus (Fig. 3) was first found in Norway 1965 (Eckblad 1968) near Horten, Vestfold. Additional findings were later done at several locations in Østfold, especially in the Hvaler archipelago.

The genus has been placed in the family Sarcosomataceae by many authors, but Eckblad (*loc. cit.*) pointed out that "the genus is an aberrant element in any family". Melendez-Howell et al. (1998) found that the species has asci of the *Sarcoscypha* type, and hence should be placed in the family Sarcoscyphaceae. However, phylogenetic analyses by Landvik et al. (1997) and Harrington et al. (1999) indicated that *D. acicola* has an aberrant position, and that the genus is not closely related to either Sarcosomataceae or Sarcoscyphaceae. Furthermore, morphological characteristics supported its placement outside these two families. The anamorph *Verticicladium trifidum* Preuss is

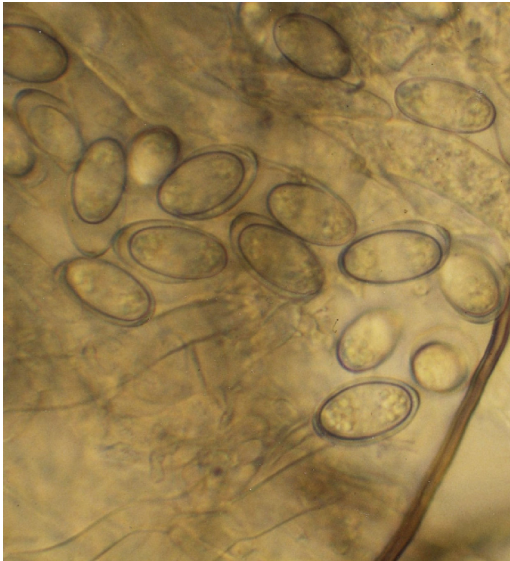


Figure 4. Mature ascospores of *Desmazierella acicola*, Norway: Hvaler, Spjærøy, RK 95.40. Note the partly loose perisporium. Spore size ca. 25 μm . Photo: R. Kristiansen.

described and illustrated by Ellis (1971), and this is more common than the teleomorph.

The phylogenetic studies by Harrington et al. (1999) showed that the genera *Chorioactis*, *Neournula*, *Wolfina* and *Desmazierella* formed a separate clade, although they are macroscopically very different from each other. *Desmazierella acicola* is a small (less than 5 mm diameter), sessile, plane, dark brown discomycete, while, on the opposite side, *Chorioactis geaster* is a large fungus up to 15 cm diameter somewhat similar to an earth star! The two more cupulate species, *Neournula pouchetti* and *Wolfina aurantiopsis*, are 4-5 cm in diameter. However, the microscopical features are similar for all these species, and based on strong support by combining results from sequencing of several genes, together with distinct morphological and cytological characters Pfister et al. (2008) erected a new family, Chorioactidaceae, for the *Chorioactis* clade. Ten of my collections from Norway

were included in their investigation. They were all collected from the end of March to the middle of May.

Korf and Zhuang (1991) focused on the large variation of the ascospore size in *D. acicola*, quoting "ascospore size reported in the literature varies greatly among investigators", which was verified and supported in more detail by Benkert (1991). Very probably most ascospores in the range 15-17 x 8-10 μm were not measured on fully mature ascospores, e.g. in Galan and Raitviir (1995) and Dennis (1978). My own measurements are in the range 20.7-24.9 x 10.4-12.4 μm ; all within the range of Benkert (1991).

Benkert (1991) was the first to observe the unusual behaviour of the ascospores of this species during their maturity, namely when fully mature their perisporium (the outer wall) becomes slippery and may fall off, and leave an empty, ovaloid cocoon, some even with polar appendages, (Fig. 4).

The distribution of *D. acicola* in Norway is, so far, restricted to findings along the east and west side of the Oslofjord (Fig. 5). My observations are that *D. acicola* develops approximately one year after the branches of pine are cut, and that the fungus appears, often gregariously, on hidden needles resting on the ground where they keep wet for several weeks.

One collection by Eckblad 1965 (O) from Akershus, Asker was growing on a needle of a dead spruce, while *D. acicola* normally grows on pine! At that time *D. piceicola*, which grow on needles of spruce, was not described (Huhtinen and Mäkinen 1984). I examined this collection in February 2010 in the hope that this might be the second record ever of *D. piceicola*, but it turned out to be only *D. acicola*, which, however, means that *D. acicola* also grows on needles of spruce.

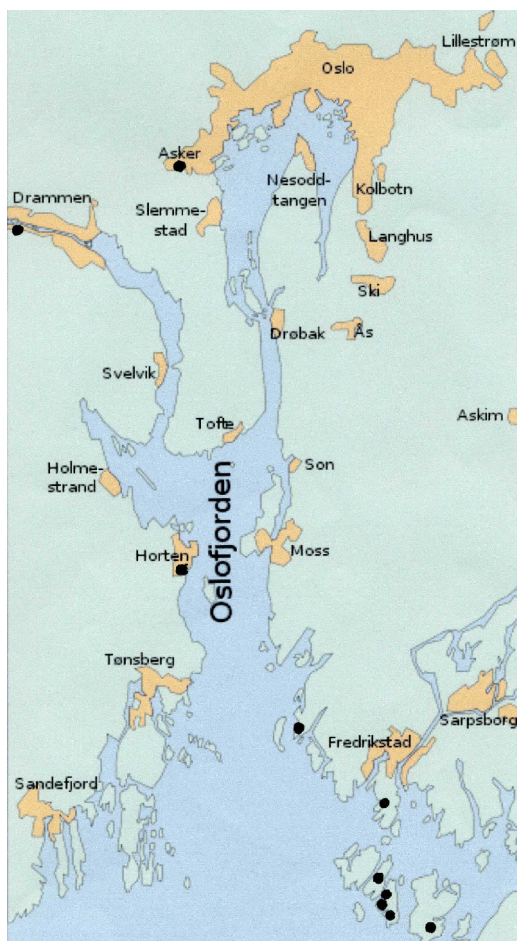


Figure 5. Distribution of *Desmazierella acicola* in Norway. Data from The Norwegian Mycological Database (NMD) and collections of the author.

COMMENTS

Can we expect to find other sarcoscyphaceous fungi in Norway? The chances are probably small, but there are a few possible candidates although many genera in these families are tropical or subtropical. The following species have been found in Europe, but some appear to have only a southern distribution here.

Sarcoscyphaceae

Pseudopithyella minuscula (Boud. & Torrend) Seaver, found on dead twigs of Cupressaceae, is morphologically similar to *Pithya cupressina*, but with very different microscopical characters.

Sarcosomataceae

Pseudoplectania melaena (Pers. : Fr.) Sacc. (syn. *P. vogesiaca* (Pers.) Seav.) is lignicole and grows among mosses on fallen dead trees of spruce. Macroscopically it is similar to *P. nigrella*, but has larger apothecia and different microscopical characters. Found in Sweden and other places in Europe.

Urnula craterium (Schwein. : Fr.) Fr.

This has a rather different habitus than the related *U. hiemale*, with a very distinct stipe. It is lignicolous and grows on buried dead sticks of preferably *Corylus avellana*. It is known from several locations in Sweden and Finland (Dissing et al. 2000, Mörner 1930, Nannfeldt 1949, Ryman 1979).

Donadinia helvelloides (Donadini, Berthet & Astier) Bellem. & Mel.-Howell (syn. *Urnula helvelloides* Donadini, Berthet & Astier). This is only known from France; it is lignicolous and grows on dead buried sticks of *Taxus baccata*.

Chorioactidaceae

Neournula pouchetii (Berthet & Rioussset) Paden

Grows on leaf litter of *Thuja* sp., *Tsuga* sp., *Pinus* sp., *Abies* sp. Occurs in France, Italy, Spain and western North America.

Desmazierella piceicola Huhtinen & Mäkinen, grows on dead needles of spruce (*Picea abies*). This has been found only once in Finland (Huhtinen and Mäkinen 1984), in autumn, but may well be found in the spring. Norway should indeed be a potential place considering our large spruce forests. It is

easily distinguished microscopically from *D. acicola* by the large fusoid ascospores with longitudinal, low ridges.

Karstenellaceae Harmaja

This family does not belong to the sarcoscyphaceous fungi, but is included here because its only known species could well be found in Norway in stands of *Corylus avellana*.

Karstenella vernalis Harmaja was first found in Finland in 1967 in the hemiboreal zone. Its taxonomic position was questionable for a long time, whether it belonged to the Pezizales or not, but Hansen et al. (2008) finally proved by phylogenetic analyses that it is an operculate discomycete of Pezizales with its own family and monotypic genus, based on a second finding of the species in New Mexico, USA!

It is a rather strange, inconspicuous fungus that reminds of a resupinate fungus (see photo in Hansen et al. 2008). It looks like a very thin membranous layer of brownish red to pinkish salmon colour, up to ca 1 cm, on rotting and decaying twigs of *Corylus avellana* and other kinds of litter among *Populus tremula*, *Tilia cordata* and the herb *Aegopodium podagraria*, on calcareous soil in Finland (Harmaja 1969). It was found in May-June (late spring). In New Mexico it was collected in late summer at ca 2300 m elevation, on damp soil under snowberry and herbaceous plants; not surprising since the blooming is much later at that altitude, although further south.

The disjunct Finnish-American distribution is very surprising, but the species is likely overlooked, and may have a much wider distribution (Hansen et al. 2008). Who will be the first to find it in Norway? Watch out for it!

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REFERENCES

- Baral H, 1984. Taxonomische und Ökologische studien über *Sarcoscypha cocci-nea* agg. Zinnoberrote Kelchbecherlinge (Kurzfassung). Zeitschrift für Mykologie 50, 117-145.
- Benkert D, 1991. Bemerkenswerte Ascomyceten der DDR.12. Sarcoscyphaceae und Sarcosomataceae (Pezizales). Gleditschia 19, 173-201.
- Benkert D, 2008. *Pithya cupressina* und *P. vulgaris* (Pezizales)- identisch oder nicht? Mycologia Bavarica 10, 55-62.
- Dennis, RWG, 1978. British ascomycetes. J.Cramer, Vaduz. 586 pp.
- Dissing H Eckblad F-E, Lange M, 2000. Pezizales Bessey, in: Hansen L, Knudsen H, (Eds.), Nordic Macromycetes, volume 1, Nordsvamp, Copenhagen 2000.
- Eckblad F-E, 1957. Norges sarcoscyphaceer. Blyttia 15, 2-12.
- Eckblad F-E, 1968. The genera of the operculate discomycetes: a re-evaluation of their taxonomy, phylogeny and nomenclature. Norwegian journal of botany 15, 1-191.
- Ellis ME, 1971. Dematiaceous Hyphomycetes. CABI.
- Galán R, Raitviir A, 1995. *Desmazierella acicola* Libert in Spain. Rivista Micologia 38, 39-44.
- Hansen K, Weber NS, Landvik S, 2008. Phylogenetic relationship and distribution of *Karstenella* (Pezizomycetes). Karstenia 48, 13-19.
- Harmaja H, 1969. *Karstenella vernalis* Harmaja, a new genus and species of discomycetes from Finland. Karstenia 9, 20-22.

- Harrington FA, 1990. *Sarcoscypha* in North America (Pezizales, Sarcoscyphaceae). *Mycotaxon* 38, 417-458.
- Harrington FA, Potter D, 1997. Phylogenetic relationships within *Sarcoscypha* based upon nucleotide sequences of the internal transcribed spacer of nuclear ribosomal DNA. *Mycologia* 89, 258-267.
- Harrington FA Pfister DH Potter D, Donoghue MJ, 1999. Phylogenetic studies within the Pezizales I. 18S rRNA sequence data and classification. *Mycologia* 91, 41-50.
- Huhtinen S, Mäkinen Y, 1984. Finnish records of discomycetes: a new species in the monotypic genus *Desmazierella* (Pezizales). *Mycotaxon* 20, 551-557.
- Korf RP, Zhuang W-y, 1991. A preliminary discomycete flora of Macaronesia: part 11. Sarcoscyphineae. *Mycotaxon* 40, 1-11.
- Kristiansen R, 1983. Vårbegersopper – en etterlysning. *Agarica* 4 (7), 37-47
- Kristiansen R, 1984. Vårbegersopper – nok en gang. *Agarica* 5 (9), 39-41.
- Kristiansen R, 1990. Oransje greinbeger (*Pithya vulgaris*) og myrvårbeger (*Pseudoplectania sphagnophila*) i Østfold. *Agarica* 10/11 (19/20), 49-58.
- Landvik S, Egger KN, Schumacher T, 1997. Towards a subordinal classification of the Pezizales (Ascomycota): phylogenetic analyses of SSU rDNA sequences. *Nordic J Bot.* 17, 403-418.
- Meléndez-Howell LM Couté A Mascarell G, Bellemere, 1998. Ultrastructure des ascques et des ascospores de *Desmazierella acicola* (Sarcoscyphaceae, Pezizales, Ascomycetes). *Intéret systématique et biologique*, *Mycotaxon* 68, 53-74.
- Mörner C Th, 1930. Discomyceten *Urnula craterium* (Schw.) Fr. – en för Sverige ny storsvamp. *Svensk botanisk tidskrift* 24, 301-310.
- Nannfeldt JA, 1949. Contributions to the mycoflora of Sweden. *Svensk botanisk tidskrift* 43, 468-484.
- Nilsen T Spolén, 2009. Svartgubbe *Sarcosoma globosum* gjenfunnet ved Prestmoen på Ringerike. *Sopp og nyttevekster* 5 (3), 40-41.
- Norwegian Mycological Database, NMD, 2010 Natural History Museum, University of Oslo, <http://www.nhm.uio.no/botanisk/sopp/>. Cited Mars 2010.
- Otani Y, 1980. Sarcoscyphineae of Japan. *Transactions of the mycological society of Japan* 21, 149-179 (in Japanese).
- Paden JW, 1984. A new Hyphomycetes with teleomorphs in the Sarcoscyphaceae (Pezizales, Sarcoscyphineae). *Canadian journal of botany* 62, 211-218.
- Pfister DH, Slater C, Hansen K, 2008. Chorioactidaceae: a new family in the Pezizales (Ascomycota) with four genera. *Mycological Research* 112, 513-527
- Ryman G, 1979. Svensk vår- och försommarsvampar inom Pezizales. *Svensk botanisk tidskrift* 72, 327-339.
- Schumacher T, 1979. Operculate discomycetes (Pezizales) on river banks in Norway. *Norwegian journal of botany* 25, 207-220.
- Spooner B, 2002. The larger cup fungi in Britain. Part 4. Sarcoscyphaceae and Sarcosomataceae. *Field mycology* 3, 9-14.
- Talgø V, Stensvand A, 2003. *Pithya cupressina* (oransje greinbeger). *Grønn kunnskap* 7 (nr. 101T), 1-2. (electronic at www.planteforsk.no).