

# ***Caliciopsis calicioides*, a corticolous ascomycete on *Populus tremula* new to Norway**

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## **KEYWORDS**

*Caliciopsis calicioides*, Eurotiomycetes, Coryneliales, Coryneliaceae, *Populus tremula*, boreal forest

## **NØKKELOORD**

*Caliciopsis calicioides*, Eurotiomycetes, Coryneliales, Coryneliaceae, osp, boreal skog

## **SAMMENDRAG**

*Caliciopsis calicioides* (Eurotiomycetes, Coryneliales, Coryneliaceae) er en særegen og lett bestemmelig sekksporesopp som vokser i barksprekker på gamle, levende ospetrær. Arten er tidligere ikke rapportert fra Norge. Den ble funnet av oss i Molde, Møre og Romsdal i 2012, og i 2013-2014 fant vi den på noen flere lokaliteter i Molde, Nesset og Tingvoll. Vi har også fått opplysninger om et eldre, upublisert funn fra Hamarøy, Nordland i 1994. I resten av Europa er arten så langt bare kjent fra Sverige og Finland. Den er også kjent fra Nord-Amerika. Den synes ofte å være assosiert med sjeldne eller rødlistede lav og en interessant funga i eldre skog.

## **ABSTRACT**

*Caliciopsis calicioides* (Eurotiomycetes, Coryneliales, Coryneliaceae) is a peculiar and easily identified ascomycete, growing in bark fissures of old, living *Populus tremula*. The species has not previously been reported from Norway. It was discovered by us in Molde, Møre og Romsdal in 2012, and during 2013 and 2014 we found additional localities in Molde, Nesset and Tingvoll municipalities. An older, unpublished record from Hamarøy, Nordland in 1994 also came to our knowledge. In the rest of Europe, it is so far only known from Sweden and Finland. It is also known from North America. It often seems to co-occur with rare or red-listed lichens and an interesting funga of bark-living fungi in natural like forests.

## **INTRODUCTION**

The genus *Caliciopsis* (Eurotiomycetes, Coryneliales, Coryneliaceae) contains species causing diseases in trees, e.g. *C. pinea* Peck (Benny et al. 1985) and species belonging to a relatively small but conspicuous guild of fungi growing on the bark of seemingly healthy living trees, like *C. calicioides* (Ellis & Everh.) Fitzp. growing on *Populus* (Fitzpatrick 1942). The ascocarps of *C. calicioides* may superficially resemble those of the lichen genera *Chaenotheca* or *Calicium*, hence the name *Caliciopsis*, but it is not lichenized. The structure of the ascocarps is also entirely different. The genus *Caliciopsis* is characterized by long stipitate, deliquescent asci and non-septate spores. The often long and

thin ascocarps also have an elevated ascigerous cavity which is seen as a swollen part, placed either near the top, in the middle part or near the base (Fitzpatrick 1942). During field investigations in Molde municipality, Møre og Romsdal in 2012 one of us (B. Nordén) found *C. calicioides*, and this made us search further for this species at other sites. This resulted in findings at some additional localities in 2013 and 2014. Later, an older occurrence of the species from Nordland in 1994 came to our knowledge. We here report the species as new to Norway and shortly present its ecology based on field observations.

#### MATERIALS AND METHODS

Collections of *C. calicioides* were found on bark of *Populus tremula* during field investigations in Møre og Romsdal in 2012, 2013 and 2014. Positions are taken in UTM (WGS84, zone 32) with handheld GPS, with an accuracy of +/- 10 m. Microscopic slides were prepared from dried material and mounted in water for measurements and photographs. The collections were studied using Wild dissecting microscope and Motic light microscope. Macro photographs were taken with a Canon EOS 650D digital camera with Canon MP-E 65 mm 1-5x macro lens. Micro photographs were made by a Motic microscope camera. Collector abbreviations

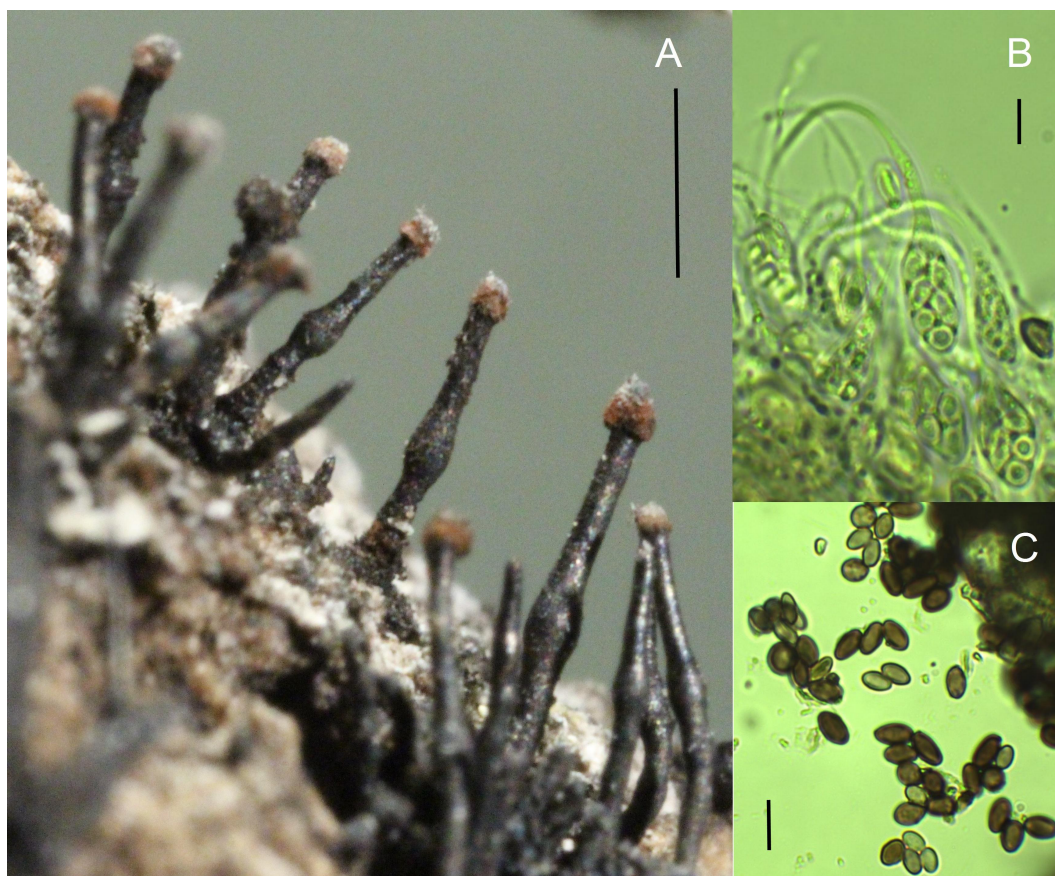


Figure 1. *Caliciopsis calicioides*. A. Ascocarps on bark of *Populus tremula* (Molde: Rislia south). Note the swollen region in the middle of the ascocarp where the centrum cavity with asci is located. Bar=1mm. B. Asci. Bar=10 µm. C. Spores. Bar=10 µm. Photos: J.B. Jordal, 8<sup>th</sup> March 2014.

include BN (Björn Nordén), GGa (Geir Gaarder) and JBJ (John Bjarne Jordal). Collections will be deposited in O.

#### DESCRIPTION

The description is based on our material from Møre og Romsdal.

The long and thin black ascocarps occur on the bark of *Populus tremula* (Fig. 1A). The ascocarps are straight to slightly curved, mostly 1.0-2.5 (-3) mm high and 0.1-0.2 mm thick. They are clustered a few or several together arising from minute black stromata. Mature ascocarps have a more or less central bulge (0.2-0.4 mm thick) containing the asci. The asci are clavate or balloon-shaped with a very long tapering stipe, the spore-bearing part is 15-20 x 10-12 µm (Fig. 1B). The ascospores are ellipsoid, gradually changing from almost hyaline (immature) to brown (mature), 6.0-8.5 x 3.5-5.5 µm (Fig. 1C). Released spores move inside the beak of the ascocarp from the hymenium in the bulge to the tip. The tip is bulbous, consisting of hyphae mixed with the mature brown ascospores, which are often staining the tip more or less brown, forming a mazaedium-like structure (Fig. 1A).

#### Material studied

All finds are on bark of *Populus tremula* in old deciduous forests together with *Betula pubescens* and often mixed with *Pinus sylvestris* and *Sorbus aucuparia*.

**Møre og Romsdal:** Molde: Brensleffjellet, south-facing hillside; position E 431716 N 6955892, 235 m asl, 16.05.2012, leg. BN & JBJ and 12.01.2013, leg. JBJ; on 16 other trees E 431530-431586 N 6956022-6956091, 270-300 m asl, 04.01.2014, leg. GGa & JBJ (Fig. 3). - south of Bakksætra, northwest-facing hillside, position E 425673 N 6957465, 280 m asl, 20.10.2013, leg. GGa & Steinar Vatne. - Rislia south, west-facing hillside on 5 trees, position E 425190-425226, N 6955682-

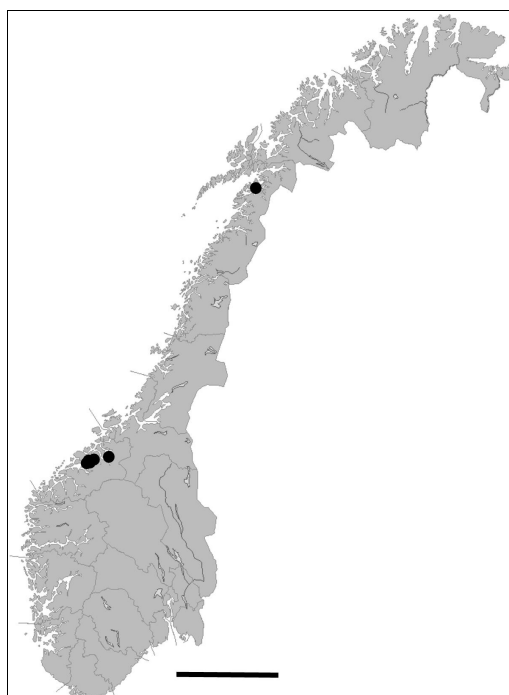


Figure 2. Distribution of *Caliciopsis calicioides* in Norway. Bar=200 km.

6955735, 230-250 m asl, 05.01.2014, leg. GGa & JBJ. - Rislia north, west-facing hillside, on 6 trees, position E 425115-425142, N 6956257-6956330, 240-245 m asl, 05.01.2014, leg. GGa & JBJ. Nesset: near Barsteintjørna, east-facing hillside, position E 439957 N 6961379, 270 m asl (within the nature reserve); southeast-facing hillside on 3 trees E 440278 N 6962120, 280 m asl (outside the nature reserve); 09.03.2013, leg. GGa. Tingvoll: Durmålhaugen, north-facing hillside, on 30 trees, diam. 30-80 cm, deepest bark fissures of each tree 20-60 mm, position E 468992-469232, N 6971602-6971738, 125-220 m asl, 22.03.2014, leg. GGa & JBJ.

Additional data (no specimen collected):

**Nordland:** Hamarøy: Kvannskogen (nature reserve), old deciduous forest with big *Populus tremula*, UTM (WGS84, zone 33) E 0540600 N 7547300 (+/-500 m), 15-20 m asl, 07.03.1994, leg. Mats Karström (Jokkmokk,





Figure 3. Big aspen *Populus tremula* with *Caliciopsis calicioides* in boreal forest. Molde: Brensfjället, 4<sup>th</sup> January 2014. Photo: J.B. Jordal.

Sweden; personal information in email 07.03. 2014, the finder has drawings made from fresh material). M. Karström has also found the species in coastal areas of Norrbotten, Sweden; this material was controlled by Ove Eriksson, University of Umeå.

The distribution is shown in Fig. 2.

#### HABITAT AND DISTRIBUTION IN NORWAY

*Caliciopsis calicioides* was growing in bark fissures of old *Populus tremula* trees in old deciduous or mixed forests with *Betula pubescens*, *Sorbus aucuparia*, *Salix caprea* and sometimes *Pinus sylvestris*. The diameter and deepest bark fissure was measured on 57 of the 63 host trees in Møre og Romsdal. The diameter was 30-90 cm, and the deepest bark

fissure of each tree was 20-60 mm. The diameter of the largest tree at each locality was 60-90 cm. One tree was broken and had died recently, but still had attached bark. The species seemed to prefer a southern to western/northwestern exposition on the trees, but at the locality Durmålhaugen it was also found exposed to the north and east. It was found up to 3.5 m above the ground. *Caliciopsis calicioides* was mainly growing in fissures where few lichens and mosses were present, but on one tree with a very large population we also found it on exposed bark between the fissures. Two other corticolous fungi on the *Populus* trees were *Lasiobelonium corticale* (Pers.) Raitv. and *Amphisphaerella dispersella* (Nyl.) O.E. Erikss. Two of the six localities in Møre og Romsdal are also the southernmost

known localities in Norway of *Staurolemma omphalarioides* (Anzi) P.M. Jørg. & Henssen, a rare lichen species occurring on old *Populus tremula* in coastal areas of Middle Norway (Holien 2011). *Staurolemma omphalarioides* and *C. calicioides* were occurring together on several trees in the locality Brensløfjellet, Molde. The localities in Møre og Romsdal are situated 125–300 m above sea level, mainly in the middle boreal vegetation zone (MB) but with the lowest parts touching the southern boreal vegetation zone (SB). They belong in the markedly oceanic vegetation section (O2). The locality in Hamarøy, Nordland is situated in the middle boreal vegetation zone (MB) and the weakly oceanic vegetation zone (O1) (Moen 1999).

## DISCUSSION

### Taxonomic notes

Using Fitzpatrick (1942) or Benny et al. (1985) our material easily keys out as *C. calicioides*; the main characteristics are ellipsoidal ascospores and ascigerous locule median to submedian. In *C. subcorticalis* (Cooke & Ellis) Fitzp. and *C. tiliae* Arnold the ascigerous locule is subterminal above a long stalk. Further, *C. subcorticalis* has smaller, subglobose spores and grows on *Quercus*, while *C. tiliae* is only known on *Tilia*. *Caliciopsis toonae* Rikkinen described from China has a median ascigerous locule, but smaller, subglobose spores (Rikkinen 2000). The measures of ascospores and other characteristics in our material, as well as the habitat, is in good compliance with Fitzpatrick (1942) and Benny et al. (1985).

### Nomenclature and systematics

Mycobank and Index Fungorum cite *Exophiala calicioides* as the current name of this species with reference to Okada et al. (2000). Okada et al. (2000) use *Sporocybe calicioides* Fr. as basionym. The description by Fries (1832) clearly shows that this is another fungus. Fitzpatrick (1920) questioned *Sporocybe*

*calicioides* Fr. as basionym for *C. calicioides*, and based his new combination on *Hypsotheca calicioides* Ellis & Everh. As there is no connection between *Exophiala calicioides* (Fr.) G. Okada & Seifert and *Caliciopsis calicioides* (Ellis & Everh.) Fitzp. the correct name of our species is *Caliciopsis calicioides*. *Exophiala* has been used for the asexual stage of fungi belonging to Herpotrichiellaceae (Chaetothyriales) and is not closely related to *Caliciopsis* in Coryneliaceae (Coryneliales).

### Distribution

In Sweden, 11 localities of *Caliciopsis calicioides* are presented by Artportalen (2014), mainly along the coast of the Baltic sea in the central and northern parts of the country. Delin (2005) and M. Karström (pers. comm. 07.03.2014) give additional information indicating that there may be 20–30 known localities of this species in Sweden. In Finland there are two localities known in the western parts of the country (S. Huhtinen pers. comm. 27.06. and 11.09.2014). The distribution in Norway seems to have its optimum in the middle boreal zone, which coincides well with the data from Sweden and Finland. It also seems to avoid continental areas. Searches on the Internet, e.g. in different national online databases, revealed no further information on this species from other European countries. In North America it is known from northern United States and southern Canada (Fitzpatrick 1942, Benny et al. 1985).

### Ecology

All finds of *Caliciopsis calicioides* in Norway have been made in bark fissures of large *P. tremula* in old-growth boreal forests. In Sweden and Finland it was also found on old and big aspens, and one of the Finnish localities has the largest and oldest aspens in the country (Artportalen 2014, Delin 2005, M. Karström and S. Huhtinen pers. comm.). In North America it is found on various species of

*Populus* (Fitzpatrick 1942, Benny et al. 1985). In Norway, big aspens especially occur outside the distribution area of spruce *Picea abies*, and can have old and stable populations in steep areas in the southern, western and middle parts of Norway, and also some places in the northern parts of the country (Bendiksen et al. 2008). *Caliciopsis calicioides* should be looked for in these regions. However, in 2013-2014 we investigated hundreds of old aspens in many different localities in Møre og Romsdal without finding the species, and we consider it to be rare. Old aspen trees are important substrates for many red-listed species in old boreal forests and needs to be considered in sustainable management. We think that *C. calicioides* should be considered in future revisions of the red lists of Norway, Sweden and Finland.

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