

# *Calicium episcalaris* (Caliciaceae), a new lichen species from Sweden

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A new species of lichen, *Calicium episcalaris* Tibell & Knutsson, is described from Sweden. It is one of few *Calicium* species being parasitic or ‘Jugendparasit’, occurring on *Hypocenomyce scalaris* (Ach.) M.Choisy growing on an old wooden building in South Sweden.

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## Introduction

Calicioid lichens and fungi have been under detailed study for many decades, and have frequently been treated in monographs and province lichen floras. Especially well studied are the Nordic countries, and today 13 species of *Calicium* are known from that area.

Calicioid lichens are attractive, and are often recorded and collected during field-trips and surveys. Some species have highly specific ecological requirements, and are utilized as ‘key species’ or ‘indicator species’ in forests and other habitats with high conservation values (Nitare 2000). They have been evaluated for red-lists in many countries, resulting in yet more attention. Thirty-two species are red-listed in Sweden, 40 in Finland, and 26 in Norway.

While searching for red-listed epi-xylic lichens in Dalsland in the west part of Sweden, the second author found a *Calicium* species, which was documented with photos and a small collection. Although it was similar to some

other *Calicium* species, like *C. montanum* Tibell (Tibell 1999a), details in gross morphology and microscopic features fitted neither with that or any species in the *Nordic Lichen Flora vol. 1* (Tibell 1999b), nor with any other previously described *Calicium*. The ecology was puzzling, it being parasitic on *Hypocenomyce scalaris*. Here this species is formally described and illustrated together with details of its ecology.

This paper is dedicated to Inga Hedberg for her long-standing and never-failing support and encouragement for the publication of lichenological contributions in *Symbolae Botanicae Upsalienses*.

## *Calicium episcalaris* Tibell & Knutsson *sp. nov.* (Fig. 1.)

Type: Sweden. Dalsland. Hålbol parish, Gäserud, on northfacing wall of wooden old barn, 27. XI 2013. Knutsson s.n. (UPS). GenBank KX228552. Mycobank MB817070.

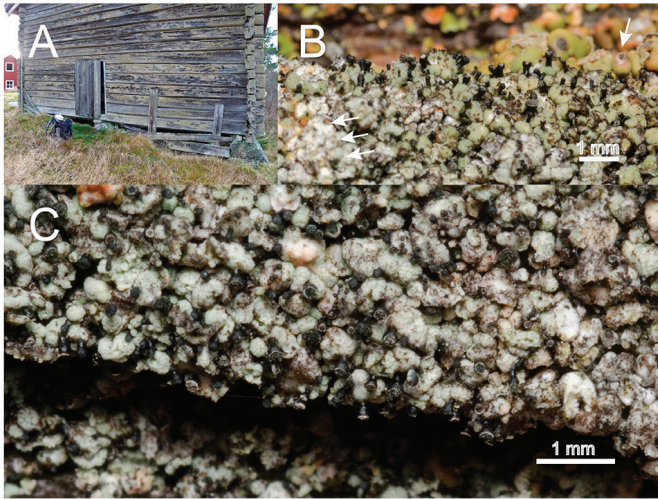


Fig. 1. Habitat and morphology of *Calicium episcalaris*.

A. Habitat: a wooden 17th century building.

B. *Calicium episcalaris* colonizing *Hypocenomyce scalaris*. Thallus of the host seemingly not affected by invading/parasitizing *Calicium episcalaris* (single arrow). Thallus of host showing degradation/transformation (triple arrows).

C. Luxuriant *Calicium episcalaris*.

ETYMOLOGY. Named after its occurrence on *Hypocenomyce scalaris*.

DESCRIPTION. black, without pruina, 0.26–0.37 mm high; capitulum lenticular to broadly obconical, 0.22–0.26 mm in diam., the excipulum edge often thinning out and pale, thus mimicking a narrow pruina; stalk 0.10–0.15 mm wide. **Asci** cylindrical, 42–46 x 5.5–6.5  $\mu\text{m}$ , with uniseriately arranged spores. **Spores** broadly ellipsoid, 10–14 x 6–8  $\mu\text{m}$ , with a minutely verrucose surface and a few irregular cracks.

Parasitic or ‘Jugendparasit’ on *Hypocenomyce scalaris*, which when parasitized shows a continuous transformation from unaffected and fertile parts to parts strongly modified by the parasite. The affected parts gradually turn pale grey in areas developing pycnidia, and finally change to medium grey and become slightly bullate when the parasite starts producing ascomata.

REMARKS. *Calicium episcalaris* is unusual in *Calicium* by being a parasite or ‘Jugendparasit’ (Poelt & Doppelbauer 1956). It has rather short-stalked ascomata and for this reason recalls *C. montanum*, but it is parasitic and does not have a pruina. The spores of *C. episcalaris* are also slightly larger and have a verrucose ornamentation. The pycnidia we have observed cannot unequivocally be identified as belonging to *C. episcalaris*. The anatomy and conidiogenesis of the pycnidia are, however, similar to those of *Calicium* species (Tibell 1997). A high production of pycnidia associated with an initial attack of parasitic *Microcalicium disseminatum* (Ach.) Vain. has previously been noted (Tibell 1978).

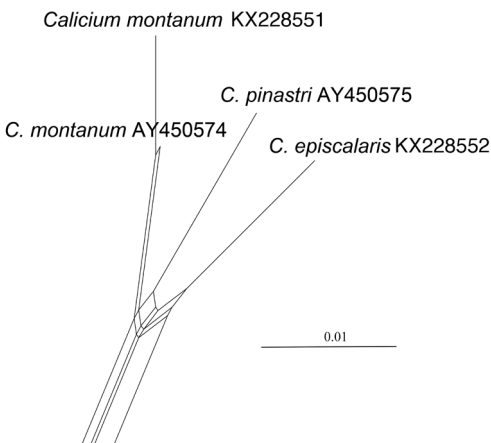


Fig. 2. Detail of a SplitsGraph analysis of ITS sequences of 17 European species of *Calicium*, depicting *C. episcalaris* and the closest species in the network representation

DISTRIBUTION AND HABITAT. So far, the species is only known from a single locality in a cultural landscape of central Dalsland, W Sweden (Fig. 1). The buildings, which date back at least to the 17<sup>th</sup> century, are mainly built from old pine wood (*Pinus sylvestris*); and they have a very rich epixylic lichen myca, including species such as *Calicium viride* Pers., *Carbonicola anthracophila* (Nyl.) Bendiksby & Tindal, *Chaenotheca ferruginea* (Turn. ex Sm.) Migula, *Cyphelium inquinans* (Sm.) Trevis., *Pycnora praestabilis* (Nyl.) Hafellner, *Lecanora* spp., and *Strangospora moriformis* (Ach.) Stein, in addition to further calicioid species. The buildings are strongly exposed and situated in a pastoral, semi-open cultural landscape, and have probably never been treated or painted, a fact that is very important for maintaining rich epixylic lichen diversity.

Similar habitats, offering substantial quantities of dead wood in semi-open situations, were most likely once widely distributed in old-growth boreal forest ecosystems. From there, the species could migrate or travel with the substrate to settlements where wood was used for fences and buildings. *Calicium episcalaris* is probably adapted to hardwood in semi-open situations, and the present occurrence thus represents a vanishing habitat. The type locality might well constitute a relict site of a once much wider distribution. Interestingly, *C. episcalaris* parasitizes the very common lichen *Hypocenomyce scalaris*. However, a rare parasite vs. common host scenario is not infrequent in natural systems (Kennedy 2012); e.g., among fungi *Volvariella surrecta* (Knapp) Singer is a rare parasite mostly on the common *Clitocybe nebularis* (Batsch) P.Kumm. Whether the parasitism on *H. scalaris* is obligatory can only be clarified by further findings. Whether it is a ‘Jugendparasit’ may be elucidated by following a population over an extended timespan.

In a SplitsGraph (Bandelt & Dress 1992; Huson & Bryant 2006) analysis of 24 aligned ITS sequences (ITS1/5.8S/ITS2) representing 17 species of European *Calicium* species (Fig. 2),

Table 1. Sequences of 17 European species of *Calicium* used in the SplitsGraph analysis.

GenBank number of new sequences in bold. For voucher information, refer to GenBank.

Taxon	Country	GenBank
<i>C. abietinum</i>	Slovakia	DQ789077
<i>C. adaequatum</i>	Sweden	AY450564
<i>C. adaequatum</i>	Sweden	AY450565
<i>C. adpersum</i>	Sweden	DQ789079
<i>C. adpersum</i>	Sweden	DQ789078
<i>C. chlorosporum</i>	India	AY450566
<i>C. denigratum</i>	Sweden	AY450568
<i>C. denigratum</i>	Sweden	AY450567
<i>C. episcalaris</i>	holotype	KX228552
<i>C. glaucellum</i>	Sweden	AY450570
<i>C. glaucellum</i>	Sweden	DQ789082
<i>C. glaucellum</i>	UK	FR799141
<i>C. glaucellum</i>	Sweden	AY450569
<i>C. hyperelloides</i>	NZ	AY450572
<i>C. lenticulare</i>	Canada	AY450573
<i>C. montanum</i>	Portugal	AY450574
<i>C. montanum</i>	Slovakia*	KX228551
<i>C. pinastri</i>	Czech R.	AY450575
<i>C. quercinum</i>	Sweden	AY450576
<i>C. salicinum</i>	Sweden	AY450578
<i>C. trabinellum</i>	Sweden	AY450579
<i>C. victorianum</i>	England	EU010389
<i>C. viride</i>	Sweden	AY450582
<i>C. viride</i>	Sweden	AY450581

\* Palice 5301 (Hb. Palice)

*C. episcalaris* is close to *C. montanum* Tibell and *pinastri* Tibell. In pairwise alignments it differs from *C. pinastri* (AY450575) in 18 SNPs and one indel; from one haplotype of *C. montana* (AY450574) in 17 SNPs and two indels and from another haplotype of *C. montana* (GenBank KX228551) in 21 SNPs and six indels.

For collections included in the alignment of European *Calicium* species, see Table 1.

## Acknowledgements.

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