



SWEDISH TAXONOMY INITIATIVE PROJECT REPORT

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New *Cortinarius* subgenus *Telamonia* species to Sweden

Introduction and background

Cortinarius is the most species rich genus of the Agaricales (gilled mushrooms), with a worldwide distribution. Based on our previous studies we have recognized about 200 species of *Cortinarius* subgenus *Telamonia* from the Nordic countries. About 100 of them, however, are without a proper name and thus not included into the national lists.

Because the number of species is high and the genus is poorly known, the interpretation and use of the names has been very variable and ambiguous. Thus any material from museums or genetic databases cannot be used without clarifying their identity first. Of the herbarium material we have examined, only about 10% has been determined correctly.

The number of *Cortinarius* sequences in the public databases (GenBank; UNITE) is quite low, and few of them have been linked to voucher specimens. Moreover, type specimens have rarely been sequenced, so some 70% of the sequences might be incorrectly identified.

The main aim of this study was to improve the knowledge of *Cortinarius* subgenus *Telamonia* species in Sweden and provide information for the forthcoming *Cortinarius* volume of Nationalnyckeln. Our objectives were to:

find a proper name for as many of the already recognized but nameless *Telamonia* species as possible by producing sequences from ca. 50 type specimens or describing them as new.

update ArtDatabanken's *Cortinarius* information, e.g. removing synonyms and ambiguous names and provide current knowledge of the ecology and distribution of all the known *Cortinarius* subgenus *Telamonia* species in Sweden.

stabilize the nomenclature by neotypifying commonly used Friesian names in cooperation with the authors of *Cortinarius* Flora Photographica.

Material and Methods

170 collections were studied, of which 130 were types and 40 were other collections. For molecular taxonomic studies, ITS regions were sequenced. Phylogenetic analyses were used for studying the taxonomy. Results were compared and combined with results from morphological studies. Boundaries between closely related species are easier to define using multiple samples. For most of the species, several specimens had already been sequenced before the onset of this project to study the intra- and interspecific variation.

Results

Unfortunately, several of the types were in such poor condition that only 110 of them were successfully sequenced. In addition, the sequencing of the types required a lot of resources. As many of the types are old and in poor condition, often several attempts were needed to obtain good sequences, and often the DNA region used for taxonomic studies had to be sequenced in several smaller fragments.

Among the successfully sequenced type specimens, 11 could be linked to species not previously recorded in Sweden, 73 names (66%) were synonyms of already known Nordic or Central European species, and 22 represented species not found in Sweden, although three of them were known to occur in Finland or Norway and will therefore probably soon be reported from Sweden too.

In addition, two new species were described, and two varieties were suggested to be combined into one species. For these 13 new Swedish species, the following information was provided: spore drawings and photographs of as many species as possible (deposited in Morphbank), a voucher specimen of every species (deposited in Naturhistoriska riksmuseet [S]), and an ITS-sequence of every species (deposited in public databases). By the year 2015, an additional 12 new species were described based on the data.

In addition, the *Telamonia* information in Dyntaxa was updated and current knowledge of the ecology and distribution of the species provided.

Discussion

110 sequences from type specimens obtained in this study will enable the stabilization of the nomenclature. They will also make possible the identification of species with DNA-sequences in a quite unambiguous way. All the sequences will be deposited in the GenBank and used to set reference sequences for *Cortinarius* in RefSeq (<http://www.ncbi.nlm.nih.gov/refseq/>) and UNITE (<https://unite.ut.ee/>).

Many of the Friesian names have not yet been neotypified, but nowadays a fairly good consensus exists that we should use most of the Friesian names as they have been interpreted in *Cortinarius Flora Photographica*.

We are preparing a large *Telamonia* revision, which will include most of the sequence data produced by us to date. Related to that paper, in which sequences from *Cortinarius Flora Photographica* plate collections are published, we will try to typify as many Friesian names as possible.

We were surprised how many Nordic species still lack names after studying the type specimens of already described species. It is fairly time consuming to describe a new species, and it would have been much easier and quicker to use an existing name. Currently, over 60 Nordic *Telamonia* species still lack a formal name.

The study will continue with funding from other sources.



Cortinarius bovinaster is one of the species described as new in the Swedish Taxonomy Initiative project.

PUBLICATIONS

Liimatainen 2015: Index Fungorum no. 198.

<http://www.indexfungorum.org/Publications/Index%20Fungorum%20no.198.pdf>

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Niskanen, T., Liimatainen, K., Mahiques, R., Ballarà, J. & Kytövuori, I. 2011. *Cortinarius badiolaevis*, a new conifer associated, darkening species in the subgenus *Telamonia* (Basidiomycota, Agaricales) *Mycological Progress* 10:101–105.

Niskanen, T., Kytövuori, I., Liimatainen, K., Lindström, H. 2013. *Cortinarius* section *Bovini* (Agaricales, Basidiomycota) in northern Europe, conifer associated species. *Mycologia* 105: 977–993. doi: 10.3852/12-320.

Niskanen, T & Kytövuori, I. 2012. Subgen. *Telamonia* Keys A-B, D-N, and Q-R. In: Knudsen H. & Vesterholt, J (eds) 2nd ed: *Funga Nordica*. Agaricoid, Boletoid and Cyphelloid genera. Nordsvamp. pp. 832–837, 840–873, and 882–885.

Liimatainen et al. 2016. Towards a more reliable barcoding database of *Cortinarius*, the largest genus of Agaricales. (in prep.)

Bellanger, Liimatainen et al. 2016. *Cortinarius* sections *Bicolores* and *Saturnini* (Basidiomycota, Agaricales), a morphogenetic overview of European and North American species. In prep.

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