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The genus *Hypomyces* (Hypocreales, Ascomycota) and allied fungicolous fungi in Estonia

I. Species growing on aphyllophoralean basidiomycetes

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Abstract: 24 species of *Hypomyces* and closely related fungicolous fungi that grow on basidiomata of aphyllophores in Estonia are reported. Seven out of the fourteen holomorphic *Hypomyces* species have been found only as anamorphs. In addition to the four considered asexual species, a new *Cladobotryum* species is described. The survey also covers species of *Arachnocrea*, *Hypocrea* and *Sphaerostilbella* that grow on aphyllophores and are known to be closely related to *Hypomyces*. A previously unknown anamorph is described for *A. stipata*. 20 of the taxa are reported as only recently discovered in Estonia.

Kokkuvõte: K. Põldmaa. Perekond *Hypomyces* (Hypocreales, Ascomycota) ja lähedased seentel kasvavad seened Eestis. I. Torikulaadsetel kasvavad liigid.

Ülevaates Eestis torikulaadsetel kasvavate perekonna *Hypomyces* ja satelliitperekondade kohta esitatakse andmeid 24 liigi esinemisest. Neist 20 liiki pole Eesti seenestiku varasemate ülevaadete kohaselt Eestist leitud. Perekondi *Arachnocrea* ja *Sphaerostilbella* mainitakse Eestist esmakordselt. Neljateistkümnest holomorfsest liigist on seitse leitud vaid anamorfina. Käsitlemist leiab ka viis seniste teadmiste kohaselt anamorfset liiki, millest üks kirjeldatakse kui teadusele uus. Samuti kirjeldatakse anamorf liigile *Arachnocrea stipata*, millel varem mittesugulist paljunemist ei tuntud.

INTRODUCTION

The group of fungicolous fungi forms an ecological dimension superimposed on other ecological groups of fungi (Gams et al., 2000). Fungi that grow on carposomata of macromycetes, form only one part of that group, among which the ascomycete genus *Hypomyces* Tul. is definitely the most species-rich taxon. It is characterized by forming light-coloured perithecia in a subiculum, cylindrical asci thickened at the top, 0-1-septate warted ascospores and fungicolous, mostly basidiomycetous habit. The ascigerous state is usually preceded by diverse conidial forms of sporulation that have been named in several anamorphic genera. Four groups have been recognized in recent monographic treatments of *Hypomyces* (Rogerson & Samuels, 1985, 1989, 1993, 1994) characterized by the range of hosts and by morphological variation. The largest number of *Hypomyces* species have been described from aphyllophores, around ten species are known on agarics and boletes, and a few species have been found on discomycetes. While these papers are based mainly on American material, overviews of the genus and related fungicolous species in different European countries are also available (Arnold, 1963, 1969a,b; Bitner, 1953; Eckblad & Torkelsen, 1974; Fassiatova, 1958; Helfer, 1991; Moravec, 1960) or records can be found in surveys of fungal biota (Cannon et al., 1985; Eriksson, 1992; Munk, 1957; Smitskaja, 1991).

Collecting fungi growing on fruitbodies of other fungi has been a "secondary hobby" for several local mycologists since the beginning of mycological activities in Estonia. While first records of *Hypomyces* in Estonia date from the middle of the last century (Dietrich, 1856, 1859), most of the specimens have been collected during the last five decades by several mycologists working at the Institute of Zoology and Botany in Tartu. While studying different groups of macromycetes that serve as hosts for *Hypomyces* species, they occasionally also brought along the injured fruitbodies from their expeditions. The most keen collector, however, was Peeter Põldmaa

whose research focused on phytopathogenic fungi and parasites attacking them. With the exception of the overview of the fungicolous species parasitising rusts and powdery mildews in Estonia (Põldmaa, 1966), he never got as far as publishing his material and observations of other fungicolous fungi. However, he regularly sent Estonian material to Günter Arnold (Weimar, Germany) who isolated some of the fungi into pure culture and also reported several of the Estonian collections (Arnold 1970a,b, 1971b, 1989).

Despite the extensive collecting activities, literature records about Estonian *Hypomyces*, in addition to those mentioned above, are scarce. In a paper by Heinrichson-Normet (1969) six species have been examined from Estonia, some of which were commented on by Arnold (1972). Koval (1983) reported five holomorphic and one anamorphic species. Moreover, until recently any of the mycologists in Estonia had isolated and studied the *Hypomyces* collections in pure culture, a method that is often indispensible for reliable identification. The author of the present paper has concentrated on studying this group of fungi, culturing the majority of the specimens collected. In course of this work three new anamorphic species and a new teleomorph were described (Põldmaa, 1996) and the taxonomy as well as the geographic distribution of some aphyllophoricolous species of *Hypomyces* was revised (Põldmaa & Samuels, 1999).

The aim of the present study is to give an overview of the species of *Hypomyces* and closely related genera occurring in Estonia, with remarks upon their abundance and phenology as well as on morphology of less known taxa. The first part covers species growing on basidiomata of aphyllophores, and *H. armeniacus* that, although growing exlusively on agarics, is known to be closely related to the aphyllophoricolous species with *Cladobotryum* Nees anamorphs (Põldmaa et al., 2000). Out of the 24 species considered four, all of them holomorphic *Hypomyces* species, have been reported from Estonia by earlier authors. The paper deals with fourteen holomorphic *Hypomyces* species (seven of these collected only as anamorphs in Estonia) and five related anamorphic species, one of which is described as new for science. *Hypocrea pallida*, species of *Arachnocrea* Moravec and *Sphaerostilbella* Sacc., that all grow on aphyllophores and have been shown to be closely related to *Hypomyces* (Põldmaa et al., 2000; Rehner & Samuels, 1995), are also treated. *Arachnocrea* is the only genus out of the ones mentioned above for which no anamorph has yet been described. We obtained ascospore germination of one collection of *A. stipata* and are illustrating the anamorph that formed in culture.

MATERIALS AND METHODS

The present survey is based on specimens collected during the last six years by the author and mycologists of the Institute of Zoology and Botany (Tartu), as well as on some earlier collections preserved in the Mycological Herbarium at this Institute. The asterisk marks species that are absent from the lists of Estonian fungi (Järva & Parmasto, 1980; Järva et al., 1998). Abbreviation "A" stands before the name of the anamorph and collections containing only the conidial stage. All the recorded substrata have been presented; their frequency can be estimated by counting the reported collection numbers. Precise collecting data for each specimen are given only for apparently rare species with less than five (teleomorphic) collections known. The specimens as well as the cultures are deposited at the Institute of Zoology and Botany; the two numbers reported refer to the Mycological Herbarium (TAA) and the Culture Collection (TFC numbers with a hyphen in the middle), respectively. Representative strains are also deposited in the culture collection of the Centraalbureau voor Schimmelcultures (CBS, Baarn). The superscript 1 indicates collections with unripe perithecia where ascospore formation could not be induced, and superscript 2 anamorphic collections that produced perithecia in culture.

Fresh material was studied in water, herbarium material was briefly rehydrated in 3% (aq.) KOH. Ascospores or conidia were isolated onto 1.5% MEA and the descriptions were made of colonies grown at 22-24 C in darkness. The measurements reported for ascospores and conidia represent the limits of 90% range of estimated normal distribution and the mean values of specimens; in other cases the extreme values are reported.

TAXONOMY

Hypomyces

* **H. albidus** Rehm, Hedwigia Beibl. 42: 291. 1903.
A: *Cladobotryum sphaerocephalum* (Berk.) Rogerson & Samuels, Mycologia 85: 241. 1993.

A: On *Fomitopsis pinicola* (Sw.: Fr.) P. Karst. - 161653 (95-98); *Hymenochaete tabacina* (Sowerby: Fr.) Lév. - 161314 (94-201), 161824 (95-148), 169564; *Steccherinum ochraceum* (Pers.: Fr.) Gray - 161231b (94-31); *Stereum rugosum* (Pers.: Fr.) Fr. - 169883 (97-124), 169904; *Stereum* sp. - 169878; *Tremella encephala* Willd.: Fr. - 169881 (97-123); *Trichaptum abietinum* (Dicks.: Fr.) Ryvarden - 167256 (97-42).

The species has been found only from Europe. Its teleomorph is known from six collections, most of which are from basidiomata of *Stereum* spp. (Põldmaa & Samuels, 1999). The anamorph appears to be quite common in Estonia and it seems likely that the teleomorph will also be found from here in future. The anamorph has been found to grow on basidiomata of different host species that inhabit the same or adjacent logs (Põldmaa & Samuels, 1999). All the specimens have been collected between the end of August and the beginning of October.

H. armeniacus Tul. Ann. Sci. Nat. Bot. Ser. IV, 13: 12. 1860.
A: *C. verticillatum* (Link) S. J. Hughes, Canad. J. Bot. 36: 750. 1958.

On a cone of *Picea abies* (L.) Karst., Läänemaa Co., between Mihkli and Koonga, 16 Aug. 1960, leg. A. Raitviir, det. G. Arnold, 40949; on leaf litter, Hiiumaa Island, Tahkuna peninsula, 1 Sep. 1960, leg. A. Raitviir, det. G. Arnold, 41182.

A: *Lactarius helvus* (Fr.) Fr. - 161823 (95-154), 169546, 169572, 169972 (98-56); *L. mitissimus* (Fr.) Fr. - 161213 (94-20), 161830 (95-156); *L. piperatus* (L.: Fr.) Gray - 169819; *L. pyrogalus* (Bull.: Fr.) Fr. - 161436 (94-52); *L. rufus* (Scop.: Fr.) Fr. - 31241, 31255, 32884, 161822 (95-130), 169508; *L. subdulcis* (Bull.: Fr.) Gray - 85918; *L. thejogalus* (Bull.: Fr.) Fr. - 161993, 161942; *L. torminosus* (Schaeff.: Fr.) Gray - 160927 (93-127), 161264; *L. trivialis* (Fr.: Fr.) Fr. - 169503, 169507, 169565; *L. vietus* (Fr.: Fr.) Fr. - 169509, 169834; *Lactarius* sp. - 86928, 160916 (93-120), 161638 (95-94), 169778, 169788, 169933 (98-82), 169948; *Russula decolorans* (Fr.) Fr.- 169525; *R. delica* Fr. - 161797 (95-151); *R. emetica* (Schaeff.: Fr.) Pers. - 85917; *R. paludosa* Britzelm. - 169510; *R. xerampelina* (Schaeff.) Fr. - 85906; *Russula* sp. - 32752, 32648, 32873, 32889, 36716, 36743, 160890 (93-112), 161212 (94-19), 161986, 161988, 169528, 169553, 169779; decayed agarics - 32747, 32867, 161639 (95-95), 169940.

This species, also known as *H. ochraceus* (Pers.: Fr.) Tul. (Rogerson & Samuels, 1994) or under the various synonyms of the anamorph (Gams & Hoozemans, 1970), is very common in Europe as well as in Asia and North America. Also in Estonia, high numbers of basidiomata of *Lactarius* and *Russula* species become destroyed by its conidial stage. The teleomorph seems to be far more rare and has been found on other substrata near the decayed agarics, as characteristic of this species (Rogerson & Samuels, 1994). Although *H. armeniacus* is restricted to inhabiting the basidiomata of agarics, mostly from the family of *Russulaceae*, it is closely related to species of *Hypomyces* that have a *Cladobotryum* anamorph and grow mostly on aphyllophores, as concluded from its 28S rDNA data (Põldmaa et al., 2000).

It is characterized by producing mainly one-celled conidia but in several strains made from Estonian collections also 1-septate conidia can be found. In some strains (95-94, 161646) we observed secondary proliferation of conidiogenous cells, as described for *H. albidus* and *H. rostratus* (Gams & Hoozemans, 1970; Põldmaa & Samuels, 1999). Sympodial proliferation of the conidiogenous cell that has never been observed for this species was noticed in strains 98-56 and 98-82. Several of the strains that have been isolated from collections growing on basidiomata of *Lactarius* species (e.g. 94-52, 95-154, 95-156) produce sweet odour while growing on MEA and also the conidia tend to be more slender (10-30 x 6-8 (-12) μm) and attenuated at the base. These remind the conidia of *C. apiculatum* (Tubaki) Gams & Hoozemans, suggesting a host-dependent morphological dimorphism in this species. The occurrence of *H. armeniacus* depends of the phenology of its hosts and is therefore most frequently encountered in Estonia throughout August and

in September when the production of basidiomata of *Lactarius* and *Russula* species is at its peak.

H. aurantius (Pers.: Fr.) Tul., Ann. Sci. Nat. (Bot.)., Sér. IV, 13: 12. 1860.
A: *C. varium* Nees, Syst. Pilze Schwämme 56. 1816.

On *Bjerkandera adusta* (Willd.: Fr.) P. Karst. - 161421 (94-70), 161767; *Fomitopsis pinicola* - 161755 (95-171); *Pleurotus ostreatus* (Jacq.: Fr.) P. Kumm. - 161097 (93-81); *Polyporus squamosus* (Huds.: Fr.) Fr. - 160770 (93-41), 160874, 161165[1], 161548 (94-223); *Trametes versicolor* (L.: Fr.) Pilat - 36681, 88843, 161440 (94-221); a fallen rotten trunk - 167399.
A: *Auricularia mesenterica* Pers. - 161550a (94-94); *Bjerkandera adusta* - 161181 (94-21), 161932, 161973, 169567, 169596; *Cerrena unicolor* (Bull.: Fr.) Quél. - 161606 (95-14), 161615 (95-15); *Flammulina velutipes* (Curtis: Fr.) Singer - 161601 (95-11); *Fomes fomentarius* (L.: Fr.) Fr. - 161083; *Inonotus leporinus* (Fr.) Gilb. & Ryvarden - 36702; *Laetiporus sulphureus* (Bull.: Fr.) Murrill - 160913 (93-74); *Phaeolus schweinitzii* (Fr.: Fr.) Pat. - 161829b (95-161); *Phellinus ferruginosus* (Fr.) Pat. - 161576 (94-80); *Ph. tremulae* (Bondartsev & Borissov) Bondartsev - 161974, 169983; *Piptoporus betulinus* (Bull.: Fr.) P. Karst. - 161598 (94-191); *Polyporus squamosus* - 32658, 32755, 36371, 161165 (94-12), 161549 (94-78), 160770 (93-41), 161901; *Ramaria eumorpha* (P. Karst.) Corner - 160978 (93-136); *Trametes hirsuta* (Wulfen: Fr.) Pilat - 161605 (95-13), 161740; *T. ochracea* (Pers.) Gilb. & Ryvarden - 161492 (94-69), 161818 (95-129); *T. versicolor* - 161602 (95-12); *Trametes* sp. - 161642 (95-96); *Trichaptum abietinum* - 161329 (94-44), 169560, 169671; the base of a stump of *Picea abies* - 161679 (95-109); decayed branch of a deciduous tree - 161989; agarics on a living tree of *Acer platanoides* L. - 169919; agarics on a living trunk of *Fraxinus excelsior* L. - 32654.

H. aurantius is a very common species in Estonia as well as worldwide, often occurring in both stages. We have found it growing on a diversity of aphyllophoraceous hosts and also on wood-decaying agarics. The telomorph has been collected mostly in August and September but there are single collections also from June and October. Anamorphic specimens originate from April to November. In addition to the typical 1-septate conidia, a few 2- and 3-septate conidia can be found in some of the specimens and/or their cultures.

***H. broomeanus** Tul., Sel. Fung. Carp. 3: 108. 1865.
A: *Gliocladium microspermum* (Sacc.) W. Gams, *Neth. J. Pl. Path.* 88: 73.

All collections on *Heterobasidion annosum* (Fr.) Bref. - Pärnumaa Co., Varbla, Mereäärse, 27 Sep. 1994, K. Põldmaa, 161513 (94-62); Ida-Virumaa Co., 4 km SSW of Virunurme, Kaukvere primeval forest, 3 Sep. 1996, K. Põldmaa, 169547 (96-72); Tartumaa Co., Järvselja Forest Division, Rõkka, 1997, E. Parmasto, 166707; Tartumaa Co., Laeva Comm., Laeva forestry, south-eastern part of the forest Suur Peenar, 10 Sep. 1997, K. Põldmaa, 169844 (97-167).
A: Tartumaa Co., 1 km N of Vorbuse, 1993, K. Põldmaa, 161194.

The specimen TAA 169844 was collected as a small conidial patch, 2 cm diam, on the hymenophore of the host. While it was kept in a moist chamber in the laboratory, it grew over the whole hymenophore of two adjacent basidiomata and developed abundant perithecia with ripe ascospores. Most of the exuded ascospores had germinated while still on the papillae of the perithecia. The disarticulation of lots of mature ascospores into equal partspores was observed in some overmature specimens. All the isolates develop mature perithecia also in culture.
H. broomeanus has been found only in Germany (Arnold, 1963; Gams & van Zaayen, 1982; Helfer, 1991) and in Great Britain (Petch, 1938, 1939), exclusively on the basidiomata of *Heterobasidion annosum*. Arnold (1963) found it rather frequent in one forest near Weimar. According to our observations, it is probably not rare but rather a species easy to overlook mainly due to the usually hidden basidiomata of its host. We have found this species only in September.

*** H. chrysostomus** Berkeley & Broome, Jour. Linn. Soc. London, Bot. 14. 113. 1875.
A: *Acremonium lindtneri* (Kirschtein) Samuels & Rogerson, Mycologia 85: 248.

All on *Ganoderma applanatum* (Pers.) Pat. -

161857[1] (96-40), 169577 (96-193), 169588, 161976[1], 161992 (96-74), 169512[1], 169534[1], 169806, 169929[1], 169963 (98-77).
A: 161255 (94-37), 161431 (94-92), 161788, 161947 (96-59), 169941, 169961.

There are many reports of this species from North America, as well as from different tropical and subtropical regions. The only records of its occurrence in Europe are a few holomorphic and anamorphic collections from Yugoslavia on *Ganoderma lucidum* (Curtis: Fr.) P. Karst., and anamorphic specimens from one location near St. Petersburg (Russia) on *Ganoderma applanatum* (Arnold, 1970b,c, 1971b). According to our observations, *H. chrysostomus* is very common in Estonia, growing loosely attached to the hymenophore of *G. applanatum*. We have never recorded it on *G. lucidum*, which itself is rare in Estonia. Most of the specimens have been collected in August and September, some also in May and July. *G. applanatum* inhabits the base of dead trunks of deciduous trees, and the parasite has to be searched for almost next to the ground; this may be one reason why it has been so infrequently recorded. The overlooking of this fascinating fungus may also be due to the mycologists, studying aphyllophoralean fungi, considering the byssus formed as the result of germination of the host basidiospores. In reality, the mycelium of *H. chrysostomus* traps host basidiospores, penetrating these, and the whole subiculum is attached to the host hymenophore only in its center, being peeled away very easily. Most of the Estonian collections contain either only the anamorph, or when the perithecia are found, these are immature, as noted also by C. T. Rogerson (Parker, 1990). I failed to induce ascospore formation in a moist chamber. In the few collections with mature perithecia two types of asocospores can be found - finely ornamented, mostly one-celled, and smoooth-walled, 1-septate ascospores that are often found to disarticulate after being discharged.

***H. corticiicola** K. Põldmaa, Mycologia 91: 185. 1999.
A: *Cladobotryum* sp.

On *Phanerochaete velutina* (Fr.) P. Karst. and on surrounding bark of a fallen trunk of *Betula pendula* Roth Jõgevamaa Co., Alam-Pedja Nat. Reserve, Võivik, 5 Nov. 1996, I. Parmasto, 162565 (96-205).

This is the paratype specimen of a recently described species, comments on which can be found in Põldmaa & Samuels (1999).

H. odoratus G. Arnold, Česká Mykol. 18: 144. 1964.
A: *C. mycophilum* (Oudem.) W. Gams & Hoozem., Persoonia 6: 102. 1970.

On *Boletus bovinus* L.: Fr. (perithecia produced on *Polyporus* sp., induced in culture by G. Arnold), Hiiumaa Island, Emmaste, 18 Sep. 1967, P. Põldmaa (JE, NY).

A: *Cortinarius odorifer* Britzelm. - 32882; *Cortinarius* sp. - 169949 (98-55), 169950, 169979; *Fomes fomentarius* - 160893 (93-64), 161261, 161398 (94-83); *Fomitopsis pinicola* - 161523 (94-63); *Hyphoderma puberum* (Fr.) Wallr. - 161243 (94-32); *Inocybe* sp. - 169780 (97-35); *Megacollybia platyphylla* (Pers.: Fr.) Kotl. & Pouzar - 161242 (94-18), 169511; *Phellinus laevigatus* (Fr.) Bourdot & Galzin - 169810; *Ph. nigricans* (Fr.) P. Karst. - 161507 (94-98); *Ph. tremulae* - 161852 (96-37), 169798; *Physisporinus vitreus* (Pers.: Fr.) P. Karst. - 169801, 169803; *Rigidoporus crocatus* (Pat.) Ryvarden - 169799 (97-38); *Tricholoma album* (Schaeff.: Fr.) P. Kumm. - 169980; *Tricholoma* sp. - 169934 (98-53); *Tricholomopsis rutilans* (Schaeff.: Fr.) Singer - 32905, 160906 (93-73); on a decayed agaric - 161500 (94-72), 169990 (98-57); on a fallen rotten trunk of *Betula pubescens* Ehrh. - 153837, 163328 (94-190); on a fallen rotten trunk of *Populus tremula* L. - 167020; on a log of a deciduous tree - 169800.

In the recent monographic works on *Hypomyces, H. odoratus* has been dealt with under the agaricolous group (Rogerson and Samuels, 1994). Also other authors (e. g. Arnold, 1964) report it mainly from agarics. Among the recent collections of this species from Estonia, specimens that have grown on different aphyllophores or decaying wood are as common as those found on agarics. The majority of the specimens have been collected during August and September, a few in June and October.

The anamorph of *H. odoratus* is characterized by having mainly 1-septate conidia. However, in some collections, e. g. 169934, 169949, 2- and 3-septate conidia are also common. The teleomorph of this species has been described from culture (Arnold, 1964) being known only from isolates originating from

Germany and the one reported herein. The anamorphs described for the few teleomorphic collections from America (Rogerson and Samuels, 1994) do not correspond to the descriptions in literature and our concept of this species, and thus probably represent another still undescribed species.

* **H. orthosporus** K. Põldmaa, Mycotaxon 59: 390. 1996.
A: *Cladobotryum orthosporum* (W. Gams) K. Põldmaa, Mycotaxon 59: 390. 1996.

On *Gloeophyllum sepiarium* (Wulfen: Fr.) P. Karst. -169879 (97-30); *Inonotus leporinus* - 161459 (94-200, CBS 235.95, TYPE); *Phellinus nigricans* - 169775[1]; *Pycnoporellus fulgens* (Fr.) Donk - 161760 (95-166), 169568 (96-78)[1].

A: *Daedalea quercina* L.: Fr. - 160997 (93-79); *Fomitopsis pinicola* - 169513, 169668; *F. rosea* (Alb. & Schwein.: Fr.) P. Karst. - 161252 (94-39); *Gloeophyllum sepiarium* - 161819 (95-129), 169667; *Inonotus radiatus* (Sowerby: Fr.) P. Karst. - 161784 (95-118); *Phellinus chrysoloma* (Fr.) Donk - 161401 (94-61); *Ph. tremulae* - 161744 (95-122); *Pycnoporellus fulgens* - 169500 (96-61); *Stereum subtomentosum* Pouzar - 161779 (95-128).

The few records of this species in literature are summarized by Põldmaa & Samuels (1999). However, it is common in Estonia, from where its teleomorph was also described. *H. orthosporus* has been collected from a variety of aphyllophores, half of which belong to the family Hymenochaetaceae. Often the fungus spreads itself over the basidiomata of different host species growing nearby (Põldmaa & Samuels, 1999). The teleomorph has been found at the end of August and throughout September whereas the anamorph from the end of May until the end of September.

* **H. polyporinus** Peck, Bull. Buffalo Soc. Nat. Hist. 1: 72. 1873.
A: *Cladobotryum clavisporum* (Gray & Morgan-Jones) Rogerson & Samuels, Mycologia 85: 241. 1993.

A: On a corticioid basidiomycete growing on *Fomitopsis pinicola*, Viljandimaa Co., Kolga-Jaani Comm., Alam-Pedja Nat. Reserve, Umbusi-Epruraba zone, Võisiku Forest, 25 Aug. 1997, K. Põldmaa, 169787 (97-37).

H. polyporinus, although very common in North America on *Trametes versicolor*, has only a few times been recorded from Europe (Põldmaa & Samuels, 1999).

* **H. pseudopolyporinus** Samuels & Rogerson, Mycologia 85: 241. 1993.
A: *Cladobotryum arnoldii* Rogerson & Samuels, Mycologia 85: 241. 1993.

On *Mycoacia fuscoatra* (Fr.: Fr.) Donk and on dead wood of *Populus tremula* surrounding it, Jõgevamaa Co., Puurmanni Comm., Alam-Pedja Nat. Reserve, Rokka, 27 Aug. 1997, I. Parmasto - 162807, (97-40, CBS 100357).

The specimen of this species, which was previously known only from its type locality in Brazil is commented upon in Põldmaa & Samuels (1999).

* **H. rosellus** (Alb. & Schwein.: Fr.) Tul., Ann. Sci. Nat. (Bot.)., Sér. IV, Bot. 13: 12,13. 1860.
A: *C. dendroides* (Bulliard) W. Gams & Hoozemans, Persoonia 6: 103. 1970.

On *Armillaria* sp., the adjacent bark of *Betula* sp. - 169928; *Hyphoderma radula* (Fr.: Fr.) Donk - 161043 (93-159); *Phellinus nigricans* - 169776 (97-41), 169846; *Piptoporus betulinus* - 6090; *Trichaptum abietinum* - 169845; on a resupinate polypore - 40665; on wood of a fallen trunk of *Betula verrucosa* - 36682; on bark of *Betula* sp. - 169556, 169557; on a stump of *Quercus robur* L. - 43268.

A: *Armillaria* sp. - 161533 (94-53), 169920; *Collybia peronata* (Bolton: Fr.) P. Kumm. - 86844; *Fomitopsis pinicola* - 160695; *Hydnellum mirabile* (Fr.) P. Karst. - 159720; *Hydnellum* sp. - *161480 Hymenochaete rubiginosa* (Dicks.: Fr.) Lév. - 161414 (94-71); *Inocybe fastigiata* (Schaeff.) Quél. - 169554; *Inonotus leporinus* - 161458 (94-93); *I. radiatus* - 161250 (94-224); *Lactarius necator* (J.F. Gmel.: Fr.) P. Karst. - 161833 (95-162); *Onnia tomentosa* (Fr.: Fr.) P. Karst. - 161761 (95-117); *Polyporus varius* Pers.: Fr. - 161971; *Stereum rugosum* - 169910; *S. sanguinolentum* (Alb. & Schwein.: Fr.) Fr. - 169840; *S. subtomentosum* - 160831 (93-57), 161802 (95-120), 169501, 169896; on an agaric - 169915; ??169887.??

H. rosellus in a very common species in Estonia as well as worldwide. We have found it growing on basidiomata of different

aphyllophores as well as on wood, bark and agarics. The anamorph, that has been recorded from May till October, is more common than the teleomorph, which is also not rare, and is encountered from the end of August until the end of October.

*** H. semitranslucens** G. Arnold, Novit. Syst. Plant. Non-Vasc. 8: 132. 1971.
A: *Cladobotryum fungicola* (G. Arnold) Rogerson & Samuels, Mycologia 85: 241. 1993.

On *Auricularia mesenterica* - 161550 (94-95); *Fomitopsis pinicola* - 161406 (94-65[2]), 169781 (97-36[2]); *Inonotus radiatus* - 169524[1]; *Lentinus* sp. - 161843[1] (96-28); *Stereum subtomentosum* - 167099 (97-240[2]).

A: *Cantharellus tubaeformis* (Bull.: Fr.) Fr. - 169945 (98-54); *Cerrena unicolor* - 161855 (96-32); *Datronia mollis* (Sommerf.: Fr.) Donk - 160706 (93-27), 161570 (94-79), 169894; *Fomes fomentarius* - 161768 (95-126), 161867 (96-35), 161990; *Fomitopsis pinicola* - 160684 (93-14), 161745 (95-124); *Hydnellum aurantiacum* (Batsch: Fr.) P. Karst. - 128130 (98-49); *Hymenochaete tabacina* - 169669; *Hydnum repandum* L.: Fr. - 161772 (95-127); *Junghuhnia* sp. - 169537; *Leptoporus mollis* (Pers.: Fr.) Quél. - 161997; *Oligoporus caesius* (Schrad.: Fr.) Gilb.& Ryvarden - 169600 (96-83); *Peniophora nuda* (Fr.) Bres. - 161563 (94-96); *Phellinus alni* (Bondartsev) Parmasto - 161415 (94-66); *Ph. chrysoloma* - 169506; *Ph. punctatus* (P. Karst.) Pilat - 169831, 169937; *Ph. tremulae* - 161744 (95-122), 161852 (96-36), 161852 (96-37), 161860 (96-34), 161956 (96-56); *Polyporus varius* - 161585 (95-92); *Rigidoporus* sp.? - 169991; *Scytinostroma portenosum* (Berk. & Curt.) Donk - 161535 (94-74), 161925 (96-48); *Stereum rugosum* - 161418 (94-68), 169672; *S. sanguinolentum* - 161808 (95-121); *S. subtomentosum* - 161246 (94-38); *Tomentella crinalis* (Fr.) M.J. Larsen - 169597 (96-84); *Trametes hirsuta* - 169538; *T. ochracea* - 161790 (95-119); *Trichaptum abietinum* - 161807 (95-125), 161924 (96-53), 161945, 167256; *T. biforme* (Fr.) Ryvarden - 161825 (95-155); on a corticioid basidiomycete 169804; on a decaying branch of *Corylus avellana* L. - 161476 (94-208); on a decaying trunk of *Picea abies* - 170003.

H. semitranslucens, probably a cosmopolitan species, is very common in Estonia. It grows on a variety of aphyllophorous basidiomata and sometimes also on bare wood and wood-inhabiting agarics. In contrast to the morphologically very similar *H. orthosporus*, representatives of Hymenochaetaceae form less than one third of its hosts. The fungus is far more often found in its conidial form of sporulation, occurring from May till October. The teleomorph has been picked up from August till October (one collection also in May), mostly while still in an immature condition.

*** H. subiculosus** (Berk. & M.A. Curtis) v. Höhnel, Ann. Mycol. 8: 468. 1910.

A: On *Scytinostroma* sp., Järvamaa Co., Türi forestry, Pällastvere, 21 Sep. 1995, K. Põldmaa, 161791a.

There is only one published record of the occurrence of *H. subiculosus* outside the tropical and subtropical regions, where it is considered to be one of the most common species of *Hypomyces* (Rogerson & Samuels, 1993). Besides the one report of the anamorph from Germany (Helfer, 1991), we are aware of only one more anamorphic collection from Finland (K. Põldmaa, unpubl.).

In the collection from Järvamaa, scarce mycelium is effused over some parts of the host hymenophore. The conidiophores are not differentiated from vegetative hyphae and bear singly displaced conidiogenous cells or branches which are 69-76 μm long and 1-1.5 μm wide. The conidia are 1-septate, clavate with a central hilum, or elliposidal to cylindrical with a wider and laterally displaced basal hilum, suggestive of retrogressively proliferating conidiogenous cells, and measure 10.4-19.5 x 4.0-6.5 μm, M = 15.0 x 5.2 μm (n=30). All these features permit the identification of this specimen as *H. subiculosus*, even though it was not possible to study it in culture.

*** H. sympodiophorus** Rogerson & Samuels, Mycologia 85: 241. 1993.
A: *Cladobotryum uniseptatum* (Castañeda) K. Põldmaa, Mycologia 91: 193. 1999.

A: on *Stereum sanguinolentum* - 169982 (98-65); on *S. subtomentosum* - 161955 (96-58), 167271, 169535 (96-71), 169898 (97-122), 169908 (97-126), 169982 (98-65).

H. sympodiophorus was known from a few collections from the U. S. A. and one specimens

from France (Põldmaa & Samuels, 1999). In all these collections the host is a species of *Stereum*. The deviations of the cultural characters of the Estonian strains have been described by Põldmaa & Samuels (1999).

* **H. viridigriseus** K. Põldmaa & Samuels, Sydowia 49: 88. 1997.
A: *Cladobotryum viridigriseum* (G. Arnold, Illman & G. P. White) K. Põldmaa & Samuels, Sydowia 49: 89. 1997.

A: On *Fomitopsis pinicola*, Viljandimaa Co., Kolga-Jaani Comm., Võisiku Forest, 26 Aug. 1997, K. Põldmaa, 169776 (97-34); same collecting data, on *Phellinus nigricans*, 169782.

The species was previously known with a few collections from Canada and U. S. A. (Põldmaa et al., 1997). The records from Estonia indicate that it may be an overlooked species, expected to be found also in other parts of at least the temperate region.

Hypomyces sp.

A.: *Cladobotryum* sp.
Fig. 1

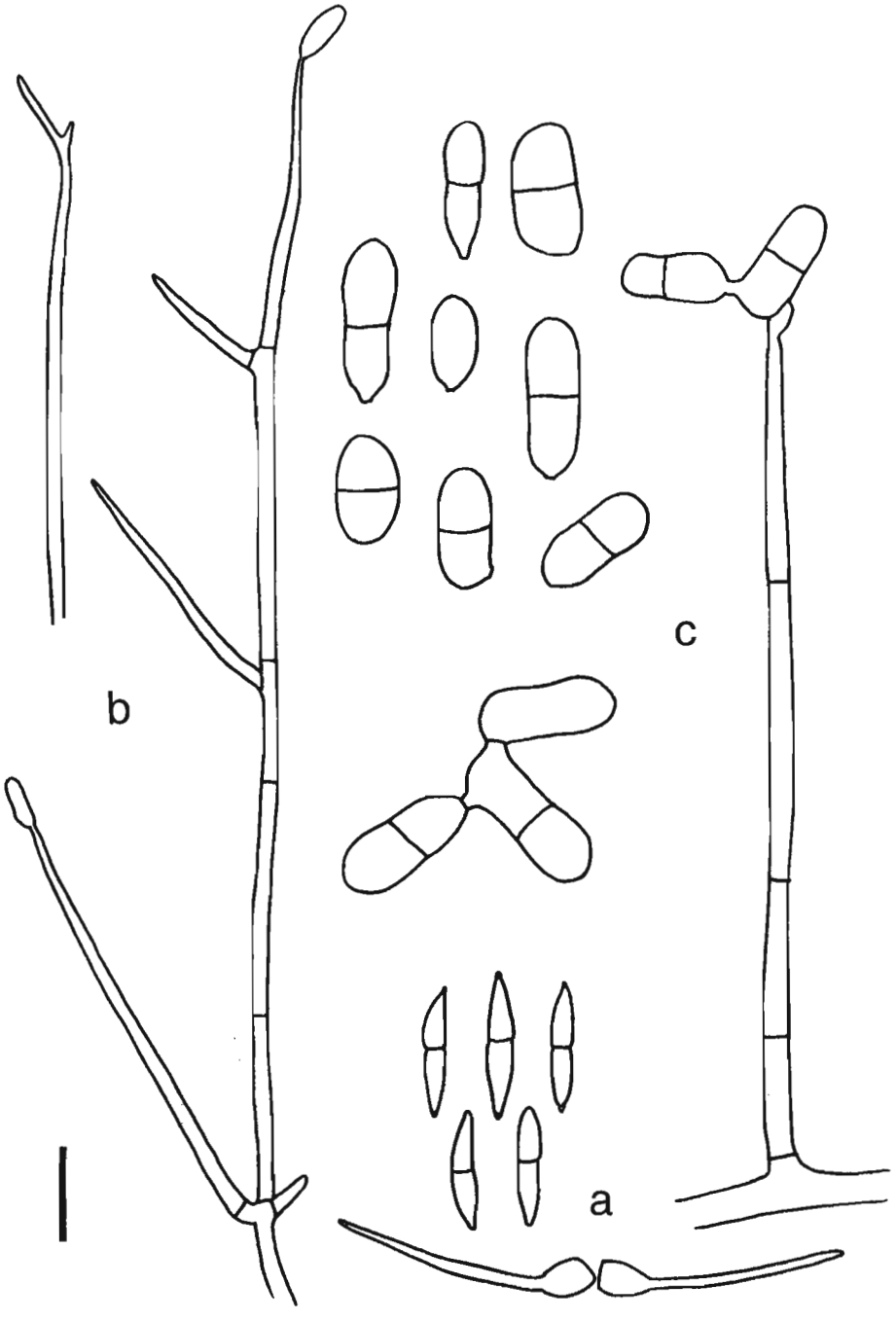
On the bark of a decaying trunk of a deciduous tree, next to the hymenophore of a cyphellaceous basidiomycete, Tartumaa Co., Laeva Comm., Alam-Pedja Nature Reserve, Tõllassaare zone, 28 Aug. 1997, K. Põldmaa, 169800 (97-39).

Subiculum white, effused, subicular hyphae slightly swollen, 4-7 μm in diam. Perithecia semiimmersed on the subiculum, amber to pale yellowish, KOH-, 250-320 x 160-230 μm; papilla conical, 70-100 μm high. Asci cylindrical, 96-120 x 4-5.5 μm; ascospores uniseriate, with ends overlapping. Ascospores fusiform, 13.1-18.3 x 2.3-3.8 μm, M = 15.7 x 3.1 μm (n=80), hyaline, 1-septate, septum median, smooth-walled, with small apiculi, 1-1.5(-2) μm long. Many ascospores have germinated and some have also disarticulated into part-spores.

Characteristics in culture. Colonies spreading comparatively slowly, reaching 10-15 mm diam in 7 d; cottony, margin even; pure white, reverse not coloured or turning pale creamish yellow. Conidiation abundant. Odour absent. Aerial mycelium becoming compacted; hyphae 2.5-3.5 μm diam, hyaline, smooth-walled. Conidiophores arising from aerial or submerged mycelium, not differentiated from aerial hyphae, ascending, 2.5-3.0 μm wide, irregularly branched. Conidiogenous cells or branches borne singly on conidiophores, 32-83 μm long, attenuated from 2-3 μm at the base to 1 μm at the tip; with a terminal or sometimes also two additional intercalary conidiogenous loci, producing up to 100 conidia from the topmost but only a few from the intercalary loci. Conidia 11.1-18.9 x 5.2-7.4 μm, M = 15.0 x 6.3 (n=30), straight, those formed first clavate and longer, with a central basal hilum, the successive ones becoming more ellipsoidal or cylindrical and broader, with a centrally displaced hilum; 1(-2)-septate, hyaline; held in long imbricate chains. Some ot the topmost conidia have germinated producing "secondary conidia" on short branches while still attached in the chain. Chlamydospores not observed.

Notes. The anamorph of the present species is almost identical to the anamorph of *Hypomyces subiculosus*. The only differences are the lack of chlamydospores and the formation of one or two intercalary loci on the conidiogenous cell. However, I have observed this also in some ascosporic isolates of *H. subiculosus*. The subiculum and perithecia, on the other hand, lack the yellow to orange colour and subsequent reaction with KOH, characteristic of *H. subiculosus*. Our collection could be considered as an albinotic form of *H. subiculosus*, particularly as such have been observed in several other species of *Hypomyces* (Arnold, 1989). This idea is challenged by differences in ascospores that are much wider, with their wall prominently verrucose in *H. subiculosus*. The ascospores resemble those of *H. sibirinae* and *H. sympodiophorus* which both differ from the present collection in other teleomorphic characters. The anamorph also resembles *Cladobotryum compactum* K. Põldmaa and *Pseudohansfordia irregularis* G. Arnold that are characterized by forming conidiogenous cells in verticils, and also by the 1-3-septate conidia in the latter species.

Due to our inability to differentiate between the anamorph of the described collection and that of *H. subiculosus*, and the availability of only one specimen, we prefer not to describe it as a new species here.



Figs. 1. *Hypomyces* sp. 169880. a. ascospores, a germinated ascospore below. b. the upper part of a conidiophore with conidiogenous cells, on the left a conidiogenous cell with an apparently additional locus on a denticle; c. a conidiogenous branch with conidia; from MEA. Scale bar: a,c = 10 μm; b = 15 μm.

Species for which no teleomorph is known.

*** Cladobotryum compactum** K. Põldmaa, Mycotaxon 59: 393. 1996.

On *Steccherinum ochraceum*, Tartumaa Co., Lääniste, 28 Aug 1994, K. Põldmaa, 161231 (94-66).

This conidial fungus shows great similarities to the anamorph of *H. subiculosus*. Both form white colonies with low texture and an irregular margin on MEA. In *H. subiculosus* perithecial production is preceded by the aerial mycelium becoming compacted and turning orange. This was not observed in *C. compactum*, but pigmentation of colonies was observed when the strain was opposed with a monosporic strain of *H. subiculosus* (G.J.S. 83-288), although the dual cultures did not reach perithecial formation.

The retrogressively proliferating conidiogenous cells that produce lots of conidia that are held in long imbricate chains, as well as the morphology of the conidia are very similar to *H. subiculosus* and to some anamorphic species (Põldmaa, 1996). The only difference observed in *C. compactum* compared to *H. subiculosus* is in the production of more than three conidiogenous cells from one point, thus forming verticils. Whether *C. compactum* is conspecific with *H. subiculosus*, or one of the several anamorphic species with similar conidiogenesis, has yet to be proved by new collections or by the use of methods other than morphological.

*** C. croceum** K. Põldmaa, Mycotaxon 59: 396. 1996.

On *Stereum rugosum*, Pärnumaa Co., Parasmaa, 25 Sep 1994, K. Põldmaa, 161418 (94-67).

*** C. dimorphicum** K. Põldmaa, Mycotaxon 59: 398. 1996.

Both on *Thelephora terrestris* Pers.: Fr., Pärnumaa Co., Palivere, 24 Sep 1994, K. Põldmaa, 161405 (94-76); Tartumaa Co., Võnnu, Terikeste., 18 Aug 1996, V. Kastanje, 161972 (96-70).

Unlike the abundant material in the type collection, in TAA 161972 there is only very scarce mycelium bearing the conidial apparatus on the base of the host fruitbodies. The colony as well as the morphological characters observed in culture correspond to those described for the type material.

C. gracile K. Põldmaa, sp. nov.

Fig. 2, 3, 4

Coloniae in agaro maltoso ad 40-50 mm diam. post 7 dies; lanosae, albae, reverso flavo. Hyphae aeriae hyalinae. Conidiophora adscendentia, 2.5-3 μm lata, verticillatim ramosa. Cellulae conidiogenae in ultimo verticillo ad 12, subulatae, 19-34 μm longae, prope basin 1.5 μm latae; ex uno loco ad tria conidia producentia. Conidia ellipsoidea vel fusiformia, recta, 7.2-16.5 x 2.1-3.9 μm, 0(-1)-septata, hyalina. Chlamydosporae adsunt. Teleomorphosis ignoto.

Holotypus. Ad basidiomata *Scytinostroma* sp., Estonia, K. Põldmaa (TAA).

Characteristics in culture. Colonies spreading moderately fast, reaching 40-50 mm diam in 7 d; cottony, margin even; whitish, reverse not coloured or turning bright sulphur yellow. Conidiation moderate. Odor absent. Aerial mycelium sparse, loose; hyphae hyaline, smooth-walled. Conidiophores arising from aerial hyphae, not differentiated from these, ascending, 2.5-3.0 μm wide, verticillately branched. Conidiogenous cells borne on conidiophores or on lateral branches, that are up to 15 μm long, by 4-12 in a verticil; subulate, 19-34 μm long, attenuated from 1.5 μm at the base to 0.5 μm at the tip; with a terminal conidiogenous locus that produces 1-2(-3) conidia. Conidia ellipsoidal to fusiform, straight, abruptly attenuated at base, often also at tip, 7.2-16.5 x 2.1-3.9 μm, M = 11.9 x 3.0 μm (n=60), 0(-1)-septate, hyaline, with a protuberant centrally displaced inconspicuous basal hilum; held singly or by few in imbricate position. Chlamydospores not observed.

Holotype. ESTONIA. Järvamaa Co.: Türi forestry, Pällastvere, on *Scytinostroma* sp., 21 Sep. 1995, K. Põldmaa, 161791, 95-170, preserved as a dried culture.

Notes. The species differs from *Cladobotryum* anamorphs of *Hypomyces* as well as from anamorphic *Cladobotryum* species by the very delicate structures of the conidial apparatus. It resembles *Cladobotryum obconicum* W. Gams & Schroers (Gams et al., 1998) that differs from *C. gracile* in having wider

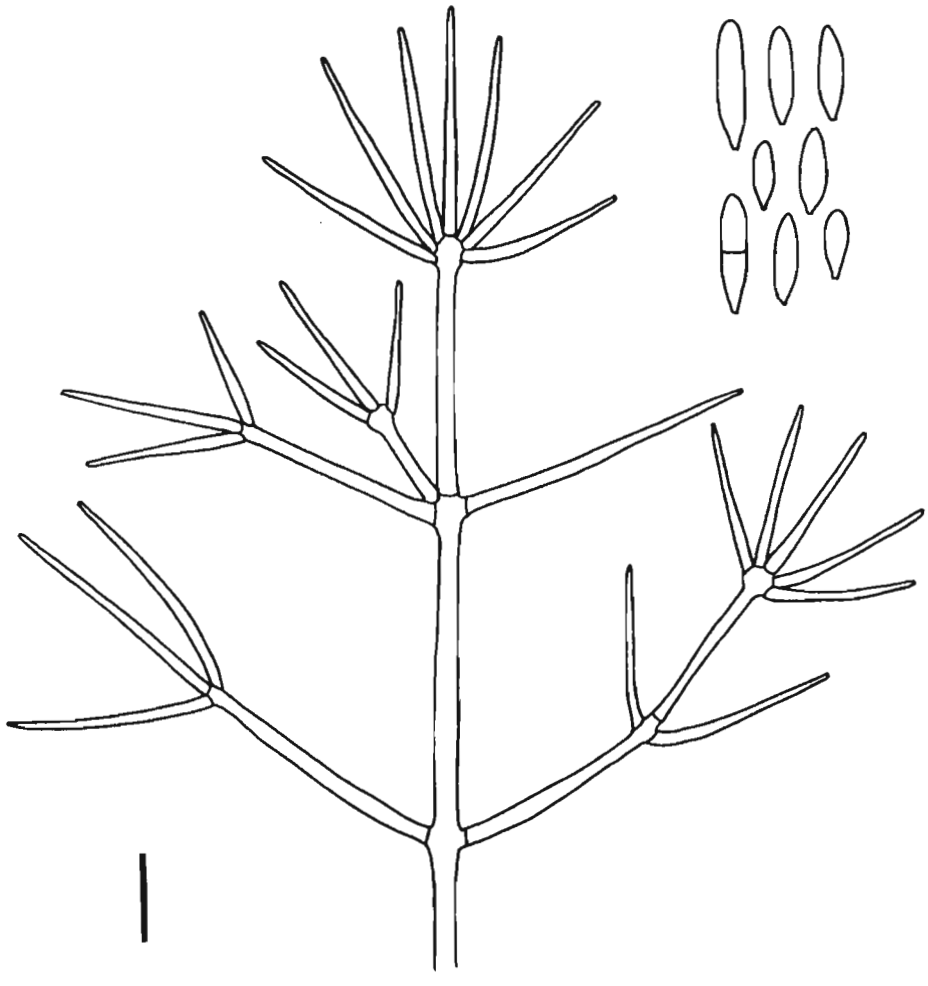


Fig. 2. *Cladobotryum gracile*, TAA 161791b. The upper part of a conidiophore with conidiogenous cells, conidia; from MEA. Scale bar = 10 μm.

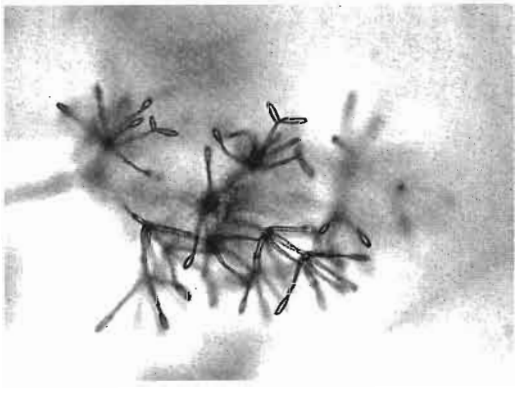


Fig. 3. *Cladobotryum gracile,* TAA 161791b. Conidiophores with conidiogenous cells and conidia; from MEA.

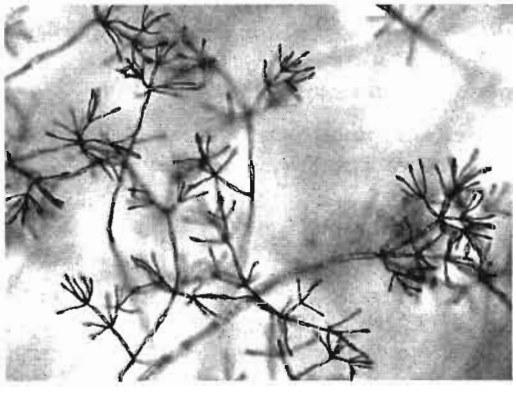


Fig. 4. *Cladobotryum gracile*, TAA 161791b. Top of a conidiophore with conidiogenous cells and conidia held singly or in pairs in imbricate position; from MEA.

and shorter conidiogenous cells, exceptionally aseptate conidia and in producing chlamydospores. *C. gracile* is reminiscent also of species of *Verticillium*, e.g. *V. psalliotae* and the conidial synanamorphs of *Mycogone*, e.g. *M. calospora* (Gams, 1983). However, *C. gracile* is shown to be closely related to aphyllophoricolous species of *Hypomyces* according to the analyses of 28S rDNA sequences (Põldmaa et al., 2000). It forms a strongly supported clade with *H. aurantius*. These two species resemble each other mainly in producing a bright yellow pigment in the agar medium. Unfortunately, there is no material of this fungus left on the natural host and therefore a dried culture was designated as the holotype.

***C. stereicola** (G. Arnold) Rogerson & Samuels, Mycologia 85: 241. 1993.

A: On *Chondrostereum purpureum* (Pers.: Fr.) Pouzar - 161922 (96-55), 161811 (95-146), 161816 (95-147), 161950 (96-57), 169593 (96-82), 169655, 169656 (97-2); on *Stereum hirsutum* (Willd.: Fr.) Gray - 161842; *S. rugosum* ? - 169966 (98-81); *Stereum* sp. - 169957 (98-80).

These collections helped to solve the taxonomic confusion that has accompamied the species since it was described (Põldmaa & Samuels,1999). *Cladobotryum stereicola* has been reported only a few times from Germany and once from Poland (Arnold, pers. comm.), the Netherlands (Gams & Hoozemans, 1970) and near St. Petersburg in Russia (Arnold, 1971a). My observations in Estonia suggest that it is not a rare but rather an overlooked species that favours *Chondrostereum purpureum* as its host.

Species from allied genera.

***Arachnocrea stipata** (Fuckel) Moravec, Bull. Soc. Mycol. Fr. 72: 162. 1956.

A: *Verticillium*-like
Fig. 5, 6

On a fallen trunk of *Picea abies*, Pärnumaa Co., Saarde, Viisireiu, 19 Oct. 1996, leg. U. Kõljalg, 159558; on mycelial ropes of a basidiomycete, Viljandimaa Co., Kolga-Jaani Comm., Alam-Pedja Nature Reserve, Umbusi-Epruraba zone, 25 Aug. 1997, leg. U. Kõljalg & K. Põldmaa, 159677 (97-43).

The genus, containing two species, differs from *Hypomyces* mainly due to its disarticulating ascospores. We observed small apiculi (1-2 μm) in both collections. These have probably been overlooked by earlier authors (e.g. Arnold, 1985; Doi, 1972; Moravec, 1956). *Arachnocrea stipata* grows mainly on wood or bark of decaying logs, some collections have been reported also from polypores. In 159677 mycelial ropes of an unidentified basidiomycete are seen in close proximity to the subiculum of *A. papyracea*. In the case where there is no hint of a fungal host we still can not rule out the possibility that the fungus may obtain nutrients from hyphae inside the wood. The species is known from North America and several countries in Europe.

Besides one culture, isolated by Walter Gams from mass of ascospores (CBS 356.80), it has not been possible to germinate the ascospores of *A. stipata* despite attempts with several collections (Arnold, pers. comm.) and its anamorph has not been described. While observing the ascospores from 159677 on MEA their very slow germination was noticed. The cultures inoculated from mass of ascospores, on the other hand, grow moderately fast, reaching 10-20 mm diam in a week. The colonies are cottony, white, reverse not coloured; the margin is even or irregular in some parts. Conidiation is good. There is no odour. Conidiophores arise from aerial hyphae, not differentiated from these, ascending, 2.5-5.5 μm wide, verticillately branched. Conidiogenous cells are borne on conidiophores but mostly on lateral branches that are 11-75 μm long and 2-3 μm wide, arising

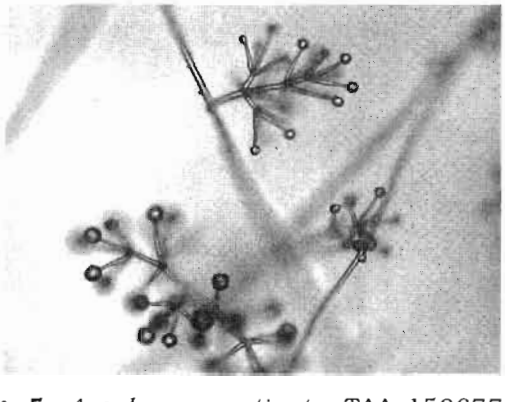


Fig. 5. *Arachnocrea stipata*, TAA 159677. Intercalary parts of conidiophores with conidiogenous cells and conidia in drops of liquid; from MEA.

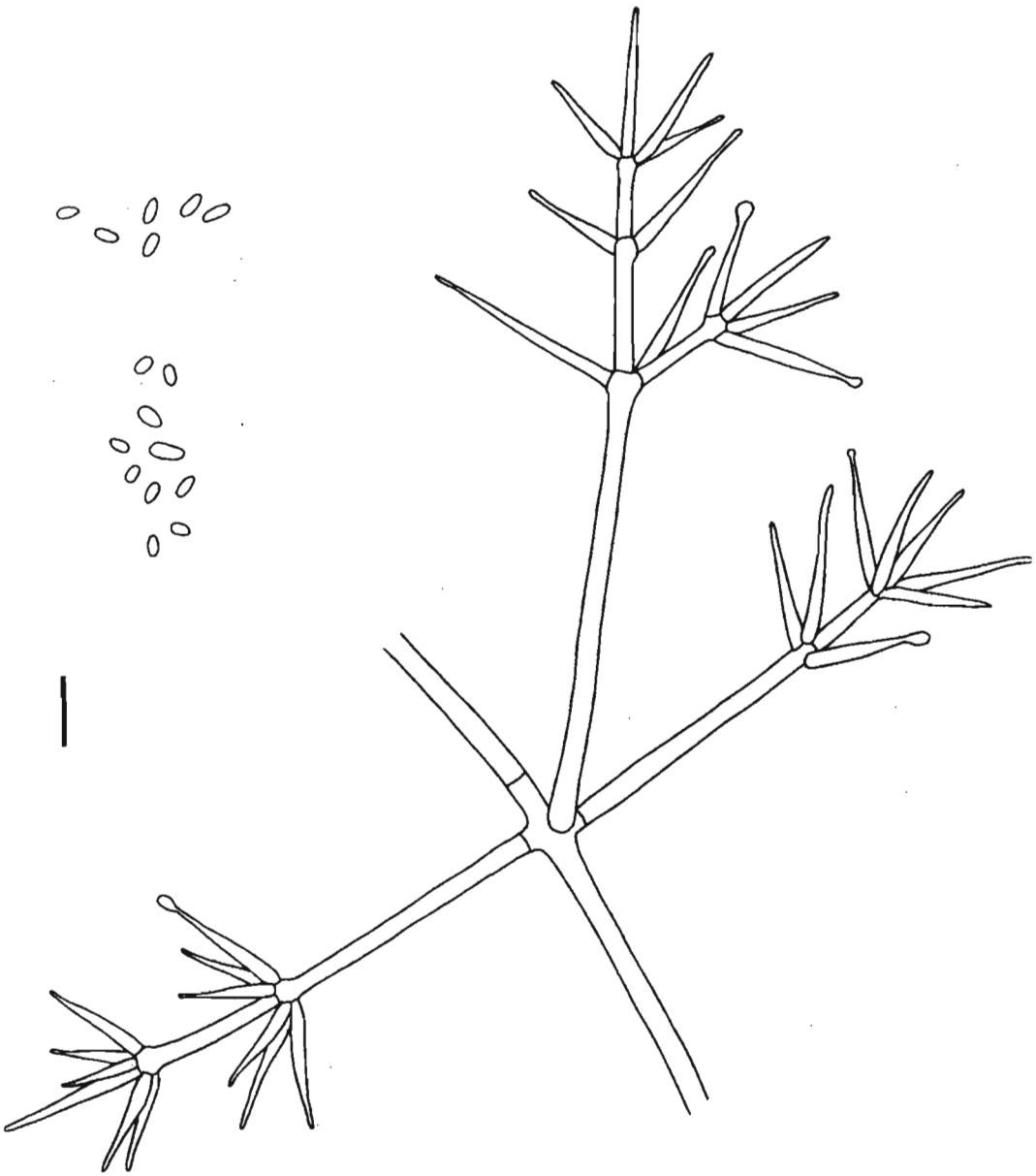


Fig. 6. *Arachnocrea stipata*, TAA 159677. An intercalary part of the conidiophore with conidiogenous cells, conidia; from MEA. Scale bar = 10 μm.

at right angles, usually in opposite position or seldom three or four formed from one point on the conidiophore, simple or giving additional side branches. Conidiogenous cells are placed by 3-8 in a verticil; subulate, 13-26 μm long, attenuated from 1.5-2.5 μm at the base to 1 μm at the tip; with a terminal conidiogenous locus that produces several conidia. Conidia ellipsoidal, straight, some slightly attenuated at base, top rounded, 2.9-5.0 x 1.3-2.4 μm, M = 3.9 x 1.8 μm (n=60), aseptate, hyaline, without a basal hilum; held in slimy heads. Chlamydospores not observed.

The isolate described above agrees well with that observed in CBS 356.80 (W. Gams, pers. comm.). The anamorph shows similarities to the

species of *Trichoderma* in the repeatedly verticillate branching of the condiophores and the branches arising mostly at right angles. Regarding the verticillately displaced conidiogenous cells it reminds species of *Verticillium* and the anamorph of *Protocrea delicatula* (Tul.) Petch that has been described to be of the *Verticillium*-type (Doi, 1972).

***Hypocrea pallida** Ellis & Everhart, Journ. Myc. 2: 65. 1886.
A: *Gliocladium* sp.

On *Oligoporus caesius* (?), Pärnumaa Co., Nigula Nat. Reserve, 17 Sep. 1996, 169600 (96-85); on *Trametes* sp., Võrumaa Co., Paganamaa, 2 Oct. 1997, K. Põldmaa, 169906 (97-168); Võrumaa Co., Paganamaa, 2 Oct. 1997, K. Põldmaa, 169917 (97-135²).

A: *Oligoporus* sp. - 169075 (97-129); on *Trametes ochracea* - 170006; on a polypore - 169985 (98-67), 169977 (98-70), 169998.

Despite possessing a *Gliocladium* anamorph that is almost identical to the anamorph of *S. aureonitens*, the taxonomic position of *Hypocrea pallida* is yet unknown. However, it has been shown to be more closely related to the species of *Hypomyces* and *Sphaerostilbella* than to other species of *Hypocrea* (Põldmaa et al., 2000; Rehner & Samuels, 1995; Spatafora & Blackwell, 1993).

H. pallida has been collected from Europe (Denmark, Germany), Canada, U. S. A., Guiana, Gabon, Japan and New Zealand. Doi & Yamatoya (1989) have reported the formation of perithecia in some ascosporic isolates but generally the species is not known to produce perithecia in culture (Samuels, pers. comm.). I obtained mature perithecia in a culture that was inoculated from conidia (97-135) on MEA although there was no perithecial formation observed on the host.

Sphaerostilbella

The genus is characterized by producing yellow to orange perithecia on a concolorous, thin, effused subiculum that is formed on wood-decaying aphyllophores (Seifert, 1985). It differs from *Hypomyces* in having comparatively small, naviculate to ellipsoidal non-apiculate ascospores with an echinulate wall, and *Gliocladium* anamorphs. Both species treated below have originally been described as belonging to *Hypomyces*, and have only recently been considered to be congeneric with *S. lutea*, the type species of the previously monotypic *Sphaerostilbella*. Analyses of ribosomal genes have revealed the close relationship of the species of *Sphaerostilbella* to *Hypomyces* (Rehner & Samuels, 1995; Spatafora & Blackwell, 1993).

***S. aureonitens** (Tul.) Seifert, Samuels & W. Gams, Stud. Mycol. 27: 145. 1985.
A: *Gliocladium penicilloides* Corda, Ic. Fung. 4: 31. 1840.

On *Stereum hirsutum* - Tartumaa Co., Laeva Comm., Alam-Pedja Nat. Reserve, Tõllassaare zone, Laeva Forestry, sq. 219, 28 Aug. 1997, E. Parmasto, 169817; on *Stereum subtomentosum* - Tartumaa Co., Võnnu, Terikeste., 26 Aug 1996, K. Põldmaa, 169515 (96-77); Tartumaa Co., Laeva Comm., Alam-Pedja Nat. Reserve, Tõllassaare zone, 15 Sep. 1997, E. Parmasto, 167271 (97-144); Võrumaa Co., Paganamaa, 2 Oct. 1997, K. Põldmaa, 169897.

A: On *S. hirsutum* - 169912; on *S. rugosum* - 169885; on *S. sanguinolentum* - 161419 (94-88); *S. subtomentosum* - 161265, 169899, 169909, 169994.

S. aureonitens, probably a cosmopolitan species, is rather common in Estonia, especially in its conidial stage. It grows mostly on the basidiomata of *Stereum* species and has been collected from the end of August till beginning of October. Although being reported from several European countries (Arnold, 1970b, Samuels, 1976), *S. aureonitens*, especially its teleomorph, is only rarely mentioned in the local lists that usually contain the well-known species of *Hypomyces*.

S. berkeleyana (Plowr. & Cooke) Samuels & Candoussau, Mycologist 9: 12. 1995.

A (associated): *Gliocladium* sp.
Fig. 7

On *Stereum hirsutum* - Jõgevamaa Co., Alam-Pedja Nat. Reserve, Nõmmeotsa, 24 Oct. 1998, K. Põldmaa, 169996; Tartumaa Co., Alam-Pedja Nat. Reserve, Võiviku Bog Island, 24 Oct. 1998, K. Põldmaa, 170004; on *Stereum* sp., Viljandimaa Co., Kolga-Jaani Comm., Alam-Pedja Nat. Reserve, Umbusi-Epruraba zone, 25

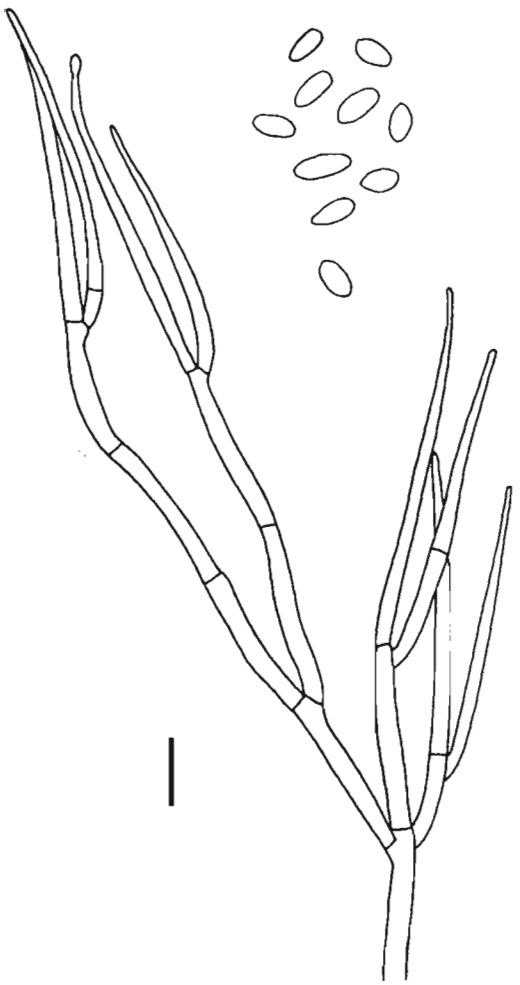


Fig. 7. *Sphaerostilbella berkeleyana*, TAA 169786. The upper part of a conidiophore with conidiogenous cells, conidia. Scale bar = 10 μm.

Aug. 1997, K. Põldmaa, 169786 (97-47);

A: On *Stereum hirsutum* - 169838, 169901 (97-134), 169902; Jõgevamaa Co., Alam-Pedja Nat. Reserve, Võiviku Bog Island, 24 Oct. 1998, K. Põldmaa, 170005; on *Stereum subtomentosum* - 169670; Tartumaa Co., Võnnu, Terikeste, 26 Aug. 1996; 169900.

S. berkeleyana is known from Europe (Denmark, Germany, Great Britain, Russia), Asia (Russia) and New Zealand growing on basidiomata of *Stereum* species. It has been considered to be an uncommon species (Candoussau and Magni, 1995). We have found the teleomorph only twice but presume that the anamorph may be more common though overlooked because of the confusion with its name and the description. *Acremonium berkeleyanum* (Karsten) W. Gams (= *Verticillium berkeleyanum* Karsten) is the anamorph of *Nectria vilior* Starb., not of *S. berkeleyana* (Gams, 1997) as considered by Arnold (1970b), who also briefly described the anamorph in culture. An anamorph, similar both to *Gliocladium* and *Verticillium* species was found growing next to the perithecia in the teleomorphic collections as well as in the reported conidial collections. The colonies of 97-47 grow slowly, reaching 7-10 mm diam in 7 d, salmon. Conidiophores are penicillately branched in the upper part. Conidiogenous cells are borne by 2-4, 40-80 μm long and 2.7-3.5 μm wide at the base. Conidia are ellipsoidal, hyaline, 5.3-8.0 x 2.5-3.8 μm, M = 6.6 x 3.1 (n=30), one-celled. I was not able to germinate the ascospores and therefore cannot confirm the conspecifity of these anamorphs with *S. berkeleyana*, that though seems very likely.

DISCUSSION

The data reported in the present paper considerably increase the number of species of *Hypomyces* and related fungicolous genera known to occur in Estonia. This broadens our knowledge of the geographic distribution of several species either on the European or also on the world scale. Finding *H. polyporinus*, *H. sympodiophorus* and *H. viridigriseus* (though only as anamorphs) in Estonia confirms that their distribution is not restricted to North America as might have been assumed. Estonian records of the anamorph of *H. pseudopolyporinus* and *H. subiculosus* show that these species, previously known only or mainly from tropical and subtropical regions, are present also in the temperate zone. The seeming rarity of some species owing to the scarcity of records in literature may be misleading too. *Hypomyces broomeanus* and *H. chrysostomus* are host-specific species for both of which only limited localities in Europe are known. Our

observations show that their real frequency, though, can be estimated by purpose-directed search of the host basidiomata.

Although this paper is not dealing with the taxonomic problems of the species considered, the problem of distinguishing between morphologically very similar species could not been avoided. *Cladobotryum compactum* and *Hypomyces* sp. were found to possess anamorphs almost identical to that of *H. subiculosus*, known as a common species in tropical and subtropical regions. It remains unclear whether all these three anamorphic specimens are conspecific or represent closely related sibling species of *H. subiculosus*. The great similarities may be also caused by convergent evolution of the anamorphs, a phenomenon common among pleomorphic fungi. In a group of aphyllophoricolous *Hypomyces* species the diagnostic value of teleomorphic characters has been shown to be limited with characteristic anamorphs appearing to be more informative for species recognition (Põldmaa & Samuels, 1999). However, the present example adds evidence for the opposite case, reported for a couple of species also in the previous paper.

One of the aims of the paper was to find phenological differences among the species dealt with. We did not carry out special field observations or experiments but only collected and compared the dates on the labels of the specimens. The only resulting conclusion is the strong dependence of the recording of considered species on the active field work periods of mycologist in Estonia (mainly from the end of August till the end of October). The occurrence is also dependent of the formation of basidiomata of the host. It seems safe to say that species growing on tough perennial basidiomata of polypores and sometimes also on wood or bark of decaying trees, could be found almost throughout the year. Species of *Hypomyces* occurring on the soft ephemeral basidiomata of agarics are found mostly in August and September when the formation of host basidiomata is most abundant.

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