The genus *Tremella* (Basidiomycota, Tremellales) in Finland

Emilia Pippola¹,* & Heikki Kotiranta²

¹) Department of Biology, P.O. Box 3000, FI-90014 University of Oulu, Finland (*corresponding author's e-mail: epippola@paju.oulu.fi)
²) Finnish Environment Institute, Research Department, P.O. Box 140, FI-00251 Helsinki, Finland (heikki.kotiranta@ymparisto.fi)

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Sixteen species of *Tremella* Pers. are currently known from Finland. Fifteen of them are illustrated and described, and a key to all Finnish species is given. *Tremella cetrariicola* Diederich & Coppins, *T. cladoniae* Diederich & M.S. Christ., *T. giraffa* Chee J. Chen, *T. globispora* D.A. Reid, *T. phaeophysciae* Diederich & M.S. Christ., *T. polyporina* D.A. Reid and *T. ramalinae* Diederich are reported as new to Finland.

Key words: Basidiomycota, fungicolous, heterobasidioid, lichenicolous, parasitism, taxonomy, *Tremella*, Tremellales

**Introduction**

Heterobasidioid fungi are poorly known in Finland. They have largely been overlooked since the early studies of P. A. Karsten (1834–1917), except for fragmentary notes in the literature (e.g., Laurila 1939, Lowy 1960, Ryman & Holmåsen 1987, Ohenoja 1996, Hansen & Knudsen 1997, Salo et al. 2006) and studies of resupinate heterobasidiomycetes (Kotiranta & Saarenoksa 1993, 2005). As a result there is not even much data on basic species composition. When we began the study of the genus *Tremella*, only nine species had been reported in Finland (Torkelsen 1997, Kotiranta & Saarenoksa 2000). The number of species was low as compared with the 25 *Tremella* species reported in the Nordic countries, and the distribution and abundance of the species were insufficiently known (Torkelsen 1997). The species were also commonly confused with other heterobasidioid fungi, especially those in the genus *Exidia* and in the order Dacrymycetales. The former group is easily distinguished from *Tremella* species by their allantoid spores and the latter group by their forked basidia.

**Material and methods**

Approximately 600 *Tremella* specimens were examined for the present study. The material is preserved in the herbaria H, JYV, K, KUO, O, OULU, S, TUR, UPS and/or in the personal herbarium of Heikki Kotiranta (H.K.).

Data on the distribution, abundance and ecology of *Tremella* species in Finland are based on these collections. For each species, except *T. cladoniae* which was added at the last moment, seven to nine specimens were selected for accurate measurements. Where less than seven specimens
exist, all were included. At least thirty spores per specimen were measured, where present. None of the measurements derives from spore prints. Basidio measurements do not include stalks. All measurements were made using x1000 or x1500 magnification and oil immersion. An eyepiece scale bar with 1 μm grid was used, and dimensions were estimated subjectively with an accuracy of 0.1 μm. The basic mountant medium used was 5% KOH. The spore measurements for each specimen are given in Table 1.

In the table, text and illustrations selected specimens are marked with the collector’s name and collecting number or year; the herbarium label data is included if needed to separate specimens of the same species. The following abbreviations are used in the table and text: \( L = \) mean length, \( W = \) mean width, \( Q = L/W \), \( Q^* = \) mean \( L/W \) ratio.

Table 1. Spore dimensions (μm) of selected specimens except for *Tremella cladoniae*. Specimens are marked with collector’s name and collecting number or year; herbarium label is included if needed to separate specimens of the same species. \( n = \) number of measured spores. The values set in boldface include at least 90% of the spores.

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*continued*
### Table 1. Continued.

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<td>4.0–4.5</td>
</tr>
</tbody>
</table>
$n =$ number of measured structures from given number of specimens (e.g., 210/7 means 210 structures measured from seven specimens). In case of size, the entire range is given in parentheses. The 90% range excluding the extreme 5% values from both ends is given outside parentheses. Where values are identical, parentheses are omitted. The entire $Q$ range is given without parentheses.

Biogeographical provinces and collecting sites are indicated according to Heikinheimo and Raatikainen (1981). The name “spruce” or “Picea” refers to *Picea abies*, “pine” or “Pinus” to *Pinus sylvestris* and “birch” or “Betula” to both *Betula pendula* and *B. pubescens*. The distribution maps were created by Raino Lampinen (Botanical Museum, Finnish Museum of Natural History) using the DMAP for Windows software by Dr. Alan Morton. The maps show the collecting sites in the 10 x 10 km squares of the Finnish uniform grid coordinate system (KKJ3) as well as the boundaries of the biogeographical provinces. If more than one collection of the same species comes from the same 10 x 10 km square, only one spot is shown. The illustrations are based on microscope drawings made with a drawing tube. Photographs are taken with an Olympus Camedia C-7070 attached to a binocular microscope or Sony Cyber-shot DSC-W15.

The nomenclature of *Tremella* is provided in the text, along with descriptions of the species. The nomenclature of other fungi, including lichenized species, follows *Index Fungorum* (http://www.indexfungorum.org) whilst the nomenclature of vascular plants follows Tutin et al. (1964–1980). The authors of the names are given in these sources and are not generally repeated here. In citations of the type specimens, nomenclature is given in its original format, and an exclamation mark (!) after herbarium acronym indicates that the type specimen was examined. The species are arranged in alphabetical order.

**Tremella** Pers.


Species of the cosmopolitan genus *Tremella* are extremely variable in appearance, including size, form and colour. Some of the species have large, gelatinous, foliose, lobate or cerebriform basidiomata looking like traditional jelly fungi, whilst the basidiomata of others are cryptic or even macroscopically invisible. Lichenicolous species often grow within galls induced in the host lichen. Nonetheless, all have characteristics in common. All the species in the genus appear to be parasitic: they grow on, in association with, or in the hymenium of other fungi.

Microscopically the genus is characterised by globose to subglobose or ovoid basidia which become longitudinally or irregularly (e.g. obliquely or transversely) septate. Basidia are two- to four-celled or exceptionally one-celled, and each cell bears an elongated sterigma variable in length. The hymenium is typically amphigenous with abundant probasidia. Spores are globose to ellipsoid, smooth, thin-walled, hyaline to slightly coloured and have a distinctive apiculus. Some spores form secondary spores or germinate by germ tubes. The yeast phase occurring in the life cycle originates via budding of the spores or secondary spores. Hyphae are typically clamped, but simple-septate hyphae occur in a few species. Haustoria are normally present, clamped and consisting of a haustorial mother cell with one or more haustorial filaments. Hyphidia are observed in a few species, but usually they are reduced or absent. Swollen cells are present in many species, and vesicles are occasionally observed. Cystidia are absent. Most of the species have a conidial stage. Conidia, or in the case of some lichenicolous species astroconidia, typically originate from conidiogenous cells.

**Key to the Finnish species of Tremella**

1. Basidiomata not macroscopically visible, in the hymenium of other fungi ................................................................. 2.
2. Distinct basidiomata or galls ............................................. 4.
3. In the hymenium of polypores .......................... *T. polyporina*
4. In the hymenium of heterobasidioid *Dacrymyces* species ................................................................. 3.
5. Basidia typically without stalks, conidia present, hyphae with real clamps ............................................ *T. obscura*
6. Basidia typically with stalks up to 18 μm long, conidia absent, hyphae with pseudoclamps ........... *T. giraffa*
7. On lichens ................................................................. 5.
8. On wood or on non-lichenized fungi ................. 10.
9. Spores typically ellipsoid ($Q^* = 1.2$), basidiomata pale
Tremella cetrariicola Diederich & Coppins (Plate 1a, Figs. 1–2)


Basidiomata cushion-like, discoid or somewhat spherical, 0.2–1.5 mm in diam., typically with a central depression and, especially in larger basidiomata, basally constricted, surface smooth, gelatinous, brown to dark brown or almost black, rose or pale brown when young, white interior consisting of lichen thallus.

Spores hyaline, thin-walled, ellipsoid, (4.2–)5.8–9.6(–10.4) × (3.8–)4.2–7.9(–9.8) µm, L = 7 µm, W = 5.8 µm, Q = 0.9–1.9, Q* = 1.2 (n = 120/4), apiculus at least partially refractive, germinating by germ tubes or forming secondary spores.

Basidia very rarely stalked, 2.4–13.3 × 1.6–2.4 µm (n = 5/2), two- or infrequently four-celled, smooth, hyaline, longitudinally, obliquely or infrequently almost transversely septate, usually subglobose or ellipsoid, occasionally oblong, (9.8–)10.2–17.4(–23.1) × (6.5–)6.7–11.9(–12.2) µm, L = 13.2 µm, W = 9 µm, Q = 1.0–2.9, Q* = 1.5 (n = 58/4), sterigmata up to ca. 32 µm long, (1.4–)1.8–3.9(–4.1) µm in diam.

Conidia-like cells observed in all specimens, but they could be secondary spores or haustorial mother cells. Conidia-like cells smooth, hyaline, thin-walled, subglobose to oval or ellipsoid, (2.8–)2.9–6.3(–7.3) × (1.8–)2.3–4(–4.5) µm, L = 4.3 µm, W = 3 µm, Q = 1.0–2.4, Q* = 1.5 (n = 45/4).

All hyphae simple-septate, smooth, hyaline, (0.8–)1.5–4.1(–5.5) µm in diam. (n = 65/4), thinto slightly thick-walled (up to 0.6 µm), occasionally with oil drops. Occasional basidia and haustoria with a basal clamp or clamp-like structure.

Haustoria abundant. Haustorial mother cells smooth, hyaline, subglobose to ellipsoid, (2.2–)2.4–4.9(–5.5) × (1.9–)2.1–3.7(–4) µm, L = 3.5 µm, W = 2.8 µm, Q = 0.8–2.4, Q* = 1.3 (n = 55/4), each mother cell bearing a single haustorial filament 0.5–1 µm in diam., up to 12 µm long, rarely branched.

Swollen cells, vesicles and hyphidia absent.

ECOLOGY. In Finland T. cetrariicola is found on the thalli of Cetrariella delisei and Tuckermanopsis chlorophylla. In addition to these hosts, it is known to occur on Tuckermanopsis americana and Tuckermanopsis ciliaris (Diederich 1996). The former is not reported from Finland and the latter is extinct (Vitikainen et al. 1997).

The Finnish collections of T. cetrariicola were made from June to October, and it seems to prefer spruce-dominated forests.
Distribution and abundance. Though there are only four collections of *T. cetrariicola* from Finland (Fig. 2), we do not consider it a threatened species. Even on the basis of these few specimens, the distribution of *T. cetrariicola* seems to be wide. In addition to the Finnish collections, there is one collection in H from Russia close to the Finnish border. The host species *C. delisei* and *T. chlorophylla* are widespread and common in Finland (Vitikainen et al. 1997), and it supports the idea that the distribution of *T. cetrariicola* is wide as well. *Tremella cetrariicola* has been reported from Sweden, Scotland, Canary Islands, Canada, the U.S.A. (Diederich 1996), Austria (Triebel 1999), Estonia (Suija 2005) and Russia (Zhurbenko 2007). This is the first Finnish record.

Notes. The brown basidiomata with a central depression and constricted base as well as the ellipsoid spores with refractive apiculus are characteristic of *T. cetrariicola*. The other lichenicolous *Tremella* species have differently shaped spores.


*Tremella cladoniae* Diederich & M.S. Christ.
in Diederich, Bibl. Lichenol. 61: 65. 1996. — Type: Ger-
The genus Tremella in Finland

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many. Schwarzwald, Bernau, Spiesshorn, on Cladonia sp., 1.VIII.1916 G. Lettau s.n. (holotype B 93630; isotype herb. Diederich).

This is the first record from Finland. For a detailed description of the species, see Diederich (1996).

Specimen examined. Finland. Varsinais-Suomi: Halikko, Vaisakko, rich grass-herb forest, on Cladonia coniocraea on decaying wood, 2007 Hyvärinen 586 & Syrjänen (H).

Tremella encephala Pers. : Fr. (Plate 1b, Figs. 2–3)


For further synonyms, see Bandoni (1961).

Basidiomata rose- or brownish orange, sometimes slightly greyish, gelatinous, cerebriform, up to 3 cm in diam., with a white firm core consisting of the hyphae of Stereum sanguinolentum.

Spores hyaline, subglobose, (6–)7.4–11(–12) × (5–)6.2–9.9(–11.6) µm, L = 9.1 µm, W = 8.2 µm, Q = 0.9–1.4, Q* = 1.1 (n = 212/7), apiculus distinctive, oil drops common, some forming subglobose to ellipsoid secondary spores or germinating by germ tubes.

Basidia four- or occasionally two-celled, mostly longitudinally septate, basally clamped, hyaline, globose or subglobose, (11.8–)12.1–17.8(–19.8) × (10.5–)12.3–19.6(–21.6) µm, L = 15.1 µm, W = 16 µm, Q = 0.8–1.2, Q* = 1.0 (n = 114/7), oil drops common, sterigmata up to ca. 100 µm long, (1.7–)1.9–3.7(–3.9) µm in diam., frequently apically swollen up to 6.1 µm in diam.

Terminal and subterminal swollen cells abundant close to the substrate and the core, occasional elsewhere. Swollen cells smooth, hyaline, globose, ellipsoid, citriform, ovoid or oblong,
(5.1–)5.9–13.6(–14.8) × (4.1–)5.3–9.6(–12) µm, 
$L = 9.5 \mu m$, $W = 7 \mu m$, $Q = 1.0–2.4$, $Q^* = 1.4 (n = 106/7)$, walls normally up to 0.6 µm, occasionally up to 1.8 µm thick.

Hyphae clamped, smooth, hyaline, (1.2–)1.8–4.4(–6) µm in diam. $(n = 112/7)$, mostly thin- to slightly thick-walled (up to 0.6 µm), here and there very thick-walled (up to 1.8 µm), anastomoses frequent, especially close to the dense core where the hyphae are intermixed with those of *S. sanguinolentum*.

Hyphidia abundant close to the substrate, to some extent also in hymenium and subhymenium. Hyphidia smooth, hyaline, (2.1–)2.4–5.8(–7.1) µm in diam. $(n = 107/7)$, thin- to slightly thick-walled (up to 0.4 µm), occasionally thick-walled (up to 1.6 µm). The hyphidia may be confused with hyphal tips or elongated swollen cells.

Haustoria abundant close to the core, rare elsewhere. Haustorial mother cells hyaline, globose, ellipsoid or oblong, 2.4–5.5(–6.1) × (1.9–)2.1–4.5(–5.5) µm, $L = 3.9 \mu m$, $W = 3 \mu m$, $Q = 0.9–2.5$, $Q^* = 1.4 (n = 99/7)$, each bearing one to four haustorial filaments, not more than 1 µm in diam., up to 14 µm long, rarely branched.

Conidial stage and vesicles absent.

**Ecology.** *Tremella encephala* parasitizing *Stereum sanguinolentum* was the first *Tremella* species proved to be a parasite (Bandoni 1961). In almost half of the Finnish collections *T. encephala* occurs either on (3 specimens studied) or with (47 specimens studied) basidiomata of *S. sanguinolentum*.

The habitats of *T. encephala* are coniferous and mixed forest of various ages, and it seems to be restricted to coniferous wood (Table 2). Even though *T. encephala* is occasionally reported to grow on angiosperms (e.g. Olive 1946a, Bandoni 1961), the single Finnish collection from birch may be a misidentification. Basidiomata are visible all year round, but are most commonly found from September to November.

**Distribution and abundance.** In Finland *T. encephala* is commonly found in the boreal zone where *Pinus* and *Picea* occur (Fig. 2). Worldwide it is recorded in most parts of Europe (Jülich 1984, Krieglsteiner 2000), North America (Ban-

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**Table 2.** Substrates of *Tremella encephala*, *T. foliacea* and *T. mesenterica*.

<table>
<thead>
<tr>
<th>T. encephala</th>
<th>T. foliacea</th>
<th>T. mesenterica</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conifers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Picea abies</em></td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td><em>Pinus sylvestris</em></td>
<td>91</td>
<td>8</td>
</tr>
<tr>
<td>Unidentified conifers</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Angiosperms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Alnus</em> spp.</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td><em>Betula</em> spp.</td>
<td>1</td>
<td>41</td>
</tr>
<tr>
<td><em>Caragana arborescens</em></td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td><em>Corylus avellana</em></td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td><em>Fraxinus excelsior</em></td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><em>Phellodendron amurense</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Populus tremula</em></td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td><em>Prunus padus</em></td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td><em>Quercus robur</em></td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td><em>Rhamnus frangula</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Ribes alpinum</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Salix</em> spp.</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td><em>Sambucus racemosa</em></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><em>Sorbus aucuparia</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Syringa vulgaris</em></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><em>Tilia</em> spp.</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Ulmus</em> spp.</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>Unidentified angiosperms</td>
<td>9</td>
<td>26</td>
</tr>
<tr>
<td><strong>Unknown substrates</strong></td>
<td>119</td>
<td>137</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>119</td>
<td>137</td>
</tr>
</tbody>
</table>

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The genus Tremella in Finland

The parasitic relationship gives the rose-coloured basidiomata of *T. encephala* a characteristic feature: the white, firm core is composed of host hyphae. In addition, basidiomata of the host are often present.

**Notes.** The parasitic relationship gives the rose-coloured basidiomata of *T. encephala* a characteristic feature: the white, firm core is composed of host hyphae. In addition, basidiomata of the host are often present.


**Tremella foliacea** Pers.: Fr. s. lato (Plate 1c, Figs. 4–5)


? Tremella frondosa Fr., Syst. mycol. 2 (Lundae): 212. 1822. — Proposals for synonymy made e.g. by Coker (1920) and Looney (1933), but T. frondosa is also suggested to be synonymous with T. aurantia Schwein. : Fr. (Roberts 1995).

Basidiomata gelatinous, pale brown to almost black, becoming foliate or lobate in maturity, from one to over 10 cm in diam.

Spores hyaline to pale brown, globose to ellipsoid, (6–)6.5–10(–11.4) × (4.5–)5.9–9.4(–9.8) µm, L = 8.2 µm, W = 7.3 µm, Q = 0.9–1.5, Q* = 1.1 (n = 210/7), apiculus distinctive, oil drops common, some forming secondary spores or germinating by germ tubes.

Basidia four- or occasionally two-celled, longitudinally of obliquely septate, basally clamped, hyaline to pale brown, globose to subglobose or ovoid, (9.4–)11–19.2(–20.2) × (9.4–)10–15.9(–19.8) µm, L = 14.1 µm, W = 13.4 µm, Q = 0.7–1.9, Q* = 1.1 (n = 132/7), oil drops common, infrequently new basidia originating.

Plate 2. — a: Tremella indecorata (right arrow), specimen Pippola 80 on Diatrype bullata (left arrow), photographed dry. — b: Tremella karstenii, specimen Inarin Lappi: Utsjoki, Paistunturit, on Juniperus communis, 2005 Pippola 398 (OULU F069353), photographed fresh. — c: Tremella mesenterica, specimen Inarin Lappi: Utsjoki, Paistunturit, on Betula, 2005 Knuttila (OULU F069526), photographed fresh. — d: Tremella mycetophiloides (arrows), specimen Kotiranta 11860, photographed dry. — e: Tremella phaeophysciae (arrow), specimen Haaken 1927 (OULU F073618), photographed dry. — f: Tremella rama-lineae (arrow), specimen Haakana 1964, photographed dry.
from existing basidia, sterigmata up to ca. 75 µm long, (1.6–)1.8–3.8(–3.9) µm in diam., often api-
cally swollen up to 5.8 µm in diam.

Conidia commonly, but not always, observed close to the substrate and occasionally elsewhere, originating from swollen or conidiogenous cells. Conidia hyaline, smooth, thin-walled, globose, ellipsoid or oblong, (1.9–)2.4–5.4(–5.9) × (1.1–)1.6–3.8(–4.2) µm, L = 3.9 µm, W = 2.3 µm, Q = 1.0–3.1, Q* = 1.8 (n = 120/4).

Terminal and subterminal swollen cells observed especially close to the substrate. Swollen cells smooth, hyaline, pale brown or brown, variable in size and form, globose, ellipsoid, oblong or cylindrical, (5.1–)6.5–39.1(–53.3) × (2.3–)5.7–31(–51.1) µm, L = 14.7 µm, W = 11.1 µm, Q = 0.9–2.6, Q* = 1.4 (n = 147/7), thin- to very thick-walled (up to 1.6 µm), occasionally extremely thick-walled (up to ca. 4 µm).

Hyphae clamped, smooth or gelatinous, hyaline to pale brown, (1.5–)1.9–6.3(–11.8) µm in diam. (n = 117/7), thin- to very thick-walled (up to 1.8 µm).

Haustoria few or abundant, occurring especially close to the substrate, originating from hyphae or swollen cells. Haustorial mother cells basally clamped, hyaline or pale brown, subglobose, ellipsoid or oblong, (3.4–)3.8–6.1(–6.9) × (2.1–)2.4–4.1(–5.5) µm, L = 4.6 µm, W = 3.4 µm, Q = 1.4–2.9, Q* = 1.4 (n = 93/7), each bearing one or a few haustorial filaments, 0.5–1.5 µm in diam., up to ca. 60 µm long, branched or unbranched.
Vesicles and hyphidia absent.

Ecology. *Tremella foliacea* is presumably a parasite of *Stereum* species (Roberts 1999, Torkelsen 2005). In Finland it is noted together with *Stereum hirsutum* (2 specimens studied), *Stereum rugosum* (4 specimens studied) and *Stereum subtomentosum* (1 specimen studied). *Tremella foliacea* is clearly more common on deciduous wood, but occurs occasionally on conifers (Table 2). Its basidiomata exist all year round. Most commonly they are found from August to October, and they are edible (Boa 2004). *Tremella foliacea* seems to prefer herb-rich forests, but it occurs frequently also in pastures, gardens, coniferous forests, as well as in peatlands and virgin forests.

Distribution and abundance. *Tremella foliacea* is a common species found almost throughout Finland (Fig. 5). Worldwide it is known from North (Coker 1920, Martin 1952), Central (Lowy 1971) and South America (Roberts 1999), Australia (Roberts 1999), Asia (Kobayasi 1939, Teng 1996, Chen 1998), Africa (Wojewoda 1981) and Europe (e.g. Wojewoda 1981, Jülich 1984, Torkelsen 1997, Roberts 1999).

Notes. Brown to almost black, foliose basidiomata are specific to *T. foliacea*. However, it is a very variable species in many respects such as substrate, colour, presence of conidia and spore size. For instance, depending on author the conidia are either absent (e.g. Neuhoff 1931, Martin 1952, Chen 1998) or present (e.g. Kobayasi 1939, Lowy 1971, Wojewoda 1981, Roberts 1999). Because of the huge variability, *T. foliacea* has been described several times with numerous variations. Now most of them are regarded as synonyms, but some might be good taxa. For instance, it is not sure if *T. foliacea* and *T. frondosa* are conspecific. If they are distinct, *T. frondosa* is distinguished from *T. foliacea* by its yellow to pale brown colour and presence of conidia (Chen 1998), or it may be synonymous with *T. aurantia* (Roberts 1995). Alternatively, the paler colour may be a result of exposure to liquid or rain (Kobayasi 1939).

Since the concept of the species is not well established, we prefer to use *T. foliacea s. lato*. As noted by Chen (1998), a good specimen should be selected as a neotype for *T. foliacea* from Europe where it was originally described. Such a neotypification could help the study of this complex.


*Tremella giraffa* Chee J. Chen (Figs. 6–7)

Bibl. Mycol. 174: 173. 1998. — Type: Germany. Tübingen,
Basidiomata not macroscopically visible, in the host hymenium.

Spores smooth, hyaline, thin-walled, globose to ellipsoid, \((5.7–)6.3–8.8(–9.9) \times (5–)5.9–8(–9.8) \, \mu m\), \(L = 7.6 \, \mu m\), \(W = 6.9 \, \mu m\), \(Q = 0.9–1.4\), \(Q^* = 1.1\) \((n = 61/2)\), apiculus distinctive, oil drops common, some germinating by germ tubes or forming secondary spores.

Basidia usually stalked, \((2–)2.1–17(–18) \times (1.1–)1.8–3.8 \, \mu m\) \((n = 31/2)\), two-celled, smooth, hyaline, thin-walled, longitudinally or occasionally obliquely or transversely septate, globose to ellipsoid, \((9.4–)9.8–14.9(–15.1) \times (8.4–)8.8–13.1(–14) \, \mu m\), \(L = 12.5 \, \mu m\), \(W = 11.3 \, \mu m\), \(Q = 0.9–1.4\), \(Q^* = 1.1\) \((n = 33/2)\), sterigmata up to ca. 50 \(\mu m\) long, \((2.1–)2.2–4(–4.8) \, \mu m\) in diam., often apically swollen up to 5.9 \(\mu m\) in diam.

Hyphae smooth, hyaline, \((1.7–)1.8–4.2(–4.3) \, \mu m\) in diam. \((n = 32/2)\), thin-walled (under 0.2 \(\mu m\)), oil drops common. Clamp-like structures, so-called pseudoclamps, near the septa observed instead of real clamps.

Haustoria abundant, originating from hyphae, basidia or stalks of basidia. Haustorial mother cells smooth, hyaline, thin-walled, globose to ellipsoid, \((2.3–)2.9–4(–4.2) \times 2.1–3.2 \, \mu m\), \(L = 3.4 \, \mu m\), \(W = 2.7 \, \mu m\), \(Q = 1.0–1.9\), \(Q^* = 1.3\) \((n = 30/2)\), each mother cell bearing one to three haustorial filaments 0.5–1 \(\mu m\) in diam., up to 21 \(\mu m\) long.
Conidial stage, swollen cells, vesicles and hyphidia absent.

Ecology. *Tremella giraffa* is parasitic in the hymenium of *Dacrymyces* species. In Finland it is found in the hymenium of *Dacrymyces minor*. It is also known to parasitize *D. stillatus* (Chen 1998) and *D. capitatus* (Van de Put 2000).

Distribution and abundance. This is the first record of *T. giraffa* from Finland. So far, it is known only from two localities (Fig. 7). Even though *Dacrymyces* species are deficiently known in Finland, they seem to be common and widespread. *Tremella giraffa* may be common and widespread as well. However, further studies are needed to understand its distribution and evaluate if it is a threatened, rare or abundant species. In addition to the type locality in Germany (Chen 1998), *T. giraffa* is found only in England, Hungary, Italy (Roberts 2007) and Belgium (Van de Put 2000), and it is deficiently known worldwide.

Notes. In addition to *T. giraffa*, there are three other *Tremella* species parasitizing *Dacrymyces* species: *T. obscura*, *T. occultifuroidea* and *T. penetrans*. *Tremella giraffa* is distinguished from the others especially by its pseudoclamps which are reminiscent of real clamps, but are not fully developed. Moreover, most of its basidia are stalked, haustoria as well as new basidia originate occasionally directly from basidia, and conidia are typically, but not necessarily (see Van de Put 2000), absent.


*Tremella globispora* D.A. Reid (Plate 1d, Figs. 7–8)


*Tremella tuberculata* Berk. sensu Bourdot and Galzin (1927), Neuhoff (1931), etc.

Basidiomata cushion-like and usually somewhat cerebriform, 1–3 mm in diam., larger only via coalescence, black when dry, greyish to blackish brown and slightly hyaline when soaked

Spores hyaline to brown, thin-walled, globose to subglobose, often wider than long, (5.4–)5.9–9.6(–10.2) × (5.4–)5.9–10.2(–12) µm, $L = 7.6 \mu m$, $W = 8.1 \mu m$, $Q = 0.8–1.2$, $Q^* = 1.0$ ($n = 90/3$), apiculus distinctive.
Basidium usually stalked, (2.4–)3.7–24.7(–27.8) × (1.9–)2–4.5(–5.4) μm (n = 50/3), basally clamped, two- or four-celled, longitudinally, obliquely or occasionally transversely septate, hyaline, pale brown or brown, sometimes thick- or very thick-walled (up to 2 μm), subglobose to ellipsoid, (12.3–)13.7–21.3(–22) × (11.4–)12–20(–20.8) μm. L = 17 μm, W = 15.3 μm, Q = 0.8–1.7, Q* = 1.1 (n = 51/3), sterigmata up to 63 μm long, (1.4–)1.8–4(–4.5) μm in diam., often collapsed.

A few swollen cells observed in subhyphalium close to the substrate, pale brown to brown, globose, ovoid or ellipsoid, (5.5–)5.8–10(–11.4) × (4–)4.3–7.9(–8.4) μm, L = 7.8 μm, W = 6.2 μm, Q = 0.9–1.9. Q* = 1.3 (n = 45/3), thin- to slightly thick-walled (up to 0.4 μm).

Hyphae clamped, smooth, hyaline, pale brown or brown, (1.4–)1.7–6.1(–8.1) μm in diam. (n = 65/3), thin- to very thick-walled (up to 2 μm). Wide and thick-walled hyphae common especially close to the substrate.

Haustorial mother cells hyaline to pale brown, globose, to ellipsoid or oblong, (1.9–)2–4.5(–5.4) μm (4–)4.3–7.9(–8.4) μm. Basidia usually stalked, (2.4–)3.7–24.7(–27.8) × (1.9–)2–4.5(–5.4) μm, Q = 0.8–2.6, Q* = 1.5 (n = 45/3), each mother cell bearing one or a few haustorial filaments up to 1 μm in diam. and 18 μm long.

Conidia are absent in Finnish *T. globispora* specimens, but according to Chen (1998) they do exist.

*Sebacina globospora* Whelden is not a synonym of *T. globispora* as e.g. Reid (1970) suspected. Both are associated with pyrenomycetous *Diaporthe* spp., but *S. globospora* lacks clamp-connections (Whelden 1935). *Sebacina globospora* is currently known as *Tremella diaporthicola* Ginns & M.N.L. Lefebvre (Ginns & Lefebvre 1993).


**Tremella hypocenomycis** Diederich (Plate 1e, Figs. 7 and 9)


Basidiomata gelatinous, somewhat irregular, grainy or cerebriform, 0.2–2 mm in diam., blackish brown to black when dry, pale brown to blackish brown when soaked.

Spores smooth, thin-walled, hyaline to slightly pale brown, globose or subglobose, (4.6–)5.4–7.6(–7.8) × (4–)5.5–7.6(–8.1) μm, L = 6.4 μm,
$W = 6.2 \mu m, Q = 0.9–1.2, Q^* = 1.0 (n = 20/2)$, apiculus remarkably broad.

Basidia two-celled, cells elongated and very variable in size, smooth, hyaline to pale brown, longitudinally or exceptionally obliquely septate, at the septum $(7.4–)8.4–17.6(–18.5) \times (9.6–)9.8–21.1(–23.7) \mu m, L = 12.4 \mu m, W = 13.7 \mu m, Q = 0.5–1.5, Q^* = 0.9 (n = 33/2)$, above the septum individual cells $2.4–7.4(–10.2) \mu m$ in diam., up to $25.5 \mu m$ long, sterigmata absent, possibly degenerated.

All hyphae simple-septate. Two kinds of hyphae observed: so-called context hyphae hyaline to pale brown, smooth, $1.1–2.7 \mu m$ (n = 34/2), thin-walled, so-called fertile hyphae usually pale brown to brown, smooth, $(2.3–)2.7–8.3(–8.6) \mu m$ in diam. $(n = 50/2)$, thick-walled (up to $1.4 \mu m$), individual cells short, sometimes almost globose.

Haustoria extremely abundant, originating mostly from fertile hyphae. Haustorial mother cells hyaline to brown, globose or subglobose, $(1.8–)2–4.4(–5.3) \times (2–)2.1–5.1(–5.6) \mu m, L = 3.1 \mu m, W = 3.3 \mu m, Q = 0.6–1.6, Q^* = 1.0 (n = 36/2)$, sometimes with walls slightly thickened (up to $0.4 \mu m$), each mother cell bearing one or occasionally a few haustorial filaments up to $1 \mu m$ in diam. and $10.5 \mu m$ long, sometimes slightly branched.

Conidial stage, swollen cells, vesicles and hyphidia absent.

**Ecology.** *Tremella hypocenomycis* occurs on the thallus of *Hypocenomyce scalaris*.

**Distribution and Abundance.** Until now, *T. hypocenomycis* was only known from the type locality. The specimen from Alavus (western Finland) is thus only the second record in the world (Fig. 7). Both specimens are old, and one might suggest the species is extinct. However, in the light of the distribution and abundance of its host (Vitikainen et al. 1997), this possibility seems to be unlikely. New specimens of *T. hypocenomycis* should be found to better understand its actual distribution, abundance and potential threats. At the moment the Red List status of *T. hypocenomycis* is impossible to evaluate.

**Notes.** The unusual basidia with elongated cells at maturity characterize *T. hypocenomycis*. Another lichenicolous *Tremella* species with similar basidia, *T. christiansenii* Diederich, has larger spores, viz. $9–12 \times 8.5–10.5 \mu m$ (Diederich 1996).


**Tremella hypogymniae** Diederich & M.S. Christ. (Plate 1f, Figs. 10–11)


Inducing galls or basidiomata on the host thallus. Gall frequent, pale yellow, pinkish, rose or brownish orange, many at least partially blackened, somewhat spherical, $0.1–2.5 \text{ mm}$ in diam., with a thin, gelatinous layer on the surface and a white interior consisting of lichen thal-
lhus. Basidiomata occasional, orange or brownish orange, slightly cerebriform, gelatinous.

Spores smooth, hyaline, thin- to relatively thin-walled, globose to subglobose, mostly wider than long, $(4.1–)5.1–7.9(–8.3) \times (4.9–)5.9–9.3(–10)$ µm, $L = 6.4$ µm, $W = 7.4$ µm, $Q = 0.6–1.3$, $Q^* = 0.9$ ($n = 179/7$), distinct apiculus frequently refractive, spores germinating by germ tubes.

Basidia extremely rarely short-stalked, 3.6–4.3 × 3.6–3.7 µm ($n = 2/2$), two- or exceptionally four-celled, cells sometimes variable in size, hyaline, longitudinally, obliquely or occasionally transversely septate, globose, irregularly ellipsoid, oblong or ovoid, $(9.8–)11.6–19.6(–23.5) \times (7.9–)9.8–14.1(–15.9)$ µm, $L = 14.8$ µm, $W = 12.1$ µm, $Q = 0.7–2.3$, $Q^* = 1.2$ ($n = 107/7$), oil drops common, sterigmata up to 34 µm long, $(1.8–)2–5.4(–5.7)$ µm in diam.

In some specimens hyphae clamped, in others mostly or completely simple-septate. Hyphae hyaline, smooth, $(1.8–)2–5.8(–7.8)$ µm in diam. ($n = 114/7$), thin- to very thick-walled (up to 2 µm), mostly with slightly thickened walls (0.2–0.6 µm), sometimes with oil drops. Hyphae, especially in the inner parts of the galls, intermingled with hyphae and other structures of the host lichen.

Haustoria normally few, occasionally either absent or abundant. Haustorial mother cells hyaline, globose to ellipsoid, $(3.7–)3.8–6.1(–7.4) \times (5.7–)6.5–10.6(–12.4)$ µm, $L = 8$ µm, $W = 9.5$ µm, $Q = 0.7–1.3$, $Q^* = 0.9$ ($n = 179/7$), distinct apiculus frequently refractive, hyphae germinating by germ tubes.

In some specimens hyphae clamped, in others mostly or completely simple-septate. Hyphae hyaline, smooth, $(1.8–)2–5.8(–7.8)$ µm in diam. ($n = 114/7$), thin- to very thick-walled (up to 2 µm), mostly with slightly thickened walls (0.2–0.6 µm), sometimes with oil drops. Hyphae, especially in the inner parts of the galls, intermingled with hyphae and other structures of the host lichen.

Haustoria normally few, occasionally either absent or abundant. Haustorial mother cells hyaline, globose to ellipsoid, $(3.7–)3.8–6.1(–7.4) \times (5.7–)6.5–10.6(–12.4)$ µm, $L = 8$ µm, $W = 9.5$ µm, $Q = 0.7–1.3$, $Q^* = 0.9$ ($n = 179/7$), distinct apiculus frequently refractive, hyphae germinating by germ tubes.
(2.9–3.5–4.5(–5.9) μm, L = 5 μm, W = 4 μm, Q = 1.0–1.9, Q* = 1.3 (n = 51/6), each mother cell bearing one haustorial filament 0.5–2 μm in diam., up to 23 μm long, rarely slightly branched.

Conidial stage, swollen cells, vesicles and hyphidia absent.

Ecology. Galls and basidiomata of T. hypogymniae are only found on the thallus of Hypogymnia physodes, an extremely common lichen species occurring on various substrates, especially on trunks and twigs, but also on iron scrap, stones, etc. Basidiomata of T. hypogymniae are found in Finland almost all year round, most frequently from June to August.

Distribution and abundance. Tremella hypogymniae is common in the whole country (Fig. 11), and it is widespread in Europe (Diederich 1996). It is also reported from Canada (Diederich 1996, 2003) and the U.S.A. (Diederich 2003) including Alaska (Geiser et al. 1998), but seems to be rare in North America (Diederich 2003).

Notes. Pale rose to brownish galls on the host thallus characterize T. hypogymniae. The predominantly two-celled basidia of T. hypogymniae are smaller than those of Tremella lobariacearum Diederich & M.S. Christ., Tremella phaeographidis Diederich, Coppins & Bandoni and other lichenicolous Tremella species which are microscopically similar (Diederich 1996).

In spite of the variability in hyphal septa, all the Finnish specimens clearly belong to a single species. Spore sizes as well as other microscopical structures are identical to each other. Basidiomata of various ages possibly differ in their septa. Simple-septate hyphae were commonly observed especially in young basidiomata with plenty of probasidia and only a few mature basidia and spores.


Tremella indecorata Sommerf. (Plate 2a, Figs. 12–13)


Basidiomata translucent pale brown to brown, cerebriform or cushion-like, 3–10 mm in diam., occasionally up to 20 mm via coalescence, upon drying turning to thin, dark brown or black films.

Spores smooth, hyaline, pale brown or brown, thin-walled, globose to subglobeose, often wider than long, (4.9–)5.9–9.4–(9.9) × (5.7–)5.9–9.8–(11.2) μm, L = 7.4 μm, W = 7.7 μm, Q = 0.8–1.3, Q* = 1.0 (n = 150/5), distinct apiculus often refractive, germinating by germ tubes or forming globose to ellipsoid secondary spores.

Basidia rarely stalked, 2–12 × 2.2–4 μm (n = 13/4), two- or four-celled, longitudinally or obliquely septate, basally clamped, smooth, hyaline to brown, globose, ellipsoid or citiform, sometimes wider than long, (11.8–)12.2–19.6–(27.1) × (11.9–)13.1–20–(22) μm, L = 16.1 μm, W = 16.2 μm, Q = 0.8–1.7, Q* = 1.0 (n = 89/5), sterigmata up to ca. 100 μm long, (1.5–)1.7–4–(5.7) μm in diam., often collapsed, apical protuberances and thick walls (up to 1.8 μm) observed especially in probasidia, oil drops common.

Conidial stage absent in most specimens. Conidia hyaline, oblong or cylindrical, (2.4–)2.6–4.2 × 0.8–1.6 μm, L = 3.2 μm, W = 1 μm, Q = 1.7–5.3, Q* = 3.5 (n = 30/1). Conidia originating from conidiogenous cells which are hyaline to brown, subglobeose, ellipsoid or oblong, (1.9–)2.4–4.4–(5.9) × (1.7–)1.8–3.4 μm, L = 3.6 μm, W = 2.7 μm, Q = 1.1–2.0, Q* = 1.3 (n = 30/1), thin-walled, small oil drops common.

Terminal and subterminal swollen cells observed in hymenium and subhymenium. Swollen cells hyaline to brown, smooth, usually thick-walled (up to 2 μm), globose, ellipsoid, ovoid, oblong or citiform, (5.9–)6.5–15.9–(17.8) × (4.3–)5–9.7–(9.9) μm, L = 10.5 μm, W = 7.1 μm, Q = 1.0–2.8, Q* = 1.5 (n = 77/5). Hyphae or basidia originate occasionally from swollen cells which may be mistaken for probasidia.

Hyphae clamped, smooth or gelatinous, hyaline to brown, (1.4–)1.6–5.9–(7.6) μm in diam.
The genus Tremella in Finland

The genus Tremella contains about 60 species, distributed worldwide. In Finland, the species Tremella indecorata is of particular interest. It is characterized by its thin- to very thick-walled hyphae (up to 2 µm). Haustoria are few or absent. Haustorial mother cells are hyaline to pale brown, globose to ellipsoid, with dimensions 2.5–5.7 × 2.2–4.3 µm. Each mother cell bears one haustorial filament, mostly under 1 µm in diameter, up to 12 µm long, rarely branched. Vesicles and hyphidia are absent.

Ecology. In Finland, T. indecorata is found on deciduous wood, often on Diatrype bullata. A connection with at least remnants of a pyrenomycete (dead perithecia or traces of mycelium) should always be present (Torkelsen 1968). In addition to Diatrype species, possible host species are known in the genus Eutypa (Torkelsen 1997). All Finnish specimens were collected either in October or November.

Distribution and Abundance. Even though there are only five collections from two biogeographical provinces (Fig. 13), the host species are so common and widespread in Finland (Dissing 2000) that we cannot presume T. indecorata to be an especially rare species. Worldwide T. indecorata seems to be restricted in Europe where it is reported e.g. from the Nordic countries (Torkelsen 1997), Estonia (Jülich 1984), Poland (Wojewoda 1981) and Spain (Dueñas 1997).

Notes. Tremella indecorata is one of the two Finnish Tremella species occurring together with pyrenomycetes and forming comparatively small basidiomata. Unlike T. globispora, T. indecorata mostly has stalkless basidia. In addition, the basidiomata of T. indecorata seem to be slightly larger than those of T. globispora.

There are also other tiny Tremella species associated with pyrenomycetous fungi, such as T. moriformis Berk. and T. subanomala Coker, which resemble T. indecorata. On the basis...
needed to reveal the actual relationships and the systematic position of the species in the Indecorata group.


**Tremella karstenii** Hauerslev (Plate 2b, Figs. 13–14)


Basidiomata hyaline to yellowish, smooth or slightly papillose, gelatinous, cushion-like or spherical, sometimes partially resupinate, 1–5 mm in diam., drying to thin, tough, almost invisible films.

Spores hyaline, smooth, thin-walled, globose, often wider than long, (2.5–)3.4–6(–7.6) × (3–)3.5–6.2(–7.5) μm, L = 4.5 μm, W = 4.9 μm, Q = 0.7–1.4, Q* = 0.9 (n = 210/7), apiculus distinctive, occasionally refractive, oil drops common, some forming subglobose to ellipsoid secondary spores.

Basidia mostly four-celled, rarely two-celled, longitudinally or occasionally obliquely or transversely septate, basally clamped, hyaline, smooth, globose to ellipsoid, sometimes wider than long, (7.8–)8.4–12.5(–15.7) × (7.7–)7.9–13.3(–15.3) μm, L = 10.5 μm, W = 10.4 μm, Q = 0.8–1.6, Q* = 1.0 (n = 110/7), sterigmata up to ca. 110 μm long, (0.7–)1–2.3(–3.7) μm in diam.

Conidial stage common, but not always present. Conidia difficult to distinguish from secondary spores, and thus not measured, both of them hyaline, smooth, thin-walled, subglobose to ellipsoid. Conidiogenous cells hyaline, smooth, thin-walled, globose to ellipsoid, (2.4–)3.2–
The genus Tremella in Finland

6.5(–7.9) × (1.8–2.4–6(–6.7) µm, L = 4.7 µm, W = 4.2 µm, Q = 0.9–2.4, Q* = 1.2 (n = 174/6).

Hyphae clamped, hyaline, smooth, (0.3–)0.9–4(–5.9) µm in diam. (n = 104/7), thin- to slightly thick-walled (up to 0.5 µm), oil drops common.

Haustoria originate from hyphae or conidiogenous cells, mostly scattered and rare, sometimes abundant or totally absent. Haustorial mother cells hyaline, smooth, globose to ellipsoidal, (1.6–)1.8–3.5(–3.9) × (1.6–)1.7–3.2(–3.4) µm, L = 2.5 µm, W = 2.2 µm, Q = 0.9–1.4, Q* = 1.1 (n = 39/4), each mother cell bearing one or two haustorial filaments 0.5–1 µm in diam., up to 29 µm long, rarely branched.

Very few swollen cells observed. Vesicles and hyphidia absent.

Ecology. Tremella karstenii grows only on Juniperus communis, and according to Torkelsen (1978), it is always found in connection with Colpoma juniperi. At least 16 of the 23 Finnish collections are found on or with ascomata of C. juniperi. The habitats of T. karstenii are mostly coniferous forests, and it seems to prefer moist lake- and riversides. In Finland T. karstenii is found from April to October.

Distribution and abundance. Collections of T. karstenii are relatively scattered, but they come from both southern and northern Finland (Fig. 13). We therefore presume that T. karstenii is common and widely distributed all over the country. Tremella karstenii has a predominantly northern alpine distribution. It is known from Norway, Sweden (Torkelsen 1978, 1997), Iceland, Germany, France, Austria, Switzerland, Slovakia, Greenland, the U.S.A. (Krieglsteiner 2000), UK (Legon et al. 2005) and Russia (Torkelsen 1978). Records from central Europe are from the Alps or Carpathian Mountains (Krieglsteiner 2000).

Notes. Before this study there were only 10 collections of T. karstenii from Finland. The low number is probably due to the difficulty of finding basidiomata. They are easily overlooked because they are small and hyaline, and shrink to thin, almost invisible films when dry. The easiest way to find them is to search broken twigs of Juniperus communis that lie partly buried in mosses etc. and are thus somewhat moist.

**Tremella mesenterica** Retz.: Fr. (Plate 2c, Figs. 15–16)


*Hormomyces aurantiacus* Bonord., Handb. allgem. Mykol.: 150. 1851, nom. anam.

*Exidia candida* Lloyd sensu auct.
*Tremella albida* Huds.: Fr. sensu auct.
*Tremella candida* Pers. sensu auct.

Basidiomata cream, yellow or orange-yellow, young basidiomata cushion-like or cerebriform, becoming folded, lobate or foliose in maturity, some parts may be resupinate, up to 5 cm or more in diam.

Spores hyaline to yellowish, smooth, thin-walled, globose to subglobose, (8–)9.8–14.9–17.4 × (7.4–)9.3–13.5(–15.6) μm, \(L = 12.2 \, \mu m\), \(W = 10.5 \, \mu m\), \(Q = 0.9–1.6\), \(Q^* = 1.2\) (\(n = 210/7\)), apiculus distinctive, mostly with oil drops, spores germinate by germ tubes or form secondary spores.

Hymenium composed only of basidia, of both basidia and conidia or only of conidia. Basidia two- to four-celled, longitudinally or occasionally obliquely septate, basally clamped, hyaline to yellowish, smooth, mostly with oil drops, thin-walled, globose to subglobose, sometimes wider than long, (14.1–)17.4–24.9(–25.9) × (14.1–)15.6–25.4(–26.1) μm, \(L = 20.8 \, \mu m\), \(W = 10.5 \, \mu m\), \(Q = 0.9–1.6\), \(Q^* = 1.2\) (\(n = 210/7\)).
= 20.2 µm, Q = 0.8–1.6, Q* = 1.0 (n = 110/7), stigmateata up to 96 µm long, (1.9–)2–4.1(–4.4) µm in diam., occasionally apically swollen up to 6.4 µm in diam., rarely branched.

Conidia hyaline to pale yellow, smooth, thin-walled, subglobose to ellipsoid, (1.8–)2.2–4.5(–5.9) × (1.6–)1.8–3.8(–4.2) µm, L = 3.3 µm, W = 2.6 µm, Q = 0.8–2.5, Q* = 1.3 (n = 210/7), originating from conidiogenous cells.

Subterminal and terminal swollen cells abundant close to the substrate, seldom elsewhere, hyaline, smooth, globose, ellipsoid, citriform or oblong, (4.5–)7.3–26.2(–41.4) × (4–)5.5–21.6(–29.4) µm, L = 16.2 µm, W = 11.3 µm, Q = 0.9–4.4, Q* = 1.5 (n = 127/7), thin- to thick-walled (up to 1.5 µm), occasionally short-stalked (up to 6.4 µm in length). Swollen cells often difficult to distinguish from vesicles and probasidia.

Vesicles rare or common close to the substrate, hyaline, globose, ellipsoid, ovoid, citriform or oblong, (9.6–)10.4–31.6(–37.2) × (6.5–)9.4–27.2(–37.6) µm, L = 20.5 µm, W = 17.1 µm, Q = 0.7–3.7, Q* = 1.3 (n = 96/7), extremely thick walled (1.3–4.2 µm), contents frequently oily and yellowish. Often difficult to distinguish from swollen cells.

Hyphae clamped, hyaline to yellowish, smooth, (0.6–)1.4–3.8(–5.6) µm in diam. (n = 119/7), mostly thin- or slightly thick-walled (up to 0.4 µm), occasionally very thick-walled (up to 1.6 µm), oil drops common.

Hyphidia rare and scattered, usually unclear, not measured.

Haustoria abundant close to the substrate, originating from hyphae and sometimes from swollen cells or vesicles. Haustorial mother cells hyaline to yellowish, smooth, thin-walled, globose, ellipsoid or oblong, (2–)2.3–5.9(–6.4) × (1.8–)2–3.9(–4.9) µm, L = 3.7 µm, W = 2.7 µm, Q = 0.8–3.0, Q* = 1.5 (n = 106/7), each mother cell usually bearing many, frequently branched haustorial filaments about 0.5 µm in diam., up to 30 µm long.

Ecology. According to the literature (Zugmaier et al. 1994, Roberts 1995, Torkelsen 2005) *T. mesenterica* is a parasite of *Peniophora* species and possibly some other closely related genera (Zugmaier & Oberwinkler 1995, Torkelsen 2005). In Finland *T. mesenterica* is noted together with the following *Peniophora* species: *P. incarnata* (4 specimens studied), *P. limitata* (4 specimens studied), *P. violaceolivida* (1 specimen studied) and *Peniophora* sp. (1 specimen studied).

*Tremella mesenterica* occurs in all kind of habitats: deciduous, coniferous and herb-rich forests, thickets, wooded pastures, gardens and other cultural environments. In Lapland it is common in mountain birch forests. Basidiomata of *T. mesenterica* are found on deciduous wood (Table 2) all year round, most frequently from August to November. It is one of the edible species in the genus (e.g. Gorter & Eicker 1988, Adhikari & Durrieu 1996, Boa 2004).

Distribution and abundance. *Tremella mesenterica* seems to be the most common Finn-
ish *Tremella* species, followed by *T. foliacea*. The bright colour may cause some misinterpretation because amateurs often bring the conspicuous and attractive basidiomata to the herbaria. *Tremella mesenterica* is found almost throughout Finland (Fig. 16). *Tremella mesenterica* is a cosmopolitan species, known from North America (e.g. Coker 1920, Olive 1946b) as well as from Central and South America (Lowy 1971), Australia (Wojewoda 1981, Roberts 1995, Krieglsteiner 2000), New Zealand (McNabb 1966), Africa (Wojewoda 1981, Gorter & Eicker 1988, Roberts 1995, Krieglsteiner 2000), Asia (Kobayasi 1939, Roberts 1995, Adhikari & Durrieu 1996, Teng 1996, Chen 1998, Krieglsteiner 2000) and Europe (e.g. Jülich 1984, Torkelsen 1997, Krieglsteiner 2000).

Notes. The yellow, folded to foliaceous and comparatively large basidiomata of *T. mesenterica* are usually easily identified. Because of the variation in colour and the presence of conidia, *T. mesenterica* is commonly considered to include two or more separate species. However, the variability is attributed to normal developmental changes and responses to different light conditions (Wong et al. 1985).

*Tremella aurantia* is another large and yellow *Tremella* species known from Europe. According to Roberts (1995), it is easily distinguished from *T. mesenterica* by its substantially smaller spores (5.5–9 × 4.5–7 µm), smaller basidia (ca. 9–13 µm wide), and by the presence of host hyphae in subhymenium and context. Moreover, the host species separate these two taxa: *T. aurantia* parasitizes *Stereum hirsutum* whilst *T. mesenterica* parasitizes *Peniophora* species (Roberts 1995). So far, *T. aurantia* has not been found either in Norway (Torkelsen 2005) or in Finland, and it seems that the distribution of *T. aurantia* does not reach the Nordic countries.


**Tremella mycetophiloides** Kobayasi (Plate 2d, Figs. 17–18)


Basidiomata resupinate, cushion-like or spherical, up to 2 mm in diam., brownish orange when dry, translucent yellowish to pale rose when soaked.

No spores seen, and only one mature, twocelled, longitudinally stalked, globose basidium observed, 10.2 × 11.8 µm, single sterigma 16.1 µm long, 1.9 µm in diam. Probasidia hyaline to yellowish, smooth, thin-walled, basally clamped, subglobose, 10.2–14.3 × 7.6–10.2 µm, L = 12.2 µm, W = 9.1 µm, Q = 1.1–1.8, Q* = 1.3 (n = 15/1).

Many basidiomata consist mainly of conidiogenous cells and dikaryotic and monokaryotic conidia. Conidiogenous cells hyaline to yellowish, smooth, thin-walled, globose to ellipsoid, (6–)6.1–9.1(–9.2) × (5.8–)5.9–8.4(–8.5) µm, L = 7.7 µm, W = 7.1 µm, Q = 0.9–1.5, Q* = 1.1 (n = 26/1). Dikaryotic conidia smooth, hyaline to yellowish, thin-walled, globose, ellipsoid or oblong, (4.4–)4.5–6.8(–7.6) × (3.3–)3.4–4.4 µm, L = 5.8 µm, W = 3.9 µm, Q = 1.0–2.2, Q* = 1.5 (n = 30/1). Conidiogenous cells hyaline to yellowish, thin-walled, globose, ellipsoid or oblong, (4.4–)4.5–6.8(–7.6) × (3.3–)3.4–4.4 µm, L = 5.8 µm, W = 3.9 µm, Q = 1.0–2.2, Q* = 1.5 (n = 30/1). Conidiogenous cells hyaline to yellowish, thin-walled, globose to ellipsoid, (1.9–)2–2.5(–2.6) × 1.6–2.3(–2.5) µm, L = 2.2 µm, W = 1.9 µm, Q = 1.0–1.4, Q* = 1.2 (n = 30/1).

Hyphae clamped, smooth, hyaline to yellowish, irregular, (1.1–)1.6–6.4(–6.6) µm in diam.
The genus Tremella in Finland

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(n = 24/1), thin- to slightly thick-walled (up to 0.4 µm).

Haustoria abundant. Haustorial mother cells smooth, hyaline to yellowish, thin-walled, sub-globose to ellipsoid 2.4–5.5 × 2–3.7 µm, $L = 3.8 \mu m$, $W = 2.6 \mu m$, $Q = 1.1–2.0$, $Q^* = 1.6$ ($n = 17/1$), each mother cell bearing one or a few haustorial filaments up to 1.5 µm in diam. and 56 µm long, sometimes branched.

Swollen cells, vesicles and hyphidia absent.

Ecology. In Finland T. mycetophiloides is found on Aleurodiscus amorphus. In addition, it is reported on Aleurodiscus grantii (Bandoni & Ginns 1993) and Phanerochaete tamariciphila (Dueñas 1996). Aleurodiscus amorphus and A. grantii occur typically on dead branches of Abies spp. and occasionally on species of Picea, Pinus, Pseudotsuga and Tsuga (Ginns 1982); P. tamariciphila occurs on Tamarix spp. (Boidin et al. 1993). In Finland A. amorphus is found on Abies sibirica, cultivated Abies sp., Picea abies and Picea sp. (Kotiranta & Saarenoksa 2000). The single Finnish collection of T. mycetophiloides is from October.

Distribution and abundance. Findings of the host A. amorphus are fairly recent and few (Kotiranta & Saarenoksa 2000), and it is not surprising that T. mycetophiloides is also rare. Further studies are needed to reveal the distribution and abundance of T. mycetophiloides. At present it

Fig. 17. Tremella mycetophiloides (from Kotiranta 11860). — a: Probasidia and the single mature basidium (right). — b: Hyphae with haustoria, of which one is attached to the host hyphae (arrow). — c: Hyphae. — d: Conidiogenous cells, dikaryotic conidia and formation of monokaryotic conidia (arrows).

Fig. 18. Distribution of Tremella mycetophiloides (●) and T. obscura (○) in Finland. The lines show the boundaries of the biogeographical provinces.
is impossible to evaluate whether the species is threatened or not. Worldwide *T. mycetophiloides* seems to be restricted to the Northern Hemisphere, as are its hosts (Ginns 1982, Boidin *et al*. 1993). In Europe it is reported e.g. from Norway (Torkelsen 1968), Denmark (Christiansen 1954), Germany (Bandoni & Ginns 1993), Spain (Doeñas 1996), Sweden, Austria, Czech Republic, Italy, Macedonia (Pilát 1953) and Poland (Wojewoda 1981), in Asia from Japan (Kobayasi 1939, Bandoni & Ginns 1993), Korea and Taiwan (Bandoni & Ginns 1993), and in North America both from Canada (Martin 1940, Bandoni & Ginns 1993) and the U.S.A. (Bandoni & Ginns 1993).

**Notes.** Small, pale basidiomata found on *Aleurodiscus* spp. characterize *T. mycetophiloides*. In addition, swellings in the hyphae, which make the hyphae look irregular, and the commonness of the conidial stage are typical. Conidia are intermixed with basidia or alone in the hymenium, and occurrence of the monokaryotic conidia, first observed by Chen (1998), seems to be characteristic.

The same specimen was studied by Kotiranta and Saarenoksa (2000). They managed to see one broadly ellipsoid spore, $6 \times 5.5 \, \mu m$, and obtained slightly larger measures of probasidia, $15-17 \times (9-11) 1.5-13 \, \mu m$. Other measurements of *T. mycetophiloides* are given for instance in the exhaustive paper by Bandoni and Ginns (1993).

*Tremella simplex* H.S. Jacks. & G.W. Martin is similar to *T. mycetophiloides*, but lacks clamps and has consistently two-celled mature basidia (Martin 1940).

**Specimen examined.** — Finland. Varsinais-Suomi: Karjaa, Mustio manor house park, on *Aleurodiscus amorphus* on dead branches of living cultivated Abies sibirica, 1994 Kotiranta 11860 (H, H.K.).

*Tremella obscura* (L.S. Olive) M.P. Christ. (Figs. 18–19)

Friesia 5: 62.1954. — *Tremella mycophaga* G.W. Martin var. *obscura* L.S. Olive, Mycologia 38: 540. 1946. — **Types:** U.S.A. Georgia, Athens, deciduous woods on the University of Georgia Campus, in the hymenium of *Dacrymyces minor* on decorticated frondose wood, 25.X.1945 Lindsay S. Olive (syntypes ISC, K(M) 36761) and in the hymenium of *D. deliquescentes* on cedar, 23.X.1945, Lindsay S. Olive (syntype not located).

Basidiomata not macroscopically visible, in the host hymenium.

Spores smooth, hyaline, thin-walled, globose to ellipsoid, $(4.3-4.9-9-(10.4)) \times (3.9-3.9-8.2-9.8) \, \mu m$, $L=7.2 \, \mu m$, $W=6.3 \, \mu m$, $Q = 0.9-1.7$, $Q^* = 1.2$ ($n=95/4$), apiculus usually distinctive, oil drops common, spores germinate by germ tubes. Conidia often resemble spores.

Basidia very rarely stalked, $3.5-8.4 \times 2.4-4.4 \, \mu m$ ($n=3/1$), basally clamped, two-celled, longitudinally or occasionally obliquely or transversely septate, smooth, hyaline to yellowish, globose to ellipsoid, $(8.4-9.6-15.3-(16.3)) \times (8)-(9.6-14-(15.3)) \, \mu m$, $L=12.3 \, \mu m$, $W=11.6 \, \mu m$, $Q = 0.8-1.7$, $Q^* = 1.1$ ($n=65/4$), sterigmata up to $65 \, \mu m$ long, $(1.9-2-4.3-(6.1)) \, \mu m$ in diam., occasionally branched, small oil drops common.

Conidial stage usually abundant. Conidia and conidiogenous cells (not measured separately) smooth, hyaline, globose, ellipsoid or oblong, $(3.3-4.1-7.8-8.4) \times (2.2-2.5-5.7-(6)) \, \mu m$, $L=5.8 \, \mu m$, $W=3.8 \, \mu m$, $Q = 1.0-2.6$, $Q^* = 1.5$ ($n=101/4$), thin- to fairly thin-walled (up to $0.4 \, \mu m$), oil droplets common.

Hyphae clamped, smooth, hyaline, $1.6-3.7-(4.3) \, \mu m$ in diam. ($n=58/4$), thin- to relatively thin-walled (up to $0.4 \, \mu m$), small oil drops common.

Haustoria abundant. Haustorial mother cells smooth, hyaline, thin-walled, globose, subglobose or ellipsoid, often wider than long, $1.8-3.8-(4) \times (1.8-1.9-3.9-(4.2)) \, \mu m$, $L=2.8 \, \mu m$, $W=2.7 \, \mu m$, $Q = 0.5-1.9$, $Q^* = 1.1$ ($n=51/4$), each mother cell bearing one haustorial filament, less than $1 \, \mu m$ in diam., up to ca. $42 \, \mu m$ long, rarely branched.

Swollen cells, vesicles and hyphidia absent.

**Ecology.** *Tremella obscura* grows in the hymenium of *Dacrymyces* species. It was originally described as parasitic on *D. minor* and *D. deliquescentes*. Finnish records are from *D. lacrymalis* and *D. stillatus*. *Tremella obscura* can be found whenever basidiomata of *Dacrymyces* species are produced. Since Finnish specimens were collected in February, May, July and August, they can probably be found all year round.
DISTRIBUTION AND ABUNDANCE. So far, there are only four collections from Finland (Fig. 18). Because they are from different parts of the country and possible hosts are common, we presume *T. obscura* to be a common species in the whole Finland. Worldwide distribution is known to extend to the U.S.A. (Olive 1946b, 1946a), Denmark (Christiansen 1954) and UK (Roberts 2007). In addition, possible records are known e.g. from Norway (Torkelsen 1968), Spain, Portugal (Dueñas 2001) and Germany (Krieglstine 2000).

NOTES. *Tremella obscura* is the first described species among the four known *Tremella* species parasitizing *Dacrymyces* species. It has clamped hyphae, mainly stalkless basidia, comparatively short sterigmata, and thin-walled conidia which do not arise from clamp connections. *Tremella obscura* is known to have two- to four-celled basidia (Olive 1946b, Christiansen 1954), but in Finnish collections only two-celled basidia were observed.

Compared with *T. penetrans*, *T. obscura* has smaller spores and basidia and substantially shorter sterigmata. It is not clearly distinct from *Tremella occultifuroidea* Chee J. Chen & Oberw. reported from Taiwan, but according to the original description (Chen et al. 1999), *T. occultifuroidea* has thick-walled, dikaryotic conidia, somewhat larger spores and remarkably long sterigmata. *T. giraffa* differs from *T. obscura* in its typical characters discussed earlier, but the characters may sometimes overlap.

In addition to these other *Tremella* species occurring in the hymenium of *Dacrymyces* species, *T. obscura* is often confused with *Tremella caloceraticola* Hauerslev which parasitizes *Calocera* spp. as well as with the conidial stage of *Occultifur internus*, an auricularioid parasite of *Dacrymyces* spp. As noted by Oberwinkler (1990), the description of *T. obscura* by Christiansen is based on material representing two different taxa: one with conidiophores of *O. internus* and another with tremellaceous basidia of *T. obscura*, whereas the original description and illustration by Olive (1946b) only have characters typical of *T. obscura*. Because Christiansen’s description is misleading, it is not surprising that many of the reports of *T. obscura* are actually reports of the conidial stage of *O. internus*, or a mixture of these two species.


*Tremella phaeophysciae* Diederich & M.S. Christ. (Plate 2e, Figs. 20–21)
Inducing olive brown, reddish brown, brown or blackish brown, resupinate or somewhat spherical or elliptical galls on the host thallus, 0.1–1.5 mm in diam., surface gelatinous, smooth or slightly wrinkled, interior consisting of the host hyphae. Spores smooth, hyaline to pale brown, thin- to fairly thin-walled (under 0.2 µm), globose, mostly wider than long, (4.2–)5–7.8(–9.1) × (4.5–)5.7–8.1(–9.4) µm, L = 6.3 µm, W = 7 µm, $Q = 0.7–1.1$, $Q^* = 0.9$ ($n = 210/9$), distinct apiculus occasionally refractive.

Basidia two-celled, rarely basally clamped, smooth, hyaline to pale brown, typically transversely, rarely obliquely or almost longitudinally septate, ellipsoid or irregularly oblong, (11.1–)15–27.7(–31) × (4.3–)5.9–9.5(–11.1) µm, $L = 21$ µm, $W = 7.7$ µm, $Q = 1.2–5.7$, $Q^* = 2.8$ ($n = 134/9$), sterigmata up to 27 µm long, (1.2–)1.9–4.9(–6.2) µm in diam.

Conidial stage, especially asteroconidia, common, but not always present. Conidia smooth, hyaline to pale brown, thin- to fairly thin-walled, globose to ellipsoid, (2.2–)2.5–5.1(–5.4) × (1.8–)2.1–4(–4.2) µm, $L = 3.9$ µm, $W = 3.1$ µm, $Q = 1.0–2.0$, $Q^* = 1.3$ ($n = 42/4$). Conidiogenous cells very unclear in some specimens and clear and abundant in others, smooth, hyaline, thin- to relatively thin-walled, irregularly oblong, (11.8–)12.2–25.2(–30.2) × (2.1–)2.5–5.3(–5.7) µm, $L = 18.4$ µm, $W = 3.9$ µm, $Q = 2.9–9.3$, $Q^* = 5.0$ ($n = 40/6$), usually with small tubes in apices (measures incl. tubes). Four-armed asteroconidia absent in some basidiomata, usually abundant when present. Asteroconidia smooth, hyaline to pale brown, thin-walled, (4.1–)7.8–16(–21) µm in diam., individual arms (0.8–)2.1–8.4(–11) µm long ($n = 168/6$).

Hyphae mostly simple-septate, infrequently clamped, (1.1–)1.8–5(–7) µm in diam. ($n = 139/9$), thin- to thick-walled (up to 1 µm).

Haustoria few or abundant, originating from hyphae or spores. Haustorial mother cells basally clamped, smooth, hyaline to pale brown, thin-walled, globose, ellipsoid or oblong, (2.1–)3.1–5.3(–6.2) × (1.8–)2.4.1(–4.3) µm, $L = 4.2$ µm, $W = 3$ µm, $Q = 0.8–2.9$, $Q^* = 1.5$ ($n = 131/9$), each mother cell bearing one or two haustorial filaments under 1 µm in diam. and 18 µm long, rarely slightly branched.

Swollen cells, vesicles and hyphidia absent.

**Ecology.** In Finland *T. phaeophysciae* is commonly found on *Phaeophyscia orbicularis* (53 specimens studied) and rarely on *P. endophoenicea* (2 specimens studied) and *P. nigricans* (1 specimen studied). As far as we know, this is the first record of host species other than *P. orbicularis*. Habitats of *Phaeophyscia* species are mostly parks, yards, etc.
Distribution and Abundance. Collections are concentrated in southern Finland and the northernmost collections originate from Lapua in western Finland (Fig. 21). Because *P. orbicularis* and *P. nigricans* occur almost throughout the country (Vitikainen *et al.* 1997), the distribution of *T. phaeophysciae* may be much wider than currently known. It is a common and widespread species in Europe (Diederich 1996), but known only from a few localities in North America (Diederich 2003). This is the first record from Finland.

Notes. Two-celled basidia with a transverse septum are characteristic of *T. phaeophysciae*. When the conidial stage is dominant, typically abundant asteroconidia are found, and both the spores and the basidia are rare. We were able to find only olivaceous, reddish or blackish brown galls induced by *T. phaeophysciae*. According to Diederich (1996) galls will later develop into convex, gelatinous and usually wrinkled basidiomata.

It is noteworthy that KOH occasionally tinges the microstructures purple, especially those of the host, but to some extent also those of *T. phaeophysciae*.

*Tremella cladoniae* is microscopically very similar to *T. phaeophysciae*, but they are distinguished by the different hosts, *T. cladoniae* occurring on *Cladonia* spp. (see Diederich 1996). They may also differ in colour. According to Diederich (1996) basidiomata of *T. cladoniae* are more pinkish brown.


*Tremella polyporina* D.A. Reid (Figs. 22–23)


land, Glasgow, Cadzow Park, in the tubes of *Tyromyces lacteus* which was growing either on *Ulmus* or on *Fraxinus*, 14.IX.1959, D. A. Reid (holotype K(M) 32740).


Basidiomata not macroscopically visible, in the host hymenium.

Sporides smooth, hyaline, thin-walled, globose to subglobose, (3.9–)4.6×(6.7–)6.1 µm, L = 5.3 µm, W = 5 µm, Q = 0.8–1.3, Q* = 1.1 (n = 120/4), apiculus distinctive, oil drops common.

Basidia two- or four-celled, smooth, thin-walled, longitudinally septate, basally clamped, globose, subglobose or ellipsoid, (6.2–)7.1–
13.2(–14.1) × (6–)7–13.3(–13.9) µm, L = 10.4 µm, W = 10.1 µm, Q = 0.8–1.4, Q* = 1.0 (n = 63/4), sterigmata up to 17 µm long, (0.9–)1.1–2.5(–3.5) µm in diam., usually narrowing towards apices, occasionally branched, oil drops common.

Conidial stage common. Conidia smooth, hyaline, globose, ellipsoid or oblong, (2–)2.7–6.2(–7.6) × (1.3–)1.8–3.1(–3.7) µm, L = 4 µm, W = 2.3 µm, Q = 1.0–3.3, Q* = 1.8 (n = 120/4), thin- to fairly thin-walled (up to 0.3 µm), originating from conidiogenous cells and possibly infrequently from hyphal tips, oil droplets common (seen as black spots). Hyphae clamped, smooth, (1–)1.8–4(–5) µm (n = 62/4), thin- to thick-walled (up to 0.8 µm), oil drops common.

Haustoria few or abundant. Haustorial mother cells smooth, hyaline, thin-walled, globose to ellipsoid, 2–3.9(–4) × (1.8–)1.9–3.2(–3.3) µm, L = 2.6 µm, W = 2.3 µm, Q = 0.7–1.8, Q* = 1.1 (n = 55/4), each mother cell bearing one to three haustorial filaments 0.5–1 µm in diam., up to 20 µm long, rarely slightly branched.

Swollen cells, vesicles and hyphidia absent.

Ecology. _Tremella polyporina_ is found especially in the hymenium of _Postia_ species, but it may not be highly host-specific. It might rather be a generalist occurring on various polypore species. Finnish specimens were collected in August, September or October.
**Distribution and Abundance.** Four Finnish collections derive from different parts of the country (Fig. 23). Collections are so widely distributed and the hosts are so common that we can presume *T. polyporina* to be a common species in the whole Finland. After being described from Scotland (Reid 1970), *T. polyporina* has been reported from several European countries, e.g. Sweden (Hansen & Knudsen 1997), Norway (Ryvarden 1998), Germany (Krieglsteiner 2000), Czech Republic, Italy (Pouzar & Vampola 1993), and Spain (Dueñas 1997). It is also known from the U.S.A. (Setliff 1982) and Canada (Koske 1972). This is the first Finnish record.

Notes. In addition to *T. polyporina*, *Tremella telleriae* M. Dueñas occurs in the hymenium of *Postia* species (Dueñas 2001). If it is distinct from *T. polyporina* (Roberts 2007), it differs in having larger basidium (Dueñas 2001) and probably also longer sterigmata and more irregular hyphae. Spores are similar (Dueñas 2001).

A specimen found in the hymenium of *Antrodia sinuosa* has remarkably smaller spores (Table 1) and basidia than other Finnish *T. polyporina* specimens, but does not differ in other respects. Because there is so far only a single collection, it is not considered as a new *Tremella* species. Further collections combined with DNA techniques are needed to understand the taxonomic position of the specimen in *A. sinuosa* as well as the taxonomy of all *Tremella* species occurring in the hymenium of polypores.


Basidiomata pale rose to pale brown, discoid or cushion-like, 0.2–3 mm in diam., sometimes basally constricted, surface smooth in young basidiomata, wrinkled in old.

Spores smooth, hyaline, thin-walled, globose to subglobose, (4.3–)4.5–7.3–(7.7) × (4–)5.1–7.7–(7.9) µm, *L* = 5.8 µm, *W* = 6.2 µm, *Q* = 0.8–1.3, *Q* = 1.0 (*n* = 60/2), distinct apiculus often refractive.

Basidia four-celled, smooth, hyaline, thin-walled, oblong or ovoid, (15.3–)19.2–33.3–(33.5) × (8.5–)9.4–13.6–(13.8) µm, *L* = 24.6 µm, *W* = 10.8 µm, *Q* = 1.4–3.4, *Q* = 2.3 (*n* = 30/2), uppermost septum longitudinal or oblique, two lower septa transverse, sterigmata up to 26 µm long, (1.9–)2–4.2–(4.9) µm in diam., sometimes with oil drops.

Hyphae simple-septate except the basally clamped haustoria. Hyphae smooth, hyaline, (1–)1.2–3.8(–4) µm in diam. (*n* = 29/2), mostly thin-walled, occasionally thick-walled (up to 0.8 µm).

Haustoria abundant, originating from hyphae. Haustorial mother cells basally clamped, smooth, hyaline, thin-walled, globose to ellipsoidal, (3.2–)3.4–4.5–(4.7) × (2.3–)2.4–3.4–(4.4) µm, *L* = 3.9 µm, *W* = 3.7 µm, *Q* = 0.8–1.7, *Q* = 1.1 (*n* = 30/2), each mother cell bearing one haustorial filament under 1 µm in diam. and 8 µm long, rarely branched.

Conidial stage, swollen cells, vesicles and hyphidia absent.

Ecology. In Finland *T. ramalinae* is found on the basal parts of the thallus of *Ramalina fraxinea*. It is also reported on *Ramalina lacera* (Diederich 1996), but *R. lacera* does not exist in Finland (Vitikainen et al. 1997). Both of the Finnish specimens of *T. ramalinae* were collected in July.

**Distribution and Abundance.** The host species *R. fraxinea* is mainly found in Southwest Finland (Vitikainen et al. 1997). Thus, distribution of *T. ramalinae* could be wider than currently known (Fig. 23), but further studies are needed to reveal its distribution and abundance and evaluate its possible Red List status.

**Tremella ramalinae** Diederich (Plate 2f, Figs. 23–24)

Bibl. Lichenol. 61: 152. 1996. — Type: Mexico. Baja California, near km 45 on road from San Quintin to Parador Puntua Prieta, ca. 10 km N of El Rosario, 30°8´N, 115°46´W, on *Ramalina lacera*, 5.1.1989 H. Sipman 24905 (holotype B; isotype herb. Diederich).
Tremella ramalinae seems to be a rare species worldwide. So far, only single specimens are known from Sweden, Mexico (Diederich 1996), Spain (Triebel 1997), Estonia (Halonen et al. 2000), Lithuania (Motiejūnaitė 2002), Poland (Kowalewska & Kukwa 2003), Iran (Sohrabi & Alstrup 2007) and California (Diederich 2003). This is the first Finnish record.

**Notes.** Tremella ramalinae is easily distinguished from other lichenicolous Tremella species by its four-celled basidia where the two lower septa are transverse and the uppermost septum longitudinal or oblique.

**Specimens examined.** — Finland. Åland: Hammarland, Katty, on Ramalina fraxinea on Fraxinus excelsior, 1964 Haakana (OULU F073614). Saltvik, Kvarnbo, on R. fraxinea on F. excelsior, 1914 Seppälä (OULU F073617).

**Conclusions**

Though knowledge of Tremella species and their distribution and abundance in Finland is extended through this study, there is still much to be elucidated. There may well be more than 16 species in Finland, particularly amongst the lichenicolous taxa. Even species new to science could yet be found. The knowledge of distribution, abundance and ecology of some Tremella species is still too deficient to evaluate if they are threatened in Finland. Further collections are clearly needed.

During the study we encountered many problems which need to be solved in order to understand taxonomic relationships within the genus Tremella. For instance, the taxonomy of species associated with pyrenomycetes and parasitic in the hymenium of polypores or Dacrymyces species needs clarification, and a neotype for T. foliacea must be selected. Even though all species in the genus Tremella have characteristics in common, it is not clear how closely lichenicolous and other Tremella species are related.

In addition, other heterobasidioid genera warrant investigation in Finland.

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