Wood-inhabiting fungi of the Białowieża virgin forest in Poland. XVIII. Amylocystis lapponica (Romell) Bond. & Sing.

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(Received: March 3, 1972.)

Abstract

The author examined the microstructure of the fruitbody and culture of polypore Amylocystis lapponica (Romell) Bond. & Sing., common in the Białowieża virgin forest on lying logs of Picea excelsa with symptoms of advanced brown rot produced by Fomitopsis rosea (Alb. & Schw. ex Fr.) P. Karst. In the fruitbody a monomitic hyphal system was revealed consisting for the most part of thick-walled nodose-septate hyphae 4–10,5 μm thick. Moreover, by examination of four cultures obtained from basidiospores, it was found (1) that the diploid mycelium gives nearly always a negative reaction, whereas the haploid mycelia give positive reactions in tests for extracellular oxidase, and (2) that the fungus is tetrapolar.

INTRODUCTION

The fungus Amylocystis lapponica (Romell) Bond. & Sing.* of the family Polyporaceae here described is a saprophyte decomposing coniferous wood in lying logs (Pilát 1938: 179; Lowe 1942: 76; Bondarcew 1953: 235; Overholts 1953: 277; Kotłaba and Pouzar 1963: 180; Domański, Orłoś, Skirgielło 1967: 80). It is a very rare species which occurs almost exclusively in virgin forests. It is probably owing to this that this fungus has not been elaborated in detail, neither has its culture. Isolation of such a culture is very difficult. The fungus is rather common in Białowieża, particularly in August and September (Domański 1959),

but the fresh fruitbodies contain a great deal of water and take a long time to dry, frequently in the meantime they become contaminated by various microscopic fungi as *Hypomyces aurantius*. In this state it is difficult to obtain from them a pure culture. Besides, the fungus infects wood lying on the ground and showing symptoms of decomposition due to *Fomitopsis rosea* (Alb. & Schw. ex Fr.) P. Karst., as pointed out by Kotlaba and Pouzar (1963: 180). The same is observed in the Białowieża National Park. Therefore mycelium had to be obtained from spores extracted from freshly collected fruitbodies.

The microscopic characters of the fruitbody have been described by numerous authors. It has traits typical for the genus *Tyromyces* P. Karst., but differs from the latter by thick-walled amyloid cystidia in the hymenium, and that is why it was included in the monotypic genus *Amylocystis* Bond. & Sing. described by Bondarczew and Singer, for which *Polyporus lapponicus* Romell is the type species. Precise descriptions of the microscopic structure of the fruitbody and culture of this fungus are, however, lacking. The present paper tries to fill this gap. In the investigations identical methods were used as in the preceding studies of this series.

**MATERIALS**

Table 1 contains a list of the fruitbodies and cultures used in the present study with their numbers in the Forest Protection Institute, Kraków, Mycological Herbarium (HMIPC).

**Table 1**

Fruitbodies of *Amylocystis lapponica* collected in Białowieża virgin forest from logs of *Picea excelsa* and cultures obtained from some of them used in tests

<table>
<thead>
<tr>
<th>HMIPC No.</th>
<th>Date of collection</th>
<th>Source of culture*</th>
</tr>
</thead>
<tbody>
<tr>
<td>286</td>
<td>August, 1956</td>
<td></td>
</tr>
<tr>
<td>526</td>
<td>August 26, 1956</td>
<td></td>
</tr>
<tr>
<td>3724</td>
<td>August 8, 1962</td>
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<tr>
<td>3418</td>
<td>October 20, 1963</td>
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<tr>
<td>4252</td>
<td>July 26, 1964</td>
<td></td>
</tr>
<tr>
<td>4259</td>
<td>July 27, 1964</td>
<td></td>
</tr>
<tr>
<td>4512</td>
<td>August 6, 1965</td>
<td></td>
</tr>
<tr>
<td>4543</td>
<td>August 10, 1965</td>
<td></td>
</tr>
<tr>
<td>4913</td>
<td>September 25, 1965</td>
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</tr>
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<td>5142</td>
<td>September 9, 1966</td>
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<td>5289</td>
<td>September 13, 1967</td>
<td></td>
</tr>
<tr>
<td>5622</td>
<td>August 26, 1968</td>
<td>Sp</td>
</tr>
<tr>
<td>5644</td>
<td>August 30, 1968</td>
<td>Sp</td>
</tr>
<tr>
<td>5645</td>
<td>August 30, 1968</td>
<td>Sp</td>
</tr>
<tr>
<td>5683</td>
<td>September 3, 1968</td>
<td>Sp</td>
</tr>
</tbody>
</table>

* Sp – from spore print obtained from fruitbody grown in forest.
Fig. 1. Cultures of *Amylocystis lapponica* after five weeks growth on malt agar in the dark at 22°C: 


**MICROSCOPIC STRUCTURE OF FRUITBODY**

The monomitic hyphal system consisted of nodose-septate hyphae with acyanophilous, indexinoid and partly inamyloid walls. The pileus cover is built of thick-walled nodose-septate hyphae 4 μm thick, collected in fascicles measuring 200-500 × 20–75 μm, and under it there is a layer, 25–50 μm thick, of the same hyphae, strongly conglutinate and more or less horizontal. The context near the upper surface of the pileus contains relatively very thin-walled hyaline and branched generative hyphae 2–3 μm thick, but in its remaining part the hyphae become so thick-walled that the lumen is often partially obscured or relatively narrow and follows an erratic course. They are branched, flexuose, 4–8(−10.5) μm thick, interlaced in various directions. In dissepiments the hyphae are mostly thick-walled, 3–4
Fig. 2. Microstructures of fruitbody of *Amylocystis lapponica*:

- **a** - endings of hyphae on the edge of dissepiment,
- **b** - hyphae of hairs of cover and upper surface of pileus,
- **b₁** - hyphae of dissepiment,
- **c** - hyphae in the upper part of context,
- **d** - hyphae most numerous in context (×500 except **a** ×800).

Fig. 3. Fragment of hymenium of *Amylocystis lapponica*:

- **a** - hyphal peg,
- **b** - basidia with or without spores,
- **c** - cystidia,
- **d** - cystidiole,
- **e** - spores (×1000).
μm thick, sometimes rather strongly interlaced and more or less parallel, with somewhat amyloid walls and thin-walled and claviformly thickened to 5–6 μm, ends on the edges. Cystidia cylindric- or fusiform-clavate, 18–40 × 3.5–6.5 μm, thick-walled, hyaline, mostly incrusted at the apex, amyloid. Hyphal pegs present. Basidia clavate, 13–25 × 4–6 μm, with 2–4 sterigmata 5–6 μm long. Spores cylindric, 7.5–11 × 2.5–3.5 μm, with hyaline, thin, smooth, inamyloid walls.

CULTURE

Mat at first appressed, whitish and not shining or shining, and covered with whitish flocks, soon becoming pallidbrown-ochraceous, then especially near the inoculum, tomentose, rather compact, 0.5–2 mm thick, ochraceous-bricky, in some

Fig. 4. Hyphae from advancing zone (a) and submerged mycelium (b) in culture of *Amylocystis lapponica* HMIPC No. 5683 (×500).
places white, pink, pink-brown (same as colour of fresh fruitbody). Advancing zone thin, translucent, whitish. Hyphae from advancing zone nodose-septate, hyaline, thin-walled, 3–4 μm thick, or irregularly thickened to 7.5 μm, with numerous, mostly unilaterally comb-shaped tubercles or branchings. Hyphae of older aerial mycelium thin-walled, nodose-septate, often inflated to 15 μm, hyaline or mostly yellow-brown with granular contents. Hyphae of submerged mycelium hyaline, strongly differentiated, both equal-thickened to 2 μm and inflated to 15 μm, with numerous branchings. Chlamydospores hyaline or yellow-brown, globose to oblong-ellipsoid, 10–25×7.5–15 μm. Scent rather pleasant, like that of fresh fruitbody. Species Code: 1, (2), 3, 11, 14, (21), 22, 26, 34, (36), 37, 38, 39, 47, (48), 53, 55, 60.
As seen from the Code the fungus gives negative (1) or positive (2) (especially its hyploid mycelia) results in tests for extracellular oxidase and shows a tetrapolar type of interfertility (60). The type of interfertility was found in one isolate only and until after 4 weeks of growth at 0°C. The results are presented below in abbreviated form:

\[
\begin{align*}
\text{HMIPC No. 5646} \\
A_1 B_1: & \ 1, 16, 19 \\
A_1 B_2: & \ 2 \\
A_2 B_1: & \ 14, 15 \\
A_2 B_2: & \ 18, 20 \\
\text{No pairings: } & A_1 B_1 \times A_2 B_2: 15 \times 1, 15 \times 16
\end{align*}
\]

REFERENCES

Bondarcev A. S., 1953, Trutovje Grify.

Grzyby zasiedlające drewno w Puszczy Białowieskiej

XVIII. Amylocystis lapponica (Romell) Bond. & Sing.

Streszczenie

Autor zbadał mikrostrukturę owocnika oraz kulturę grzyba Amylocystis lapponica (Romell) Bong. & Sing. występującego powszechnie w Puszczy Białowieskiej na leżących na ziemi kłodach świerkowych, wykazujących równocześnie objawy zaawansowanej zgnilizny drewna wywołanej przez Fomiopsis rosea (Alb. & Schw. ex Fr.) P. Karst. Stwierdził monomityczny system strzępkowy w owocniku, złożony w przeważającej mierze z grubościennych strzępek septowanych ze sprzążkami o grubości 4-10,5 μm. Ponadto po zbadaniu 4 grzybni, wyizolowanych na sztuczną pożywkę z zarodników podstawkowych ustalił, że grzybnia diploidalna daje prawie zawsze negatywną, a grzybnia haploidalna daje pozytywną reakcję w próbie na pozakomórkową oksydazę oraz że grzyb jest tetrapolarny.