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MORPHOLOGY AND CULTURAL STUDIES OF HYMENOCHAETE ATTENUATA

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SUMMARY

The morphology of the basidiocarp, together with the cytology and cultural characteristics of Hymenochaete attenuata, found in Switzerland, have been studied. Code numbers, based on the methodology proposed by Nobles, and SEM photographs for this species are supplied.

RESUME

La morphologie des basidiomes, la cytologie et les cultures d'Hymenochaete attenuata trouvé en Suisse ont été étudiées. Les résultats sont complétés par le code basé sur la méthodologie de Nobles, et par des photographies réalisées au microscope électronique à balayage.

ZUSAMMENFASSUNG

Die Morphologie des Fruchtkörpers, die Zytologie und die Kulturen von in der Schweiz gefundenen Hymenochaete attenuata wurden untersucht. Die Resultate sind mit dem nach Nobles vorgeschlagenen Code ergänzt und mit rasterelektronenmikroskopischen Photographien belegt.

INTRODUCTION

During a taxonomic study of the mycoflora of Switzerland two collections were found that coincide with the description of Hymenochaete attenuata (Lév.) Lév. This species has been considered Indo-asiatic, although also recorded by Cunningham (1957) for Australia and New Zealand.

Hymenochaete attenuata does not appear to have been recorded so far from Europe. We believe it is of interest to redescribe the morphology of this species on the basis of our material and the cultural characteristics.

MATERIAL AND METHODS

Light microscope: Free-hand sections were mounted for observation in a solution of cotton blue-lactophenol, or in a solution of congo-red.

Scanning electron microscope: The material was fixed according to the method used previously by Keller (1985); in which samples of the basidiocarp were fixed in KMnO₄, dehydrated in acetone series and then subjected to critical point drying. The samples were coated with gold and observed using a Philips 500.

Cultural and cytological studies: The polysperme cultures were obtained from spore-prints. The study of the morphology was carried out based on Nobles's method (1948, 1958, 1965), with her code, and furthermore it includes the added numbers mentioned by Boidin & Lanquetin (1983).

The medium employed was:

- a) growth medium: malt agar (Nobles, 1948)
- b) oxidase reaction medium: 1: gallic acid agar (Davidson et al., 1938)
2: tannic acid agar (idem.)
3: guaiacol 2% (Boidin, 1958)
4: paracresol (idem.)
5: tyrosine (idem.)

The reaction intensity and the rate of the mycelial growth are given as described by Davidson et al. (op. cit.).

For the cytological study we followed the technique mentioned by Boidin (1958). Cultures were grown under collodion film, and fixed by a saturated solution of HgCl₂ and glacial acetic acid, and finally were stained with slow giemsa.

The colour of the mycelium culture and basidiocarp are described on the basis of Seguy's colour chart (1936).

RESULTS

a- Description

Hymenochaete attenuata (Lév.) Lév., Ann. Sci. Nat., Bot, sér.

III, 5, 152. 1846. (= Stereum attenuatum Lév.,
Ann. Sci. Nat., Bot. sér. III, 2, 212. 1844.)

Basidiocarp thin, coriaceous to papery, resupinate with slightly elevated margins, effuso-reflexed or pileate-sessile. At first orbicular (1-2 mm diam) with reflexed margins, soon confluent. Hymenial surface warm sepia (Pl. VIII, 116), slowly colliculose, sometimes creviced in small areas. Reflexed portions 0,5 - 2 cm diam, rarely imbricate, with the adaxial surface brown (Pl. VIII, 117), banded with concentric zones of different shades of brown. Margin thinning out, fibrillose, brown clear (Pl. IX, 131).

Context well developed 150 - 250 μ m thick, parallel with the substrate, formed of loosely interwoven radially arranged hyphae. Hyphae thick-walled 1,7 - 3,6 μ m diam, golden yellow, septate and usually branched at right angles. Cuticle absent. Abhymenial hairs arising directly from the context. Setal layer seated on the context, formed by one or two rows of irregularly arranged setae. Setae (55) - 70 - 105 x 6 - 8 - (9) μ m, aculeate, with acute apices (Fig.3a), ensheathed or naked, a few with slightly (Fig.3b) or more strongly (Fig.3c) twisted axes; and some setae (40) - 50 - 90 x 6 - 9 μ m, with dome-shaped apices (Fig.2a,b,c).

Hymenium composed of basidia and basidioles. Basidia subclavate 18 - 26 x 4 - 5 μ m, with 4 curved sterigmata. Spores cylindrical to elliptical 4,5 - 6 x 2,5 - 3,5 μ m (Fig.1b and 3d, e), smooth, hyaline, thin-walled, neither amyloid nor dextrinoid.

Material examined: Switzerland, Jura, Develier; 10 october 1987; leg. J. Keller (NEU 4212a); Id.; 18 october 1987; leg. J. Keller & D. Job (NEU 4212b).

Substratum: Effused on bark or decorticated dead branches of Alnus; associated with a white pocket rot.

b- Cultural and cytological studies:

Macroscopic characters: growth very slow, reaching 6,8 - 7,2 cm after 6 weeks. Mycelial layer felted, white at the beginning, turning ocre yellow (Pl. IX, 131) after the 4th week, and brown (Pl. VIII, 172), banded with concentric zones of dark brown (Pl. VIII, 116) near the margin, after the 5th week. Margin regular, cottony, white, and advanced mycelium submerged (Fig.1a).

Reverse changed to brown in the area up to 4,5 - 6 cm from the inoculum. Odour absent.

Reactions: guaiacol 2%: + + + (+); no growth paracresol: - ; tr.
 tannic acid: + + + ; no growth tyrosine : - ; tr.
 gallic acid: + + + + ; no growth

Microscopic characters: Margin formed by 1,5 - 2,8 μ m diam generative hyphae, straight or more rarely twisted, afibulate, with few branches and thin walls. Submerged mycelium composed of generative hyphae, afibulate, irregular submoniliform after the second week, with swellings (6 - 14 μ m diam) and few kidney-shaped protuberances. Mycelial layer formed, at the beginning, by regular septate, afibulate, generative hyphae, 1,8 - 4 μ m diam, with thin hyaline walls. From the second week, afibulate, generative hyphae with golden thickened walls form in the culture, a few with amber, oily contents. Bipyrnid crystals, probably of calcium oxalate monohydrate (Keller, 1985) are present after the 3rd week in culture. From the 4th week in correlation with the dark concentric zones of the mycelial layer we observed brown generative hyphae, with irregular short branches, and slightly thickened walls, which form a compact mesh and resulting in a plectenchymatous tissue.

Cytological studies: cells binucleate, rarely uni- or trinucleate.

Code: 2a, 6, 11, (22), 26, 32, 37, 39, 47, 54.

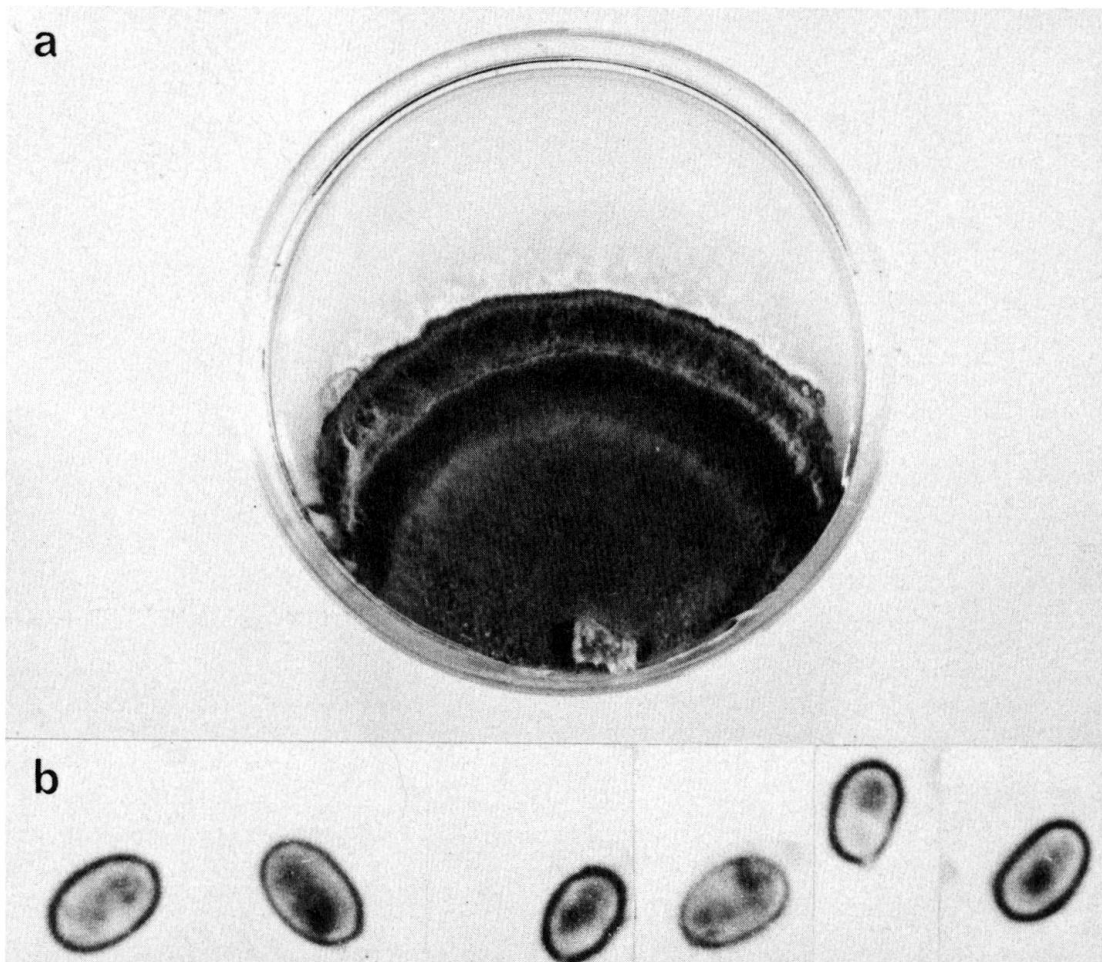


Fig.1a: Aspect of six-week-old culture (x 1).

Fig.1b: Elliptical spores (light microscopy, x 1000).

DISCUSSION

Both Swiss collections agree in the macro- and microscopical features with the New Zealand material of *H. attenuata* studied by Cunningham. Nevertheless the European collections seem to show more variety in spore form.

Hymenochaete attenuata can be recognized by the absence of a cuticle and the unusual characteristic in the genus of possessing two types of setae: (a-) setae aculeate, twisted or not with acute apices (Fig.3a). (b-) setae shorter with rounded, domed apices (Fig.2a,b',c). The young stage of the aculeate setae differs from the former in having a thinner, golden yellow wall (light microscope) and acute apices (Fig.2a).

The same dimorphism in the setae was found by Cunningham (1957) in an authentic L  veill   specimen from Java, deposited at the Kew Herbarium.

In SEM study, spore form is generally cylindrical (Fig.3d). Nevertheless in the study with the light microscope of the spore-print and hymenium, the spores are more variable and many are elliptical (Fig.1b), as in H. attenuata material. This change may result from desiccation of the material and the elasticity of the spore walls.

Hymenochaete attenuata seems to be closely related to H. sallei Berk. & Curt. Both have effuso-reflexed to pileate fructifications, medium-sized setae and spores, and the absence of a cuticle, but H. sallei has allantoid to suballantoid spores (Job, 1985) and setae only with acute apices. In the cultural characteristics the species have a different code number (Job, 1986) and the former present plurinucleate cells in the polysperme culture (Boidin, 1984).

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FIGURES

Fig.2a: Evidence of the dimorphism of setae: young aculeate setae (top left arrow) and mature setae with domed apices (bottom right arrow) x 1680.

Fig.2b: Mature aculeate setae (on the left) and mature domed setae (on the right) x 2200.

Fig.2c: Detail of domed setae, ensheathed, x 3650.

Fig.3a: Setae naked with acute apices, x 2300.

Fig.3b: Setae slightly twisted, x 2900.

Fig.3c: Setae strongly twisted, x 2700.

Fig.3d: Cylindrical spore, x 20400.

Fig.3e: Elliptical spore, x 20900.



Fig. 2

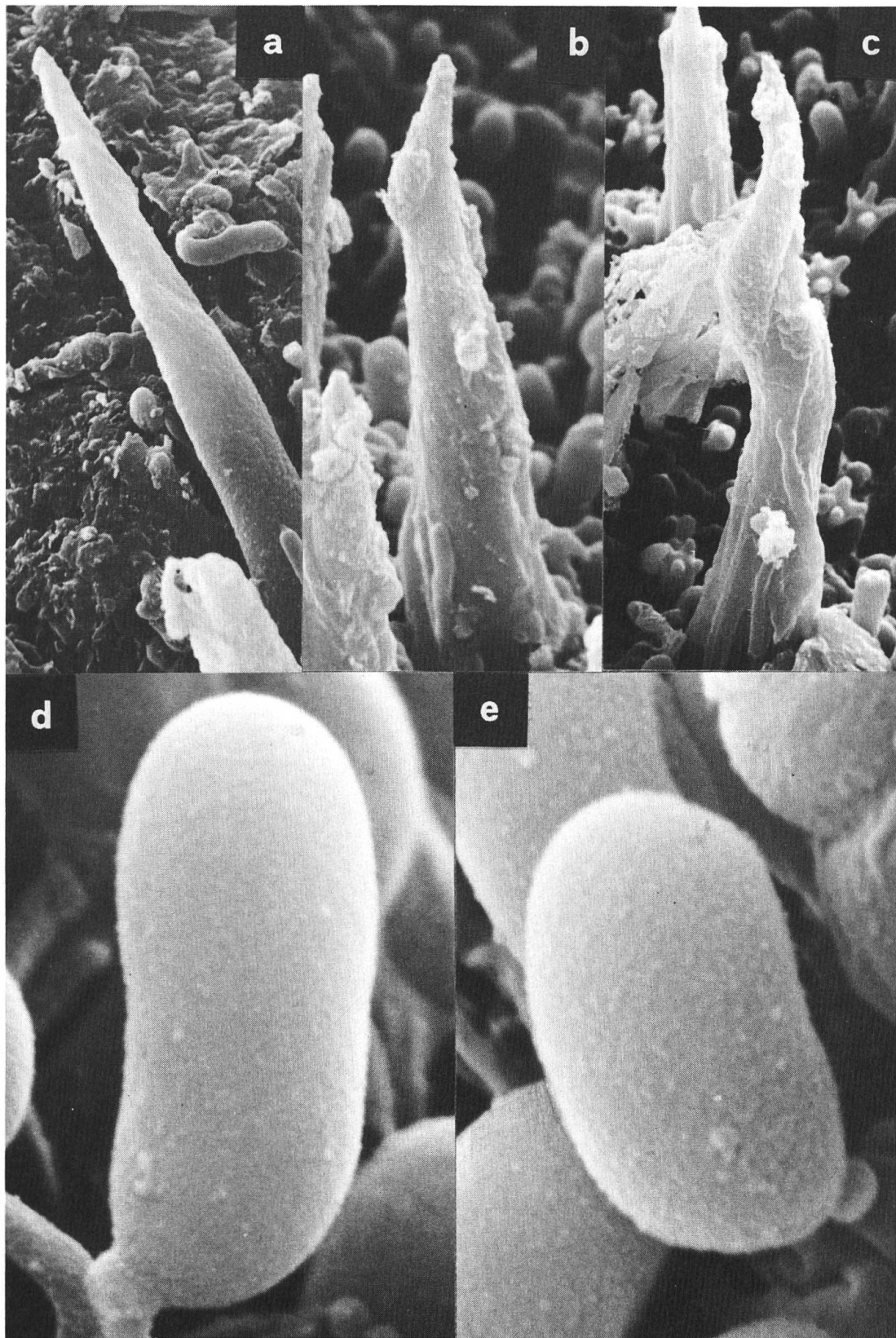


Fig. 3

