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STUDIES ON INDIAN POLYPORES VII. MORPHOLOGICAL
AND CULTURAL CHARACTERS OF *POLYPORUS HIRSUTUS*
WULF. EX FR.

By

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Morphological and cultural characters of *Polyporus hirsutus* Wulf. ex Fr. have been studied in detail and in the light of these observations, the taxonomy of the fungus has been discussed.

INTRODUCTION

Polyporus hirsutus Wulf. ex Fr. is cosmopolitan in distribution growing generally on angiospermic wood, rarely on gymnasperms, and causes a white rot. In the present paper is given detailed morphological and cultural characters of this fungus and its taxonomic position is discussed in accordance with modern concepts.

MATERIALS AND METHODS

Macroscopic and microscopic characters of the basidiocarps were studied from fresh specimens collected locally by the authors during 1975 to 1978 following the method of Roy and De (1979). Cultural studies were made with

polysporous cultures and the method of Nobles (1948) was followed. Voucher specimens and cultures have been deposited in the Mycological Herbarium of the Visva-Bharati University.

POLYPORUS HIRSUTUS WULF EX FR.

Basidiocarp

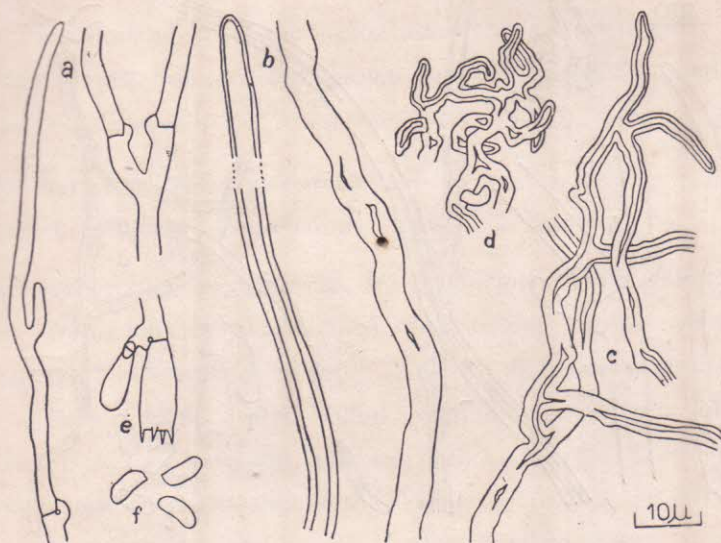
Basidiocarp usually annual, occasionally reviving in the second season, sessile or effuso-efflexed, solitary or imbricate, dimidiate, applanate, sometimes reniform, corky-coriaceous when fresh, rigid on drying, $2.0-6.0 \times 2.5-8.0 \times 0.1-1.0$ cm; upper surface white or yellowish, strongly hirsute, often velvety, concentrically zonate; margin thin, even; context white to woody brown, coriaceous, up to 0.5 cm thick; hymenial surface white to yellowish brown, smooth, pores regular, round or angular, sometimes lamellate, 2-3 per mm; tubes up to 0.5 cm long.

Hyphal characters: (a) generative hyphae hyaline, thin-walled, with clamp connections, $2.0-4.0 \mu$ in diameter (Text-fig. 1, a); (b) skeletal hyphae hyaline, thick-walled to solid, straight or slightly tortuous, rarely branched, with unbranched tapering apex, $2.8-5.6 \mu$ in diameter (Text-fig. 1, b); (c) binding hyphae hyaline, thick-walled to solid, of 2 types— (i) with long, tapering branches, $2.0-4.2 \mu$ in diameter (Text-fig. 1, c) and (ii) with short, much curled branches, giving a coralloid appearance, $1.5-3.0 \mu$ in diameter (Text-fig. 1, d).

Hymenium: Basidia (Text-fig. 1, e) clavate, tetraterigmatic, $12.6-16.0 \times 4.0-5.6 \mu$; basidiospores (Text-fig. 1, f) hyaline, thin-walled, cylindrical, apiculate, $4.5-7.2 \times 1.5-3.0 \mu$; hyphal pegs conical, composing a bundle of thin-walled generative hyphae and projecting $17.5-24.5 \mu$ beyond the hymenial layer.

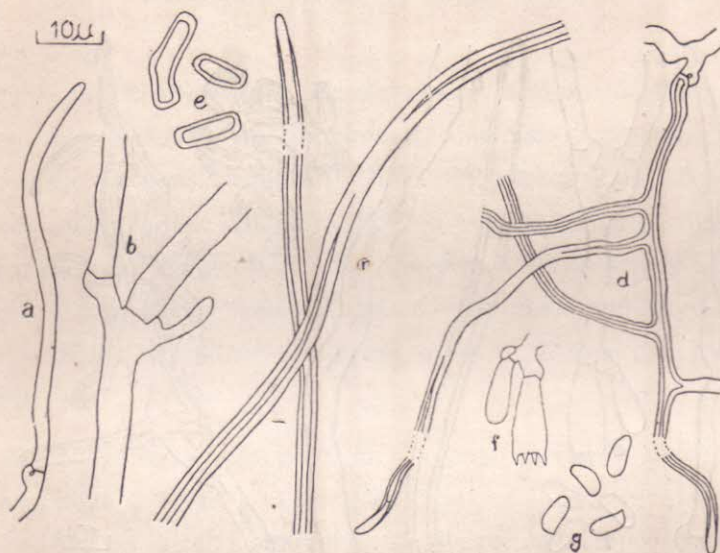
Culture

Growth characters: Growth rapid, mat reaching a radius of 6.5-7.0 cm in 4 days and covering the plates in 2 weeks. Advancing zone even, slightly raised with mycelium extending up to the margin. Mat at first floccose to woolly-floccose showing fine radiations from centre to the periphery, soon becoming



Text-fig. 1, *Polyporus hirsutus* Wulf. ex Fr. Microscopic structures from basidiocarps.

- a, Thin-walled generative hyphae;
- b, Skeletal hyphae;
- c, Binding hypha with long branches;
- d, Binding hypha with short, curled branches;
- e, Basidia; and
- f, Basidiospores



Text-fig. 2, *Polyporus hirsutus* Wulf. ex Fr. Microscopic structures from cultures.

- a, Thin-walled generative hypha from advancing zone;
- b, Wider, thin-walled generative hypha from aerial mycelium,
- c, Skeletal hyphae;
- d, Binding hypha with long branches;
- e, Chlamydospores;
- f, Basidia; and
- g, Basidiospores.

more dense and floccose-felty to woolly-felty, with small compact mycelial balls scattered all over the surface and developing in some plates small poroid fruit bodies. Colour usually white, occasionally cream coloured patches appearing in some plates at the periphery of the mat after about 4 weeks. Reverse bleached.

Oxidase reactions positive; strong diffusion zones on both gallic acid and tannic acid agar media; no mycelial growth on gallic acid, but good mycelial growth on tannic acid media.

Hyphal characters : Advancing mycelium—generative hyphae hyaline, thin-walled, branched, with clamp connections, $2.0-4.2\ \mu$ in diameter (Text-fig. 2, a).

Aerial mycelium—(a) hyphae as in the advancing zone but slightly wider and up to $8.4\ \mu$ in diameter (Text-fig. 2, b); (b) skeletal hyphae hyaline, long, usually unbranched, thick-walled to solid, $2.0-4.0\ \mu$ in diameter (Text-fig. 2, c); (c) binding hyphae hyaline, thick-walled, with lumina narrow or obliterated, much branched, branches long and tapering, $1.5-3.0\ \mu$ in diameter (Text-fig. 2, d); (d) chlamydospores hyaline, slightly thick-walled, $5.6-21.0 \times 2.8-4.2\ \mu$, intercalary or terminal, cylindrical or of various shapes (Text-fig. 2, e).

Fruit body : hyphae as in aerial mycelium; basidia (Text-fig. 2, f) clavate, tetrasterigmatic, $11.2-16.0 \times 4.2-5.6\ \mu$; basidiospores hyaline, thin-walled, cylindrical, apiculate, $4.2-7.2 \times 1.5-3.0\ \mu$ (Text-fig. 2, g).

DISCUSSION

The aforesaid description indicates that the basidiocarp of *P. hirsutus* is trimitic in construction and thus agrees with the views of Cunningham (1965), Bakshi (1971), Domanski, Orlos and Skirgiello (1973), Gilbertson (1974), and Ryvarden (1978), but in the presents investigation the hyphal system has been studied in greater detail. As described, skeletal hyphae are of the 'vermiculiform type' of Teixeira (1962) while the binding hyphae with long tapering branches

as well as with much curled branches represent respectively the 'long type' (Cunningham, 1946) and 'coralloid type' (Fidalgo, 1958; Roy, 1972) of binding hyphal system.

P. hirsutus has been included by various authors under the genera *Polyporus* Mich. ex Fr., *Trametes* Fr., and *Coriolus* Quel.

According to modern taxonomic concepts species having basidiocarps with different hyphal systems are not regarded as congeneric. So *P. hirsutus* possessing dimitic hyphal system can not be placed under the dimitic genus *Polyporus* Mich. ex Fr.

Basidiocarps of *P. hirsutus* resemble somewhat in exomorphology the basidiocarps of *Polyporus versicolor* L. ex Fr., the type of the genus *Coriolus* Quel. Both have tough and coriaceous fruit bodies with zonate upper surface which are also velutinate. But the two species differ in their anatomical as well as in cultural characters. Van der Westhuizen (1971) who made detailed investigations on the morphology of the basidiocarps and cultures of *P. versicolor* reported the presence of arboriform type of skeletal hyphae and pale brown thick-walled generative hyphae in basidiocarps and cultures of this species. These structures are not formed in *P. hirsutus* neither in basidiocarps nor in cultures. Unlike the culture of *P. hirsutus*, that of *P. versicolor* produces finely farinaceous to floccose young mycelium, becoming collapsed later in which finally appear brown skin-like or crustose areas (Nobles, 1965; Bakshi, Sehgal and Singh, 1969; Vander Westhuizen, 1971) constituting thick-walled, shortly branched generative hyphae, hyaline but 'stained by a lacquerlike substance secreted in the brown areas' (Vander Westhuizen, 1971). With so great differences in anatomical and cultural characters *P. hirsutus* can not be placed in the genus *Coriolus* Quel which is based on *P. versicolor*.

Thick, corky basidiocarps of *Trametes suaveolens* (L. ex Fr.) Fries, the type species of *Trametes* Fr., having azonate pileate surface which may be tomentose when young and becomes glabrous when old, apparently differs greatly in exomorphology from the coriaceous, zonate, strongly velutinate basidiocarps

of *P. hirsutus* with those of *T. suaveolens* as recorded by Van der Westhuizen (1971) shows that both have similar kinds of hyphae in their basidiocarps. Cultural descriptions of *T. suaveolens* given by Nobles (1965) and Van der Westhuizen (1971) also indicate its similarity with the cultural character of *P. hirsutus* as regards texture of the mat and hyphal characters. Besides, both *P. hirsutus* (Sen and Sehgal, 1967) and *T. suaveolens* (Nobles, 1965) show tetrapolar sexuality and give positive reactions in oxidase tests.

From a consideration of all these evidences it appears that *P. hirsutus* is really closely allied to *T. suaveolens* in respect of microscopical, cultural and biological characters. It is concluded therefore that the genus *Trametes* Fr. is the right place for *Polyporus hirsutus* Wulf. ex Fr.

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