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Polyporus baudoni Pat. on *Eucalyptus* spp. in South Africa

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ABSTRACT

The morphology and anatomy of the fruit-bodies and characteristics in pure culture, of *Polyporus baudoni* Pat., which is associated with death of species of *Eucalyptus* and other trees in South Africa, are described. The anatomical characters of these fruit-bodies agree with those of the type specimen, as well as with those of the type specimen of *Phaeolus manihotis* Heim which is shown to be synonymous. The anatomical characters of the fruit-bodies and the cultural characteristics differ from those of *Polyporus schweinitzii* Fr., the type of the genus *Phaeolus* Pat. The fruit-bodies and cultures display combinations of characters not known to occur in any other species of polypore.

INTRODUCTION

A disease of *Eucalyptus* species in plantations in northern Natal, which results in death of the trees in increasing numbers, has been causing concern during the past few years. Death of the trees is associated with the appearance of a fungus with large, bright orange-yellow to yellow-brown stipitate, poroid fruit-bodies at the bases of trunks and on the ground among the trees. This disease was first reported by Luckhoff (1955) who referred to this fungus as *Ganoderma colossum*. Subsequent study by the present author confirmed the association between the death of the trees and presence of the fungus but raised doubts about its identity.

The fungus has now been identified as *Polyporus baudoni* Pat., first described from the Congo (Patouillard, 1914). A fungus, *Phaeolus manihotis* Heim, first described from Madagascar on manihoc (Heim, 1931), was reported by Brunck (1965) on *Cassia siamea* from Ghana and Upper Volta, on *Gmelina arborea* from the Ivory Coast and Upper Volta and on *Eucalyptus* spp. from Brazza Congo and South Africa. Browne (1968) recorded this fungus in association with death of trees in East Africa and suggested that *Phaeolus manihotis* Heim is identical to *Polyporus baudoni* Pat. The fungus does not appear to be well known and very few references to it exist in the literature. It is the purpose, in this paper, to furnish detailed descriptions of the morphology and anatomical characters of the fruit-bodies found in Natal and of the cultures made from them and to report on the results of comparisons made with the type specimens of *Polyporus baudoni* Pat. and *Phaeolus manihotis* Heim and cultures and fruit-bodies of *Polyporus schweinitzii* Fr., the type species of the genus *Phaeolus* Pat. (Donk, 1960).

METHODS

Fresh and dried fruit-bodies were examined microscopically according to the methods described by Teixeira (1956) and Van der Westhuizen (1971). Thin slices of tissue cut and removed in a radial-longitudinal plane from various parts of the fruit-bodies, were carefully teased apart in water or lactophenol with the aid of fine, sharpened darning needles under 25× magnification of a stereo-microscope. Hyphae dissected out in this way were mounted in water or lactophenol and examined with a 100 × oil immersion lens.

Cultures were obtained by removing small pieces of context tissue from freshly broken surfaces of newly collected fruit-bodies with the aid of sterile, fine-pointed forceps and placing these on agar plates which contained 1,5% Oxoid malt extract solidified by 1,5% agar in distilled water.

The cultural characters were studied and described according to the methods of Nobles (1948) from cultures growing on 1,5% Oxoid malt extract agar plates as described above, inoculated at the side of the dish, and incubated in the dark at 25°C for 6 weeks. The cultures were tested for the presence of extra-cellular oxidase enzymes by growing them at 25°C for seven days on plates of 1,5% malt agar to which 0,5% of gallic acid and 0,5% of tannic acid had been added according to the method described by Nobles (1948) and Van der Westhuizen (1971).

All colours are named according to the notation of Ridgway (1912).

DESCRIPTIONS

Carpophores (Figs. 1–7).

Fruit-bodies terricolous or lignicolous annual, solitary, or grouped; pileus orbicular, applanate to somewhat depressed or dimidiate and often depressed behind, mostly broadly obconical, tapering sharply to a reduced base and frequently attached to a hypogeous, soft, pseudosclerotium or mycelial sheath or pad attached to stem or root of host, simple or with imbricate or connate lobes, spongy when fresh drying to soft, brittle corky to soft woody, light, 12–70 cm in diameter or up to 40 × 20 × 2–8 cm in dimidiate forms; upper surface finely pubescent to glabrous and crustose over rounded lumps, uneven, tuberculate, often unevenly concentrically sulcate, mat, in bright orange yellow colours, "Buff yellow" to "Apricot yellow" "Warm buff" to "Zinc orange" darkening to "Mars yellow" or "Sudan brown" on drying. Margin obtuse, thick, rounded, entire or undulate to somewhat lobate, concolourous, sterile below. Pore surface bright yellow, "Lemon yellow" to "Apricot yellow" when fresh, drying darker, occasionally to "Antique brown" to "Mummy

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brown", poroid; pores angular, to labyrinthiform 1–4/mm; dissepiments, even to somewhat lacerate, thin; tubes concolourous with pore surface, 1–4 mm deep in one layer. Context "Pale orange yellow" to "Orange buff" or "Mikado orange" when fresh drying to "light orange yellow" "Warm buff" or "Antimony yellow" .5–7 cm thick, soft felty, azonate or concentrically zoned, darkening in KOH.

Hyphal characters: (1) hyphae hyaline or faintly yellowish, branching, thin-walled, nodose-septate, and simple-septate, 3,0–5,0μ in diameter (Fig. 8); (2) hyphae as in (1) but somewhat swollen and filled with bright yellow or yellowish brown refractive contents 7,0–15,0μ in diameter (Fig. 10); (3) fibre hyphae straight or flexuous, unbranched or occasionally branched with walls thickened, yellowish, refractive and lumina narrowed or occasionally occluded, aseptate, or with occasional simple septa, 2,0–3,0μ in diameter (Fig. 9), swelling and fracturing when mounted in 5% KOH solution (Fig. 11).

Hymenium: basidia long-clavate, 14–24 × 5–8μ with four slender sterigmata 2,5–4,0μ long; basidiospores hyaline, long ellipsoid to almost cylindrical, thin-walled, smooth, 5–11 × 3,0–5,0μ, mostly 6,5–7,5 × 3,5–4,5μ, non-amyloid, (Fig. 13, 14).

Construction: At the margin the fruit-body consists of branching, thin-walled, septate hyphae, hyaline to pale yellowish, with dense, deeply staining contents and agglutinated into strands. Immediately behind the margin many narrow fibre hyphae are present, intertwined with thin-walled, septate hyphae, some of which have dark-coloured luminal contents. At the upper surface, the thin-walled, septate hyphae are branched and intertwined, many with dark-coloured contents, and agglutinated, together with fibre hyphae into bundles that project upwards, their ends bent over in all directions and agglutinated by a dark-brown, resinous substance into the thin, hardened surface of the dry fruit-body (Fig. 12). Dark-coloured zones, 10–20μ thick, of similar construction to the upper surface, may be present in the context at different levels. The context consists of hyaline or yellowish, flexuous, thick-walled, aseptate fibre hyphae and thin-walled, branching septate hyphae often with bright yellow or yellow-brown refractive contents, intertwined into a fairly loose, soft, homogeneous tissue. The dissepiments consist mainly of yellowish aseptate fibre hyphae, with walls slightly thickened, their lumina relatively wide and often with yellowish contents, and tightly intertwined in a vertical direction. Numerous thin-walled septate hyphae with short, lateral branches which bear the basidia at the hymenial surfaces are present between the fibre hyphae. Intertwined with the hyaline hyphae of the dissepiments, are numerous, thin-walled, septate hyphae, somewhat swollen and filled with a bright yellow, granular or refractive substance, which apparently imparts the bright yellow colour to the dissepiments.

Cultural characters (Fig. 15–22).

Growth is moderately rapid, the colonies reaching radii of 12–35 mm in one week and covering the plates in 3–4 weeks. The margin is even to slightly bayed with the mycelium raised to the limit of growth. The advancing mycelium is thin, silky, colourless or faintly yellowish becoming gradually thicker, more dense and woolly over the older part of the mat and gradually forming woolly patches along the sides of the dish. Over the inoculum the mycelium is quite dense, woolly to felty and "Naphthalene yellow" to "Buff yellow" in colour. This dense mycelium gradually increases in size and darkens over the younger parts over the mat to form dense felty areas of "Mustard yellow" to "Buckthorn brown" whilst patches of woolly mycelium on the sides of the dish turn "Naphthalene yellow" or darker. The mat may change colour slowly or the felty dark-coloured aerial mycelium may spread and darken until the entire mat may be felty and "Chamois", "Naples yellow" "Ochraceous tawny" or "Cinnamon brown" in 5–6 weeks, or, the mat may become irregularly appressed and lacunose in patches with low, irregular ridges of dense felty "Warm buff" to "Antimony yellow" mycelium, grown together in an irregular pattern.

The reverse bleaches slowly and a strong, sweetish but nauseating odour is given off. The agar is softened under the mat.

On gallic acid and tannic acid malt agar no diffusion zones are formed but colonies of up to 35 mm in diameter are formed in 7 days on both media.

Hyphal characters

Advancing mycelium: hyphae hyaline, thin-walled, nodose-septate with simple clamps, branching near the septa, 3,0–5,0μ in diameter (Fig. 17).

Aerial mycelium: (a) hyphae as in the advancing zone; (b) narrow hyaline hyphae with simple septa and thin walls and deeply staining contents, branching near the septa, the branches long, often forming H-connections, 1,5–3,0μ in diameter (Fig. 18,21); (c) hyphae as in (b) but with brownish, lacquer-like contents and often distended in parts up to 10μ in diameter (Fig. 20); (d) fibre hyphae hyaline or pale yellowish, long, narrow, unbranched or occasionally branched, the walls thickened, refractive and lumina narrowed, aseptate with deeply staining contents or with brownish contents, arising from septate, thin-walled hyphae 2,0–4,0μ in diameter (Fig. 19, 22), swelling and fracturing readily in KOH mounts (Fig. 11).

Submerged mycelium: hyphae hyaline, wide, thin-walled, nodose-septate and simple septate, without contents or with deeply staining contents.

Specimens examined.

in Herb PRE: 14204, Swaziland, 1918; 17052, on grass, Magaliesberg, Pretoria Dist., Jan., 1923; 23764, on *Celtis rhamnifolia*, Wonderboompoort, Pretoria, 1926; 30832, on ground, Park Rynie, Natal, Jan., 1939; 32379, on ground in thick grass, Park Rynie, Natal Jan., 1938; 35995, on dead wood, Marracuene, Mocambique, May, 1946; 40660, pine plantation, Dukuduku Forest Reserve, Natal, Dec., 1952; 41021, on roots of leguminous liane, Dukuduku Forest Reserve, Natal, Dec., 1954; *42148, Dukuduku Forest Reserve, Natal, Dec., 1961; 43155, base of tree in indigenous forest, George, C.P., Feb., 1966; 44621, base of living coppice of *Eucalyptus*, Dukuduku, Dec., 1967; *44622, on ground among *Eucalyptus*, Dukuduku, Dec., 1967; 44623, on ground near living *Eucalyptus*, Dukuduku, Dec., 1967; 44624, at base of living *Eucalyptus*, Dukuduku, Dec., 1967; 44625, at base of *Eucalyptus* stump with 2 living stems, Dukuduku, Dec., 1967; 44626, on ground, Dukuduku, Dec., 1967; 44627, on ground near decayed *Pinus* sp. stump, Dukuduku, Jan., 1969; 44628, on ground, attached to *Eucalyptus*, root, Dukuduku, Jan., 1970; 44629, at base of dead *Eucalyptus* tree, Dukuduku, Jan., 1970; *44630, at base of *Eucalyptus* coppice shoot, Dukuduku, Jan., 1970; *44631, at base of dead stem of *Eucalyptus*, Dukuduku, Jan., 1970; 44632, on piece of dead wood on ground, Dukuduku, Jan., 1970;

*44633, on ground, on living root of *Eucalyptus*, Dukuduku, Jan., 1970; *44634, on ground near dead *Eucalyptus maculata*, Dukuduku, Jan., 1970; *44636, with pseudosclerotium on root of dead *Eucalyptus*, Dukuduku, Jan., 1970; *44637, on root of *Pinus taeda*, Dukuduku, Jan., 1970; *44638, on ground among *Eucalyptus*, Dukuduku, Jan., 1970.

in Herb. Forest Products Research Laboratory, Princes Risborough: as *Ganoderma colossus* (Fr.) Bres., on *Cassia siamea*, Miralya near Mwanza, Tanganyika, July 1957. (Culture No. 338); in Herb. Muséum National d'Histoire Naturelle, Paris; *Phaeolus manihotis* Heim sp. nov. Aux environs du lac Alaotra (Madagascar) Avril 1930. Leg. G. Bouriquet. (Type).

in Herb. Patouillard in Farlow Herbarium; *Polyporus baudoni*, Mr. Baudon No. 1616, 29 May 1912, FH sheet No. 2456 (Type).

Observations in the field.

Fruit-bodies growing at the bases of trunks of *Eucalyptus* trees, closely resemble those of large bracket shaped polypores. Unlike these, the fruit-bodies of *P. baudoni* are not formed by hyphae which grow out of the trunk tissues. These fruit-bodies develop instead, from pseudosclerotial tissue composed of pale yellow mycelium and sand grains that ensheath the roots and underground portions of the stems of affected trees in a layer which may vary from a thin weft of mycelium to up to 2 cm in thickness (Fig. 6, 7). Consequently, these fruit-bodies are very easily removed from the tree trunks to which they are merely closely appressed. Removal of the fruit-body hardly leaves a mark on the trunk whilst the point of severance from the pseudosclerotium frequently escapes observation. The fruit-bodies growing on the soil surface also come away with little or no resistance when plucked and frequently without showing scars where they have been attached to the pseudosclerotia. Only by carefully removing the soil underneath the fruit-body, does its attachment to a root by a larger or smaller pseudosclerotium become visible (Fig. 3).

The fresh, actively growing fruit-bodies are bright in colour and quite watery. They appear on the ground and against tree trunks and stumps from the middle of December and may survive for six weeks or longer, depending on weather conditions. In a wet season they develop to maturity, then darken with age until autolysis sets in when they deliquesce into black, soggy masses which finally dry to a few, black, friable, cinder-like flakes. In dry seasons the fruit-bodies darken, dry up, and become rigid, friable and light in weight. It not is known how these disintegrate but they also disappear before the following fruiting season.

Observations on type material

The type specimen of *Phaeolus manihotis* Heim agrees with Heim's (1931) description. The context is felty and consists mainly of unbranched or occasionally branching fibre hyphae with pale yellow to brownish-yellow thickened walls, and narrow, aseptate lumina, often flexuous to almost tortuous and 2,0–6,0μ, mostly 3,0–3,5μ, in diameter, swelling and fracturing when mounted in KOH. These are intertwined with hyaline to pale yellow, thin-walled hyphae, mostly collapsed, and thin-walled, nodose-septate hyphae with brown, somewhat refractive contents and often distended and up to 12μ in diameter.

(*indicates culture examined as well).

No septa or clamps were seen on the hyaline, thin-walled hyphae but these are continuous with the nodose-septate hyphae with brown contents. The upper surface consists of fibre hyphae and thin-walled hyphae agglutinated by a yellowish brown substance into a dense hardened layer in which no detail can be distinguished. No basidia or spores were present (Fig. 23).

Heim (1931) described the basidia as clavate measuring 11–14 $\times$ 6–8μ whilst basidiospores are obovoid to sub-cylindrical with a small hilar appendage and smooth thin, hyaline wall, measuring 5,5–7 $\times$ 3,2–4,3μ. He also emphasized the thin superficial crust on some parts of the fruit-bodies, the characteristic straw-yellow to rusty-fawn colour of the felty context of the fruit-body which consists mostly of thick-walled, unbranched hyphae, and thin-walled excretive hyphae which originate from thin-walled subhyaline hyphae with septa and clamps, and the presence of a stipe which is a prolongation of the pileus.

In phytopathological notes on *P. manihotis*, Heim (1931) described the formation of a thick mycelial muffler or sheath on the subterranean parts of manioc and cajanus plants which results in death of the plants and from which the large spongy fruit-bodies are formed.

The type of *Polyporus baudoni* Pat. consits of a number of slices cut from a large fruit-body. These agree with the morphological characters of Patouillard's (1914) description. These fruit-bodies with felty context consist mainly of fibre hyphae which are hyaline or sub-hyaline, flexuous, unbranched or occasionally branched, thick-walled, with narrow lumina, aseptate and 2–5μ in diameter. Thin-walled, hyaline hyphae, mostly collapsed and shrunken are present among them and thin-walled hyphae with yellowish-brown contents and walls distended up to 8μ in diameter are present in fairly large numbers. Basidia are clavate with 4 slender sterigmata, mostly 20 $\times$ 6μ; basidiospores long ellipsoidal to short cylindrical, with hilar apiculum, smooth, hyaline, thin-walled, 5–7 $\times$ 3,0–3,5μ (Fig. 24).

In his description Patouillard (1914) stated that the fungus resembles a triangle resting on its apex and with the two lateral sides concave. The mycelium forms greyish filaments which include soil and plant debris but does not form a true sclerotium.

In the present investigation it was found that the context hyphae of Patouillard's specimen swell and fracture when mounted in 5% KOH so that it was impossible to observe micro-morphological detail in mounts for microscopic examination made in this medium. Water or lactophenol could be used for this purpose but no detail of the type of septation of the thin-walled hyphae could be distinguished even in these media.

Fruit-bodies of *Polyporus schweinitzii* Fries. the type of the genus *Phaeolus* Pat. (Donk, 1960) and cultures made from them, were examined for comparison with those of the South African collections of *Polyporus baudoni*. Their cultural characters agreed closely with the descriptions by Nobles (1948). In both cultures and carpophores only one type of hypha, viz: brownish, branching hyphae with simple septa and 3–12μ in diameter, made up to bulk of the tissues whilst a brown, resin-like substance was

present in segments of these hyphae in the trama of the tubes of the fruit-bodies. These hyphae do not swell and disintegrate when mounted in KOH.

Cultures and fruit-bodies examined: DAOM 1897, under *Pinus mughus*, Central Experimental Farm, Ottawa, (det. L.O. Overholts) July 1931; DAOM F9420, on fallen *Picea sitchensis*, Oyster River, B.C. August 1939; DAOM 31930, on ground, Fallowfield Ont., August 1955; DAOM 72512, on ground, Bells Corners, Ont. July 1957.

Basidiospore size.

It appears from the above descriptions that the basidiospores of the South African collections are both longer and wider than those of the type specimens and of the original descriptions. For comparison, dimensions of basidiospores of the type specimens and from some South African collections selected at random, are presented in Table 1.

TABLE 1.—Size of basidiospores of the type specimen of *Polyporus baudoni*, and the isotype of *Phaeolus manihotis* and South African collections.

Specimen	*Size range*
Polyporus baudoni, Type, in FH.....	5,0–7,0 × 3,0–3,5μ
**Phaeolus manihotis*. Isotype. in K....	5,5–7,4 × 3,2–4,0μ
P. manihotis, (description Heim, 1931)	5,5–7,0 × 3,2–4,0μ
PRE 23764.....	5,0–8,0 × 3,0–4,0μ
PRE 44623.....	6,0–8,5 × 3,0–4,5μ
PRE 44624.....	6,0–10,0 × 3,5–4,5μ
PRE 44637.....	5,0–10,0 × 3,0–4,5μ

Although smaller, the spore sizes of the type material and descriptions are within the limits of and in agreement with the most common size, 7,0 × 4,0μ, of the basidiospores of the South African collections.

DISCUSSION

From the description it is clear that the fruit-body of *Polyporus baudoni* has a dimitic hyphal system according to the concepts of Corner, (1932a, & b). The hyphal characters of *P. baudoni* do not agree in all respects with Corner's (1932b) descriptions as the thick-walled hyphae do not project beyond the thin-walled hyphae at the margin of the carpophore. The thick-walled hyphae are rather fragile and develop behind the margin which is composed of thin-walled, septate hyphae. The thick-walled hyphae are however the terminal, thick-walled, aseptate, prolongations of lateral branches of thin-walled, septate hyphae and thus agree morphologically with Corner's (1932a, b) definition of skeletal hyphae.

The thin-walled, septate hyphae agree with Corner's (1932a) definition of generative hyphae, since all other structures in the carpophores arise from them. They also give rise to the widened hyphae with dark-coloured contents. These resemble conducting hyphae but do not form a continuous network or system, as described by Talbot (1954), in the tissues. Their contents stain in phloxine but not in Melzers' solution. Although they also partly resemble gloeocystidia, the absence of a staining reaction with Melzers' solution and the fact that they may from part of generative hyphae, negate this possibility. They therefore appear to be generative hyphae in which metabolic products of unknown nature have accumulated.

* (Size given by Dr D. N. Pegler at K. to Prof. J. L. Lowe, private communication).

The fruit-bodies of *Polyporus baudoni* thus differ in some aspects of their construction from fruit-bodies with dimitic hyphal systems of other species of polypores described before (Corner, 1932b; Van der Westhuizen, 1971).

In cultural characters *Polyporus baudoni* is unusual in that the thin-walled advancing hyphae are regularly and abundantly nodose-septate whilst many young, thin-walled aerial hyphae are simple-septate. This character together with the negative oxidase reaction and the presence of thick-walled fibre hyphae, refer cultures of *Polyporus baudoni* to Nobles' (1965) Key Code 1, 5, 8, a position which it occupies by itself. This unique combination of characters together with the characteristic bright yellow colours of its cultures, allow the recognition of cultures of this species without difficulty.

The structures formed in cultures of *Polyporus baudoni* are also present in the carpophores from which they were made. In the cultures, the thin-walled, septate hyphae are prominent in the aerial mycelium where they give rise to thick-walled fibre hyphae whilst clamps develop gradually at some of their septa. These hyphae differ from the thin-walled, septate, branching hyphae in the context of the carpophores only by being narrow and more or less straight. They agree with the hyphae in the carpophores in respect of their septation, the fact that fibre hyphae arise from them and that their contents may become dark-coloured in parts. These narrow thin-walled, septate hyphae are thus homologous structures to the thin-walled, septate hyphae of the carpophores.

The thin-walled, nodose-septate hyphae of the advancing zone of the cultures resemble the hyphae from the margin of the fruit-bodies in all respects whilst the fibre hyphae from the cultures are also similar to those of the carpophores.

The South African specimens described here, resemble the type specimen of *Phaeolus manihotis* very closely in respect of morphology, hyphal characters and anatomy but basidiospores of the South African collections are generally larger. This may indicate a specific difference between the South African and the type collections. In the South African collections, however, considerable variation in spore size is evident and the spore sizes of the type specimens occur within the range of sizes found in the South African specimens. It appears that description of a new species for the South African material is not justified and, furthermore, may be considered to be conspecific with the type of *Phaeolus manihotis* Heim.

The characters of the type specimen of *Phaeolus manihotis* Heim also agree closely with those of the type specimen of *Polyporus baudoni* Pat. The colour, construction and texture of the fruit-bodies and the morphology of the thick-walled hyphae, basidia and basidiospores of the two specimens agree very closely. However, although thin-walled hyphae are present in the fruit-body of *Polyporus baudoni*, it was not possible to determine the nature of their septation with certainty because of the poor condition of preservation and fragility of the specimen. This raises a certain amount of doubt about conspecificity of the two species but, because they agree so well in other characters, it seems that Browne's (1968) suggestion that the two species

are conspecific, is justified. For this reason, the South African collections are referred to *Polyporus baudoni* Pat.

Collections of *Polyporus baudoni* have been named as *Ganoderma colossum* on previous occasions but, although some superficial resemblance exist between the two species, the absence of the characteristic ganodermoid basidiospore from fruit-bodies of *P. baudoni*, and their presence in those of *G. colossum* (Furtado, 1965) negates any possible relationship between these two species.

It is evident that types of hyphae present in cultures and carpophores of *Polyporus baudoni*, as described here, are not present in cultures and carpophores of *Polyporus schweinitzii* Fr., the type species of the genus *Phaeolus* Pat. (Donk, 1960). Because the presence or absence of different types of hyphae in carpophores are regarded as of phylogenetic importance by Nobles (1958), Teixeira (1962) and Van der Westhuizen (1971), the two species cannot be regarded as being phylogenetically related and are thus not congeneric. *Polyporus baudoni* thus cannot be classified in the genus *Phaeolus* Pat. The species cannot be assigned to a more suitable genus either, because no other genus in which the complex of characters described for this species, is known to exist at present. Since its cultural characters were shown to be unique, it is possible that a new genus may have to be created to accommodate *Polyporus baudoni* Pat.

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FIG. 1–7.—**Polyporus baudoni.** Fig. 1. Fruit-bodies on ground and at base of *Eucalyptus* trunk. Fig. 2. Fruit-body arising from base of trunk of *Eucalyptus* sp. Fig. 3. Root of *Pinus* sp. with soil removed to show attachment of fruit-body. Fig. 4. Pore surface of fruit-body. Fig. 5. Longitudinal section of fruit-body showing inverted triangle shape. Fig. 6. Immature fruit-body with subterranean pseudo-sclerotium. Fig. 7. Close-up view of *Eucalyptus* rootlet ensheathed by pseudo-sclerotium.

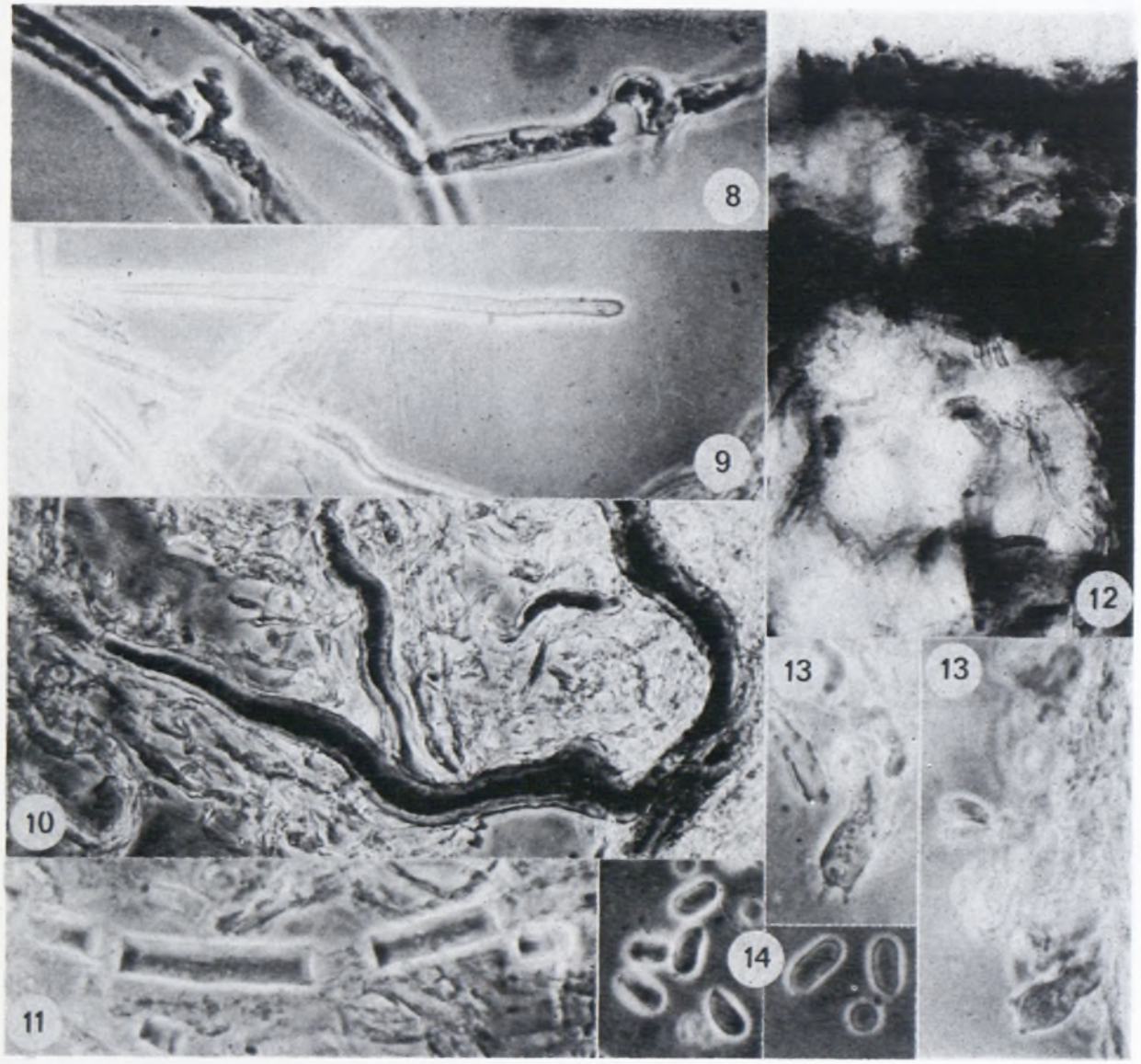

FIG. 8–14.—**Polyporus baudoni,** micromorphological characters of carpophores. Fig. 8. Thin-walled hyphae with clamps at septa from margin, x1 000 phase contrast. Fig. 9. Thick-walled fibre hyphae from context, x500 phase contrast. Fig. 10. Thin-walled, distended hypha with dark-coloured contents from context, x500 phase contrast. Fig. 11. Segments of fractured fibre hypha from context, mounted in KOH, x1 000, phase contrast. Fig. 12. Radial longitudinal section from context below upper surface, x400. Fig. 13. Basidia, x1 000 phase contrast. Fig. 14. Basidiospores, x1 000 phase contrast.

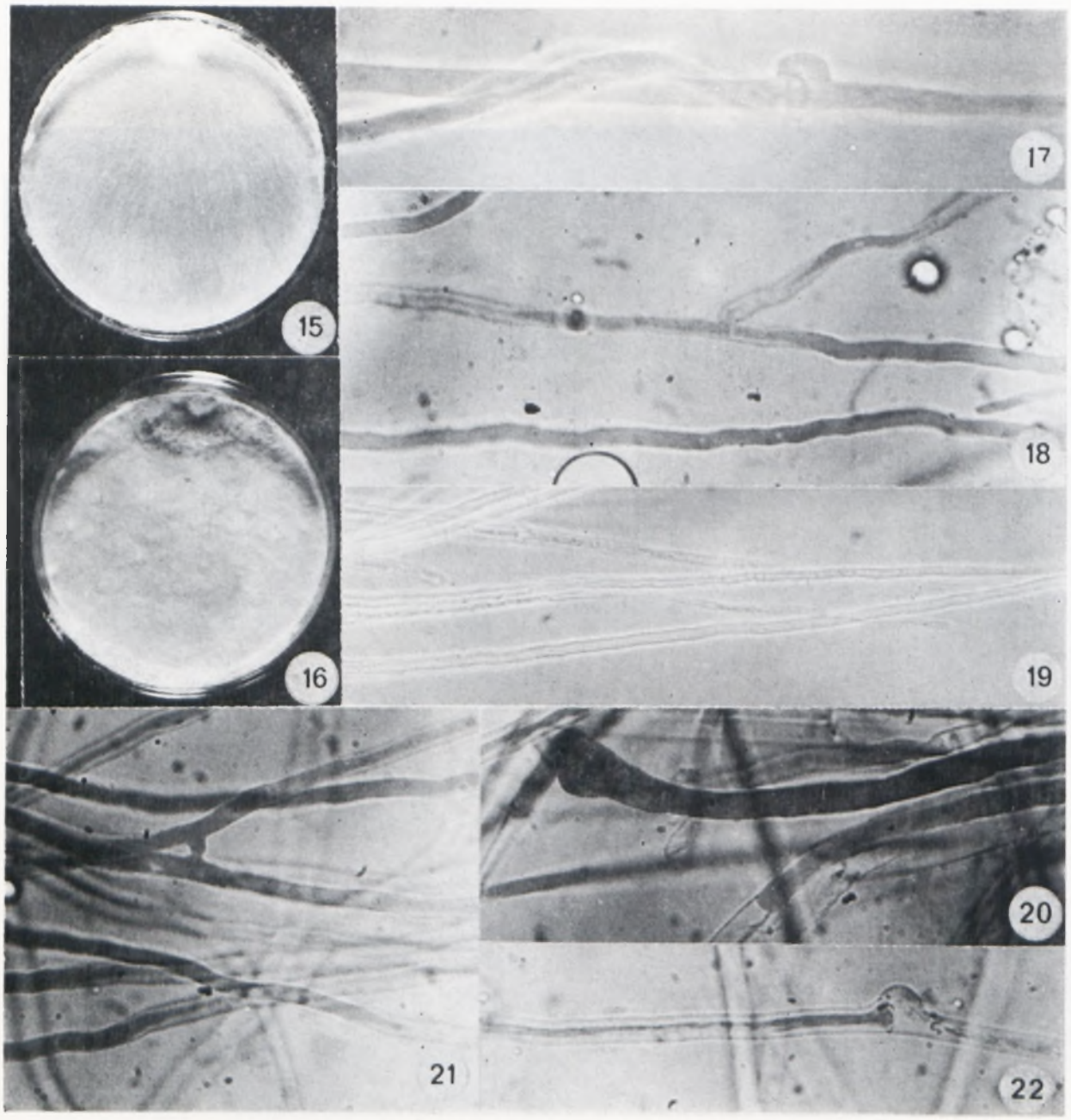

FIG. 15–22.—**Polyporus baudoni,** cultural characters. Fig. 15. & Fig. 16. Cultures of different isolates at 4 weeks. Fig. 17. Thin-walled hypha with clamped septum from advancing zone x1 000 phase contrast. Fig. 18. Narrow, thin-walled deeply staining, branching, aerial hyphae showing simple septum, x1 000. Fig. 19. Unbranched, aseptate, fibre hyphae from aerial mycelium x500, phase contrast. Fig. 20. Thin-walled, aerial hypha with dark-coloured contents, x1 000. Fig. 21. H-connection between thin-walled, deeply-staining, simple-septate aerial hyphae, x1 000. Fig. 22. Thick-walled, fibre hypha (left) arising at clamped septum of thin-walled hypha (right) x1 000.

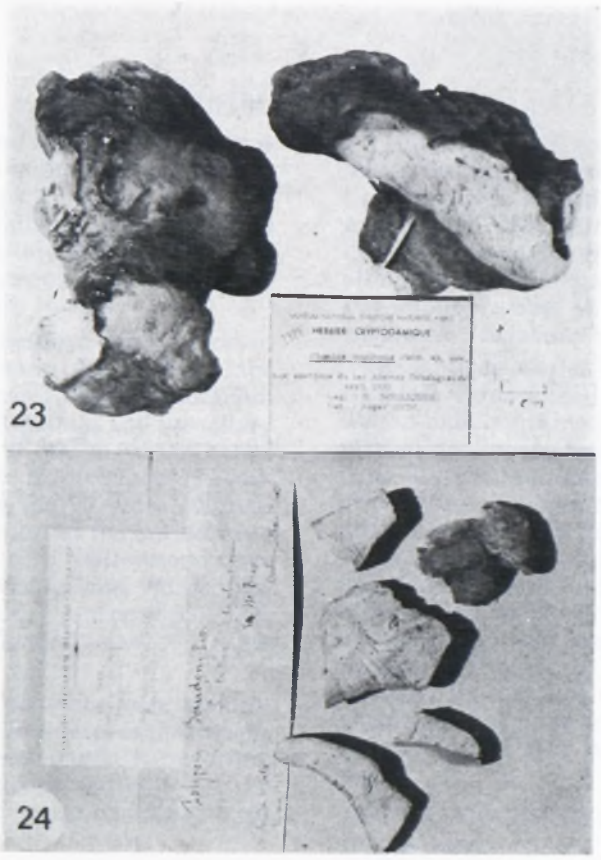

FIG. 23–24.—Type specimens. Fig. 23. *Phaeolus manihoti* Heim. Fig. 24. *Polyporus baudoni* Patouillard.