

# PENICILLIFER, A NEW GENUS OF HYPHOMYCETES FROM SOIL

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## SUMMARY

A new genus of the Hyphomycetes, *Penicillifer* nov. gen. and its type species, *P. pulcher* nov. sp. are described and illustrated.

## INTRODUCTION

When plating out washed soil particles from an experimental plot near Wageningen, a hyphomycete was isolated producing long chains of hyaline, septate phialospores from hyaline, penicillately branched conidiophores. Since the fungus does not conform to any of the described genera, a new genus, *Penicillifer*, is proposed.

### *Penicillifer* nov. gen.

Fungi imperfecti, hyphomycetes saprophytici. Conidiophora erecta, hyalina, longa, septata, penicillata. Metulae normaliter complures per conidiophorum; omnis metula plures phialides fert. Phialides hyalinae, cylindratae. Phialosporae cylindratae, obclavatae vel ellipsoideae, biapiculatae, septatae, siccae, in catenis basipetalibus natae.

Habitat in terra.

Species typica: *Penicillifer pulcher*.

Fungi imperfecti, hyphomycetes saprophytici. Conidiophores erect, hyaline, long, septate, penicillate. Metulae normally several per conidiophore; each metula bears several phialides. Phialides hyaline, cylindrical. Phialospores cylindrical, sometimes obclavate or ellipsoidal, apiculate at both ends, septate, produced in basipetal chains.

Habitat in soil.

Type species: *Penicillifer pulcher*.

### *Penicillifer pulcher* nov. spec.

Coloniae in agarō malti preparato lente crescentes, medio brunneae, versus marginem hyalinae. Mycelium septatum, ex hyphis 2.5–3.5  $\mu$  crassis compositum, funiculosissimum; funiculi in parte superiori e cellulis brunneis, irregulariter incrassatis consistens. Conidiophora in primis funiculis supportata, stipitibus 150–300  $\mu$  longis, 4–4.5  $\mu$  crassis, infra penicilla 3–5 septis divisa. Metulae 2–5 verticillatae, 25–30  $\mu$  longae, 4–5  $\mu$  crassae, usque ad 6 phialides ferentes. Phialides cylindratae, sursum abrupte angustatae, 20–25  $\mu$  longae, 4–6  $\mu$  crassae. Phialosporae catenatae, normaliter uniseptatae, raro bis- vel trisepta-

tae, leves, hyalinae, plerumque cylindraceae, nonnunquam obclavatae vel ellipsoideae, utrimque abrupte angustatae et apiculatae, 18–22 (14–31)  $\mu$  longae, 4–6  $\mu$  crassae. Cellulae basales magis apiculatae et nonnunquam majores quam apicales.

Habitat in vitro ex terra, Wageningen, Neerlandia.

Typus in Herb. et cult. CBS no. 560.67.

Colonies on malt agar attaining about 35 mm in diameter in 3 weeks and up to 60 mm in 5 weeks at 22°–24°C, brown in the centre, lighter towards the margin with hyaline outer rim of several mm, radiately striate and finely zonate when viewed in transmitted light, irregularly sectorial. Aerial mycelium sparse, mainly white, hyphae 2.5–3.5  $\mu$  in diameter, strongly funiculose; the mycelial bundles arise from the substrate mycelium, subhyaline at the base, darker towards the tip where the hyphae consist of short, irregularly shaped and swollen cells, ending in few long, thin, hyaline mycelial strands or loose hyphae. The pigmentation of the hyphae determines the colour of the colony. Conidiophores few in young cultures and mainly arising at right angles from the hyphal bundles, *Thysanophora*

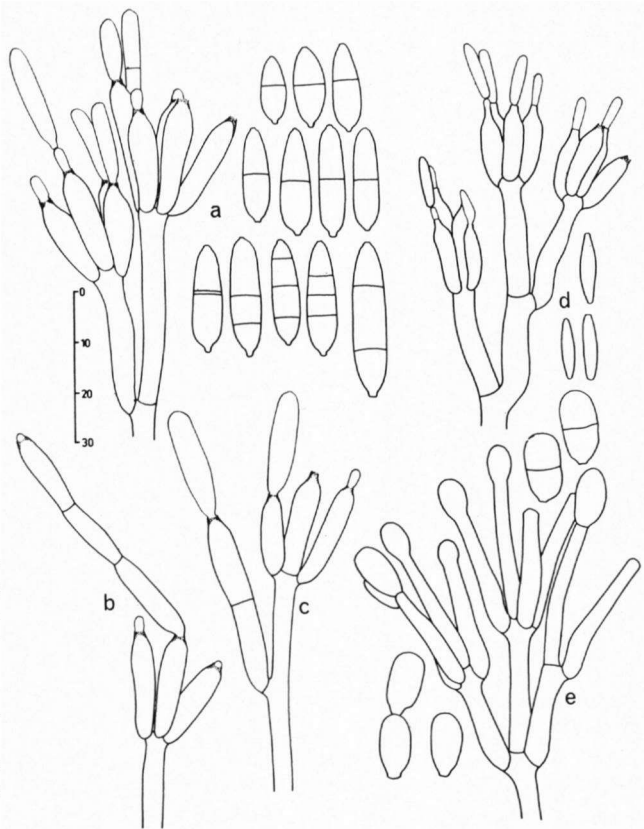


Fig. 1 a. *P. pulcher*, conidiophore and spores; b. and c. *P. pulcher*, conidiophores with proliferations; d. *Thysanophora longispora* Kendrick, conidiophore and spores; e. *Diplocadium minus* Bonorden, conidiophore and spores.

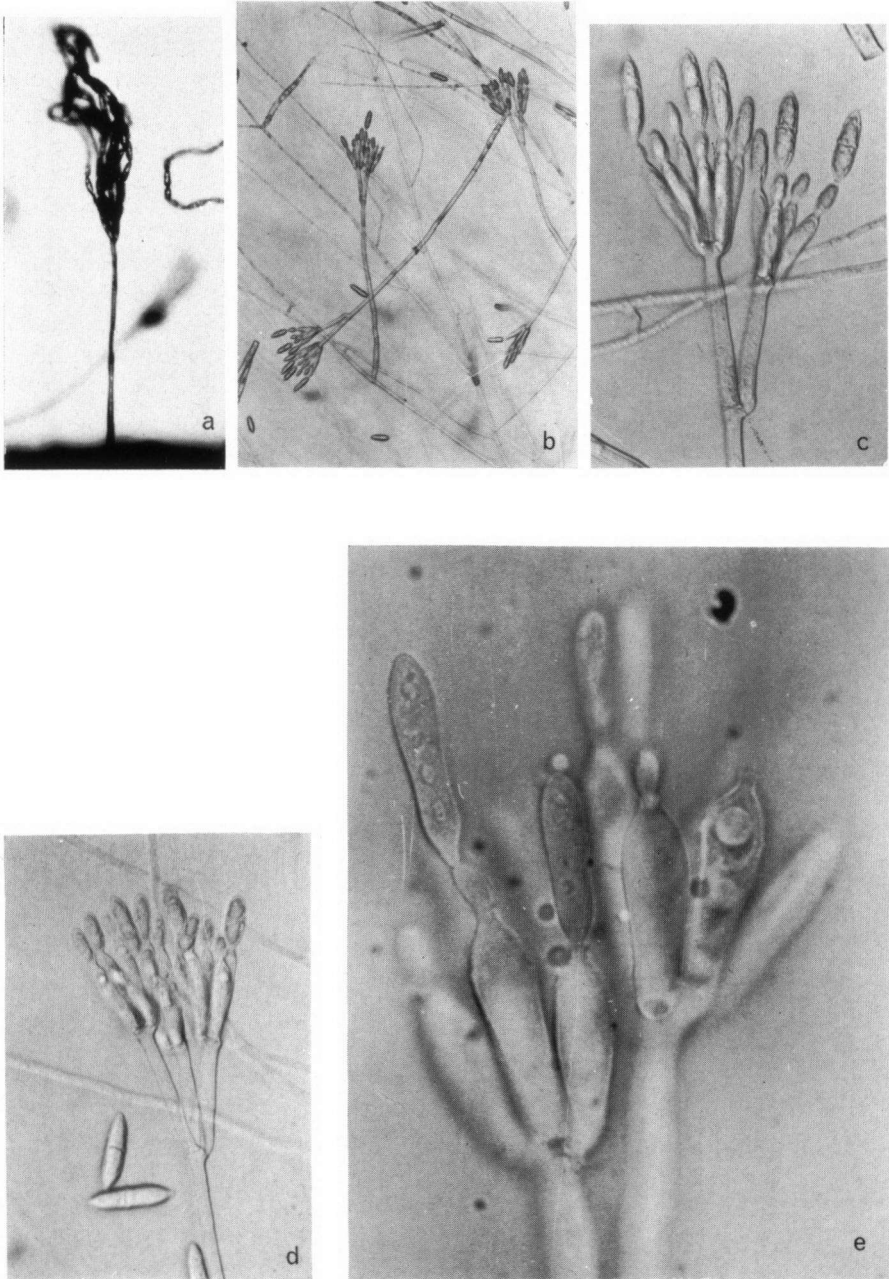


Plate 1. a-e. *P. pulcher*, a, dry chains of conidia; b, habit of conidiophores; c, basipetal formation of conidial chains; d, conidiophore and conidia; e, details of phialides producing conidia.

in older cultures also forming dense stands in the centre of the colony, where they arise from the substrate mycelium; habit penicillate and reminiscent of the section *Asymmetrica-Divaricata* in *Penicillium*; stipe 150–300  $\mu$  long and 4–5  $\mu$  wide, 3–5 septate below the penicillus, hyaline. Metulae 2–5, 25–30  $\mu$   $\times$  4–5  $\mu$ , each bearing a verticil of up to 6 phialides. Phialides cylindrical, abruptly tapering in the distal part, 20–25  $\mu$   $\times$  4–6  $\mu$ . Phialospores catenate, smooth, normally two-celled, rarely bisepate or triseptate, hyaline, usually cylindrical and conically tapering to both ends, sometimes obclavate or ellipsoidal, 18–22 (14–31)  $\mu$   $\times$  4–6  $\mu$  with basal cell more distinctly apiculate and sometimes longer than the apical one.

Two kinds of proliferation of the phialide may occur: (a) a phialide grows to abnormal length and becomes septate (*fig. 1c*) and (b) a normal phialide produces at its apex another phialide, which may be aseptate or septate (*fig. 1b*).

In some cultures white sectors appear. Monospore cultures from these remain white, they produce more aerial mycelium but very few spores.

On soil extract agar colonies remain hyaline and grow slower than on malt agar; they produce even sparser aerial mycelium, the habit of which is much less funiculose; sectors are absent; zonation is more pronounced. Conidiophores are numerous, they appear in the centre of the colony and in concentric rings, and arise from the substrate mycelium.

#### DISCUSSION

The fungus described shows affinities with the following genera, with which it is to be compared: *Penicillium* Link, *Cylindrocladium* Morgan, *Metarrhizium* Sorok., *Thysanophora* Kendrick, *Cladobotryum* Nees and the species *Hormiactis candida* Höhnel.

Resemblance to *Penicillium* is by the habit of the conidiophore. In its simplest form the conidiophore of *Penicillifer* consists of an unbranched stipe with a whorl of phialides. As a rule, however, there is a whorl of metulae as well, and often one and sometimes two asymmetrically placed branches below the level of the metulae. This range also occurs in the section *Asymmetrica* subsection *Divaricata* of *Penicillium* (RAPER & THOM 1949). Distinction from *Penicillium* is by the large two-celled spores.

With *Cylindrocladium* (BOEDIJN & REITSMA 1950; MEYER 1959), *Penicillifer* has in common the cylindrical, septate phialospores; a difference is the absence of the sterile prolongation of the conidiophore and the production of dry conidial chains.

The cylindrical phialides resemble those of *Metarrhizium* (MEYER 1959), but in this genus the conidiophores are united in sporodochia and are low branched; spores are always one-celled.

The most closely related genus seems to be *Thysanophora* (KENDRICK 1961); from this *Penicillifer* differs mainly by its thinner and hyaline conidiophores and its septate spores.

*Penicillifer* resembles *Didymocladium ternatum* (Bonorden) Sacc. (= *Cladobotryum ternatum* Neerl. 17(1), Febr. 1968

*dobotryum variospermum* (Link) Hughes) (NICOT 1962) by the chains of hyaline, two-celled spores; but it differs in the penicillate habit of the conidiophore and in the mechanism of spore production.

The spores of *Penicillifer pulcher* closely resemble those of *Hormiactis candida* Höhnelt (DOMSCH 1960), but in this species the conidia are not produced from phialides.

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