Three Species of *Curvularia* from *Pinus*.

By

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Since Boedijn (1) created the genus *Curvularia* in 1933, species have been reported from the soil (8), on *Gladiolus* bulbs (5), on vegetable seeds (3), and on grasses (2, 4, 6). This paper records two species found on pine trees and one species causing blue stain of pine timber. No previous records of *Curvularia* on such substrata have been traced.

Boedijn (1) divided the genus into three groups on the basis of the number and location of the darker, enlarged cells in the conidia. Two of the fungi described here have three-septate conidia with the two central cells larger and darker in colour than the others; these features are characteristic of the Maculans group. The third specimen has the three-septate conidia of the Lunata group, in which only the penultimate cell is larger and darker.

A. Maculans Group.

Curvularia maculans (Bancroft) Boedijn in Bull. Jard. Bot. Buitenzorg, ser. iii, Vol. 13, 1933, pp. 120–134.

Illustrations: Fig. 1; Plate 1 A.

On Czapek agar (7), the colonies are at first subhyaline but soon turn black. They are appressed, spreading, velvety, sometimes with superficial dull brown cottony hyphae, raised and tufted in the centre, with the reverse black.

The submerged mycelium is subhyaline to light brown, septate, branched, smooth or sometimes constricted at the septa and 3–6 μ wide. The aerial mycelium is darker brown, straight-walled, branched, septate and 3–6 μ wide.

The conidiophores arise as lateral branches of the aerial and submerged mycelium and are light brown in colour, and narrow at the base, mostly 3–4 μ wide. Towards the fertile region the conidiophores widen gradually. The fertile region is dark brown and geniculate with many protuberances on which the conidia are borne in whorls or irregular spirals. Upon separation of the conidia, circular scars are left on these protuberances. In this region the hyphae are 4–6 μ wide. The conidiophores vary in length from 76 μ to over 200 μ.

The conidia are elliptical to obovate and broadly rounded at the ends. They are widest at or above the middle, smooth and often slightly constricted at the proximal septum. The terminal cells are small and light brown with a conspicuous scar in the basal cell. The central cells are larger, thicker-walled, and of a dark, almost opaque brown colour. In size they vary from 18–24 μ long and 12–16 μ wide, being mostly 22 $\times$ 16 μ.

Habitat: On shoots of *Pinus patula* infected with *Diplodia pinea*, Louis Trichardt, Transvaal. May 1953.

This fungus, with its more or less elliptical conidia of which both central cells are enlarged and dark, agrees very closely with Boedijn's description except for a small but insignificant discrepancy in spore size (Boedijn's measurements were 19–26 $\times$ 11–17 μ).

Curvularia brachyspora Boedijn loc. cit.

Illustrations: Fig. 2; Plate 1 B.

On Czapek agar, the colony is at first subhyaline, soon turning dark greenish-brown to black, spreading, appressed, cottony, with the reverse black.

The submerged mycelium is hyaline or subhyaline, light greenish-brown or light brown, branched, septate, straight-walled, or constricted at the septa and 2–6 μ wide. The aerial mycelium is darker brown, straight-walled, smooth, septate and 2–6 μ wide.

The conidiophores are brown, erect, more or less straight, single, unbranched, arising as lateral or terminal branches of trailing or aerial hyphae. They are narrow at the base but widen gradually towards the darker, geniculate, fertile region where conidia are borne in spirals on fairly prominent protuberances. Their length is variable, 30–>200 × 3–6 μ.

The conidia are elliptical, widest at the middle, markedly unequal sided, rounded at the ends, three-septate with the wall slightly constricted at the outer septa. The middle septum is thick and dark. The two central cells are larger than the light brown terminal cells, and of a dark translucent brown colour. The conidia measure 16–24 × 10–14 μ, being mostly 22 × 14 μ.

Habitat: On shoots of *Pinus patula* infected with *Diplodia pinea*, Rhenosterhoek, Oct. 1952.

Like the previous one, this fungus has both the middle cells of the conidia larger and darker than the terminal ones. It differs from *C. maculans*, however, in that these cells appear clear and translucent although dark in colour, while the conidia are markedly unequal sided.

In all respects, this fungus agrees closely with Boedijn's (1) description of *C. brachyspora*.

B. Lunata Group.

Curvularia pallescens Boedijn, loc. cit.

Illustrations: Fig. 3; Plate 1, C.

On Czapek agar, the colony is at first hyaline but soon turns dark brown to black. It is slightly raised in the centre, appressed, spreading, velvety, with the reverse black.

The submerged mycelium is subhyaline to light greenish-brown, later turning olivaceous, septate, branched, more or less straight-walled or constricted by the septa, 2–8 μ wide. The aerial mycelium is more or less straight-walled, septate, light brown, and 2–8 μ wide.

Conidiophores arise as terminal or lateral branches of the submerged and aerial hyphae. They are brown, simple, erect, more or less straight, septate, narrow at the base but widening gradually towards the darker, geniculate, fertile region where spores are borne in spirals on well developed protuberances which show circular scars upon separation. Their length is very variable, 60 μ to over 200 μ × 3–6 μ.

The conidia are elongate elliptical, unequal sided or sometimes slightly bent, rounded at the ends, with a marked hilum at the proximal end. They are pale brown, smooth, three-septate with the third cell slightly larger and thicker-walled than the others, often slightly darker coloured or both central cells slightly larger and darker than the terminal cells which are sub-hyaline or pale brown, 18–26 × 8–10 μ.

Habitat: In blue-stained sapwood of *Pinus patula*, Sabie. March 1952.

This fungus differs from the previous two in having narrower conidia without marked contrast in the colour of the cells. Nor is the third cell markedly larger than the others, as is characteristic of the Lunata group.

Boedijn (1) described the conidia of *C. pallescens* as elongate elliptical, inequilateral, or slightly bent, very faintly brownish, three-septate, the third cell or both central cells larger and slightly darker than the almost colourless terminal cells, 21·5–30 × 7–11 μ. Groves & Skolko (3) described and illustrated a species of *Curvularia* whose pale brown conidia were closely similar to Boedijn's and had the third cell slightly larger and darker than the others, which is a feature of the species

described above. Marchionatto (6) reported from the Argentine that a species of *Curvularia* isolated from rice had acropleurogenous, ellipsoid, straight, geniculate conidia, 24–30 × 7–10 μ, consisting of four cells of irregular size and shape, the top and bottom ones hyaline and the middle ones greyish. Although he identified this fungus as *C. pallescens*, there is some doubt whether this is correct as it does not match Boedijn's description. Nor does it resemble the species described by Groves & Skolko, or the present fungus from *Pinus*. The last, however, agrees closely with both Boedijn's and Groves & Skolko's (3) descriptions and illustrations of *C. pallescens*, except that it appears to be slightly darker in colour than Boedjin's description would imply. Groves & Skolko's (3) illustrations, however, indicate that the conidia of their fungus were slightly darker in colour than is apparent from their description, so that there is very close similarity between their fungus and this one. The conidia of the fungus from *Pinus* are definitely brown but of a light, translucent tint, which is much lighter than in the other two species described. Other than this, there is a close similarity between this fungus and the descriptions of *C. pallescens*. For the present it appears, therefore, that this fungus should be identified as *C. pallescens* rather than be given independent specific rank.

Of great interest too is the sap-staining property of this fungus. It was isolated from a piece of log showing bluish grey streaks. Inoculation of sterilised blocks of sapwood with this fungus caused pale greenish grey stains to develop in the blocks after 14 days incubation. Continued incubation caused intensification of the stain to a bluish grey colour. This intensification of colour was associated with a colour change of the hyphae from pale greenish brown to dark brown, in the tracheids and rays, together with an increase in the number of hyphae present. Chips removed from these blocks and incubated on malt agar, yielded pure cultures of the fungus again. (Plate 1, D).

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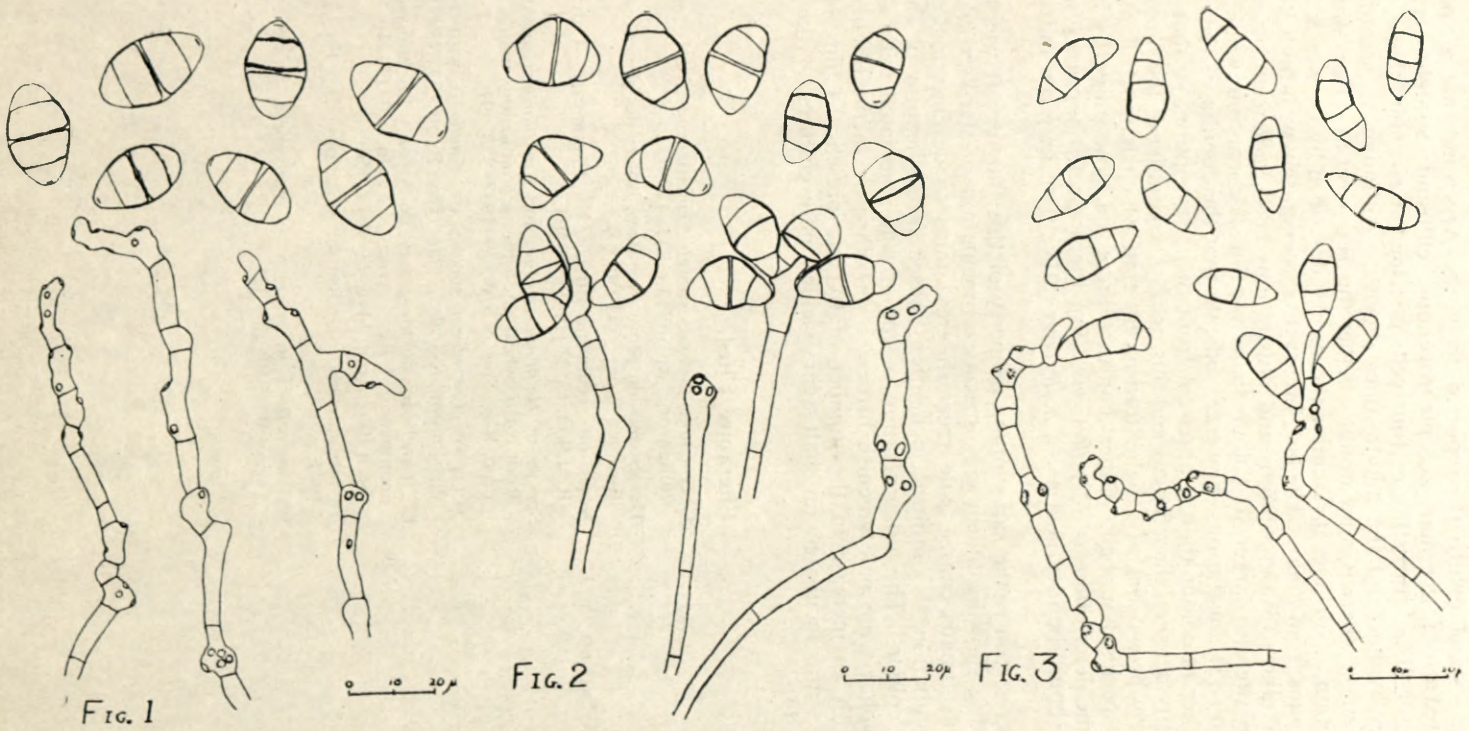

FIG. 1.—*Curvularia macyulans.*
FIG. 2.—*Curvularia brachscspora.*
FIG. 3.—*Curvularia palleens*

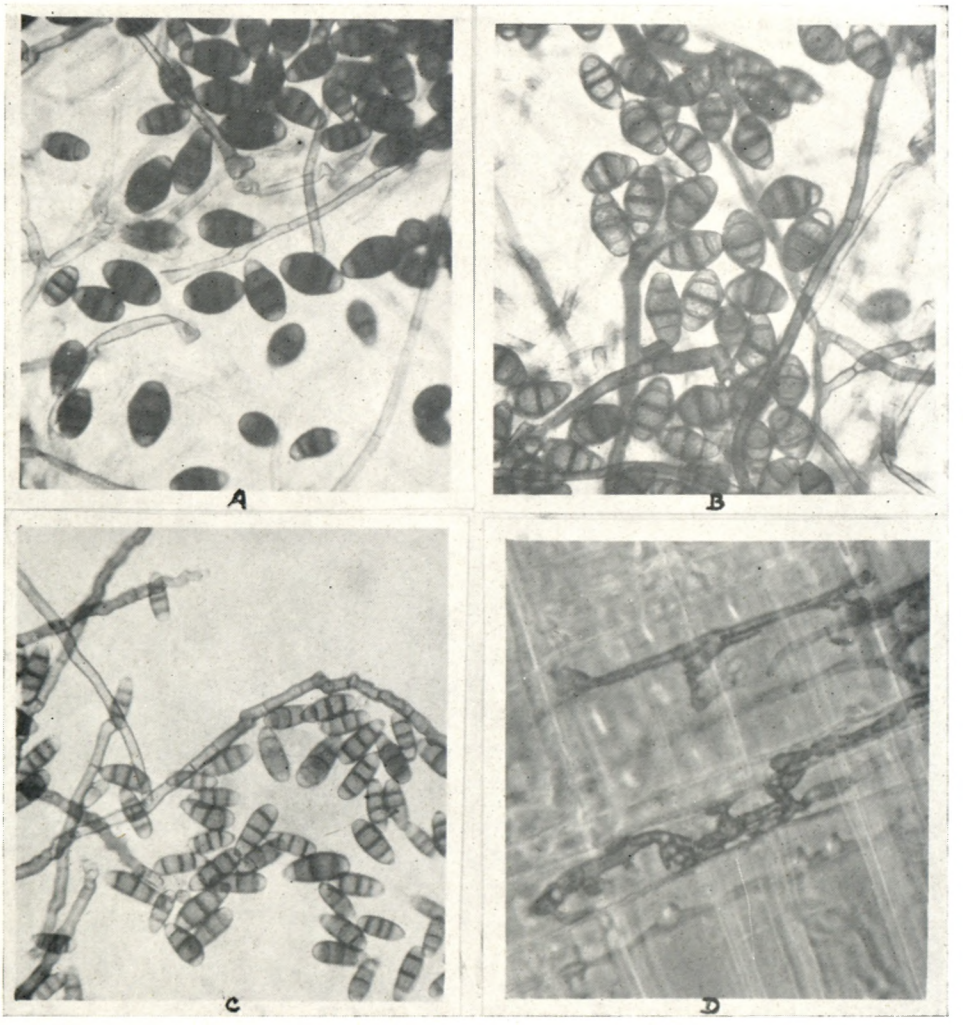

PLATE 1.

A.—*C. maculans.*

B.—*C. brachyspora.*

C.—*C. pallescens.*

D.—Hyphae of *C. pallescens* in medullary ray of *Pinus patula* (radial longitudinal section).