

The Mycoflora of Wheat Field Debris, Part I

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ABSTRACT

Descriptions are given of five fungus species isolated from stubble of a wheat field in the Heilbron district: *Acremonium strictum* Gams, *Acremonium persicinum* (Nicot) Gams, *Acremonium curvulum* Gams, *Tricellula curvata* Haskins and *Ulocladium consortiale* (Thum.) Simmons.

Outbreaks of photosensitivity amongst sheep grazing *Panicum* grasses in cultivated lands in the Orange Free State were described by Steyn (1928) and Rimington & Quin (1937). The aetiology of this disease, locally known as Dikoor, has not yet been resolved. Steyn (1928) considered the possibility that a smut fungus which infected the *Panicum* plants might have been the cause. Kellerman & Marasas (1971) advanced the hypothesis that Dikoor may be a mycotoxicosis caused by the toxic spores of saprophytic fungi growing on wheat straw in these reaped lands. In an attempt to establish a causal relationship between a saprophytic fungus and Dikoor, the Department of Agricultural Technical Services initiated a survey of the mycoflora of wheat debris and *Panicum* leaves. The authors co-operated in this survey. In this series of papers a number of fungi isolated from these materials, obtained from a farm in the Heilbron district, Orange Free State, will be described.

The material was cut into short lengths of 1-2 cm each, and shaken up in sterile water. The resultant suspensions were diluted serially and plated on malt extract agar (Oxoid malt extract 1.5%, agar 2%) to which penicillin and streptomycin were then added to inhibit bacterial growth. For microscopic study, the fungi were grown on malt extract agar or oatmeal agar and incubated at 25 °C.

Five species isolated from this habitat are described below. Live cultures of these have been deposited in the Potchefstroom University Culture Collection and dried down cultures in the Mycological Herbarium (PREM) at 590 Vermeulen Street, Pretoria.

***Acremonium strictum* Gams** in *Cephalosporium*-artige Schimmelpilze, p. 42. Gustav Fischer (1971).

Figure 3.

Colonies on oatmeal agar moderately fast growing reaching a diameter of 25 mm in 10 days at 25 °C, appressed to the medium and delicately floccose in the centre, white becoming rosaceous in light, reverse buff-rosaceous. Hyphae thin-walled, hyaline, up to 1.5 µm and usually less than 1 µm diam. Phialides arising from submerged or prostrate hyphae and mostly from hyphal ropes, mostly single and unbranched, straight and gradually tapering, thin-walled, without collarette, 20-52 µm long, basal and apical diameter normally not exceeding 2.0 µm and 1.0 µm respectively, basally septate and sometimes with one or more additional septa. Conidia produced in slimy heads, cylindrical or ellipsoidal, straight or occasionally slightly curved, hyaline, smooth, 3.0-6.0 × 1.0-2.0 µm. Chlamydospores absent.

Specimen examined: P.U. Culture Collection, No. 1178, isolated from wheat debris, Heilbron, O.F.S., Dec. 1971. PREM 44855 dried culture on 1.5% malt extract agar.

This is the first record of this species in South Africa.—M.C.P.

***Acremonium persicinum* (Nicot) Gams** in *Cephalosporium*-artige Schimmelpilze, p. 75. Gustav Fischer (1971).

Figure 1, 2.

Colonies on oatmeal agar fast growing reaching a diameter of 30-40 mm within 10 days at 25 °C, chondroid, floccose in centre with funiculose aerial mycelium about 3 mm high, rosaceous in light, reverse cream to brownish or saffron (Rayner: Chart 1, 10), numerous elongated crystals in older colonies. Hyphae septate, partly thick-walled, hyaline, 1.5-2.5 µm diam. Phialides arising from prostrate hyphae and mainly from aerial hyphal ropes, mostly simple, straight and gradually tapering, thin-walled, smooth, without collarette, basally septate, 20-35 µm long, basal and apical diameter normally not exceeding 2.5 and 1.0 µm respectively. Conidia in dry heads with limited number of spores or in chains, obovoid, basally somewhat acuminate or rostellate and apically rounded, smooth and eventually very finely roughened, 3.5-7.0 × 1.5-3.0 µm. Chlamydospores absent.

Specimen examined: P.U. Culture Collection. No. 1179, isolated from wheat debris, Heilbron, O.F.S., Dec. 1971. PREM 44856 dried culture on 1.5% malt extract agar.

This is the first record of this species in South Africa.—M.C.P.

***Acremonium curvulum* Gams** in *Cephalosporium*-artige Schimmelpilze, p. 57. Gustav Fischer (1971).

Figure 4.

Colonies moderately fast growing on oatmeal agar reaching a diameter of 25 mm in 10 days at 25 °C closely appressed to the medium, aerial mycelium forming scattered sporiferous hyphal ropes, salmon coloured in light. Hyphae branched, septate, thin-walled, hyaline, 1.0-2.5 µm diam. Phialides arising from prostrate hyphae or aerial hyphal ropes, single or in groups, simple or branched, straight or slightly curved or with uneven outline, gradually tapering, usually without collarette, 18-57 µm long, basal and apical diameter normally not exceeding 3.0 and 1.5 µm respectively, thin-walled, basally septate. Conidia produced in slimy heads, falcate, at times basally slightly pointed, hyaline, smooth, 4.0-10.0 × 1.0-2.0 µm. Chlamydospores absent.

Specimen examined: P.U. Culture Collection, No. 1177, isolated from wheat debris, Heilbron, O.F.S., Dec. 1971. PREM 44857 dried culture on 1.5% malt extract agar.

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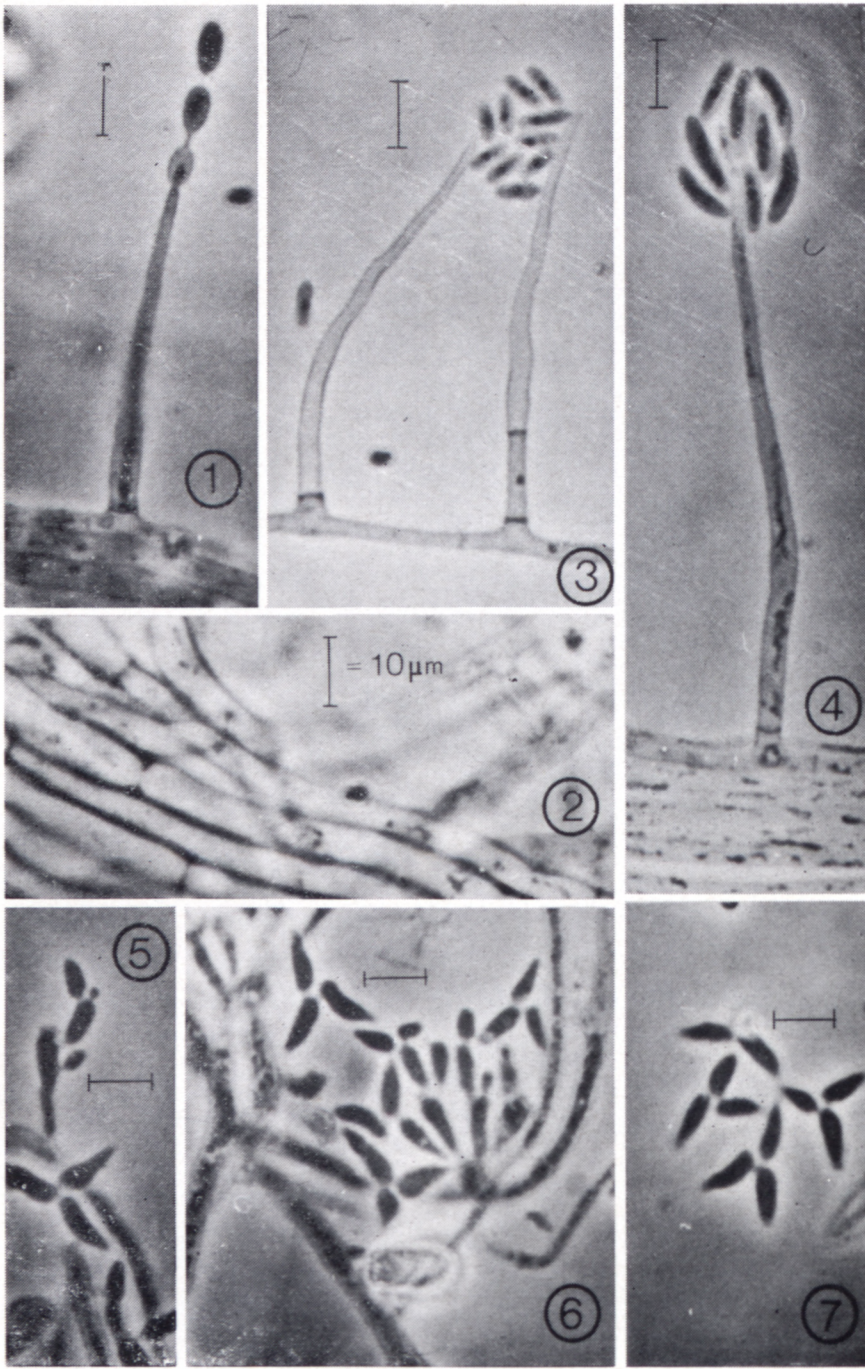


FIG. 1-7.—Fig. 1, *Acremonium persicinum*, phialide and phialoconidia (phase contrast). Fig. 2, *A. persicinum*, thick-walled hyphae of chondroid mycelium (phase contrast). Fig. 3, *Acremonium strictum*, phialides and phialoconidia (phase contrast). Fig. 4, *Acremonium curvulum*, phialide and phialoconidia (phase contrast). Fig. 5, *Tricellula curvata* young conidiophore showing blastic development of conidia (phase contrast). Fig. 6 and 7, *T. curvata*, mature conidiophore and conidia (phase contrast).

This isolate agrees very closely with the original description (Gams, loc. cit.) but has spores longer than $6.7\ \mu\text{m}$. In a personal communication Dr Gams explained that his conidium measurements indicate only the 95% interval within which the average figure would fall and that the dimensions of individual conidia may easily be outside this range.

This is the first record of this species in South Africa.—M.C.P.

Tricellula curvata Haskins in Can. J. Microbiol. 4: 273-285 (1958); Petersen in Bull. Torr. Bot. Club 89: 287-293 (1962); Webster in Trans. Br. mycol. Soc. 42: 416-420 (1959).

Figures 5, 6, 7.

Colony on malt agar slow growing, reaching a diameter of 30 mm in 25 days at $25\ ^\circ\text{C}$, smooth and appressed with occasional raised funiculose clusters, salmon apricot (Rayner, 1970), reverse similar, no pigment diffusing into the agar. Hyphae smooth, septate, branched, hyaline, $1.0-2.0\ \mu\text{m}$ diam. Conidiophores macronematous, mononematous, short,

$4.0-7.0 \times 2.0-2.5\ \mu\text{m}$, mostly clavate and branching in the apical region to form a somewhat penicillate head, at times curved, non-septate, hyaline. Conidiogenous cell integrated, holoblastic, polyblastic, determinate, denticulate. Conidia composed of three separate unequal hyaline and smooth cells, viz a basal cell with a lateral and apical cell connected to its apex by means of narrow protoplasmic isthmuses and eventually separated by deposition of cell wall material, overall dimensions $8.0-11.0 \times 7.0-9.0\ \mu\text{m}$; basal cell variable, mostly somewhat reniform or clavate and pointed basally, $4.0-6.0 \times 1.5-2.0\ \mu\text{m}$; apical cell somewhat reniform, $4.0-5.0 \times 1.5-2.0\ \mu\text{m}$; lateral cell reniform with the free end pointed, $3.0-5.0 \times 1.5-2.0\ \mu\text{m}$.

Specimen examined: P.U. Culture Collection No. 1184, isolated from wheat debris, Heilbron, O.F.S., March 1972. PREM 44858 dried culture on 1.5% malt extract agar.

The morphological features and dimensions of this isolate agree well with those given by Haskins (loc. cit.). Its cultural characters, however, differ from those supplied by Webster (loc. cit.) who described the colony on malt agar as pale pink above and buff below with radial furrows and sparse sporulation. Cultures of the isolate described here did not have any radial furrows and the sporulation was abundant. The identity of this isolate was confirmed by Dr J. A. von Arx, Baarn, Netherlands.

T. curvata and other members of the genus have been previously recovered from air and water. It is, therefore, the first record of this fungus from a different habitat and the first record of the genus in South Africa.—W.J.J.

Ulocladium consortiale (Thüm.) Simmons in Mycologia 59: 67-92 (1967).

Macrosporium consortiale Thümen in Herb. mycol. oeconom. 450 (1876).

Stemphyllium consortiale (Thüm.) Groves & Skolko in Can. J. Res. C 22: 196, (1944).

Stemphyllium illicis (Tengwall) Neergaard in Danish species of *Alternaria* and *Stemphyllium*. Copenhagen: Einar Munksgaard. (1945).

Macrosporium abietis Tengwall in Meded. Phytopath. Lab. Willie Commelin Scholten 6: 34-35 (1924).

Stemphyllium congestum Newton in Phytopathology 18: 565-578 (1928).

Stemphyllium dendriticum De Sousa da Camara in Proposta de divisao do genero *Stemphyllium* fungo da ordem das Hyphales (Mart.) em Sacc. et Trav. p. 21, Lisbonne (1930).

Alternaria consortiale (Thüm.) Groves & Hughes in Hughes, Can. J. Bot. 31: 636 (1953).

Pseudostemphyllium consortiale (Thüm.) C. V. Subramanian in Curr. Sci. 30: 423 (1961).

Figures 8, 9, 10, 11, 12.

Colony on malt agar growing rapidly at 25 °C reaching a diameter of 50 mm in 5 days, mycelium appressed, spore production prolific resulting in a colony surface which is carbonaceous veivety, colour olivaceous-black with the reverse of the colony similar. Hyphae smooth to finely roughened, light buff to honey, bright, septate, 3-5 μm diam. Conidiophores macronematous, smooth, light isabelline (Rayner, 1970), bright, 50,0-150,0 \times 4,0-5,0 μm , geniculate in the conidiogenous area. Conidiogenous cells integrated, polytretic, 1-2 pores per cell, scars small and usually more than 10. Conidia dry, mostly solitary, occasionally in short chains, often with a geniculate false beak with up to 11 geniculations and serving as a secondary conidiophore, colour variable, light umber when young and dark umber at maturity, shape variable, subglobose, obovoid or oblong-elliptical, often basally tapering to a porate apiculus, septate, usually with 1-4 transverse and 2-6 longitudinal and oblique septa, slightly to moderately constricted at the septa, 21-35 \times 11-22 μm , ave.

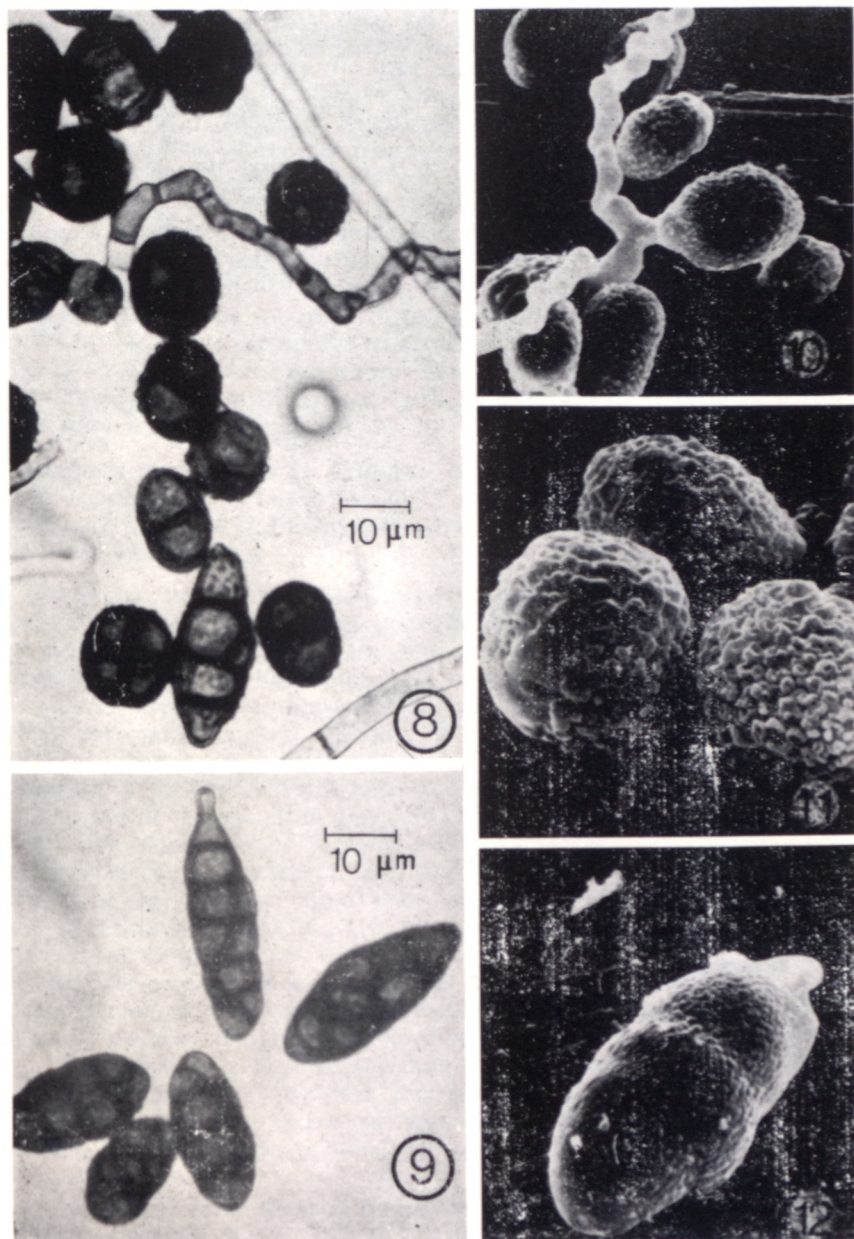


FIG. 8-12.—Fig. 8 and 9, *Ulocladium consortiale*, conidia, demonstrating variability found in this species. Fig. 10, *U. consortiale*, conidia and conidium with branched geniculate false beak \times 1 000 (scanning electron micrograph). Fig. 11 and 12, *U. consortiale*, conidia \times 2 400 showing variations in spore surface characteristics (scanning electron micrograph).

27,6–18,2 μm , smooth, verruculose or verrucose; scanning electron micrographs reveal that the surface of the apparently smooth conidia are finely verruculose while that of the roughened conidia are irregularly cerebriform and often with roughened and smooth areas on the same conidium. In culture submerged globose to sub-globose spores develop in the agar, mostly 1–2 septate with transverse and longitudinal septa, slightly constricted at the septa, verruculose, amber, 11–17 \times 11–15 μm , remaining attached to the hyphae.

Specimen examined: P.U. Culture Collection No. 1214, isolated from wheat debris, Heilbron, O.F.S., March 1972. PREM 44859 dried culture on 1,5% malt extract agar.

Groves & Skolko (loc. cit.) accepted *Macrosporium consortiale* (Thüm.) as the type for *Stemphyllium consortiale* in the section Pseudostemphyllium erected by Wiltshire (Trans. Br. mycol. Soc. 21, 211–239, 1939). They described the conidia as "variable in shape, quadrilateral to oblong-ovoid, at first nearly smooth, becoming coarsely verrucose, muriform, more or less constricted at the septa, very dark to brown or black, (13)–18–25–(28) \times (12)–14–17–(23) μm ". Simmons (loc. cit.) made *M. consortiale* the type for *U. consortiale*. However, he regarded the description of *S. consortiale* by Grove & Skolko as incorrect and thought it to be *U. atrum*. *S. consortiale* was nevertheless retained as a synonym of *U. consortiale*.

In his treatment of *Stemphyllium illicis* Tengwall in the section Pseudostemphyllium, Neergaard (loc. cit.) noted that the conidia are smooth, echinulate or more or less verrucose, even warty. He furthermore stated in the Appendix to his book that *S. illicis* is identical with *S. consortiale* (Thüm.) Groves & Skolko and the latter name should, therefore, have priority. It follows that *S. illicis* should be regarded as a synonym of *U. consortiale* as well.

The isolate described here corresponds well with the description given by Simmons (loc. cit.) except for the fact that it differs in the surface features of the conidia. According to Simmons (loc. cit.) "*U. consortiale* is restricted to a species with smooth to inconspicuously roughened conidia of medium colour density." The conidia of this isolate vary from apparently smooth to definitely roughened and can hardly be described as predominantly smooth. It is also similar to *S. illicis* described by Neergaard (loc. cit.). Since there is no obvious basis for regarding this isolate as a separate species it must be labelled *U. consortiale*.

This is the first record of this species in South Africa.—W.J.J.

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