

The mycoflora of wheat field debris, Part III

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ABSTRACT

Descriptions are given of four fungus species isolated from stubble of a wheat field in the Heilbron district: *Ulocladium botrytis* Preuss, *Drechslera australiensis* (Bugnicourt) Subram. & Jain ex M. B. Ellis, *Cladosporium macrocarpum* Preuss, *Verticillium fusisporium* W. Gams.

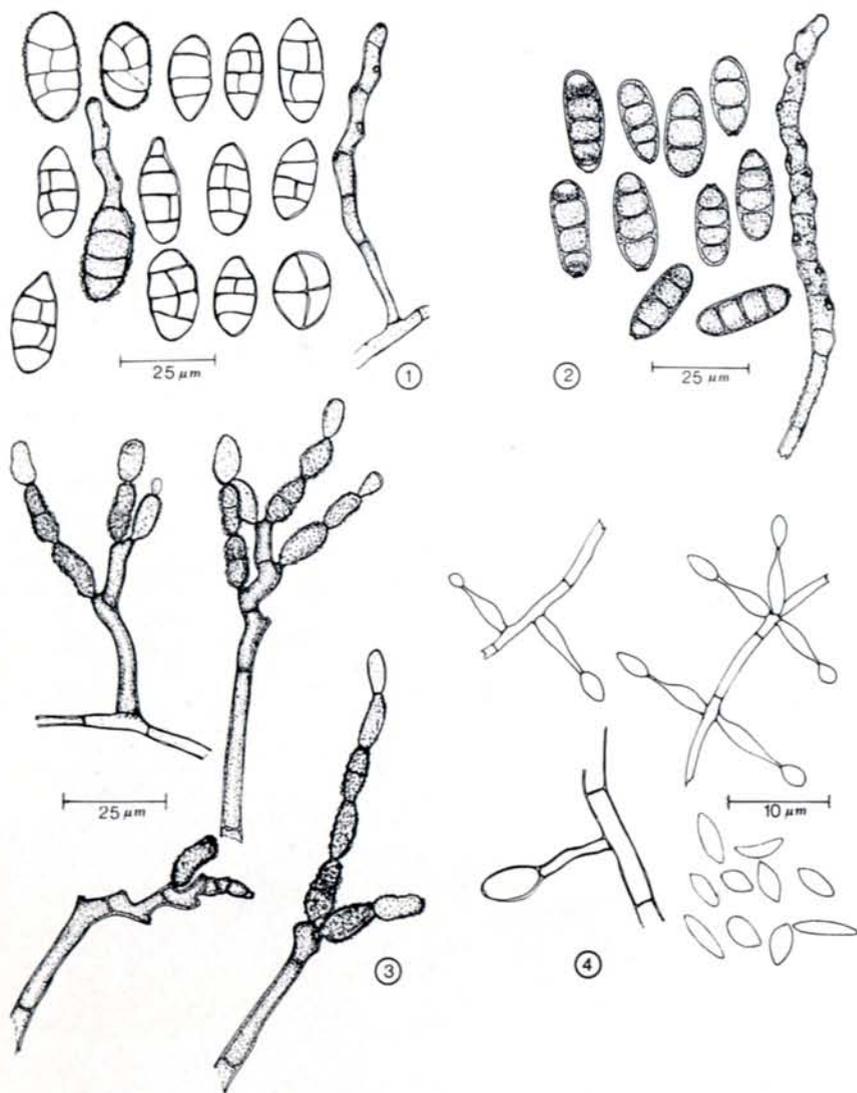
RÉSUMÉ

LA MYCOFLORE DES DÉBRIS DE CHAMPS DE BLÉ. IIIe PARTIE

On décrit quatre espèces fongiques isolées de chaumes de blé dans un champ du district d'Heilbron: *Ulocladium botrytis* Preuss, *Drechslera australiensis* (Bugnicourt) Subram. & Jain ex M. B. Ellis, *Cladosporium macrocarpum* Preuss, *Verticillium fusisporium* W. Gams.

This is a further report on the fungi isolated from wheat stubble. The object of this study was given in the first paper in this series (Papendorf & Jooste, 1974). Living cultures of the fungi described here have been deposited in the Potchefstroom University Culture collection and dried cultures in the Mycological Herbarium (PREM) of the Plant Protection Research Institute at 590 Vermeulen Street, Pretoria.

The methods used are those described in previous papers (Papendorf & Jooste *l.c.*, Jooste, 1976). In addition, the potato-carrot agar used was prepared by making an extract of 30 g of potatoes and 30 g of carrots boiled in 1 litre of water for one hour. The extract was filtered and 15 g of agar added before autoclaving. For scanning electron microscopy the fungi were dried by means of the critical point



FIGS 1-4.—Camera lucida drawings of 1, conidia and conidiophores of *Ulocladium botrytis*; 2, conidia and conidiophores of *Drechslera australiensis*; 3, conidia and conidiophores of *Cladosporium macrocarpum*; 4, phialides, conidia and chlamydospores of *Verticillium fusisporium*.

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procedure after dehydration in ethanol and amyl acetate (Cohen, 1970). The dried specimens were coated with silver before scanning with a Cambridge Stereoscan electron microscope.

Ulocladium botrytis Preuss in Simmons, *Mycologia* 59, 67–91 (1967); Ellis in Dematiaceous Hyphomycetes, Kew: Commonwealth Mycological Institute (1971).

Stemphyllium botryosum Wallr. var. *ulocladium* Preuss in Sacc. IV, 522 (1886).

Stemphyllium botryosum Wallr. var. *botrytis*, Lindau in Rabenhorst, Kryptogamen Flora von Deutschland und der Schweiz I. Pilze Abt. IX, 216 (1910).

Figures 1, 10, 11, 12 and 13.

Colonies on potato-carrot agar grow moderately fast, reaching a diameter of 40 mm in 7 days at 25 °C. *Mycelium* appressed, smooth, velvety, dark olivaceous-grey to black, buff around the more or less crispate edge of the colony, reverse olivaceous-grey, no pigment diffusing into the agar. *Hyphae* hyaline to light-honey, branched, septate, smooth to verruculose, fertile hyphae mostly verruculose, 2,0–5,0 µm diam. *Conidiophores* mononematous, macronematous, occasionally branched, honey to isabelline, geniculate with up to 8 geniculations, pores conspicuous and one per cell, 35,0–120,0 × 3,0–4,0 µm. *Conidia* solitary, dry verruculose to verrucose or tuberculate, light umber becoming olivaceous black with ageing, mostly with 3 transverse and 2–4 longitudinal septa, slightly constricted at the septa, subglobose, obovoid or ellipsoidal, the latter often conspicuously symmetrical and tapering towards

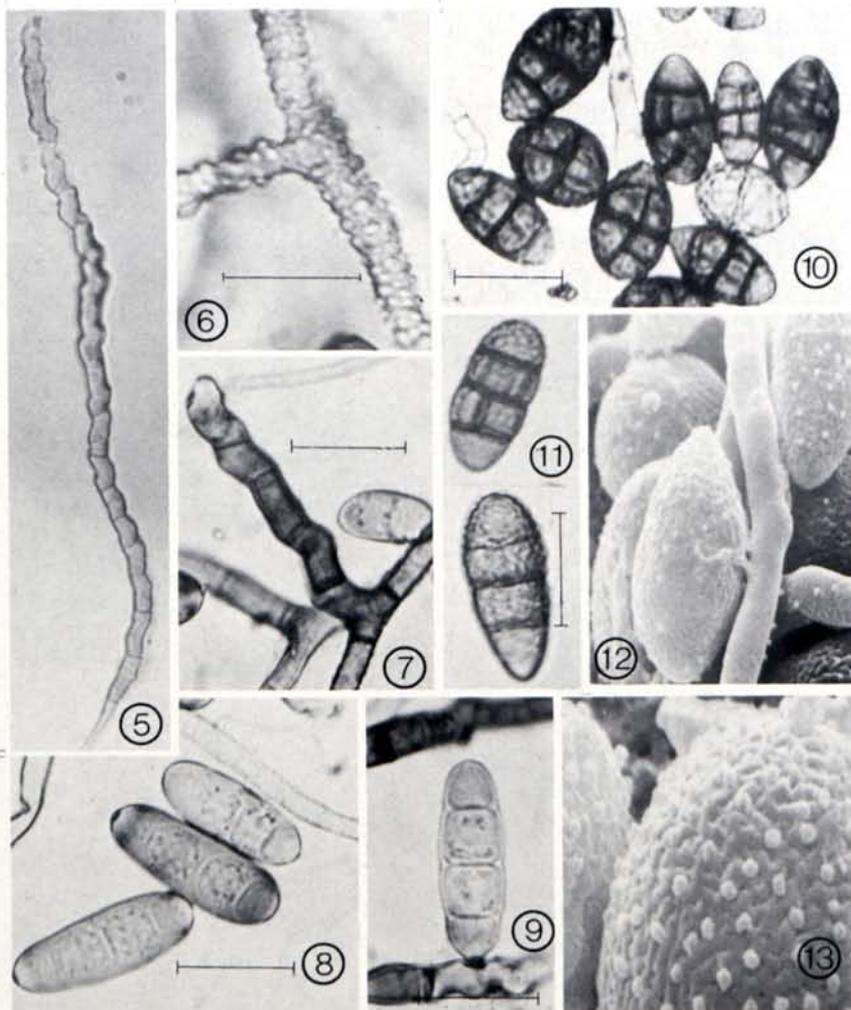
both ends, basal apiculus only conspicuous on obovoid conidia, geniculate false beaks bearing up to eight subglobose or obovoid conidia occur occasionally, conidial dimensions variable, 21,0–34,0 × 10,0–14,0 µm, ave. 25,0 × 12,0 µm, length: width ratio 2,15:1, conidia with false beaks 33,0–62,5 × 10,0–12,5 µm ave. 47,0 × 11,8 µm, beak length 9,0–37,5 × 3,0–4,0 µm, ave. 21,0 × 3,5 µm.

Specimen examined: P.U. Culture Collection no. 1295, PREM 45012 dried culture on potato-carrot agar.

The characteristic features of this isolate differ in some respects from those noted by Simmons (*l.c.*) for *U. botrytis*. The conidia are slightly larger and not obovoid as often as indicated by Simmons. A comparison of this isolate with Simmons's cultures of *U. botrytis* deposited at the CBS revealed that its conidia are regularly more ellipsoidal and not as conspicuously obovoid as those described by Simmons (*l.c.*). The basal apiculus is not always as prominent as in the case of Simmons's isolates. However, the predominantly three-septate nature of the conidia is a common feature of all the isolates studied. The morphology of the conidia can most satisfactorily be determined in 7-day old cultures. In older cultures the variation in conidial morphology tends to obscure the distinctive characteristics of the species.

Owing to the extreme variability exhibited by species of this genus, it is not justified to describe this isolate as a new species and it is most appropriately named *U. botrytis*.

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



FIGS 5–13.—*Drechslera australiensis* 5, conidiophore; 6, verrucose hypha; 7, conidiophore; 8, conidia showing lighter pigmentation of ends; 9, conidium showing constrictions at septa. *Ulocladium botrytis*. 10, 11, conidia representing the most characteristic types; scanning electron micrographs showing: 12, characteristic conidium morphology (×1370); 13, surface ornamentation of conidia (×3460). Bar in figures represents 10 µm.

Drechslera australiensis (Bugnicourt) Subram. & Jain ex M. B. Ellis in Ellis, Dematiaceous Hyphomycetes, Kew: Commonwealth Mycological Institute (1971).

Helminthosporium australiense Bugnicourt in Revue gen. Bot. 62, 242 (1955), (name published invalidly without Latin diagnosis).

Figures 2, 5, 6, 7, 8 and 9.

Colonies on oatmeal agar grow rapidly, reaching a diameter of 90 mm in 10 days at 25 °C. *Mycelium* raised, cottony, varying in colour from very pale olivaceous-grey to olivaceous-grey, darkest colour mostly close to the medium and in the centre of the colony, reverse dark olivaceous-grey, agar not pigmented. *Hyphae* smooth or verruculose, bright, olivaceous, septate, branched, 3,0–5,0 μm diam. *Conidiophores* mononematous, macronematous, unbranched, sterile portion slender, flexuous light olivaceous, verruculose, septate, 1,5–5,0 μm diam., conidiogenous part smooth, septate, geniculate, normally with two geniculations per cell, conidiogenous cells polytretic (2–3 pores per cell), 30,0–330,0 \times 4,0–5,0 μm . *Conidia* single, dry, acropleurogenous, olivaceous-brown, smooth, 3–4 pseudo-septate (usually 3), oblong ellipsoidal, straight, prominent scar on basal cell slightly protuberant (not a hilum), basal and apical ends of conidium slightly less pigmented at maturity, occasionally constricted at the septa, 19,0–26,0 \times 7,5–12,5 μm ave. 22,7 \times 9,7 μm .

Specimen examined: P.U. Culture Collection no. 1286, PREM 45013 dried culture on oatmeal agar.

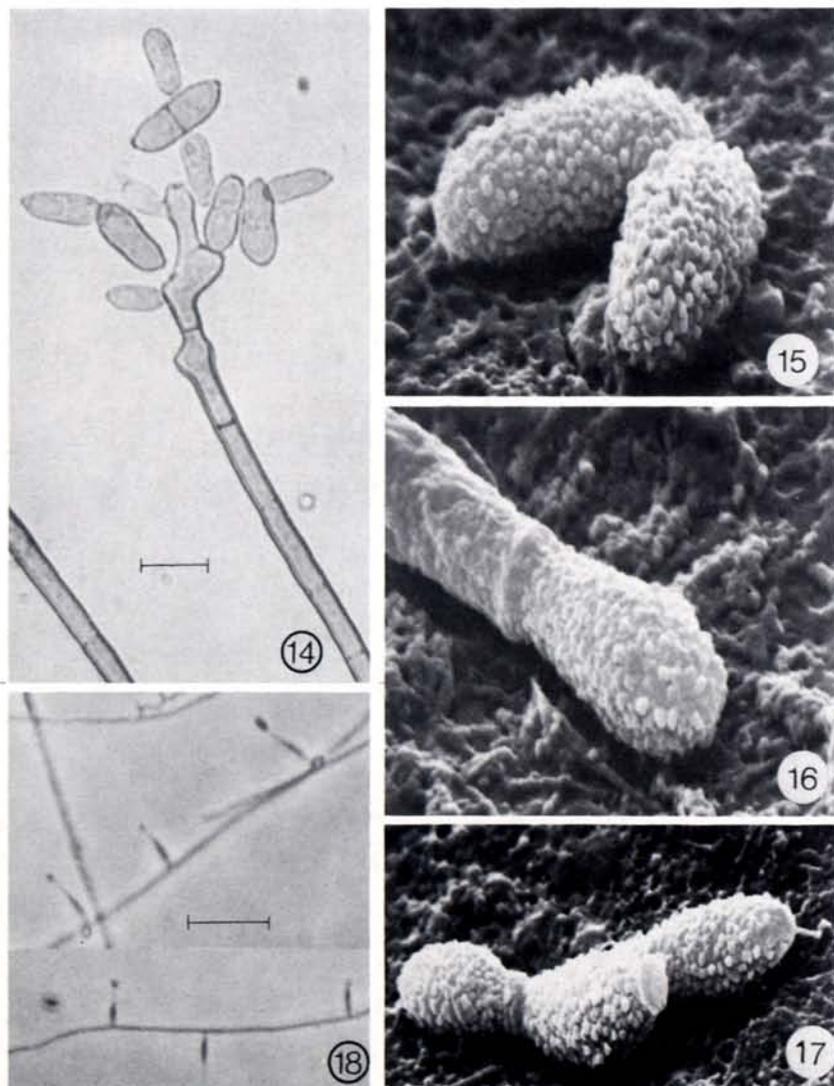
As *Drechslera* species show considerable variation on different media, this isolate was cultured on potato-carrot agar and maize meal agar as well. The colony characteristics did not vary appreciably, although growth on potato-carrot agar was slower and less profuse. Dimensions of the conidia, however, differed. On maize meal agar the conidial dimensions were 14,0–25,0 \times 9,0–12,5 ave. 22,9 \times 9,8 μm and on potato-carrot agar they were 19,0–31,0 \times 7,5–10,0 ave. 25,6 \times 8,9 μm . The most constant feature of this fungus found on the different media is the predominance of conidia with three pseudosepta.

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

Cladosporium macrocarpum Preuss in De Vries, Bibliotheca Mycologia 3, 76–81 (1952). Ellis in Dematiaceous Hyphomycetes, Kew: Commonwealth Mycological Institute (1971).

Figures 3, 14, 15, 16 and 17.

Colonies on 1,5% malt extract agar slow growing, attaining a diameter of 50 mm in 14 days at 25 °C. *Mycelium* velvety, undulated, olivaceous black, reverse of colony similar, no pigment diffusing into the agar. *Hyphae* smooth, septate, branched, slightly constricted at the septa, straight or flexuous, bright, olivaceous-green or olivaceous-brown, 5,0–8,75 μm diam. *Conidiophores* macronematous, mononematous, smooth, septate, flexuous, width fairly uniform over entire length, 124,0–310,0 \times 5,0–6,25 μm ; conidiogenous part geniculate, tapering slightly towards the apex, conidiogenous cells polyblastic, integrated,



FIGS 14–18.—*Cladosporium macrocarpum*. 14, conidiophore and conidia; scanning electron micrographs of: 15, conidia showing surface ornamentation ($\times 3200$); 16, attachment of conidium to conidiophore [$\times 3600$]; 17, disc-like attachment scar of conidia ($\times 2240$). *Verticillium fusisporium*. 18, phialides on prostrate hyphae. Bar in figures represents 10 μm .

scars prominent, cicatrized and 1,0–1,5 μm diam. *Conidia* dry, catenate, acropleurogenous, bright, pale-brown to olivaceous-brown, verrucose, subglobose, ellipsoidal or obovoid, 0–1 septate, often slightly constricted at the septum, basal and apical scars protuberant, ramoconidia absent, 12,5–22,5 \times 5,0–12,5 μm , ave. 17,3 \times 7,3 μm .

Specimen examined: P.U. Culture Collection no. 1234. PREM 45014 dried down culture on 1,5% malt extract agar.

The isolate described agrees in most respects with those of De Vries (*l.c.*) and Ellis (*l.c.*). The conidia with two or three septa, noted by these authors, were not found in this isolate. The nature of the verrucose surface of the conidia is shown in Figs 15–17 and can appropriately be described as densely tuberculate. The protuberant scars on the conidia appear to be disc-like structures.

Verticillium fusisporium W. Gams in *Cephalosporiumartige Schimmelpilze*, Stuttgart: Gustav Fischer Verlag (1971).

Figures 4 and 18.

Colonies on oatmeal agar grow rather slowly reaching a diameter of 45 mm in 10 days. *Mycelium* dense, cottony, raised, white, reverse of colony white, no pigment diffusing into the agar. *Hyphae* smooth, septate, branched, hyaline, 1–2 μm diam., occasionally encrusted in small crystals. *Phialides* smooth, hyaline, thin-walled, lageniform with a narrow neck or somewhat subulate, arranged on prostrate hyphae in whorls of 2–4, whorls somewhat distant, phialides occasionally single and alternately spaced on fertile hypha, 6,25–11,25 \times 1,25–1,8 ave. 7,9–1,5 μm . *Conidia* smooth, hyaline, slimy, accumulating in small droplets at the tips of the phialides, fusiform, curved fusiform, obovoid or ovoid, 2,5–6,5 \times 1,5–2,5 ave. 3,9–1,9 μm , length: width ratio 2,03:1. *Chlamydospores* smooth, hyaline, moderately thick-walled, ovoid, borne on short hyphal branches 5,0–6,0 \times 3,0–4,0 μm .

Specimen examined: P.U. Culture Collection no. 1288 PREM. 45015 dried culture on oatmeal agar.

This isolate does not completely correspond with the type as described by Gams (*l.c.*). In culture it does not form the cherry-red colour in the agar, which is characteristic of the type; furthermore the phialides are smaller and only rarely subulate and the conidium morphology shows a greater variation. The presence of chlamydospores is a characteristic of this isolate, which has not been observed in the type.

The identity of this species has been determined by Dr W. Gams of the Centraal Bureau voor Schimmelcultures, Baarn.

This is the first record of the species in South Africa.

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UITTREKSEL

Vier fungus spesies wat uit stoppels van 'n koringland in die Heilbron distrik geïsoleer is, word beskryf nl. Ulocladium botrytis Preuss, *Drechslera australiensis* (Bugnicourt) Subram. & Jain ex M. B. Ellis, *Cladosporium macrocarpum* Preuss, *Verticillium fusisporium* W. Gams.

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