

## Cotton Staining caused by *Crebrothecium ashbyi* (= *Eremothecium ashbyi*) in South Africa

by

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### ABSTRACT

A description is given of *Crebrothecium ashbyi* (Guill.) Routien (= *Eremothecium ashbyi* Guill.) which was isolated from yellow stained cotton fibres. This fungus, in association with cotton stainer insects, caused extensive cotton staining in the Vaalharts area of the Cape Province during 1969-1970.

Cotton staining, also known as internal boll rot or stigmatomycosis, is a serious disease which is caused by yeast-like fungi in the genera *Ashbya*, *Eremothecium*, *Nematospora* and *Spermophthora* and spread by sucking insects. Although the taxonomy of these fungi has been a source of some controversy (Pridham and Raper, 1950; Lodder and Kreger-Van Rij, 1952), these four genera, characterised by needle-shaped spores, are currently placed in the family Spermophthoraceae of the Endomycetales by most authors (Gäumann, 1964; Von Arx, 1967).

Three species of Spermophthoraceae, *Ashbya gossypii* (Ashby and Nowell) Guill. (= *Nematospora gossypii* Ashby and Nowell), *Nematospora coryli* Pegl. and *Crebrothecium ashbyi* (Guill.) Routien (= *Eremothecium ashbyi* Guill.), have been reported as causing cotton staining in association with sucking insects, primarily *Dysdercus* spp. in South Africa (Moore, 1930; Ulyett, 1930; Pearson, 1934, 1947; Wallace, 1939; Wickens, 1940; Rainey, 1948; Pridham and Raper, 1950; Doidge, 1950; Doidge, Bottomley, Van der Plank and Pauer, 1953; Empire Cotton Growers Corporation Progress Reports, 1933-1948; C.M.I. Distribution Maps of Plant Diseases No. 153 and 163). *A. gossypii* is common in the more humid parts of the South African cotton belt while *N. coryli* has been found only occasionally in the northern Transvaal (Moore, 1930; Wickens, 1940). *Crebrothecium ashbyi* has been recorded only once from a single piece of lint at Barberton, Transvaal (Wickens, 1940).

During April 1970, a sample of lemon yellow stained cotton was received from Vaalharts Irrigation Settlement, Cape Province. According to Dr Gillham of the J. L. Clark Cotton Corp., this type of lemon yellow staining had not been observed in the area before and was widespread in the Vaalharts region during the 1969-1970 season although the cotton stainer insect population was low. Microscopic examination of these yellow fibres revealed that they were packed with needle-shaped spores. A lemon yellow, yeast-like fungus, *Crebrothecium ashbyi* (Guill.) Routien, was isolated from these fibres by incubating them on potato dextrose agar at 25°C.

*C. ashbyi* was first isolated from cotton in the Sudan and described as *Eremothecium ashbyi* Guill. (Guilliermond, 1935; 1936; Tarr, 1955). The new genus *Crebrothecium* was erected by Routien (1949) because *E. ashbyi* differs from the type species of *Eremothecium*, *E. cymbalariae* Borzi, in the presence

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of intercalary chains of "asci" and in the indefinite arrangement of spores in the spore sacs.

According to Krneta-Jordi (1962), the only culture of *C. ashbyi* which had previously been isolated is Guilliermond's type strain from the Sudan. The ten isolates of *C. ashbyi* at the Centraalbureau voor Schimmelcultures, Baarn, Netherlands, are apparently all subcultures of the type strain, except possibly CBS 185.6/, B.I.G., which was received from Dr Mach, Bot. Inst. d. Ernst Moritz Arndt Universität, Greifswald, without further particulars (Dr M. A. A. Schipper, personal communication). A culture of *C. ashbyi* which was obtained from the



FIG. 1—3. — *Crebrothecium ashbyi* (Nomarski interference contrast,  $\times 1000$ ). Fig. 1, spore sac filled with spores. Fig. 2, dichotomous branching of hypha and deliquescent spore sac. Fig. 3, spores.

Northern Utilization Research and Development Division, United States Department of Agriculture, Peoria, Illinois, was deposited by A. C. Thaysen without any further information on its source (Dr L. J. Wickerham, personal communication).

*Crebrothecium ashbyi* (Guill.) Routien in Mycologia 41: 184 (1949).

*Eremothecium ashbyi* Guill. in Compt. Rend. Acad. Sci. Paris 200: 1556 (1935); CMI Descriptions of pathogenic Fungi and Bacteria, No. 181 (1968).

Figures: 1, 2, 3.

Colonies grow rapidly on potato dextrose agar and produce spores within 2 days at 25°C. Colonies are Lemon Yellow (Ridgway, 1912, Plate IV), probably due to the production of riboflavin which also diffuses out and stains the agar yellow, flatly appressed, have the appearance of melted snow and produce no aerial mycelium. *Vegetative hyphae* are dichotomously branched, filled with yellow protoplasm, non-septate except in old cultures, 5—7.5µ wide. Usually an entire hypha or a large portion of it becomes fertile, giving rise to chains of intercalary, truncate-ellipsoid spore sacs (asci?). *Spore sacs* are separated by constricted areas in which the hyphal wall is thickened (Callosepfpfen of Krneta-Jordi, 1962), 55—100µ (mostly 70—80µ) long, 7—10µ wide and completely filled with spores (ascospores?). *Spores* are irregularly disposed without any arrangement in fascicles, entangled and overlapping one another, difficult to count but apparently ranging from 8 to 32 (mostly 16) per sac. Spores are released by deliquescence of the spore sac walls, hyaline, non-septate, multi-globulate, needle-shaped, curved and sharply attenuated to a pointed projection at one end, 24—28 x 2—2.5µ (mostly 25 x 2µ).

*Assimilation reactions:* non-fermentative; glucose, sucrose, trehalose, raffinose, glycerol and succinate are assimilated (kindly determined by Dr. J. P. van der Walt).

*Specimen examined:* PRE 44335 (Mycological Herbarium), cultures on potato dextrose agar isolated from yellow stained cotton (*Gossypium* sp.) bolls, Vaalharts, Cape Province, April 1970. Cultures have also been deposited in the Centraalbureau voor Schimmelcultures, Baarn, Netherlands (CBS 741.70) and the Northern Utilization Research and Development Division, United States Department of Agriculture, Peoria, Illinois (NRRL Y-7249).

The South African isolate was compared with the following isolates of *C. ashbyi* and found to be identical in all respects: CBS 204.36, *Guilliermond*, Type Culture; NRRL Y-1363, *A. C. Thaysen*. The assimilation reactions of the South African isolate also agree well with the data obtained for NRRL Y-1363 (Dr. L. J. Wickerham, personal communication).

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