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A new acidophilic *Scytalidium*¹

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A brown mold fungus was isolated from acid soil and from acid solutions in an industrial plant and a uranium mine. The only type of spores observed were arthroconidia. The morphology of the fungus is illustrated and it is described as a new species, *Scytalidium acidophilum*.

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On a isolé une moisissure brune d'un sol acide et de solutions acides provenant d'une usine et d'une mine d'uranium. Des arthroconidies furent les seuls types de spores observés. La morphologie de la moisissure est illustrée et on la décrit comme étant une nouvelle espèce, *Scytalidium acidophilum*.

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Attempts to identify four strains of fungi isolated from acidic soil (pH 1.4-3.5) from a field adjacent to a sulfur stockpile from a natural gas purification plant near Bowden, Alberta, led to a comparison with an aciduric fungus described by Starkey and Waksman (1943). Their strain, which they called Fungus D, was isolated from acid solutions (pH 0.2-0.7) containing 4% copper sulfate used in an industrial plant. In their experiments, Starkey and Waksman showed that Fungus D was very tolerant to acid conditions and even able to grow at pH 0.0. Another similar strain was cultured in 1972 from acid uranium mine drainage water by K. C. Iverson (Canadian Department of Agriculture, Central Experimental Farm, Ottawa). All six isolates appear to belong to the same species, which is described here as new. Since they produced only poorly differentiated brown arthrospores, they are referred to the form genus *Scytalidium* Pesante (see Ellis 1971).

Scytalidium acidophilum Sigler et Carmichael, sp. nov.

Coloniae compactae, griseae.

Mycelium ex hyphis septatis, pallide brunneis vel brunneis.

Conidiophora absunt (micronemata).

Arthroconidia sine disjunctoris vel cellulis separandis, cylindrica vel ovalia vel irregularia, 0-1 septata, pallide brunnea, tandem brunnea, aliquando verruculosa.

HABITATUS: in solo acido vel liquido acido.

TYPUS: ex solo, Bowden, Alberta, November, 1971, UAMH 3460.

Colonies on cellophane on Pablum cereal agar (Pablum precooked mixed cereal, 10%; agar, 1.5%) are moderately slow-growing, reaching a diameter of 21-26 mm in 21 days at 25C. The colonies are flat, developing radiating furrows showing a tendency to crack, and producing scant velvety aerial mycelium (Fig. 7). The color is dark grey-brown, reverse dark grey. Colonies on cereal agar at pH 4.5 (obtained by the addition of sulfuric acid to the medium) grow faster,

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achieving diameters of 28–31 mm in 21 days at 25C, and they show increased aerial mycelium and fewer furrows. Scant growth is seen at 37C after 21 days.

A similar reaction to pH occurs on phytone-yeast extract agar (PYE) (Baltimore Biological Laboratories). The colonies are slow-growing at the usual pH of 6.6, reaching 15 mm after 28 days at 25C, and are heaped and folded (Fig. 6). With the addition of acid to the medium (pH 5.0), the colonies are flatter, spreading to 38 mm in 28 days, and showing more luxuriant aerial mycelium.

The hyphae are septate, pale to mid-brown, and fragment to form arthroconidia (Fig. 1). Chains of arthroconidia are either terminal or intercalary, 0–1 septate, at first smooth and pale (Fig. 2), later becoming dark brown and thicker-walled (Fig. 3), and sometimes becoming encrusted or verruculose in old cultures (Fig. 5). Arthroconidia are broadly ellipsoidal, cylindrical, or irregularly shaped and show a constriction at the septum. Conidia measure 4.5–6.5(8) × 7–23 μ. Two-celled conidia are usually 4.5–6.5(8) × (10)11.5–23 μ, while one-celled conidia measure 4.5–6.5(8) × 7–13(16) μ.

All isolates showed only a scanty production of arthroconidia with the chains tending to remain intact in young cultures. Sporulation was enhanced on acid medium.

CULTURES EXAMINED: From soil near a sulfur pile, Bowden, Alberta: UAMH 3460, TYPE, November 1971; UAMH 3492, 3493, and 3494, June 1972. From liquid: UAMH 3489, from industrial plant acid solutions, "Fungus D" of Starkey and Waksman (1943); UAMH 3535, from uranium mine drainage water, Ivarson, 1972. Subcultures from the type strain (3460), and from 3489, 3494, and 3535 were deposited in the Commonwealth Mycological Institute, Kew; the Centraalbureau voor Schimmelcultures, Baarn, and the American Type Culture Collection, Rockville.

One of the isolates (UAMH 3460), when grown on cereal agar at 18C, produced upright tufts of hyphae resembling synnemata. Some hyphae at the base of the tufts fragmented to form thick-walled, brown arthrospores but those at the tip remained thin-walled and pale, giving the tip a feathery appearance (Fig. 8). Synnemata were not observed in any other isolate grown under the same conditions, but spiny outgrowths occurred on old colonies on PYE.

Another isolate (UAMH 3493) frequently formed sclerotia composed of thick dark-brown hyphae (Fig. 4). An attempt to mate the strains by pairing them on cereal agar at 18C showed evidence of slight inhibition where the strains met. Subsequently, each of the strains was grown on straw agar (chopped decomposing hay, 3%; agar, 1.5%) at 25C and 18C in an unsuccessful attempt to produce an ascomycete state. However, on this medium, each of the other strains also developed sclerotia. The addition of acid to the medium had no noticeable effect on the formation of sclerotia. Pairing of the strains on straw agar resulted in a decrease in the number of sclerotia produced.

In addition to Starkey's and Waksman's original paper, the acid and copper tolerance of the species has been investigated by Starkey (1973) and by Gould *et al.* (1973).

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FIGS. 1–8. *Scytalidium acidophilum*. Fig. 1. Smooth, 1-septate, arthroconidia of type strain, × 990, phase contrast. Fig. 2. Chains of arthroconidia of type strain, × 620, phase contrast. Fig. 3. Chains of arthroconidia showing thick walls, × 620, bright field. Fig. 4. Sclerotium, × 620, phase contrast. Fig. 5. Mature verruculose arthroconidia, × 990, phase contrast. Figs. 6–7. Colonial morphology after 14 days at 25C. Fig. 6. UAMH 3494 on PYE, × 1.5. Fig. 7. UAMH 3494 on cereal, (a) × 1.5, (b) × 2.25. Fig. 8. Tufts of hyphae formed by type strain after 21 days at 18C, × 2.25.

