

TRICHOCLADIUM OPACUM

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Hughes (1952), in an account of the hyphomycete genus *Trichocladium* Harz (1871), characterized it as possessing short, scarcely differentiated conidiophores which swell out apically into solitary, dark brown, thick-walled, more or less ovoid to elongate chlamydospores which are 1- to 4-septate. He restricted the genus to two species, *T. asperum* (Corda) Harz, which he chose as lectotype, and *T. opacum* (Corda) Hughes. Subsequently a third species, *T. canadense* Hughes (1959) was added, conforming to the generic concept outlined above. *T. asperum* and *T. opacum* have been isolated from soil many times (Bisby *et al.* 1933; Farrow 1954; Chesters and Thornton 1956; Brown 1958; Sewell 1959; Domsch 1960; Caldwell 1963; Parkinson and Thomas 1965) and in screening slide preparations of a large number of fungi isolated by one of us (G. C. B.) from organic soils in southwestern Ontario, all three species were identified (Bhatt 1965).

In addition, four *Trichocladium*-like isolates were recorded which could not be assigned to any of the existing taxa, and it was at first proposed to describe these isolates in a new species of *Trichocladium*. The cultures were replated on potato dextrose agar to permit proper characterization, but when they began to sporulate, it appeared that they had undergone a reversion to type, and were, in fact, normal isolates of *T. opacum*. Observation of the cultures under the higher powers of the binocular dissection microscope suggested a solution to this puzzle. There were marked differences between the chlamydospores produced on the aerial hyphae and those on the immersed mycelium. Slide preparations derived separately from aerial and immersed portions of the cultures showed that chlamydospores on aerial hyphae (Fig. 1) were of the kind described for *T. opacum*, while those on immersed mycelium (Fig. 2) were often much longer and made up of many more cells than had previously been recorded for *T. opacum*. Similar differences were now found in cultures originally determined as *T. opacum*. Evidently the "anomalous" preparations had originated from immersed portions of normal *T. opacum* cultures. Although we have not observed this phenomenon in the other species of *Trichocladium*, it has been found consistently in our isolates of *T. opacum*. Because it may engender taxonomic confusion, and seems to require some emendation of our concept of *Trichocladium*, it is documented here.

Several hundred chlamydospores from aerial and immersed portions of cultures were measured, and the number of cells per chlamydospore recorded. While aerial chlamydospores were $17.5\text{--}58 \times 10.2\text{--}17.2 \mu$ and 2- to 8-celled, immersed ones were $17.5\text{--}110 \times 10.2\text{--}15.8 \mu$ and 2- to 17-celled. The length of chlamydospores was almost directly proportional to the number of cells they contained. The distribution of cell number among the two types of chlamydospore is compared in Fig. 3. The histogram shows that, while the cell numbers exhibited by immersed spores completely overlap the range shown for aerial spores, there are far fewer 3- and 4-celled immersed spores, and far

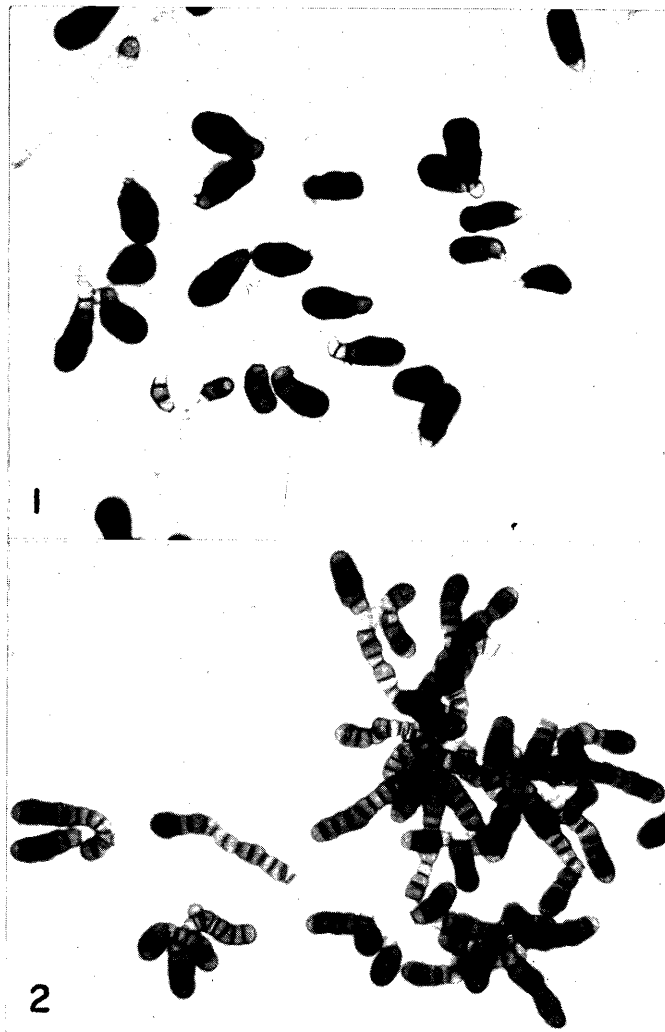


FIG. 1. Chlamydozoospores of *Trichocladium opacum* on aerial mycelium (GCB No. 442),
 ×280.
 FIG. 2. Chlamydozoospores of *T. opacum* on immersed mycelium (GCB No. 657), ×280.

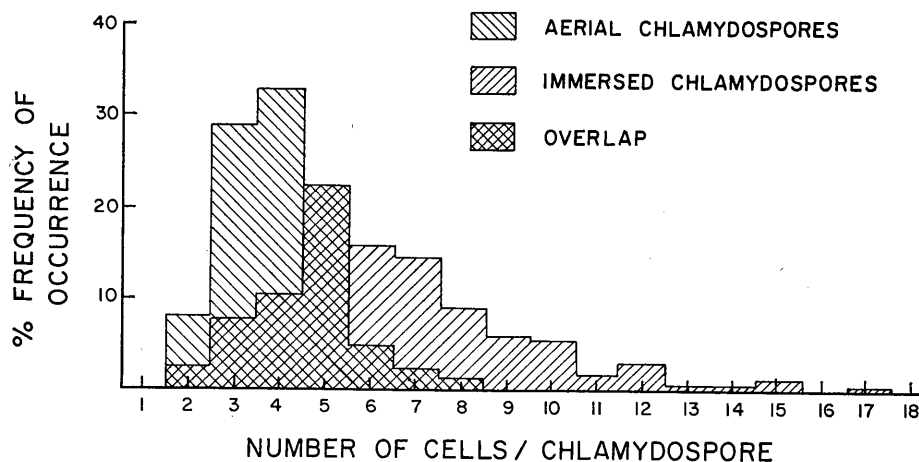


FIG. 3. Superimposed histograms showing that 58% of immersed chlamydospores had more than five cells, while only 10% of aerial chlamydospores fell into this category.

more 5- to 10-celled immersed spores. There is, in other words, a very significant shift toward an indefinite cell number in immersed chlamydospores. It is not the purpose of this paper to speculate on possible reasons for this proliferation; we merely wish to place these observations on record.

The concepts of many hyphomycete genera are being broadened today, as more and more specimens fill gaps in various biological continua. It seems reasonable to extend the limits of the genus *Trichocladium*, describing the chlamydospores as didymospores or phragmospores, and transversely 1- to many-septate rather than transversely 1- to 4-septate. It may be of some significance to point out here that the chlamydospores of *T. asperum*, the lectotype species, and *T. canadense* usually have a germ pore in each cell. Chlamydospores of *T. opacum* apparently lack germ pores altogether. *T. canadense* sometimes bears scattered phialides which produce small, slimy amerospores; phialides have not been observed in the other two species. The taxonomic importance of these differences at the generic level, if any, is not known.

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- BHATT, G. C. 1965. Studies on the fungal flora of cedar forests. M.Sc. Thesis, University of Guelph, Guelph, Ontario.
- BISBY, G. R., JAMES, N., and TIMONIN, M. 1933. Fungi isolated from Manitoba soil by the plate method. *Can. J. Res. C*, **8**, 253-275.
- BROWN, J. D. 1958. Soil fungi of some British sand dunes in relation to soil type and succession. *J. Ecol.* **46**, 641-664.
- CALDWELL, R. 1963. Observations on the fungal flora of decomposing beech litter in soil. *Trans. Brit. Mycol. Soc.* **46**, 249-261.
- CHESTERS, C. G. C. and THORNTON, R. H. 1956. A comparison of techniques for isolating soil fungi. *Trans. Brit. Mycol. Soc.* **39**, 301-313.
- DOMSCH, K. H. 1960. Das Pilzspektrum einer Bodenprobe. I. Nachweis der Homogenität. *Arch. Mikrobiol.* **35**, 181-195.
- FARROW, W. M. 1954. Tropical soil fungi. *Mycologia*, **46**, 632-646.
- HARZ, C. O. 1871. Einige neue Hyphomyceten. *Bull. Soc. Imp. Moscow*, **44**, 125-127.

- HUGHES, S. J. 1952. *Trichocladium* Harz. Trans. Brit. Mycol. Soc. **35**, 152-157.
- 1959. Microfungi. IV. *Trichocladium canadense* n. sp. Can. J. Botany, **37**, 857-859.
- PARKINSON, D. and THOMAS, A. 1965. A comparison of methods for the isolation of fungi from rhizospheres. Can. J. Microbiol. **11**, 1001-1007.
- SEWELL, G. W. F. 1959. Studies of fungi in a *Calluna*-heathland soil. II. By the complementary use of several isolation methods. Trans. Brit. Mycol. Soc. **42**, 354-369.

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