ENTOMOPHTHORA BREVINUCLEATA SP. NOV.
[ZYGYOMYCETES, ENTOMOPHTHORACEAE],
A PATHOGEN OF GALL MIDGES [DIP.: CECIDOMYIIDAE] (1)

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Entomophthora brevinucleata, a fungal pathogen of gall midges, is described. The species occurs on at least 3 host species, including the wheat blossom midge *Sitodiplosis mosellana* Gehin and *Mycodiplosis* sp. *E. brevinucleata* produces rhizoids, either monohyphal or comprising bundles of a few hyphae, without holdfasts. The hyphal bodies are subspherical with mean dimensions of 27.5 × 22.1 μm. The primary conidia are campanulate with mean dimensions from individual hosts of 11.2-18.9 × 8.7-15.8 μm. They contain 3-13 nuclei with a mean diameter of between 2.7 and 3.7 μm stained with lactophenol-aceto-orcein. The secondary conidia are of similar shape but smaller. Cystidia and resting spores were not observed.


In Switzerland, a few gall midges killed by a species of *Entomophthora* were found most years from 1978-1982. During June 1983, however, an epizootic caused by the same fungus was discovered in a population of the wheat blossom midge *Sitodiplosis mosellana* Gehin inhabiting a pure stand of the grass *Phalaris arundinacea* L. The following description of the fungus is based mainly on this material. In the UK many specimens of *Mycodiplosis* sp. infected with the same fungus were found in winter wheat *Triticum aestivum* L. in 1982. Similar infected gall midges on winter wheat observed, but not examined, in previous years were probably also killed by this fungus.

METHODS

Cadavers were mounted within a few hours of collection or stored in 70% ethanol or placed in humid chambers to induce the fungus to sporulate. The projected conidia were collected on slides and mounted either in lactophenol-cottonblue [0.1% (w/v)] (LPCB) or in lactophenol-aceto-orcein (LPAO) of the following composition: 2 parts of lactophenol (20 g phenol + 20 ml lactic acid + 10 ml glycerol + 20 ml dist. water) and 1 part of aceto-orcein [1 g orcein in 100 ml 50% (v/v) acetic acid]. This stained the nuclei effectively and was also used as the medium in which the cadavers were mounted. Only those nuclei which appeared spherical were measured.

(1) While this paper was in press, Ben-Ze’ev & Zelig (Mycotaxon 21, 463-474, 1984) described a similar fungus under the name *Entomophthora israelensis*. Their data suggest an eventual identity of the 2 fungi but are unsufficient to allow a full comparison with ours. If the 2 descriptions are found to refer to the same fungus, then the binomial *E. israelensis* has priority and *E. brevinucleata* will be invalid.
RESULTS

DESCRIPTION OF THE NEW SPECIES:

Entomophthora brevinucleata sp. nov. (Plates 1-3)

Conidia primaria (11-) 15 (-22) × (8-) 12.6 (-19) μm, campanulate, apicaliter distincte acute, basim versus convexa, (3-) 6-7 (-13) nucleis praedita, 2.5-4.5 μm diam. Conidia secundaria similia, 11-17 × 9-14 μm. Conidiophora non ramosa, rhizoidia ex hyphis singularibus vel ramosis, sine hyphopodia. Sporae quiescentes et cystidia nulla. Ad Diptera [Cecidomyiidae]. Helvetia. Holotypus ZT, Cotypi K et BPI.

Primary conidia 11-22 × 8-19 μm (av. 15.0 × 12.6 μm), campanulate with distinct apical point and slightly convex base, 3-13 nuclei (av. 6.4) with a diameter of 2.5-4.5 μm. Secondary conidia similar to the primary ones, 11-17 × 9-14 μm. Conidiophores simple, rhizoids monohyphal or in bundles of a few hyphae, without specialised adhesive structures. Resting spores and cystidia not observed. Parasite of Diptera [Cecidomyiidae].

Localities and sampling dates:

Switzerland, SH, Neunkirch: 11 specimens between July 3 and 17, 1978 on leaves of Phalaris arundinacea; ZH, Stammheim: 1 specimen on a leaf of winter wheat Triticum aestivum on June 16, 1981; Solothurn: 4 specimens on leaves of winter wheat on July 7, 1982; SH, Oberhallau: 2 specimens on leaves of winter wheat on June 15, 1983; ZH, Reckenholz: 3 specimens on leaves of winter wheat between June 16 and 27, 1983; SH, Neunkirch: 209 specimens on leaves of P. arundinacea between June 22 and July 5, 1983; U.K., Harpenden, Hertfordshire: more than 50 specimens of Mycodiplosis sp. on leaves of winter wheat on July 26, 1982.

Most of the cadavers found on P. arundinacea were those of Sitodiplosis mosellana (W. Nijveldt, pers. comm.). This gall midge was also observed depositing eggs in the flowers of this grass.

Symptoms:

All cadavers were fixed to the underside of leaves. The wings were spread outwards, pressed against the leaf (fig. 1). The body was fixed by rhizoids. Midge which had recently died were usually fixed only by rhizoids emerging from the mouthparts, but later also by rhizoids emerging from the last abdominal segments or from the whole abdomen (fig. 2). The rhizoids, particularly those emerging from the abdomen, were usually monohyphal (figs 6-7), often irregularly flattened along much of their length and sometimes fused in pairs distally; some, especially those emerging from the mouthparts, were joined together in bundles (figs 8-9). They ended without a specialised holdfast. The monohyphal rhizoids were 6-9 μm in diameter, exceptionally 5-14 μm.

Hyphal bodies and conidiophores:

At the moment of death the midges contained subspherical to ellipsoidal hyphal bodies (fig. 3) which measured 19-40 × 15-30 μm (tab. 1). Larger, often elongated and budding hyphal bodies were considered to be the « mother cells » of the rhizoids (fig. 5). The hyphal bodies germinated to produce a single germ tube with a mean diameter of 5.3 ± 0.7 μm. This germ tube usually developed directly to form the conidiophore and the conidium respectively. However, 2 well defined and homogenous transitional stages often developed, referred to here as « transitional bodies ». Those of type A were rod-shaped, straight or slightly curved (fig. 4) with mean dimensions of 48.9 × 9.8 μm (tab. 1). The nuclei in these bodies had a mean diameter from individual hosts of 2.8-2.9 μm. The transitional bodies of