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A new aphidicolous fungus from Poland

Zoophthora phalloides sp. nov. *(Entomophthoraceae)*

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In the course of investigations on the flora of entomogenous fungi of the Białowieża National Park started in 1960, four species of *Entomophthoraceae* were observed parasitizing on aphids within the strict reservation: *Conidiobolus coronatus* (Costantin) Batko (1964 a), *Entomophaga thaxteriana* (Petch) Batko (1964 c), *Zoophthora (Pandora) aphidis* (Hoffman in Fresenius) Batko (1964 c, 1966 a) and a fungus which was identified as *Entomophthora occidentalis* Thaxter (1888) and reported under this name as new for the mycoflora of Poland (B a t k o 1964 a).

Morphological analysis of this fungus performed on the basis of material collected later at the type locality (VII.1962 leg. A. Batko; VII.1964 leg. Z. Borowski) proved, however, that it differs significantly from *Entomophthora occidentalis* (at present — *Zoophthora occidentalis* (Thaxter) Batko 1964 c). Therefore in the present work the above mentioned species is described as a new species under the name *Zoophthora phalloides* sp. nov.

Zoophthora (subg. *Zoophthora*) *phalloides* sp. nov.

Conidia uninucleata, cylindrica vel oblonge cylindrica, ad apicem rotundata, 32—40—48 × 11—13—14 µ, *papillata (secundum Lakoni classificationem), papilla basi prominenta, lata, rotundata. Conidia secundaria primariis similia vel conidia secundaria anadhaesisporae sunt. Pseudocystidia filiformia, ad apicem rotundata. Rhizoidea filiformia, in pseudorhizomorphae congregata. Spores perdurantes incognitae. Parasitus aphidorum.*

Typus: numerus MO-ent-t7 in collectio autoris et figurae 1—51.

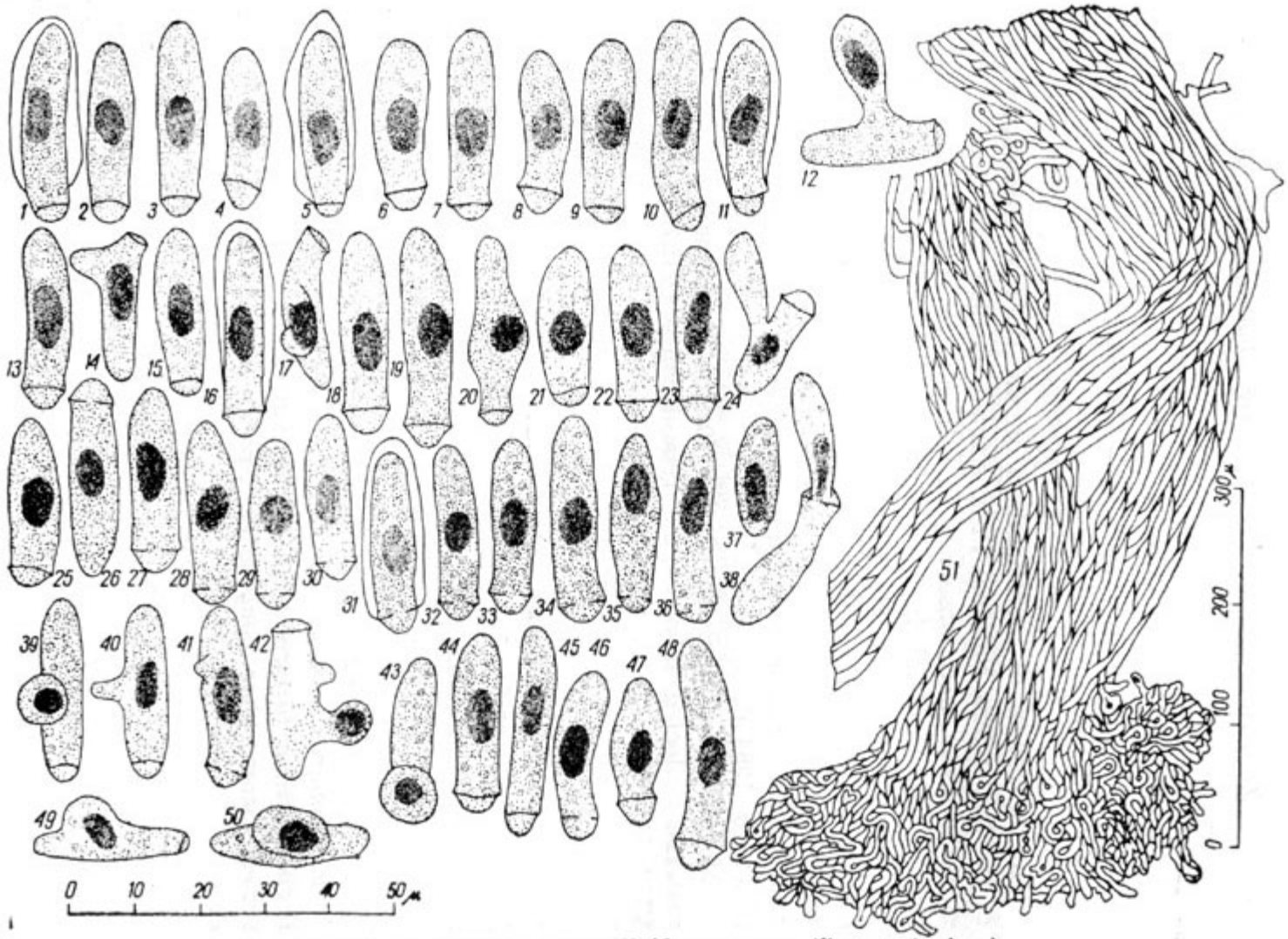
Hospes typicus: *Microlophium evansi* Theob. (*Aphidoidea*).

Habitatio typica: Polonia, Białowieża, divisio 399.

Etymology: name stressing the phallic shape of the conidia.

Conidia elongated cylindrical, less frequently elongated oval, sometimes curved with rounded tip, slightly tapering towards the tip

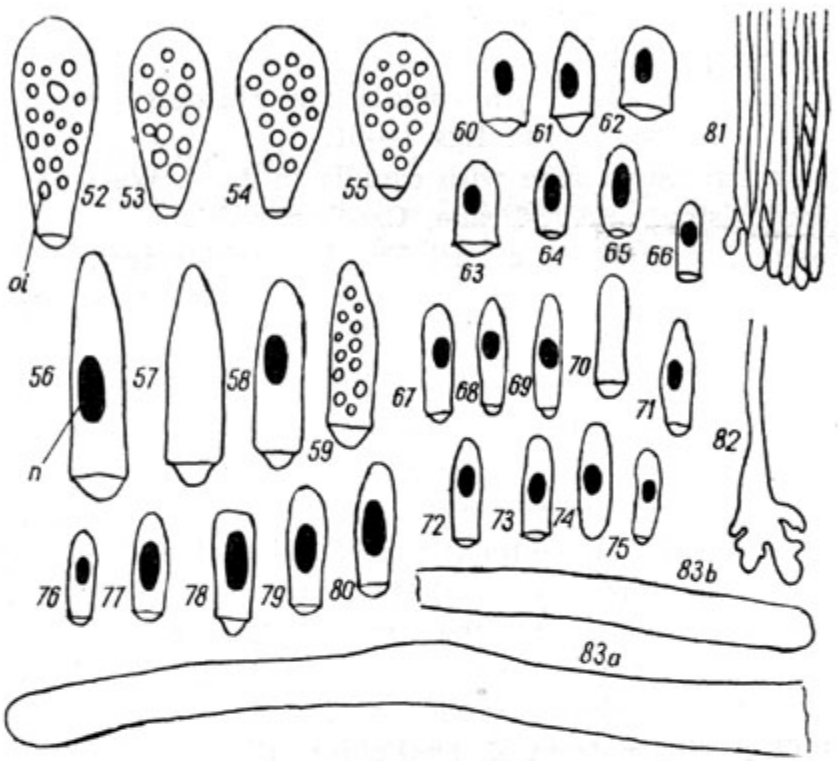
Plate I



Figs 1—51. *Zoophthora phalloides* sp. nov. (figurae typicae)

1—50 — conidia; *1—13, 15—16, 18—23, 25—36, 44—48* — fresh primary conidia; *12, 14, 17, 24, 38—43, 49—50* — various stages of formation of secondary conidia; *37* — secondary conidium; *51* — simple rhizoids forming three clusters (pseudorhizomorphs).

Plate II



Figs. 52—83. Morphology of various *Zoophthora* subg. *Zoophthora* spp. *52—55* — conidia of *Z. americana*; *56—59* — conidia of *Z. occidentalis*; 60—65 — conidia of *Z. geometralis*; 66—75 — conidia of *Z. radicans*; *76—80* — conidia of *Z. phytonomi; 81* — cluster of rhizoids of *Z. americana; 82* — terminal part of single (isolated) rhizoid of *Z. occidentalis*; *83* — apical parts of two *Z. radicans* pseudocystidia (diagrammatic); *52—65* and *82—81* redrawn from Thaxter, 1888, simplified and reduced to a magnification about 1000 ×, comparable with magnification of figs originals *67—80*. Originals Figs. *81, 82* from Thaxter and *83*, orig. (in uncomparable magnific.). (*oi* — lipid drops, *n* — *nucleus*).

and the base, sometimes somewhat constricted above the papilla (32—40—48 × 11—13—14 μ, relative width 17—25—48%) (expressed as % of length), of the type papillata (according to Lakon's classification, 1919); papilla broad, generally not narrower than conidium; single nucleus ovally elongated or oval, sometimes visible in unstained material, and when stained with cotton blue in lactophenol, very distincly visible; plasma homogenous, hyaline without larger vacuoles or granules. Secondary conidia similar to primary ones but generally relatively broader, form on short conidiophores growing each from one maternal conidium; sometimes secondary conidia — anadhesispores (explication of term — see Batko, 1966 b), about 18 × 7 μ, form on capillary conidiophores 80—120 × 1,5—2,5 μ in dimensions. Pseudocystidia not

thicker than conidiophores, not numerous, with rounded tips filled with dense plasma. Rhizoids thin, threadlike, unramified, very numerous, tightly interlaced forming 2—4 pseudorhizomorphs. Resting spores unknown. Aphid parasite.

Type: microscopic slide with conidia and rhizoids (in author's collection: symbol MO-ent-t7 and figs 1—51.

Paratype: microscopic slide with conidia in dr. J. Weiser's collection, Entomologický Ústav ČSAV, Praha, Czechoslovakia.

Type host: *Microlophium evansi* Theob. (*Aphidoidea*).

Type locality: Białowieża National Park, Poland, nettles (*Urtica dioica* L.) growing in roadside ditch along road bordering from north side section 399.

Zoophthora phalloides is a species most closely similar to *Z. occidentalis,* the conidia of which, however, are conical, generally sharply pointed at the tips similarly as the pseudocystidia (figs 56—59). A second species with which the above mentioned *Z. phalloides* is closely related is *Z. phytonomi* (Arthur) Batko (1964 c), but the conidia of the latter though large are smaller, on the average less than 30 μ long, and a large part of these has an oval elongated and not a cylindical shape (figs 76—80). The remaining species of *Zoophthora* subg. *Zoophthora* (Batko 1966 a) differ from *Z. phalloides* still more by their conidia of much smaller linear dimensions or else of quite different shape.

Key for determination of species of subgenus *Zoophthora*

1. Papilla much narrower than conidium. Conidia tapering towards base, oval or pyriform (figs 52—55) with granular plasma or minute lipid droplets 2

1.* Papilla equal or almost equal in width to conidium (figs 56—80). Conidia not tapering towards base or only slightly narrower, cylindrical or fusiform with hyaline plasma generally not containing granules or lipid droplets (figs 1—50, 56—80) 4

2. Conidia pyriform, relative width 75—85%, granular plasma. Resting spores — azygospores up to 30 μ in diameter (Yen 1963). Parasite of tiger moth *Creatonotus gangis* L. (*Lepidoptera*: *Arctiidae*) caterpillars

Z. creatonotus (Yen) Batko (1964 c)

2.* Conidia elongated ovoid or elongated pyriform (figs 52—55), relative width mostly about 50%, plasma with numerous minute lipid droplets. Resting spores more than 30 μ in diameter. Parasite of adult calyptrate flies (*Diptera, Calyptrata*) 3

3. Resting spores — smooth azygospores

Z. americana (Thaxter) Batko (1964 c)

3.* Resting spores — zygospores with bullate exosporium (MacLeod 1956)

Z. bullata (Thaxter in Povah) Batko (1966 a)

4. Conidia up to 26 μ long 5

4.* Conidia mostly over 26 μ long 7

5. Conidia relative breadth over 50% (figs 60—65). Parasite of moths (*Lepidoptera*), chiefly of *Geometridae* family (Thaxter 1888)

Z. geometralis (Thaxter) Batko (1964 c)

5*. Conidia relative width 23—32% (figs 66—75) 6

6. Parasite of *Dermaptera*. Resting spores unknown (Giard 1899)

Z. forticulae (Giard) Batko (1964 c)

6.* Parasite of other insects. Resting spores — zygospores smooth and light coloured (Brefeld 1870, 1881)

Z. radicans (Brefeld) Batko (1964 b)

7. Conidia 37 μ long frequently with somewhat convex sides (figs 76—80). Parasite of beetles (*Coleoptera*) 8

7*. Conidia over 37 μ long, more slender, frequently with parallel sides (figs 1—50, 56—59). Parasite of aphids (*Homoptera*: *Aphidoidea*) . 9

8. Azygospores intramatrical (formed in the host's body), dark-brown, with finely creased or warted surface (Rostrup O. 1935, Arthur 1886, Garbowski 1927)

Z. phytonomi (Arthur) Batko (1964 c)

8*. Azygospores extramatrical, formed on stroma on surface of host's body (Raunkiaer 1893), light-brown, smooth

Z. nebriae (Raunkiaer) Batko (1966 a)

9. Conidia conical with pointed tips (figs 56—59) pseudocystidia also sharply ended. North America (Thaxter, 1888)

Z. occidentalis (Thaxter) Batko (1964 c)

9.* Conidia cylindrical sometimes curved with rounded tips (figs 1—50), pseudocystidia also rounded (figs 83 a, b).

Z. phalloides sp. nov.

According to the available information the ten species enumerated in the key exhaust for the present the subgenus *Zoophthora* in the interpretation adopted by the author (1966 a, c). The synonyms of these species has been elaborated in another publication, in press, it should only be mentioned here that *Entomophthora sphaerosperma* Fresenius = *Z. radicans* + *Z. forficulae* + *Z. phytonomi* (+ *Z. nebriae* ?); *Entomophthora aphrophorae* E. Rostrup (1896) is probably identical with *Entomophthora sphaerosperma cicadelliphaga* Turian (1957), whereas *Entomophthora* (*Tarichium*) *punctata* Garbowski and *E.* (*T.*) *coleopterorum* Petch are *Z. phytonomi*.

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Nowy dla Polski gatunek grzyba Zoophthora phalloides sp. nov.

Streszczenie

Praca zawiera opis nowego gatunku grzyba mszycobójczego z rodziny *Entomophthoraceae*, odkrytego w Białowieskim Parku Narodowym, *Zoophthora* (subg. *Zoophthora*) *phalloides* sp. nov.; odznacza się on dużymi, smukłymi konidiami o zaokrąglonym szczycie (fig. 1—50), czym różni się od znanych dotąd gatunków z rodzaju *Zoophthora* Batko (1964 b, c) i z podrodzaju typowego (Batko 1966 a). Autor podaje klucz do oznaczania 10 gatunków tworzących obecnie wymieniony podrodzaj.