

Two Entomopathogenic *Conidiobolus* Species First Observed on the Aphids in Korea

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진딧물에서 발견된 국내 미기록 곤충병원성 곰팡이 *Conidiobolus obscurus*와 *C. thromboides*에 관한 보고

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ABSTRACT: *Conidiobolus obscurus* and *C. thromboides* (Zygomycetes: Entomophthorales), aphid-attacking fungi, were found on the *Dactynotus* species (Homoptera: Aphididae) in June 1998 for the first time in Korea. They produce globose primary conidia typical to the genus *Conidiobolus* but their dimensions are clearly distinguished. *Conidiobolus thromboides* produces rhizoids and conidiophores with cylindrical constriction at their apices but *C. obscurus* does not form rhizoids or constricted conidiophores. Resting spores were not found in our specimens of both species, but their vegetative structures observed readily allowed identification.

KEYWORDS: Entomophthoraceous fungi, *Conidiobolus obscurus*, *C. thromboides*, *Dactynotus* species

The genus *Conidiobolus* Brefeld (Zygomycetes: Entomophthorales) is a morphologically complex genus. Collectively, the species exhibit various types of vegetative growth and spores. Mycelium initially coenocytic, and usually soon becomes divided into multinucleate segments, forming walled, elongate hyphal bodies. Conidiophores are unbranched, and primary conidia are globose to pyriform with rounded apex and prominent papilla. Secondary conidia are forcibly discharged by papilla eversion, resembling primaries (King, 1975).

Most species of *Conidiobolus* are saprophytes but three species including *C. obscurus* (Hall & Dunn) Remaudière & Keller, *C. thromboides* Drechsler, *C. coronatus* (Costantin) Batko, have been regarded as major entomopathogens (Humber, 1997). In particular, *C. obscurus* and *C. thromboides* have received much attention because they infect a broad range of aphid species, and grow readily in axenic culture (Humber, 1997; King, 1975). Accordingly, much attempts are being made in many countries to isolate and select the most pathogenic indigenous isolate for development of microbial insecticide. However, occurrence of *C. obscurus* and *C. thromboides* in Korea has never been reported despite of their potential use as microbial insecticides.

An infectious disease affecting aphids (*Dactynotus* sp.)

was encountered on the horseweeds at National Institute of Agricultural Science and Technology (NIAST) during June 1998. A close examination revealed entomophthoroses, with conidial stage present. Dead cadavers were collected, and prepared for microscopic examination on glass slides in a drop of lactophenol by heating them gently. The entomophthoraceous fungi were identified on the basis of anamorphic characteristics.

Our microscopic examination indicated the entomophthoroses were stemmed from the two *Conidiobolus* species, *C. obscurus* and *C. thromboides*. Both species were morphologically in a close affinity to each other. However, differences in the shape and dimensions of the primary conidia easily differentiate both species. Herein, anamorphic appearances of *C. obscurus* and *C. thromboides*, first observed in Korea, were described and illustrated on the basis of the collected specimens.

Descriptions of Species

1. *Conidiobolus obscurus* (Hall & Dunn) Remaudière & Keller, *Mycotaxon* 11: 331, 1980; Hall & Dunn, *Hilgardia* 27: 159, 1957 (Fig. 1).

Aphids killed by *C. obscurus* are held to the horseweeds by their proboscis and rhizoids are absent. The conidiophores are simple and unbranched (Fig. 1A). The primary conidia are globose and unitunicate with .hemi-

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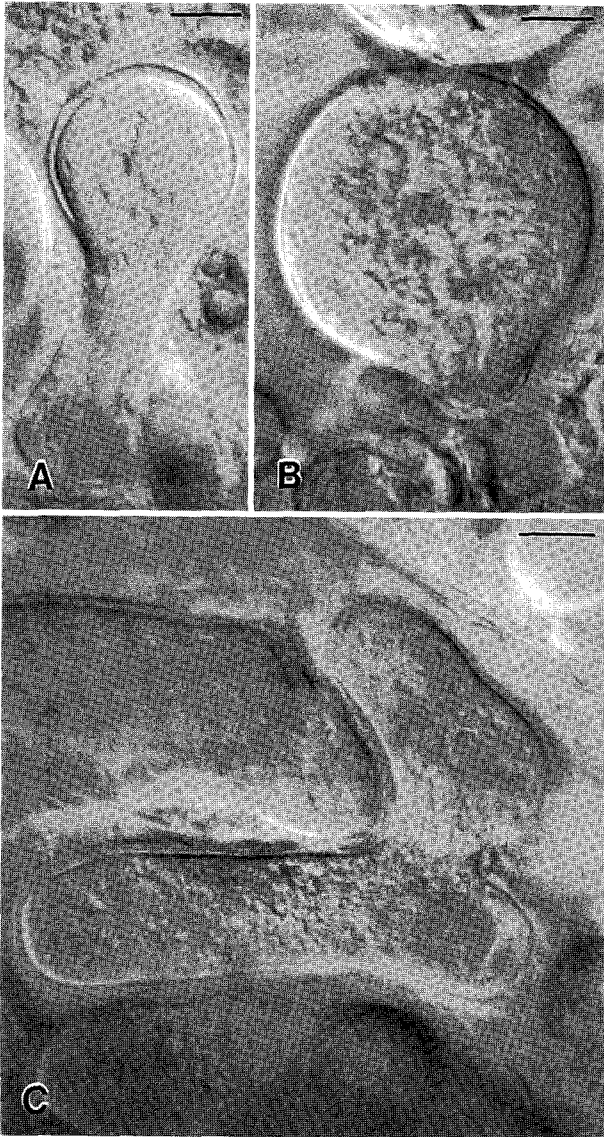


Fig. 1. (A) Simple and unbranched conidiophore with a immature primary conidium. (B) Globose and unitunicate primary conidium with a hemispherical papillar. (C) Hyphal bodies with a distinctly undulating margin. All bars in figures=10 μ m.

spherical papillar (Fig. 1B), measuring 32-38.5 μ m diameter (average 35.44 μ m). Only a few primary conidia were formed on surface of aphid cadavers. Nuclei are usually inconspicuous by light microscopy, and rarely stained by aceto-orcein. No capilliconidia or microconidia are formed. The hyphal bodies are curved, branched with a distinctly undulating margin (Fig. 1C), measuring 12-22 μ m thick (average 18.16 μ m). The resting spores were not observed in our specimens.

This species has a broad range of aphid species, including *Dactynotus* species, *Acyrtosiphon kondoi*, *A. pisum*, *Teroaphis trifolii* f. *maculata*, *Myzus persicae*, *M. ornatus*, *Macrosiphum rosae* (Milner *et al.*, 1980). Due to ready growth and broad host range, this fungus deserves

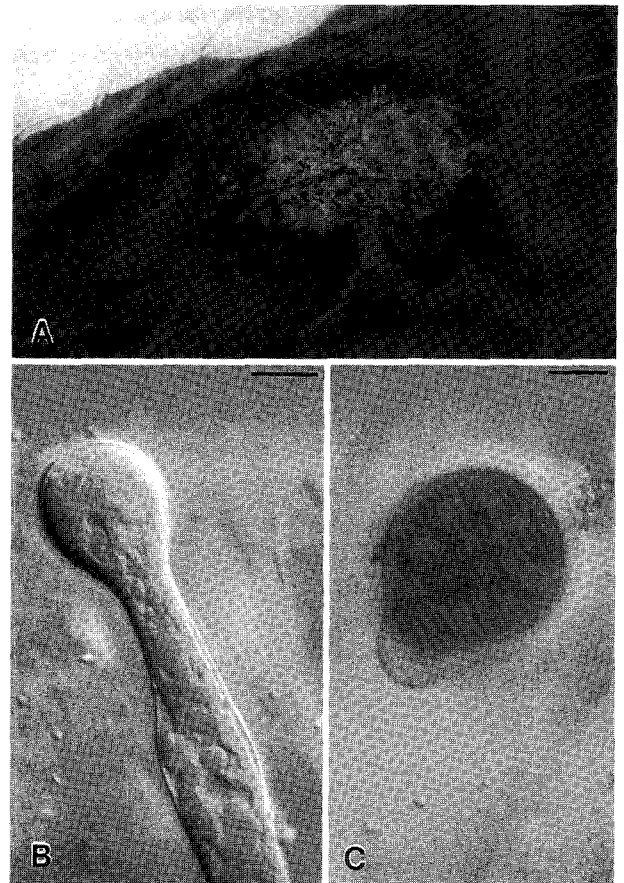


Fig. 2. (A) Aphid cadaver killed by *Conidiobolus thromboides*, with fuzzy surface. Bar=200 μ m. (B) Simple and unbranched conidiophore with constriction at its apex. Bar=10 μ m. (C) Globose primary conidium containing a conspicuous, clear nucleoplasm surrounded by a layer of hyaline protoplasm (stained by aceto-orcein). Bar=10 μ m.

further research for use as a microbial insecticide.

2. *Conidiobolus thromboides* Drechsler, *J. Wash. Acad. Sci.* 43: 38, 1953 (Fig. 2).

Aphid cadavers killed by *C. thromboides* are characteristically held to the horseweeds by their rhizoids. The entire surface of host is fuzzy because of noncontiguous hyphae (Fig. 2A). Hyphae are moderately branched, measuring 8-14 μ m thick (average 10.49 μ m). Conidiophores are simple, unbranched with constrictions at their apices, producing single conidia (Fig. 2B). The primary conidia (19-30 μ m diameter; average 26.32 μ m) are globose, containing a conspicuous, clear nucleoplasm surrounded by a layer of hyaline protoplasm (Fig. 2C). Papillar tapers, merging gradually with contour of conidia. No capilliconidia or microconidia are formed. The resting spores were not observed in our specimens.

This species has similar microscopic morphology with *C. obscurus*. However, close examination reveals clear distinction between the two species. The primary conidial

size of *C. obscurus* is even larger than that of *C. thromboides*. Another differing feature is that *C. thromboides* produces rhizoids and conidiophores with cylindrical constriction at their apices but *C. obscurus* does not form rhizoids or constricted conidiophores. Like *C. obscurus*, this species has a broad host range of aphid species, and readily grow on nutritionally simple culture media, with the potential as a microbial insecticide.

적 요

국내 미기록 진딧물병원성 곰팡이, *Conidiobolus obscurus*와 *C. thromboides*를 1998년 6월경 수원 농업과학기술원내의 망초에 서식하는 진딧물 (*Dactynotus* sp.)에서 발견하였다. 두 종은 *Conidiobolus*속 곰팡이의 전형적인 둥근 모양의 1차포자를 형성하며 전반적으로 유사한 형태를 나타내었다. 하지만 *C. obscurus*의 1차포자 크기는 *C. thromboides*의 것보다 월등히 큰 것으로 나타났다. 또한 *C. thromboides*는 rhizoid를 형성하며 분생자병이 점차적으로 가늘어지나 *C. obscurus*는 rhizoid를 형성하지 못하

며 일정한 굵기의 분생자병을 만드는 것이 뚜렷한 차이점이었다.

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