

Notes on Three Species of the Genus *Euphoriomyces* (Laboulbeniales) from Korea

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Three species of the genus *Euphoriomyces* (Laboulbeniales) were found newly from Korea. *E. agathidii* (Maire) Tavales was collected from *Agathidium* sp. (Leiodidae, Coleoptera). The characteristic traits of this species are the distal portion of the primary axis composed of 5–11 superposed layers and bearing more or less the elongated appendages. *E. cybocephali* (Thaxter) Thaxter was collected from *Pseudocolenis hilleri* Reitter (Leiodidae, Coleoptera). The primary axis of this species composed of 5–9 superposed layers is simple, not branched and a single antheridium occurs on the apex of the secondary axis. *E. sugiyamae* Majewski was collected from *Scaphisoma rufum* Achard (Scaphidiidae, Coleoptera). This species is very unique in having the antheridia formed as coner cells with lateral necks.

KEYWORDS: *Euphoriomyces*, Korea, Laboulbeniales (Ascomycota)

So far 15 species of the genus *Euphoriomyces* have been described by Tavales (1985), Majewski (1981, 1986, 1988, 1994, 1999), Thaxter (1931), Santamaria (1991, 1992). Eight species (included two species also found from Africa and Asia) have been found in Europe, four in Asia, three in America and two in Africa. In Asian species, two species have been reported from Sri Lanka (Thaxter, 1915, 1931), one from Sumatra (Thaxter, 1931) and one from Japan (Majewski, 1988), but no species of the genus *Euphoriomyces* have been reported from Korea as far. The host insects of them have been known from the five families of the Coleoptera. Ten species parasitize Leiodidae, two species occur on Ciidae, one on Cybocephalidae, one on Endomychidae and one on Staphylinidae. In this paper, three species of the genus *Euphoriomyces* and their host insects will be reported and described from Korea. They are new to Korea.

Description of Species

Key to the species of genus *Euphoriomyces*

1. Perithecia, antheridia and axis of receptacle produced at the second or third layer of receptacle
..... *Euphoriomyces agathidii*
- 1'. Perithecia, antheridia and axis of receptacle produced on the third layer of receptacle 2
2. Thallus with a single perithecium, antheridium and only the primary axes without appendages
..... *Euphoriomyces cybocephali*
- 2'. Thallus with 2–3 perithecia, antheridia formed as

coner cells of the distal receptacle and composed of 2–3 axis with a few appendages
..... *Euphoriomyces sugiyamae*

1. *Euphoriomyces agathidii* (Maire) Tavales. *Mycologia Memoir* 9: 218, 1985; Majewski, *Polish Botanical Studies* 7: 169, 1994; Santamaria, *Revista Iberoamericana de Mycologia* 8: 45, 1991.

Ectinomyces agathidii Maire. *Bull. Soc. Hist. Nat. Afrique Nord.* 11: 156, 1920.

Asaphomyces agathidii (Maire) Scheloske, *Parasitol. Schriftenreihe* 19: 92, 1969. (Fig. 1, 4)

Monoecious. Thallus hyaline yellowish. Total length to the top of the perithecium (up to the upper most perithecium) 85–117 μm . Receptacle axis (up to the third cell bearing perithecia) 35–38 \times 15–35 μm (included the foot); cell I obtriangular, cell II about two times broader than length, cell III up to the three times broader than length; except for the cell I, most of the cells cut off, unilaterally or bilaterally, isodiametric basal cells of secondary antheridial branchlets or inflated stalk cells of perithecia; the primary axis is a prolongation of receptacle, usually simply once branched on the fourth or fifth cell, consisting of 5–11 superposed cells (except for the three cells of receptacle), its distal cell bears one or two phialides proliferated into short branchlets; secondary lateral branchlets short, each with 1–2 terminal phialides which proliferate.

Perithecia composed of the stalk cell and the perithecium proper, produced unilaterally or bilaterally usually between the second and the fourth cell of the main axes, 1–3 in number, ovate or elongated cylindrical, with narrowed subapical part, the apical protruding cell indistinct;

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the perithecium proper $40\text{--}65 \times 13\text{--}20 \mu\text{m}$; the stalk cell nearly isodiametric, $10 \times 10 \mu\text{m}$.

Host genera: *Agathidium* and *Amphicyllis* (Leiodidae, Coleoptera)

Host Species in Korea: *Agathidium* sp.

Distribution: Germany, North Africa, Spain, and South Korea

Specimens examined: Youngsil, Mt. Halla, Jeju Island, 13 July, 1997, L-Y-1445-1, 1445-2 and 1445-3

This species is very similar to *E. rossii*, from which it is distinguished by the larger thalli and primary axis composed of some more cells than the latter. Thalli were collected from elytra, metasternum, abdomen and legs of host insects living on *Russula densifolia* (Russulaceae, Agaricales) in the deciduous broad-leaved trees forest.

2. *Euphoriomyces cybocephali* (Thaxter) Thaxter. Mem.

Amer. Acad. Arts Sci. 16: 309, 1931; Santamaria, Revista Iberoamericana de Micologia 8: 47, 1991; *Stichomyces cybocephali* Thaxter. Proc. Amer. Acad. Arts Sci. 51: 42, 1915 (Fig. 2, 5)

Monoecious. Thallus hyaline yellowish. Total length to the top of the perithecium $65\text{--}68 \mu\text{m}$. Receptacle (primary axis) consisting of the basal and distal portions; the basal portion composed of three superposed cells, $25 \times 13 \mu\text{m}$; cell I obtriangular, narrower towards the basal portion, broader towards the distal portion; cell II flattened, isodiametric; cell III the largest and broadest to the others; the distal portion of the receptacle (primary axis) consisting of usually 5-9 superposed cells, divided unilaterally into two cells at the lower portion (usually from second to fifth layer except for the basal portion of receptacle); the secondary axis bearing unilaterally on the third cell of the receptacle, composed of the stalk cell and the antheridium proper; the antheridium proper nearly flask-

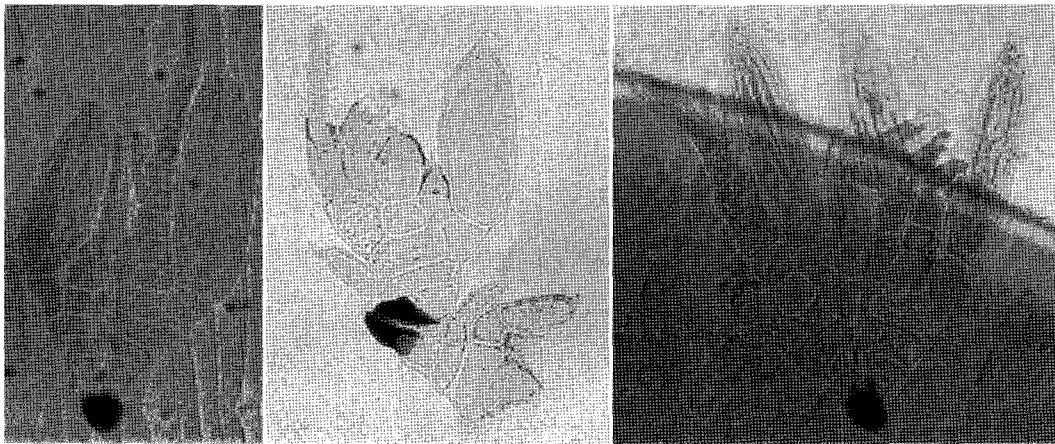


Fig. 1. *Euphoriomyces agathidii* Scale $50 \mu\text{m}$.

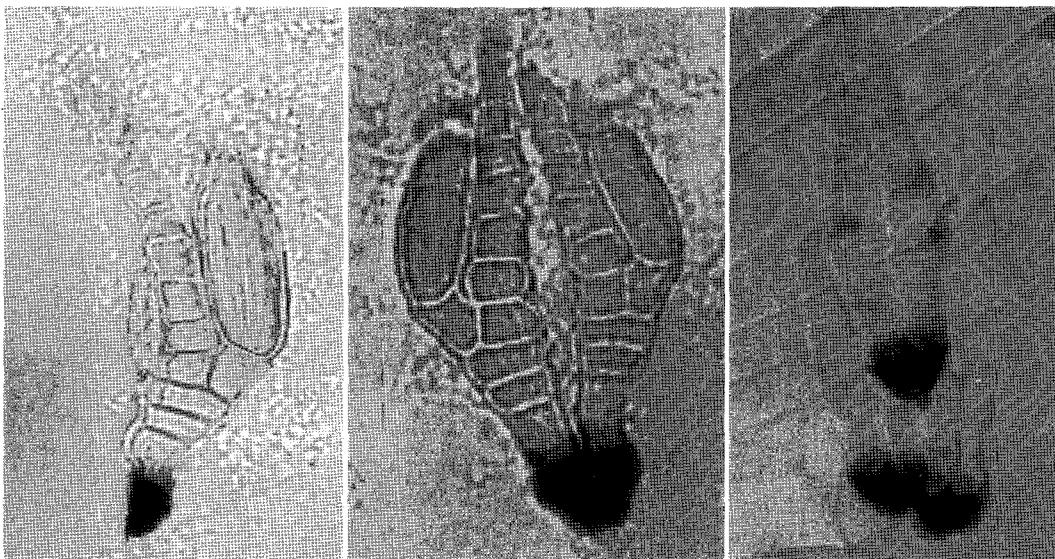


Fig. 2. *Euphoriomyces cybocephali* Scale $50 \mu\text{m}$.

shaped, $20 \times 4 \mu\text{m}$; the stalk cell $3 \times 5 \mu\text{m}$.

Perithecium composed of the stalk cell and the perithecium proper; perithecium proper elongated cylindrical or ovate, only one in number, $38\text{--}40 \times 10 \mu\text{m}$; the stalk cell $10 \times 7 \mu\text{m}$.

Host genera: *Cybocephalus* (Cybocephalidae) and *Pseudocolenis* (Leiodidae), all Coleoptera.

Host species in Korea: *Pseudocolenis hilleri* Reitter (known newly from Korea).

Distribution: South Korea and Sri Lanka.

Specimens examined: Mt. Jiri, Euongmojeong, Gyeongnam Province, 29 July, 1997. L-Y-1401-1, 1401-2, 1401-3, 1401-4 and 1401-5.

The present species is closely related to *E. cioideus*, but it differs from following features; in *E. cybocephali* the primary axis are composed of 5~9 superposed cells and not branched, whereas in *E. cioideus* they are composed of 8~10 superposed cells and one or two appendages are branched at the distal portion.

Thaxter's materials (1931) showed two kinds of specimens having the primary (Thaxter, 1931, Fig. 12~13) and the secondary axis (Thaxter, 1931, Fig. 14). Korean

materials are nearly agreed with his representatives, although the length of primary axis are longer than those of Thaxter. They are identified to *E. cybocephali*, because of the structures of cells and the figures of thalli are closely related to the latter. Host insects were caught in a mountain forest with *Quercus mongolica* (Fagaceae) on *Suilus grevillei* (polyporaceae). This species have been found only on the genus *Cybocephalus* as far, but Korean materials have been collected newly from the genus *Pseudocolenis*. Thalli occurred on various parts of the host body.

3. *Euphoriomyces sugiyamae* Majewski, Trans. Mycol. Soc. Japan 29: 37, 1988; Santamaria, Revista Iberoamericana de Micologia 8: 49, 1991 (Fig. 3, 6)

Thallus hyaline yellowish. Total length to the top of the highest perithecium $110\text{--}118 \mu\text{m}$. The axis of the receptacle and primary appendages consist of 9~13 superposed cells that are slightly elongated or (except for the basal cell) flattened; the receptacle gradually broadens to the third cell; the higher situated cells are narrower and of nearly the same breadth. The fourth cell of the receptacle

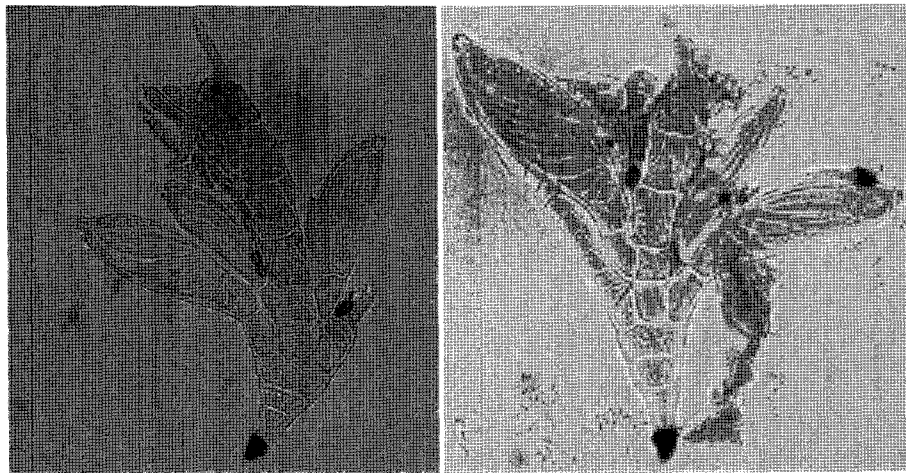


Fig. 3. *Euphoriomyces sugiyamae* Scale $50 \mu\text{m}$.

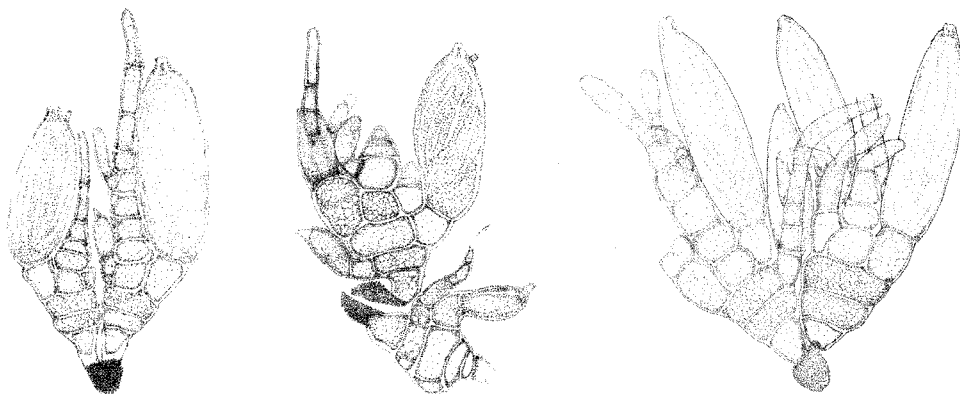


Fig. 4. *Euphoriomyces agathidii* Scale $50 \mu\text{m}$.

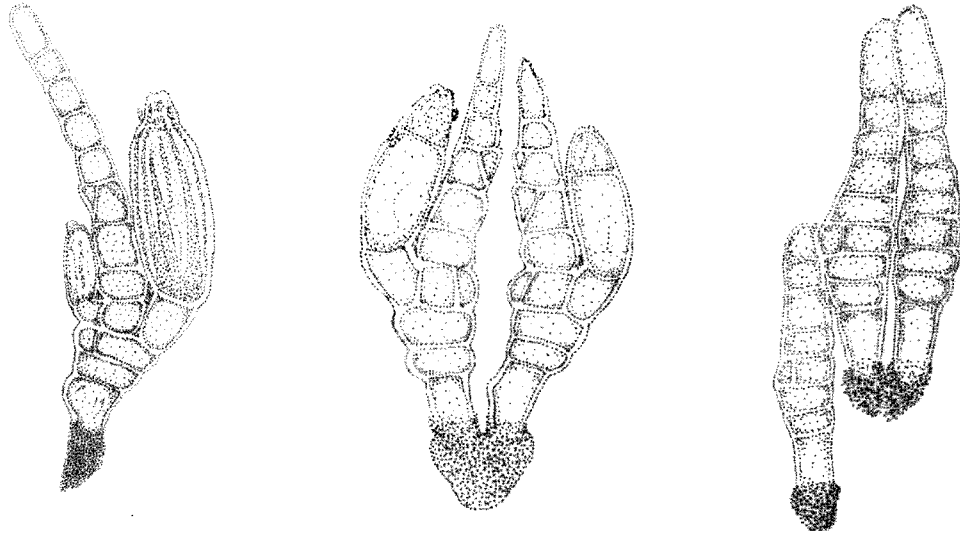


Fig. 5. *Euphoriomyces cybocephali* Scale 50 μm .

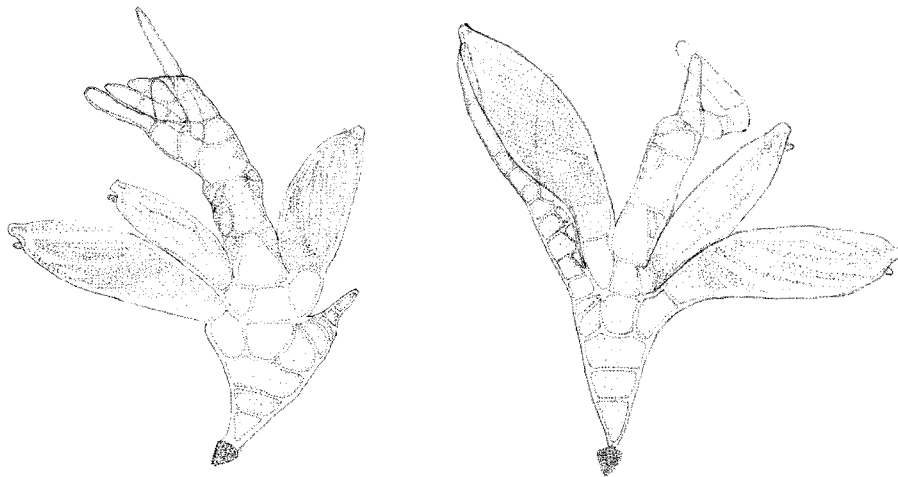


Fig. 6. *Euphoriomyces sugiyamae* Scale 50 μm .

divides, laterally separating on one or both side the stalk cell of the perithecium and on the other the basal cell of the secondary appendage; Antheridia directed upwards, arranged in one row, are separated in the upper corner of 3~5 distal cells of the receptacle. A few long branchalets (up to 56 μm long) arise from the distal cell of the receptacle. The secondary appendage resembles the parallel distal part of the receptacle, but is usually made up of somewhat more narrow cells.

The stalk cell of the perithecium slightly elongated, basal cells obvious. The perithecia almost cylindrical elongate, 1~3 in number, 53~68 \times 14~23 μm ; the apex narrows fairly abruptly to a narrow rounded top; one side of the subapex with a projecting part.

Host genera: *Pseudocolenis* (Coleoptera, Leiodidae) and *Scaphisoma* (Coleoptera, Scaphidiidae), (known newly from Korea)

Host Species in Korea: *Scaphisoma rufum* Achard

Distribution: Japan and South Korea

Specimens examined: near Temple Hwaem, Mt. Jiri Guryegun, Jeonnam province, 20 July, 1998, L-Y-2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011 and 2013

This species is very unique in having the antheridia formed as corner cells with lateral necks and the receptacle composed of the unicells from the basal cell to the third cell. Although the present species should be included in the genus *Carpophoromyces* according to personal information from Dr. I. Tavares (Majewski, 1994), in this paper it is described to the genus *Euphoriomyces*.

The specimens of this species were found newly on *Scaphisoma rufum* in a valley forest with *Quercus variabilis* (Fagaceae). Thalli bears on the pronotum abdomen, sternites and elytra of the host insects.

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