

Study on the *Laboulbeniales* Parasited on Aquatic *Coleoptera* in Korea

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한국의 수서갑충에 기생하는 라블베니아균류에 관한 연구

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ABSTRACT: Three species of the genus *Chitonomyces* and one species of the *Autoicomycetes* (*Laboulbeniales*, *Ascomycotina*) were newly added to the flora of Korea. They were *Autoicomycetes bicornis* Thaxter, *Chitonomyces chinensis* Thaxter, *Chitonomyces melanurus* Peyritsch and *Chitonomyces paradoxus* (Peyritsch) Thaxter. Descriptions of all species of the *Laboulbeniales* collected in this country, including their host insects and distribution, were given in this paper.

KEYWORDS: *Autoicomycetes*, *Chitonomyces*, *Laboulbeniales*, Aquatic insects.

Key to the Korean species of the genus *Autoicomycetes* and *Chitonomyces*.

1. Perithecium with from one to three projections variably developed from its upper wall-cells: projection consisting of a simple series of superposed cells *Autoicomycetes bicornis*
1. Perithecium without projection or with from one to three projections: projection unicellular *Chitonomyces*
 2. Receptacle opaque and blackish the distal portion..... *Chitonomyces melanurus*
 2. Receptacle hyaline or yellowish the distal portion.
 3. Perithecial projection partly opaque and blackish: perithecium proper united with the receptacle on the lateral side, basal portion of the receptacle blackened *Chitonomyces chinensis*
 3. Perithecial projection hyaline or yellowish, concolorous with the perithecial venter: thallus hatchet-shaped, stout, perithecial projection stout, conical, on the tip of the perithecium *Chitonomyces paradoxus*

Enumeration of Species

1. *Autoicomycetes bicornis* Thaxter, Mem.Amer.Acad.Arts Sci. 16: 356 (1931)

Total length to the tip of perithecium exclusive of the apical projection, 308 μ m long, 66 μ m thick. Thallus pale yellowish, partly brownish, consisting of a receptacle and a perithecium. Receptacle pale yellowish, comprising the basal and distal portions, 132 μ m long, 60 μ m thick; the basal portion cylindrical, slight-

ly tapering towards the basal end, composed of basal cell and three flat superimposed cells, forming basally a conical large blackish foot, 132 μ m long, 60 μ m thick; the distal portion gradually tapering towards the distal end, 113 μ m long, 23 μ m thick.

Perithecium more darkly brownish, suffused than the receptacle, ellipsoidal, consisting of eight layers of wall-cells, forming two long projections at both the anterior and posterior sides of subterminal portion, 172 μ m long, 67 μ m thick;

the perithecial projection cylindrical, comprising 16 superimposed cells, curved strongly outwards, gradually tapering towards the distal end, 264 μm long, 32 μm thick. Antheridium not observed.

Host genera: *Berosus* (*Hydrophilidae*), *Laccobius* (*Hydrophilidae*)

Host species in Korea: *Laccobius bedeli* Sharp

Distribution: Argentina, Belgrano, Buenos Aires, Korea (new record), Parlermo

Specimen examined: A storing reservoir of chiwon dong, Kwangju City, Korea, October 8, 1988, L-Y-0459. This fungus species is similar to *A. herocharalis* Thaxter in having two perithecial projections and size. However the present species is distinguished from *A. herocharalis* by simple perithecial projections. The specimen were collected on the left leg at the prothorax of host insect.

2. *Chitonomyces chinensis* Thaxter, Mem. Amer. Acad. Arts Sci. 14: 405 (1924) & 15: 517 (1926); Sugiyama, Trans. Mycol. Soc. Japan 18: 157 (1977) Sugiyama & Hayama, Trans. Mycol. Soc. Japan 22: 189 (1981); Sugiyama & Phanichapol, Nat. Hist. Bull. Siam Soc. 32: 52 (1984); Sugiyama & Nagasawa, Trans. Mycol. Japan 26: 4 (1985).

Thallus hyaline, suffused with yellow-brown, partly blackish and opaque, 225-232 μm long, 50-53 μm thick. Receptacle cylindrical, gently curved posteriorly through the entire length, consisting of the basal and distal portion, 53 μm long, 37-40 μm thick; the thallus, composed of one-celled layers; the first layer about twice longer than thick, and blackish gradually becoming thicker towards the distal end, more or less bent posteriorly, 40-45 μm long, 32 μm thick; the second layer flat, more than three times thicker than long, wholly hyaline and yellowish, partly suffused with brown, 8-13 μm long, 37-40 μm thick; the distal portion of receptacle consisting of four layer composed of cells, 153-158 μm long, 26-29 μm thick; the first layers of composed of two cells arranged side by side, partitioned with an oblique septum, 18-24 μm long, 26-29 μm thick; the second layer one-celled cylindrical, more or less tapering towards the basal end, separated from the posterior cell of

first layer by an oblique septum, 69-74 μm long, 11-13 μm thick; the third layer composed of two cells arranged antero-posteriorly 45-50 μm long, 11 μm thick; anterior cell projecting obliquely upwards to from a conical prominence; the fourth layer one-celled, bell-shaped, placed obliquely on the posterior cell of the third layer, 29-32 μm long, 13 μm thick.

Perithecium yellowish-brown except for the distal projection which is blackish and opaque, comprising a perithecial stalk, perithecium proper and basal and distal projections, 122-132 μm long, 37-42 μm thick; the stalk one-celled, formed besides the anterior side of the first layer of the distal portion of receptacle, united to it, subtriangular when viewed laterally, often forming distally a small brownish conical projection, 18 μm long, 8 μm thick; the perithecium proper cylindrical, more or less becoming thinner towards both the basal and distal ends, rounded terminally, united laterally to the second and third layers of the distal portion of the receptacle, forming terminally a blackish horn-shaped projection, 106 μm long, 37-42 μm thick; the projection curved posteriorly beyond the distal pore of the perithecium and over the distal end of the receptacle, 29-32 μm long, 8-11 μm thick.

Host genus: *Laccophilus* (*Dytiscidae*)

Host species in Korea: *Laccophilus difficilis* Sharp.

Distribution: Borneo, China, Formosa, Japan, Korea (new record) and Thailand

Specimens examined: Taechon dong, Kwangju City, October, 8, 1988, L-Y-0463, L-Y-0466

This species is characterized by the blackish, horn-shaped distal projection of the perithecium and by the broadly blackened basal portion of the receptacle. It is similar to *C. paradoxus* (Peyritsch) in having a perithecial projection. However, these two species are distinguished in that perithecial projection of *C. chinensis* is blackened and strongly curved, while that of *C. paradoxus* is hyaline and not strongly curved. The specimens were found on the middle portion of abdominal margin at the hosts.

3. *Chitonomyces melanurus* Peyritsch. Sitzungsber. Kais. Acad. Wiss. Math. Naturwiss. Kl. 68(1): 251 (1873); Thaxter, Mem. Amer. Acad.

Arts Sci. 12: 289 (1986) & 14: 4055 (1924); Spegazzini, An. Mus. nac. Hist. Nat. Buenos Aires 27: 47 (1915); J. and W. Siemaszko, Polskie Pismo. Entomol. 12: 122 (1983); Sugiyama, Ginkgoana 2: 24 (1973); & Trans. Mycol. Soc. Japan 18: 158 (1977); Sugiyama and Hayama, Trans. Mycol. Soc. Japan 22: 192 (1981); Sugiyama & Nagasawa, Trans. Mycol. Soc. Japan 26: 9 (1985).

Thallus hyaline with tint of yellowish brown except for some basal and distal portions which are blackish and opaque 132-168 μm long, 24-32 μm thick. Receptacle cylindrical, consisting of the basal and distal portions, 122-159 μm long, 11-13 μm thick; the basal portion composed of two one-cell layers, 21-32 μm long, 11-13 μm thick; the first layer forming basally a blackish obconical foot, 11-13 μm long, 8-11 μm thick; the second layer approximately as long and thick as the first, 11-21 μm long, 11-13 μm thick; the distal portion consisting of four layers which consist of one or two cells, 103-127 μm long, 9-12 μm thick; the first layer comprising two cells separated by an oblique septum and often placed almost above and below, 11-21 μm long 9-12 μm thick; the second layer one-celled, long and slender 34-40 μm long, 7-8 μm thick; the third layer comprising two cells separated antero-posteriorly by an oblique septum, 21-32 μm long, 7-11 μm thick; the anterior cell hyaline, projection distally forming a small conical projection; the posterior cell wholly blackened; the fourth layer wholly blackened in common with the posterior cell of the third layer, horn-shaped, strongly curled posteriorly 29-40 μm long, 7-9 μm thick.

Perithecium concolorous with the lower portion of the receptacle cylindrical, consisting of a one-celled stalk, perithecium proper and two subterminal projections 71-98 μm long, 16-21 μm thick; the stalk very small, formed obliquely above the first layer of the distal portion of receptacle, 13-16 μm long, 3-5 μm thick; the perithecium proper united to the second and third layers of the distal portion of receptacle in the posterior side, tapering towards the thinly rounded termination at distal portion. 66-87 μm long, 16-21 μm thick; the projections

formed on the anterior and posterior sides of subapical portion of perithecium proper beneath the lip cells, anterior portion, 18-26 μm long, 5-8 μm thick and posterior portion, 16-21 μm long, 5-11 μm thick.

Host genus: *Laccophilus* (*Dytiscidae*)

Host species in Korea: *Laccophilus difficilis* Sharp.

Distribution: Africa, Borneo, China, Europe, Japan, Java, Korea (new record), Sumatra, Taiwan, and Thailand.

Specimens examined: Taechon dong, Kwangju City, October, 8, 1988, L-Y-0460, L-Y-0461, L-Y-0462, L-Y-0465, L-Y-0468, L-Y-0473

This species is characterized by the strongly curved, blackish termination of its receptacle and two subterminal projection on its perithecium. This species is similar to *C. intermedius* Thaxter *C. javanicus*, *C. helicofer* Thaxter and *C. japonensis* Thaxter in its general appearance, but is distinguishable from the former two species by the strongly curved termination of its receptacle and from *C. helicofer* by the wholly opaque termination of its receptacle. This species also is distinguished from *C. japonensis* by the short anterior projection of its perithecium which does not exceed the top of the perithecium.

4. *Chitonomyces paradoxus* (Peyritsch) Thaxter. Proc. Amer. Acad. Arts Sci. 27: 32 (1982), Mem. Amer. Acad. Arts Sci. 14: 406 (1924); Picard, Bull. Soc. Mycol. France 29: 515 (1931); Spegazzini, An. Mus. Nac. Hist. Nat. Buenos Aires 27: 47 (1915); Sugiyama, Ginkgoana 2: 24 (1973); Sugiyama and Phanichapol, Nat. Hist. Bull. Siam Soc. 31: 63. (1984); Sugiyama & Nagasawa, Trans. Mycol. Soc. Japan 26: 9 (1985); *Heimatomyces paradoxus* Peyritsch, Sitzungsber, Kaiserl, Acad. Wissensch. Math-Naturwissensch, Klasse 68: 251 (1873).

Thallus hyaline with tint of yellowish-brown, hatchet-shaped, stout; 172-180 μm long, 53-58 μm thick. Receptacle composed of basal and distal portions, 159 μm long, 24-26 μm thick: the basal portion included in blackish suffusion, composed of two one-cell layers, tapering towards the pointed tip of the basal obconical foot, 34-40 μm long, 24-26 μm thick;

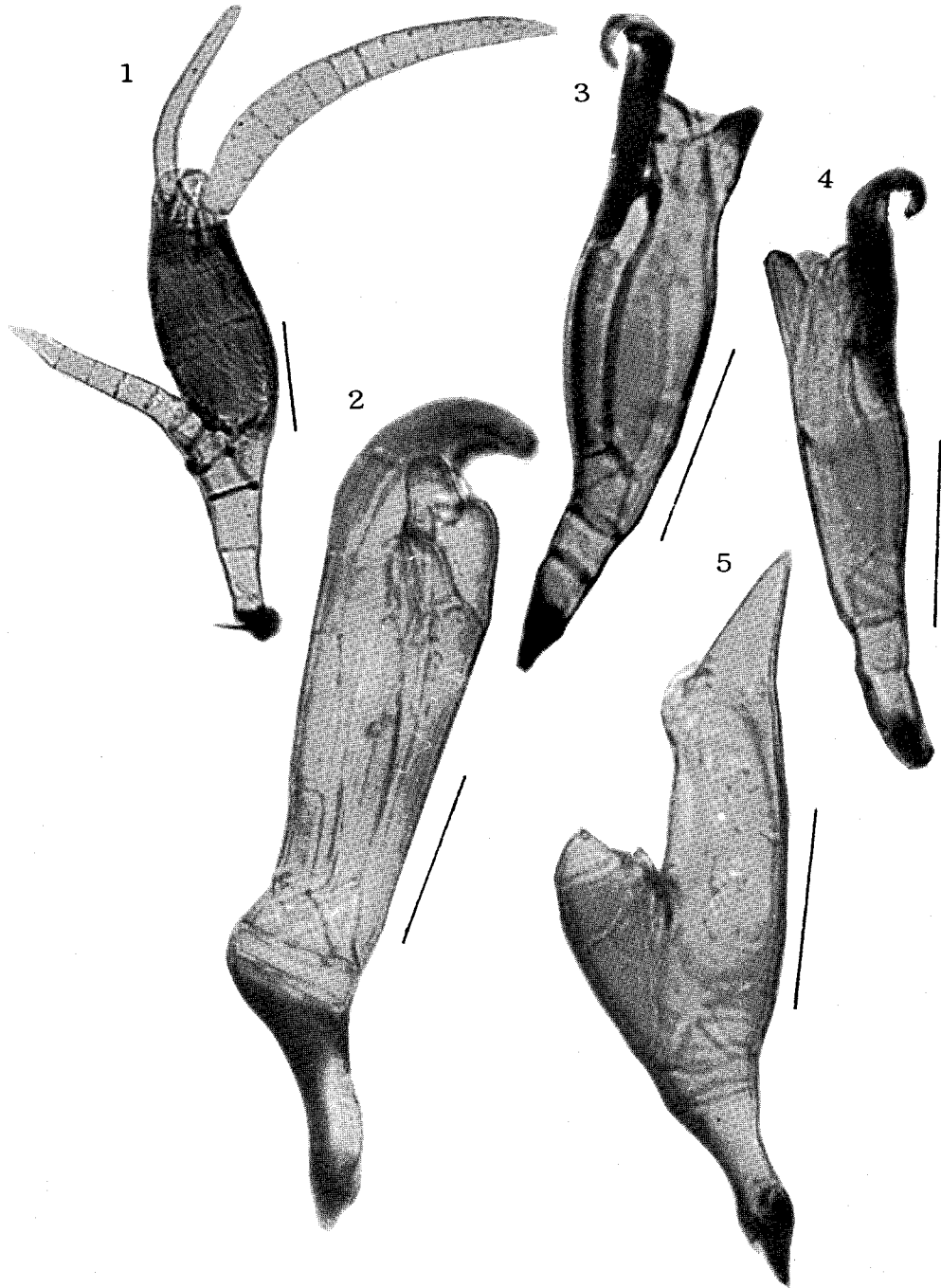


Fig. 1. *Autoicomyces biocornis* Thaxter on *Laccobius bedeli* Sharp. scale: 50 μ m
Fig. 2. *Chitonomyces chinensis* Thaxter on *Laccophilus difficilis* Sharp. scale: 50 μ m
Fig. 3-4. *Chitonomyces melanurus* Peyritsch on *Laccophilus difficilis* Sharp. scale: 50 μ m
Fig. 5. *Chitonomyces paradoxus* (Peyritsch) Thaxter on *Laccophilus difficilis* Sharp. scale: 50 μ m

the first layer blackish; opaque except the anterior side of the upper portion, 24-26 μm long, 20-21 μm thick; the second layer flat, 11-13 μm long, 24-26 μm thick; the distal portion of receptacle cylindrical, almost wholly hyaline, comprising four layers of cells, 119-124 μm long, 18 μm thick; the first layer consisting of two cells arranged antero-posteriorly and separated from each other by an oblique septum, 8-13 μm long 18 μm thick; the second layer long and slender, formed above the posterior cell of the first one, 40-45 μm long, 16-24 μm thick; the third layer comprising two cells arranged antero-posteriorly and separated from each other by an oblique septum, 13-18 μm long, 16-21 μm thick; the fourth layer one-celled, formed above the posterior cell of the third layer bell-shaped, 11-13 μm long, 13 μm thick.

Perithecium composed of a stalk, perithecium proper and an apical projection, 119-122 μm long, 29-34 μm thick; the stalk one celled, formed above the second layer of the basal portion of receptacle, united to the anterior cell of the first layer of the distal portion of receptacle on lateral side, 8-11 μm long, 13-18 μm thick; the perithecium, proper ellipsoidal, united to the second and third layers of the distal portion of receptacle on the posterior side, forming a large conical projection beside the pore of the perithecium 74-77 μm long, 29-34 μm thick; the projection more or less curved anteriorly, pointed at termination.

Host genus: *Laccophilus* (*Dytiscidae*)

Host species in Korea: *Laccophilus difficilis* Sharp.

Distribution: Borneo, Europe, Formosa, Japan, Korean (new record), Sumatra, Taiwan, Tailand and U.S.A.

Specimens examined: Taechon dong, Kwangju City, October, 8, 1988, L-Y-0462, L-Y-0464

This fungal species is characterized by a stout subsigmoidal thallus and a long lateral projection of the receptacle. Similar projections are found in allied two species, *C. italicus* Spegazzini and *C. spinosus* Thaxter. However, the apex of the projection is branched in *C. italicus* and curved upwards at right angle in *C. spinosus*.

摘 要

1988년 3월부터 1988년 9월까지 한국의 남부지방을 중심으로 수생갑충을 채집하여 라블베니아 균류의 기생여부를 조사한 결과 2속 4종의 미기록종을 발견하였기에 다음과 같이 보고하고자 한다.

Autoicomycetes bicornis Thaxter

Chitonomyces chinensis Thaxter

Chitonomyces melanurus Peyritsch

Chitonomyces paradoxus (Peyritsch) Thaxter

이들 표본은 모두 조선대학교 사범대학 생물교육학과 연구실에 보관되어 있음.

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