

## Notes on the Laboulbeniales Collected in Korea —Species from the Cheju Island—

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### 韓國에서 採集된 Laboulbenia 菌類에 관하여

—濟州地域을 中心으로—

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**ABSTRACT:** The Seven Species under three genera of the Laboulbeniales collected from September 1993 to August 1994 in Cheju Island. They are as follows; *Chitonomyces Chinensis* Thaxter on *Laccophilus difficilis* Sharp (Dytiscidae, Coleoptera), *C. melanurus* Peyritsch on *Laccophilus difficilis* Sharp, (Dytiscidae, Coleoptera), *C. Paradoxus* (Peyritsch) Thaxter on *Laccophilus difficilis* Sharp, (Dytiscidae, Coleoptera), *Laboulbenia exigua* Thaxter on *Haplochlaenius costiger* (chaudoir), (Carabidae, Coleoptera) *L. flagellata* Peyritsch on *Harpalus roninus* Bates, (Carabidae, Coleoptera), *L. vulgaris* Peyri-tsch on *Bembidion oxyglomma* Bates, *B. scopulinum* Kirby, (Carabidae, Coleoptera) and *Rickia ancylopi* Thaxter on *Ancylopus melanocephalus* Oliver, (Endomychidae, Coleoptera).

**KEYWORDS:** *Chitonomyces*, *Laboulbenia*, *Rickia*, Laboulbeniales, Cheju Island, Korea

The Laboulbeniales is a highly specialized fungus group of the Ascomycotina. All species of this fungal group are known as the obligate exoparasites of the Arthropoda, especially of insect, with the exception of a small number of species found on mites and milipedes.

They are minute, mostly less than one millimeter long, and look like hairs or bristles of the insects own.

Members of the Laboulbeniales are widely distributed in the world and include above 2,000 known species under 131 genera, although the richest floras were found in tropical regions.

Concerning the Korean Laboulbeniales, 46 spe-

cies under 14 genera of this fungus group were recorded by delete (1981, 1982a, 1982b, 1982c, 1983, 1984a, 1984b, 1984c, 1986a, 1986b, 1986c, 1986c, 1990, 1991, 1992).

By that time (1992), 12 species under three genera of the Laboulbeniales were in Cheju Island.

The authors collected the insects from September 1993 to August 1994 in Cheju Island and examined the parasitization of the Laboulbeniales.

In this paper, we add 7 species under 3 genera of this fungal group.

### Materials and Methods

Many thousands of insects were observed under a binocular microscope to examine the parasi-

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tization of the Laboulbeniales. The rates of parasitized insects by this fungus were variable depending on insect group and on the localities, but in average they were lower than 2 percent.

The fungi on the surface of the insects were removed by a thin needle, and mounted by a refined Berlese's fluid (neoshigalar) for preparation. The preparations were preserved in the incubation box set at 50°C for 3 or 4 days to make the materials recovered in original shape. The specimens were observed under a photomicroscope at 1,000 X. The specimens examined were preserved in the Department of Biology, College of Education, Chosun University.

### Description of the species

**1. *Chitonomyces chinensis* Thaxter**, Mem. Amer. Acad. Arts Sci. 14: 405, 1924 & 15: 517, 1926; Sugiyama, Trans. Mycol. Soc. Japan 18: 157, 1977; Sugiyama and Hayama, Trans. Mycol. Soc. Japan 22: 189, 1981; Sugiyama and Phanichapol, Nat. Hist. Bull. Soc. 32: 52, 1984; Sugiyama and Nagasawa, Trans. Mycol. Soc. Japan 26: 4, 1985; Lee and Kim, Kor. J. Mycol. 18: 2, 1990. Fig. 2-3.

Host genus : *Laccophilus* (Dytiscidae, Coleoptera).

Host species in Korea : *Laccophilus difficilis* Sharp.

Distribution : Borneo, China, Formosa, Japan, Korea and Thailand.

Specimens examined : Wolsan, Pucheju-gun, Cheju Island, August, 28, 1994, L-Y-1057, 1058, 1059, 1060, 1061 and 1062.

This species is characterized by the dark yellowish, horn-shaped, sharply curved apical projection of the perithecial venter. It is similar to *C. paradoxus* in general appearance, but is distinguished in having a distinctly blackish and sharply curved perithecial projection, whereas that of *C. paradoxus* is straight and yellowish, condolorous with the perithecium venter. Specimens were collected from the posterior margin of the right and left elytron of the host insect.

**2. *Chitonomyces melanurus* Peyritsch**, Sitzungsber. Kaiserl. Acad. Wissensch. Math-Naturwissensch.

Klasse 68(1): 251, 1873; Thaxter, Mem. Amer. Acad. Arts Sci. 12: 289, 1896 & 14: 405, 1924; Spegazzini, An. Mus. Nac. Hist. Nat. Buenos-Aires 27: 47, 1915; Siemaszko, J. and Siemaszko, W. 3; Polskie. Pismo. Entomol. 12: 122, 1933; Sugiyama, Ginkgoana 2: 24, 1973; Trans. Mycol. Soc. Japan 18: 158, 1977; Sugiyama and Hayama, Trans. Mycol. Soc. Japan 18: 187-196, Sugiyama and Nagasawa, Trans. Mycol. Soc. Japan 26: 9, 1985; Lee and Kim, Kor. J. Mycol. 18: 2, 1990. Fig. 1-2.

Host genus : *Laccophilus* (Dytiscidae, Coleoptera).

Host species in Korea : *Laccophilus difficilis* Sharp.

Distribution : Africa, Borneo, China, Europe, Java, Korea, Sumatra, Taiwan and Thailand.

Specimens examined : Wolsan, Pucheju-gun, Cheju Island, August, 28, 1994, L-Y-1045, 1048, 1052, 1055, 1070 and 1071.

This species is the type species of the genus. It is characterized by the sharply curved, blackish termination of its receptacle and two subterminal projections on its perithecium. This species is similar to *C. intermedius*, *C. javanicus*, *C. helicofer* and *C. japonensis* in its general appearance, but is distinguishable from the former 2 species by the sharply curved termination of its receptacle, and from *C. helicofer* by the wholly opaque termination of its receptacle. This fungus also is distinguished from *C. japonensis* by the short anterior projection of its perithecium which does not reach beyond the top of the perithecium.

**3. *Chitonomyces paradoxus* (peyritsch) Thaxter**, Proc. Amer. Acad. Arts Sci. 27: 32, 1892, Mem. Amer. Acad. Arts Sci. 14: 406, 1924; Picard, Bull. Soc. Mycol. France 29: 515, 1913; Spegazzini, An. Mus. Nat. Buenos-Aires 27: 47, 1915; Sugiyama, Ginkgoana 2: 24, 1973; Sugiyama and Phanichapol, Nat. Bull. Siam Soc. 31: 63, 1984; Sugiyama and Nagasawa, Trans. Mycol. Soc. Japan 26: 9, 1985; *Heimatomyces paradoxus* peyritsch, Sitzungsber. Kaiserl. Acad. Wissensch. Math-Naturwissensch. Klasse 68: 251, 1873; Lee and Kim, Kor. J. Mycol. 18: 3, 1990. Fig. 3-2.

Host genus : *Laccophilus* (Dytiscidae, Coleoptera).

Host species in Korea : *Laccophilus difficilis*

Sharp.

Distribution : Borneo, Europe, Formosa, Japan, Korea, Sumatra, Thailand and U.S.A.

Specimens examined : Han-Gyong, Pucheju-gun, Cheju Island, August, 28, 1994, L-Y-1063, 1064, 1065, 1066, 1067 and 1072.

The most important character of this species is the formation of a horn-shaped projection on the perithecium. This fungus is closely allied to *C. chinensis*, but is distinguished by the straight habit of its perithecial terminal projection.

4. *Laboulbonia exigua* Thaxter, Proc. Amer. Acad. Arts Sci. 38: 37, 1902 et Mem. Amer. Acad. Arts Sci. 13: 333, 1908; Sugiyama, Ginkgoana 2: 48, 1973; Lee, Kor. J. Mycol. 9(4): 183, 1981. Fig. 1-3, 3-3.

Host genus : *Chlaenius*, *Haplochlaenius* (*Carabidae*, *Coleoptera*).

Host species in Korea : *Haplochlaenius costiger* (*Chaudoir*).

Distribution : Japan and Korea.

Specimens examined : Songpanak, Mt. Halla, Cheju Island, August, 27, 1994, L-Y-1033, 1034 and 1036.

The main characters of the present species are the stout basal portion of receptacle and the blackish perithecial projection as well as the two simple branches of the receptacle. In some individuals, however, the perithecial projection is absent or very short and hyaline. This species shows the position specifically, namely occurs on only prothorax of their hosts.

5. *Laboulbonia flagellata* Peyritsch, Sitzungsber. Kais. Akad. Wissensch. Math-Naturwissensch. Klasse 68: 247, 1873; Thaxter, *Laboulbonia elongata*, Proc. Amer. Acad. Arts Sci. 25: 10, 1890; Spegazzini, Redia 10: 50, 1914; An. Mus. nac. Hist. nat. Buenos Aires: 29: 623, 1917; Balazuc, Livre du Cinquantenaire de l'Institute de Speleologie' Emile Racovitz, Bucarest: 469, 1971; Bull. Soc. linn. Lyon 43(2): 59, 1974; et ibid. 51: 13, 1982; Sugiyama, Trans. mycol. Soc. Japan 13: 261, 1972; Ginkgoana 2: 51, 1973; Lee, Kor. J. Mycol. 9(4): 184, 1981. Fig. 1-1.

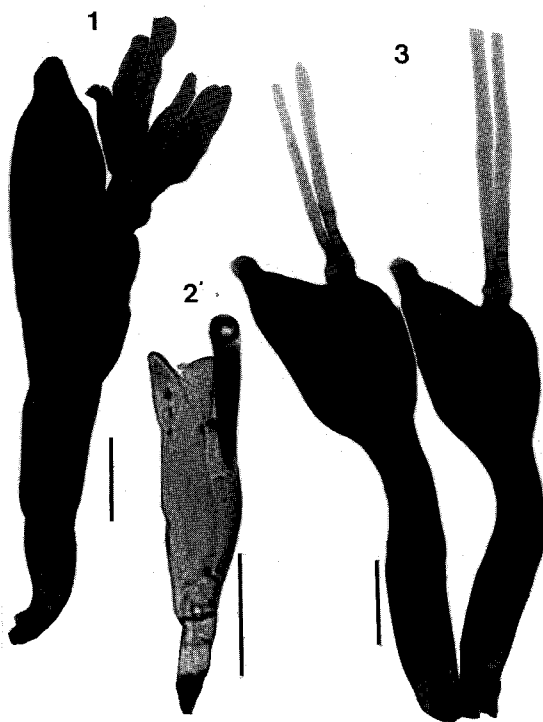


Fig. 1. 1. *Laboulbonia flagellata* Peyritsch on *Harpalus roninus* Bates, (*Carabidae*, *Coleoptera*). 2. *Chitonomyces melanurus* Peyritsch on *Lacophilus difficilis* Sharp, (*Dytiscidae*, *Coleoptera*). 3. *Laboulbonia exigua* Thaxter on *Haplochlaenius costiger* (*Chaudoir*), (*Carabidae*, *Coleoptera*). Scales: 50  $\mu$ m.

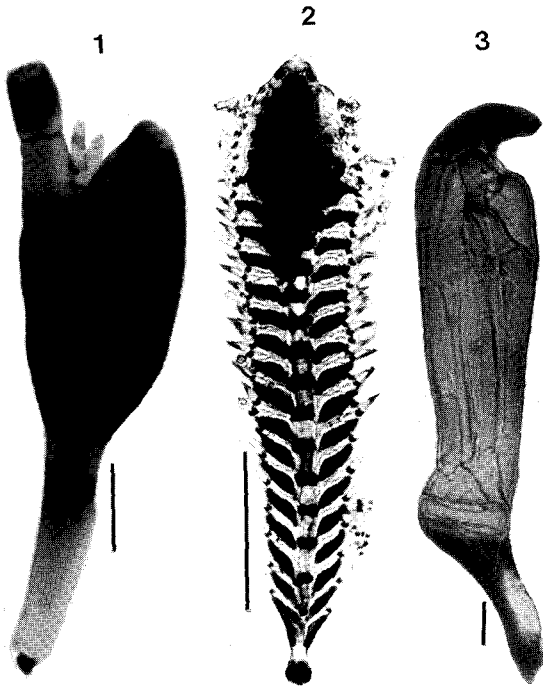
Host genera : *Acanthogenius*, *Anchomenus*, *Anisodactylus*, *Argutor*, *Antisphodrus* *Calatus*, *Colpodes* *Coptodera*, *Limosthenes*, *Macrochilus*, *Platynus*, *Pleurosoma*, *Pseudopristonuchus*, *Onypterygia* and *Stomis* (*Carabidae*, *Coleoptera*).

Host species in Korea : *Agonum buchani* Hope, *Harpalus* sp. (1), *Harpalus* sp. (2) and *Pterostichus microcephalus* Motschulsky.

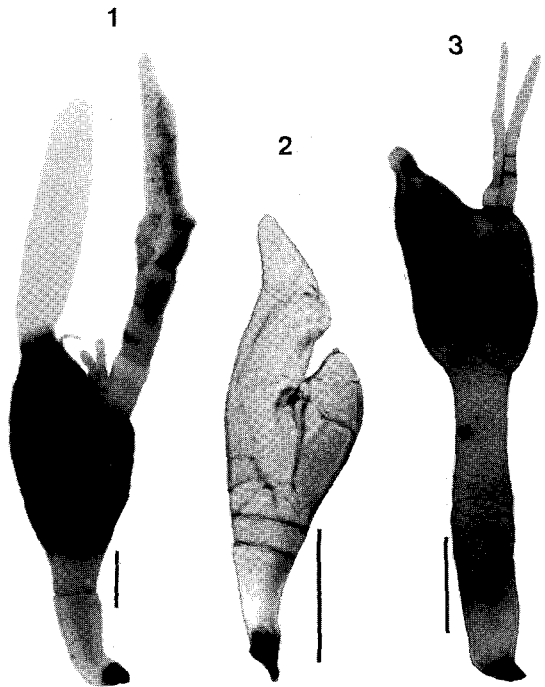
Distribution : Africa, Europe, China, Japan, Korea, Australia, New Zealand and North and South America.

Specimens examined : Kwaun Temple, Cheju-city, Cheju Island, August, 27, 1994, L-Y-1037 and 1038.

This species is characterized by the pale thalli,



**Fig. 2.** 1. *Laboulbenia vulgaris* Peyritsch on *Bembidion oxyglomma* Bates and *B. scopulinum* Kirby, (Carabidae, Coleoptera).  
2. *Rickia ancylopi* Thaxter on *Ancylopus melanocephalus* Oliver, (Endomychidae, Coleoptera).  
3. *Chitonomyces chinensis* Thaxter on *Laccophilus difficilis* Sharp (Dytiscidae, Coleoptera).  
Scales: 50  $\mu$ m.



**Fig. 3.** 1. *Laboulbenia vulgaris* Peyritsch on *Bembidion oxyglomma* Bates and *B. scopulinum* Kirby, (Carabidae, Coleoptera).  
2. *Chitonomyces paradoxus* (Peyritsch) Thaxter on *Laccophilus difficilis* Sharp (Dytiscidae, Coleoptera).  
3. *Laboulbenia exigua* Thaxter on *Haplochlaenius costiger* (chaudoir), (Carabidae, Coleoptera). Scales: 50  $\mu$ m.

the branches of the receptacle of about equal length and the lateral antheridia. Numerous variations of this species were found on members of Carabidae of the world.

**6. *Laboulbenia vulgaris* Peyritsch**, Sitzungsber. Kaiserl. Wissensch. Math-Naturwissensch. Klasse 68: 245, 1873; Thaxter, Proc. Amer. Acad. Arts Sci. 27: 44, 1892 et Mem. Amer. Acad. Arts Sci. 12: 318, 1892 et 13: 335, 1908; Spegazzini, An. Mus. nac. Hist. nat. Buenos Aires 23: 72, 1912 et 27: 62, 1915 et Redia 10: 42, 1914; Siemaszko, J. & W. Polskie Pisma Entomol. 6: 197, 1928; Middelhoek, Nederl. Kruidk. Arch. 56: 249, 1949; Balazuc, Livre du Cinquantenaire de l'Institut de Speleologie 'Emile Racovitza', Bucarest: 473, 1971; Bull. Soc. Inn. Lyon 43: 310, 1974 et 51: 22, 1982;

Balazuc, Espadaler & Girbal, Collnea. Bot. 13(2): 413, 1982; Sugiyama, ginkgoana 2: 66, 1973; Rossi, Quaderni Speleologia, Circolo Speleologico Romano 3: 3, 1978; Terada, Trans. mycol. Soc. Japan 19: 59, 1978; Lee, Kor. J. Mycol. 9(4): 184, 1981. Fig. 2-1, 3-1.

Host genus: *Bembidion* (Carabidae, Coleoptera).

Host species in Korea: *Bembidion oxyglomma* Bates and *B. scopulinum* Kirby.

Distribution: Cosmopolitan.

Specimens examined: Kwaun Temple, Cheju-city, Cheju Island, August, 27, 1994, L-Y-1118 and 1119.

The main character of this species is the blackish perithecium and blackish upper portion of the receptacle. This cosmopolitan species offers

most confused taxonomical problems in the genus *Laboulbenia*. Further studies must be necessary to settle them.

7. *Rickia ancylopi* Thaxter, Proc. Amer. Acad. Arts Sci. 52: 40, 1916 et Mem. Amer. Acad. Arts Sci. 15: 452, 1926; Sugiyama, Ginkgoana 2: 75, 1973; Terada, Trans. mycol. Soc. Japa 19: 60, 1978; Lee, Kor. J. Mycol. 9: 185, 1981. Fig. 2-2.

Host genus : *Ancylopus* (*Endomychidae*, *Coleoptera*).

Host species in Korea : *Ancylopus melanocephalus* Oliver.

Distribution : Africa, Japan and Korea.

Specimens examined : Sogwip'o City, Cheju Island, August, 27, 1994, L-Y-1041, 1042, 1043 and 1044.

The dark slender receptacle with hyaline basal cells of appendage is characteristic to the present species. The present species appears to be closely related to *R. tessellata* Thaxter. In the present paper, however, Korean representatives are identified as *R. ancylopi* because of the host specificity.

## 摘 要

濟州道 地域에서 라블베니아 菌類는 現在까지 2屬 12種이 報告되었으나, 1993年 9월부터 1994年 8월까지 昆蟲들을 採集하여 라블베니아 菌類의 寄生與否를 觀察한 結果 지금까지 報告되지 않았던 1屬과 既存의 2屬등 3屬 7種을 얻었기에 다음과 같이 報告한다.

*Chitonomyces Chinensis* Thaxter on *Laccophilus difficilis* Sharp (*Dytiscidae*, *Coleoptera*), *C. melanurus* Peyritsch on *Laccophilus difficilis* Sharp, (*Dytiscidae*, *Coleoptera*), *C. Paradoxus* (Peyritsch) Thaxter on *Laccophilus difficilis* Sharp, (*Dytiscidae*, *Coleoptera*), *Laboulbenia exigua* Thaxter on *Haplochlaenius costiger* (Chaudoir), (*Carabidae*, *Coleoptera*) *L. flagellata* Peyritsch on *Harpalus roninus* Bates, (*Carabidae*, *Coleoptera*), *L. vulgaris* Peyritsch on *Bembidion oxyglimma* Bates, *B. scopulinum* Kirby, (*Carabidae*, *Coleoptera*) and *Rickia ancylopi* Thaxter on *Ancylopus melanocephalus* Oliver, (*Endomychidae*, *Coleoptera*).

## 謝 辭

본 논문은 1993학년도 조선대학교 학술 연구비에 의하여 연구되었음

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