New and Interesting Laboulbeniales from Brazil

Walter Rossi
Università dell’Aquila, Coppito, Italy

Ernesto Bergonzo
Università dell’Aquila, Coppito, Italy

Follow this and additional works at: http://scholarship.claremont.edu/aliso

Part of the Ecology and Evolutionary Biology Commons, and the Environmental Microbiology and Microbial Ecology Commons

Recommended Citation
Available at: http://scholarship.claremont.edu/aliso/vol26/iss1/3
NEW AND INTERESTING LABOULBENIALES FROM BRAZIL

WALTER ROSSI AND ERNESTO BERGONZO

Dipartimento di Scienze Ambientali, Università dell’Aquila, 67100 Coppito, L’Aquila, Italy
(vrossi@univaq.it)

ABSTRACT

Two new species of Laboulbeniales are described: Laboulbenia parasyphrae, parasitic on Parasyphraea sp. (Coleoptera, Chrysomelidae, Alticinae), and L. skelleyi, parasitic on Pselaphus rubricatus and P. signatus (Coleoptera, Erotylidae). Other recorded species are Chaeomyces pinophilii, Chitonomyces aurantiacus, Corethromyces ophiis, Dimophomyces platensis, Dioicomyces anthicus, D. cf. notoxi, Hesperomyces cocincloides, Hydrophilomyces rhynchophorae, Laboulbenia arnaldi, L. funeralis, L. pachystoma, and L. systenae. Six “morphospecies” of Chitonomyces (C. appendiculatus, C. hyalinus, C. prolongatus, C. simplex, C. uncinatus, and C. cf. zonatus) parasitic on a single species of Laccophilus (Dytiscidae) are also reported.

Key words: Ascomycetes, Brazil, Chitonomyces, Coleoptera, insect parasites, Laboulbeniales, taxonomy.

INTRODUCTION

Despite widespread recognition as a “megadiversity country” (McNeely et al. 1990) and the recent publication of an impressive fungal checklist listing over 4600 names (DaSilva and Minter 1995), the fungi of Brazil remain very imprecisely known. Of particular note, given the unquestioned diversity of prospective hosts in this country, are the entomogenous fungi. In keeping with patterns of diversity from other regions, it is likely that the most diverse group of entomogenous fungi in Brazil will be the Laboulbeniales. To date approximately 100 species of these arthropod-associated fungi, the majority occurring on beetles, have been recorded in the literature from Brazil. More recently our own fieldwork has resulted in the addition of 18 species associated with flies (Bergonzo et al. 2004). Here, we document the occurrence of an additional 13 species associated with beetles, two of which are described as new. Furthermore, we take the opportunity to report on recent collections of representatives of the genus Chitonomyces on Laccophilus, and discuss the patterns of occurrence of fungal thalli in relation to the position of growth on the host integument. Although we have refrained from formally synonymizing some of these taxa, we provide further clues supporting the hypothesis that they are “growth forms” (sensu Scheloske 1976) of a single species, rather than distinct species.

MATERIALS AND METHODS

Most insects were collected in the field by the authors using standard entomological techniques. Insects were stored in 70% ethyl alcohol for transport to the laboratory, where they were carefully examined with a dissecting microscope. Parasitic fungi were removed from the hosts and mounted on permanent slides according to Benjamin (1971). Holotypes of the new species are deposited in the Botanical Museum in Florence (FI). All the other slides are provisionally held in the collection of the junior author and will be deposited in FI.
Known distribution and hosts.—The species of Chitonomyces reported above were described from different parts of the body of Laccophilus spp. from the USA (Thaxter 1895, 1902, 1924), with the exception of Chitonomyces zonatus, which was found in China on Laccophilus parvulus Aubé, L. solutus Sharp and L. sharpi Réginburt (Thaxter 1926). Later, Chitonomyces appendiculatus, C. hyalinus, C. simplex, and C. uncinatus were found also in Central America (Thaxter 1924). The parts of the host occupied by these parasites were reported as follows: C. appendiculatus on the anterior legs; C. hyalinus on the tips of posterior legs; C. prolongatus on the margin of the left elytron; C. simplex on the middle and distal half of the right elytron; C. uncinatus on the inferior surface of the abdomen; C. zonatus on the margin of left elytron and on the tarsi of mid- and posterior legs.
New record.—CEARÁ: on various parts of the body of six specimens (three males and three females) of Laccophilus fasciatus Aubé collected in a pond of the Rio Jaguariibe near Limoeiro do Norte (S05°09.2′, W038°07.4′), 25 Sep 1998, E. Bergonzo & W. Rossi. In particular, Chitonomycyes appendiculatus was found on a spine at the distal end of the left posterior leg of a male; C. hyalinus was found on the tarsi of the left posterior leg of two specimens (one male and one female); C. prolongatus was found on the margin of the left elytron of five hosts (two males and three females; in one case a few thalli were also found on the inferior surface of the abdomen); C. simplex was found on all six host insects on the distal half of the right elytron, with the exception of a male bearing these parasites on the right portion of the pronotum; C. uncinitus was found on the inferior surface of the abdomen of the three males; the parasites referred to C. zonatus with some uncertainty were found on the margin of the right elytron of two specimens (one male and one female) and on a spine at the distal end of the left posterior leg of a male (together with C. appendiculatus). As many as five different “morphospecies” were found on a single host, with a minimum of two. The distribution of these Chitonomycyes species on the body of their insect host are depicted in Fig. 2–6.

Remarks.—We find it very difficult to believe that the observed parasites, although quite different morphologically, belong to different species displaying “position specificity” (sensu Benjamin and Shanor 1952). Among other things, it would be very difficult to explain the transmission of the spores of such “species” as C. simplex from an elytron to another elytron, or of C. uncinitus from the ventral portion of the abdomen to a similar area of another host. We think that these parasites represent different “growth forms” (sensu Scheloske 1976) of a single species. The whole question can be solved by means of molecular analyses.

Corethromycyes ophtis Thaxter

Known distribution and hosts.—This species is only known from Argentina, where it was found on Ophites fauvoti Lynch (Staphylinidae) (Thaxter 1931).

New record.—CEARÁ: on various parts of the body of three specimens of Ophites bergonzi Drugman collected along a torrent between Baturité and Guaramiranga (S04°17.3′, W038°55.9′), 720 m, 5 Oct 1997, E. Bergonzo & W. Rossi.

Remarks.—The abundant Brazilian material corresponds closely with the original description with the exception of the pigmentation of the receptacle, which is dark but not opaque.

Dimorphomycyes platensis Spegazzini

Known distribution and hosts.—On Apocellus spp. (Staphylinidae) in Argentina, Uruguay, Guatemala, and Bolivia (Spegazzini 1917; Thaxter 1924; Weir & Rossi 2001).

New record.—CEARÁ: on various parts of the body of a few specimens of Apocellus sp. collected around a swamp near Itiáqaba (S04°40.4′, W37°50.0′), 24 Sep 1998, E. Bergonzo & W. Rossi.

Remarks.—The Brazilian specimens display considerable polymorphism, thus confirming the synonymy between Dimorphomycyes platensis, D. vulgarissimus Spegazzini, and D. furcatus Thaxter (Weir and Rossi 2001).

Dioscomycyes anthici Thaxter

Known distribution and hosts.—Reported in many countries from all over the world except Australia on various species and genera of the family Anthicidae (Santamaria 2002).

New record.—CEARÁ: on the median femur of a single specimen of Cyclodinus sp. collected around the Lagoa de Precabura near Messejana (S03°48.4′, W38°26.8′), 9 Oct 1997, E. Bergonzo & W. Rossi.

Remarks.—The Brazilian specimens fall within the great variability of the species.

Dioscomycyes cf. notoxi Thaxter

Known distribution and hosts.—This parasite is known only from the type series, which was found on Notoxus eximius Champion (Anthicidae) from Guatemala (Thaxter 1931).

New record.—CEARÁ: on the elytra and abdomen of two specimens of Acanthius unntuberculatus (Pic) collected along the shores of Riacho do Lagamar near Pacajus (S04°13.6′, W38°28.7′), 26 Sep 1998, E. Bergonzo & W. Rossi.

Remarks.—The male thalli perfectly agree with the original description and differ from those of Dioscomycyes anthici in having a strictly terminal antheridial efferent tube (Fig. 14). In the Brazilian female thalli (Fig. 13) the brownish tinge of the primary appendage extends to the outer sides of cells I and II, which are much paler in the type series.

Hesperomycyes coccinelloides (Thaxter) Thaxter

Known distribution and hosts.—On “minute coccinellid allied to Scymnus” from the West Indies (Grenada, Trinidad, and Jamaica), the Philippines, and Borneo (Thaxter 1917); on Scymnus tardus Mulsant from Panama (Thaxter 1931); on an unidentified coccinellid from the USA (Benjamin 1989); on Scymnus sp. from Spain (Santamaria 1995).

New record.—CEARÁ: on a single specimen of Dionus seminculus Mulsant collected around the Cana Brava lake, near Guaramiranga (S04°14.6′, W038°57.6′), 815 m, 1 Dec 1998, E. Bergonzo.

Remarks.—Dionus was once considered a subgenus of Scymnus. Although the two are now regarded as separate genera, they are obviously related.

Hydrophomycyes rhynchophorius (Thaxter) Thaxter

Known distribution and hosts.—Described from the USA on Phaeonomotum extriatitum (Say) (Hydrophilidae) (Thaxter 1908); it has been reported also from Argentina (sub Ecteinomycyes lambricoides Spegazzini) on Phaeonomotum spegazzini Bruch (Spegazzini 1917).

New record.—CEARÁ: on the internal margin of the elytra of a specimen of Phaeostoma posticatum (Sharpl) collected on the submerged vegetation of the Cana Brava lake, near Guaramiranga (S04°14.6′, W038°57.6′), 815 m, 8–10 Oct 1997, E. Bergonzo; on the elytral margin, abdomen and posterior legs of a specimen of the same host insect collected under the submerged stones of a torrent between Baturité and Guarabimara (S04°17.3′, W038°55.9′), 720 m, 8 Oct 1997, E. Bergonzo & W. Rossi.
Remarks.—The Brazilian parasites are not identical with those reported on *Phaenonotum* spp. in North and South America. However, the variability observed among the specimens found on different parts of the body of *Phaenostoma* and the uncertainty about the distinctness of the various species described from *Phaenonotum* dissuade us from describing a new species.

*Laboulbenia arnaudii* Balazuc

**Known distribution and hosts.**—This species is known only from the type series, which was found on *Goniadera* sp. (Tenebrionidae) in French Guiana (Balazuc 1986).

**New record.**—AMAZONAS: on the elytra and the pronotum of a female specimen of *Strongylum* sp. (Tenebrionidae),
collected by means of a flight trap near Lake Januari (S03° 20', W060° 17'), 23 Aug 1991, Adis leg.

Remarks.—This species is characterized by the short, stout habit and the spreading branchlets of the appendages. Although found on a different host genus, the Brazilian specimens closely correspond to the original description, except that Balazuc’s illustration shows a longer series of short, constricted cells in the lower part of the appendage.

Laboulbenia funeralis Thaxter

Known distribution and hosts.—Notwithstanding two old, likely erroneous records from Europe, this species seems to be
exclusively American; it has been reported from Argentina, Bolivia, the United States and, doubtfully, from Brazil (Balazuc 1971; Weir and Rossi 2001).

New records.—CEARA: on various specimens of Neogyrisinus gibbus (Aubé) collected in a torrent between Baturité and Guaramiranga (S04°17.3′, W038°55.9′), 720 m, 8 Oct 1997 and 28 Sep 1998, E. Bergonzo & W. Rossi. PARANA: on the elytra of a male specimen of N. chalybeus (Perty), on the elytra of a female specimen of N. gibbus, and on the elytra and median legs of a male specimen of N. gibbus collected in a torrent near the Foz do Iguaçu waterfalls, 25 Jan 1994, W. Rossi.

Remarks.—As in other Laboulbeniales, such as Laboulbenia richardiana recently described (Rossi and Kotrba 2004), L. funerale displays a high degree of polymorphism depending on the area of the host body where it grows. The “typical” form described by Thaxter (1912) and subsequently recorded and illustrated by Spegazzini (1917) and Balazuc (1971), is found on the elytral margin (Fig. 16). The thalli observed on the legs are almost straight, with the basal cell longer and broader than the suprabasal, the perithecium much shorter, and cell V extending upwards along the inner margin of the perithecium (Fig. 17). The most striking and diverse thalli are found on the distal portion of the right elytron: these have a sigmoid habit and have a swanlike shape if viewed upside down (Fig. 18). The latter form was the most common in Ceará. Surprisingly, Thaxter (1912) wrote about L. funerale: “This species ... seems constant in specimens from a considerable number of different individuals ...”.

Laboulbenia pachystoma Spegazzini

Fig. 21, 22

Known distribution and hosts.—This species was described from specimens found on the elytra of various unidentified Gymnidae from northern Argentina (Spegazzini 1912, 1917) and has not been recorded since.


Remarks.—The Brazilian thalli observed on the elytra (Fig. 22) agree fairly well with the description and the drawing given by Spegazzini, the upper portion of the perithecium only being slightly more tapered; also the conspicuous, dark, rounded spot reported as a distinctive character of Laboulbenia pachystoma is always present in these specimens. However, the parasites found on the anterior legs differ consistently from these for the more much slender habit and for the cell V adnate to the perithecial upper portion (Fig. 21).

Laboulbenia pachystoma is closely related to L. guerinii Robin, from which it differs mainly in having a much more inflated perithecium.

Laboulbenia parasyphepherae W.Rossi et Bergonzo, sp. nov.

Fig. 23


Gray colored, with the perithecium darker and the basal cell much paler. Basal and suprabasal cells variously elongate, the former being always longer than the latter. Cells III and IV combined into a single cell that is taller than it is broad. Cell V small and elongate. Insertion cell unusually narrow and tall, sometimes even squarish in outline. Outer appendage consisting of a large, irregular, externally blackened basal cell, which gives rise from a deeply blackened area of insertion to an anterior-posterior series of short, stout, stiff, falcate, externally brownish, simple branchlets. The inner appendage consists of a very small basal cell producing a branch on either side, whose lower cell is usually dark with blackish septa, ending with 2-3 bottle-shaped antheridia. A similar branchlet bearing antheridia is frequently found also amid the branchlets of the outer appendage. Perithecium ovoid with a not well distinguished tip, the lips strongly unequal, the inner usually much more prominent, rounded distally, subtended by a dark suffusion. Total length 161–312 μm; perithecium 80–119 × 37–60 μm; length of antheridia 16–22 μm; longest appendage, from insertion cell to tip 80 μm; ascosporae 46–54 μm.

Holotype.—BRAZIL: CEARA, at the apex of the elytra and of the abdomen of a specimen of Parasyphera sp. (Coleoptera, Chrysomelidae, Alticinae) collected around the Cama Brava lake, near Guaramiranga (S04°14.6′, W038°57.6′), 815 m, 8–10 Oct 1997, E. Bergonzo & W. Rossi, no. 2235 (FI).

Remarks.—Dimensions of the thalli are quite variable: the longest thalli were found on the upper, distal portion of the abdomen, the shortest on the elytra, near the tip.

Among the various species of Laboulbenia parasitic on Chrysomelidae, the one more closely related to L. parasyphepherae seems to be L. cristatella Thaxter (1914). The two species share the undivided cell III + IV, the narrow and tall insertion cell, and the arrangement of the branchlets of the outer appendage. However, in L. cristatella these branchlets are much longer and the color of the thalli is much paler.

The specimens identified as L. lacticae Thaxter depicted in Fig. 20 of Weir & Beakes (1996: 127) very likely belongs to L. parasyphepherae. Laboulbenia lacticae has cells III and IV clearly separated (see Fig. 8 in Weir and Rossi 2001: 177).

Laboulbenia dorstii Balazuc (1975b) is quite similar to L. cristatella and seems to be a synonym of the latter.

Laboulbenia skelleyi W.Rossi et Bergonzo, sp. nov.

Fig. 21

Receptaculum helvolum, cellulae IV externa parte fusiore, interdum etiam cellulae III; perithecium griseum, dorsali parte superne dilutum, ventrali vero atra; perithecium apex ater, in minima hyalina labia desinent. Habitats brevis ac compactus. Cellulae V parvae, fere triangulae, inter perithecium et psallium protubentia. Psallium obliquum, crassum, cellulis IV + V clare brevius. Exterior appendix...
Laboulbenia parvula was originally described on ground beetles (Carabidae) from North America (Thaxter 1892) and its presence on Erotylidae is unlikely. It bears some resemblance to the new species in general habit, but has an almost entirely free perithecium and a branched outer appendage.

Laboulbenia encaustis differs from Laboulbenia skelleyi in having the perithecium free from the receptacle for 3/4 of its length and the inner appendage consisting of very short branchlets. It should be noted that either the name of the host insect or the collecting place are wrong, since Encaustes praenobilis is only found in Eastern Asia.

The only other species of Laboulbenia reported on Erotylidae so far is L. nestidis Balazuc, parasitic on Nesitis sexnotata (Wied.) from Malaysia; this Asian species differs from L. skelleyi in having a branched outer appendage and a much more elongate receptacle (Balazuc 1975a).

**Laboulbenia systemae** Spegazzini (1917)

*Known distribution and hosts.*—Described on *Systena testaceovittata* Clark (Chrysomelidae, Alticinae) from Argentina and recently recorded from Bolivia on *S. s-littera* (L.) (Weir and Rossi 2001).

*New record.*—CEARÁ: on the mesosternum of a specimen of *Systena s-littera* collected around the Cana Brava lake, near Guaramiranga (S04°14.6′, W03°57.6′), 815 m, 8–10 Oct 1997, E. Bergonzo & W. Rossi; on various parts of the body of a male specimen of *S. s-littera* collected on plants near the shore of the Açude de Flexeiras near Meruoca (S03°31.8′, W04°28.1′), 650 m, 15 Oct 1999, E. Bergonzo & W. Rossi.

*Remarks.*—Laboulbenia systemae is closely related to *L. homophoetae* (Spegazzini) Thaxter. The two species can be distinguished only by the appendages. These are composed of long and slender branches in the latter species, while in the former the same are shorter, stiff, and much darker at the base.

It is worth mentioning that while the specimen of *Systena s-littera* from Açude de Flexeiras was immature, its integument being not completely sclerified, the thalli of the parasite were fully mature. This means that Laboulbeniales can reach maturity in a relatively short time, which can be estimated to be about a couple of weeks.

**ACKNOWLEDGMENTS**

We are grateful to the entomologists who kindly identified the host insects: A. Bachmann (Gyrinidae, Hydrophilidae), M. Biondi (Chrysomelidae), C. Canepari (Coccinellidae), D. Drugman (Staphylinidae), J. Ferrer (Tenebrionidae), G. Nardi (Anthicidae), A. Newton (Staphylinidae), and M. Toledo (Dytiscidae). We also wish to thank E. Arndt for the infected specimen of *Strongylium*, P. Skelley for infected *Erotylidae*, L. Cajani for checking the Latin descriptions, F. De Santis for his help with the photographic plates, C. Sagnolli for his assistance during collecting trips in Brazil, and J. Chayle and C. Migoya (Instituto de Botánica Spegazzini) for sending pictures of the type specimens of a few species described by Spegazzini.
LITERATURE CITED


