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A NEW CARABIDICOLOUS SPECIES OF THE GENUS *LABOULBENIA* FROM SUMATRA

(ASCOMYCETES, LABOULBENIALES)

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In the course of investigations carried out in the Zoological Museum at Amsterdam, a considerable amount of material of Laboulbeniales was obtained from beetles of the family Carabidae from the Indo-Australian region. An extensive report on this collection is in preparation. In the present paper one of the most distinct species collected is described and I take pleasure in dedicating this species to Prof. Dr. J. HEIMANS in grateful recognition of his drawing my attention to this fascinating group of Fungi and his stimulating interest in the progress of my work.

Laboulbenia heimansii nov. spec.

Material. — 2 full-grown individuals taken from the inferior surface of the prothorax of a specimen of *Casnoidea interstitialis* Schm.-Goeb. from Sumatra: Manna, 1902, Coll. M. KNAPPERT (slide nr. Z. M. A. 359).

Latin description. — Proxima *L. concinnae* Thaxt., sed forma longiore et graciliore differt. Receptaculum pallide lutescens, hyalinum, distaliter paullo dilatatum. Cellulae III et VI angustiores, quam in *L. concinna* pro rato longiores, cellula V cellulam III haud attinginte. Perithecium pro rato brevius et latius quam in *L. concinna*, paraphysibus minus numerosiores. In *Casnoidea interstitiali* occurit. Typus: Museum Zoologicum Amstelodamensium, prep. No. Z.M.A. 359.

Description. — Receptacle very pale yellowish, rather weakly punctulate distad of cell I. Cell I large, subcylindrical, the basal half gradually tapering towards the foot-cell. Cell II about half as long as cell I, but of about the same width, cylindrical, anterior and posterior sides of equal length, the proximal and distal septa marked by slight constrictions. Cells III and IV subequal, each about half as long as cell II. Septum between cells III and IV marked by a slight constriction. Cell VI somewhat longer than cell III, about two thirds of cell II. Cell V rather small, separated from cell IV by an oblique septum, therefore not in contact with cell III. Cell VII also rather small and only a little broader than cell V, bulging a little at the anterior side. Insertion-cell normally developed, almost horizontal, black. Basal cells of perithecium elongate so as to form a hyaline neck-like stalk for the perithecium. The curvature of this stalk causes the

perithecium to bend away from the longitudinal axis at an angle of about 45°.

Perithecium opaque, brownish black, except at the somewhat translucent lip-cells. Perithecium rather long, rather slender (possibly due to shrinkage during the long time of dry preservation), broadest at about one third of its length, asymmetrically and gradually tapering towards the apex. Apex shortly cylindrical. Mouth of perithecium opening distally, with a wide slit on the lateral side.

Outer basal cell of appendages rather broad but short, a little prominent on the posterior side, its distal septum blackened, the branches broken off. Inner basal cell of about the same size as the outer, giving rise to a tuft of apparently rather short, unbranched paraphyses with blackened septa.

Total length to tip of perithecium: 385–440 μ; largest width: 45–50 μ; length to insertion-cell: 210–240 μ; perithecium exclusive of stalk: 135–160 μ × 48–50 μ; perithecium including stalk: 175–210 μ.

With the number of described species, subspecies and varieties coming near to 500, the genus *Laboulbenia* is the largest of its order. The last comprehensive treatment of the genus was given by THAXTER

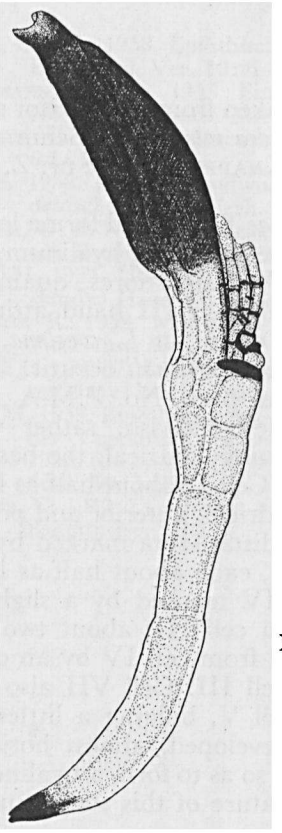

Fig. 1. *Laboulbenia heimansii* nov. spec., type specimen.

in the 2nd part of his unsurpassable monograph and dates from 1908. Since that time, however, many new species have been described, partly by THAXTER in his preliminary papers, partly by SPEGAZZINI and others. Obviously, a revision of *Laboulbenia* was planned by THAXTER, but unfortunately this revision never appeared owing to his untimely death in 1932.

In view of these circumstances, the description of a new species of *Laboulbenia* has become a somewhat hazardous undertaking nowadays.

To determine the relationship of the presently described species it seems fully justified to restrict the discussion to those forms occurring on Carabid hosts, since the species described from other Coleopterous families and insect orders other than Coleoptera apparently either belong to specific and rather disjunct groups or pertain to the complex of certain polyphagous species like *L. flagellata* Peyr., *L. polyphaga* Thaxt., etc.

Among the Carabidicolous species of *Laboulbenia* an entirely free and stalked perithecium such as in the presently described species is by no means a normal feature. The character is obviously one of a derivative nature, and the species in which it occurs are to be looked upon as highly differentiated. We find a stalked perithecium in a number of species parasitic on hosts belonging to quite disjunct tribus of the family Carabidae, like, for instance, the Panagaeini *(L. brachionychi* Thaxt., *L. brachionychi* subsp. *euschizomeri* Speg.), the Pterostichini *(L. orthomi* Thaxt., *L. cauliculata* Thaxt., *L. colpodis* Thaxt.), the Helluodini *(L. helluodis* Thaxt.), the Dryptini *(L. galeritae* Thaxt., *L. decipiens* Thaxt., etc.), etc. The morphological differences between the groups of parasites infesting these host categories show that, on the one hand the stalked perithecium was acquired along different phylogenetic lines and, on the other hand, a certain degree of host specificity of the species-groups of *Laboulbenia* with regard to the host categories exists.

It is, therefore, not surprising that the nearest relative of *L. heimansii*, *L. concinna* Thaxt. 1902 from "*Casnonia*" spec.[1]) from Buitenzorg, Java, came from a host species belonging to the same tribus as *Casnoidea interstitialis* Schm.-Goeb., viz. the Colliurini. *L. heimansii* and *L. concinna* agree largely in the conformation of the receptacle, the relation of the perithecium to the receptacle and the characters of the appendages. *L. concinna*, however, may be easily distinguished by the dark colour of the receptacle distad of cell I, the less elongate and more club-shaped receptacle, the comparatively broader cells III and VI, the relatively larger cell V, which is separated from cell IV by a vertical septum and thus is in contact with cell III, and the more copiously developed appendages.

As regards the relationship of *L. concinna*, THAXTER (1908) did not give an opinion, and the place the species was given, viz. between *L. rhinophora* Thaxt. and *L. imitans* Thaxt., does not appear to have

[1]) According to CSIKI (1927–1933) the name *Casnonia* is no longer in use. The Indonesian species previously referred to this genus apparently now belong to the genera *Colliuris* and *Casnoidea*.

much significance in this respect. Indeed, *L. concinna* and *L. heimansii* seem to stand rather isolated, in particular among the other species recorded from hosts of the tribus Colliurini.

According to my unpublished host-index of the Carabidicolous Laboulbeniales the following species of *Laboulbenia* have been recorded from the Colliurini, sensu Csiki (1927–1933).

Host genus	Parasite	Recorded also from hosts of the tribus	Geographical distribution
Colliuris	*L. casnoniae* Thaxt.	Pterostichini, Lebiini	Oriental, Australian Palearctic, Ethiopian and Neotropical regions
	L. equatorialis Thaxt.	—	Neotropical region
	L. falcata Thaxt.	—	Neotropical region
	L. flaccida Thaxt.	—	Neotropical region
Casnoidea	*L. casnoniae* Thaxt.	See above	
	L. heimansii nov. spec.	—	Oriental region
"*Casnonia*" (*Casnoidea* or *Colliuris*)	*L. asiatica* Thaxt.	—	Oriental region
	L. bottegoi Speg.	—	Ethiopian region
	L. concinna Thaxt.	—	Oriental region
Calophaena	*L. minima* Thaxt.	Lebiini, Agrini	Neotropical region
	L. triordinata Thaxt.	—	Neotropical region
Eudalia	*L. eudaliae* Thaxt.	—	Australian region
Leptotrachelus	*L. minima* Thaxt.	See above	
Pionycha	*L. minima* Thaxt.	See above	

Of these species, *L. casnoniae* doubtlessly belongs to the complex of *L. flagellata* Peyr. and apparently takes the place on the Colliurini and Lebiini of the latter which focusses on the Pterostichini. Only a single record of *L. casnoniae* from Pterostichini is known, but this may be considered somewhat doubtful since the locality of the particular host, *Homothes elegans* Newm., an Australian species, was given as "India".

L. flaccida, according to Thaxter (1908), is related to *L. planetis* Thaxt. from *Planetes* (Zuphiini) and *L. helluodis* Thaxt. from *Helluodes* (Helluodini), and was compared also with *L. casnoniae*. It seems to be a more differentiated form belonging to the complex of *L. flagellata*.

Possibly related to the species of the *flagellata*-complex, though decidedly more disjunct, is *L. asiatica*, which is closely related to *L. celestialis* Thaxt. from *Drypta* (Dryptini) and *Dicranoncus* (Pterostichini) and apparently also to *L. acrogenis* Thaxt. from *Acrogenys* (Zuphiini). By evidence of the characters of the appendages, in particular the inflated outer basal cell, *L. equatorialis* and *L. falcata*, two somewhat isolated species, seem to show affinity to *L. asiatica*.

L. eudaliae was compared with *L. loxandri* Thaxt. from *Loxandrus* (Pterostichini) by Thaxter, but the relationship was considered quite uncertain. The characters of the appendages, however, seem to show some similarity with those of *L. equatorialis* and *L. falcata:* the inflated

outer basal cell characteristic for the latter two species and *L. asiatica* is also typically developed in *L. eudaliae*.

Together with *L. casnoniae*, *L. minima* so far is the only species parasitic on Colliurini which has been recorded from other Carabid tribus, but probably THAXTER united several species under this name. *L. minima* was compared with *L. longicollis* Thaxt. from *Galerita* (Dryptini) by THAXTER in 1908 in spite of the totally different conformation of the receptacle. *L. longicollis*, a species with a stalked perithecium, superficially somewhat resembles *L. heimansii*, but differs in particular by the structure of the appendages. In that respect it differs also from *L. minima* and the relationship between *L. longicollis* and *L. minima*, therefore, seems rather remote. On the other hand the appendages in *L. minima* are not unlike those in *L. concinna* and *L. heimansii*, and *L. minima*, although strongly differing in habit, may be regarded as the nearest relative of *L. concinna* and *L. heimansii*. On the whole, these three species appear related, though not particularly closely, to the group of *L. asiatica*, *L. equatorialis*, *L. falcata* and *L. eudaliae*.

L. triordinata among the other species occurring on Colliurini stands quite isolated. It is decidedly related to *L. helluomorphae* Thaxt. from *Helluomorpha* (Helluonini) and *Pleuracanthus* (Helluonini) and *L. perplexa* Thaxt. from *Galerita* (Dryptini), as stated by THAXTER, as well as to other species described from *Galerita*.

L. bottegoi, finally, was described without reference to other species. It seems to be a minute and rather insignificant form pertaining to the complex of *L. polyphaga* Thaxt., a species with a wide host-distribution focussing on Harpalini.

Summarizing the above discussion we may say, that the species of *Laboulbenia* parasitic on hosts of the tribus Colliurini do not form a cohesive group but rather fall apart in several more or less unrelated categories. Of these the group embracing *L. minima*, *L. heimansii* and *L. concinna*, apparently having no definite relatives on other Carabid tribus, seems to be the most characteristic. The species of the other groups have their nearest relatives on Pterostichini, Harpalini, Lebiini, Agrini, Dryptini, Zuphiini, Helluodini, and Helluonini.

It may be of interest, especially to Coleopterologists, to pass some remarks here on the information which the systematic relationship of the parasites may supply on the affinities of their host-group to other Carabid tribus. Although it is quite clear that there exists no absolute parallel in the taxonomy of insects and the Laboulbeniales which infest them, there can be no doubt that the host-distribution of the species of *Laboulbenia* is not a random one, and that, in general, it gives some indication as to the interrelationship of the hosts.

In the present case, there is no doubt that the Colliurini through their parasites show a strong affinity to the tribus Lebiini, Agrini, Dryptini, Zuphiini, Helluodini and Helluonini. These six groups, together with some others, partly raised to the rank of families, have been recently united in a superfamily Lebiomorphi by JEANNEL (1949), and were opposed, amongst the superfamilies Harpalomorphi, Callistomorphi and Masoreomorphi, to the Odacanthomorphi, a superfamily

largely agreeing in concept with the tribus Colliurini sensu CSIKI.

In view of the evidence supplied by the relationships of the species of *Laboulbenia* occurring on Colliurini, however, it may be remarked tentatively, that the distinctive characters of this tribus as against the six other tribus may have been somewhat overestimated by JEANNEL.

The indications towards a relationship of the Colliurini with the Pterostichini and Harpalini also may be of importance. The fact, however, that these indications are given mainly by two weakly differentiated species, *L. casnoniae* and *L. bottegoi*, reduces somewhat their significance.

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An extensive bibliography of the Carabidicolous Laboulbeniales will be given in my forthcoming paper. In connection with the present paper the following references are the most important.

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