

Studies on Indian Laboulbeniales IV: Three species of *Laboulbenia*

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Three rare species of *Laboulbenia* are described here from India. These are *L. camponoti* on *Camponotus* sp. (Hymenoptera, Formicidae), *L. cristata* on *Paederus* sp. (Coleoptera, Staphylinidae) and *L. idiostoma* on *Altica* sp. (Coleoptera, Chrysomelidae).

Key Words—Coleoptera; Hymenoptera; India; *Laboulbenia*; Laboulbeniomyces.

The genus *Laboulbenia* Montagne & Robin has the largest number of taxa among the laboulbeniaceous fungi, with more than 500 species described. Although *Laboulbenia* species mainly parasitize carabid beetles, they also occur on other families of Coleoptera and other groups of Arthropods. Three species of *Laboulbenia* were described earlier by us (Kaur et al., 1993) and in this paper three more species of the same genus are described. Two of these are parasitic on Coleopteran beetles and one on Hymenoptera. Their host parasitic relationship is as follows:

Fungus	Host Insect
<i>Laboulbenia camponoti</i> Batra	<i>Camponotus</i> sp. (Hymenoptera, Formicidae)
<i>L. cristata</i> Thaxter	<i>Paederus</i> sp. (Coleoptera, Staphylinidae)
<i>L. idiostoma</i> Thaxter	<i>Altica</i> sp. (Coleoptera, Chrysomelidae)

Laboulbenia camponoti Batra, Amer. J. Bot. **50**: 991. 1963. Figs. 1, 4

This species was collected from ants (Hymenoptera, Formicidae). It was found to be present mostly on the legs of the host and very rarely on the abdomen, thorax and other parts. It was reported earlier by Batra (1963) from India. The overall dimensions, coloration and general morphology of the receptacle, perithecium and appendage fit well with the material described by her.

Total length of the thallus is 68.7–75 μm , individuals mostly occur in pairs. The receptacle consists of five layers of cells, 50–62.5 μm long. The first cell forms a foot at the basal end. All layers are single-celled except the fourth, which is divided into two cells subequally. Insertion cell is black. Appendage single, up to 150–175 μm long, hyaline, usually branched with septa above, lowest two cells darkened, one or two antheridia, borne on single basal cell. Perithecium is 42.7–50 \times 12.5–18.7 μm , faintly olivaceous, two-thirds free, in-

ner margin straight, outer margin convex, apex blunt with blackened area around its base, lips hyaline.

This is one of the five species reported from the order Hymenoptera. All of them occur only on ants. Besides the above species, the other two species of *Laboulbenia* which occur on ants are *L. formicarum* Thaxter (1908) and *L. ecitonis* Blum (1924). The former is found on ants of the genera *Lasius*, *Formica*, *Prenoleps*, *Polyergus* and *Myrmecocystus* (subfamily Formicidae), while *L. ecitonis* is found on *Ecton quadriglume* Haliday (subfamily Dorylinae).

Host genus: *Camponotus* (Hymenoptera, Formicidae).
Specimens examined: Delhi, Aug. 5, 11, 1992, DU/MSK/906–907; Sep. 8, 18, 1992, DU/MSK/908–909; Oct. 5, 8, 11, 16, 1992, DU/MSK/910–913; Dec. 4, 8, 1992, DU/MSK/914–915.

Laboulbenia cristata Thaxter, Proc. Amer. Acad. Arts Sci. **28**: 174. 1893, Mem. Amer. Acad. Arts Sci. **12**: 330. 1896, **13**: 354. 1908; Sugiyama and Shazawa, Trans. Mycol. Soc. Japan **18**: 276. 1977; Lee and Lee, A festschrift celebrating the sixtieth birthday of Dr. Ji-Yul Lee, p. 120. 1982; Sugiyama and Majewski, Trans. Mycol. Soc. Japan **26**: 455. 1985; Majewski, Trans. Mycol. Soc. Japan **29**: 38. 1988. Figs. 2, 5

Total length of the thallus is 212.5–250 μm . Receptacle is hyaline in immature thallus but becomes pale yellowish brown with age, consists of basal and distal portions. The basal portion is cylindrical, variable in length and consists of five layers of cells. All layers are one-celled except the fourth one. The first and second layers form a stalk which tapers towards the base forming a foot at the basal end. The first layer is 25–43.7 μm long and 18.7–25 μm thick, the second layer is 43.7–75 μm long and 25–37.5 μm thick. The third layer is 12.5–18.7 μm thick and 25–31.6 μm long. The fourth layer is composed of two cells, 18.7–25 μm long and 12.5 μm thick, of which the anterior cell is smaller than the

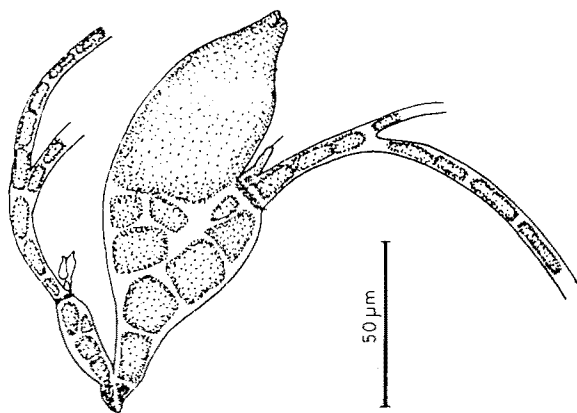


Fig. 1. *Laboulbenia camponoti* on *Camponotus* sp.
Mature individual and an individual with aborted perithecium.

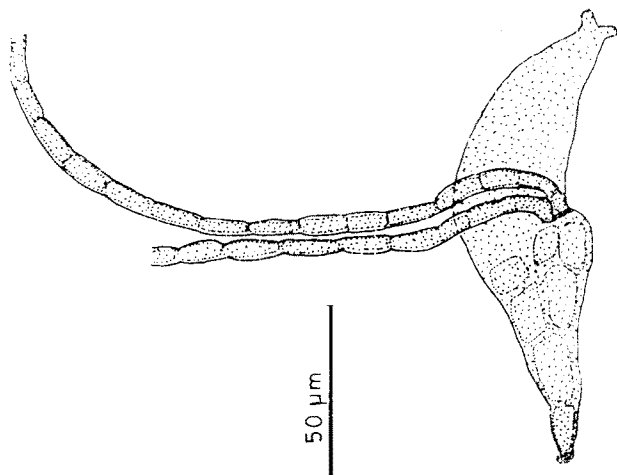


Fig. 3. *Laboulbenia idiostoma* on *Altica* sp.
Mature individual.

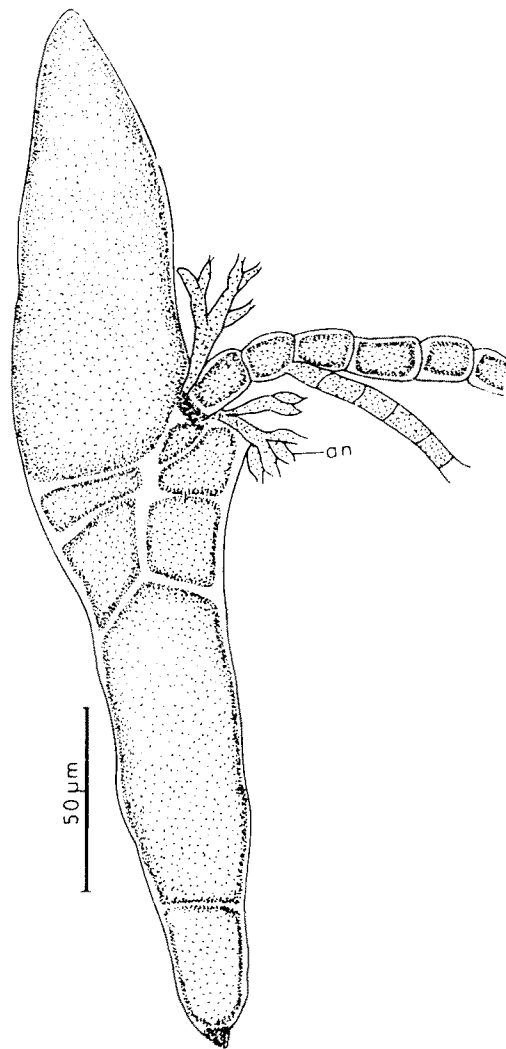


Fig. 2. *Laboulbenia cristata* Thaxter on *Paederus* sp.
Mature individual with antheridia (an).

posterior. The fifth layer is black, forming a constricted portion of the receptacle, $3.12\text{--}4\ \mu\text{m}$ long and $12.5\text{--}18.7\ \mu\text{m}$ wide. The distal portion of the receptacle is composed of two branches, the posterior branch is thicker than the anterior one, composed of two hyaline cells at the base and forming about three simple brownish branchlets at the basal end of the subbasal cell, $137.5\text{--}175\ \mu\text{m}$ long, the anterior branch is short comparatively and producing terminal antheridia in small clusters.

Perithecia reddish brown, blackened at apex, completely free from the receptacle on lateral side, $87.5\text{--}125\ \mu\text{m}$ long and $37.5\text{--}50\ \mu\text{m}$ in diam. Stalk concolorous with the receptacle formed near the distal end of a large basal cell and a few distal small cells, arranged laterally, $31.2\text{--}37.5\ \mu\text{m}$ long and $18.7\text{--}25\ \mu\text{m}$ thick.

Host genus: *Paederus* (Coleoptera, Staphylinidae).

Distribution: Europe, Penninsular Malaysia, Korea, Japan (Sugiyama, 1973; Majewski, 1988), North, Central and South America.

Specimens examined: Delhi, May 5, 12, 1992, DU/MSK/919-920; June 14, 22, 1992, DU/MSK/921-922; July 10, 1992, DU/MSK/923; Aug. 18, 22, 1992,

DU/MSK/924-925; Sept. 22, 1992, DU/MSK/926; Oct. 21, 1992, DU/MSK/927.

This is one of the most distinct species of the genus. The important feature of this species is the outer branch of the receptacle, which is branched into three to many simple branchlets on the subbasal cell. These branchlets are usually suffused with reddish brown pigment and arranged in an antero-posterior series. The outermost branchlet is blackish at the base and hyaline at the distal portion and is lost in mature individuals. The present species compares very favorably in all respects with the description and illustration given by Thaxter (1914).

Laboulbenia idiostoma Thaxter, Proc. Amer. Acad. Arts Sci. 50: 28. 1914; Sugiyama and Phanichapol, Nat. Hist. Bull. Siam Soc. 32: 74. 1984; Majewski and Sugiyama, Trans. Mycol. Soc. Japan 27: 432. 1986.

Figs. 3, 6, 7

Thallus is hyaline, brown, consisting of a receptacle

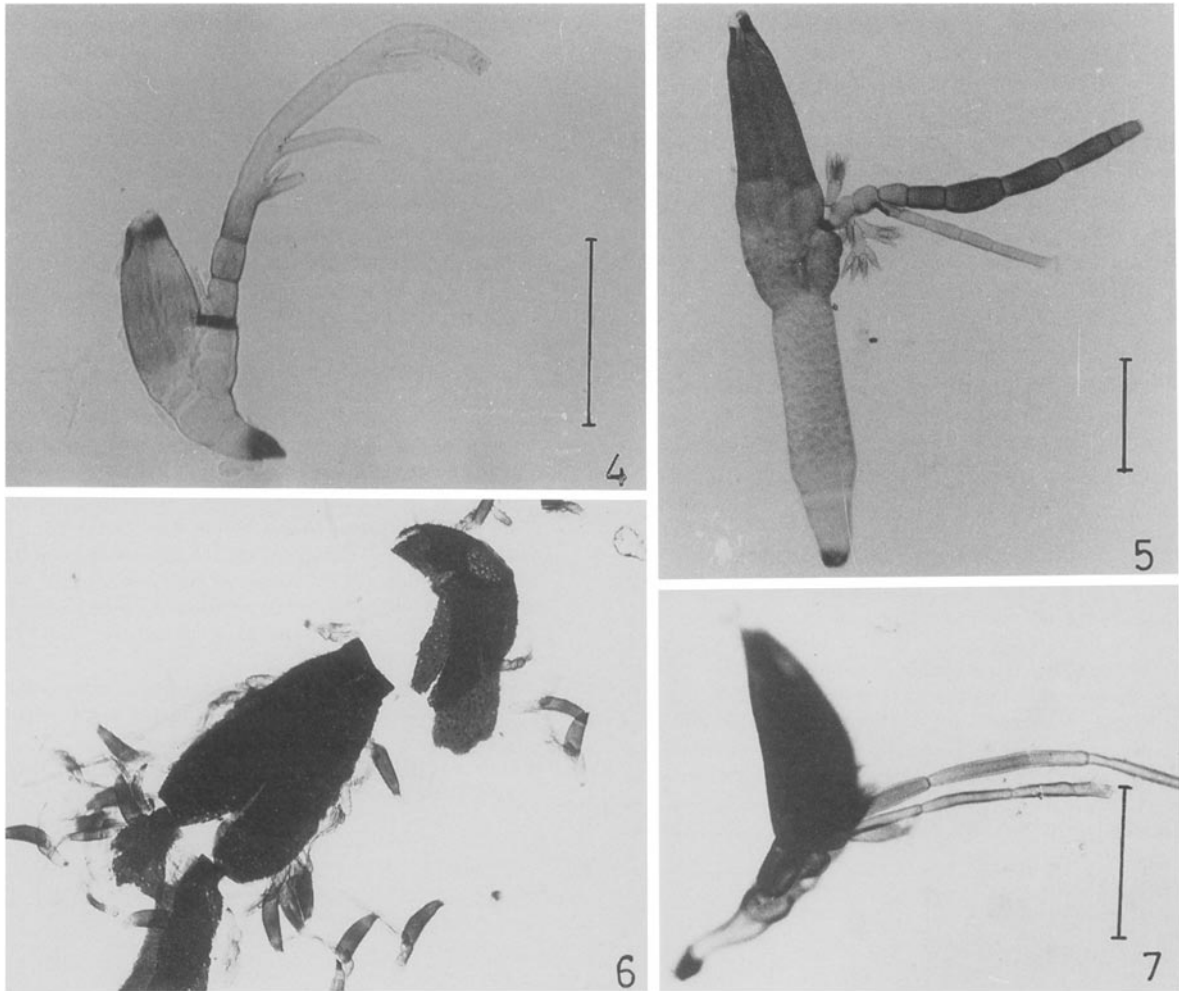


Fig. 4. *Laboulbenia camponoti*.
Mature thallus.

Fig. 5. *Laboulbenia cristata*.
Mature individual showing antheridia.

Figs. 6, 7. *Laboulbenia idiostoma*.

6: Insect showing number of fungi attached to it.

7: Mature thallus with perithecial projections. (All scales 50 μm .)

and perithecium proper. Total length to the tip of the thallus is 125–137.5 μm . The thickest portion is 31.2 μm . Receptacle is composed of receptacle proper and two distal branches. Receptacle proper is cylindrical, short and stout, comprising five layers of cells. Each layer is one-celled except the fourth. The first and second layer form a stalk of the thallus. The first layer is hyaline, thickest at the distal end, gradually tapering towards the basal foot, 25–37.5 μm long and 12.5–18.7 μm thick, the second layer is darker than the first, 18.7–25 μm long and 12.5 μm thick and is placed on the posterior half of the distal end of the second layer. The fourth layer is composed of two roundish cells arranged antero-posteriorly, 18.7–25 μm long and 12.5 μm thick, of which the posterior cell is larger than the anterior. The fifth layer is blackish, flat, forming a constricted part of the receptacle. The distal two branches of receptacle are placed above the fifth layer, arranged antero-

posteriorly, the anterior branchlet short and dichotomous, forming terminal antheridia, the posterior two branchlets are simple, long sterile. The posterior branch of the receptacle is simple or sometimes forms two simple branchlets of unequal length above the basal cell, the longer branchlet is constricted with a blackish septum at the base, 262.5–275 μm long. Perithecium consisting of a stalk and perithecium proper, the stalk is short and formed on the distal end of the second layer of the receptacle, separated from it by an oblique septum, united to the third and the fourth layer on lateral side, perithecium proper is darkly suffused with blackish brown except the tip, thickest near the base, tapering towards the distal end, free from the receptacle laterally forming apically a pair of short hyaline projections with round tips. Antheridium slightly brownish, 25–37.5 μm long.
Host genus: *Altica* (Coleoptera, Chrysomelidae).
Distribution: Thailand (Sugiyama and Phanichapol, 1984)

Borneo (Majewski and Sugiyama, 1986), Bali, Taiwan and Haiti (Thaxter, 1914).

Specimens examined: Delhi, March 15, 18, 1993, DU/MSK/904, 905.

The main features of this species are the short receptacle with the posterior branch of the appendage bent at the base and the relatively large conical perithecium with distinct apical projections.

The species infests the host very heavily although it was encountered only from the antenna of the host insect.

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Literature cited

- Batra, S. W. 1963. Some Laboulbeniaceae (Ascomycetes) on insects from India and Indonesia. *Amer. J. Bot.* **50**: 986–992.
- Blum, G. 1924. Zwei neue Laboulbenien aus Brasilien. *Centr. Bakt., Parasitenk. Infektionskr., 2 Abt.* **62**: 300–302.
- Kaur, S., Pathak, A. and Mukerji, K. G. 1993. Studies on Indian Laboulbeniomyces I. Three unrecorded species of the genus *Laboulbenia* Montagne et Robin. *Cryp. Bot.* **3**: 357–360.
- Lee, Y.-B. and Lee, C.-I. 1982. Studies on the Laboulbeniomyces in Korea (III). In: "A festschrift celebrating sixtieth birthday of Dr. Ji-Yul Lee," pp. 117–125. Committee for the publication of a festschrift for Dr. Ji-YUL Lee in commemoration of his sixtieth birthday, Seoul.
- Majewski, T. 1988. Some Laboulbeniales (Ascomycotina) collected in Japan. I. Species from Shizuoka Prefecture. *Trans. Mycol. Soc. Japan* **29**: 33–54.
- Majewski, T. and Sugiyama, K. 1986. Notes on the Laboulbeniomyces (Ascomycotina) of Borneo IV. *Trans. Mycol. Soc. Japan* **27**: 425–439.
- Sugiyama, K. 1973. Species and genera of Laboulbeniales (Ascomycetes) in Japan. *Ginkgoana* **2**: 1–97.
- Sugiyama, K. and Majewski, T. 1985. The Laboulbeniomyces (Ascomycotina) of Peninsular Malaysia II. *Trans. Mycol. Soc. Japan* **26**: 449–462.
- Sugiyama, K. and Phanichapol, D. 1984. Laboulbeniomyces (Ascomycotina) in Thailand. I. *Nat. Hist. Bull. Siam Soc.* **32**: 47–88.
- Sugiyama, K. and Shazawa, E. 1977. Notes on Laboulbeniomyces of Formosa. *Trans. Mycol. Soc. Japan* **18**: 270–278.
- Thaxter, R. 1893. New species of Laboulbeniaceae from various localities. *Proc. Amer. Acad. Arts Sci.* **28**: 156–188.
- Thaxter, R. 1896. Contribution towards a monograph of the Laboulbeniaceae. *Mem. Amer. Acad. Arts Sci.* **12**: 187–429.
- Thaxter, R. 1908. Contribution towards a monograph of the Laboulbeniaceae. Part II. *Mem. Amer. Acad. Arts Sci.* **13**: 217–469.
- Thaxter, R. 1914. Laboulbeniales parasitic on Chrysomelidae. *Proc. Amer. Acad. Arts Sci.* **50**: 15–50.