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Laboulbeniales from Poland parasitizing on semi-aquatic insects

ANNA SARNA, JOLANTA MILEWSKA

Institute of Botany, Warsaw University, Al. Ujazdowskie 4,
00-478 Warsaw, Poland

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In this study, a new species of *Coleoptera* parasites (*Hydrophilomyces limnebii* sp. n. on *Limnebius aluta* and *L. truncatellus*) and new subspecies (*Rhynchophoromyces anacaenae* Scheloske ssp. *nasutellus* ssp. n. on *Anacaena limbata*) are described. The localities of three species new in Poland are given.

INTRODUCTION

The present publication is a result of the authors' study dealing with flora of *Laboulbeniales* in Poland. The material was collected from May to September 1974 in the environments of Warsaw and in the Suwałki lake district.

The purpose of the authors' research was to investigate *Laboulbeniales* flora parasitizing on semi-aquatic insects.

There were 20 species of *Laboulbeniales* parasitizing on semi-aquatic insects known in Poland prior to our study. They were described in publications by J. and W. Siemaszko (1928, 1931, 1933) and by Majewski (1971, 1973a, b, 1974).

The authors themselves have found 19 species of aquatic *Laboulbeniales*. One species new to science, *Hydrophilomyces limnebii* sp.n.; and one subspecies new to science, *Rhynchophoromyces anacaenae* Scheloske ssp. *nasutellus* ssp. n., were found. Three species new in Polands flora were collected: *Autoicomyces crassus* Speg., *Chitonomyces ceratomycetalis* Thaxter, and *Hydrophilomyces elegans* Speg.

In general, 2605 specimens of *Laboulbeniales* parasitizing on 459 hosts were collected. 24 species of *Laboulbeniales* parasitizing on semi-aquatis insects found in Poland, are already known.

A LIST OF COLLECTED *LABOULBENIALES* AND THEIR HOSTS

Fungus	Host
Autoicomyces crassus Speg.	— *Berosus luridus* L. (*Coleoptera, Hydrophilidae*)
Cantharomyces italicus Speg.	— *Dryops* sp. (*Coleoptera, Dryopidae*)
Ceratomyces aquatilis Picard	— *Hydrochus carinatus* Grm.; *H. elongatus* Schall (*Coleoptera, Hydrophilidae*)
Chaetarthriomyces crassapendicatus Scheloske	— *Chaetarthria seminulum* Hrbst. (*Coleoptera, Hydrophilidae*)
Chitonomyces bidessarius Thaxter	— *Hygrotus inequalis* Gyll. (*Coleoptera, Dytiscidae*)
Chitonomyces ceratomycetalis Thaxter	— *Haliplus wehnckei* Gerh. (*Coleoptera, Haliplidae*)
Chitonomyces hydropori Thaxter	— *Coelambus impressopunctatus* (Schall.) (*Coleoptera, Dytiscidae*)
Chitonomyces melanurus Peyr.	— *Laccophilus hyalinus* Degeer; *Laccophilus minutus* L. (*Coleoptera, Dytiscidae*)
Chitonomyces paradoxus (Peyr.) Thaxter	— *Laccophilus hyalinus* Degeer; *Laccophilus minutus* L. (*Coleoptera, Dytiscidae*)
Coreomyces macropus Thaxter	— *Sigara praeusta* Fieb. (*Hemiptera, Corixidae*)
Helodiomyces elegans Picard	— *Dryops* sp. (*Coleoptera, Dytiscidae*)
Hydraeomyces halipli Thaxter	— *Cnemidotus caesus* Dft.; *Haliplus haydeni* Wehncke; *Haliplus ruficollis* Deg.; *Haliplus wehnckei* Gerh. (*Coleoptera, Haliplidae*)
Hydrophilomyces coneglianensis Speg.	— *Laccobius minutus* L.; *Laccobius alutaceus* Thoms. (*Coleoptera, Hydrophilidae*)
Hydrophilomyces elegans Speg.	— *Laccobius minutus* L.

Hydrophilomyces limnebii sp. n.	— *Limnebius aluta* Bedel; *Limnebius truncatellus* Thunb. (*Coleoptera, Hydrophilidae*)
Laboulbenia gyrinicola Speg.	— *Gyrinus mergus* Ahrens; *Gyrinus natator* (L.) Müller (*Coleoptera, Gyrinidae*)
Rhynchophoromyces anacaenae Scheloske	
ssp. *anacaenae*	— *Anacaena limbata* F.; *Anacaena globulus* Payk. (*Coleoptera, Hydrophilidae*)
ssp. *nasutellus* ssp. n.	— *Anacaena limbata* F.
Rhynchophoromyces hydrobii Majewski	— *Hydrobius fuscipes* L.; *Hydrophilus caraboides* L. (*Coleoptera, Hydrophilidae*)
Zodiomyces vorticellarius Thaxter	— *Helochares lividus* Forst.

SPECIES NEW FOR SCIENCE AND NEW IN POLAND'S FLORA

Autoicomyces crassus Spegazzini

On *Berosus luridus* L.: Postawele, Suwałki county, small lake among swamps, 17.07.1974, leg. A. Sarna.

The specimens correspond to the description and drawing of Spegazzini (1915: 39-40, fig. 3). They differ only in the presence of additional, small secondary appendages forming on the tip of the primary appendage.

Chitonomyces ceratomycetalis Thaxter

On *Haliplus wehnckei* Gerh.: Kleszczówek, Suwałki county, melioration ditch, 5.08.1974, leg. A. Sarna.

Only one specimen was found and it corresponds to the description and drawing of Thaxter (1926: 517) and Scheloske (1969: 99, fig. 12-13).

Species known from the Federal Republic of Germany (Scheloske 1969) and China (Thaxter 1926).

Hydrophilomyces elegans Spegazzini

On *Laccobius minutus* L.: Kleszczówek, Suwałki county, on the banks of lake Krajwelek, 10.08.1974; on the banks of Przechodnie Mazowieckie

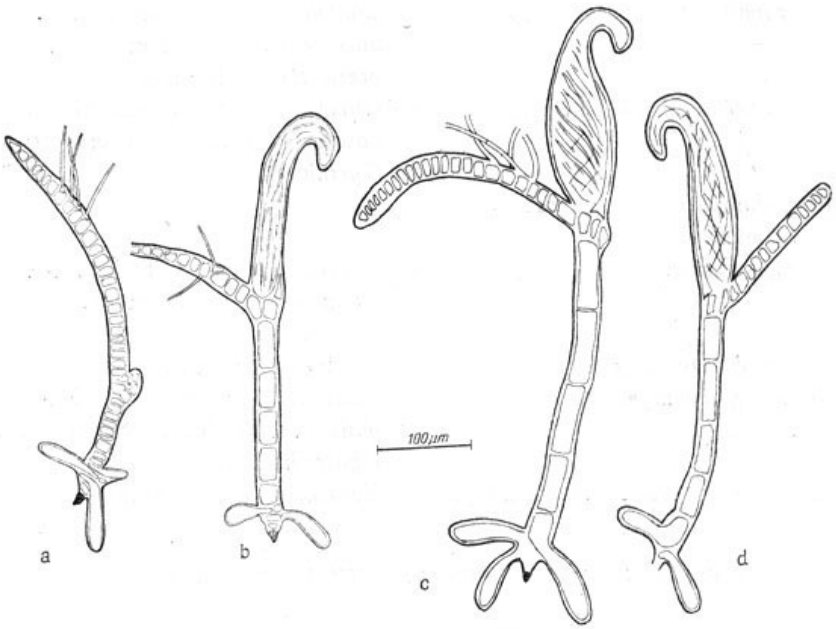

Fig. 1 *Hydrophilomyces elegans* Speg. on *Laccobius minutus* L.
Kleszczówek: *a* — immature specimen, *b* — mature specimen; Dębina: *c* — specimen with 23 cells in appendage, *d* — specimen with 15 cells in appendage

lake, 12.07.1974, leg. A. Sarna; Łomna, Warsaw voivodship, near Nowy Dwór, a small body of water near a village, 28.05.1974; Dębina, Warsaw voivodship, near Nowy Dwór Mazowiecki, melioration ditch in wet fields, 19.09.1974 leg. J. Milewska.

The specimens from Suwałki county (collected by A. Sarna) are somewhat smaller than the fungi found and described by Spegazzini (1915: 54, fig. 19). Some specimens have less cells in appendages. Total length: 405—440 µm, appendage length: 210-250 µm. Appendage consists of 16-22 cells. (Fig. 1).

Specimens from the Kampinos primeval forest (collected by J. Milewska) are more than 50% larger than Spegazzini's (l. c.); total length: 700 µm; 744 µm. Perithecium 310 µm; 340 µm. The appendages of specimens here described were composed of 15 and 23 cells.

According to Spegazzini, the number of cells in appendage is one of the main traits that distinguish *Hydrophilomyces elegans* from *H. coneglianensis*. This characteristic number is 20-22 for *H. elegans* and 15-16 for *H. coneglianensis*.

Polish specimens described here have varying numbers of appendage

cells (from 15 to 23), which indicates that the trait cannot be a diagnostic one.

Thaxter (1931: 297) has included *H. elegans* in the genus *Misgomyces*. This species, however, has a characteristic elongated cell among the cells of perithecium wall and specific appendage structure. Therefore, it seems proper to include this species in the genus *Hydrophillomyces*.

Species known in Italy only.

Hydrophilomyces limnebii Sarna et Milewska sp. n.

Habitus hyalinus. Receptaculum longum, leviter arcuatum, in tota fere longitudine eandem diametrum habens, ex 12-16 cellulis (saepius 14-15) una supra aliam positis, constructum est. Cellula infima receptaculi forman trianguli saepius habet, cellulae tamen in parte inferiore receptaculi compressae vel quadratae attamen in parte superiore longiores quam latiores sunt. In super duae cellulae sustinentes, quae in parte inferiore receptaculi inveniuntur, paulo elongatae sunt. Cellula pedunculi perithecii parva est ac variam formam habet. Perithecium longum, gracile, cum parum apparenti ventre perithecii collumque 2-4 longius quam venter perithecii plus minusve in medio valde flexuosum et usque ad leviter distinctam partem apicalem in fine compressam angustatur. Cellula externa parietis perithecii distincta. Appendix (antheridialis) similis receptaculo, ex 11-15 cellulis minoribus quadratisque constructa est. Antheridia e parvis ac triangularibus cellulis, quae in parte superiore appendicis se separant, singillatim oriuntur. Tota longitudo (scilicet ab ungue ad apicem perithecii erecti: 595-900 μm; longitudo receptaculi: 288-420 μm; longitudo perithecii (cum toto collo): 425-480 μm; longitudo partis flexuosae colli 115-190 μm; appendix ad 180 μm longa.

Typus: parasitus Laccobius minutus L. in Polonia (Kleszczówek).

Hyaline. Receptacle long, slightly curved, of equal diameter, consisting of 12-16 superposed cells (mostly 14-15). The basal cell is triangular, lower cells flattened or square, upper ones elongated. Two elongated supporting cells are to be found in the lower part of the receptacle. The stalk-cell of the perithecium is small, variform. The perithecium is long, slender, with a slightly differentiated venter. The neck of the perithecium is 2-4 times longer than the venter, sharply curved half way through its length, narrowing to the sligthly distingushed tip and the flattish apex. The appendage is similar to the receptacle, consisting of 11-15 smaller, square cells. The antheridia arise individually from small triangular cells which are separated from the cells in the upper part of appendage.

Total length (including the recurved portion): 595-900 μm, receptacle: 288-420 μm, perithecium (including the whole neck): 425-480 μm, recurved part of perithecium: 115-190 μm, appendage: 180 μm. (Fig. 2).

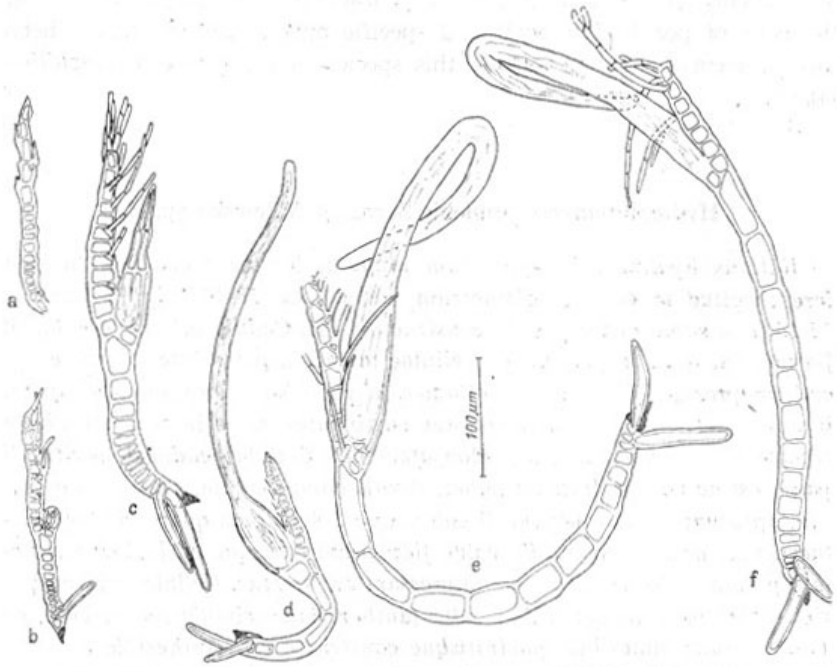

Fig. 2 *Hydrophilomyces limnebii* sp. n. on *Limnebius truncatellus* Thunb.
a — Dębina — very young specimen; *b* — Postawele — young specimen with forming perithecium; *c* — Postawele — immature specimen; *d* — Smolniki — mature specimen with straight neck of perithecium; *e* — Dębina — mature specimen with curved receptacle; *f* — Kleszczówek — mature specimen, holotype

On *Limnebius truncatellus* Thunb.: Postawele, Suwałki county, small pool among swamps, 17.07.1974; Postawelek, Suwałki county, peat-ditch, 19.07.1974; a pothole among swamps, 22.07.1974; Kleszczówek, Suwałki county, peat-ditch, 8.08.1974 (coll. T. Majewski 1478 — holotype), leg. A. Sarna. Dębina, small pool in meadows, 18.09.1974, leg. J. Milewska.

On *Limnebius aluta* Bedel: Postawele, Suwałki county, in wet meadows, 13.08.1974; Smolniki, Suwałki county, peat-ditch, 12.8.1974, leg. A. Sarna.

Among the mature specimens found, almost all have the neck of the perithecium curved. One specimen with a straight neck was found (Fig. 2d). This fungus also had a smaller number of cells (7) in the receptacle.

The fungus was classified to genus *Hydrophilomyces* on the basis of Benjamin's key (1970: 77-94). The following traits are characteristic of this genus: 1) a straight appendage consisting of superposed cells of regular shape. Appendage is a continuation of the axis of the receptacle. From the appendage arise some barren branches and sitting antheridia. 2) the presence of a distinct, additional elongated cell in the wall of the perithecium.

The specimens found are quite similar to *Hydrophilomyces hamatus* Majewski (1974: 275-276, Fig. 4). The common characteristics are: the presence of two elongated buffer cells in the lower part of the receptacle, the long recurved perithecium neck and a similar arrangement of the appendage cells. The fungi described here differ, however, from *H. hamatus* by: 1) their larger size (total lenght of *H. hamatus*: 270-420 μm, perithecium 200-280 μm; 2) a much longer and much more sharply recurved perithecium neck, 3) the cells forming the appendage divide themselves into small, triangular cells from which lateral branches grow out.

The new species is less similar to other known *Hydrophilomyces* species.

The fungus was found on the lower part of the host's body (*Limnebius truncatellus* and *L. aluta*): 6 specimens on the coxae of the hind legs, 4 specimens on the mesothorax, 4 on the margin of the left elytron, 3 on the lower side of the abdomen, and 4 on the metasternum.

The name of the species found originated from the host's generic name.

Rhynchophoromyces anacaenae Scheloske

Among the material found on *Anacaena limbata* F. and *A. globulus* Payk., some specimens agree well with Scheloske's diagnosis (1969: 143-144) but others stick to the description and drawings of Scheloske (l.c.). On this ground we decided to make a new subspecies — ssp. *nasutellus*. In this way the range of variability of this species includes the characters of ssp. *anacaenae* and ssp. *nasutellus*. (Fig. 3).

Rhynochophoromyces anacaenae Scheloske
ssp. **nasutellus** Milewska ssp. n.

Habitus brunescens. Receptaculum longum ac rectum atque in tota longitudine paene eandem diametrum habens, ex 9-12 cellulis quadratis constructum est. Perithecium longum fuscatiore ac distincta parte ven-

trali. Collum longius quam pars ventralis, flexuosum versus appendicem antheridialem atque in parte apicali ubi etiam rostellum invenitur, leviter inflatum est.

Typus: parasitus *Anacaena limbata F. in Polonia (Buraków).*

Yellowish-brown in color. The receptacle is long, straight, equal in diameter, consisting of 9-12 superposed square cells. The perithecium is greatly elongated, with a differentiated venter and a long neck. The

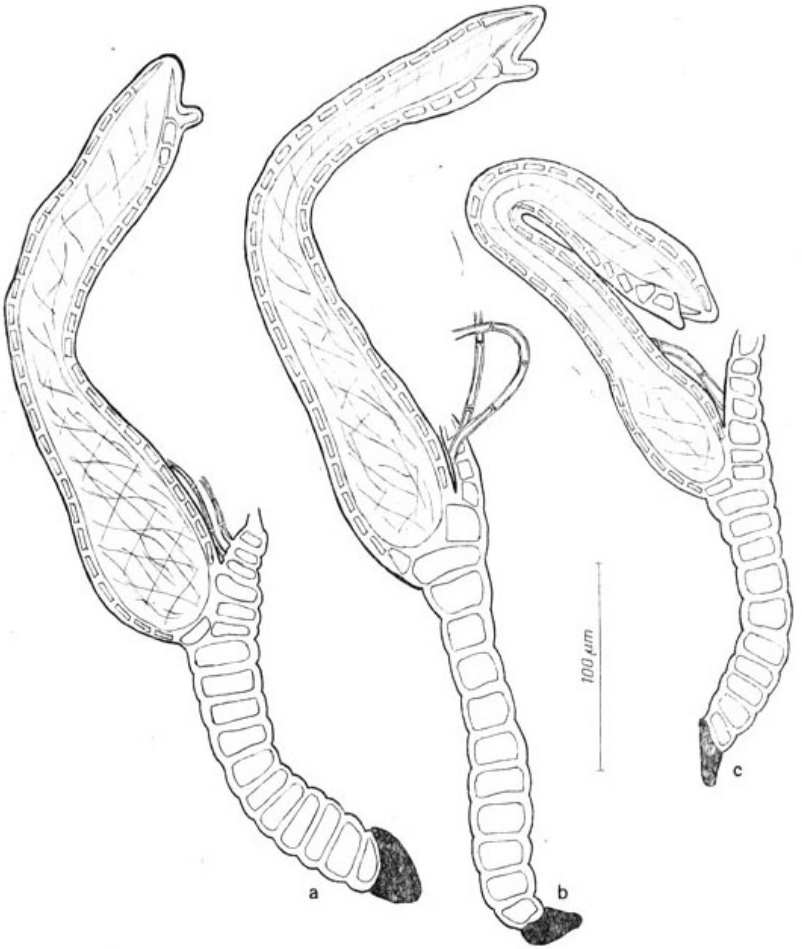

Fig. 3. *Rhynchophoromyces anacaenae* Scheloske ssp. *nasutellus* ssp. n. on *Anacaena limbata* F.

a — Buraków — specimen with straight neck of perithecium; *b* — Buraków — specimen with slightly recurved neck of perithecium, holotype; *c* — Polesie Stare — specimen with sharply recurved neck of perithecium

venter is shorter and darker than the neck, more less or bent toward the appendage. The apex of the perithecium is broader, with a small digitate process.

On *Anacaena limbata* F.: Buraków, Warsaw voivodship near Nowy Dwór Mazowiecki, a shallow melioration ditch in fields, 1.05.1974, 18 specimens on 4 hosts (coll. T. Majewski 1565 — holotype); Polesie Stare, a melioration ditch in fields, 4 specimens on 1 host, 9.05.1974; Dziekanów Leśny, a melioration ditch in meadows, 3 specimens on 1 host, 30.05.1974, leg. J. Milewska.

The most characteristic trait of the described specimens is the presence of one small digitate process (occassionally two) on the apex of the perithecium. This process is formed by a protrusion of the terminal cell of the perithecium wall, and the neck of the perithecium is somewhat broader in this place. It is characteristic that the neck of the perithecium is sharply recurved towards the appendage, that is to say, opposite to the typical specimens of *R. anacaenae*. The total lenght is variable — 432 μm up to 792 μm, but dimensions 432-480 μm were characteristic for 3 specimens, 564-576 μm — for 3 specimens, 618-624 μm for 3, and 9 specimens were longer than 700 μm. Receptacle consists of 9-12 cells, never less than 9 (receptacle in *R. anacaenae* Schelocke ssp. *anacaenae* is often composed of 6-8 cells).

The described fungi appear on the whole lower side of host's body, including the legs. It is interesting to note, that these fungi were not found on the lower side of elytra and on the margins of prothorax where typical specimens of *R. anacaenae* ssp. *anacaenae* often appear.

All these traits indicate that the described fungi distinctly differ from *R. anacaenae* ssp. *anacaenae*. No intermediate forms between the described specimens and *R. anacaenae* ssp. *anacaenae* have been found and this fact indicates that the non-typical structure of the described fungi is not due to variability and plasticty of this species.

Rhynchophoromyces hydrobii Majewski

On *Hydrobius fuscipes* L.: Smolniki, Suwałki voivodship, a small body of water in swamps, 2.08.1974, leg. A. Sarna; Łomianki, Warsaw county, near Nowy Dwór Mazowiecki, a small lake near a village, 2.05.1974; *Kiełpin*, Warsaw county, near Nowy Dwór Mazowiecki meliorationu ditch near Kiełpińskie Lake, 29.05.1974, leg. J. Milewska.

On *Hydrophilus caraboides* L.: Smolniki, Suwałki voivodship a small body of water in swamps, 2.08.1974, leg. A. Sarna.

Specimens from *Hydrobius fuscipes* correspond to the description and figures of Majewski (1971: 274-276, Fig. 7) but the fungi from

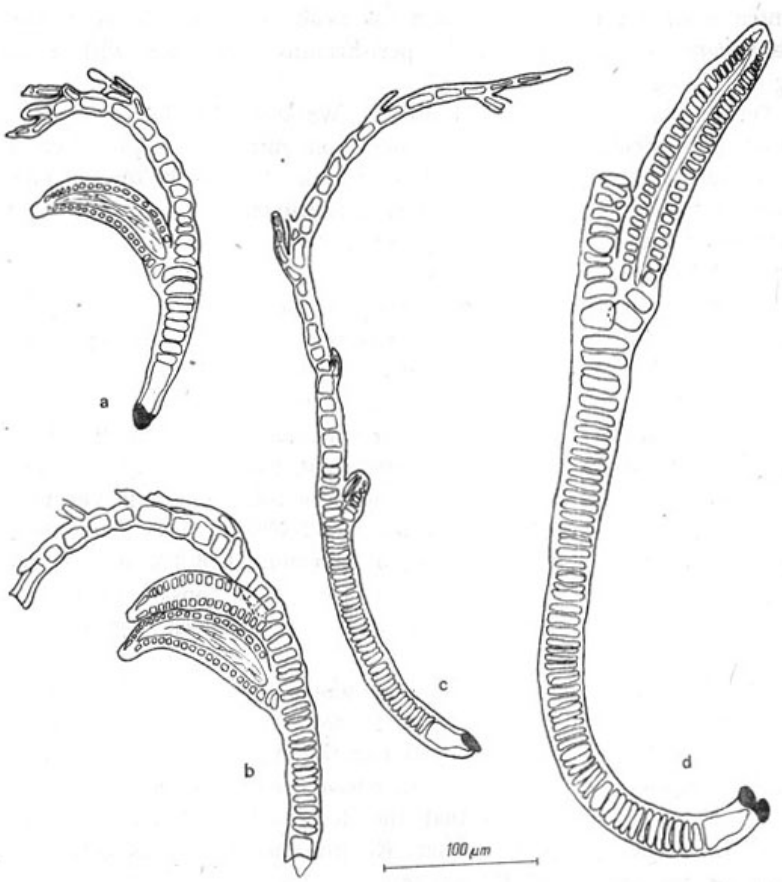

Fig. 4 *Rhynchophoromyces hydrobii* Majewski on *Hydrophilus caraboides L.*, Smolniki

a — mature specimen with sharply recurved one perithecium; *b* — mature specimen with sharply recurved two perithecia; *c* — young, greatly elongated specimen; *d* — mature, greatly elongated specimen

Hydrophilus caraboides are quite different from Majewski's diagnosis. They have a sharply recurved outside perithecium (at 55° angle from the axis of the receptacle), (Fig. 4a), and consequently the axis of the appendage is a continuation of the axis of the receptacle (in typical specimens the axis of the perithecium is a continuation on the axis of the receptacle).

Some elongated specimens were found (Fig. 4d). Total lenght 425-480 µm, receptacle 282-418 µm. Not all specimens were quite mature, so their dimensions should probably be larger. This elongation is due to the

presence of a receptacle three times as long (compared with Majewski's data) which is composed of 45-58 cells.

According to Majewski (1971), the presence of two perithecia (less frequently one and rarely three) is one of the characteristics attributed to *R. hydrobii*. Among the material found, a majority of specimens had only one perithecium.

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Laboulbeniales z Polski pasożytujące na owadach wodnych

Streszczenie

W pracy opisano nowy dla nauki gatunek *Laboulbeniales* pasożytujący na chrząszczach (*Hydrophilomyces limnebii* sp. n. na *Limnebius aluta* i L. *truncatellus*) oraz nowy podgatunek również występujący na *Coleoptera* (*Rhynchophoromyces anacaenae* Scheloske ssp. *nasutellus* ssp. n. na *Anacaena limbata*). Podano także trzy gatunki nowe dla flory Polski.