

**Bot flies and warble flies
(Diptera: Gasterophilidae, Oestridae,
Hypodermatidae) in the collection of the
Hungarian Natural History Museum. II. Larvae**

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Abstract: The collection label data of larval specimens of bot and warble fly species preserved in the Zoological Department, HNHM, Budapest, are described. Eighteen species of the three dipterous families are represented by more than 1,100 specimens, which include also some larvae collected in Egypt (1 sp.) and in Mongolia (3 spp.).

Key words: Diptera, Gasterophilidae, Oestridae, Hypodermatidae, collection records, Hungary, Palaearctic region.

Numerous publications appear in the scientific literature on bot and warble fly species every year. These papers deal not only with their taxonomy, life-habits and phenology but also with the newest methods of their control and the immunological reactions of their hosts, etc. Below only those works are shortly reviewed which were inevitably necessary or useful for the identification of larvae. As a matter of course, the literature published on the species found in Hungary is more inclusively mentioned.

The greatest personality of bot and warble fly studies was K. Ya. Grunin, who deceased recently. For the book series "Fauna SSSR" he worked up all the three dipterous families in details (1955, 1957, 1962). The morphology of larvae was also discussed in his books in a proper way: numerous good illustrations were published, which have by now served several generations of dipterists in studies or identifications of bot and warble flies. When Grunin (1965, 1966, 1969) prepared the parts of Hypodermatidae, Oestridae and Gasterophilidae for Lindner's "Die Fliegen der palaarktischen Region", his data from the Soviet Union were amplified by those from Europe and Mongolia. Grunin (1953) published a separate book on the bot and warble flies of domesticated animals. Minár's chapters in books (1977, 1980) on the morphology and taxonomy of bot and warble flies in Czecho-Slovakia render valu-

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able help to those studying their larvae also in Hungary (he published numerous valuable papers also on the bionomics, distribution, phenology and control of the Palaearctic species). Zumpt's (1965) book is undoubtedly the best known work on the flies causing myiasis, incl. bot and warble flies. This is an excellent summary of all the morphological, phenological and life-habits data of the imagos and larvae of bot and warble flies, including the characteristics of their distribution and pathogenesis. Only a small part of the published illustrations is original (most of them are from other authors), however, his identification keys are exceptionally clear and usable. The best treatise of the morphology of Diptera larvae in recent years was published by Teskey (1981) in two chapters of the Manual of Nearctic Diptera; we concur all his morphological interpretations. Soós and Minár (1986) published the catalogue of all the three families in the new Catalogue of Palaearctic Diptera; this work is an easily accessible and usable aid also for applied entomologists in any question of nomenclature.

As for the bot and warble flies of Hungary, there are rather few publications, even if we include all the works on their control, etc. Kertész's (1897) short paper on the grubs ["kukaczkok"] living under the skin of deers and roe-deers is not an original paper but a mere compilation. Szilády (1935) was the first to review the bot and warble flies of Hungary (at least he aimed at a review). His short paper is a pretty collection of erratic names and mistakes in keys; in addition he published a new junior synonym of *Gasterophilus pecorum*. The imago material of the old collection of the HNHM, which was published by Szilády, was completely destroyed (burnt) in 1956; all who know Szilády's other works, strongly advise not to rely fully on his identifications. Szunyoghy's (1964) paper on the nasal bot fly of deer is an educational but not a scientific paper.

Sugár (1974, 1976a,b) published numerous interesting data on the bot and warble flies of wild ruminants in Hungary; actually those are the first fully reliable data on our bot and warble flies (other than *Hypoderma bovis*). There the distribution data and phenology (Sugár 1974), the prevalence and intensity of infestation with bot fly larvae (*Pharyngomyia picta*, *Cephenemyia auribarbis*, *C. stimulator*) were discussed (Sugár 1976a). His paper on the distribution of warble flies (Sugár 1976b) is equally important. He published also proposals for the control of the bot and warble fly infestations of wild ruminants. Egri (1984) published a paper on the history of research on stomach bots. In another paper (Egri 1985) he wrote about his observations on the dynamics and localization of egg-laying of *Gasterophilus intestinalis*. Papp (1988) published a review of the bot fly and warble fly species of Hungary based on his studies on the imago material of the HNHM and partly on the materials listed below. It has been found that there are no voucher specimens of *Rhinoestrus purpureus* and *Hypoderma lineatum* in collections from Hungary. In summary: the Hungarian fauna includes 14 species of bot and warble flies; three other species are expected to occur here.

MATERIALS AND METHODS

The materials for this paper are mainly all the larval materials preserved in 70% alcohol (predominantly isopropyl alcohol) in the collection of the HNHM. For a long time no resolute efforts were made at the Zoological Department to collect dipterous larvae incl. larvae of bot flies and warble flies; not more than a careful preservation of larvae that had somehow reached the collection was practised.

A Hungarian mammologist, the late János Szúnyoghy, while performing morphological studies on red deer in Hungary, collected also numerous larvae of oestrids. Unfortunately, the majority of his materials had been deteriorated before it reached the Diptera collection; the rest, i.e. the larvae now in the HNHM are in a poor state of preservation. In the list below Szúnyoghy's collection numbers are given /in brackets/.

Only a part of all the oestrid and hypodermatid larvae collected from wild ruminants during dr. László Sugár's studies came to the collection of the HNHM. These larvae are well preserved (we presume they were killed by hot water and later kept in 70 % alcohol), however originally none of the vials had identification labels. After their identification we were able to identify several vials with the data in Sugár's papers (1974, 1976a,b) but actually all these larvae were unnamed for us.

Besides the larvae collected in Hungary, several vials with larvae from Mongolia and Egypt were also studied (collectors are Dr. László Sugár, the late Dr. Zoltán Kaszab and "afrikai exp.").

In the course of the identification of bot fly and warble fly larvae, 897 specimens in 90 vials were originally found in the collection of the Zoological Department, Hungarian Natural History Museum, Budapest. That collection in the HNHM included 12 species (eight from Hungary, three from Mongolia and one from Egypt).

There is a collection in the Parasitological and Zoological Department, University of Veterinary Science, Budapest (further on: UVSB), which includes also numerous larvae of bot flies and warble flies; this collection is used for laboratory practical studies of parasitology. All these materials were also studied, identified and several former misidentifications were corrected; a few larvae per species were transferred to the collection of the HNHM. There are five demonstration objects (large cylindrical glasses) with formaldehyde in the collection of the UVSB which contain larvae (and pupae) of five species of *Gasterophilus* settled/glued on glass plates. These objects were without any locality labels; all we know is that these larvae were collected within the present borders of Hungary sometime before (or during) the Second World War. The materials in the Parasitological and Zoological Department, University of Veterinary Science are listed under "UVSB" preceding those in the HNHM in the list of species. The total number of specimens published in this paper is nearly 1,200 ex. of 18 species.

The larvae were studied with a stereomicroscope at 25 to 100-fold magnification; some first instar larvae had to be covered in liquid on a hollowed slide for study at a higher magnification. Identification labels were put into every vial. Most

of the larvae were identified by the first author (A. Sz.), thus those labels are with his name only. The identification labels bear also the short for the larval instars (L1, L2, L3, as in the list below) and the number of specimens. Now every vial contains larvae of one species only, even if larvae of two dipterous species were originally collected from the same host animal.

In the "List of species" below the species are listed in a taxonomical order following Soós and Minár (1986). As for the label data for the larvae, all the data are quoted which seem to be essential for any future retrieval and identification of any specimen in the collection. The original data in Hungarian are given in English [in square brackets], similarly to any additional data not given on labels. In the case of some species some comments on the circumstances of identification or on the state of preservation are added.

In the course of the identification and reordering of the larvae of bot flies and warble flies in the collection of the HNHM, the first author (A. Sz.) made numerous China ink drawings of the whole body of larvae (in dorsal and ventral views) or of some characteristic features; this was done partly in order to establish a better reference basis for the identifications. All these drawings will be published in the "Bagócslegyek" part of the series "Fauna Hungariae" next year.

List of species

GASTEROPHILIDAE

Gyrostigma rhinocerontis (Hope, 1840)

1 ex L3: Budapest, Állatkert [Zoo], D.-Afrikából importált orrszarvú ürtette [discharged by a black rhinoceros imported from S-Africa], 1983. nov. 24., det. L. Papp (cf. Papp 1991).

Gasterophilus haemorrhoidalis (Linnaeus, 1758)

UVSB: 14 ex. L2, 8 ex. L3, 4 ex. pupae: without any locality data (Hungary), in a demonstration object with formaldehyde (1 ex. L2 and 5 ex. L3 transferred to alcohol and preserved in the HNHM).

Gasterophilus inermis (Brauer, 1858)

UVSB: 16 ex. L3: without any locality label (Hungary), in a demonstration object with formaldehyde (4 ex. transferred to alcohol and preserved in the HNHM).

Gasterophilus intestinalis (De Geer, 1776)

UVSB: 15 ex. L3: without any locality label (Hungary), in a demonstration object with formaldehyde; 18 ex. L3: without any locality data (Hungary), 1985.VII.23. (in alcohol); 37 ex. L3: Dömsöd, Kiskunsági AG, Hajós-puszta, 1984. ápr. 2-3. Eqvalan kezelésre ürült [discharged after a treatment with Eqvalan], det. L.Papp; HNHM: 4 ex. L3: Budapest, marhavágóhíd, lógyomorból [slaughterhouse, from

horse stomach], 1965.VII.6., leg. Török Ferenc; 12 ex. pupae: 2, VII.25. [? Gammel, Hungary]; 11 ex. L3: Dömsöd-Apajpuszta, Hajós, 1984.IV.2., 2,5-3 éves csikók Eqvalan kezelésre ürtették [2.5 to 3 years old horses discharged them after a treatment with Eqvalan], leg. Papp L., Farkas R.; 45 ex. L1: ibid., Tripolisz, ló szőréről [from horse hairs as eggs], 1983.IX.27-28., leg. Papp L.; 2 ex. L1: ibid., lárvák keltek [larvae hatched] IX.27., 1983.IX.23.

Gasterophilus nasalis (Linnaeus, 1758)

UVSB: 6 ex. L2, 18 ex. L3, 4 pupae: without any locality data (Hungary), in a demonstration object with formaldehyde (4 L3 transferred to alcohol and preserved in the HNHM).

Gasterophilus pecorum (Fabricius, 1794)

UVSB: 5 ex. L2, 6 ex. L3: without any locality label (Hungary), in a demonstration object with formaldehyde (1 ex. L2 and 4 ex. L3 transferred to alcohol and preserved in the HNHM).

OESTRIDAE

Oestrinae

Oestrus ovis Linnaeus, 1758

UVSB: 4 ex. L2, 5 ex. L3: without any locality data; HNHM: 1 ex. L3: Budapest, vásárcsarnok [market-hall], bárány orr-arcfelében volt [found in the nasal cavity of a lamb], 1978.XII.21.; 1 ex. L3: Péntesgyőr, Kerteskdő, a rostacsont agyalap felé eső részén volt beágyazva [found embedded in the ethmoid bone facing the cerebral base of a sheep], 1983.IV.26. 1 ex. L3: ibid., juh orrüregéből [from the nasal cavity of a sheep]; 3 ex. L1, 2 ex. L2: ibid.; 10 ex. L1: ibid.; 1 ex. L3: ibid.; 5 ex. L3: ibid., 1983.IV.25.; 4 ex. L2: ibid., IV.26.

Cephalopina titillator (Clark, 1816)

10 ex. L3: Egypt, Abu-Rawash, Cairo mellett [near C.], 1957., afrikai exp.

Cephenemyiinae

Pharyngomyia dzerenae Grunin, 1950

3 ex. L3, 6 ex. L2: Mongolia, Ongon-Somon, 20 km SE, dzeren (*Procapra gutturosa* Gmel. female), 21.VI.1978., leg. L. Sugár; 7 ex. L3: ibid., (pregnant), 22.VI.1978.; 8 ex. L3: ibid., on the aeroplane from dzerens, 23.VI.1978. – These larvae and those of *Przevalskiana aenigmatica* (see below) were fixed with a solution of formaldehyde instead of 70 % alcohol and they were stored in that solution for a long time. The larvae have become wrinkled and grey, they are in a bad state of preservation, so their identification was a difficult task.

Pharyngomyia picta (Meigen, 1824)

UVSB: 8 ex. L3: without any locality label; HNHM: 6 ex. L3: Gemenc, No. 267., *Cervus elaphus*-ból, 1964.III.16.; 1 ex. L3: Iharos, No. 193, szarvas [red deer]; 1 ex. L3: Mátramindszent, /103/, 1964.I.24.; 3 ex. L3, 1 ex. vedlő [molting L2/L3]: Pécsvárad, *Cervus elaphus* garatból [from pharynx], 1964.I.26.; 1 ex. L2, 3 ex. L3: Budakeszi, 1 éves szarvasüdő garatüregéből [from pharyngeal cavity of a hearst]; 1 ex. L2, 4 ex. L3: Perbál-Guba, nőstény szarvasborjú orrgaratjából [from the nasopharyngeal cavity of a hind calf], 1974.IV.12.; 1 ex. L2, 4 ex. L3: Budakeszi, *Cervus elaphus* nőstény adult orrüregéből [from nasal cavity of a hind], 1974.V.13., leg. Sugár L.; 1 ex. L1, 7 ex. L2, 7 ex. L3: ibid., IV.19.; 1 ex. L1, 3 ex. L3: ibid., hím egy éves [one year old hart], V.23.; 2 ex. L2, 4 ex. L3: ibid., nőstény egy éves [hearst], VI.17.; 1 ex. L2, 3 ex. L3: ibid., két éves [two years old], VI.15.; 1 ex. L1, 3 ex. L3: ibid., V.23.; 7 ex. L1: ibid., öt éves, az orrüreg bal oldalán hét lárva, jobb oldalon nem volt [five years old, seven larvae were found on the left side of the nasal cavity, none on the right side], IX.7.; 21 ex. L1, 12 ex. L2: ibid., hím borjú [hart calf], I.4.; 2 ex. L3: ibid., nőstény tíz hónapos [hind calf of ten months], III.7.; 1 ex. L3, 1 ex. pupa: ibid., egy éves [one year old], V.21.; 4 ex. L3: ibid., nyolc éves [eight years old], VI.19.; 1 ex. L3: ibid., V.13.; 1 ex. L3: ibid., egy éves [one year old], V.23.; 1 ex. L3: ibid., adult, V.8.; 4 ex. L3: ibid., egy éves [one year old], V.30.; 1 ex. L3: ibid., VI.10.; 1 ex. L2: 2, *Cervus elaphus* nőstény [hind], 1973.XII.27.

Cephenemyia auribarbis (Meigen, 1824)

UVSB: 2 ex. L2, 44 ex. L3: without any locality label; HNHM: 1 ex. L3: Felsőbáránd, őzből [from roe-deer], 1974.VI.15., leg. Sipos Gy.; 1 ex. L3: Gemenc, No. 267., *Cervus elaphus*-ból, 1964.III.16.; 9 ex. L3: Iharos, No. 193., szarvasból [from red deer]; 8 ex. L2, 13 ex. L3: Felsőtárkány, Állami Gazd., *Cervus elaphus* orr-garatjából [from nasopharyngeal cavity], 1964.I.20.; 4 ex. L2, 11 ex. L3: ibid.; 5 ex. L2, 8 ex. L3: Mátramindszent, *Cervus elaphus*-ból /103/, 1964.I.27.; 3 ex. L3: Pécsvárad, szarvas garatból [from pharynx of a deer], 1964.I.26.; 7 ex. L3: Gödöllő, Áll. Vg., 184., *Cervus elaphus*-ból, 1964.II.12.; 10 ex. L2, 6 ex. L3: Gyulaj, Áll. Vg., *Cervus elaphus*-ból; 6 ex. L3: Karapancsa, 206., *Cervus elaphus*-ból; 6 ex. L3: Pilis, Áll. Erdész., 228., *Cervus elaphus*-ból; 7 ex. L3: Gemenc, Öcsény, 179., *Cervus elaphus*-ból, 1964.II.11.; 10 ex. L3: Szentá, Dél-Somogyi ÁG., 221., *Cervus elaphus*-ból; 8 ex. L3: Gyulaj, 208., *Cervus elaphus*-ból; 15 ex. L1: Budakeszi, 171., 1974.VI.8.; 2 ex. L2, 6 ex. L3: ibid., 3-4 éves nőstény *Cervus elaphus* orr-garatüregéből [from the nasopharyngeal cavity of a three to four years old hind], 1975.II.7.; 1 ex. L2, 6 ex. L3: ibid., tíz hónapos nőstény [ten months old hearst], 1975.III.7.

Cephenemyia stimulator (Clark, 1815)

UVSB: 11 ex. L3: Újszász, 1977. júl. 31., *Capreolus* hím garatából [from pharynx of a roe-buck], leg. Janisch M.; HNHM: 1 ex. L2, 6 ex. L3: Terehegy, Baranya, két éves őzbak garatüregéből [from pharyngeal cavity of a two years old roe-buck], 1975.V.12, leg. Somfalvi; 15 ex. L1: Királyrét (Börzsöny), kb. 10 éves őzsuta orrüre-

géből [from nasal cavity of a ca. ten years old roe-doe], 1975.IV.5.; 2 ex. L3: Biatorbágy, adult, hím óz garatüregéből [from pharyngeal cavity of an adult roe-buck], 1974.VI.8.; 1 ex. L3: Pöröske, hím adult ózból [from a roe-buck], 1974.VII.31.; 1 ex. L3: Velence, 4 éves ózbakból [from a four years old roe-buck], 1974.V.13., leg. Sugár L., Barátossy G.; 1 ex. L3: Soholló, hat éves ózbakból [from a six years old roe-buck], 1974.VII.17.; 1 ex. L3: Isaszeg, egy éves ózbak garatüregéből [from pharyngeal cavity of an one year old roe-buck], 1975.V.4.

HYPODERMATIDAE

Oestromyiinae

Oestromyia leporina (Pallas, 1778)

1 ex. L3: Bükk Nemzeti Park, Bükkzsérc, Kistrét, *Microtus arvalis*-ból /6057/, 1981.X.13., leg. Demeter A.; 3 ex. L3: B.[ükk]N.[ational]P.[ark]: Hór-völgy, Oszla, *Microtus arvalis*-ból /6081/, 1981.X.14., leg. Demeter A. – Mongolia: 1 ex. L3: Uvs aimak: 4 km OSO vom Pass Ulaan davaa, zwischen dem See Örög nuur und der Stadt Ulaangom, 1700 m, 1968.VII.6., No. 1075, leg. Dr. Z. Kaszab ("Geeinzelt am Talgrund unter Steinen und vom Boden").

Oestromyia prodigiosa Grunin, 1949

Mongolia: 1 ex. L3: Uvs aimak: Senke des Sees Acit nuur, 26 km NO von dem Flutal Altan gadasin chev gol, cca 33 km WSW vom Pass Zenklegijn davaa, 2150 m, *Ochotona pricei*, 1968.VII.4., leg. Dr. Z. Kaszab, No. 1062 ("Trockene Artemisia – Hochgebirgssteppe Geeinzelt").

Hypodermatinae

Przhevalskiana aenigmatica Grunin, 1950

Mongolia: 26 ex. L2: "Mongólia, mongol gazellából, formalin old., 1978. leg. Sugár L." [from Mongolian Gazelle, solution of formaldehyde]. - We have not got any material for comparison, only the morphological data of Grunin (1956, 1965), including his drawings. Zumpt (1965) republished Grunin's data (drawings) only.

Hypoderma actaeon Brauer, 1858

3 ex. L2, 3 ex. L3: Székesfehérvár, adult nőstény *Cervus nippon*-ból [from an adult hind of *C. nippon*], 1979.III.16.; 3 ex. L3: Nagykovácsi, adult hím gímszarvas háttájéki bőre alól [from under the skin of the back area of an adult hart], 1975.III.24.; 2 ex. L3: Budakeszi, üdő gímszarvas bőr alatti kötőszövetéből [from subcutaneous connective tissue of a hind calf], 1975.III.24., leg. Sugár L.; 2 ex. L3: ibid., III.27.; 11 ex. L1, 25 ex. L2, 1 ex. L3: ibid., hím 6 éves [from a six years old hart], 1976.XI.12.; 23 ex. L1, 29 ex. L2: ibid., hím 1,5 éves [from an one and a half years old hart], XI.12.; 23 ex. L2: ibid., nőstény [hind], 1970.I.13.; 17 ex. L2, 1 ex. L3:

ibid., 1976.XII.6.; 1 ex. L2: ibid., 1978.I.12.; 2 ex. L3: ibid., 1975.III.24.; 3 ex. L3: ibid., IV.15.

Hypoderma bovis (Linnaeus, 1758)

UVSB: 24 ex. L3: Izsák, Mózes major, 1984. ápr. 25., tenyészüszók bőre alól (hát) [from under the skin of the backs of breeding heifers], det. L. Papp [seven specimens to the collection of the HNHM]; 2 ex. L3: ibid.; numerous L3 specimens: ibid., üszók hátbőre alól [from under the skin of the backs of heifers]. Formerly there had been no larva of this species in the collection of the HNHM.

Hypoderma diana Brauer, 1858

UVSB: 1 ex. L2, 8 ex. L3: without locality, 1985, őz hátbőre alól [from under the skin of the back of a roe-deer], det. L. Papp; 3 ex. L2, 22 ex. L3: 2, 1986. febr. 21., leg. Dr. Nagy Emil [one ex. to the collection of the HNHM]; HNHM: 2 ex. L3: Gemenc, 1 éves nőstény gímszarvas bőr alatti kötőszövetéből [from the subcutaneous connective tissue of a hearst], 1974.IV.30., leg. Sugár L.; 2 ex. L3: Gödöllő, ÁTE kísérleti karám, őzbakból [experimental pen, from a roe-buck], 1978.I.13.; 30 ex. L1, 17 ex. L2: Budakeszi, nőstény őz gerinctájéki bőre alól [from under the skin of the vertebral area of a roe-dee], 1976.XII. 13.; 51 ex. L1, 3 ex. L2: ibid., fél éves hím [from a half year old male fawn], 1977.XI.21.; 74 ex. L1: ibid., fél éves nőstény [from a half year old female fawn], 1976.XI.12.; 60 ex. L1: ibid., hím [male], 1976.X.14.; 36 ex. L1: ibid., nőstény [female], 1976.XI.8.; 9 ex. L1: ibid., hím muflon bőre alól [from under the skin of a moufflon ram], 1976.XI.1. – In connection with the identification of *H. actaeon* and *H. diana* it is to be mentioned that the descriptions and drawings for the second instar larvae as published by Grunin (1962, 1965) and by Zumpt (1965, repeating Grunin's drawings), are not always unequivocally applicable (i.e. not always proper for a safe identification). It was found during our studies that the configuration of the small spines on the first and second segment varies among the specimens of both species and thus, it is less suitable for the separation of these two species. In some cases the doubtful specimens were named through the identification of third instar larvae in the same vial.

Szappanos, A. és Papp, L.: Bagócslegyek (Diptera: Gasterophilidae, Oestridae, Hypodermatidae) a Természettudományi Múzeum gyűjteményében. II. Lárvák

Az állatorvosi parazitológiai és vadegészségügyi szempontból egyaránt fontos bagócslegyek lárvainak korábban nem volt hazai lárvagűjteménye. A legtöbb lárva a Természettudományi Múzeum Állattárában gyűlt össze, ezért e gyűjteményt a szerzők az Állattár anyagainak identifikálásával kívánták megalapozni. Feldolgozták az Állatorvostudományi Egyetem Parazitológiai és Állattani Tanszékén őrzött anyagokat is. Munkájuk során több mint 1100 lárvét határoztak meg.

Magyarországon végzett gyűjtésekből 13 faj lárvaát találták (Gasterophilidae: *Gasterophilus haemorrhoidalis*, *G. inermis*, *G. intestinalis*, *G. nasalis*, *G. pecorum*;

Oestridae: *Oestrus ovis*, *Pharyngomyia picta*, *Cephenemyia auribarbis*, *C. stimulator*;
Hypodermatidae: *Oestromyia leporina*, *Hypoderma actaeon*, *H. bovis*, *H. diana*).

Mongóliából 4 faj (*Pharyngomyia dzerenae*, *Oestromyia leporina*, *Oestromyia prodigiosa*, *Przhevalskiana aenigmatica*) lárváit, Egyiptomból a *Cephalopina titillator* lárváit mutatták ki (egy Dél-Afrikából importált orrszarvúból a *Gyrostigma rhinocerotis* lárváját is).

Eredményeik rámutatnak a hazai gyűjtések hiányosságaira is (elsősorban a *Gasterophilus* és a *Hypoderma* fajok vonatkozásában). A megalapított bagócslárvagyűjtemény mint összehasonlító anyag minden további hazai vizsgálat és a bagócslárvák elleni védekezés céljait is jól szolgálja majd.

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