

PRELIMINARY DATA REGARDING BEETLE PARASITE SPECIES COLLECTED FROM DIFFERENT ECOSYSTEMS MET IN DOLJ COUNTY IN 2016

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Abstract. The research on the diversity of parasite beetles from Dolj County exposed in this paper were made in 2016. The beetle biological material (44 specimens, 3 of which displaying various parasite forms) was collected from terrestrial ecosystem - Cernătești, Craiova, Mogoșești. The hosts, from the systematic viewpoint, belong to the order Coleoptera and 3 families: Aphodiinae, Dynastiidae, Scarabaeidae. The species on which parasites were found are *Aphodius fimetarius* (Linnaeus 1758); *Oryctes nasicornis* Linnaeus in 1758; *Copris lunaris* (Linnaeus 1758). The parasites identified from the systematic viewpoint, are varied and grouped as follows: arachnids - *Uropodoidea* sp. (Mesostigmata: Uropodoidea) and *Hypoaspis* sp. (Mesostigmata: Laelapidae) and nematodes - *Ascarops strongylina* Rudolphi, 1819 (Spiruroidea: Spirocercidae: *Ascarops*). The dominant species was the arachnids identified in *Oryctes nasicornis* and *Copris lunaris*, new for Dolj, Romania in case of this species. In this paper we expose the results of research conducted in two species of parasites (*Ascarops strongylina*, identified in *Aphodius fimetarius* and *Uropodoidea* sp. to *Copris lunaris*) the other will be set out in a forthcoming paper.

Keywords: mites, beetles, Dolj County.

Rezumat. Date preliminare privind specii de paraziți la coleoptere din diferite ecosisteme din județul Dolj colectate în 2016. Cercetările privind diversitatea paraziților la coleoptere din județul Dolj expuse în lucrarea de față au fost realizate în anul 2016. Materialul biologic de coleoptere (44 exemplare din care 3 exemplare au diverse forme parazite) a fost colectate din ecosisteme terestre (Cernătești, Craiova, Mogoșești). Gazdele, din punct de vedere sistematic, aparțin ordinului Coleoptera încadrându-se în 3 familii: Aphodiinae, Dynastiidae, Scarabaeidae. Speciile pe care s-au găsit paraziți sunt: *Aphodius fimetarius* (Linnaeus 1758); *Oryctes nasicornis* Linnaeus in 1758; *Copris lunaris* (Linnaeus 1758). Paraziții identificați în urma cercetărilor de specialitate, din punct de vedere sistematic, sunt variați și sunt încadrați astfel: acarieni - *Uropodoidea* sp. (Mesostigmata: Uropodoidea) și *Hypoaspis* sp. (Mesostigmata: Laelapidae) și nematodul - *Ascarops strongylina* Rudolphi, 1819 (Spiruroidea: Spirocercidae: *Ascarops*). Specia dominantă este reprezentată de către acarieni. În lucrarea de față vom expune rezultatele cercetărilor efectuate la două specii de paraziți (*Ascarops strongylina* la *Aphodius fimetarius* și *Uropodoidea* sp. la *Copris lunaris*), celelalte urmând a fi expuse într-o lucrare viitoare.

Cuvinte cheie: acarieni, coleoptere, județul Dolj.

INTRODUCTION

The purpose of this paper is to present some contributions to the knowledge of the diversity of parasites, analyzing beetle species present in different types of ecosystems in Dolj County.

In the recent years, the insects undergo the complex action of ecological factors (climatic factors, soil factors and biotic) affecting biological cycles of insects, spread emergence of mass propagation or decrease the number of the specimens of certain species, the emergence of new pests, etc. As a result, the number of beetle specimens found in the studied ecosystems was low.

All the material found on land has been identified, analysed and then assessed the level of infestation.

The beetle biological material (44 specimens, 3 of which displaying various parasite forms) was collected from terrestrial ecosystem - Cernătești, Craiova, Mogoșești. The hosts, from the systematic viewpoint, belong to the order Coleoptera and 3 families: Aphodiinae, Dynastiidae, Scarabaeidae. The species on which parasites were found are *Aphodius fimetarius* (Linnaeus 1758); *Oryctes nasicornis* Linnaeus in 1758; *Copris lunaris* (Linnaeus 1758).

The parasites identified from the systematic viewpoint, are varied and grouped as follows: arachnids - *Uropodoidea* sp. (Mesostigmata: Uropodoidea) and *Hypoaspis* sp. (Mesostigmata: Laelapidae) and nematodes - *Ascarops strongylina* Rudolphi 1819 (Spiruroidea: Spirocercidae: *Ascarops*).

MATERIALS AND METHODS

The material used in this paper consists in identifying, analyzing and researching a total of 44 specimens found in the field, on which, there were identified three species of parasites.

The species of beetles are presented in systematic order according to the year they were collected and there are mentioned the species of parasite identified for each of them.

The material was collected in 2016. Collections were made at different times each year from the month of May. Collection date is mentioned for each species. Moreover, for every locality there are rendered the geographic coordinates, flora and fauna information. Collection methods were different according to the analysed host species.

1. **Collection methods** for *Aphodius fimetarius*, *Oryctes nasicornis* and *Copris lunaris*.

The insect was sampled from the ground with a pair of tweezers and put in a jar containing filter paper soaked with alcohol 4%. I took photos and transported the material to the Faculty of Biology, biology laboratory, where the specialists took samples from the surface of the insect-body. To analyze the mites, after taking photos, they were placed in a solution of paraffin and sent to the expert for determination.

2. Collection and research methods for mites

Each of the four specimens examined contained mites that was stored in separate glass jars at room temperature until they were carefully transported and examined under the microscope. Using tweezers, mites were collected from *O. vacca*, *O. taurus*, *Oryctes nasicornis* and *Copris lunaris* females, more precisely from the feet and the ventral side of the abdomen. For identification, the mites were prepared in paraffin.

3. Collection method for *Ascarops strongylina*

After taking photos, the parasite was removed with a pair of tweezers and put in a solution of formalin and water. The collection date and place was written on the label and then the samples were transported to the museum to be determined.

To determine the collected material there were used the works of PANIN (1957) in the entomology laboratory of the Department of Natural Sciences Museum of Oltenia Craiova. For the species of mites, the determination was performed by Mr. Ismail Babaiean, University of Tehran, College of Agriculture. From the systematic viewpoint, the species of Spirocercidae was determined by Mrs. analyst Claudia Mirela Fimon, who will further determine the exact species.

Some of the photos were made with Mr. Cristi Boicea and Mrs. Marilena Dinu - chemist in the laboratory of Restoration - Oltenia Museum Craiova by means of the stereomicroscope OLYMPUS 3D and another category were made by DMC-FZ62 Panasonic FullHD digital camera by Lila Gima.

The taxonomy and nomenclature of the identified species is made according to Fauna Europea.

RESULTS AND DISCUSSIONS

The analysed material is represented by 44 specimens of which 3 specimens had parasites. The material was collected in 2016 in the following locations: Cernătești, Craiova, Mogoșești. There are rendered the collection sites, the species of collected beetles and the identified parasites (Table 1).

Table 1. Material collected and their parasites.

No.	Host	Parasites	Collection site	Date of collection
1	<i>Aphodius fimetarius</i> (Linnaeus 1758)	<i>Ascarops strongylina</i> Rudolphi 1819	Cernătești	May 2, 2016
2	<i>Oryctes nasicornis</i> Linnaeus 1758 ♀	<i>Hypoaspis</i> sp.	Craiova	May 3, 2016
3	<i>Copris lunaris</i> (Linnaeus 1758)	<i>Uropoda</i> sp.	Mogoșești	May 12, 2016

Host: *Aphodius fimetarius* (Linnaeus 1758)

Parasite: *Ascarops strongylina* Rudolphi 1819

Collection site: Cernătești

Date of collection: May 2, 2016

Aphodius fimetarius (Linnaeus 1758)

Polyphaga: Scarabaeiformia: Scarabaeoidea: Aphodiidae: Aphodiinae: *Aphodius*

Aphodius is a genus of beetles in the Scarabaeidae family. In most species both the adults and larvae are coprophagous (dung feeding) although some species have herbivorous or saprophagous larvae. *Aphodius* species typically dominate dung beetle communities in north temperate ecosystems. Most species are functionally classified as endocoprids, also known as dwellers, because the larvae live and feed within the dung pat itself.

Their systematics is uncertain, the subfamily it comprises over 11 tribes with 280 genera and 3200 species.

Aphodius fimetarius is a common species with coprophagous trophic regime, found in all climatic conditions of Romania. It is frequent in cow and horse manure (CHIMIȘLIU, 2001b; c).

The research was carried out on a meadow of Cernătești locality. On this meadow, local people leave their animals free to graze. The area is quite rich in cow dung and pig feces.

From the cow dung, we collected 4 specimens of *Ontophagus* sp., namely one female and three males. They were stored in a jar and transported to the laboratory for examination. In the Malpighian tubule of a male specimen of the coprophagous coleopteran, there were found eggs in infective stage (L3).

Ascarops strongylina Rudolphi 1819

Nematoda: Secernentea: Spirurida: Spirurina: Spiruroidea: Spirocercidae: *Ascarops*

It is a species of endoparasitic nematode, which is quite widespread in the world; it has as an intermediary host a coprophagous species (*Aphodius*, *Ontophagus*, *Gymnopleurus*) and as a permanent host the domestic pig and the wild boar. Only two species of the genus are so far present at pigs in the world, namely *A. strongylina* and *A. dentate*;

generally, the main difference between them is the body length, which is up to 15 mm and 22 mm in adult males and females of the first species and up to 35 mm and 55 mm in males and females of the second species (OLSEN, 1974).

Life cycle: The eggs are eliminated together with feces and consume the larval stages in the adults of the coprophagous Coleoptera *Aphodius* spp., *Onthophagus* sp. and / or *Gymnopleurus* sp. in our country (BALTHAZAR, 1936), only when they are digested by them.

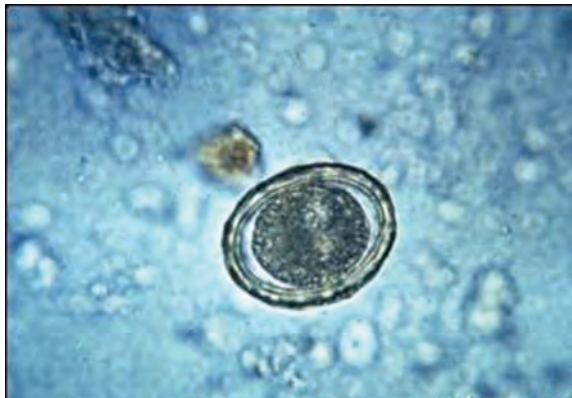


Figure 1. Photo of Malpighian tubule ***

The infective stage of the parasite (L3) develops inside the beetle and, according to some authors, in birds (euparatenic host) (ODENING, 1968-69 in DAWES BEN, 1976). Then, it is ingested by pig together with the consumed water or food (OLSEN, 1974) and reaches the wall of the stomach lining (MEHLHORN, 2008; KUMAR, 2004) or the small intestine, the pig being the definitive host.

The embryonic eggs are eliminated in the external environment by the female through the pig feces. They measure about 20-40 μ m depending on the degree of development. Incubation lasts for almost 4 weeks.

Eggs in the infected stage (L3) were found in the Malpighian tubules at the coprophagous beetle. They are oval, irregularly contoured, operculate at the poles, embryonated (Fig. 1).

The microscope used to study the preparation does not have a built-in camera and as a result, for example, we used a similar image found on the internet.

Adults in small numbers are not dangerous, but when present in large numbers, they can cause inflammation and ulceration in the body of the definitive host.

Host: *Copris lunaris* (Linnaeus 1758)

Parasits: *Uropoda* sp.

Collection site: Mogoșești

Date of collection: May 12, 2016

Copris lunaris (Linnaeus 1758) Coleoptera: Polyphaga:
Scarabaeiformia: Scarabaeoidea: Scarabaeidae: Scarabaeinae:
Coprini: *Copris*

They are coprophagous, feeding on various mammalian excreta, mainly large herbivores.

Of Coprinae only *Copris lunaris* (Linnaeus 1758) is spread throughout Central Europe. His behaviour in nesting was described by several authors, including LENGERKEN (1952), TEICHERT (1960) ROMMEL (1967) and KLEMPERER (1982 a, b) in BAHRAMI et al., 2011.

The presence of different species of mites suggest that they have great adaptability (MAŠÁN & HALLIDAY, 2009).

Using tweezers, mites were collected from *C. lunaris* female, more precisely from the feet (Fig. 2).

The parasite *Uropoda* sp. was identified at the collected species (Fig. 3). All specimens of this species were in the phoretic stage, deuteronymph.



Figure 2. *C. lunaris* and deuteronymph fixed from the feet (orig.).

The deutonymph *Uropoda* sp. attaches to the host using an anal pedicel, as found in many species of Uropodina (BAJERLEIN & BŁOSZYK. 2004) (Fig. 3).

The superfamily Uropodoidea or tortoise mites is represented by over 2,000 species described worldwide, many of them in irregular habitats such as, nets, wood scraps and dung.

Phoresy (ability of mites to attach to the body of an insect) is therefore a prerequisite for their distribution between these habitats. Their eating habits are little known, but usually they are considered to be omnivorous, feeding on hyphae of fungi, slow moving prey, etc.

The deutonymphs of certain species feed on nematodes and fungi, as well as on the eggs and larvae of their hosts (BAHRAMI et al., 2011).

The most commonly encountered species of mites at *Copris lunaris* are *Pelethiphis altocumulus*, *Macrocheles copridis*, *Parasitus copridis*, *Uropoda copridis*, *Copriphus pterophilus* and *Hispanic onchodellus*.

Many papers have been published on mesostigmatid mites that live in association with *Copris* species, but few of the authors have paid special attention to the behavioural relationship between mites and their hosts.

The mites have developed different strategies for dispersal, as shown by their preferential attachment either to adults or their offspring (BAHRAMI et al., 2011).

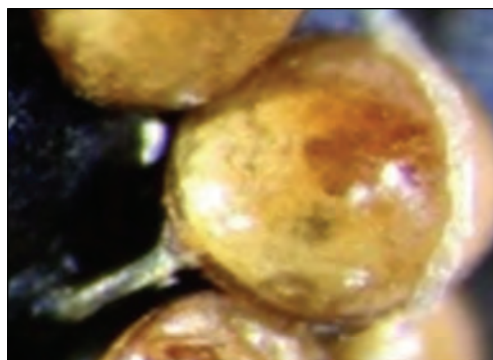


Figure 3. Deutonymph fixed with the uropod (orig).

CONCLUSIONS

The work joins the efforts of specialists who contribute to the knowledge of entomofauna diversity.

Of the identified parasite species, we publish only the results for 7 species that we studied, the next ones being part of another paper.

Cernătești, Craiova, Mogoșești localities represent new collection sites for each species of Coleoptera.

The species of mites identified in the studied beetles are species reported by foreign authors, but there are no mentions of them in the Romanian specialized literature.

On the other hand, it is difficult to draw firm conclusions about the specificity of the host, because the studies performed on them so far are brief.

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