

PRELIMINARY DATA REGARDING BEETLE PARASITE SPECIES COLLECTED FROM DIFFERENT ECOSYSTEMS MET IN DOLJ COUNTY IN 2017

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Abstract. The research studies on the diversity of parasite beetles from Dolj County exposed in this paper were achieved in 2017. The beetle biological material (32 specimens, 4 of which displaying various parasite forms) was collected from terrestrial ecosystems - Radomir, Bistreț, Valea Stanciului, Bâlta. The hosts, from the systematic viewpoint, belong to the order Coleoptera, respectively to 2 subfamily- Dynastidae and Scarabaeinae, from Scarabaeidae family. The species on which parasites were found are *Onthophagus (Palaeonthophagus) vacca* (Linnaeus 1758); *Onthophagus taurus* (Schreber, 1759); *Oryctes nasicornis* Linnaeus 1758 and *Copris lunaris* (Linnaeus 1758). From the systematic viewpoint, the identified parasites are mites and grouped as follows: *Macrocheles* sp. (Mesostigmata: Dermanyssina: Eviphidoidea: Macrochelidae) and *Hypoaspis* sp. (Mesostigmata: Laelapidae). The dominant species is represented by mites, *Macrocheles* sp., identified in *O. vacca* and *O. taurus*, new for Dolj, Romania. In this paper we expose the results of research conducted in two species of parasites (*Macrocheles punctillatus*, identified in *O. vacca* and *Hypoaspis* sp. to *Copris lunaris*); the other will be set out in a forthcoming paper.

Keywords: mites, beetles, ecosystems.

Rezumat. Date preliminare privind specii de paraziți la coleoptere din diferite ecosisteme din județul Dolj colectate în 2017. Cercetările privind diversitatea paraziților la coleoptere din județul Dolj expuse în lucrarea de față au fost realizate în anul 2017. Materialul biologic de coleoptere (32 exemplare din care 4 exemplare au diverse forme parazite) a fost colectat din ecosisteme terestre (Radomir, Bistreț, Valea Stanciului, Bâlta). Gazdele, din punct de vedere sistematic, aparțin ordinului Coleoptera încadrându-se în 2 familii: Dynastidae și Scarabaeidae. Speciile pe care s-au găsit paraziți sunt: *O. (Palaeonthophagus) vacca* (Linnaeus 1758); *O. taurus* (Schreber, 1759); *O. nasicornis* Linnaeus 1758 și *C. lunaris* (Linnaeus 1758). Paraziții identificați în urma cercetărilor de specialitate, din punct de vedere sistematic, sunt acarieni și sunt încadrați astfel: *Macrocheles* sp. (Mesostigmata: Dermanyssina: Eviphidoidea: Macrochelidae) și *Hypoaspis* sp. (Mesostigmata: Laelapidae). Specia dominantă ca și parazit este reprezentată de către acarieni, *Macrocheles* sp., identificați la *O. vacca* și *O. taurus*. În lucrarea de față vom expune rezultatele cercetărilor efectuate la două specii de paraziți (*Macrocheles punctillatus* identificat la *O. vacca* și *Hypoaspis* sp. la *Copris lunaris*), celelalte urmând a fi expuse într-o lucrare viitoare.

Cuvinte cheie: acarieni, coleoptere, ecosisteme.

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 recent years, insects have undergone the complex action of ecological factors (climatic, soil and biotic factors) affecting the 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 was identified and analysed; then, the level of infestation was assessed. The beetle biological material (32 specimens, 4 of which displaying various parasite forms) was collected from terrestrial ecosystem - Radomir, Bistreț, Valea Stanciului, Bâlta. The hosts, from the systematic viewpoint, belong to the order Coleoptera, respectively to 2 Dynastidae and Scarabaeidae. The species on which parasites were found are *O. vacca* (Linnaeus 1758); *O. taurus* (Schreber, 1759); *Oryctes nasicornis* Linnaeus 1758 and *Copris lunaris* (Linnaeus 1758). From the systematic viewpoint, the identified parasites are mites and grouped as follows: *Macrocheles* sp. (Mesostigmata: Dermanyssina: Eviphidoidea: Macrochelidae) and *Hypoaspis* sp. (Mesostigmata: Laelapidae).

MATERIALS AND METHODS

The material used in this paper consisted in 32 specimens found in the field, which were identified, analysed and studied, three species having 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 2017. Collections were made at different dates, in May, June and July. Collection date is mentioned for each species. Moreover, for every locality, there are rendered the geographical coordinates, flora and fauna information. Collection methods were different according to the analysed host species.

1. Collection methods for *O. vacca*, *O. taurus*, *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 in alcohol 4%. There were taken photos and the material was transported to the museum, entomology 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 specimenes 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.

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 some 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 Boicea - 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 was represented by 44 specimens of which 7 specimens had parasites. The material was collected in 2017 in the following locations: Radomir, Bistreț, Valea Stanciului, Bâlta. 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>Onthophagus (Palaeonthophagus) vacca</i> (Linnaeus 1767)	<i>Macrocheles punctillatus</i> (Willmann, 1939)	Radomir	May 17, 2017
2	<i>Onthophagus taurus</i> (Schreber, 1759)	<i>Macrocheles</i> sp.	Bistreț	May 17, 2017
3	<i>Oryctes nasicornis</i> Linnaeus 1758 ♀	<i>Hypoaspis</i> sp.	Valea Stanciului	May 30, 2017
4	<i>Copris lunaris</i> (Linnaeus 1758) ♀	<i>Uropoda</i> sp.	Bâlta	June 6, 2017

Host: *Onthophagus (Palaeonthophagus) vacca* (Linnaeus 1767)

Parasite: *Macrocheles punctillatus* (Willmann, 1939).

Collection site: Radomir

***O. (Palaeonthophagus) vacca* (Linnaeus 1767)**

Scarabaeoidea: Scarabaeidae: Scarabaeinae: Onthophagini: *Onthophagus: Palaeonthophagus*

The genus *Onthophagus* is represented in the fauna of Oltenia by 16 species, out of the 24 reported for the fauna of Romania (CHIMIȘLIU, 2004). All 16 species were identified in Dolj County entomofauna.

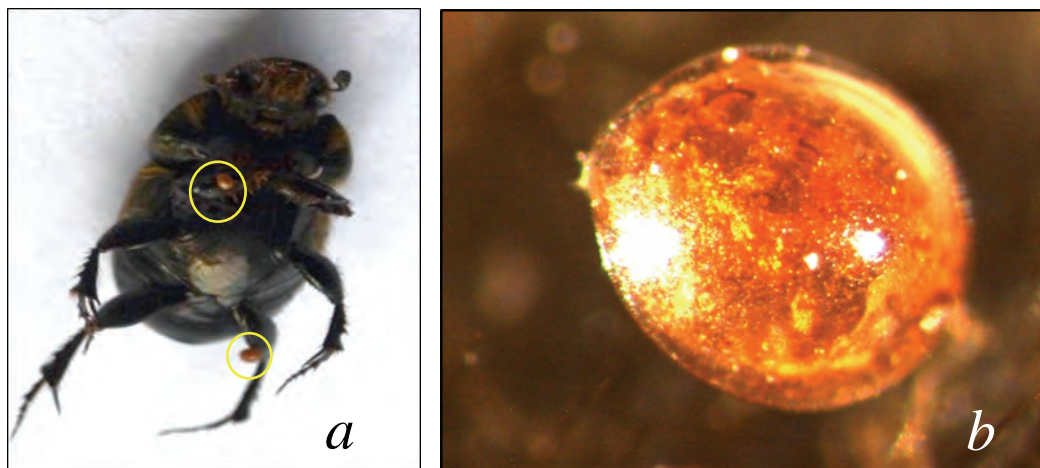


Figure 1. Deuteronymphs on the legs (a) fixed with pedicel (b) at *O. vacca* (orig).

O. vacca is a species with coprophagous trophic regime, encountered in all climatic conditions, except for the alpine steppes, being more common in the area of oak forests and ante-steppes (PANIN, 1957). This species is present in most of Southern Europe, Western Asia and North Africa.

The species of the genus *Onthophagus* Latr. are hosts for *Rhabditistretzeli* Sachs., *Ascarops strongylina* Rud. and *Gongylonema scutatum* Auct. (Nematoda, Secernentea, Spirurida, Gongylonematidae), *Macrocheles punctillatus* (Willm.), *Anoetus ferroniarum* (Duf.) (Acari, Mesostigmata, Dermanysoidea, Scheloribatidae).

The material was found in an area where the locals leave their cattle for grazing. The identified mite species is *Macrocheles punctillatus* (Willmann, 1939) and Radomir locality is a new site for this species.

The species *M. punctillatus* is described by Bregetova and Koroleva (1959) (in COSTA, 1966) and Bregetova (1960) at *Onthophagus* sp.; the species is common in Israel in manure stacks (in COSTA, 1964) and reported by BALTHASAR (1963) (Figs. 1a, b).

***Macrocheles punctillatus* (Willmann, 1939)**

Arachnida: Micrura: Acari: Anactinotrichida: Mesostigmata: Dermanyssina: Eviphidoidea: Macrochelidae: *Macrocheles: M. punctillatus*.

The species of the genus *Macrocheles* fall into two main categories, for ecological reasons, which correlate with certain morphological features. There are those species usually found in leaves, garbage, moss, bird nests and small mammals and other habitats that are not predominantly associated with coprophagous insects and there are species that are usually coprophilic, in association with coprophagous insects, but also found in piles of compost, rotting grass, dung, generally loose soil that favors the reproduction of synanthropic flies (KRANTZ, 1981).

The species in the aforementioned group are often forezia species; mostly females can be found on coprophagous and necrophagous insects, for example garbage bugs and synanthropic flies. Their males are rarely found.

Some species of the two categories have certain common characters: *M. penicilliger* is found on coprophagous insects and *M. matrius*, which is very often associated with chicken manure and compost heaps, is not usually found on coprophagous insects. Both species have a strong preponderance.

It is interesting to note that KRANTZ (1981) showed that the group of glabra species and *M. robustulus* do not share the ambulacral characters in the immature stages found in other *Macrocheles* species and that *M. penicilliger* is an intermediate between the two main types of ambulacral structures (in KEITH HYATT & EMBERSON, 1988).

Most species have been found out to be predators specialized on eggs and young larvae of flies, coleopterans and also on small nematodes and small worms of Enchytraeidae found in their habitat, although biological data are much more fragmented for these species (KEITH HYATT & EMBERSON, 1988).

Host: *Oryctes nasicornis* Linnaeus 1758 (The European rhinoceros beetle) ♀

Parasite: *Hypoaspis* sp.

Collection site: Valea Stanciului

***Oryctes nasicornis* Linnaeus, 1758**

Coleoptera: Scarabaeidae: Dynastinae: *Oryctes*

It is the only representative of the Dynastinae subfamily found in Northern Europe. It is widespread in the Mediterranean basin up to Pakistan, the Near East and North Africa.

Oryctes is the most economically important genus of rhinoceros beetles in the subfamily Dynastinae (family: Scarabaeidae), since is insect pest. It is a sexually dimorphic species. The male's head is topped by a long curved horn (hence its common name), while the females have no horns (Fig. 3).

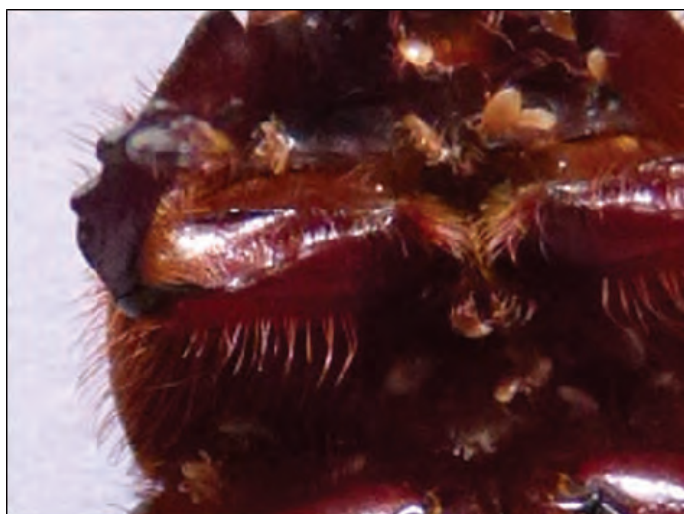


Figure 3. Deuteronymph of *Hypoaspis* sp. on *O. nasicornis*, female (original).

***Hypoaspis* sp.**

Arthropoda: Arachnida: Acari: Mesostigmata: Laelapidae: *Hypoaspis*

Fifteen species considered as belonging to *Hypoaspis* sp. have been reported from Iran so far, including new species. Almost all species of *Hypoaspis* sp., which appear in Iran, are associated with Coleoptera, especially with species belonging to the Scarabaeidae family, while few have been collected in the soil (JOHARCHI & SHAHEDI, 2016).

The Laelapidae family includes about 800 species of dermanyssoid mites, including obligate and facultative parasites of vertebrates, paraphagous insects and free-living predators that inhabit the soil litter habitats, as well as nests of vertebrates and arthropods (EVANS until 1966, FARAJI & HALLIDAY, 2009; et al., 2009; JOHARCHI et al., 2011; JOHARCHI et al., 2012a, b in JOHARCHI & SHAHEDI, 2016). At present, the family is classified in approximately 144 genera, including *Hypoaspis* with 36 species.

The family of Laelapidae mites includes many species that are ectoparasites of small mammals, birds, annelids, insects and myriapods, as well as predators in the soil, living freely in the leaf and moss bedding (EVANS & TILL, 1979; KHANJANI & UECKERMANN, 2005; FARAJI & HALLIDAY, 2009; KRANTZ & WALTER, 2009 in MOHAMMAD KHANJANI et al., 2013).

In recent years, specialty studies on the presence of mites of the genus *Hypoaspis* sp. have been carried out especially by researchers in Iran (MOHAMMAD KHANJANI et al., 2013; JOHARCHI & SHAHEDI, 2016)

Many species of *Hypoaspis* sp. which appear in Iran are associated with Coleoptera, especially with the species of the Scarabaeidae family (JOHARCHI & SHAHEDI, 2016).

Fifteen species considered as belonging to *Hypoaspis* sp. have been reported from Iran so far, including new species (JOHARCHI & SHAHEDI, 2016).

It is difficult to determine the species, because they are not yet trained specialists. On the other hand, it is difficult to draw firm conclusions about the specificity of the host because the studies performed on them are brief.

Laelapidae species are associated with a variety of insects, including the beetles belonging to the Scarabaeidae family, which they also use to disperse (JOHARCHI et al., 2017).

The members of the genus *Hypoaspis* Canestrini (Fig. 4) and the related genera are predators found in soil, litter and moss (EVANS & TILL, 1979 in MOHAMMAD KHANJANI et al., 2013).

Some of these species are used as biological control agents in greenhouse crops against spiders and thrips, and in fungus cultures such as *Rhizoglyphus* and *Tyrophagus* spp. (ENKEGARD et al., 1997, LESNA et al., 2000, VANNINEN & KOSKULA 2004, BEAULIEU, 2009 in MOHAMMAD KHANJANI et al., 2013).

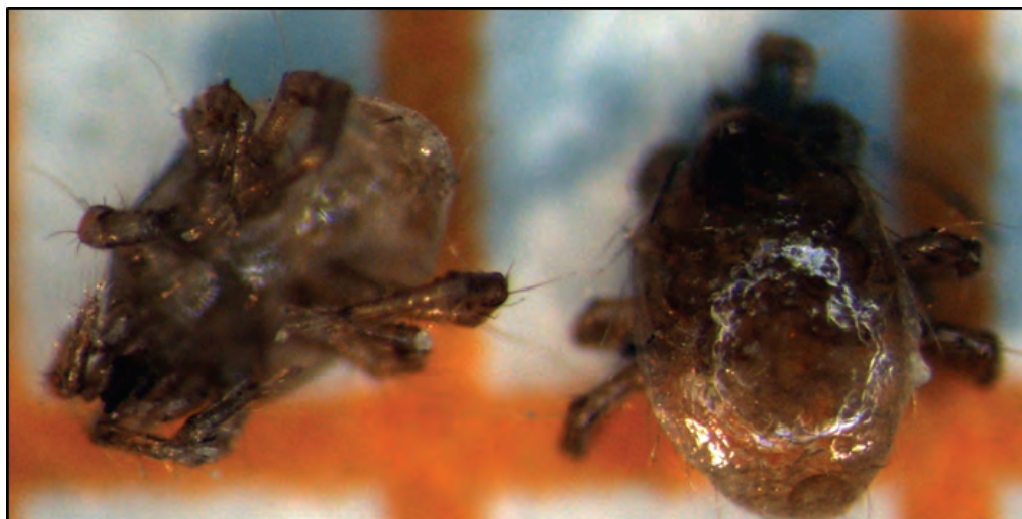


Figure 4. Deuteronymphs of *Hypoaspis* sp. ventral and dorsal side (orig.).

They can cause significant reductions in the number of fungus and thrips attacks on flowers (BEAULIEU, 2009 in MOHAMMAD KHANJANI et al., 2013).

At the same time, *Hypoaspis calcuttaensis* Bhattacharya significantly reduced the number of root-knot nematode, *Meloidogyne Javanica* (Treub), a pest of the plant *Hibiscus esculentus*.

Hypoaspis rhinocerotis Oudemans feeds on the eggs of the coconut rhinoceros beetle *Oryctes rhinoceros* L., a serious pest of coconut palm trees.

Hypoaspis athiasae Costa, originally associated with *O. monocerus* Oliver, from Côte d'Ivoire, feeds on *O. rhinoceros* eggs (COSTA, 1971; GERSON et al., 2003 in MOHAMMAD KHANJANI et al., 2013).

Besides *Hypoaspis athiasae*, Costa (1971) described yet another species collected from Coleoptera from Israel, Côte d'Ivoire and Western Samoa. Khanjani & Ueckermann (2005) described *Hypoaspis polyphyllae* from *Polyphylla olivieri* (in MOHAMMAD KHANJANI et al., 2013).

Polyphylla olivieri (Scarabeidae) is a serious pest of horticultural crops in western Iran. Its larvae cause serious damage to the roots of apple and cherry trees, as well as of potatoes, and adults occasionally attack apple and cherry leaves (in MOHAMMAD KHANJANI et al., 2013).

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, Radomir, Bistreț, Valea Stanciului, Bâlta 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.

It is difficult to determine the species, because they are not yet trained specialists. On the other hand, it is difficult to draw firm conclusions about the specificity of the host because the studies performed on them are brief.

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