

DATA REGARDING THE PRESENCE OF *Hypoaspis* sp. G. Canestrini, 1884 (MESOSTIGMATA: LAELAPIDAE) MITES IN COLEOPTERA BEETLES FROM THE ENTOMOFAUNA OF DOLJ COUNTY

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Abstract. Research on the presence of mite species in beetles in Dolj County, especially those of the genus *Hypoaspis* G. Canestrini, 1884, began in 2016, with the discovery of the first specimen of beetle that presented this phoresy organism. The mites species was first reported in Dolj County in 2016, in Craiova, then in 2017 in Valea Stanciului. The biological material of beetles (6 specimens, of which 1 specimen has mites) was collected, in May 2020, from an urban terrestrial ecosystem, Craiova City. The host, from a systematic point of view, belongs to the order of Coleoptera, belonging to the Dynastidae family (Coleoptera: Scarabaeoidea: Dynastidae: Dynastinae: Oryctini: *Oryctes*). The species on which mites were found is a male of *Oryctes nasicornis* Linnaeus 1758. The identified interspecific relationship is transported or spread, respectively phoresy. The mites identified as a result of specialized research, from a systematic point of view, belong to the genus *Hypoaspis* (Mesostigmata: Laelapidae). The species identified at *O. nasicornis* ♂ is new for Dolj, Romania.

Keywords: Craiova, *Oryctes nasicornis* L. ♂, mites, phoresy.

Rezumat. Date privind prezența acarienilor din genul *Hypoaspis* sp. G. Canestrini, 1884 (Mesostigmata: Laelapidae) la coleoptere din județul Dolj. Cercetările privind diversitatea relațiilor interspecifice la coleoptere din județul Dolj expuse în lucrarea de față au fost realizate între anii 2016-2017. Materialul biologic de coleoptere (6 exemplare, din care 1 exemplar prezintă acarieni) au fost colectate din ecosistemul terestru, orașul Craiova în luna mai, 2020. Gazda, din punct de vedere sistematic, aparține ordinului Coleoptera încadrându-se în familia Dynastiidae. Specia pe care s-a găsit acarieni este *Oryctes nasicornis* Linnaeus 1758 ♂. Relația interspecifică identificată este de transport sau răspândire, respectiv forezie. Acarienii identificați în urma cercetărilor de specialitate, din punct de vedere sistematic, aparțin genului *Hypoaspis* (Mesostigmata: Laelapidae) iar specia identificată la *O. nasicornis* ♂ este semnalare nouă pentru județul Dolj.

Cuvinte cheie: Craiova, *Oryctes nasicornis* L. ♂, acarieni, forezie.

INTRODUCTION

The purpose of this paper is to present the contribution to the knowledge of the diversity of mites present in beetles, analysing the species of beetles present in different types of ecosystems in Dolj County. The biological cycles of insects are affected by changes in ecological factors and as a result their number in the studied area has been low.

Surprisingly, the nasicorn was found in an anthropized system. The biological material represented by the nasicorn (6 specimens, on with mites) was collected from the terrestrial ecosystem - a neighbourhood park in the city of Craiova. All material found in the field was identified and analysed; then, the level of infestation was assessed. The host, from a systematic point of view, belongs to the Coleoptera order, respectively to the Dynastidae family. The species on which the mites were found are *Oryctes nasicornis* Linnaeus 1758. From a systematic point of view, the identified mites belong to arachnids - *Hypoaspis* sp. (Mesostigmata: Laelapidae).

MATERIALS AND METHODS

The material used in this paper consisted of 6 specimens found in a neighbourhood park in the city of Craiova, which were identified, analysed and studied, with a single specimen showing mites.

The material was collected in May 2020. The collection of the 6 specimens of *Oryctes nasicornis* was made on different dates, from the moment when the species were signalled in this area, during May.

The collection methods were as follows:

1. **Collection methods for *O. nasicornis*.** The insect was taken from the ground with a pair of tweezers and placed in a jar containing filter paper soaked in 4% alcohol. Photographs were taken and the material was transported to the Natural Sciences Section of the Oltenia Craiova Museum, to the entomology laboratory, where the specialists took samples from the surface of the insects' bodies.

In order to be examined, after we took photos, the mites were placed in a paraffin solution and sent to the expert for determination.

2. **Methods of collection and research of mites.** The mites were collected using tweezers on the ventral side of the chest of the male specimen of *O. nasicornis*. For identification, the mites were prepared in paraffin. They were stored at room temperature until they were transported and carefully examined under a microscope.

To determine the collected material, the works of PANIN (1957) were used, and the beetle species were determined in the entomology laboratory of the Department of Natural Sciences of the Museum of Oltenia Craiova. Some of the photos were taken with the digital camera by Mr. Cristian Stamate (graphic engineer, Oltenia Museum Craiova), Lila Gima and another category of photos was taken by Mrs. Marinela Boicea (chemist in the Restoration-Conservation Laboratory - Oltenia Craiova Museum) through the Olympus 3D stereo microscope, Image-Analysis Software.

The taxonomy and nomenclature of the identified species have been verified in accordance with the European fauna.

RESULTS AND DISCUSSION

The analysed material was represented by 6 specimens of which 1 specimen had mites. The material was collected in 2020, in the park in the central area of Craiova (Fig. 1).

Host: *Oryctes nasicornis* Linnaeus 1758 ♂

Phoretic organism: *Hypoaspis* sp.

Collection site: Craiova

Date of collection: May 14, 2020

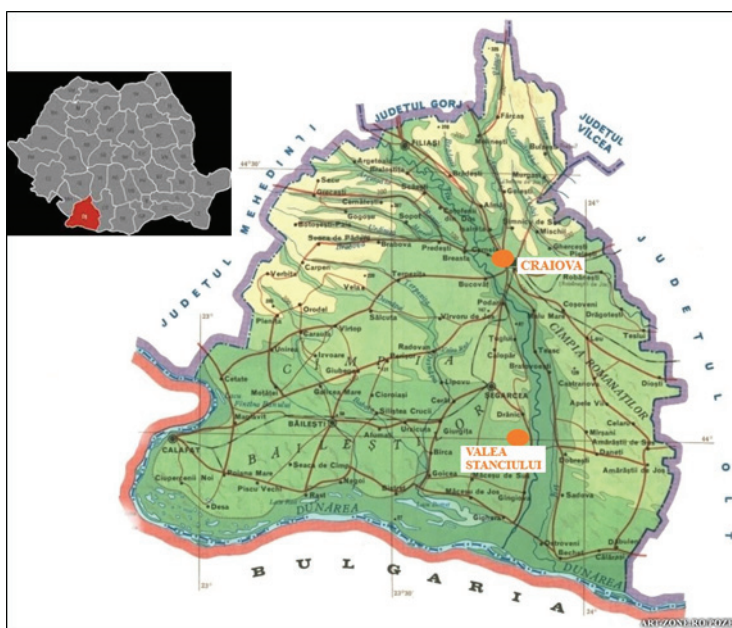


Figure 1. Collection locations in Dolj County, România (2016-2020).

***Oryctes nasicornis* Linnaeus, 1758 ♂ - the rhinoceros beetle, nasicorn (Fig. 2)**

Coleoptera: Polyphaga: Scarabaeiformia: Scarabaeoidea: Dynastidae: Dynastinae: Oryctini : *Oryctes* Illiger, 17

Status according to IUCN: low-risk species, endangered.

Oryctes is the most important economic genus of rhinoceros beetles in the subfamily Dynastinae, because it is harmful to insects. It is a dimorphic sexual species, and the sexual dimorphism in this species is very pronounced. The male's head is covered by a long curved horn (hence its common name the rhinoceros beetle, nasicorn) (Fig. 2), while females have no horns (STANCA-MOISE, 2013).

The species occurs in forests, forest steppes, as well as in steppes. This year, several specimens of rhino beetles were found in a small relaxation park, with rich vegetation, located near the museum of Craiova.

The larvae grow in plant composts and decomposing vegetable matter, often in the rotten wood of different deciduous species. The trees found in this area are: ash (*Fraxinus americana* L.), tulip tree (*Liriodendron tulipifera* L.), aspen (*Populus tremula* L.), maple (*Acer platanoides* L.). Adults are active during April-August and survive only one year (PANIN, 1957).



Figure 2. *Oryctes nasicornis*, male (original – foto Cristian Stamate).

Protection and conservation measures. Protecting old trees in deciduous forests; prohibiting the collection of the species by amateur collectors.

The species is included in the annexes to the Berne Convention as a rare species, threatened with extinction.

Oryctes (Oryctes) nasicornis (Linnaeus 1758) (Fig. 3)

Contribution to the reports in the fauna of the Dolj county: BOBÎRNAC & SANDA (1964) - Tâmburești (DJ); CHIMIȘLIU (2000a) - Craiova, Plenița, Verbicioara; CHIMIȘLIU (2005) - Amărăștii de Jos, Bratovoiești, Bucovăț, Craiova, Craiova-Gr. Botanică, Craiova-Obedeanu, Desa, Făcăi, Fărcașu, Filiași, Leamna, Leu, Mischii, Negoii, Plenița, Predești, Poiana Mare, Răcari, Șimnic, Teasc, Vâlcom, Verbicioara; CHIMIȘLIU & MOGOȘEANU (2009) - Bratovoiești, Bucovăț, Calafat, Craiova, Craiova-Parc, Dăbuleni, Gogoșu, Leu, Leamna, Negoii, Răcari, Secui, Șimnic. Urzicuța 07.05.2011, 12.05.2012, Bariera Vâlcrii 15.05.2012 (LILA GIMA, 2014), Craiova - relaxation park in the central area of city Craiova, May 14, 2020.

The literature mentions that the nasicorn (*O. nasicornis* L.) is a host species for *Didymophyes gigantea* F. ST. (Gregarinomorpha, Gregarinidae), *Thelastoma macramphidium gallicum* THÉOD., *Th. cuspidatum* RUD., *Cephalobellus* spp. (Nematoda, Secernentea, Oxyurida, Thelastomatidae), *Macrocheles plumiventris* HULL. and *Coleolaelaps integer* (BERL.) (Mites, Mesostigmata, Dermanysoidea), *Microphthalma disjuncta* WIED., *Microphthalma disjuncta* WIED., *Billoca pectinata* MEIG. and *B. microcera* ROND. (Diptera, Brachycera, Tachinidae, Dexiinae) (information about the authors in LILA GIMA, 2014).

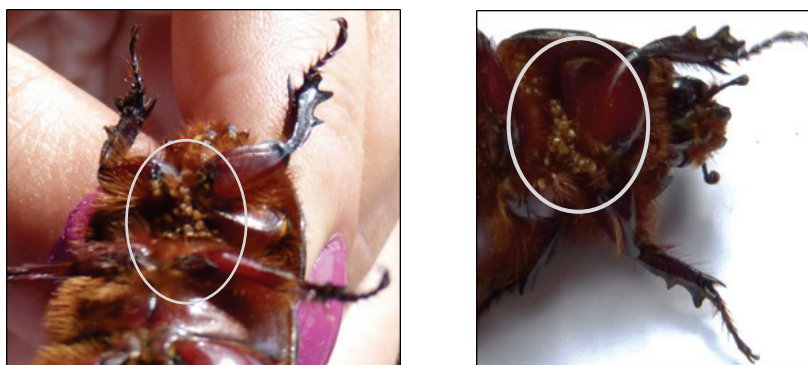


Figure 3. Ventral side of *O. nasicornis* male with *Hypoaspis* sp. (original – foto Lila Gima).

***Hypoaspis* sp.**

Arthropoda: Arachnida: Acari: Mesostigmata: Laelapidae: *Hypoaspis* G.Canestrini, 1884 (Fig. 4)

The mite family Laelapidae includes species that are free living as well as others that are parasitic on vertebrates, or have varying degrees of association with arthropods. Most arthropod-associated species are found in the genera *Hypoaspis* Canestrini 1884b sens. lat. and *Pseudoparasitus* Oudemans 1902. This group has not achieved a stable generic and sub-generic classification so far (see comments by Evans and Till 1966; Tenorio 1982), and recent reviews of *Hypoaspis* sens. lat. do not agree on the status of its constituent taxa (Karg 1979-1989c; Evans and Till 1966, 1979; Bernhard 1971; Krantz and Ainscough 1990) mentioned in STRONG & HALLIDAY, 1994.

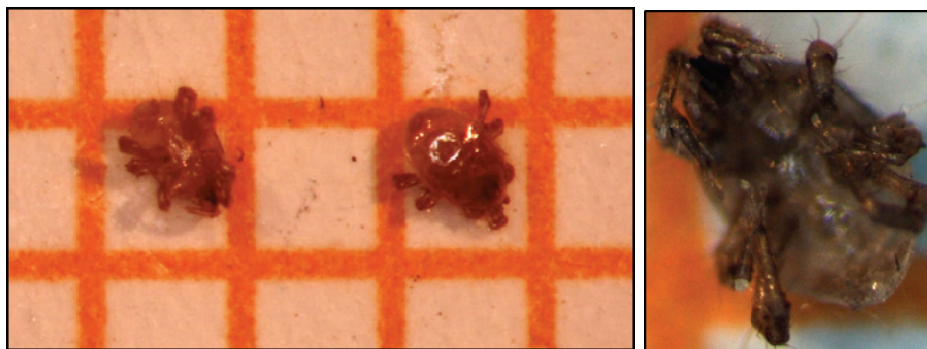


Figure 4. *Hypoaspis* sp.
(original – foto Marinela Boicea).

Evans and Till (1966) found that they could distribute most British species of *Hypoaspis* among the following subgenera: *Hypoaspis* sens. strict., *Alloparasitus* Berlese 1920, *Cosmolaelaps* Berlese 1903, *Gaeolaelaps* Tragarth 1952, *Gymnolaelaps* Berlese 1903, *Holostaspis* Kolenati 1858, *Laelaspis* Berlese 1903, *Pneumolaelaps* Berlese 1920 and *Stratiolaelaps* Berlese 1916, which were distinguished on the basis of a combination of morphological and ecological properties. However, they disregarded these groups when presenting a key to the British species because although the groupings are ecologically intuitive, the boundaries between them cannot be delineated on the basis of morphological characters alone (mentioned in STRONG & HALLIDAY, 1994).

Difficulties in obtaining a stable classification have arisen because the group has never been analysed from a phylogenetic perspective, and because it contains many species that should probably be placed in other genera (Costa and Hunter 1970; Costa 1971). The lack of a stable phylogenetic classification complicates the problem of analysing the possible host specificity of genera and subgenera. As pointed out by Evans and Till (1966) and Tenorio (1982), the resolution of the existing confusion in this group must begin with a detailed morphological examination of a variety of species from all over the world, combined with studies of ecological factors such as host associations and symbiotic relationships. (mentioned in STRONG & HALLIDAY, 1994).

This need for scientific clarity has been taken seriously in the paper of the authors STRONG & HALLIDAY, 1994, where they described three new species of *Hypoaspis* that have little known ecological property of association with beetles. These species significantly expand the range of biosystematic data available for the genus.

Data on the presence of mites in beetle coleoptera are still mentioned by the authors JOHARCHI & SHAHEDI, 2016, but, for the moment, in this case, we only make a report of the mites at sp. *Oryctes*, only a systematic classification being possible up to the gender level. 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.

The previous personal reports of some representatives of the *Hypoaspis* genus consist of 2 specimens collected from Valea Stanciului (May 3, 2016) (LILA GIMA, 2017) and Craiova (May 2017) (LILA GIMA, 2018).

CONCLUSIONS

The paper joins the efforts of specialists who contribute to the knowledge of the diversity of the entomofauna and the identification of types of interspecific relationships, in this case being a forosis relationship.

In the present case, the novelty is represented by the fact that this time, unlike the previous specimens collected in which the host was female, the mites were found on a male of *Oryctes nasicornis*.

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

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

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