

IRANIAN DUNG BEETLES (COLEOPTERA: SCARABAEOIDEA) ASSOCIATED WITH RODENT BURROWS: LIST OF COLLECTED SPECIES AND SOME ADDITIONAL COMMENTS

Mohammad Moradi Gharakhloo¹ & Stefano Ziani²

¹ Department of Biology, Faculty of Science, Zanjan University, Zanjan, Iran. – moradi_g@yahoo.com

² Via S. Giovanni, 41/a, I-47014 Meldola FC, Italy. – stefanoziani@alice.it

Abstract: A list is presented of scarabaeoid beetles collected in rodent burrows in Iran. They fall into three categories according to the degree of relationship of the beetles with burrows. A total of 22 species - 18 phloeoxens, 2 phleophiles and 2 phleobionts – are recorded. *Osmanius balthasari* (Petrovitz, 1963) is recorded for the first time from Iran.

Key words: Coleoptera, Scarabaeidae, Aphodiidae, phleophily, biology, list of species, new record, Iran.

Escarabajos coprófagos (Coleoptera: Scarabaeoidea) de Irán asociados con madrigueras de roedores: lista de especies recolectadas, y algunos comentarios adicionales

Resumen: Se presenta una lista de Scarabaeoidea recogidos en madrigueras de roedores en Irán, clasificados en tres categorías según su grado de relación con las madrigueras. Se registran 22 especies: 18 foleoxenos, 2 foleófilos y 2 foleobiontes. *Osmanius balthasari* (Petrovitz, 1963) is recorded for the first time from Iran.

Palabras clave: Coleoptera, Scarabaeidae, Aphodiidae, foleofilia, biología, lista de especies, primera cita, Irán.

Introduction

The Scarabaeoids living in association with rodents burrows and nests represent a very peculiar fauna, still little investigated and studied in the Middle East. Burrows assure to nidicolous scarabs not only a great deal of excrement but also constant high humidity and temperature, factors which may explain this kind of association (Falcoz, 1914).

Scarabaeoidea that are involved in this relationship can be divided (Halffter & Matthews, 1966) into three categories:

1) Phloeoxen species, i.e. scarabs only occasionally entering in burrows, to look primarily for shelter in a cold or dry climate and secondarily for the excrements. Such species mainly occur outside and can be found in several kinds of excrements.

2) Phleophile species, i.e. scarabs that predominantly occur in burrows, feeding on droppings of their occupants. They can be found also outside but usually are stenophagous and come only to a certain type of excrement.

3) Phleobiont species, i.e. scarabs with an obligatory biology related to rodent burrows. They utilize exclusively droppings left by rodents in their nests or burrows and avoid consuming other dung types found outside rodent burrows.

According to Halffter & Matthews (1966) these three categories can be regarded as grades of association and represent a natural and evolutionary sequence towards a narrow adaptation between dung beetles and rodents. Zunino & Halffter (2008) affirm that in the Palaearctic many of the species cited in burrows are also collected outside, showing apparently a phloeoxen or phleophile relationship. The association between scarabs and rodents seems to be stricter in the

Mediterranean region, particularly in steppe or arid habitats, than in other palaeartctic areas. Similar relationships have been described at least for the Nearctic ecozone (Zunino & Halffter, 1988; Hanski & Cambefort, 1992; Ocampo & Phillips, 1992; Gordon & Skelley, 2007), even if such type of adaptations is most probably present in different biogeographical regions and involves seemingly phylogenetically distant Scarabaeoidea groups, implying the convergence in the exploration of the same ecological niche under very different and biogeographical circumstances.

Within a research project undertaken by the authors to increase the knowledge about Iranian nidicolous scarab beetles and better understand their biology, one of us (M. Moradi) in 2008 has begun to collect Scarabaeoidea species found in burrows and nests of rodents all over Iranian territory. The first results have already been published in two papers (Moradi Gharakhloo & Ziani, 2009 and Ziani & Moradi Gharakhloo, 2010). A list of all the species and specimens collected during two sampling years is presented below. We prefer to put in the first category (phloeoxen species) also the species for which, in light of what is up to now known on nidicolous scarabs, the presence in burrows could be considered accidental.

All the specimens listed were collected by M. Moradi in burrows or nests of Rodentia belonging to the genera *Allactaga* Cuvier, 1837, *Meriones* Illiger, 1811, *Microtus* Schrank, 1798, and *Spermophilus* Cuvier, 1825, all over Iranian territory but mostly in the northwest.

When not specified the general distribution of the species is taken from Löbl & Smetana (2006).

List of Species

SPECIES ACCIDENTALLY OR OCCASIONALLY OCCURRING IN BURROWS (PHOLEOXENS)

- *Calamosternus granarius* (Linnaeus, 1767)
Scarabaeus granarius Linnaeus, 1767: 547
TYPE LOCALITY: “Europa”.
DISTRIBUTION: Nearby cosmopolitan species.
MATERIAL EXAMINED: 1 specimen: IR-Razavi Khorasan prov., Fariman 910 m, V.2009.
REMARKS: Copro-saprophagous, sometimes necrophagous species, never recorded in burrows or nests. The underground presence of *C. granarius* can be regarded as accidental.
- *Eudolus quadriguttatus* (Herbst, 1783)
Scarabaeus quadriguttatus Herbst, 1783: 10
TYPE LOCALITY: “Reppen” [Poland, Rzepin].
DISTRIBUTION: Europe; Northern Africa; Turkey, Levant, Iraq, Iran, Afghanistan, Central Asia, China.
MATERIAL EXAMINED: 1 specimen: IR-Razavi Khorasan, Fariman 910 m, V.2009.
REMARKS: Pittino, 1996 cited *E. quadriguttatus* in rodents burrows on the Anatolic central plateau. The species seems to be mainly attracted by poorly hydrated dung (Dellacasa & Dellacasa, 2006), such as sheep and goat droppings. Its relation, even if not strict, with small mammals nests is therefore not at all surprising.
- *Eupleurus subterraneus* ssp. *subterraneus* (Linnaeus, 1758)
Scarabaeus subterraneus Linnaeus, 1758: 348
TYPE LOCALITY: “Europa”.
DISTRIBUTION: Europe; Morocco, Algeria; Middle East, central and eastern Asia.
MATERIAL EXAMINED: 1 specimen: IR-Yazd, Bafgh, 995 m, VI.2009.
REMARKS: *E. subterraneus* has never been recorded as a nidicolous species. Its record in a burrow could be considered accidental.
- *Melinopterus punctatosulcatus* ssp. *hirtipes* (Fischer de Waldheim, 1844)
Aphodius hirtipes Fischer de Waldheim, 1844: 45
Aphodius sabulicola Thomson, 1868: 16 [type locality: “...Kempinge nära Skanör” (Sweden, Skanör, Kampinge)]
Aphodius (Melinopterus) sphacelatus ssp. *ponticus* Petrovitz, 1967: 328 [type locality: “Işik Dag” (Turkey)]
TYPE LOCALITY: “Ekatherinengrad” [Ukraine, Dnipropetrovs’k].
DISTRIBUTION: Northern and central-eastern Europe; Turkey, Middle East, central Asia.
MATERIAL EXAMINED: 1 specimen: IR-Razavi Khorasan, Fariman, 910 m, V.2009.
REMARKS: *M. punctatosulcatus* has never been recorded as a nidicolous species. Its record within rodent burrows has to be regarded as accidental.
- *Caccobius (Caccobius) mundus* (Ménétries, 1839)
Onthophagus mundus Ménétries, 1839: 23
TYPE LOCALITY: “Turquie” [Turkey].
DISTRIBUTION: South-eastern Europe; Turkey, Levant, Iraq, Iran, Turkmenistan.
MATERIAL EXAMINED: 8 specimens as follows: IR-Sistan and Baluchistan, Khash, 1410 m, VI.2009, 3 specimens; IR-Razavi Khorasan, Torbat-e jam, 1390 m, V.2009, 1 specimen; IR-Yazd, Bafgh, 995 m, VI.2009, 1 specimen; IR-Razavi Khorasan, Fariman, 910 m, V.2009, 2 specimens; IR-Sistan and Baluchistan, Zabul, 1475 m, VI.2006, 1 specimen.
REMARKS: *C. mundus* has never been recorded in burrows of small mammals. The collection of 8 specimens in 5 different localities may suggest an occasional pholeophily unknown until now.
- *Euonthophagus amyntas* ssp. *auchenia* (Redtenbacher, 1850)
Onthophagus auchenia Redtenbacher, 1850: 48
Onthophagus (Euonthophagus) amyntas ssp. *aspadanaensis* Petrovitz, 1965: 671 [type locality: “Kuh-räng, west. Isfahan” (Iran)]
Onthophagus (Euonthophagus) rechingeriorum Mandl, 1976: 372 [“Surmandeh bei Semiran” (Iran, Esfahan)]
TYPE LOCALITY: “Südpersien” [Iran, Fars].
DISTRIBUTION: Iran (Ziani, 2006).
MATERIAL EXAMINED: 3 specimens: IR-Kerman, Jiroft, 685 m, VI.2009, 1 specimen; IR-Kerman, Kahnuch, 490 m, VI.2009, 1 specimen; IR-Yazd, Bafgh, 995 m, VI.2009, 1 specimen.
REMARKS: Neither *E. amyntas* nor any other species of the genus has been recorded in rodents burrows. From now on it is not possible to deem this species as nidicolous, even if occasional.
The two records from Kerman move eastward the known geographic distribution of the species (Ziani, 2006).
- *Euonthophagus atramentarius* (Ménétries, 1832)
Onthophagus atramentarius Ménétries, 1832: 179
TYPE LOCALITY: “Bakou” [Azerbaijan, Baku].
DISTRIBUTION: South-eastern Europe; Egypt; Turkey, Levant, Iraq, Iran, Central Asia.
MATERIAL EXAMINED: 2 specimens: IR-Yazd, Bafgh, 995 m, VI.2009.
REMARKS: The record of *E. atramentarius* in rodent burrows has to be considered as accidental.
- *Euonthophagus gibbosus* (Scriba, 1790)
Copris gibbosus Scriba, 1790: 56
TYPE LOCALITY: “Gladenbach” [Germany, Essen].
DISTRIBUTION: Central and southern Europe; Turkey, Israel/Palestine, Syria, Iran, Afghanistan, Central and eastern Asia.
MATERIAL EXAMINED: 2 specimens: IR-Kerman, Jiroft, 685 m, VI.2009, 1 specimen; IR-Kerman, Kahnuch, 490 m, VI.2009, 1 specimen.
REMARKS: The record of *E. gibbosus* in rodent burrows has to be deemed as accidental.
- *Onthophagus (Palaeonthophagus) aleppensis* Redtenbacher, 1843
Onthophagus aleppensis Redtenbacher, 1843: 15 (985)
TYPE LOCALITY: “Syria”.
DISTRIBUTION: Turkey, Levant, Afghanistan.
MATERIAL EXAMINED: 3 specimens: IR-Yazd, Bafgh, 995 m, VI.2009, 2 specimens; IR-Razavi Khorasan, Torbat-e jam, 1390 m, V.2009, 1 specimen.
REMARKS: Never cited as a nidicolous species. Its presence in burrows could be accidental.

- *Onthophagus (Palaeonthophagus) cruciatus* Ménétries, 1832
Onthophagus cruciatus Ménétries, 1832: 178
 TYPE LOCALITY: “Bakou” [Azerbaijan, Baku].
 DISTRIBUTION: Caucasus; Turkey, Levant, Iraq, Iran.
 MATERIAL EXAMINED: 2 specimens: IR-Khorasan, Fariman, 910 m, V.2009.
 REMARKS: First record from rodents burrows. Failing other records, the presence of this species in rodent burrows has to be considered accidental.
 SYSTEMATIC NOTE. On the basis of the genitalia analysis of characters of males and females, Martín-Piera & Zunino, 1986 placed *Onthophagus cruciatus* in the *ovatus* group, stating its close phylogenetic relationship with *O. dellacasai* Pittino & Mariani, 1981. In our opinion this placement is not supported by external morphological characters. Particularly, the body of *O. cruciatus* is quite flattened, its meso- and metatarsi are longer than the respective tibiae, the male metasternal plate has a deep concave hollow and, last but not least, the dominant colour of elytra is light yellow. In all the species belonging to the *ovatus* group, in contrast, the body is rather convex, meso- and metatarsi are as long as the respective tibiae, the male metasternal plate is regularly flat, almost convex, and the elytra are strictly black or dark brown, sometimes with dark red spots at base and at apex. That is why we don't believe that the inclusion of *O. cruciatus* in the *ovatus* group can be justified.
- *Onthophagus (Palaeonthophagus) dorsosignatus* d'Orbigny, 1898
Onthophagus dorsosignatus d'Orbigny, 1898: 237
 TYPE LOCALITY: “Lac de Van” [Turkey, Van lake].
 DISTRIBUTION: Caucasus; Turkey, Afghanistan, Iraq, Iran.
 MATERIAL EXAMINED: 4 specimens: IR-Razavi Khorasan, Fariman, 910 m, V.2009, 1 specimen; IR-Razavi Khorasan, Torbat-e jam, 1390 m, V.2009, 1 specimen; IR-Sistan and Baluchistan, Zabul, 1475 m, VI.2009, 1 specimen; IR-Sistan and Baluchistan, Khash, 1410 m, VI.2009, 1 specimen.
 REMARKS: *O. dorsosignatus* has never been cited as a nidicolous species. Its presence in burrows could be accidental.
- *Onthophagus (Palaeonthophagus) fissicornis* (Steven, 1809)
Copris fissicornis Steven, 1809: 34
 TYPE LOCALITY: “Iberia” [Georgia].
 DISTRIBUTION: South-Eastern Europe; Turkey, Levant, Iraq, Iran, Turkmenistan.
 MATERIAL EXAMINED: 77 specimens: IR-Yazd, Bafgh, 995 m, VI.2009, 1 specimen; IR-Sistan and Baluchistan, Zahedan, 1373 m, VI.2009, 5 specimens; IR-Southern Khorasan, Birjand, 1480 m, V.2009, 1 specimen; IR-Razavi Khorasan, Mashhad, 970 m, V.2009, 7 specimens; IR-Kerman, Baft, 2270 m, VI.2009, 8 specimens; IR-Kerman, Rafsanjan, 1510 m, VI.2009, 4 specimens; IR-Northern Khorasan, Shirvan, 1160 m, V.2009, 5 specimens; IR-Northern Khorasan, Bojnord, 1070 m, V.2009, 3 specimens; IR-Sistan and Baluchistan, Khash, 1410 m, VI.2009, 1 specimen; IR-Sistan and Baluchistan, Zabul, 1475 m, VI.2009, 5 specimens; IR-Kerman, Jiroft, 685 m, VI.2009, 4 specimens; IR-Sistan and Baluchistan, Saravān, 1410 m, VI.2009, 5 specimens; IR-Razavi Khorasan, Torbat-e jam, 1390 m, V.2009, 1 specimen; IR-Razavi Khorasan, Kashmar, 1050 m, V.2009, 5 specimens; IR-Southern Khorasan, Nahbandan, 1185 m, V.2009, 5 specimens; IR-Southern Khorasan, Birjand, 1480 m, V.2009, 5 specimens; IR-Razavi Khorasan, Quchan, 1240 m, V.2009, 4 specimens; IR-Razavi Khorasan, Fariman, 910 m, V.2009, 2 specimens; IR-Razavi Khorasan, Nishabur, 1250 m, V.2009, 1 specimen; IR-Sistan and Baluchistan, Iranshahr, 1570 m, VI.2009, 5 specimens.
 REMARKS: *O. fissicornis* is most frequently found in surface excrements, never recorded as a nidicolous species. Anyway, as illustrated by this study, 77 specimens collected in 20 different Iranian localities show the relationship of this species with rodent burrows, at least in Iran. Therefore, *O. fissicornis* has to be considered as pholeoxen.
- *Onthophagus (Palaeonthophagus) lucidus* (Illiger, 1800)
Copris lucidus Illiger, 1800: 106
Copris lucidus Sturm, 1800: 95 [type locality: “Ungarn” (Hungary)]
 TYPE LOCALITY: “Segedin in Niederungen an der Theiß” [Hungary, Szeged, Tisza river].
 DISTRIBUTION: Central and south-eastern Europe; Turkey, Levant, Iraq, Iran.
 MATERIAL EXAMINED: 15 specimens: IR-Kerman, Jiroft, 685 m, VI.2009, 2 specimens; IR-East Azarbaijan, Kharrvana, 1341 m, IV.2009, 1 specimen; IR-Kerman, Rafsanjan, 1510 m, VI.2009, 1 specimen; IR-Razavi Khorasan, Mashhad, 970 m, V.2009, 2 specimens; IR-Southern Khorasan, Nahbandan, 1185 m, V.2009, 1 specimen; IR-Sistan and Baluchistan, Saravān, 1410 m, VI.2009, 4 specimens; IR-Kerman, Baft, 2270 m, VI.2009, 1 specimen; IR-Sistan and Baluchistan, Zabul, 1475 m, VI.2009, 2 specimens; IR-Northern Khorasan, Shirvan, 1160 m, V.2009, 1 specimen.
 REMARKS: The same hypotheses advanced for *O. fissicornis* can also be applied for *O. lucidus*. It has never been recorded as a nidicolous species, but its presence in rodent burrows in 9 Iranian localities suggest a non accidental association with burrows.
- *Onthophagus (Palaeonthophagus) ruficapillus* Brullé, 1832
Onthophagus ruficapillus Brullé, 1832: 169
Onthophagus ruficapillus ssp. *guilanensis* Pittino, 1982: 517 [type locality: “Guilan, Nav's Valley”, Iran]
 TYPE LOCALITY: “Morée” [Greece, Peloponnese].
 DISTRIBUTION: Central and southern Europe; Turkey, Levant, Iraq, Iran.
 MATERIAL EXAMINED: 14 specimens. IR-Razavi Khorasan, Fariman, 910 m, V.2009, 3 specimens; IR-Yazd, Bafgh, 995 m, VI.2009, 1 specimen; IR-Sistan and Baluchistan, Khash, 1410 m, VI.2009, 8 specimens; IR-Sistan and Baluchistan, Zabul, 1475 m, VI.2009, 2 specimens.
 REMARKS: *O. ruficapillus* is an euryphagous species, cited as pholeoxen by Carpaneto & Pittino, 1998.
- *Onthophagus (Palaeonthophagus) suturellus* Brullé, 1832
Onthophagus suturellus Brullé, 1832: 168
 TYPE LOCALITY: “Morée” [Greece, Peloponnese].
 DISTRIBUTION: South-eastern Europe; Caucasus; Turkey, Levant, Iran.
 MATERIAL EXAMINED: 2 specimens: IR-Yazd, Taft, 1590 m, VI.2009.

REMARKS: Recorded from rodent nests by Pittino, 1996, and deemed as pholeoxen by Carpaneto & Pittino, 1998.

- *Onthophagus (Palaeonthophagus) vacca* (Linnaeus, 1767)
Scarabaeus vacca Linnaeus, 1767: 547
TYPE LOCALITY: "...in Gallia australi"; "Borussia" [France; Prussia (central Europe)].
DISTRIBUTION: All over Europe; Morocco; Turkey, Levant, Iran, central Asia.
MATERIAL EXAMINED: 8 specimens: IR-Sistan and Baluchistan, Zahedan, 1373m, VI.2009, 1 specimen; IR-Razavi Khorasan, Nishabur, 1250 m, V.2009, 1 specimen; IR-Northern Khorasan, Bojnord, 1070 m, V.2009, 2 specimens; IR-Kerman, Jiroft, 685 m, VI.2009, 2 specimens; IR-Yazd, Bafgh, 995 m, VI.2009, 2 specimens.
REMARKS: The species is most frequently found in excrements available on the soil surface. It has never been recorded from burrows, and its association with rodent burrows may be considered as accidental.
- *Gymnopleurus flagellatus* (Fabricius, 1787)
Scarabaeus flagellatus Fabricius, 1787: 17
TYPE LOCALITY: "Europa".
DISTRIBUTION: Southern Europe; Northern Africa; Turkey, Levant, Iran, central Asia, Mongolia, China.
MATERIAL EXAMINED: 80 specimens: 77 specimens as already reported in Moradi Gharakhloo & Ziani, 2009; IR-Razavi Khorasan, Nishabur, 1250 m, V.2009, 1 specimen; IR-Yazd, Mehriz, 1480 m, VI.2009, 2 specimens.
REMARKS: The presence of the dung ball-rolling *G. flagellatus* inside rodent burrows (Moradi Gharakhloo & Ziani, 2009) is herein confirmed. It is not yet possible, anyway, to hypothesize if such Scarabaeinae species is occasionally associated with burrows or if this association is stricter. Its relationship with rodents has to be further investigated.
- *Ateuchetus armeniacus* (Ménétries, 1832)
Ateuchus armeniacus Ménétries, 1832: 173
TYPE LOCALITY: "Zouvant"; "Arménie russe" [Southern Azerbaijan; Armenia].
DISTRIBUTION: South-eastern Europe; Turkey, Levant, Iraq, Iran.
MATERIAL EXAMINED: 5 specimens as already reported in Moradi Gharakhloo & Ziani, 2009.
REMARKS: More observations are necessary to better understand the nidicolous biology of this rolling scarab, surprisingly collected in inhabited burrows of *Spermophilus xanthoprimum* (Bennet, 1835).

SPECIES PREFERABLY OCCURRING IN BURROWS (PHOLEOPHILES)

- *Onthophagus (Palaeonthophagus) angorensis* Petrovitz, 1963
Onthophagus angorensis Petrovitz, 1963: 235
TYPE LOCALITY: "Çubuk-barağ bei Ankara" [Turkey].
DISTRIBUTION: South-eastern Europe; Turkey, Levant, Iran, central Asia.
MATERIAL EXAMINED: 2 specimens: IR-Razavi Khorasan, Torbat-e jam, 1390 m, V.2009.
REMARKS: After its description this species was recorded from burrows or nests of small mammals by Pittino (1996), Carpaneto & Pittino (1998), and Pittino (2004). The species can be considered as pholeophile.

- *Onthophagus (Palaeonthophagus) ponticus* Harold, 1883
Onthophagus ponticus Harold, 1883: 434
Onthophagus furcicornis Reitter, 1892: 202 [type locality: "Taurus", Southern Turkey, Toros dağları]
Onthophagus krali Balthasar, 1963: 603 [type locality: "Umgebung von Kirovabad (Jelisavetpol) in Transcaucasien stammten" (Azerbaijan, Gjandža)]
Onthophagus citellorum Medvedev, 1965: 186 [type locality: "Yug stepi" (Southern steppes: Ukraine? Southern European Russia?)]
TYPE LOCALITY: "Mzchet (Grusien)" [Georgia].
DISTRIBUTION: South-eastern Europe; Turkey, Lebanon, Iraq, Iran (Ziani & Gudenzi, 2006).
MATERIAL EXAMINED: 14 specimens: IR-Kerman, Ravar, 1175 m, VI.2009, 1 specimen; IR-Kordestan, Marivan, 1320 m, IV.2009, 2 specimens; IR-Ilam, Dehloran, 215 m, IV.2009, 1 specimen; IR-East Azarbaijan, Kharvana, 1341 m, IV.2009, 4 specimens; IR-Zanjan, Dandi, 1570 m, IV.2009, 1 specimen; IR-Yazd, Abarkooh, 1510 m, VI.2009, 2 specimens; IR-West Azarbaijan, Khoy, 1180 m, IV.2009, 3 specimens.
REMARKS: Carpaneto & Pittino (1998) included *O. ponticus* (sub *O. furcicornis* Reitter, 1892) among the species which seem to prefer rodent dens. *O. ponticus* can be collected outside, aboveground, but its association with burrows is frequent, if not obligate.

SPECIES OBLIGATORY OCCURRING IN BURROWS (PHOLEOBIONTS)

- *Osmanius balthasari* (Petrovitz, 1963)
Paracoptochirus balthasari Petrovitz, 1963: 244
TYPE LOCALITY: "Anatolien, zwischen Iskenderun und Belen" [central-southern Turkey, between Iskenderun and Belen].
DISTRIBUTION: Greece; Turkey. Herein recorded for the first time in Iran.
MATERIAL EXAMINED: 36 specimens: IR-Qazvin, Sirdan, 1308 m, IV.2009, 2 specimens; IR-Kordestan, Saqqez 1500 m, IV.2009, 5 specimens; IR-Qum, Dastjerd, 1680 m, IV.2009, 1 specimen; IR-Ilam, Saleh abad, 620 m, IV.2009, 5 specimens; IR-Chaharmahal-e Bakhtiari, Chelgard, 1950 m, IV.2009, 9 specimens; IR-Kerman-shah, Islam abad, 1335 m, IV.2009, 6 specimens; IR-Kerman, Zarand, 1655 m, VI.2009, 3 specimens; IR-Nurestan, Nour abad, 1650 m, IV.2009, 5 specimens.
REMARKS: According to the original description (Petrovitz, 1963), the holotype of *O. balthasari* was collected in buried dried dog dung. The species was quoted in rodents burrows for the first time by Pittino (1996) then confirmed as pholebiont by Carpaneto & Pittino (1998).
- *Onthophagus (Palaeonthophagus) psychopompus* Ziani & Moradi, 2010
Onthophagus (Palaeonthophagus) psychopompus Ziani & Moradi, 2010
TYPE LOCALITY: "Iran, Tehran prov.: Hashtgerd"
DISTRIBUTION: Iran (Ziani & Moradi Gharakhloo, 2010).
MATERIAL EXAMINED: The whole type series, composed of 75 specimens (see Ziani & Moradi Gharakhloo, l.c.).
REMARKS: *O. psychopompus* seems to be a pholeobiont species, obligatorily associated with rodents.
Besides, there are a few specimens of Aphodiini whose correct identification requires further work. The possibility

that some belong to undescribed species cannot be excluded at this stage. They will be the object of future publication.

Discussion

In the last two years 22 species of Scarabaeoidea were collected in burrow and nests of Iranian rodents. The presence of 10 of the listed species inside burrows can be deemed as accidental. Other 8 species - *Eudolus quadriguttatus*, *Caccobius mundus*, *Onthophagus fissicornis*, *O. lucidus*, *O. ruficapillus*, *O. suturellus*, and, with a question mark, *Gymnopleurus flagellatus* and *Ateuchetus armeniacus*, could be considered pholeoxens. Two are pholeophils (*Onthophagus angorensis* and *O. ponticus*), whereas two (*Osmanius balthasari* and *Onthophagus psychopompus*) seems to be obligatorily associated with rodents burrows. The geographic distribution of the latter four species reveals that they are not associated with a particular species or genus of rodents. Only *Onthophagus psychopompus* is an Iranian endemism, even if spread in all over the country, and anyway all the known specimens were collected in burrows of rodents belonging to three different genera. *Osmanius balthasari* is distributed from Greece to Iran, *Onthophagus angorensis* from Serbia to central Asia and *O. ponticus* from Romania to Iran, through Greece and Lebanon. This demonstrates that they do not have a strict link with the host, and most probably not even host preference. The relationship is not with a given borrowing rodent species but with the microhabitat and food availability underground (i.e. the association is probably with the habitat, not with the rodent).

Regarding the biodiversity in the Iranian investigated burrows, we have listed in this work 5 species of Aphodiidae and 17 of Scarabaeidae. The number is still very low. We believe that further investigations on the associations between Scarabaeoidea and small mammals, particularly rodents, burrows, mostly in the Middle East, will yield new systematic and ecological data.

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