Евразиатский энтомол. журнал 24(2): 113–118
doi 10.15298/euroasentj.24.02.11

First record of an *Anthocomus* Erichson, 1840 larva (Coleoptera: Malachiidae) found inside a *Megachile* sp. nest (Hymenoptera: Megachilidae) built in a *Heracleum sosnowskyi* Mandenova, 1944 stem (Apiaceae) from the Kurskaya Oblast, Russia

Первая находка личинки *Anthocomus* Erichson, 1840 (Coleoptera: Malachiidae) в гнезде *Megachile* sp. (Hymenoptera: Megachilidae) из стебля *Heracleum sosnowskyi* Mandenova, 1944 (Apiaceae) в Курской области, Россия

I.S. Plonski*, K.S. Ivlev, S.E. Tshernyshev*****
И.С. Плонски*, К.С. Ивлев, С.Э. Чернышёв*****

* International Research Institute for Entomology, Natural History Museum Vienna, Burgring 7, A-1010 Wien, Austria. E-mail: isidor.plonski@nhm.at. https://orcid.org/0000-0003-3818-1137

* Международный исследовательский институт энтомологии, Естественно-Исторический музей Вены, Вена Австрия.

** Voronezh State University, Universitetskaya Pl. 1, Voronezh 394006 Russia. E-mail: kostyaivlev03@mail.ru.

** Воронежский государственный университет, Университетская пл. 1, Воронеж 394018 Россия.

*** Institute of Systematics and Ecology of Animals, Siberian Branch of the Russian Academy of Sciences, Frunze Str. 11, Novosibirsk 630091 Russia; Tomsk State University, Prosp. Lenina 36, Tomsk 634050 Russia. E-mail: sch-sch@mail.ru. http://orcid.org/0000-0001-5931-9241.

***Институт систематики и экологии животных СО РАН, ул. Фрунзе 11, Новосибирск 630091 Россия; Томский государственный университет, проспект Ленина 36, Томск 634050 Россия.

Key words: Soft-winged flower beetle, larva, solitary leafcutter bee nest, hogweed stem, Eastern Europe.

Ключевые слова: жук малашка, личинка, гнездо одиночной пчелы мегахилиды, стебель борщевика, Восточная Европа.

Abstract. The nests of the solitary leafcutter bee *Megachile* sp., built in the stem cavities of Sosnowsky's hogweed (*Heracleum sosnowskyi* Manden.) growing in Kurskaya Oblast, Russia, were examined in August 2023. A larva of *Anthocomus* Erichson 1840, closely related to the species *Anthocomus rufus* (Herbst, 1783), was found among parasitoids of two families of Chalcidoidea in one of the nests. The presence of a Malachiidae larva in the nest of a solitary bee nesting in Apiaceae stems is reported for the first time.

Резюме. В августе 2023 года в Курской области были обследованы гнёзда одиночной пчелы-листореза *Megachile* sp., сооружённые в полостях стеблей борщевика Сосновского (*Heracleum sosnowskyi* Manden.). В одном из гнёзд среди паразитоидов двух семейств Chalcidoidea была обнаружена личинка *Anthocomus* Erichson 1840, внешне близкая к личинке вида *Anthocomus rufus* (Herbst, 1783). Присутствие личинки Malachiidae в гнезде одиночной пчелы, гнездящейся в стеблях сельдерейных (Apiaceae) отмечается впервые.

Introduction

The pre-imaginal stages of beetles within the superfamily Cleroidea are poorly studied, both morphologically and synecologically [cf. Klausnitzer, Constantin, 1996]. For example, larvae of the Malachiidae have been recorded to be reared from or found in rock crevices and pools of the marine intertidal zone [Asano, Kojima, 2009, 2013], under beach wrack [Moore 1956; Moore, Legner, 1977], under pebbles, rocks, and clumps of lichens in granitic outcrop areas [King, 1985], in plant litter [Perris, 1856; Xambeu, 1897], in the upper soil stratum [Medvedev, Galatz, 1969], under the bark or in dead wood of trees [e.g. Heeger, 1857; Perris, 1862, 1869, 1877, 1899; Kaltenbach, 1874; Flach, 1887; Xambeu, 1892; Kolbe, 1895; Urban, 1914; Holzschuh, 1971; Foster, Antonelli, 1973; Dix, 1990; Bretzendorfer, 1996] or *Hedera helix* L. [Reibnitz, 1987; Burger, 1991], in basidocarps [Bretzendorfer, 1996; Knapp, 2003; Skvarla,

How to cite this article: Plonski I.S., Ivlev K.S., Tshernyshev S.E. 2025. First record of an *Anthocomus* Erichson, 1840 larva (Coleoptera: Malachiidae) found inside a *Megachile* sp. nest (Hymenoptera: Megachilidae) built in a *Heracleum sosnowskyi* Mandenova, 1944 stem (Apiaceae) from the Kurskaya Oblast, Russia // Euroasian Entomological Journal. Vol.24. No.2. P.113–118. https://doi.org/10.15298/euroasentj.24.02.11

2019], inside galleries of wood-boring insects [Xambeu, 1895; Gardner, 1931; Hayashi, Takenaka, 1959], in pith-containing stems of vascular plants [Guérin-Méneville, 1847; Giraud, 1866; Urban, 1914; Hayashi, Takenaka, 1959; Alexander, 1996], in moss [Hayashi, 1962; Asano, Yoshitomi, 2011], in subcortical egg-pods of orthopterans [Farrow, 1974], inside spider cocoons [Sacher, Klausnitzer, 1992], inside larval faecal cases of leaf beetles [Asano, 2021], inside old oothecas of mantises [Plonski et al., 2021], in crabronid wasp nests inside old reed galls [Bogusch et al., 2017], in galls of a tephritid fly on *Artemisia* L. [Foster, Antonelli, 1973], in old twig galls of *Saperda populnea* (L., 1758) [Georgiev et al., 2004], in the garbage pans of termite nests [Costas et al., 1988; Costas, Vanin, 2010], in bird nests [Foster, Antonelli, 1973], in thatched roofs made out of straw [Perris, 1895] or inside houses [Weidner, 1974; Šmaha, 1976; Buchelos, Papadoulis, 1991]. The larvae of these beetles are known to be predators or to combine predation with mycophagy on detritus and bacterial or fungal moulds [Abeille de Perrin, 1890; Xambeu, 1908].

Data on the bionomy of soft-winged flower beetle species occurring in the Euro-Asian forest-steppe regions are scarce (especially for geobionts) and there is a lack of precise data on the larval habitats of most species found in this region.

In what follows, the presence of a Malachiidae larva in a nest of a solitary bee nesting in stems of an umbellifer is reported for the first time from the Kursk region in Russia.

Material and methods

Nests of the solitary leafcutter bee *Megachile* sp. built in the stem cavities of Sosnowsky's hogweed (*Heracleum sosnowskyi* Manden.) were examined by Konstantin Ivlev. The plants were growing along a road near artificial water bodies in the Kursk region (see Figs 1–2). Collected nests were placed in a freezer for three months to fix the sample and preserve its contents. Examination of the contents of one nest under laboratory conditions (Fig. 2) revealed no bee larvae, but abundant parasitoids from two families of Chalcidoidea, one of which, a male, was identified by Ekaterina Vladimirovna Tselikh (Zoological Institute of the Russian Academy of Sciences, Sait Petersburg) as *Rakosina deplanata* Boucek, 1956. Among the parasitoids, a small orange larva, about 3.5 mm long, belonging to the Cleroidea, was discovered (Fig. 4). Further examination by Sergei E. Tshernyshev allowed its identification as a larva of *Anthocomus* Erichson 1840, closely related to the species *Anthocomus rufus* (Herbst, 1783).

For the larval description, the following abbreviations are used according to M. Asano [2017, 2021]: BL — body length, from the anterior margin of the frons to apex of the urogomphi, BW — maximum body width, HL — head capsule length, HW — maximum head capsule width, TL — thorax length, TW — thorax width, AL — abdomen length, AW — abdomen width, UL — urogomphi length, UW — urogomphi width.

The present work is registered in ZooBank (www.zoobank.org) under urn:lsid:zoobank.org:pub:1192A09D-4A23-4582-9FB4-6DEBDE7F065F.

Results

Anthocomus cf. *rufus* (Herbst, 1783)

Figs 1–7.

Material. **Russia, *Kurskaya Oblast:*** 11 km SSW Kastornoe settlement, environs of Kotovka village, alongside the road near artificial water reservoirs, 51.75216° N, 38.156642° E, 19.VIII.2023, leg. K. Ivlev — 1 larva (ex *Megachile* sp. nest in *Heracleum sosnowskyi* dry stem).

Description. *Instar larva.* Body red-orange, soft, rather segmented and flattened, oblong.

Head capsule elongate, 1.4 times as long as broad, flattened, coronal suture (stem) spans to the medial part and then bifurcates triangularly to two frontal sutures (arms), surface sparsely covered with erect long light setae, stemmata well developed, small and oval, arranged above frontal sutures (arms) at lateral sides of the head. Labrum elongate, distinctly longer

Figs 1–2. Habitat where a *Megachile* bee nest with an *Anthocomus* larva was found in a stem of Sosnowsky's hogweed. 1 — view of the road where the hogweed grew; 2 — artificial pond near the road.

Рис. 1–2. Местообитание, в котором было обнаружено гнездо пчелы *Megachile* sp. с личинкой *Anthocomus* sp. в стебле борщевика Сосновского. 1 — вид на дорогу, где рос борщевик; 2 — искусственный пруд у дороги.

Fig. 3. Exposed hogweed stem with a nest of *Megachile* sp.
Рис. 3. Вскрытый стебель борщевика с гнездом *Megachile* sp.

than wide. Mandibles strong, bidentate, with small additional denticle at base (Fig. 5).

Thorax 2 times as long as wide, segment large, distinctly massive in comparison with abdominal segment, slightly convex in the middle and depressed at posterior angles, sparsely covered with semierect setae, each segment with a pair of glandularia at base; prothorax is 1.2 times as long as wide, with straight anterior margin and arcually prominent posterior one, hind angles laterally truncated, anterior rounded, disc with two comma-shaped spots at posterior angles and two longitudinal median stripes evenly diverging in the centre, white translucent area at the head and near hind angles; mesonotum 1.6 times as long as broad, with straight anterior margin hidden by the pronotum, and slightly emarginate posterior margin, hind angles with round translucent areas and short curved dark stripes on the inner sides of the areas; metanotum 1.5 times as long as wide, moderately wider than pro- and metanotum, with distinctly rounded anterior angles and straight anterior and posterior margins, anterior margin is hidden by the mesonotum, disc with translucent white round areas at hind angles and complex figure compiled with dark stripes which looks like the letter psi (ψ).

Prolegs of moderate size, not long or short; femora and tibiotarsi of equal length, claws straight, short, slightly curved at the apex and pointed (Fig. 6).

Abdomen 9-segmented, at about 1.1 times wider and 1.2 times longer than thorax, each abdominal segment twice shorter than metathorax; all segments are the same size, short, covered with semierect light hairs and provided with two glandularia dorsally. Urogomphi bifurcate, parallel, each urogomphus is triangular in shape, with a straight outer side and a truncated noncurved apex, possesses several pairs of long light setae.

Measurements in mm. BL — 3.6; BW — 1.3; HL — 0.7; HW — 0.5; TL — 1.1; TW — 0,6; AL — 1.3; AW— 0.6; UL — 0.5; UW— 0.4.

Larval habitat and synecology. The larva was found in an old nest (within the contents of a brood cell) of *Megachile* sp. (Hymenoptera: Megachilidae), which was built in the stem cavity of a Sosnowsky's hogweed (*Heracleum sosnowskyi* Manden.) (Apiaceae) (Fig. 3). Parasitoids from two families of Chalcidoidea were present nearby, including a male of *Rakosina deplanata* Boucek, 1956 (Hymenoptera: Pteromalidae).

It is doubtful that the small (3.5 mm) Malachiidae larva preyed on bee larvae, except in the very early stages when bee larvae are 1.6–2.0 mm in size. Rather, they may have preyed on the larvae of the pteromalid parasitoids, which reach 1–2 mm in length.

Remarks. Kurskaya Oblast is located between 50°54' N and 52°26' Nand 34°05' E and 38°31' E, in the south-western part of Russia and the eastern part of Europe. In Jacobson's [1915: 698] «Beetles of Russia and Western Europe», five *Anthocomus* Erichson, 1840 species are reported for this area, namely: *A. coccineus* Schall. (Mogilev (Belorussia), Kherson (Ukraine), Saratov (Russia)), *A. bipunctatus* Harr. (= *A. equestris* F.) (Moscow, Voronezh, Saratov, Astrakhan, Orenburg, Dagestan (all in Russia), Elisavetgrad (now Kropivnitskii), Kherson (Ukraine)), *A. miniatus* Kol. (Saratov, Novorossiisk (Russia), Georgia, Azerbaijan, Turkmenia, Uzbekistan), and *A. fasciatus* L. (Saratov, Moscow (Russia), Kiev (Ukraine), Tiflis (Georgia)). In the «Key to Insects of European Part of the USSR» [Gurjeva, 1965: 210], four *Anthocomus* species are given: *A. fasciatus* L., *A. miniatus* Kol., *A. bipunctatus* Harrer., and *A. coccineus* Schall. (= *A. rufus* Hbst.). According to current systematics [Mayor, 2004, 2007; Tshernyshev, 2021], all these species are represented by the following taxa: *Anthocomus* (*Anthocomus*) *fasciatus* (Linnaeus, 1758), *A.* (*A.*) *rufus* (Herbst, 1783) (= *A. coccineus* (Schaller, 1783)), *Anthocomus* (*Celidus*) *equestris* (Fabricius, 1781) (=*Anthocomus bipunctatus* Abeille de Perrin, 1891), and *A.* (*C.*) *miniatus* (Kolenati, 1846).

Two of these four species, *A.* (*C.*) *miniatus* (Kolenati) and *A.* (*A.*) *fasciatus* (Linnaeus) in the region prefer the mountainous part of the South Caucasus, their occurrence in the Kurskaya Oblast is unlikely. The other two species, *A.* (*C.*) *equestris* (Fabricius) and *A.* (*A.*) *rufus* (Herbst), on the contrary prefer plain territories. *Anthocomus* (*A.*) *rufus* (Herbst) is widespread across Europe, extending northwards to Finland and Saint Petersburg, while *Anthocomus* (*C.*) *equestris* (Fabricius) exhibits a broad distribution within the Palearctic forest-steppe zone. The latter also demonstrates a Holarctic distribution pattern due to anthropogenic introduction into North America (USA and Canada). Both species occur in southern Russia and their distribution in Kurskaya Oblast is very possible. In fact, the larva found in the *Megachile* nest should belong to one of these two species. We think it is more likely to be *A.* (*A.*) *rufus* (Herbst), based on the characters below. The larva of *A. equestris* differs in having a bright pink to red body colour, a more or less equilateral head capsule and a short, sclerotized

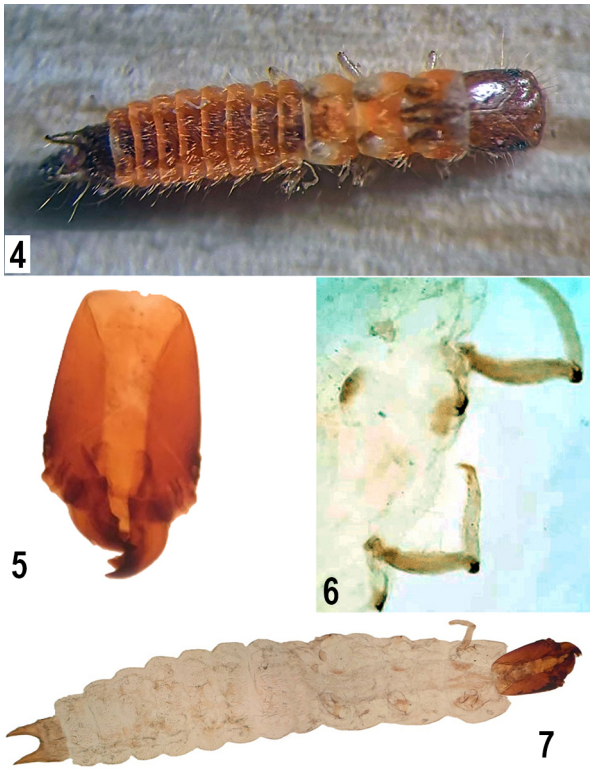
and not clearly visible colour pattern on the thoracic segments; the urogomphi are short, not sclerotized, of the same colour as the body, subparallel in shape and with rounded apices. The larva of *A. rufus* has orange-red body colouration, distinctly elongated head capsule and elongated, sclerotized and clearly visible colour pattern on prothorax, consisting of four longitudinal stripes on pronotum and two stripes on meso- and metanotum; urogomphi elongated, sclerotized and brown in colour, parallel, each urogomph triangular in shape, with straight outer side and truncated apices.

This is the first record of an *Anthocomus* larva in a *Megachile* bee nest in a stem of Sosnowsky's hogweed. This is also the first record of a soft-winged flower beetle larva cohabiting with Chalcidoidea parasitoids in a *Megachile* bee nest.

Discussion

Plonski (in prep.) summarizes biological data on larval micro-habitats and larval trophic ecology of *Anthocomus* species as follows: «Holzschuh [1971] reared five *Anthocomus equestris* (Fabricius, 1781) (together with nine other beetle species) out of bark of a dead *Acer platanoides* L. tree, which was infested by *Scolytus koenigi* Schevyrev, 1890. And, Skvarla [2019], who makes a case for fungivory in *A. equestris*, reports a «handful of specimens» reared out of basidiocarps of *Bjerkandera adjusta* (Willd.: Fr.) P. Karst. Foster & Antonelli [1973] report findings of *Anthocomus horni* (Pic, 1912) larvae in wood of *Pinus flexilis* E. James, in galls of a tephritid fly on *Artemisia tridentata* Nutt., and in nests of *Pica pica* Linnaeus, 1758 (Passeriformes: Corvidae). Urban [1912] reared *Anthocomus rufus* (Herbst, 1786) in captivity, observed smaller larvae feeding on dead collembolans and fed older larvae with crushed arthropods like flies, midgets and spiders. Bogusch et al. [2017] found larvae of *A. rufus* in the nests of *Pemphredon fabricii* (Müller, 1911) (Hymenoptera: Crabronidae) in reed galls of *Lipara* spp. (Diptera: Chloropidae). The life-history of *Anthocomus fasciatus* is largely unknown. Horion [1953] believed, based on their phenology, that the biology of *A. fasciatus* is comparable to that of *A. equestris* (see above for available data). A larva supposed to belong to *A. fasciatus* was found in a mural crevice [Matthes, 1962], which hints to a free-living, roaming larval stage». In summary, it can be stated that: the trophism of Malachiidae larvae is generalistic and opportunistic, because they have a mobile, roaming phase and seek out different micro-habitats for food uptake or overwintering, since some species have been found in or reared from more than one type of micro-habitat.

Furthermore, the discovery of a Malachiidae larva in a solitary bee nest inside the stem cavity of hogweed provides further compelling evidence that the pre-imaginal stages of these beetles inhabit a wide range of micro-habitats, which explains the high diversity of Malachiidae in arid ecosystems where the saproxylobiontic food-web is almost absent.



Figs 4–7. General view of the *Anthocomus* cf. *rufus* larva from a *Megachile* sp. nest in Sosnowsky's hogweed. 4 — a dried larva taken directly from the nest of a solitary bee; 5 — head capsule ventrally; 6 — prolegs; 7 — larva, ventral view. Figs 5–7 show a larva examined after alcohol preservation.

Рис. 4–7. Общий вид личинки *Anthocomus* cf. *rufus* из гнезда *Megachile* sp. в стебле борщевика Сосновского. 4 — сухая личинка, взятая непосредственно из гнезда одиночной пчелы; 5 — головная капсула вентрально; 6 — ноги; 7 — личинка, вентрально. На рис. 5–7 показана личинка после консервации в спирте.

Acknowledgements

We are sincerely grateful to Dr. Alice Laciny (Vienna, Austria) for the linguistic revision of the text, and Dr. E.V. Tselikh (Saint Petersburg) for identification cholcidoid wasps.

This study was supported by the Program of Basic Scientific Research (FNI) of the State Academies of Sciences (Project No. 0247-2021-0004). The material used in the study was provided by the Institute of Systematics and Ecology of Animals Siberian Branch of RAS, collection «Siberian Zoological Museum».

References

Abeille de Perrin E. 1890. Malachiidae. Malachides d'Europe et pays voisins // Annales de la Société Entomologique de France. Vol.6. No.10. P.181–260.

Alexander K.N.A. 1996. *Malachius viridis* Fabricius (Melyridae) breeding in stem of wild cabbage // The Coleopterist. Vol.5. No.1. P.19.

Asano M. 2017. Morphology and biology of *Malachius prolongatus* (Coleoptera: Melyridae: Malachiinae) // Acta Entomologica Musei Nationalis Pragae. Vol.57. No.2. P.603–615. https://doi.org/10.1515/aemnp-2017-0

Asano M. 2021. The larva of *Intybia histrio* (Kiesenwetter) (Coleoptera: Melyridae) // Japanese Journal of Systematic Entomology. Vol.27. No.2. P.206–210.

Asano M., Kojima H. 2009. On the mature larvae of the genus *Laius* (Coleoptera, Malachiidae) from Japan // Japanese Journal of Systematic Entomology. Vol.15. No.2. P.481–486.

Asano M., Kojima H. 2013. Description of the early instars of *Laius asahinai* Nakane (Coleoptera: Malachiidae): first discovery of a foetomorphic larva in Malachiidae // The Coleopterists Bulletin. Vol.67. No.1. P.40–45. https://doi.org/10.1649/072.067.0109

Asano M., Yoshitomi H. 2011. The Larva of *Carphurus pengaronae* Champion (Coleoptera, Malachiidae, Carphurinae) // Japanese Journal of Systematic Entomology. Vol.17. No.2. P.225–229.

Bogusch P., Havelka J., Astapenková A., Heneberg P. 2017. New type of progressive provisioning as a characteristic parental behaviour of the crabronid wasp *Pemphredon fabricii* (Hymenoptera Crabronidae) // Ethology, Ecology & Evolution. Vol.30. No.2. P.114–127. http://dx.doi.org/10.1080/03949370.2017.1323801

Bretzendorfer F. 1996. Kleine Mitteilung 171. *Tillus elongatus* (L.) Zucht aus Buche (Col., Cleridae) // Mitteilungen des Entomologischen Vereins Stuttgart. Bd.31. P.108.

Buchelos C.T., Papadoulis G.T. 1995. Occurrence of *Malachius* sp. (Coleoptera: Malachiidae) larvae in houses in Southern Greece // Annales de l'Institut Phytopathologique Benaki. N.S. Vol.17. P.99–102.

Burger F. 1991. Bemerkenswerte Käfer (Col., Malachiidae, Anobiidae, Cerambycidae, Anthribidae) aus einer Efeutreibzucht (*Hedera helix* L.) // Entomologische Nachrichten und Berichte. Bd.35. No.1. S.65–66.

Costa C., Vanin S.A., Casari-Chen S.A. 1988. Larvas de Coleoptera do Brasil. Museu de Zoologia, Universidade de Sao Paulo: Sao Paulo. 282 p.

Costa C., Vanin S.A. 2010. Coleoptera larval fauna associated with termite nests (Isoptera) with emphasis on the «bioluminescent termite nests» from Central Brazil // Psyche: a Journal of Entomology. Art.723947. P.1–12.

Dix M.E. 1990. *Malachius ulkei* Horn (Coleoptera: Malachiidae): an egg predator of *Paleacrita vernata* Peck (Lepidoptera: Geometridae) // Journal of the Kansas Entomological Society. Vol.63. No.4. P.648–652.

Farrow R.A. 1974. The larva of *Laius villosus* (Coleoptera: Melyridae) feeding on the egg-pods of the Australian plaque locust, *Chortoicetes terminifera* (Orthoptera: Arcididae) // Journal of the Australian Entomological Society. Vol.13. No.3. P.185–188.

Foster D.E., Antonelli A.L. 1973. Larval description and notes on the biology of *Anthocomus horni* (Coleoptera: Melyridae) // Pan-Pacific Entomologist. Vol.49. P.56–59.

Gardner J.C.M. 1931. Immature stages of Indian Coleoptera (9) // The Indian Forest Records (Entomology Series). Vol.16. No.4. P.91–111.

Georgiev G., Ljubomirov T., Raikova M., Ivanov K., Sakalian V. 2004. Insect inhabitants of old larval galleries of *Saperda populnea* (L.) (Coleoptera: Cerambycidae) in Bulgaria // Journal of Pest Science. Vol.77. No.4. P.235–243.

Giraud J.E. 1866. Mémoire sur les insectes qui habient les tiges sèches de la Ronce // Annales de la Société Entomologique de France. Vol.4. No.6. P.443–500.

Gradwell G.R. 1957. Habits of larvae of *Malachius bipustulatus* (L.) (Col., Malachidae). // Entomologist's Monthly Magazine. Vol.93. P. 104.

Guérin-Méneville M. 1847. Communications // Bulletin des séances de la Société entomologique de France. 1847: XIII.

Gurjeva E.D. 1965. [36. Fam. Melyridae (Malachiidae) — soft-winged flower beetles] // [Key to Insects of European Part of the USSR]. Zhestkokrylye i veerokrylye. Vol. .5. Moscow– Leningrad: Nauka. P.207–213. [In Russian].

Hayashi N. 1962. Notes on the immature stages of *Attalus japonicus* Kiesenwetter (Melyridae). (Studies on coleopterous larvae XIII) // Akitu. Vol.10. P.15–19.

Hayashi N., Takenaka N. 1959. On the Larva of *Malachius prolongatus* Motschulsky (Melyridae). (Studies on coleopterous larvae VII) // Akitu. Vol.8. P.73–76.

Heeger E. 1857. Beiträge zur Naturgeschichte der Insekten. (16. Fortsetzung) // Sitzungsberichte der kaiserlichen Akademie der Wissenschaften in Wien, Mathematisch-naturwissenschaftliche Klasse. Bd.24. P.315–334.

Holzschuh C. 1971. Bemerkenswerte Käferfunde in Österreich. Ein Beitrag zur Faunistik und Ökologie mitteleuropäischer Käfer // Mitteilungen der forstlichen Bundes-Versuchsanstalt Wien. Vol.94. P.1–65.

Jacobson G.G. 1905. [26 family Zygiidae]. [Beetles of Russia and Western Europe]. Saint Petersburg: A.F. Devrien Publishing. P.687–712. [In Russian].

Kaltenbach J.H. 1874. Die Pflanzenfeinde aus der Klasse der Insekten. Ein nach Pflanzenfamilien geordnetes Handbuch sämmtlicher auf den einheimischen Pflanzen bisher beobachteten Insekten zum Gebrauch für Entomologen, Insektensammler, Botaniker, Land- und Forstwirthe und Gartenfreunde. Stuttgart: J. Hoffmann. 848 p.

King P.S. 1985. Natural History of *Collops georgianus* (Coleoptera: Melyridae) // Annals of the Entomological Society of America. Vol.78. No.1. P.131–136.

Klausnitzer B., Constantin R. 1996. 66. Familie: Malachiidae // Klausnitzer B. (Ed.): Die Larven Der Kafer Mitteleuropas. Bd.3. Polyphaga. Tl.2. P.204–217.

Knapp H. 2003. Kleine Mitteilung 129. Malachiiden-Beifänge aus Zuchtmaterial (Col.) // Mitteilungen des Entomologischen Vereins Stuttgart. Bd.38. P.30.

Kofler A. 2010. Zur Kenntnis der Käferfauna Osttirols (Österreich): Teil VIII Malacodermata (Lycidae bis Lymexylonidae) // Carinthia II. Bd.200. Nr.120. S.525–552.

Kolbe W. 1895. Beiträge zur Larvenkenntniss schlesischer Käfer // Zeitschrift für Entomologie, Breslau (N.F.). Bd.20. S.1–8.

Moore I. 1956. Notes on some intertidal Coleoptera with descriptions of the early stages (Carabidae, Staphylinidae, Malachiidae) // Transactions of the San Diego Society of Natural History. Vol.12. P.207–230. Plts 14–17.

Moore I., Legner E.F. 1977. The developmental stages of *Endeodes* LeConte (Coleoptera: Melyridae) // Proceedings of the Entomological Society of Washington. Vol.79. P.172–175.

Medvedev L.N., Galataz L.P. 1969. On the larvae of *Simoderus reflexicollis* Gebl. (Coleoptera, Melyridae) // Polskie Pismo Entomologiczne. Vol.39. No.2. P.331–338.

Perris E. 1852. Histoire des métamorphoses du *Clambus enshamensis* Westw., du *Cryptophagus dentatus* Herbst, du *Latridius minutus* Linné, du *Corticaria pubescens* Illig., de *l'Orthoperus piceus* Steph., du *Malachius aeneus* Fabr. et de la *Sapromyza quadripunctata* Fabr. // Annales de la Société Entomologique de France. Vol.2. No.10. P.571–601. Plts 14–15.

Perris E. 1856. Histoire des metamorphoses de divers Insectes // Mémoires de la Société Royale des Sciences de Liège. T.10. P.233–280.

Perris E. 1862. Histoire des insectes du Pin maritime. Supplément aux coléoptères et rectifications // Annales de la Société Entomologique de France. Vol.4. No.2. P.173–243.

Perris E. 1869. Notices entomologiques II. Insectes dont les larves habitent la Vigne sauvage, le Pin, le Chêne ordinaire, le Chêne Tauzin et l'Orme // Annales de la Société Entomologique de France. Vol.4. No.9. P.462–463.

Perris E. 1877. Larves de coléoptères // Annales de la Société Linnéenne de Lyon. N.S. T.23. P.1–430.

Plonski I.S., Rădac I.A., Cassar Th. 2021. On larvae of soft-winged flower beetles (Coleoptera: Melyridae and Rhadalidae) found in oothecae of mantises (Mantodea: Mantidae) // Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen. Vol.73. P.25–30.

Reibnitz J. 1987. Käferzucht aus Efeu // Mitteilungen des Entomologischen Vereins Stuttgart. Bd.22. S.34.

Sacher P., Klausnitzer B. 1992. Funde von Zipfelkäferlarven (Col., Malachiidae) in Kokons der Wespenspinne (*Argiope bruennichi*) // Entomologische Blätter. Bd.88. No.1. P.33–42.

Skvarla M.J. 2019. New information about *Anthocomus equestris* (Fabricius, 1781) (Coleoptera: Melyridae), a soft-winged flower beetle commonly found in homes // Proceedings of the Entomo-

logical Society of Washington. Vol.121. No.4. P.693–699. http://dx.doi.org/10.4289/0013-8797.121.4.693

Šmaha J. 1976. Weitere Feststellungen lästigen Vorkommens der Larven von Zipfelkäfern (*Malachius*; Col., Malachiidae) // Anzeiger für Schädlingskunde, Planzenschutz, Umweltschutz. Bd.49. No.6. P.86–87.

Tshernyshev S.E. 2021. A review of the genus *Anthocomus* Erichson, 1840 (Coleoptera, Cleroidea: Malachiidae) of Inner Asia // Zootaxa. Vol.4969. No.3. P.511–525. https://doi.org/10.11646/zootaxa.4969.3.4

Urban C. 1912. Zur Lebensgeschichte des *Anthocomus rufus* Hbst. // Entomologische Mitteilungen. Bd.1. P.331–337.

Urban C. 1914. Zur Naturgeschichte des *Malachius bipustulatus* // Entomologische Mitteilungen. Bd.4. S.4–10.

Weidner H. 1973. Larven von Zipfelkäferm (*Malachius*, Col. Malachiidae) als Lästlinge in Ferienhäusern // Anzeiger für Schädlingskunde, Planzenschutz, Umweltschutz. Bd.46. No.6. P.86–89.

Xambeu V. 1897. Moeurs et métamorphoses de l'*Antholinus amictus*, Erichson. Coléoptère de la famille des Malachides // Le Naturaliste. Vol.2. No.11. P.104.

Xambeu V. 1892. Moeurs et métamorphoses du *Malachius inornatus* Kust. (Cyanescens Muls.). Coléoptère du groupe des Malachiides // Le Naturaliste. Vol.2. No.6. P.157–158.

Xambeu V. 1895. Moeurs et métamorphoses du *Malachius parilis* (Erichson). Coléoptère du groupe des Malacodermes // Le Naturaliste. Vol.2. No.9. P.19–20.

Поступила в редакцию 17.1.2025