

## Soft-winged flower beetles (Coleoptera, Cleroidea: Malachiidae) of the Sikhote-Alinskii Nature Reserve, the Russian Far East

### Жуки-малашки (Coleoptera, Cleroidea: Malachiidae) Сихоте-Алинского заповедника на Дальнем Востоке России

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**Key words:** Soft-winged flower beetles, distribution, endemic, Northern Primorie.

**Ключевые слова:** жуки-малашки, распространение, эндемик, Северное Приморье.

**Abstract.** 14 species from 10 genera and 4 tribes of two subfamilies of the family Malachiidae have been recorded in the Sikhote-Alin Nature Reserve. This represents almost half of all species known from the Far Eastern region of North Asia and a quarter of the total species diversity of the area. The overwhelming majority of species are of Far Eastern distribution; only one species, *Nepachys cardiaca* (Linnaeus, 1761), is widespread in the Palaearctic, while two species, *Cordylepherus facialis* (Gebler, 1832) and *Ebaeus (Ebaeus) transbaikalicus* Pic, 1912, extend into Eastern Siberia, Mongolia, and Northeast China. The fauna of the Sikhote-Alin Nature Reserve reflects the specificity of the Far Eastern region and differs significantly from other regions of North Asia.

**Резюме.** В Сихоте-Алинском заповеднике отмечено 14 видов жуков малашек из 10 родов, 4 триб двух подсемейств семейства Malachiidae. Это почти половина всех видов, известных в дальневосточной области Северной Азии и четверть всего видового разнообразия малашек области. Подавляющее большинство видов — дальневосточного распространения, только один вид, *Nepachys cardiaca* (Linnaeus, 1761), широко распространён в Палеарктике, а два вида: *Cordylepherus facialis* (Gebler, 1832) и *Ebaeus (Ebaeus) transbaikalicus* Pic, 1912 заходят в Восточную Сибирь, Монголию и Северо-Восточный Китай. Фауна Сихоте-Алинского заповедника отражает специфику Дальневосточной области и ритительно отличается от остальных регионов Северной Азии.

## Introduction

The soft-winged flower beetles belong to the family Malachiidae within the superfamily Cleroidea. These small to medium-sized beetles, ranging from 1 to 8 mm in length, are characterised by their soft bodies with freely articulated sclerites, which contribute to their high mobility. This structural specifics has allowed the Malachiidae to inhabit a wide range of ecosystems, from Arctic tundra to tropical coastlines and inland deserts.

The diversity of soft-winged flower beetles is greater in warmer regions, while their numbers are significantly reduced in the temperate zone of Eurasia. The larvae of soft-winged flower beetles have been recorded as predators [Shurovenkov, 1980; Švihla, 1984; Klausnitzer von, Constantin, 1996; Plonski et al., 2021], mainly on trees and grasses, and there is some evidence that they may also feed on moulds [Skvarla, 2019]. The family Malachiidae originated over 100 million years ago, with the oldest forms exhibiting typical features of male-specific structures known from Burmese amber inclusions mined in Myanmar, which are approximately 100 million years old and belong to the latest Albanian to earliest Cenomanian of the mid-Cretaceous [Tshernyshev, Legalov, 2023]. The family is well known from the Eocene of the Paleogene, with beetles described from Baltic and Rovno amber, as well as from imprints in the Florissant deposit [Berendt, 1845; Klebs, 1910; Wickham, 1912; Spahr, 1981a,b; Majer, 1998; Mawdsley, 1999; Zherikhin, Ross, 2000; Kubisz, 2001; Kirejtshuk, Nel, 2008; Tshernyshev, 2012a, 2016, 2019, 2020; Kirejtshuk et al., 2018; Tihelka et al., 2021; Tshernyshev et al., 2023; Tshernyshev, Legalov, 2023].

In the northern part of the Asian continent, within the conventionally defined region of Northern Asia, soft-winged flower beetles are represented by nearly 60 species belonging to 25 genera across 6 tribes of 2 subfamilies [Tshernyshev, 2012b]. In the conventionally delineated region of the Far East, more than 30 species have been recorded, which constitutes over half of the total species diversity of soft-winged flower beetles in Northern Asia. Relatively recently, the following species have been described from this region: *Ebaeus (Ebaeus) legalovi* Tshernyshev, 2009, *Hypebaeus (Hypebaeus) cooteri* Tshernyshev, 1922, *Troglocollops (Troglocollops) sundukovi* Tshernyshev, 2007, *Intybia takaraensis* (Nakane, 1955), *Nepachys coreanus* Wittmer, 1989,

*Anthocomus (Anthocomus) kurbatovi* Tshernyshev, 2022, *Cordylepherys pseudofaustus* Tshernyshev, 2009, *Malachius (Malachius) glaucoviolaceus* Tshernyshev, 2009, *Haplomalachius (Flabellomalachius) ishiharai kasantsevi* Wittmer, 1996 and *H. (F.) transbaikalensis* Tshernyshev, 1999 [Nakane, 1955; Wittmer, 1989, 1996; Tshernyshev, 2007, 2009, 2022a, b]. The majority of the species recorded in the Far East region are found in Primorye [Tshernyshev, 2012 b,c], within which the Sikhote-Alin Nature Reserve is located. This study examines the species composition of soft-winged flower beetles collected from various parts of the reserve over five years of research. This is the first summary of the fauna of soft-winged flower beetles in the reserve, providing insights into the species composition of Malachiidae at nearly the southernmost point of the Russian Far East. The work was carried out as part of an ongoing study of the insect fauna of the Sikhote-Alin Nature Reserve [Lafer, 1996; Kazantsev, 1994; Kuznetsov, 2000; Sundukov, 2013; Smetana, Shavrin, 2018; Sergeev, 2019, 2020 a-c, 2021, 2022 a-c, 2023, 2024; Platia et al., 2020; Prosvirov, Sergeev, 2021; Sazhnev et al., 2021; Sazhnev, Sergeev, 2021; Sundukov, Sergeev, 2021; Legalov, Sergeev, 2022; Sergeev, Legalov, 2022; Tishechkin et al., 2022; Miroshnikov, Sergeev, 2023; Volkovitsh et al., 2023].

## Materials and Methods

The Sikhote-Alin Nature Reserve is the largest protected natural reserve in the coniferous-deciduous forest belt of Eurasia and the Americas, established in 1935. It covers an area of over 400,000 ha and extends from the coast of the Sea of Japan inland, including the western and eastern foothills of the Sikhote-Alin mountain range [Utenkova, Labetskaya, 2006; Gromyko, 2010]. The flora of the Sikhote-Alin Nature Reserve includes 1,094 species of vascular plants from 504 genera and 135 families [Pimenova, 2016]. The significant altitude gradient has resulted in the vertical zonation of the vegetation. Seven altitude zones can be distinguished: coastal vegetation, coastal oak woodland zone, cedar broadleaf forest zone, fir-spruce forest zone, rocky birch forest zone, dwarf cedar zone and alpine tundra vegetation. Currently, one of the most important factors in the transformation of the vegetation cover of the reserve remains forest fires [Gromyko, 2010].

The material for this study consisted of collections made by M.E. Sergeev in 2015–2020 on the territory of the Sikhote-Alin Nature Reserve, as well as in the vicinity of the settlement of Terney, which is located close to the reserve boundaries. Collections will be carried out using the most effective methods: sweeping with a net over herbaceous and shrub vegetation, shaking branches of shrubs and trees on a screen, manual collection along routes and using Merike traps.

In the territory of the Sikhote-Alin Nature Reserve, material was collected from 11 sites (Fig. 1): **1** — *Abrek site*: floodplain of the Skrytaya River (45°06'29" N,

136°45'32" E); **2** — *near the settlement of Terney*: floodplain of the Serebryanka River, 45°03'12" N, 136°37'16" E; **3–4** — *Blagodatnoye site*: Upper course of the Sukhoy River, 44°58'57" N, 136°31'09" E, surroundings of Blagodatnoye Lake 44°57'12" N, 136°32'48" E; **5** — *Golubichnoye site*: surroundings of Golubichnoye Lake, 44°54'30" N, 136°31'36" E; **6** — *Kunaleyka site*: Khanov stream, 44°53'83" N, 136°20'24" E; **7** — *Kuruma site*: Kuruma river floodplain, 44°54'94" N, 136°12'75" E; **8** — *Ust-Serebryany site*: Serebryanka river floodplain, 45°08'25" N, 136°22'43" E; **9** — *Yasnaya site*: Zabolochennaya river floodplain, 45°16'59" N, 136°23'93" E; **10** — *Solontsovy site*: Zabolochennaya river floodplain, 45°18'88" N, 136°28'58" E; **11** — *Ust-Prokhnodnaya site*: natural solonchak «Kaplanovsky», 45°32'11" N, 136°13'28" E. All sites are traditionally designated areas of the reserve, associated with monitoring stations, and include parts of the basins of major rivers or large streams [Pimenova, 2016]. Additional material was collected in the Udege Legend National Park (45°45'34" N, 135°28'37" E), in the city of Vladivostok (43°13'20" N, 131°59'34" E), on Russkii Island (42°59'41" N, 131°55'30" E; 43°01'45" N, 131°52'26" E), near Barabash village, Barabashevka river floodplain (43°11'20" N, 131°30'59" E) and Kedrovaya Pad Reserve (43°10'18" N, 131°28'20" E).

The collected material is deposited at the Siberian Zoological Museum of the Institute of Systematics and Ecology of Animals, Siberian Branch of the Russian Academy of Sciences, Novosibirsk (ISEZ).

The present work is registered in ZooBank ([www.zoobank.org](http://www.zoobank.org)) under LSID urn:lsid:zoobank.org:pub:D28D9E62-5A1B-4CBE-98C7-1B69B8024E5E

## Results

### Malachiidae Fleming, 1821

#### Carphurinae Champion, 1923

*Carphuroides rosti* (Pic, 1902)

**Material.** 3–4: 2.VIII.2018 — 1♂, 1♀, 9: 12.VII.2018 — 1♀.

### Malachiinae Fleming, 1821:

#### Attalini Abeille de Perrin, 1890

#### *Nepachys cardiaca* (Linnaeus, 1761)

**Material.** 3–4: 2.VI.2016 — 1♂, 1♀.

#### *Nepachys coreanus* Wittmer, 1989

**Material.** 3–4: 3.VIII.2016 — 1♀.

### Malachiini Fleming, 1821

#### *Anhomodactylus albilabrus* (Pic, 1914)

**Material.** 1: 3–5.VIII.2020 — 1♀; 2: 23.VI.2016 — 2♀♀; 3–4: 16.VI.2017 — 1♂, 1♀, 28.V.2017 — 2♀♀, 2.VIII.2016 — 3♀♀, 4.VIII.2018 — 1♂, 2.VI.2018 and 2.VI.2016 — 2♀♀; 5: 5.VIII.2019 — 1♀; 6: 24.V.2017 — 1♂; 7 — 6–9.VI.2020 — 2♀♀; 10: on window, 1.VI.2020 — 1♀; 11: 15.VII.2016 — 1♀, 17.VI.2015 — 2♀♀; Vladivostok: 8.V.2019 — 1♂; Barabashevka: 8.VI.2019 — 1♂.

#### *Cordylepherys facialis* (Gebler, 1832)

**Material.** 3–4: 1.VIII.2016 — 1♀.

*Cordylepherus sibiricus* (Kiesenwetter 1879)

**Material.** 3–4: 2.VI.2016 — 2♀♀; 11: 27.VIII.2016 — 2♀♀;  
Barabash: 8.VI.2019 — 1♀; Russkii Island: 31.V.2019 — 1♂, 1♀.

*Cordylepherus pseudofaustus* Tshernyshev, 2009

**Material.** 1: 7.VII.2017 — 1♂; 3–4: 25.VI.2016 — 1♀, 1♀; 5:  
15.VII.2017 — 1♀.

*Haplomalachius (Flabellomalachius) ishiharai kasantsevi* Wittmer 1996

**Material.** 2: 16.VI.2017 — 1♀, 13.VI.2018 — 2♀♀, 23.VI.2018 —  
1♂, 13.VI.2015 — 1♀, 13, 23.VI.2016 — 1♂, 6♀♀; 3–4: 2.VI.2018 —  
1♂, 2.VI.2016 — 2♂♂, 8♀♀, 25.VI.2016 — 2♀♀; 5: 30.VI.2016 — 1♀;  
6: 6.IV.2018 — 1♀; Russkii Island: 24.V.2019 — 3♀♀.

*Malachius (Malachius) glaucoviolaceus* Tshernyshev, 2009

**Material.** 6: 6.IV.2018 — 1♂, 2♀♀.

*Cyrtosus christophi* (Kiesenwetter, 1879)

**Material.** 1: 3–5.VIII.2020 — 1♂, 5♀♀; 24.VI.2015 — 1♀;  
2: 23.VI.2016 — 1♂, 2♀♀; 3–4: 23.VI.2018 — 1♀, 1.VIII.2016,  
4.VIII.2018 — 2♂♂, 1♀, 2.VI.2016 — 1♂; 5: 30.VI.2016 — 1♀;  
17.VII.2017 — 1♀, 14.VII.2017 — 2♀♀; 7: 6–9.VI.2020 — 3♀♀;  
8: 5.VI.2017 — 1♂, 23.VI.2018 — 1♀; Udege Legend National  
Park: 21.VIII.2015 — 1♀; Kedrovaya Pad Reserve: 8.V.2019 — 1♂;  
Barabash: 8.VI.2019 — 1♂; Russkii Island: 24.V.2019 — 2♂♂.

## Ebaeini Portevin, 1931

*Ebaeus (Ebaeus) transbaikalicus* Pic, 1912

**Material.** 3–4: 2.VIII.2018 — 1♀, 3.VIII.2016 — 1♀,  
9.VIII.2020 — 1♀.

*Ebaeus (Ebaeus) legalovi* Tshernyshev, 2009

**Material.** Vladivostok: 12.VI.2019 — 5♀♀.

*Hypebeus (Hypebeus) cooteri* Tshernyshev, 2022

**Material.** 3–4: 3.VIII.2016 — 1♀.

## Apalochrini Mulsant and Rey, 1867

*Intybia (Intybia) takaraensis* (Nakane, 1955)

**Material.** 5: 5.VII.2019 — 2♀♀, 30.VI.2016 — 3♂♂, 1♀.

Thus, 14 species from 10 genera and 4 tribes of two subfamilies have been recorded in the Sikhote-Alin Nature Reserve. This represents almost half of all species known from the Far Eastern region of North Asia and a quarter of the total species diversity of the area. The overwhelming majority of species are of Far Eastern distribution; only one species, *Nepachys cardiaca* (Linnaeus, 1761), is widespread in the Palearctic, while two species, *Cordylepherus facialis* (Gebler, 1832) and *Ebaeus (Ebaeus) transbaikalicus* Pic, 1912, extend into Eastern Siberia, Mongolia, and Northeast China. The fauna of the Sikhote-Alin Nature Reserve reflects the specificity of the Far Eastern region and differs significantly from other regions of North Asia.

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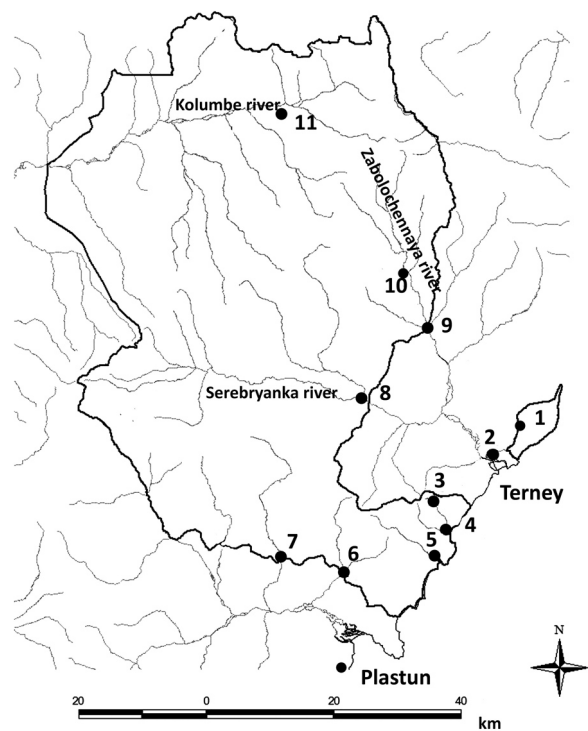


Fig. 1. Locality map of Malachiidae in the Sikhote-Alinskii Nature Reserve. For numbers see Material and methods.

Рис. 1. Карта районов сбора в Сихоте-Алинском заповеднике. Номера см. в разделе «Материал и методы».

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