Harvestmen (Opiliones) of the Sikhote-Alin and the Far Eastern Marine Biosphere Reserves, Russia

Сенокосцы (Opiliones) Сихотэ-Алинского и Дальневосточного морского биосферного заповедников

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Key words: Opiliones, Far East, protected areas, Primorski Krai, faunistics.

Key words: Opiliones, Дальний Восток, охраняемые природные объекты, Приморский край, фаунистика.

Abstract. An annotated list of 8 Opiliones species within 3 families, Caddidae (1 sp.), Sclerosomatidae (3 spp.) and Phalangiidae (4 spp.), recorded from the Sikhote-Alin Nature Reserve, the Far East Marine Reserve and Russky Island of the Russian Far East is presented. 7 Opiliones species are recorded for the Sikhote-Alin Nature Reserve, 5 species for the Far Eastern Marine Reserve, and one species, Oligolophus tienmushanensis Wang, 1941 (Phalangiidae), is recorded for Russky Island. All species are distributed in the Far East, except Caddo agilis Banks, 1892, also known from North-East America and Japan. A rare and locally distributed species, Homolophus albofasciatus (Kulczyński, 1901), is briefly described and illustrated.

Introduction

Harvestmen (Opiliones) is a group of arachnids widespread in a wide range of different geographical zones and biotopes. Currently 8707 species of Opilionidae have been described [Kury et al., 2020], but the species diversity of this group is estimated at about 10 000 species [Pinto-Da-Rocha et al., 2007].

The first information on harvestmen of Primorsky Krai appeared in the work by V.V. Redikortsev [1936] with a description of Metagagrella ussuriensis Redikortsev, 1936 (now a junior synonym of Melanopa grandis Roewer, 1910). Almost thirty years later, redescription of Mitopus mongolicus Roewer, 1912 and Homolophus arcticus Banks, 1893 (as Euphalangium albofasciatus (Kulczyński, 1901)) from the «Уссурийский Край» was published in a paper by W. Starega [1964]. Later, S.I. Lyovushkin [1972] described Taracus birsteini (Lyovushkin, 1972) from the Belii Dvorets Cave (Partizansky Raion). In the «Кatalog der Weberknechte (Opiliones) der Sowjet-Union» by W. Starega [1978] only four species were registered from Primorsky Krai: T. birsteini, M. grandis, M. m. mongolicus, and H. arcticus (as Egaenus zichi Kulczyński, 1901). A year later, I.I. Gritsenko [1979a, b] listed seven species for this territory: Hamitergium eobium (Redikortsev, 1936) (Lophacantus eobium), M. grandis (as M. damila and M. ussuriensis), M. m. mongolicus, H. arcticus (as E. albofasciatum), Oligolophus tienmushanensis Wang, 1941, Phalangium opilio Linnaeus, 1761, and Bidentolophus bidens (Simon, 1880) (as E. transbaicalicum). In addition, Sabacon makinoi Suzuki, 1949 [Gritsenko, 1979a] as S. habei Suzuki, 1966 was described exclusively based on juvenile specimens from the Kedrovaya Pad Nature Reserve. This finding still requires confirmation [Trilikauskas, 2015].

More recent data on harvestmen of Primorsky Krai are available from the works of A.N. Chemeris [Chemeris et al., 1998; Chemeris, 2000], where several species...
are redescribed and *Mitopus morio* (Fabricius, 1779) and *Psathyropus tenuipes* Koch, 1878 are added to the regional check-list. The record of *Nipponopsalis coreana* Suzuki, 1966 in Primorsky Krai (high number of specimens was collected in the vicinity of Vladivostok) is erroneous and should be referred to *T. birsteini* [Schönhofer, 2013].

Another species described from Primorsky Krai was *Sabacon rossopacificus* Martens, 2015 from Velikan Cave (Partizansky Raion) [Martens, 2015]. *Caddo agilis* Banks, 1892 was recorded in the Sikhote-Alin Nature Reserve in 2020 [Prokopenko, Sergeev, 2020]. This is the first species of the family Caddidae registered from continental part of the Russian Far East. To date, fourteen species of harvestmen from five families are registered for Primorsky Krai (Table 1).

Although the opilionid fauna of Primorsky Krai is relatively well known, data concerning the Sikhote-Alin State Nature Biosphere Reserve and the Far Eastern Marine Biosphere Reserve are still missed. Thus, the present paper increases knowledge on the opilionid fauna of these protected areas.

**Material and methods**

This paper is based on study of the 55 mature and the 14 juvenile harvestmen specimens, collected by the second author during 2015–2020 field seasons in the localities listed in Table 2. The material was collected mainly by hands and by the pitfall traps.

All measurements are in mm. Photographs were taken by USB Digital camera Lens Mount attached to a Zeiss Primo Star microscope and a MBS-10 stereomicroscope. All material is deposited in the personal collection of the first author.

Sikhote-Alin State Nature Biosphere Reserve was founded in 1935 and is the largest protected nature reserve in the coniferous-broadleaved forest belt of Eurasia and America. At present it is over 400 000 ha and extends inland from the coast of the Japan Sea, including the western and eastern spurs of the Sikhote-Alin mountain range. Mountain slopes of different steepness occupy up to 80% of the reserve’s area [Utenkova, Labetskaya, 2006; Gromyko, 2010]. Flora of Sikhote-Alin Nature Reserve includes 1094 species of vascular plants from 504 genera and 135 families [Pimenova, 2016]. Significant altitudinal gradient determines seven altitudinal zones of vegetation, coastal vegetation, belt of coastal oak forests, belt of pine-broadleaved forests, fir-spruce forests, stone-birch forests, belt of cedar shrub, and mountain-tundra vegetation. Forests of other formations amount about 25% of the total area of the forest cover. Herbal vegetation occupies only about 2% [Pimenova, 2016]. At present, fires are one of the most important factors causing the transformation of the vegetation cover of the reserve [Gromyko, 2010].

Far Eastern Marine Biosphere Reserve was founded in 1978, and includes a group of islands in the Peter the Great Bay and sections of the mainland shoreline. The reserve’s territory is about 64 000 ha, about 98% of which belongs to the bay water area. Vegetation cover of the islands differs significantly from that of the mainland, due to climatic conditions occur. The islands are strongly influenced by winter winds, and therefore

| Family         | Species                          | Number of collected specimens |
|----------------|----------------------------------|-------------------------------|
|                |                                  | S.-A. Res. | F.-E. Res. | Russky Island |
| **Sabaconidae**| *Sabacon makinoi* Suzuki, 1949    | –          | –          | –            |
|                | *Sabacon rossopacificus* Martens, 2015 | –          | –          | –            |
| **Taracidae**  | *Taracus birsteini* Lyovushkin, 1972 | –          | –          | –            |
| **Caddidae**   | *Caddo agilis* Banks, 1892       | 16         | –          | –            |
| **Sclerosomatidae** | *Hamitergum eobium* (Redikortsev, 1936) | 3          | 2          | –            |
|                | *Melanopa grandis* Roewer, 1910  | 3          | 1          | –            |
|                | *Psathyropus tenuipes* Koch, 1878 | –          | 1          | –            |
| **Phalangiidae**| *Bidentolophus bidens* (Simon, 1880) | –          | –          | –            |
|                | *Homolophus albofasciatus* (Kulczyński, 1901) | 5          | –          | –            |
|                | *Homolophus arcticus* Banks, 1893 | 8          | 1          | –            |
|                | *Mitopus mongolicus mongolicus* Roewer, 1912 | 6          | –          | –            |
|                | *Mitopus morio* (Fabricius, 1779) | –          | –          | –            |
|                | *Olgolophus tienmushanensis* Wang, 1941 | 5          | 3          | 1            |
|                | *Phalangium opilio* Linnaeus, 1758 | –          | –          | –            |

Table 1. Taxonomic composition of harvestmen of Primorsky Krai and the number of specimens collected in the Sikhote-Alin Reserve, Far Eastern Marine Reserve and Russky Island

Таблица 1. Таксономический состав сенокосцев Приморского края и число экземпляров, собранных в Сихотэ-Алинском и Дальневосточном морском заповедниках, а также на острове Русский
creeping forms of tree and shrub vegetation are widespread. In addition, unlike the mainland forests, which suffer from fires and logging, the human impact on plant communities in the islands is less pronounced and the advanced stages of demutation are much greater. The islands of the Peter the Great Bay are relatively small. They located on the continental shelf near the coast. These islands are spurs of the coastal mountain rises, which were part of the continent in the Pleistocene, from which they separated between 11,000 and 8,500 years ago. Thus, there is an opportunity to study the composition and structure of peculiar communities of terrestrial animals and ways of their adaptation to the island habitats in a natural experiment [Velizhanin, 1976; Belyaev, 2013; Legalov, Sergeev, 2018; Sergeev, 2019].

Results and discussion

In toto, eight harvestmen species from five families, Caddiidae (1 species), Sclerosomatidae (3 species) and Phalangiidae (4 species) were recorded. Opiliofauna of the Sikhote-Alin Nature Reserve is the most species-rich and includes seven species (Table 1). Five opilionid species were found in the Far Eastern Marine Reserve. Only one species, *Oligolophus tienmushanensis* (family Phalangiidae), was registered on Russki Island. All species are distributed in the Far East, except *Caddo agilis* Banks, 1892, also known from North-East America and Japan. The annotated check-list of harvestmen of the Sikhote-Alin Reserve and the Far Eastern Marine Reserve is presented below, and brief morphological description of the rare local species *H. albofasciatus* is given.

**Caddidae** Banks, 1893

*Caddo agilis* Banks, 1892: Primorskii Krai: Sikhote-Alin Reserve [Prokopenko, Sergeev, 2020].

**Material. Sikhote-Alin Reserve:** natural landmark «Abrek», Skrytaya River Valley, 3–5 VII.2020, 11° E; natural landmark «Blagodatnoe», upper reaches of Sukhoi Spring, slopes of Lysaya Mount, 9–10 VII.2020, 5° E.

**Distribution.** USA, Canada, Japan, Russian Federation: Primorskii Krai, Kuril Islands, Sakhalin Island [Suzuki, 1958; Scheir, 1975; Cokendolpher, Lee, 1993; Giribet, Kury, 2007; Shultz, Regier, 2009; Groh, Giribet, 2015; Shultz, 2018; Prokopenko, Sergeev, 2020].

**Sclerosomatidae** Simon, 1879

*Hamitergum eobium* (Redikorzev, 1936)

*Lophacantus eobius* Banks, 1893: Primorskii Krai: Sikhote-Alin Reserve [Prokopenko, Sergeev, 2020].

**Material. Sikhote-Alin Reserve:** natural landmark «Abrek», Skrytaya River Valley, 3–5 VII.2020, 11° E; natural landmark «Blagodatnoe», upper reaches of Sukhoi Spring, slopes of Lysaya Mount, 9–10 VII.2020, 5° E.

**Distribution.** USA, Canada, Japan, Russian Federation: Primorskii Krai, Kuril Islands, Sakhalin Island [Suzuki, 1958; Scheir, 1975; Cokendolpher, Lee, 1993; Giribet, Kury, 2007; Shultz, Regier, 2009; Groh, Giribet, 2015; Shultz, 2018; Prokopenko, Sergeev, 2020].
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Hamitergum ebrium (Redikorzev, 1936: Chemeris et al., 1998) — Kedrovaya Pad Biosphere Reserve, Ussuriyskiy Nature Reserve; Chemeris, 2000 — near Anisimovka Village, Kangauz River (Shkotovskii Raion), Chuguev Field Station (Chuguevskii Raion).

Material. Sikhote-Alin Reserve: natural landmark «Kunaleika», cordon «Khanov», 21.VI.2018, 1♀; natural landmark «Blagodatnoe», Cape North vicinity, 2.VIII.2018, 1♀, ibidem, upper reaches of Sukhoy Spring, slopes of Lyasya Mount, 10.VII.2020, 1♀; Far Eastern Marine Reserve: Popov Island, 3–4.V.2019, 1♂.

Distribution. North Korea, Russian Federation: Chita Region, Far East [Chemeris et al., 1998].

Melanopa grandis Roewer, 1910

Metagagrella assurienesis Redikorzev, 1936: Redikortsev, 1936, Roewer, 1934, Staręga, 1978, Gritsenko, 1979b: — Primorsky Krai: Andreevka Village and Bryusa Peninsula, Kruglava Bay (Chakasian Raion), Anisimovka Village, Kangauz River (Shkotovskii Raion), Ussuriyskiy Nature Reserve, Kedrovaya Pad Biosphere Reserve, vicinity of Vladivostok, Peter the Great Bay.

Material. Sikhote-Alin Reserve: natural landmark «Serdinka», upper reaches of Serekhamska River, 11.VIII.2017, 1♀; natural landmark «Sporny», headwaters of Serebryanka River, 29.VII.2020, 2♂♂. Far Eastern Marine Reserve: Popova Island, 26.VIII.2018, 1♂.

Distribution. Japan, Korea, China, Russian Federation: Primorsky Krai [Chemeris, 2000; Zhang, Zhang, 2013].

Psathyropus tenuepes Koch, 1878

Psathyropus tenuepes Koch, 1878: Chemeris, 2000 — Andreevka Village (Chakasian Raion), vicinity of Vladivostok, Peter the Great Bay.

Material. Far Eastern Marine Reserve: Furugelma Island, 18–20.VIII.2018, 1♂.

Distribution. Russia: south Kuril Islands, Sakhalin, Moneron [Crawford, Marusik, 2007], Primorskiy krai [Chemeris, 2000]; Japan: Honshu, Hokkaido [Suzuki, Tsurusaki, 1983].

Phalangiidae Simon, 1879

Homolophus albofasciatus (Kulczyński, 1901) — Far Eastern Marine Reserve: Furugelma Island, 26.VIII.2018, 1♂; ibidem, 18.IX.2018, 1♀, 1♂.

Distribution. Russia: south Kuril Islands, Sakhalin, Moneron [Crawford, Marusik, 2007], Primorskiy Krai [Chemeris, 2000]; Japan: Honshu, Hokkaido [Suzuki, Tsurusaki, 1983].

Fig. 1. Details of Homolophus albofasciatus, photo by M.E. Sergeyev. A — external appearance of male from vicinity of Golubichnoe Lake; B, D — glans dorsally (glans are up, stylus is broken), C — glans laterally, D — penis dorsally, E — ovispositor dorsally.

Phalangiidae Simon, 1879

Euphalangium albofasciatum Kulczyński, 1901: Staręga, 1964, Gritsenko, 1979a, b; Primorsky Krai: «Ussuriyskiy Krai», «Primorye», Ussuriyskiy Nature Reserve (Shkotovskii Raion), Novokhvalinsk Village (Khanskii Raion).

Material. Sikhote-Alin Reserve: natural landmark «Golubichnoe», near Golubichnoe Lake, 20.VIII.2015, 1♂, 1♀; ibidem, 18.IX.2018, 1♀, 1♂. Distribution. North Korea, Mongolia, China, Russian Federation: Siberia, Primorsky Krai [Staręga, 1964; Cokendolpher, 1987; Snegovaya, Cokendolpher, 2021].

Description. Dactil characteristics see Snegovaya, Cokendolpher [2021]. Measurements. Male. Body length — 6.1, body width — 3.9, cephalothorax length — 2.0, ocularium width — 0.7, «clypeus» (space between ocularium and front margin of carapace) — 1.0; chelicerae: basal segment — 1.6, distal segment — 1.8, forceps length — 1.0. Penis: length — 3.2, width at base — 0.6, width in the narrowest part — 0.15. Length of palp and legs are given in Table 3. Male in nature is in fig. 1, A, penis is in fig. 1, B–D. Female. Measurements. Body length — 8.5, body width — 5.0, thorax length — 1.6, ocularium width — 0.5, «clypeus» — 0.8; chelicerae: basal segment — 1.0, distal segment — 1.3, forceps length — 0.7. Length of palp and legs are given in Table 4. Ovispositor as fig. 1 (E).

Homolophus arcticus Banks, 1893

Euphalangium albofasciatum (Kulczyński, 1901): — «Ussuriyskiy Krai»;

Egaenus zichyi Kulczyński, in Zichy 1901: Staręga, 1978; Tsurusaki, 1987 — Primorsky Krai;

Homolophus arcticus Banks, 1893: Chemeris, 2000 — Primorsky Krai: Ussuriyskiy Nature Reserve, Chuguevskaya Field Station (Chuguevskii Raion), Anisimovka Village, Kangauz River (Shkotovskii Raion).

Material. Sikhote-Alin Reserve: Terny village vicinity, «sorok» (hill), broad-leaved forest, 30.VII.2018, 2♂♂; ibidem, 9.VIII.2018, 1♀; natural landmark «Ust-Prokhodnaya»,
saltmarsh «Kaplanovsky», upper reaches of Kolumba River, pine-broadleaved forest, 21.VIII.2017, 1♂; natural landmark «Svetlaya», Serokamenka River Valley (at the confluence with Kolumba River), 12.X.2017, 2♂; natural landmark «Yasnaya», Zabolochennaya River Valley, 8–12.VII.2018, 1♂; natural landmark «Golubichnaya>, near Golubichnaya Lake, 18.IX.2018, 1♂. Far Eastern Marine Reserve: Furugelma Island, 18–20.VIII.2018, 1♂.

**Distribution.** China (Gansu, Xinjiang, Sichuan), Japan (Hokkaido), Korea, Mongolia, Tibet, Russian Federation: Chitinskaya Oblast, Yakutia, Commander Islands, Magadanskaya Oblast, Sakhalin Island, Kamchatka, Khabarovskii Krai, Primorski Krai [Chemeris, 2000; Staréga, 2003; Snegovaya, Cokendolpher, 2021].

**Mitopus mongolicus mongolicus** Roewer, 1912

*Mitopus mongolicus mongolicus* Roewer, 1912: Staréga, 1964, 1978; Gritsenko, 1979b; Chemeris, 2000 — Primorski Krai: Ussuriyskiy Nature Reserve, Kedrovaya Pad Biosphere Reserve, Reshetnikovo Village (Pogranichnyi Raion), Anisimovka Village (Sikotovskii Raion), «Ussuriyskiy Krai».

**Material. Sikbote-Alin Reserve: natural landmark «Snezhnaya», upper reaches of Serokamenka River, 1.VIII.2017, 1♂; natural landmark «Yasnaya», Zabolochennaya River Valley, 8–12.VII.2018, 1♂; natural landmark «Blagodatnoye», near Blagodatnoye Lake, 27.IX.2018, 1♂. Furugelma Island, 17.VIII.2018, 2♂; Popova Island, 26.VIII.2018, 1♂. Russky Island: 31.VIII.2018, 1♂.

**Distribution.** North Korea, Russian Federation: Khabarovskii and Primorski Krai [Chemeris, 2000].

**Acknowledgments**

The authors are grateful for A.N. Chemeris (Tomsk State University) for the help with identification of harvestmen species.

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