



## New and reconfirmed records of *Sphenoptera orichalcea* (Pallas, 1781) (Coleoptera, Buprestidae) from Iran and Armenia

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**ABSTRACT.** Based on materials recently collected in Iran and Armenia, jewel-beetle *Sphenoptera* (*Chrysolemma*) *orichalcea* (Pallas, 1781) is reported for the first time for Iranian fauna, and occurrence of the species in Armenia is also reconfirmed. Some diagnostic characters, ecological and biological notes along with photographs are provided.

**Key words:** Jewel-beetle, new records, Caucasia, Wetlands, Saltlands

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### INTRODUCTION

The genus *Sphenoptera* Dejean, 1833 is a very large and diverse assemblage of beautiful buprestids (Coleoptera, Buprestidae), which include about 1200 species, distributed mainly in the arid and semi-arid areas of Southern Palearctic, Ethiopian and Oriental regions (Bellamy, 2008). The larvae of *Sphenoptera* species develop in the roots and stems of perennial herbaceous plants and semi-shrubs, some species are also living under the bark of trees and shrubs (Krivosheina, 1975; Alexeev, 1981; Zykov, 1995; Jalil & Ali, 2020). There are many taxonomic problems among species of the genus *Sphenoptera*. These difficulties are due to lack of enough reliable morphological characters for separating the species and the high level of variabilities arising from the environmental conditions and the host plants (Kalashian & Sakalian, 2007). Both complicated taxonomy and the large number of synonyms have caused *Sphenoptera* to be one of the taxa with vast number of inconsistencies in species records (Volkovitsh & Kalashian 2003; Kalashian et al., 2005a, 2005b; Kalashian & Volkovitsh, 2009; Volkovitsh & Kalashian, 2016).

In the annotated catalogue of the Iranian jewel beetles (Coleoptera: Buprestidae) (Ghahari et al., 2015), 111 species of *Sphenoptera* have been listed, of which 31 species are endemic to the country. Occurrence of 13 species is considered doubtful. For Armenia, 53 species (Five endemic) have been recorded so far (Volkovitsh & Kalashian, 2016); some records are based on the old data, need

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confirmation. In the course of samplings conducted in Iran (by Y. Karimpour) and Armenia (by M. Kalashian), specimens of *Sphenoptera (Chrysoblemma) orichalcea* (Pallas, 1781) were found, representing first record for Iranian fauna and re-discovery in Armenia.

## MATERIAL AND METHODS

Sampling surveys were conducted in Iran/West Azarbaijan province during May of 2019–2020 to find the phytophagous insects associated with *Halocnemum strobilaceum*. In order to find the root-feeding insects, we started to collect the plants with symptoms of infestations on their roots. Samples were picked out from root and crowns of host plants about 10 cm from the top of the soil. About 50 samples of the roots were collected. The collected materials were brought to the laboratory and placed into the prepared glass boxes (30 × 40 × 80 cm), covered by muslin for maintenance and rearing of insects under laboratory conditions (27±2 °C; 70±5% relative humidity and a photoperiod of 12:12 L:D). Boxes were checked daily for emerging insects. In Armenia, the beetle specimens were collected using the standard entomological sweep net. Collected beetles were killed, air dried and mounted for identification. The specimens were identified using the keys of Richter & Alexeev (1965) and description in Volkovitsh & Kalashian (2003). All observations and studies related to the life cycle of the beetle were performed in the field. To determine the biological stage of the beetle related to its life cycle, the roots of *H. strobilaceum* were pulled out of the soil at different times and split. Relevant date and immature stages of the beetle inside the roots (Fig. 1) were recorded. The voucher specimens are deposited in the collections of the Natural History Museum of Urmia University (NHMUU) and of the Institute of Zoology, Scientific Center of Zoology and Hydroecology, National Academy of Sciences of Armenia (NASA).

## RESULTS

### Taxonomic Accounts

**Order:** Coleoptera Linnaeus, 1758

**Family:** Buprestidae Leach, 1815

**Genus** *Sphenoptera* Dejean, 1833

*Sphenoptera (Chrysoblemma) orichalcea* (Pallas, 1781) (Figs 1–3)

**Syn.:** *Sphenoptera fossulata* Zoubkoff, 1829:157; *Sphenoptera meyeri* Gebler, 1830:76; *Sphenoptera karelini* Faldermann, 1833:46; *Sphenoptera cupraria* Mannerheim, 1837:96; *Sphenoptera australis* Gory & Laporte, 1839:34; *Sphenoptera zoubkoffii* Gory, 1841:312; *Sphenoptera impressicollis* Motschulsky, 1860:414; *Sphenoptera aciculata* Marseul, 1865:395; *Sphenoptera solskyi* Becker, 1867:108; *Sphenoptera cuprea* Ballion, 1878; *Sphenoptera wilkinsi* Jakovlev, 1887:117; *Sphenoptera astrachanica* Reitter, 1890:278; *Sphenoptera pruinosa* Abeille de Perrin, 1891:267.

**Materials examined:** 1♂, 1♀ (NHMUU), IRAN, West Azarbaijan (Azarbaijan-e Gharbi) province, saline lands around Soldoz wetland, 37°02'29" N, 45°36'53" E, Elev. 1280 m a.s.l., ex *Halocnemum strobilaceum* (Pall.) Bieb., 1819 (Chenopodiaceae), collected 02.v.2019, imagoes reared at the end of May, 2019; 2♂♂, 1♀ (NASA), same data, but collected at 07.v.2020, imagoes reared at the end of May, 2020, leg.: Y. Karimpour (Fig. 2B); 1♂, ARMENIA, Armavir prov., env. Arazap, "Vordan karmir" State Sanctuary, 40°05'16" N, 44°14'21" E, Elev. 850 m a.s.l. 28.v.2017, sweeping; leg.: M. Kalashian (Fig. 3B).

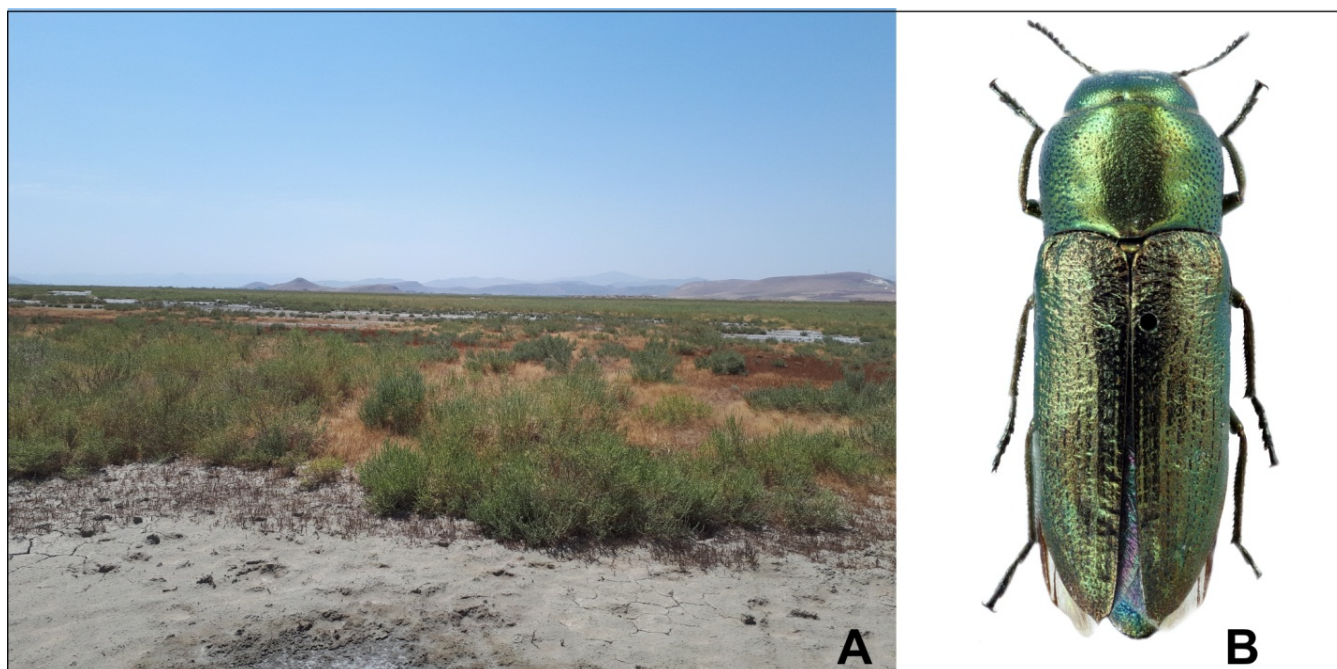
**Diagnosis** (Fig. 2B – female; Fig. 3B – male)

Beetles of both sexes are of medium size, body length 7–17 mm, dorsal coloration very variable, from golden-green to blackish-bronzy, dorsal integument microrericated, with distinct silky luster. Pronotum widest near or before middle with sides subparallel in posterior half and with approximately straight posterior angles, disk flattened medially. Anterior three-fifth of elytra are subparallel, apically elytra with three sharp teeth on each elytron. *Sphenoptera orichalcea* belongs to the subgenus

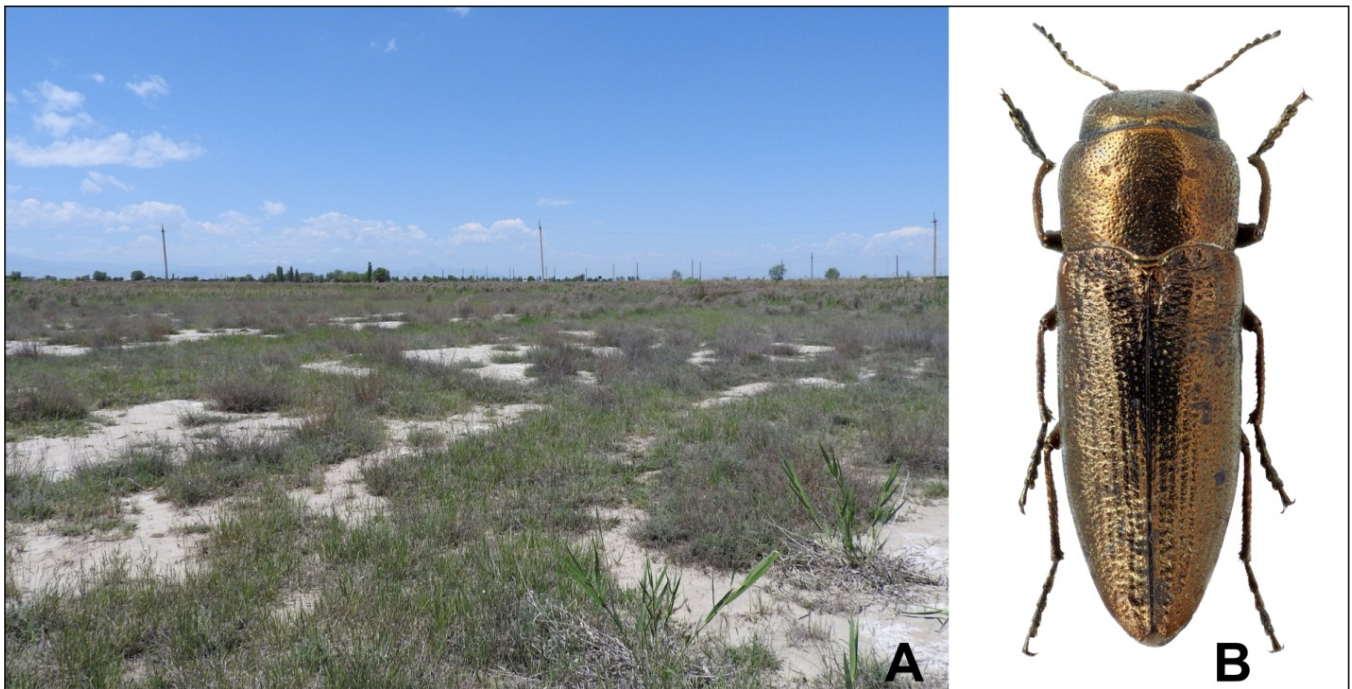
*Chrysoblemma* Jakovlev, 1889, which is characterized by the same structure of elytral apices. All other species of the subgenus from Iran and Armenia except of *S. tristicula* Reitter, 1895 have smooth and shiny dorsal integument; pronotum in these species is widest behind middle, with sides more or less divergent towards sharp posterior angles. *Sphenoptera tristicula* with structure of dorsal integument similar to *S. orichalcea* is black with more or less distinct bluish reflection, pronotum spheroidal with disk nearly regularly convex.



**Figure 1.** The larva of *Sphenoptera orichalcea* inside the root of *H. strobilaceum* (saline lands around the Soldoz wetland, West Azarbaijan, Iran).



**Figure 2.** **A.** Habitat in Soldoz wetland (West Azarbaijan, Iran); **B.** *Sphenoptera orichalcea*, female.



**Figure 3.** A. Habitat in “Vordan karmir” sanctuary (Armenia); B. *Sphenoptera orichalcea*, male.

### Life cycle

Adult beetles appear from mid-May. After emergence and mating, the fertile female beetles make an oviposition hole in the upper parts of host plant stem and lay single egg in each hole. After hatching, young larvae tunnel down the *H. strobilaceum* stem until reaching the root area just below the soil surface. The larvae feed on the main and lateral roots of the host plant and make a distinct mine in it (Fig. 1). The beetle complete one generation per year and overwinters as full development larvae.

### DISCUSSION

*Sphenoptera orichalcea* is a South Palearctic species, distributed in South-East European Russia, South-West Siberia, Kazakhstan, countries of Central Asia, Mongolia and Northern China (Volkovitsh & Kalashian, 2003, 2016). The species has already reported from Dagestan (Reitter, 1895 - as *S. astrachanica* Reitter, 1890), Caucasus (Reitter et al., 1906 - as *S. karelini* Faldermann, 1835) and Southern Transcaucasia (Azerbaijan and Armenia) (Volkovitsh & Kalashian, 2016). Several host plants of different families, including Polygonaceae (*Atraphaxis* L.), Fabaceae (*Caragana* F.) and several Amaranthaceae (*Bassia* All. = *Kochia* Roth, *Anabasis* L., *Kalidium* Moq., *Halocnenum* M. B.) (Serkova, 1958; Taranov, 1987; Alexeev et al., 1990) are recorded from this species. Depending of diversity of host plants, the beetle represents several ecological forms which lead to description of numerous synonyms species (Volkovitsh & Kalashian, 2003). In Iran, specimens of *S. orichalcea* were obtained by rearing from its larvae feeding in the crown and roots of *H. strobilaceum* (Figs 1, 2A, B) which had been collected from the saline lands of Soldoz wetland. In this area, *H. strobilaceum* is a dominant halophytic species and often forms monodominant communities or co-occurs with *Puccinellia distans* (Jacq.) Parl. (Poaceae) and *Aeluropus* sp. (Poaceae). According to EUNIS classification (Davies et al., 2004) the habitat can be classified as Continental inland salt steppes. In Armenia this species was collected in very similar habitat also classified as Continental inland salt steppes (*Aeluropus* spp. dominated habitats) (Fayvush & Alexanyan, 2016) (Fig. 3A, B). Host plant remains unknown, but taking into consideration morphological peculiarities of the specimen collected (see Volkovitsh & Kalashian, 2003) the species most probably is developing also on *H. strobilaceum* which is presented and very common in the above-mentioned plant community.

*Sphenoptera orichalcea* was originally reported from Armenia only by Morawitz (1877) as *S. karelini* Faldermann, 1833, collected by himself in 1875 in the environs of Etschmiadzin. On the base of this record the species was reported for Armenia (as "Erivan" [governorate]) in catalogues of Jacobson (1913) and Obenberger (1930) which was accepted in recently published Catalogue of Palaearctic Coleoptera (Volkovitsh & Kalashian, 2016) though the latter authors could not find any specimen of *S. orichalcea* from Armenia in several European collections. Thus, no specimen was reliably found in Armenia during more than 1.5 century, and the above-mentioned specimen is new evidence confirming presence of *S. orichalcea* in Armenian fauna.

#### AUTHOR'S CONTRIBUTION

MK: Collected and sorted the specimens and recorded the biological data in Armenia, compared the specimens with type material. MD: Specimens collection and record the biological data in Iran. YK: Collection and storage of the specimens along with record of biological data in Iran, preparation of the draft. All authors read and approved the final contents of the manuscript.

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#### AVAILABILITY OF DATA AND MATERIAL

Not applicable.

#### ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

#### CONSENT FOR PUBLICATION

Not applicable.

#### CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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## اولین و تایید گزارش *Sphenoptera (Chrysoblemma) orichalcea* (Pallas, 1781) (Coleoptera, Buprestidae) از ایران و ارمنستان

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**چکیده:** براساس نمونه‌هایی که اخیراً از ایران و ارمنستان جمع‌آوری شده‌اند سوسک *Sphenoptera (Chrysoblemma) orichalcea* (Pallas, 1781) برای اولین بار از ایران گزارش و انتشار آن در ارمنستان نیز تایید شد. برخی از ویژگی‌های تشخیص گونه، خلاصه‌ای از زیست‌شناسی و بوم‌شناسی آن به همراه تصاویری از گونه و زیستگاه مربوطه ارائه شد.

**واژگان کلیدی:** سوسک جواهر، گزارش‌های جدید، قفقاز، تالاب‌ها، نمک‌زارها