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THE FIRST RECORD OF THE ARID GENUS *SUARIUS* NAVÁS (NEUROPTERA: CHRYSOPIDAE) FROM RUSSIA

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Summary. The genus *Suarius* Navás and two species – *S. tigridis* (Morton, 1921) and *S. mongolicus* (Tjeder, 1936) (Chrysopidae: Chrysopinae) – are recorded for the first time from Russia (southern Astrakhan Region). This is northern-most record of this arid genus. Distribution and species status of two pairs of externally very similar species of *Suarius* (*S. tigridis – S. gobiensis* (Tjeder, 1936) and *S. mongolicus – S. caviceps* (McLachlan, 1898)) and an important aberration in the venation are discussed.

Key words: Chrysopidae, *Suarius*, Astrakhan Region, European Russia.

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Резюме. Род *Suarius* Navás и два вида – *S. tigridis* (Morton, 1921) и *S. mongolicus* (Tjeder, 1936) (Chrysopidae: Chrysopinae) – впервые зарегистрированы в России (юг Астраханской области). Это самая северная находка этого аридного рода. Обсуждаются распространение и видовой статус двух пар внешне очень сходных видов рода *Suarius* (*S. tigridis – S. gobiensis* (Tjeder, 1936) и *S. mongolicus – S. caviceps* (McLachlan, 1898)) и важная аберрация в жилковании.

INTRODUCTION

The genus *Suarius* Navás, 1914 (Chrysopidae: Chrysopinae) contains about 30 species occurring through southern Eurasia and northern Africa, mainly in arid regions (Brooks & Barnard, 1990; Aspöck & Hölzel, 1996; Aspöck *et al*., 2001; Yang *et al*., 2018). In Europe,

the genus is distributed only in a few southern countries, and up to date four species were recorded: *S. walsinghami* Navás, 1914, *S. tigridis* (Morton, 1921), and *S. iberiensis* Hölzel, 1974 from Spain, and *S. nanus* (McLachlan, 1893) from Greece and North Macedonia (Aspöck *et al*., 2001; Monserrat, 2016). In Asia, the northern-most localities of the genus are situated in semi-desert areas of Mongolia and Kazakhstan.

Here, we report the first known occurrences of this genus in the south Astrakhan Region, one of southern-most regions of European Russia, based on two species, i.e., *S. tigridis* (Morton, 1921) and *S. mongolicus* (Tjeder, 1936). This part of the Astrakhan Region belongs to the southern desert floristic region (Laktionov, Afanasyev, 2007).

Examined material is mostly deposited in the Bioresource Collection of the Federal Scientific Centre of East Asia Terrestrial Biodiversity of the Far East Branch of the Russian Academy of Sciences (reg. number 2797657).

NEW RECORDS

Subfamily Chrysopinae Schneider, 1851

Genus *Suarius* Navás, 1914

***Suarius tigridis* (Morton, 1921)**
Figs 1, 2

MATERIAL. **Russia** (first record): Astrakhan Region (Astrakhanskaya Oblast): lower reaches of the Volga River, right bank, at light, 46°49.817N, 47°34.744E, 1.VI 2019, 1♂, 6♀ (A. Solodovnikov); the left bank of the Bereket River: Khozhetaevka, 46.6728°N, 48.2384°E, 21.VIII 2024, 1♂, 1♀ (R.A. Gorelov).

DISTRIBUTION. Europe (Spain, Russia), northern Africa (Morocco, Algerian, Tunisia, Egypt) and Middle East (Israel, Iraq, Kuwait, Bahrein, Tajikistan) (Morton, 1921; Hölzel, 1967; Monserrat *et al*., 1990, 2014; Aspöck *et al*., 2001; Monserrat, 2008, 2013, 2016; Monserrat & Díaz-Aranda, 2012). Luppova (1966) recorded *S. tigridis* from the valley of the Vakhsh River in southern Tajikistan. This was the single record of the species in the former USSR.

REMARKS. The principal external distinguishing features of the examined specimens are following. Head is dirty yellowish with black maculation and reddish shading in many places, especially on the face and frons (Figs 1B–D). Black maculation: there are two narrow stripes between the antennae which follow along the inner and posterior margin of the toruli (these stripes between the antennae sometimes touch: Fig. 1C); the face below the eyes sometimes have a short central strip; the genae has a broad stripe; the clypeus has a narrow outside margin. The scapus has two broad longitudinal stripes outside and posteriorly, and a narrow short line in front near the pedicellus; the outside of the pedicellus has a black stripe. The palpi are mostly brown. The pronotum is brownish, yellow medially with an interrupted dark brown median line. The forewings are 8.5–9.5 mm (male) and 9.5–10.5 mm long (female). The wing veins are mainly dark with long pale sections. Maculation is well developed, varying slightly, but in general is as shown in Fig. 1A.

Externally, *Suarius tigridis* is no different from the Asian *S. gobiensis* (Tjeder, 1936), distributed in Saudi Arabia, Iraq, Iran, Mongolia (Govĭ-Altay, Bayanhongor) and China (Inner Mongolia) (Tjeder, 1936; Hölzel, 1966, 1967, 1980; Steinmann, 1968, 1971; Aspöck *et al*., 2001; X. Yang *et al*., 2005). The head maculation of Spanish specimens of *S. tigridis* (e.g., Monserrat, 2016: fig. 112, 161) is similar to that of *S. gobiensis* from Mongolia (e.g., (Tjeder, 1936: fig. 1F; Steinmann, 1968: fig. 1, 2). The wing maculation of the holotypes of *S. tigridis* (Morton, 1921: pl. 2, fig. 4) and *S. gobiensis* (Tjeder, 1936: pl. 17, fig. 8) are nearly identical.

Male specimens from the Astrakhan Region are assigned to *S. tigridis* fairly confidently based on their genitalia (Fig. 2): the central apical process of the gonostyli 9 (=arcessus) is prolonged and pointed in the dorsal view, while it is short and obtuse in *S. gobiensis* (Hölzel, 1966: fig. 22); the upper process of the gonopophyses 9 (=entoprocessus) is straight, but is curved upwards in *S. gobiensis* (Hölzel, 1966: fig. 25). These features are concordant with those of specimens from Spain (Monserrat, 2016: fig. 162–164).

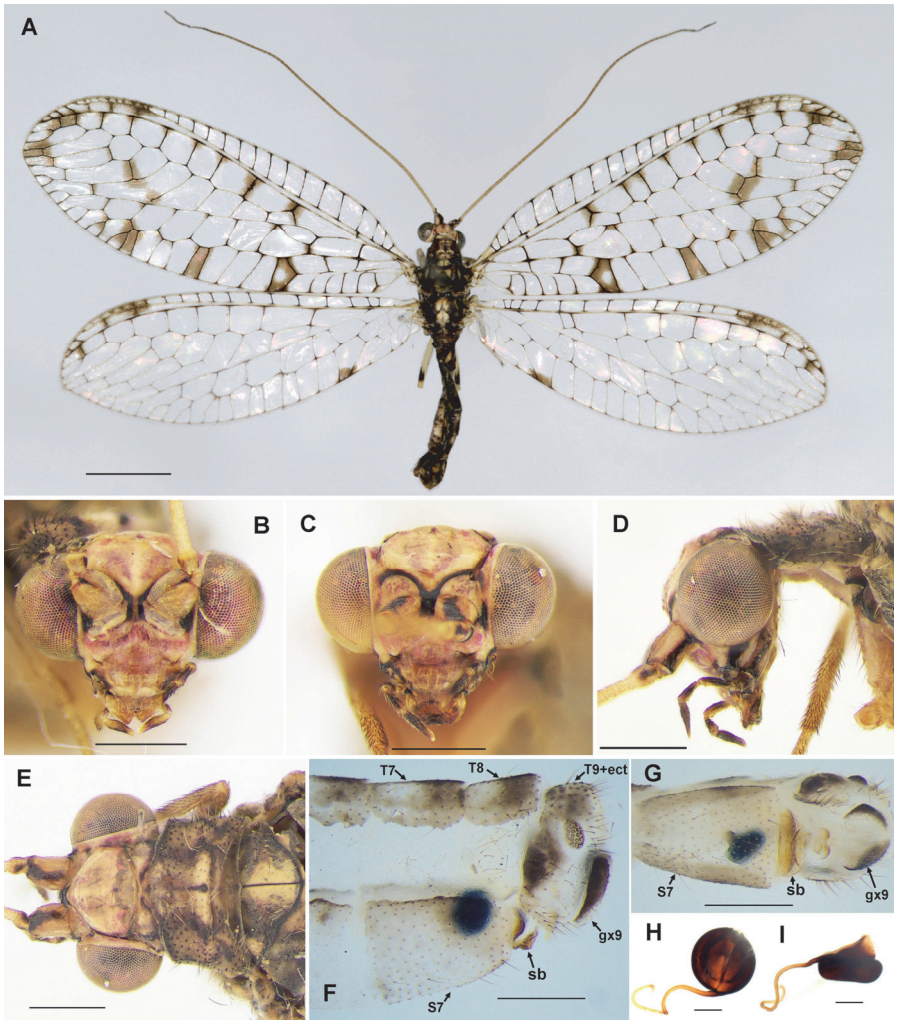

Fig. 1. *Suarius tigridis* from the Astrakhan Region, females: A – whole specimen; B, C – heads of two different specimens, frontal view; D – head and prothorax, lateral view; E – head and thorax, dorsal view; F – apex of abdomen, lateral view; G – apex of abdomen, ventral view; H – spermatheca, dorsal view; I – spermatheca, lateral view. ect – ectoproct; gx9 – gonocoxites9; sb – subgenitale; S7 – 7th sternite; T7–T9 – 7th to 9th tergites. Scale bars: 2 mm (A), 0.5 mm (B–G), 0.1 (E, F).

However, the subgenitale (=fused gonocoxites 8) and the spermateca of the female (Figs 1F–I) are more similar to those of *S. gobiensis* than *S. tigridis* (cf. Tjeder, 1936: fig. 1B–E, 2A–D) (see Discussion).

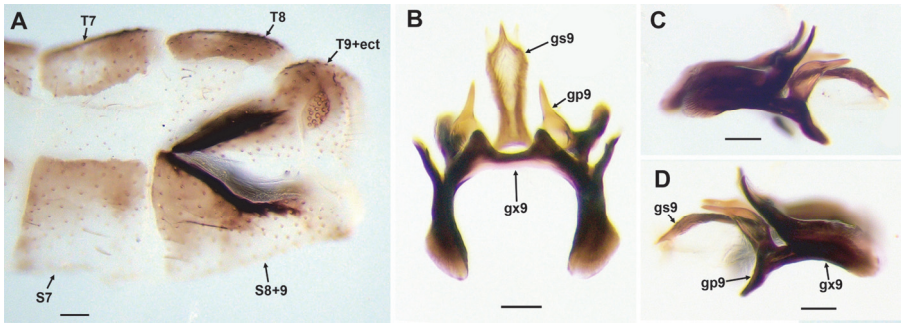

Fig. 2. *Suarius tigridis* from the Astrakhan Region, male: A – apex of abdomen, lateral view; B – inner genital complex, dorsal view; C – same, lateral view of right side; D – same, lateral view of left side. ect – ectoproct; gp9 – gonopophyses9 (=entoprocessus); gs8 – gonostylus9 (=arcessus); gx9 – gonocoxites9 (=gonarcus); S7–S9 – 7th to 9th sternites; T7–T9 – 7th to 9th tergites. Scale bars: 0.1 mm.

***Suarius mongolicus* (Tjeder, 1936)**
Fig. 3

MATERIAL. **Russia** (first record): Astrakhan Region (Astrakhanskaya Oblast): lower reaches of the Volga River, right bank, 46°49.817N, 47°34.744E, at light, 1.VI 2019, 1♀ (A. Solodovnikov).

DISTRIBUTION. Europe (Russia), Asia: western Kazakhstan, Uzbekistan, Turkmenistan, Oman, Saudi Arabia, Iran, Afghanistan, China (Inner Mongolia, Xinjiang), Mongolia (Hovd, Govĭ-Altay, Bayanhongor, Övörhangay, Ömnögovĭ) (Tjeder, 1936; Steinmann, 1965, 1968, 1971; Dorokhova, 1977, 1979; Hölzel, 1967, 1980, 1995; Aspöck *et al*., 2001; X. Yang *et al*., 2005).

REMARKS. *S. mongolicus* was mentioned by X. Yang *et al*. (2005) as distributed in "Russia (Siberia)". But later this record is absent in the Catalogue of Chinese Neuroptera (D. Yang *et al*., 2018). "Russia (Siberia)" was probably an erroneous record.

The principal external distinguishing features of the examined specimen are as follows. The head is pale, yellowish with dark maculation; there is a large dark spot between the antennae; the genae and clypeus with smaller spots laterally; and there are two elongated slightly curved very dark brown spots on the vertex. The scapus has two broad longitudinal stripes outside and posteriorly; and the pedicellus is marked posteriorly. The palpi are pale. The pronotum is green-yellowish with an interrupted median brownish line and uncertain maculation laterally. The forewings are 8.7 mm long. The veins are mainly pale with short dark lengths and setae, without maculation.

Hölzel (1967) stated that *Suarius mongolicus* and *S. caviceps* (McLachlan, 1898) are indistinguishable externally. *S. caviceps* is distributed in northern Africa (Morocco, Algeria, Tunisia, Libya, Egypt, Sudan) and Middle East (Turkey, Israel, Saudi Arabia, Iraq, Iran) (McLachlan, 1898; Navás, 1910, 1913, 1914, 1915, 1932; Esben-Petersen, 1920, 1932; Auber,

1955; Hölzel, 1966, 1967, 1980, 1995; Monserrat *et al*., 1990; Ohm & Hölzel, 1992; Aspöck *et al*., 2001; Canbulat, 2007; Ghahari *et al*., 2010). Hölzel (1967) found some differences in the genitalia of both males and females in these species. According to him, sternite 8+9 of the male in *S. mongolius* is narrower in lateral view that that of *S. caviceps*, but the inner genitalia appear nearly identical in both species (see Hölzel, 1967: fig. 69, 70). The subgenitale of the females in these species differs somewhat more (see Hölzel, 1967: fig. 71, 73). However, later Hölzel (1980) noted that some females of *S. mongolicus* and *S. caviceps* in Saudi Arabia cannot be distinguished with certainty.

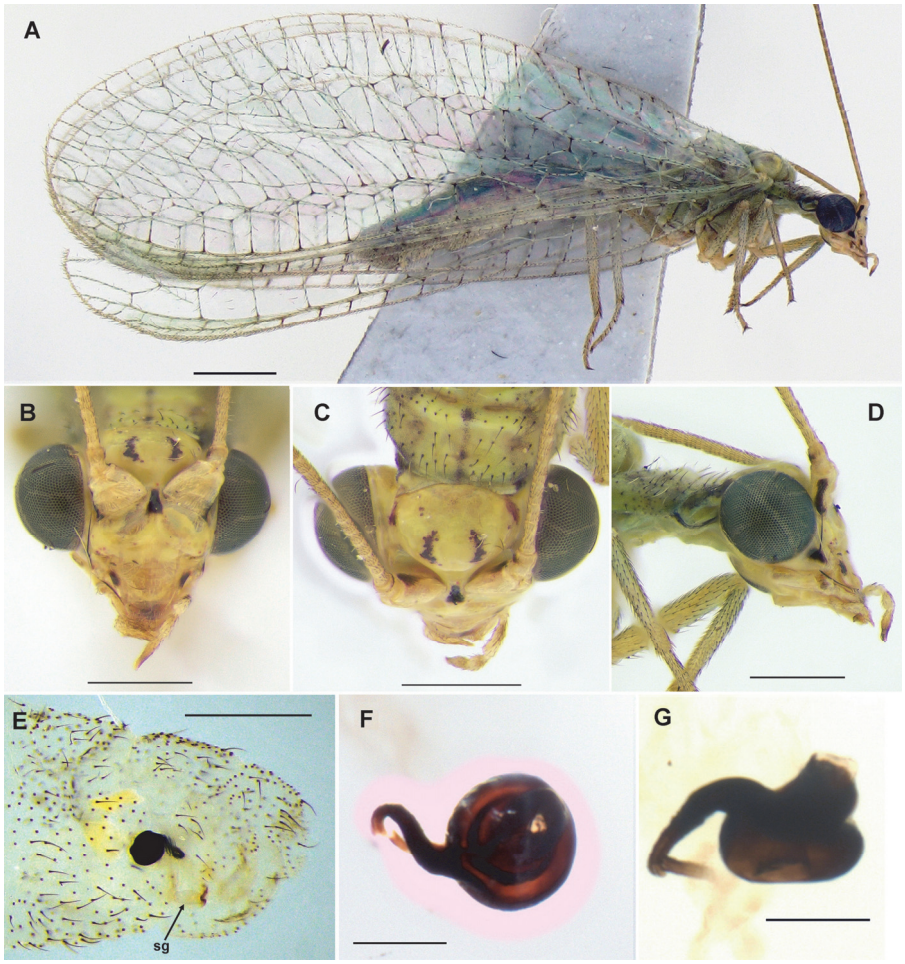

Fig. 3. *Suarius mongolicus* from the Astrakhan Region, female: A – specimen in lateral view; B – head, frontal view; C – head and prothorax, dorsal view; D – head and prothorax, lateral view; E – apex of abdomen, lateral view; F – spermatheca, dorsal view; G – spermatheca, lateral view. sb – subgenitale. Scale bars: 1 mm (A), 0.5 mm (B–E), 0.1 (F, G).

The female from the Astrakhan Region is referred to *S. mongolicus* because its subgenitale and spermatheca (Fig. 3E–G) are more like those of that species than *S. caviceps*, as shown by Hölzel (1967: fig. 71, 73).

DISCUSSION

Suarius is the most xerophilous genus among the Palaearctic Chrysopidae. Until recently, its range was not known to extend beyond regions with a desert or semi-desert climate (see Hölzel, 1984: map 10), and some species are very abundant in countries with such a climate, e.g., *Suarius alisten* (Návas, 1914) in Oman (Hölzel 1995). However, several species have been recently described from humid subtropical (Fujian, Guanxi) and tropical (Hainan) regions of China (X. Yang *et al*., 2005).

The detailed ecology of two species found in Russia is almost unknown. In Spain, *Suarius tigridis* is mainly collected at light. The plants on which it lives are unknown; it is probably low desert vegetation (such as *Salsola*, *Thymelaea*, *Nicotiana*, *Arundo*, *Tamarix*) (Monserrat, 2016). The species was recorded at an elevation of 950 m to 1150 m in Mongolia (Steinmann, 1968, 1971) and 800 m in Iran (Hölzel, 1966).

S. mongolicus is "inhabitant of desert vegetation" (Dorokhova, 1979). It was recorded at an elevation from 860 m to 2700 m in Mongolia (Tjeder, 1936; Steinmann, 1965, 1968, 1971; Dorokhova, 1977), at an elevation of 2650 m in western China (Xinjiang) (X.Yang *et al*., 2005), and at an elevation from 1150 m to 1400 m in Iran (Hölzel, 1967).

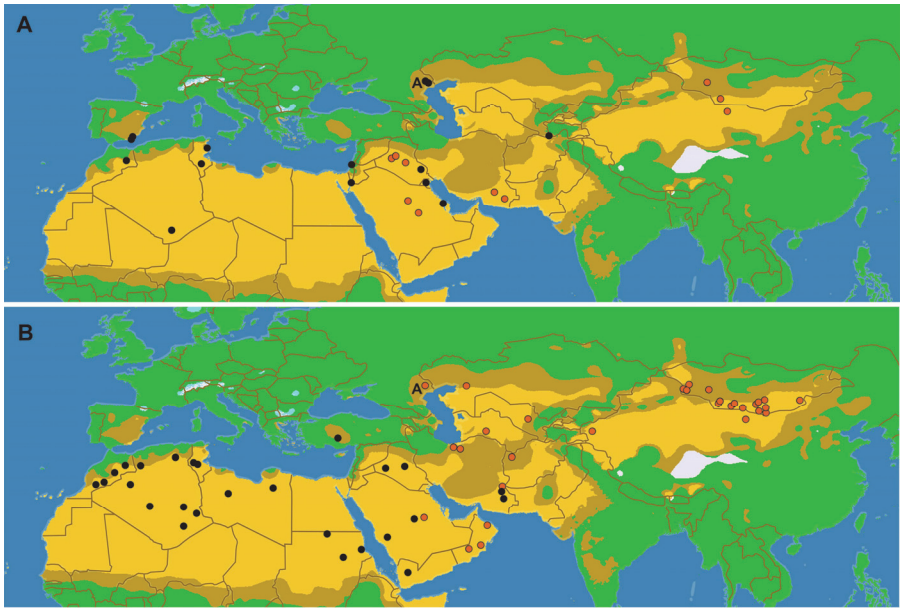

Fig. 4. Distribution of two pairs of externally very similar species of *Suarius*. A – *Suarius gobiensis* (red) and *S. tigridis* (black); B – *S. mongolicus* (red) and *S. caviceps* (black). A – localities in the Astrakhan Region. Areas with desert climate are shown by yellow color, those with semi-desert climate by brown color (after LordToran based on Peel *et al*., 2007).

Two pairs of the *Suarius* species are identical externally and very similar genitally, i.e., *S. tigridis – S. gobiensis* and *S. mongolicus – S. caviceps*. In general, *S. gobiensis* and *S. mongolicus* are East-Palearctic species, and *S. tigridis* and *S. caviceps* are West-Palearctic (Fig. 4). In Middle East these species co-occur. All four species could be theoretically distributed in the Astrakhan Region. It is unclear if these species pairs are indeed distinct species, or if this is usual geographic variability in genitalia structures and there are only two species, *S. tigridis* and *S. caviceps*. The genital differences between species in pairs are very small. For example, the females of *S. mongolicus* and *S. caviceps* in Saudi Arabia cannot be distinguished with certainty, even by genitalia (Hölzel, 1980). Moreover, our examination of *S. tigridis* shows that the male is assigned to that species with certainty, while females appear be assigned to *S. gobiensis*. Unfortunately, we could not examine genitalia of both males and females outside the Astrakhan Region. Therefore, a detailed study of the genitalia across their entire ranges is essential to determine whether these pairs are synonymous. At least, *S. gobiensis* appears to be a synonym of *S. tigridis*.

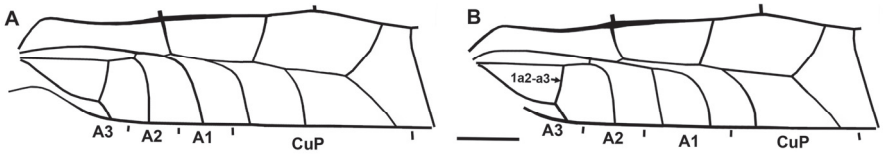

Fig. 5. Portions of the forewing venation of *S. tigridis*. A – right wing; B – left wing of the same specimen (converted to standard view, with apex to the right). Scale bar: 0.5 mm.

A rare aberration of the forewing venation is detected in one of examined specimens of *S. tigridis*. In the right wing, the distal branch of A1 is re-located to originate from CuP (Fig. 5A), where in the left wing of the same specimen it is normal, originating from A1 (Fig. 5B). The normal state of the forewing CuP in Chrysopidae is its single bifurcation, as in Fig. 5B. In this aberrant wing, CuP has two branches. This aberration is important as the CuP of some fossil species have two branches (e.g., Makarkin & Perkovsky, 2024: fig. 2A). This fact must be taken into account if the fossil species is represented only by isolated wings.

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