

## First record of *Agabus safei* Abdul-Karim et Ali, 1986 (Dytiscidae) from Kazakhstan

### Первая находка *Agabus safei* Abdul-Karim et Ali, 1986 (Dytiscidae) в Казахстане

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КЛЮЧЕВЫЕ СЛОВА: новые находки, распространение, группа *nebulosus*, Азия.

ABSTRACT. *Agabus safei* Abdul-Karim et Ali, 1986 (Dytiscidae), previously known from Iraq only from original description is recorded from Kazakhstan for the first time. Characters of this species and *Agabus nebulosus* group as a whole are discussed.

РЕЗЮМЕ. *Agabus safei* Abdul-Karim et Ali, 1986 (Dytiscidae), известный ранее только по первоописанию из Ирака, впервые приводится для территории Казахстана. В статье обсуждаются признаки этого вида и группы *Agabus nebulosus* в целом.

#### Introduction

The *Agabus nebulosus* species group characterized by pronotum without anterior beading; penis without subapical dorsal spine, dorsal spinulae enlarged in apical third; dorsal surface largely yellow [modified from: Nilsson, Holmen, 1995].

According to identification key provided by Ph.A. Zaitzev [1953, 1972], the *Agabus nebulosus* species group (Fig. 1) characterized by uniformly yellow pronotum, sometimes with 1–2 small black spots in the middle, elytra of uniform color or with brown speckles, or with irregular spots. Males of this group have large adhesive discs on their pro- and mesotarsomeres 1–3 vs *Agabus guttatus*-group, which have not ventral adhesive setae [Nilsson, 1992]. Also, one-character separate *A. nebulosus* group from *A. guttatus* group and *A. paludosus* — absence of sublateral gap in the posterolateral row of punctures on pronotum [Nilsson, 1992].

This species group according to Nilsson [2000] includes six valid species: *Agabus conspersus* (Mar-

sham, 1802), *A. dichrous* Sharp, 1878, *A. friedrichi* (Falkenström, 1936), *A. godmanni* Crotch, 1867, *A. nebulosus* (Forster, 1771) and *A. safei* Abdul-Karim et Ali, 1986.

During the study of new material collected by V.A. Stolbov in Kazakhstan, single male of *Agabus* sp. from this group was found, which differs from two species previously recorded from the country: *Agabus conspersus* and *A. dichrous* [Nilsson, Hajek, 2022].

In this note, we compare newly collected specimen from Kazakhstan with available material and published descriptions of species from *Agabus nebulosus*-group.

#### Material and methods

Terminology of male aedeagus anatomical position (dorsal, ventral, lateral aspects) used according to Miller and Nilsson [2003].

The photographs of the habitus were made by A.S. Sazhnev using a Leica MC170 HD digital camera mounted on a Leica M165C stereomicroscope. The pictures were processed in Helicon Focus 7.7.4. and Sketchbook.

The material examined is deposited in the Papanin Institute for Biology of Inland Waters of the Russian Academy of Sciences (Borok, Russia).

#### Results

Studied specimen from Kazakhstan can be attributed to “*nebulosus*” subgroup without doubts due to all characters, except pronotal rim (Fig. 2), which in stud-

ied specimen is quite thin at the base (at posterior angle of pronotum).

This specimen differs from *A. nebulosus* and *A. conspersus* by narrower body shape (Figs 1–4), and from that species and *A. dichrous* by the structure of male protarsal claw (Figs 12–15), last abdominal ventrite sculpture (Figs 16–18) and genitalia (Figs 19–22).

There are no distinct differences between studied specimen (Figs 4–7, 11, 15, 18, 21) and original description of *A. safei* Abdul-Karim et Ali, 1986, thus, we tentatively attributed it to this species.

#### Family Dytiscidae Leach, 1815

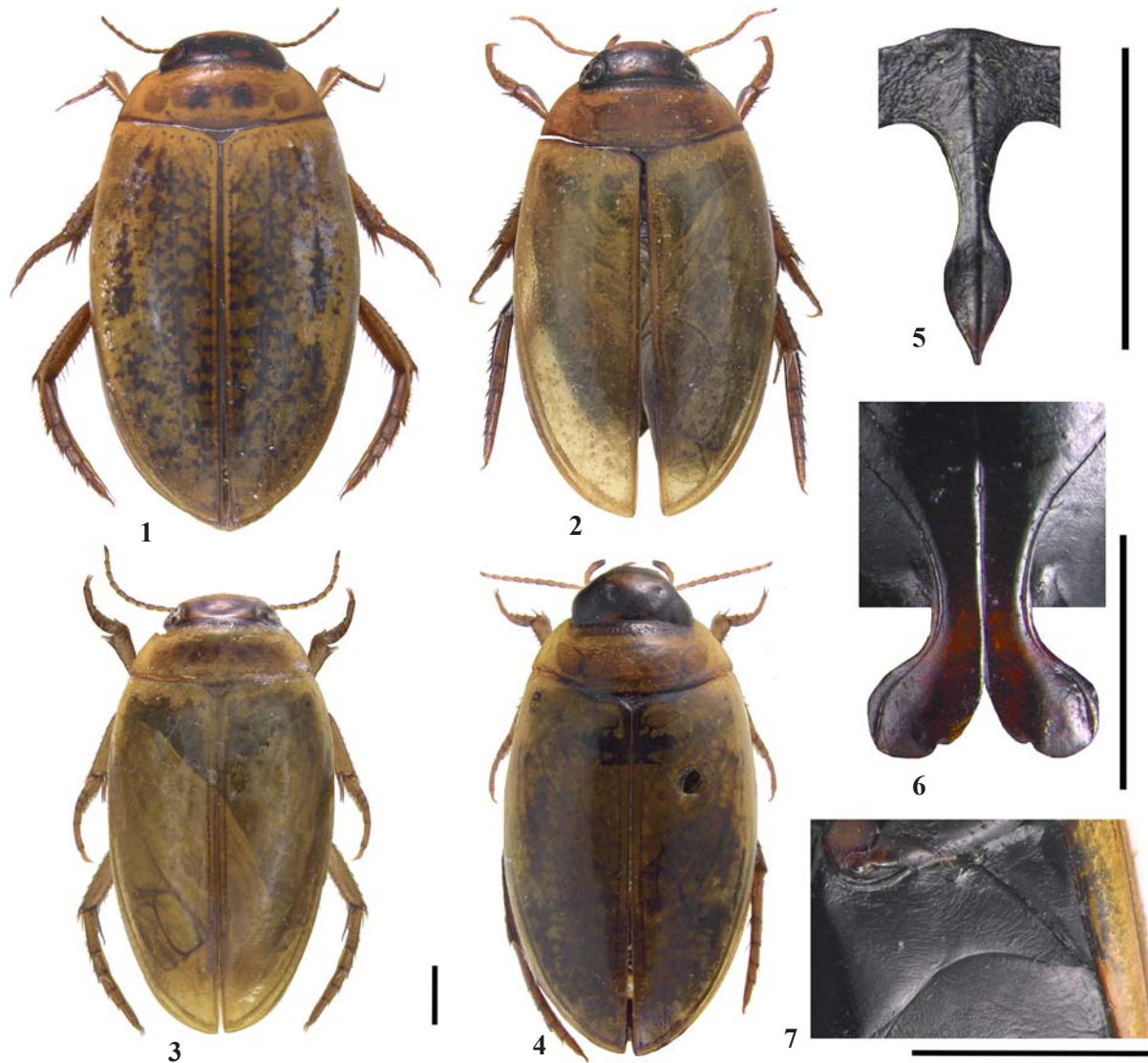
#### *Agabus safei* Abdul-Karim et Ali, 1986

MATERIAL. Kazakhstan: Turkistan Region, Western Tien Shan Mountains, Aksu-Zhabagly Nature Reserve, Jetymsay gorge, Lake

Kyzyljar (small floodplain lake of Jetymsay stream), 42°24'42.5"N 70°32'46.1"E, 1440 m a.l.t., 14.VIII.2019, 1 ♂, V. Stolbov leg.

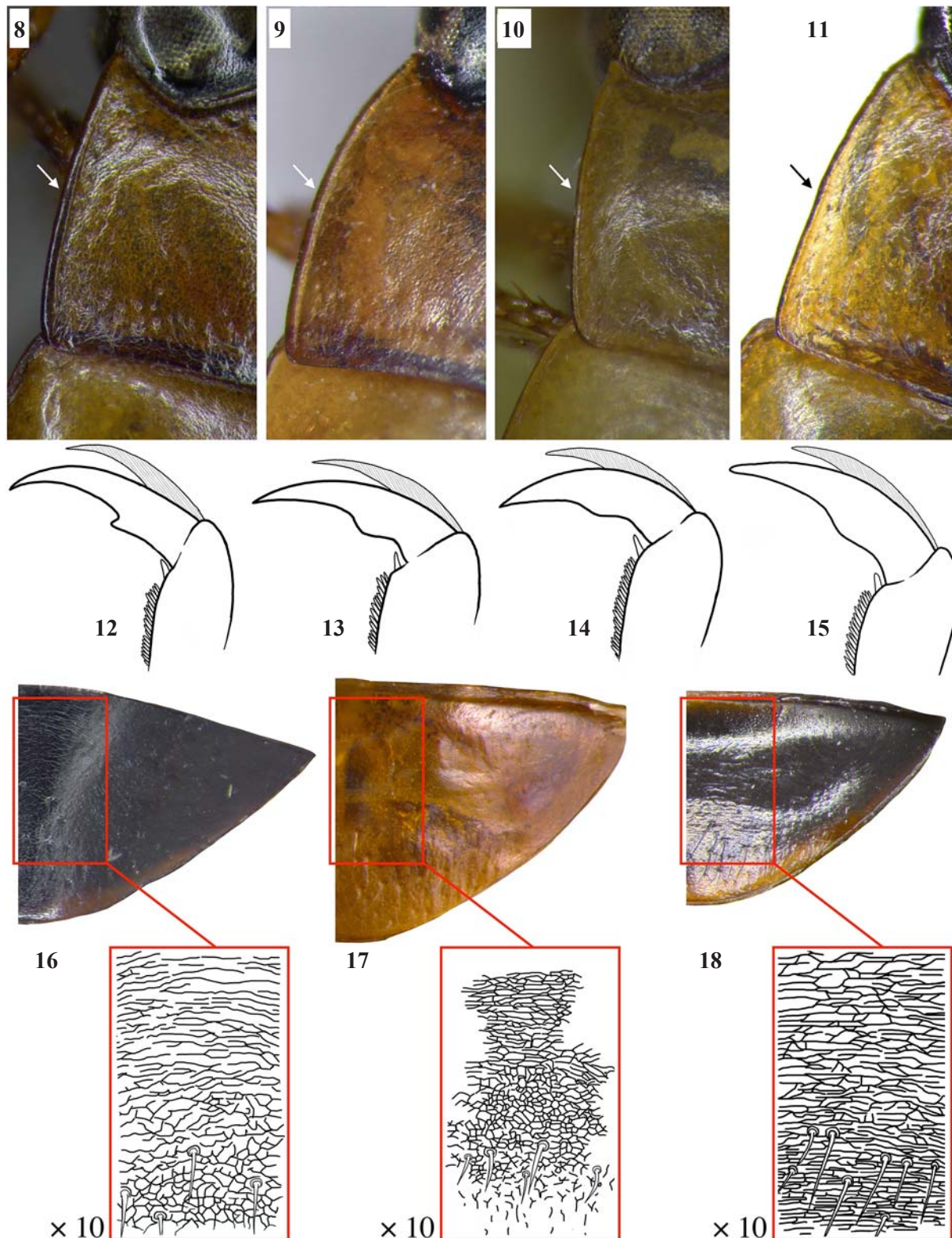
According to original description (Abdul-Karim, Ali, 1986) *A. safei* differs from *A. conspersus* by more elongated shape, transparent yellow dorsal and yellowish (♀) or brownish (♂) ventral coloration, lighter clypeus and spots behind eyes, pedicel not shorter than subsequent flagellum antennomeres. In our material the last character is not informative, only in *Agabus dichrous* scapus and pedicel are shorter than other antennomeres.

Unfortunately, type material of *A. safei*, stored in Iraqi Natural History Museum, Baghdad is not available and possibly not survived. For the final resolve of the problem, it is required to collect new material in the type locality "Hatra (Nineva)", to establish the neotype and compare with our Kazakhstan specimen. Possibly, Zaitzev's [1953] record of *Agabus friedrichi* from Kyrgyzstan, Susamy [Suisamy] (ca. 42°10'55"N 73°57'26"E) also belongs to *A. safei*.



Figs 1–7. Habitus and morphology details of *Agabus nebulosus* species group: 1 — *Agabus nebulosus* (Forster, 1771), habitus; 2 — *A. conspersus* (Marshall, 1802), habitus; 3 — *A. dichrous* Sharp, 1878, habitus; 4–6 — *A. safei* Abdul-Karim et Ali, 1986 from Kazakhstan; 4 — habitus, 5 — prosternal process; 6 — metacoxal processes; 7 — lateral lobe of metaventrte and epipleuron. Scale bar: 1 mm.

Рис. 1–7. Габитус и детали строения видов *Agabus* группы *nebulosus*: 1 — *Agabus nebulosus* (Forster, 1771); 2 — *A. conspersus* (Маршам, 1802); 3 — *A. dichrous* Шарп, 1878; 4–6 — *A. safei* Абдул-Карим и Али, 1986 из Казахстана; 4 — габитус, 5 — отросток переднегруди; 6 — отростки задних тазиков; 7 — боковая доля заднегруди и эпиплеура. Масштабная линейка: 1 мм.



Figs 8–18. *Agabus* spp.: 8, 12, 15 — *Agabus nebulosus* (Forster, 1771); 9, 13, 16 — *A. conspersus* (Marshall, 1802); 10, 14, 17 — *A. dichrous* Sharp, 1878; 11, 15, 18 — *A. safei* Abdul-Karim et Ali, 1986 from Kazakhstan; 8–11 — lateral rim of pronotum; 12–15 — claws of male protarsus; 16–18 — last abdominal sternum sculpture. Arrows indicate lateral rim of pronotum.

Рис. 8–18. *Agabus* spp. Ж 8, 12, 15 — *Agabus nebulosus* (Forster, 1771); 9, 13, 16 — *A. conspersus* (Marshall, 1802); 10, 14, 17 — *A. dichrous* Sharp, 1878; 11, 15, 18 — *A. safei* Abdul-Karim et Ali, 1986 из Казахстана; 8–11 — боковой край переднеспинки; 12–15 — коготки передних лапок самцов; 16–18 — скульптура последнего стернита брюшка. Стрелками обозначен боковой бортик переднеспинки.



Figs 19–22. *Agabus* spp, penis (ventral and lateral views) and right paramere: 19 — *Agabus nebulosus* (Forster, 1771); 20 — *A. conspersus* (Marsham, 1802); 21 — *Agabus safei* Abdul-Karim et Ali, 1986 from Kazakhstan; 22 — *A. dichrous* Sharp, 1878 (photo by S.V. Litovkin). Arrows indicate dorsal spinulae. Scale bar: 1 mm.

Рис.19–22. *Agabus* spp, пенис (вид снизу и сбоку) и правая параметра: 19 — *Agabus nebulosus* (Forster, 1771); 20 — *A. conspersus* (Marsham, 1802); 21 — *Agabus safei* Abdul-Karim et Ali, 1986 из Казахстана; 22 — *A. dichrous* Sharp, 1878 (фото С.В. Литовкина). Стрелками обозначены шипики на дорсальной стороне пениса. Масштабная линейка: 1 мм.

## Discussion

At least four studied species of the group (*Agabus conspersus*, *A. nebulosus*, *A. dichrous* and *A. safei* from Kazakhstan) have an inner (anterior) claw of male protarsus with expansion. Possibly, this character is also specific for the *nebulosus*-group as a whole.

In our opinion this species group includes, at least, two subgroups: “*nebulosus*” and “*dichrous*”.

First one (“*nebulosus*”) includes two West Palaearctic species *Agabus conspersus* (Figs 2, 9, 13, 16, 20) and *A. nebulosus* (Figs 1, 8, 12, 16, 19), which have thick lateral rim of pronotum (Figs 8–9); basal half of paramere shorter than bristled distal one.

Second one (“*dichrous*”) includes East Palaearctic species *Agabus dichrous* (Figs 3, 10, 14, 17, 22) and *A. friedrichi* [see: Falkenström, 1936, incl. Abb. 13], which have a thin lateral rim of pronotum (Figs 10–11), basal half of paramere near equal to bristled distal one.

According to original description by G.R. Crotch [1867] it is difficult to attribute endemic of the Azores, *A. godmani*, to one or another subgroup. Due to the species range it is more probably belongs to “*nebulosus*” one.

At the same time, *A. safei* possibly can be included in “*nebulosus*” subgroup at least on the base of paramere with long bristled distal part [Abdul-Karim, Ali, 1986: Fig. 1B].

According to literature species of the group occurs in not shaded water bodies, sometimes brackish [Nilsson, Holmen, 1995; Prokin et al., 2020; etc.]. The coloration type of *Agabus nebulosus* group with the ventral side is darker than the dorsal, which is not typical for Dytiscids and water animals as a whole, can be adaptive in case of living in such open, not shaded water bodies with a light-colored bottom (for example, clay or sandy), primarily temporary ones [Prokin, Petrov, 2007]. In such water bodies, it is more important to be

invisible against the background of the bottom for terrestrial predators, such as birds, than for predators in the water column, since fish are usually absent in such habitats and prey organisms are abundant.

It is necessary to revise the *Agabus nebulosus*-group using all available collections, especially from Asia, to clarify species composition and ranges.

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**Competing interests.** The authors declare no competing interests.

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