

**On the occurrence of
Gomphus vulgatissimus (Linnaeus, 1758) and *G. schneiderii* Selys, 1850
in Azerbaijan – a brief discussion of the known status quo**

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Abstract

Boudot et al. (2021) extirpated, without any discussion, *G. vulgatissimus* from the list of Azerbaijan Odonata, subsuming all records of this taxon under *G. schneiderii*. This is contradictory to the fact that *G. vulgatissimus* was documented for Azerbaijan by Bartenef (1912). We discuss the current knowledge of the two taxa *G. vulgatissimus* and *G. schneiderii*, document a new record of *G. vulgatissimus* for Azerbaijan, and map all known findings of the two taxa that have been reported to date as well as the potential distribution (search area) of *G. vulgatissimus* in northern Azerbaijan.

Keywords: *Gomphus schneiderii*, *Gomphus vulgatissimus*, distribution map, Azerbaijan.

Introduction

Currently, the species complex comprising *Gomphus vulgatissimus* and *Gomphus schneiderii* seems to be taxonomically and systematically unsettled as obvious problems with field identification are existing (De Knijf et al. 2013). From the regional point of awareness in Russian literature, e.g. Ketencheniev & Haritonov (1998) did not consider the occurrence of *G. schneiderii* in the Caucasus region, however, Skvortsov (2010) and Onishko & Kosterin (2021) did.

Dumont et al. (2021) sequenced in total as few as eight specimens of both taxa for the mitochondrial COI gene and nine specimens for the nuclear nucleotide sequence ITS1 – 5.8 S rRNA – ITS2 - 18S rRNA. In this limited analysis, they ignored large parts of the ranges of these taxa. On page 28, these authors made a misleading statement: "COI and ITS, however, single it [*G. schneiderii*] at full species level (Fig. 1)". In fact, fig. 1 shows the COI phylogenetic tree while the ITS tree is shown in fig. 2. *G. schneiderii* and *G. vulgatissimus* indeed form two sister clusters with maximum support in the COI tree, while in the ITS tree only *G. vulgatissimus* forms a cluster of its own which is nested inside (!) the cluster of *G. schneiderii*. So, contrary to what they claimed, the molecular analysis by Dumont et al. (2021) failed to resolve the phylogenetic relations and systematic positions of these two species but caused more confusion. Obviously, more sequences need to be involved to resolve them.

Seidenbusch (1997) tried to separate the taxa based on six specimens from Turkey, Romania and Germany. He hesitated to consider his conclusions as final and requested the study of broader material. The deepest study was made by De Knijf et al. (2013) based on material from Montenegro and giving insight into the variability of morphological characters of *G. schneiderii*.

Based on our current knowledge, there seems to be no study that treats the status of the two taxa on an empirical basis which would allow us to rule out one of the two taxa in Azerbaijan. Despite this unsatisfactory situation, the occurrence of *G. vulgatissimus* was extirpated from Azerbaijan without any discussion by Boudot et al. (2021), even though one of the co-authors had stated the following: "...it appears to be possible that at least the contact zone of both species might run through the eastern part of the Transcaucasian depression." (Schröter et al. 2015).

The situation caused by Boudot et al. (2021), and the problem of insufficiently determined larvae

Boudot et al. (2021) show only *G. schneiderii* as occurring in Azerbaijan, although *G. vulgatissimus* is given in the map by Boudot & Kalkman (2015) for Azerbaijan. Without any discussion, this dot is now attributed to *G. schneiderii*. It is not fully clear which finding it was, but it is likely to be the one reported by Bartenef (1912). Bartenef (1912) explicitly identified the specimen from Areš, Elisavetpol as *G. vulgatissimus vulgatissimus*. Bartenef (1912a: 154) illustrated the appendages of *G. vulgatissimus* and *G. schneiderii* comparatively. Therefore, it can be assumed that Bartenef knew the difference between *vulgatissimus* and *schneiderii*, especially since his illustration corresponds very well with that in Dijkstra et al. (2020) or Skvortsov (2010). The geographical coordinates given by De Knijf (in litt.) and said to be used in Boudot et al. (2021) mark Areš (Agdash district) south of the Mingechevir Reservoir in the Kura Valley. In the distribution map presented by Boudot et al. (2021), there are further localities for *G. schneiderii* in Azerbaijan. This is peculiar since, to our knowledge, no occurrences of *G. schneiderii* for this country were published prior to the Atlas by Boudot et al. (2021). It could be concluded from the distribution of *G. vulgatissimus* and *G. schneiderii* as shown therein that only *G. schneiderii* occurs in Azerbaijan. However, this is not true given the finding by Bartenef (1912) and reconsidered literature data (Tab. 1).

Kasymov (1975) provides evidence of larvae of *G. vulgatissimus* for Poylu, Dashbulak, Yenikend, Muganly and Almaly. However, the author did not indicate how these larvae were determined. It can be assumed that Popova (1953) was used for this purpose. Regardless of whether the marking of *G. vulgatissimus* given there is suitable for a determination, *G. schneiderii* is not mentioned in this publication, which is why all users are inevitably led to *G. vulgatissimus*.

There are references to *G. vulgatissimus* in Kasymov (1965), although it is unclear where the information comes from. Some of the localities are mentioned in Kasymov (1975) and he probably had the later published findings at his disposal, since he stated in 1975 that he studied the aquatic fauna of the Middle Kura, Alazani, Iori (Georgia) and Ganjachay Rivers during the summer months of 1964-1966.

***Gomphus vulgatissimus* at Balakan/Balaken (Ititala village) in northern Azerbaijan from 01-VI-2012**

Fig. 1 documents a current record of *Gomphus vulgatissimus* from Ititala village, a locality in Azerbaijan near the border to Georgia. The specimen likely developed in the boundary river Katehchay (tributary of Alasani River), a river where Kasymov (1972), too, collected larvae he identified as *G. vulgatissimus*.

The morphology of secondary genitalia from the specimen (Fig. 1a-c) corresponds very well with drawings in Dijkstra et al. (2020), Skvortsov (2010: 333) or Onishko (2019). The primary genitalia (Fig. 1d,e) are very close to the drawings provided in Dijkstra et al. (2020) and Skvortsov (2010). Therefore, the specimen is definitely *Gomphus vulgatissimus*.

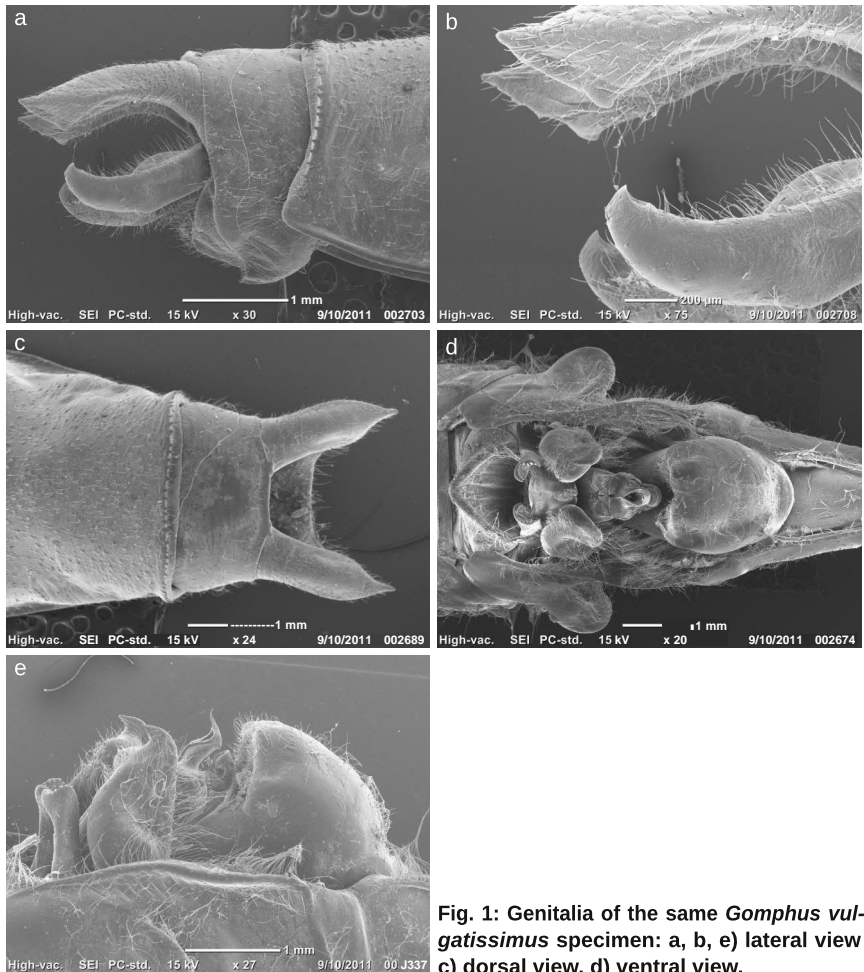


Fig. 1: Genitalia of the same *Gomphus vulgatissimus* specimen: a, b, e) lateral view c) dorsal view, d) ventral view.

The current knowledge of the distribution of *Gomphus vulgatissimus* and *G. schneiderii* in Azerbaijan

To demonstrate the current knowledge of the distribution of *Gomphus vulgatissimus* and *G. schneiderii* in Azerbaijan, we compile the records of these species and „*G. vulgatissimus*“-larvae in Table 1 and Fig. 2, of all published records that we know. Records of gom-

Tab. 1: Azerbaijan records of *Gomphus vulgatissimus*, *G. schneiderii* and the „*G. vulgatissimus*“-larvae with unsettled identification. Coordinates - decimal degrees of latitude and longitude – are derived from Google Earth.

Locality	Source	Latitude	Longitude
„<i>Gomphus vulgatissimus</i>“- larvae without definite identification			
Village Bala Bagman near Kirovabad / = Ganja	Kasymov 1975	40.74511	46.38285
Kapuchay river near Zakatala	Kasymov 1975	41.64888	46.63831
Mouth of Katehchay in Alasani (at the border between Georgia and Azerbaijan)	Kasymov 1972	41.57674	46.30222
Poylu	Kasymov 1972	41.16762	45.44699
Dashbulak	Kasymov 1972	40.90294	46.04441
Yenikend (Hauptkanal)	Kasymov 1972	40.91133	46.30883
Muganly (Alasani, Fluß)	Kasymov 1972	41.47928	46.49045
Almaly (Alasani, Fluß)	Kasymov 1972	41.34297	46.76196
River branches of Alazani ca. 2km north of the Mingecha-Ure River Reservoir	Kasymov 1965	40.89131	46.70274
Iori (Georgia)	Elanidze (1956)		
Orphan Kur (Yetim Kur Akhmaz)	Guliyeva (2020)	40.59765	47.19963
Nakhchivan	Guliyeva (2021) (from the geographic position of record: probably <i>G. schneiderii</i>)	39.13997	45.41702
Garkhun	Guliyeva (2021) (from the altitude of record: probably <i>G. vulgatissimus</i>)	41.12451	48.33378
Yalama	Dengina (1947) (This record is due to general distribution of <i>G. schneiderii</i> in Azerbaijan quite surely not <i>vulgatissimus</i> but <i>schneiderii</i>)	41.75209	48.58403
<i>Gomphus vulgatissimus</i>			
Ora? (Ares)	Bartenef (1912)	40.73123	47.22943
Balakan/Balaken (Ititala village)	Skvortsov & Snegovaya, 01-VI-2012, this publication	41.58552	46.36080
<i>Gomphus schneiderii</i>			
Lenkoran	Dumont et al. (2021)	38.75286	48.84750
Masaili	Dumont et al. (2021)	39.03403	48.65884
Lenkoran, Azfilial	This study	38.67637	48.79885
Samson river near Acharkut, Armenia	Durand (2019)	41.0331	45.0746
Khachmaz, Nabran village	Snegovaya (2020) (reexamined and corrected record) (see Snegovaya 2022)	41.75894	48.69300

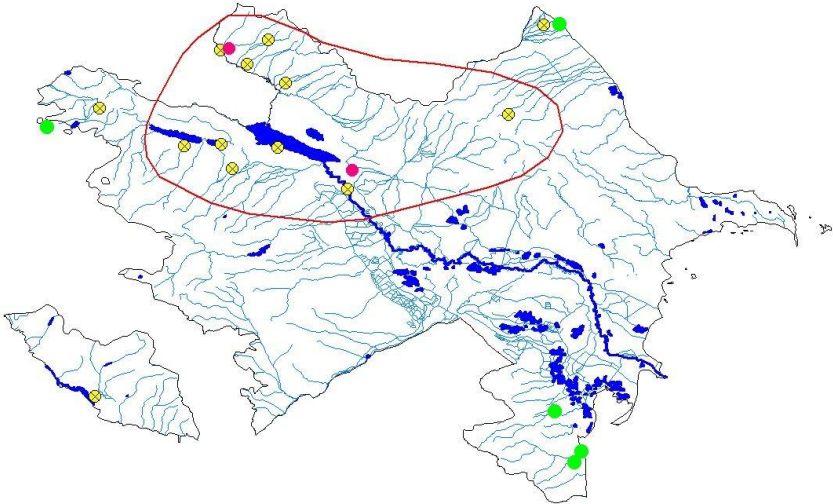


Fig. 2: All findings of *Gomphus schneiderii* (green dots), *G. vulgatissimus* (red dots) and *G. c.f. vulgatissimus*-larvae (yellow dots) that have been reported to date. Flowing waters are shown in light blue, standing waters in dark blue. The potential distribution (search area) of *G. vulgatissimus* is outlined in red and is probably restricted to the northwestern part of Azerbaijan. To draw the map, several shapefiles from open sources on the internet (DIVA-GIS etc.) were used.

phids that are impossible to occur in Azerbaijan (e.g. *G. pulchellus* or *Ophiogomphus cecilia*) published by several authors are ignored, although they could also be based on larval stages of *G. vulgatissimus*/*G. schneiderii*.

Considering the situation documented in Fig. 2 and the above-mentioned statement by Schröter et al. (2015) that the contact zone of *Gomphus schneiderii* and *G. vulgatissimus* might run through the eastern part of the Transcaucasian depression, it would be wise to carry out more fieldwork in the area of potential distribution of *G. vulgatissimus* to obtain further evidence of the occurrence of this taxon in Azerbaijan. Two of the specimens identified as true *G. vulgatissimus* originated from this area, as well as several specimens identified as cf. *vulgatissimus*-larvae.

Discussion

Against this background, it should be noted that

- (1) There is a published record of *G. vulgatissimus* for Azerbaijan by Bartenef (1912), which was omitted in the atlas by Boudot et al. (2021).
- (2) All records of *G. vulgatissimus*/*schneiderii* available prior to the publication of the above-cited atlas referred to "*G. vulgatissimus*". Since Kasymov (1965, 1975) made these finds in the same area of the Kura or the Mingechevir reservoir as Bartenef (1912), and as the here published record of *G. vulgatissimus* (see Tab. 1), it cannot be assumed a priori that Kasimov's larvae were not "*vulgatissimus*". On the contrary, based

on the currently known facts, it is more likely to be *vulgatissimus* than *schneiderii*. Only a targeted search can clarify which species occurs in this area.

(3) This uncertainty should have been communicated in the accompanying text to *G. schneiderii* published by Boudot et al. (2021), and the distribution map of *G. vulgatissimus* had better been included. Boudot & Kalkman (2015) presented a very patchy map of the distribution of *G. vulgatissimus* north of the Black Sea, and it is not clear whether these are natural distribution gaps or coverage gaps.

(4) A revision of the taxonomic status of *Gomphus vulgatissimus* and *G. schneiderii*, based on a broad base of material collected from the entire range and on an extended number of target sequences, is urgently needed. Until such a study is available, the species status of the two taxa should be treated conservatively.

(5) In order to be clear which taxon is involved, reports of field studies should indicate which identification characters were used to identify the imagines, and which book was consulted to identify the specimens.

- Because of the broadest availability among odonatologists and some very good figures, we consider the book of Dijkstra et al. (2020) to be the most suitable to achieve maximum transparency in the identification of imagines. Skvorstov (2010), too, provides a detailed key with instructive and detailed figures to separate the two taxa.
- In the case of larval identification, the advice of Brochard & van der Ploeg (2013) should be followed. Again, Skvorstov (2010) provides a key to separate the larva of the two taxa. In any case, this book of Skvortsov is the gold standard to separate the two taxa.

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