Additional Odonata records from Georgia, southern Caucasus ecoregion, with the first record of *Ischnura fountaineae* (Odonata: Coenagrionidae)

Malte Seehausen[1], Asmus Schröter[2], Levan Mumladze[3] & Burkhard Grebe[4]

[1] Museum Wiesbaden, Friedrich-Ebert-Allee 2, 65185 Wiesbaden, Germany; malte.seehausen@museum-wiesbaden.de

[2] Rasenweg 10, 37130 Gleichen, Germany; ORCID ID: 0000-0002-3655-2304; notulae@osmylus.com

[3] Ilia State University, Institute of Ecology, Cholokashvili steet 33/5, 0179 Tbilisi, Georgia; Invertebrate Research Center (IRC), Agladze street 26, 0119 Tbilisi, Georgia; lmumladze@gmail.com

[4] Oberdorfallee 7a, 53909 Zülpich, Germany; burkhard.grebe@t-online.de

Abstract. Records of 57 odonate species group taxa obtained at 76 sampling sites during several field surveys between 2012 and 2016 are presented, corresponding to more than three quarters of the Georgian odonate fauna. *Ischnura fountaineae* is a new addition to the country's list. *Sympetrum arenicolor* was recorded for the second time and *Aeshna serrata* was found at two further lakes on the Javakheti volcanic plateau. For other species, such as *Cordulia aenea* and *Leucorrhinia pectoralis* only very limited and mainly old data was available. In addition, new records for *Coenagrion ponticum*, an endemic of the Caucasus region, as well as for *Coenagrion pulchellum* and *C. scitulum*, both rare in the Caucasus region, are given. Further information on the globally threatened gomphids *Onychogomphus assimilis* and *O. flexuosus* are presented, including the first exuviae records of the latter in Georgia. New findings of the nominate taxon of *Sympetrum vulgatum* provided indications on regional distribution pattern and spatial delimitation from ssp. *decoloratum*. Further records of *Pantala flavescens* suggested rather regular occurrence in Georgia, being an integral part of the Georgian dragonfly fauna. The existence of small isolated pockets of *Calopteryx splendens* ssp. *tschaldirica* inside the core area of ssp. *intermedia* in Georgia was confirmed as well as several individuals of ssp. *tschaldirica* from the Georgian stronghold of the taxon in the Javakheti volcanic plateau showing entirely hyaline wings, phenotypically resembling ssp. *waterstoni*. Against the background of general taxonomic difficulties with the *Calopteryx splendens* taxa complex, both phenomena are discussed.

Further key words. Dragonfly, damselfly, Anisoptera, Zygoptera, Khevsureti historical province

Introduction

An extensive overview and update of the Odonata fauna of Georgia was provided by Schröter et al. (2015). For any basic information on climate, geology and current state of odonatological research in Georgia we refer to this study. Since the latest additions to the Georgian dragonfly fauna, *Sympetrum arenicolor* and *Selysiothemis nigra* (Schröter 2010a; Schröter et al. 2015), the checklist records 74 species group taxa from the country. On the whole the knowledge of the Georgian

dragonfly fauna is still fragmentary and almost every survey potentially brings new discoveries, shifting the knowledge frontier. Here we present additional records from all over the country for more than three quarters of the Georgian species, including the first record of *Ischnura fountaineae*, increasing the number of species group odonate taxa known from Georgia to 75.

Material and methods

The majority of data were collected during field trips focused on the Kakheti region and Vashlovani National Park of eastern Georgia at the bordering area to Azerbaijan from 21-vi- to 05-vii-2016 (MS) as well as at the lakes and wetlands of the Javakheti volcanic plateau from 15-vi- to 04-ix-2015 and 29-v- to 26-vi-2016 (LM). Records from Khevsureti historical province and adjacent areas at the northern slopes of the Caucasus range at the bordering area to Chechnya and North Ossetia-Alania (Russian Federation) were gathered from 26-viii- to 13-ix-2015 (AS). Most of the data from the central and western regions of the country as Racha-Lechkhumi and Kvemo Svaneti as well as Imereti were collected from 29-v- to 18-vi-2016 (BG). Supplementary data based on photographic evidence were kindly made available by Andrzej S. Jadwiszczak, Steve Rooke and Nazi Berdzenishvili. The representation of the data was derived from the scheme used by Schröter et al. (2015).

List of localities with Odonata records

Indicated are (in that order) the administrative unit on the level of regions, description of the localities with Georgian toponyms, coordinates, altitude in meters above sea level and date(s).

(1) Tbilisi (თბილისი), park-like landscape gardening with concrete pool with waterlilies and goldfish (41.7336°N, 44.8359°E, 580 m a.s.l.), 26-viii- to 30-viii-2015. **(2)** Tbilisi (თბილისი), gorge of Tsavkisistskali river (წავკისისწყალი) (41.6828°N, 44.7899°E, 580 m a.s.l.), 21-vi-2016; corresponds to loc. 2 in Schröter et al. (2015). **(3)** Tbilisi (თბილისი), gravelroad to the waterfall along the northern slope of Tsavkisistskali gorge (წავკისისწყალი) (41.6843°N, 44.7910°E, 600 m a.s.l.), 21-vi-2016; corresponds to loc. 3 in Schröter et al. (2015). **(4)** Tbilisi (თბილისი), southwestern shore of Lisi lake (ლისის ტბა) (41.7431°N, 44.7280°E, 628 m a.s.l.), 21-vi-2016; corresponds to loc. 7 in Schröter et al. (2015). **(5)** Tbilisi (თბილისი), pond at Liptovi street, south of Tbilisi Reservoir (41.7369°N, 44.8398°E, 562 m a.s.l.), 16-vi-2016. **(6)** Tbilisi (თბილისი), marsh area with ponds at Vanati street, south of Tbilisi Reservoir (41.7428°N, 44.8236°E, 590 m a.s.l.), 16-vi-2016. **(7)** Tbilisi (თბილისი), Kvirikeskhevi stream (კვირიკესხევი) at northern shore of Tbilisi Reservoir (41.7593°N, 44.8418°E, 540 m a.s.l.), 16-vi-2016. **(8)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), reedy bank of Aragvi river (არაგვი) at confluence with Kura river (მტკვარი) (41.8415°N, 44.7252°E, 451 m a.s.l.), 06-vi-2016. **(9)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), Juta river valley (სნოსწყალი) between Juta village (ჯუთა) and confluence with Snostskali river (სნოსწყალი) (42.5617°N, 44.7024°E, 1 850–2 100 m a.s.l.), 03-ix-2015. **(10)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი) small mire with *Swertia iberica* just

between Chaukhistkali river and Zeta Camping site east of Juta village (ჯუთა) (42.5767°N, 44.7478°E, 2 200 m a.s.l.), 03-ix-2015. **(11)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), Shatili village (შატილი), Khevsureti historical province (ხევსურეთი), open bushland at the camping lodges (42.6581°N, 45.1578°E, 1 415 m a.s.l.), 13-ix-2015. **(12)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), northeast of Shatili village (შატილი), Khevsureti historical province (ხევსურეთი), small pool with *Typha laxmanni* in the floodplain of the Argun river (არღუნი) (42.6594°N, 45.1603°E, 1 415 m a.s.l., 13-ix-2015. **(13)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), Mutso (მუცო) close to Chechen border, historical province Khevsureti (ხევსურეთი) (42.6057°N, 45.2068°E, 1 570 m a.s.l.), 13-ix-2015. **(14)** Kakheti (კახეთი), Khodashniskhevi river (ხოდაშნისხევი), south of Alaverdi Monastery (ალავერდი, ალავერდის მონასტერი) (42.0314°N, 45.3765°E, 443 m a.s.l.), 01-vi- to 02--vi-2016. **(15)** Kakheti (კახეთი), pond ca. 250 m south of Alaverdi Monastery (ალავერდი, ალავერდის მონასტერი) (42.0299°N, 45.3794°E, 428 m a.s.l.), 02-vi-2016. **(16)** Kakheti (კახეთი), Babaneurispsha stream (ბაბანეურისფშა), tributary of Alazani river (ალაზანი) near road 43 between Kvemo Alvani (ქვემო ალვანი) and Laliskuri (ლალისყური) (42.0653°N, 45.3964°E, 424 m a.s.l.), 02-vi-2016. **(17)** Kakheti (კახეთი), artificial pond near Pshaveli (ფშაველი) (42.0769°N, 45.4371°E, 451 m a.s.l.), 02-vi-2016. **(18)** Kakheti (კახეთი), Patardzeuliskhevi river (პატარძეულისხევი) at road S5 south Patardzeuli (პატარძეული) (41.7314°N, 45.2451°E, 770 m a.s.l.), 22-vi-2016. **(19)** Kakheti (კახეთი), Bolia river (ბოლია) at Gremi Cathedral (გრემის ტაძარი) west of Eniseli (ენისელი) (42.0026°N, 45.6602°E, 435 m a.s.l.), 30-vi-2016. **(20)** Kakheti (კახეთი), artificial pool at Kakheti Wine Guild (კორპორაცია 'ქინძმარაული') in Kvareli (ყვარელი) (41.9467°N, 45.8140°E, 410 m a.s.l.), 30-vi-2016. **(21)** Kakheti (კახეთი), Kabali river (კაბალი), tributary of Alazani river (ალაზანი), west of road S5 (41.7207°N, 46.0661°E, 220 m a.s.l.), 01-vii--2016. **(22)** Kakheti (კახეთი), fishponds south Alazani river (ალაზანი) west of bridge on road S 5 (41.6705°N, 46.0767°E, 210 m a.s.l.), 01-vii-2016; corresponds to loc. 29 in Schröter et al. (2015). **(23)** Kakheti (კახეთი), fishpond southeast of Tsnori (წნორი) (41.5956°N, 46.0353°E, 250 m a.s.l.), 01-vii-2016. **(24)** Kakheti (კახეთი), channel of Alazani river (ალაზანი) southeast of Tsnori (წნორი) (41.5943°N, 46.0330°E, 260 m a.s.l.), 01-vii-2016 **(25)** Kakheti (კახეთი), small lake west of Ozaani (ოზაანი) (41.5489°N, 45.9878°E, 530 m a.s.l.), 01-vii-2016. **(26)** Kakheti (კახეთი), rivulet beside road 39, *ca* 6 km north of Gamarjveba (გამარჯვება) (41.5206°N, 45.9889°E, 585 m a.s.l.), 22-vi-2016; corresponds to loc. 32 in Schröter et al. (2015). **(27)** Kakheti (კახეთი), Artsivis Kheoba Natural Monument (არწივის ხეობა) 'Eagle's Canyon' (terrestrial habitat) northwest of Dedoplistskaro (დედოფლისწყარო) (41.4885°N, 46.0946°E, 780 m a.s.l.), 28-vi-2016. **(28)** Kakheti (კახეთი), rivulet at Artsivis Kheoba Natural Monument (არწივის ხეობა) 'Eagle's Canyon' northwest of Dedoplistskaro (დედოფლისწყარო) (41.4871°N, 46.0953°E, 740 m a.s.l.), 28--vi-2016. **(29)** Kakheti (კახეთი), way to Khornabuji fortress (ხორნაბუჯი) (terrestrial habitat) northeast of Dedoplistskaro (დედოფლისწყარო) (41.4838°N, 46.1256°E, 815 m a.s.l.), 28-vi-2016. **(30)** Kakheti (კახეთი), Khornabuji fortress (ხორნაბუჯი) (terrestrial habitat), northeast of Dedoplistskaro (დედოფლისწყარო) (41.4863°N, 46.1351°E, 715 m a.s.l.), 28-vi-2016. **(31)** Kakheti (კახეთი), Patara lake (პატარა ტბა) east of Dedoplistskaro (დედოფლისწყარო) (41.4635°N, 46.1782°E, 620 m a.s.l.), 27-vi-2016. **(32)** Kakheti (კახეთი), Mghvrietskali river (მღვრიეწყალი) northeast of Dedoplistskaro (დედოფლისწყარო) (41.4656°N, 46.1604°E, 660 m a.s.l.), 27-vi-2016. **(33)** Kakheti

(კახეთი), western shore of Kochebi lake (კოჭების ტბა) east of Dedoplistskqaro (დედოფლისწყარო) (41.4430°N, 46.1410°E, 782 m a.s.l.), 27-vi-2016; corresponds to loc. 35 in Schröter et al. (2015). **(34)** Kakheti (კახეთი), pond at dry Kushiskhevi river (ქუშისხევი) south of Dedoplistskaro (დედოფლისწყარო) (41.4425°N, 46.0823°E, 760 m a.s.l.), 27-vi-2016. **(35)** Kakheti (კახეთი), Lekistskali river (ლეკისწყალი) in Bughamoedani plain (ბუღამოედანის ვაკე) in Vashlovani National Park (ვაშლოვანის სახელმწიფო ნაკრძალი) (41.1377°N, 46.5806°E, 215 m a.s.l.), 26-vi-2016. **(36)** Kakheti (კახეთი), valley of Alazani river (ალაზანი) around Mijnis Kure Bungalows (მიჯნისყურე) in Vashlovani National Park (ვაშლოვანის სახელმწიფო ნაკრძალი) (41.1113°N, 46.6464°E, 95 m a.s.l.), 24-26-vi-2016. **(37)** Kakheti (კახეთი), valley of Alazani river (ალაზანი) north Mijnis Kure Bungalows (მიჯნისყურე) in Vashlovani National Park (ვაშლოვანის სახელმწიფო ნაკრძალი) (41.1237°N, 46.6501°E, 100 m a.s.l.), 19-v-2016 (by A. S. Jadwiszczak), 25-26-vi-2016. **(38)** Kakheti (კახეთი), floodplain of Iori river (იორი) south of Dali reservoir (დალის ტბა/ დალის წყალსაცავი) (41.2758°N, 45.8931°E, 270 m a.s.l.), 27-iv-2012 (by S. Rooke); corresponds to loc. 34 in Schröter et al. (2015). **(39)** Kakheti (კახეთი), southwestern shore of Sakhare lake (სახარე ტბა), a salty lake of high salinity (41.5760°N, 45.3188°E, 825 m a.s.l.), 30-v-2016, 02-vii-2016; corresponds to loc. 40 in Schröter et al. (2015). **(40)** Kakheti (კახეთი), ponds for lifestock watering alongside road to Davit Gareja monastery (დავითგარეჯის სამონასტრო კომპლექსი) (41.4811°N, 45.3243°E, 707 m a.s.l.), 02-vii-2016; corresponds to loc. 41 in Schröter et al. (2015). **(41)** Kakheti (კახეთი), scrubland at Davit Gareja monastery (დავითგარეჯის სამონასტრო კომპლექსი) (41.4486°N, 45.3753°E, 710 m a.s.l.), 02-vii-2016; corresponds to loc. 42 in Schröter et al. (2015). **(42)** Kvemo Kartli (ქვემო ქართლი), reedy ditches west of Kumisi Reservoir (კუმისის ტბა) (41.5884°N, 44.8187°E, 478 m a.s.l.), 03-vii-2016. **(43)** Kvemo Kartli (ქვემო ქართლი), southwestern shore of Kumisi Reservoir (კუმისის ტბა) (41.5809°N, 44.8200°E, 475 m a.s.l.), 04-vii-2016. **(44)** Kvemo Kartli (ქვემო ქართლი), southeastern shore of Kumisi Reservoir (კუმისის ტბა) (41.5790°N, 44.8518°E, 470 m a.s.l.), 04-vii-2016. **(45)** Kvemo Kartli (ქვემო ქართლი), floodplain of Debeda river (დებედა) south of Akhali Mamudlo (ახალი მამუდლო) (41.3428°N, 44.8800°E, 338 m a.s.l.), 03-vii-2016. **(46)** Kvemo Kartli (ქვემო ქართლი), floodplain of Debeda river (დებედა) after junction with Khrami river (ხრამი) southeast of Lezhbadini (41.3635°N, 44.9886°E, 290 m a.s.l.), 03-vii-2016. **(47)** Kvemo Kartli (ქვემო ქართლი), pond along road A 303 east Imera village (იმერა) (41.6497° N, 44.2205°E, 1 608 m a.s.l.), 14-vi-2016. **(48)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), Kvabliani river (ქვაბლიანი) west of Adigeni (ადიგენი) (41.6774°N, 42.6937°E, 1 151 m a.s.l.), 13-vi-2016. **(49)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), Tsundi lake (წუნდის ტბა) north of Tmogvi (თმოგვი) (41.4122°N 43.3264°E, 1 235 m a.s.l.), 14-vi-2016. **(50)** Guria (გურია), city centre of Chokhatauri (ჩოხატაური), terrestrial habitat (42.0205°N, 42.2416°E, 150 m a.s.l.), 28-vi-2016 (by N. Berdzenishvili). **(51)** Guria (გურია), pond and ditches west of Khidmaghala (ხიდმაღალა) (42.0379°N, 42.7739°E, 1 m a.s.l.), 10-vi-2016. **(52)** Racha-Lechkhumi and Kvemo Svaneti (რაჭა-ლეჩხუმი და ქვემო სვანეთი), pond east of Nikortsminda (ნიკორწმინდა) (42.4582°N, 43.1060°E, 1 083 m a.s.l.), 08-vi-2016. **(53)** Racha-Lechkhumi and Kvemo Svaneti (რაჭა-ლეჩხუმი და ქვემო სვანეთი), garden in city centre of Oni (ონი) (42.5829°N, 43.4446°E, 802 m a.s.l.), vii-2015. **(54)** Shida Kartli (შიდა ქართლი), ponds along street to Uplistsikhe cave-complex (უფლისციხე) south of the railway

(41.9641°N, 44.1688°E, 560 m a.s.l.), 06-vi-2016, 22-vi-2016. **(55)** Shida Kartli (შიდა ქართლი), Kura river (მტკვარი) below Uplistsikhe cave-complex (უფლისციხე) east of Gori (გორი) (41.9653°N, 44.2083°E, 560 m a.s.l.), 22-vi-2016. **(56)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), small subalpine lake northeast of Datvisjvari pass (დათვისჯვარი) in upper Argun river valley (არღუნი), Khevsureti historical province (ხევსურეთი) (42.5261°N, 45.0648°E, 2 430 m a.s.l.), 13-ix-2015. **(57)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), floodplain of Snostskali River (სნოსწყალი) southeast of Sno village (სნო) (42.5988° N, 44.6445° E, 1 780 m a.s.l.), 03-ix-2015. **(58)** Tbilisi (თბილისი), residential area within the capital (terrestrial habitat) (41.6780°N, 44.8518°E, 405 m a.s.l.), 27-vi-2015. **(59)** Imereti (იმერეთი), rivulet in half-shaded forest and artificial pond with closed aquatic vegetation south Mandaeti (მანდაეთი) (42.1747°N, 43.3269°E, 765 m a.s.l.), 09-vi-2016. **(60)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), Bugdasheni river (ბუღდაშენი) (outflow of the lake of the same name) east Orlovka village (ორლოვკა) (41.2177°N, 43.6579°E, 2 045 m a.s.l.), viii-2015. **(61)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), marshy shore of Saghamo lake (საღამოს ტბა) at the outflow of Paravani river (ფარავანი) (41.2959°N, 43.7342°E, 2 015 m a.s.l.), viii-2015. **(62)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), southeastern shore of Bugdasheni lake (ბუღდაშენის ტბა) (41.1987°N, 43.6877°E, 2 045 m a.s.l, 04-viii-2015. **(63)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), marshy northeastern shore of Paravani lake (ფარავანის ტბა) (41.4813°N, 43.8314°E, 2 080 m a.s.l.), 06-viii-2015. **(64)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), western shore of Madatapa lake (მადათაფას ტბა) (41.1754°N, 43.7661°E, 2 115 m a.s.l.), 15-vi-2015, 01-viii-2015; situated *ca* 1 km southeastwards loc. 52 in Schröter et al. 2015. **(65)** Tbilisi (თბილისი), northern edge of Vake park (ვაკის პარკი) east of Mikheil Meskhi Stadium (terrestrial habitat) (41.7114°N, 44.7484°E, 490 m a.s.l.), 04-x-2015. **(66)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), northwestern shore of Khanchali lake (ხანჩალის ტბა) (41.2695°N, 43.5464°E, 1 930 m a.s.l.), 02-viii-2015; opposite shore of the same lake as loc. 54 in Schröter et al. 2015. **(67)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), southern shore of Khanchali lake (ხანჩალის ტბა) (41.2426°N, 43.5604°E, 1 930 m a.s.l.), 04-viii-2015; corresponds loc. 54 in Schröter et al. 2015. **(68)** Shida Kartli (შიდა ქართლი), small artificial three years old pond west of Kaspi (კასპი) (41.9274°N, 44.3970°E, 530 m a.s.l.), 29-v-2016. **(69)** Kvemo Kartli (ქვემო ქართლი), northwestern bank of Lipi reservoir (ლიპის ტბა) (41.5253°N, 44.3785°E, 1 100 m a.s.l.), 05-vi-2016. **(70)** Kakheti (კახეთი), Patardzeuliskhevi river (პატარძეულისხევი) within Patardzeuli village (პატარძეული) (41.7439°N, 45.2398°E, 830 m a.s.l.), 08-vi-2016. **(71)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), western bank of Narekvavi reservoir (ნარეკვავის წყალსაცავი) (42.0745°N, 44.5641°E, 900 m. a.s.l.), 12-vi-2016. **(72)** Mtskheta-Mtianeti (მცხეთა-მთიანეთი), northern shore of Bazaleti lake (ბაზალეთის ტბა) (42.0452°N, 44.6710°E, 878 m a.s.l.), 12-vi-2016. **(73)** Tbilisi (თბილისი), garden in residential area within the capital (terrestrial habitat) (41.6765°N, 44.8940°E, 426 m a.s.l.), 18-vi-2016. **(74)** Tbilisi (თბილისი), reedy Patriarchy lakes (საპატრიარქოს ტბები) along Kura river (მტკვარი) west of Karajalari (კარაჯალარი) (41.6281°N, 44.9314°E, 357 m a.s.l.), 18-vi-2016. **(75)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), marshy meadow at southeastern bank of Paskia lake (პასკიას ტბა) (41.3939°N, 43.4279°E, 1 725 m a.s.l.), 26-vi-2016. **(76)** Samtskhe-Javakheti (სამცხე-ჯავახეთი), nameless reedy lake between Paskia lake (პასკიას ტბა) and Kumurdo village (კუმურდო) (41.3851°N, 43.3805°E, 1 758 m a.s.l.), 26-vi-2016.

Results

Altogether, 57 odonate species group taxa were recorded at 76 sampling sites, corresponding to more than three quarters of the Georgian Odonata fauna. *Ischnura fountaineae* is a new species for Georgia and the finding of *Sympetrum arenicolor* is the second for the country. Records from Khevsureti historical province represent the first data from this remote region.

Measurements and some characteristics of Georgian *Onychogomphus* exuviae (cf. Fig. 5):

O. flexuosus: total length 21.5–23 mm (♂, n = 5) and 22–24 mm (♀, n = 8). Width of head 4.5–5 mm, length of prementum 2.8–3.5 mm, number of blunt serrations on median lobe of labium 24–30, number of blunt serrations on lapial pulp 14–16. All specimens with lateral spines on S7–9 and dorsal tubercles on S2–9, amongst which the tubercles of S2–3 and S8–9 were the most pronounced; tubercle on S5–6 barely visible. Antennae spinose, not hairy, with short, rough setae.

O. assimilis: total length 26–31 mm (n = 83), all specimens without distinct lateral spines.

O. forcipatus albotibialis: total length 21–26.5 mm (n = 262), usually with lateral spines on S6–9; in single specimens the spine on S6 barely visible or even absent. Antennae with long hair-like setae.

List of recorded taxa and species

Roman numerals indicate abundance classes of adults: I – single; II – 2–5; III – 6–10; IV – 11–20; V – 21–50; VI – 51–100; VII – 101–500; VIII – 501–1 000; IX – 1 001–10 000. Capital letters indicate the following abbreviations: A – individual; C – copula, tandem; O – ovipositing; T – teneral, emergence; U – exuvia.

Family Lestidae

1. ***Lestes barbarus* (Fabricius, 1798)**
   (5) A II **(6)** A III **(34)** V **(40)** A IV.
2. ***Lestes dryas* Kirby, 1890**
   (62) A VII **(63)** A VII **(64)** A VIII **(76)** A VII.
3. ***Lestes macrostigma* (Eversmann, 1836)**
   (43) A I.
4. ***Lestes sponsa* (Hansemann, 1823)**
   (62) A VII **(63)** A VII **(64)** A VIII.
5. ***Sympecma fusca* (Vander Linden, 1820)**
   (29) A I **(30)** A II **(73)** A III.

Family Calopterygidae

6. ***Calopteryx splendens intermedia* Selys, 1890**
   (2) A V **(7)** AT VI **(14)** A III **(15)** A I **(16)** ACT VI **(19)** A II **(21)** A II **(26)** A I **(42)** A II **(45)** A VII **(46)** A II **(55)** A III **(70)** A III.

7. ***Calopteryx splendens tschaldirica*** **Bartenev, 1909**
   (55) AO II **(62)** A I **(67)** A III.
8. ***Calopteryx virgo festiva*** **(Brullé, 1832)**
   (59) A II.

Family Euphaeidae

9. ***Epallage fatime*** **(Charpentier, 1840)**
   (2) A V.

Family Coenagrionidae

10. ***Coenagrion lunulatum*** **(Charpentier, 1840)**
    (49) A VI **(64)** A VII **(64)** A IX **(66)** A VII.
11. ***Coenagrion ponticum*** **(Bartenev, 1929)**
    (52) AT III **(52)** A III **(69)** A VI **(71)** A V.
12. ***Coenagrion puella*** **(Linnaeus, 1758)**
    (15) A II **(16)** A II **(28)** A II **(45)** A II **(48)** A I **(49)** A III **(52)** A II **(54)** A II.
13. ***Coenagrion pulchellum*** **(Vander Linden, 1825)**
    (47) A VI **(49)** ACO IV **(54)** A I **(75)** A I **(76)** A VII.
14. ***Coenagrion scitulum*** **(Rambur, 1842)**
    (23) A I **(49)** ACO III **(54)** A I.
15. ***Coenagrion vanbrinkae*** **Lohmann, 1993**
    (14) A II **(26)** ACO V.
16. ***Enallagma cyathigerum*** **(Charpentier, 1840)**
    (4) A I **(31)** A II **(40)** A II **(62)** A VI **(64)** A VII **(71)** A VI **(72)** A IV.
17. ***Erythromma viridulum*** **(Charpentier, 1840)**
    (22) A III **(25)** A IV **(54)** A VI **(72)** A V.
18. ***Ischnura elegans*** **(Vander Linden, 1820)**
    (4) A VII **(7)** AC V **(8)** A I **(15)** A II **(22)** A V **(23)** A IV **(25)** A IV **(31)** A V **(34)** A IV **(37)** A II **(40)** A IV **(42)** A V **(43)** A IV **(44)** A II **(45)** A V **(46)** A V **(49)** ACT VI **(51)** A I **(52)** AC II **(54)** AT V **(69)** A VII **(72)** A VI.
19. ***Ischnura fountaineae*** **Morton, 1905**
    (37) A I.
20. ***Ischnura pumilio*** **(Charpentier, 1825)**
    (6) A II **(19)** AC II **(26)** A IV **(28)** A V **(31)** A I **(34)** AC III **(40)** A IV **(42)** A III **(43)** AC II **(54)** AC II.

Family Platycnemididae

21. ***Platycnemis dealbata*** **Selys, 1850**
    (18) A I **(21)** A IV **(22)** A VI **(23)** A IV **(24)** A VI **(25)** A VI **(26)** A V **(28)** A V **(30)** AI **(32)** A II **(36)** A I **(42)** A VII **(45)** A VII **(46)** A VII.
22. ***Platycnemis pennipes*** **(Pallas, 1771)**
    (2) A I **(16)** ACO VI **(69)** A VII.

Family Aeshnidae

23. ***Aeshna affinis*** **Vander Linden, 1820**
(27) A I **(28)** A II **(29)** A IV **(30)** A II.

24. ***Aeshna cyanea*** **(Müller, 1764)**
(53) A I.

25. ***Aeshna isoceles*** **(Müller, 1767)**
(4) A I **(21)** A I **(26)** A I **(54)** A II **(74)** A VII.

26. ***Aeshna juncea*** **(Linnaeus, 1758)**
(10) ACO II **(11)** A II **(13)** A II **(56)** AO I.

27. ***Aeshna mixta*** **Latreille, 1805**
(29) A II **(33)** A I.

28. ***Aeshna serrata*** **Hagen, 1856**
(62) A IV **(63)** A V **(64)** A VI.

29. ***Anax imperator*** **Leach, 1815**
(3) A I **(4)** A II **(15)** A II **(23)** A II **(25)** A II **(31)** A I **(40)** A I **(54)** A II **(55)** A I **(68)** A I.

30. ***Anax parthenope*** **Selys, 1839**
(4) A I **(9)** A VII **(15)** A I **(22)** A I **(23)** A I **(25)** A I **(31)** A III **(40)** A I **(42)** A II **(43)** AC II **(49)** A I **(54)** A I.

31. ***Caliaeschna microstigma*** **(Schneider, 1845)**
(2) AU II **(59)** A II.

Family Gomphidae

32. ***Gomphus schneiderii*** **Selys, 1850**
(16) A II **(55)** U I.

33. ***Lindenia tetraphylla*** **(Vander Linden, 1825)**
(43) A I.

34. ***Onychogomphus assimilis*** **(Schneider, 1845)**
(55) U III.

35. ***Onychogomphus flexuosus*** **(Schneider, 1845)**
(36) ACU IV **(37)** ATU II **(41)** A I **(45)** A II **(48)** A I **(58)** A I.

36. ***Onychogomphus forcipatus albotibialis*** **Schmidt, 1954**
(2) AU IV **(37)** ATU II **(16)** U II **(19)** A II **(21)** A I **(24)** A I **(45)** A III **(46)** AT II **(50)** AT I **(55)** ATU I.

Family Cordulegastridae

37. ***Cordulegaster insignis charpentieri*** **(Kolenati, 1846)**
(3) A II **(65)** A I.

Family Corduliidae

38. ***Cordulia aenea*** **(Linnaeus, 1758)**
(52) A I.

Family Libellulidae

39. ***Crocothemis erythraea*** **(Brullé, 1832)**
(15) A II **(22)** A IV **(25)** A III **(42)** A III **(43)** A II **(45)** A III **(46)** A II **(51)** A I **(54)** A III.

40. ***Leucorrhinia pectoralis*** **(Charpentier, 1825)**
(63) A I.

41. ***Libellula depressa*** **Linnaeus, 1758**
(2) A I **(8)** A II **(15)** A II **(17)** A II **(23)** A I **(24)** A I **(28)** A III **(49)** A II **(54)** A II **(59)** A IV **(68)** A II.

42. ***Libellula pontica*** **Selys, 1887**
(38) AT I.

43. ***Libellula quadrimaculata*** **Linnaeus, 1758**
(47) A I **(64)** A V.

44. ***Orthetrum albistylum*** **(Selys, 1848)**
(4) A II **(7)** A I **(8)** A II **(17)** AO II **(22)** A V **(23)** A III **(25)** A III **(31)** A III **(43)** A I **(46)** A III **(51)** A III **(52)** AT II **(54)** AT II.

45. ***Orthetrum brunneum*** **(Fonscolombe, 1837)**
(2) A V **(4)** A II **(19)** A IV **(20)** A I **(26)** A VI **(27)** A II **(28)** A VI **(30)** A I **(32)** A III **(34)** A II **(35)** A I **(42)** A VII **(43)** A III **(45)** A IV **(46)** A IV.

46. ***Orthetrum cancellatum*** **(Linnaeus, 1758)**
(4) A II **(29)** A I **(31)** A IV **(43)** A I **(44)** A I **(49)** AC V **(52)** A I.

47. ***Orthetrum coerulescens anceps*** **(Schneider, 1845)**
(2) A IV **(14)** AC III **(15)** AC III **(18)** A I **(26)** A IV **(42)** A III **(43)** A II **(45)** A VI **(46)** A VI.

48. ***Orthetrum sabina*** **(Drury, 1773)**
(22) A II.

49. ***Pantala flavescens*** **(Fabricius, 1798)**
(1) A II **(12)** A I.

50. ***Selysiothemis nigra*** **(Vander Linden, 1825)**
(36) A I.

51. ***Sympetrum arenicolor*** **Jödicke, 1994**
(43) AT II.

52. ***Sympetrum flaveolum*** **(Linnaeus, 1758)**
(61) AT I **(62)** A II **(62)** A II **(64)** A II **(67)** A VI.

53. ***Sympetrum fonscolombii*** **(Selys, 1840)**
(7) A II **(8)** AT I **(15)** AT III **(22)** A I **(33)** A II **(34)** A III **(39)** A II **(40)** A III **(43)** A I **(44)** A I **(49)** AC II **(68)** A IV **(71)** A VI.

54. ***Sympetrum meridionale*** **(Selys, 1841)**
(3) A II **(29)** A II.

55. ***Sympetrum sanguineum*** **(Müller, 1764)**
(29) A I **(40)** A II **(46)** A II.

***56. Sympetrum striolatum* (Charpentier, 1840)**
(3) A I **(6)** AT I **(15)** AT III **(18)** A I **(21)** A I **(27)** A III **(29)** A VII **(30)** A III **(41)** A V **(42)** AT III **(43)** AT IV **(46)** AT IV.

***57. Sympetrum vulgatum vulgatum* (Linnaeus, 1758)**
(11) A II **(57)** A II.

Discussion

Our records of *Calopteryx splendens tschaldirica*, an altitudinal taxon centred on the volcanic plateau of the Armenian highland, strikingly illustrate the difficulties of applying a consistent taxonomical system to the puzzling *C. splendens* taxa complex in the Caucasus region (cf. Dumont et al. 1987; Schröter et al. 2015: 306). On the one hand, the discovery of a small isolated population of this taxon at the Kura river east of Gori at loc. (55) within the range of *C. s. intermedia* was surprising since – at first glance – the sympatric occurrence of two taxa gave the impression

Fig. 1. Old male of *Calopteryx splendens tschaldirica* with entirely hyaline wings. Bugdasheni lake, Javakheti volcanic plateau, Georgia (04-viii--2015). Photo: LM

Fig. 2. Male of *Calopteryx splendens tschaldirica.* Kura river east of Gori, Georgia (22-vi-2016). Photo: MS

of two good species rather than subspecies. On the other hand, individuals of ssp. *tschaldirica* with entirely hyaline wings phenotypically resembling ssp. *waterstoni* Schneider, 1984 such as the male shown on Fig. 1 from the Javakheti volcanic plateau, the stronghold of the taxon in Georgia, suggested the contrary. Such individuals emphasized the hypothesis that the taxon *tschaldirica* alternatively could be considered as hybrids with wing markings showing diverse variation extending between the two extreme types *waterstoni* (entirely uncoloured hyaline wings) and *intermedia* (wings fully coloured except bases), whereas recessive gene(s) may make the hyaline-wing pattern to appear again in hybrid populations (cf. Dumont et al. 1987; Schröter 2010a: 213; Schröter et al. 2015: 310). Males observed at loc. (55) (cf. Fig. 2) showed broadly hyaline wing apices and the blue spot did not reach the wing hind margin and thus phenotypically basically corresponded to the *tschaldirica*-type illustrated in Schröter et al. (2015: Fig. 4). It is noteworthy that at this locality individuals of the numerically dominant *C. s. intermedia* perched predominantly at protruding bushes and trees along the banks of the Kura river whereas *tschaldirica*-males remained a few metres aside at a very small shady side channel of about 3 m length beside the main river where oviposition also took place. This spatial segregation was most likely not due to true niche separation but the smaller inferior *tschaldirica*-males were rather pushed into a suboptimal part of the habitat by the stronger and dominant *intermedia* present in superior numbers. Such isolated outposts of males phenotypically corresponding to ssp. *tschaldirica* northeast of its mountainous main range and deep within the area of *ssp. intermedia* in the Kakheti region were previously reported by Schröter (2010a: 213 f.). It appears to be possible that such isolated outposts are relicts of a former larger area of ssp. *tschaldirica*. However, it seems to be more likely to us that the eastern border of the main range of ssp. *tschaldirica* oscillates and groups of individuals periodically use the Kura river as a corridor for movements towards the East; smaller groups might thus manage to establish within the range of ssp. *intermedia* – at least for some time. Compared to males of ssp. *tschaldirica* from its core range as depicted in Schröter et al. (2015: 310) and Dumont et al. (1987: 243), however, the blue wing marking of males at loc. (55) extended to the nodi. Moreover, the hyaline apices and wing hind margins had a brownish tinting (cf. Fig. 2), indicating that genetic introgression with the darker ssp. *intermedia* had probably already begun. Thus, a long-term study of the fate of this small group of *tschaldirica* at loc. (55) would most likely witness its being entirely genetically incorporated into the huge pool of the dominating ssp. *intermedia*. Such considerations would support above point of view whereupon ssp. *tschaldirica* might alternatively be subsummed formally under *C. splendens* ssp. [trans *intermedia* ad *waterstoni*].

Our three new records for *Coenagrion scitulum*, previously one of the least recorded species of the Caucasus region, support the assumption that this inconspicuous species in fact is less rare than believed (Schröter et al. 2015: 321).

As regards the unclear taxonomical status of the little known *Coenagrion vanbrinkae* we refer to the statement in Schröter (2015: 321 f.); the same applies to the yet unsettled infraspecific taxonomy of Georgian *Enallagma cyathigerum* s.l. (cf. Schröter et al. 2015: 323 f.).

Ischnura fountaineae is new to the Georgian fauna. This predominantly Central Asian species associated with arid and semi-arid areas was found on the bank of the Alazani river within the Vashlovani National Park. The single male was captured for identification and photographic evidence and then released (Fig. 3). In the Caucasus region this species was known from at least four sites in adjacent Azerbaijan (Haritonov 1988; Dumont 2004; Skvortsov & Snegovaya 2014, 2015; cf. Boudot et al. 2015), the nearest one being at *Mingachevir (*Mingəçevir) only about 50 km distance to our Georgian loc. (37). A further record was reported by Skvortsov & Kuvaev (2010) from the adjacent Caspian Depression to the North, at the vicinities of Chyornye Zemli Nature Reserve in the Kalmykian Republic (Russia). Interestingly, all these records referred to single males only, suggesting rather low abundances or vagrants in the Caucasus region. However, this species might also well be overlooked which is why we consider this first record for Georgia overdue rather than surprising. Thus, we assume further records to be made in the steppes and semi deserts in the southeastern corner of the country.

The knowledge of almost all aspects of the ecology of the globally threatened *Onychogomphus flexuosus* is still very limited (cf. Schröter et al. 2015: 330). Observations at loc. (36) and (37) at the southern Alazani valley within the semi arid Vashlovani National Park at the bordering area to Azerbaijan provided new insight into the species' reproduction ecology. Individuals were frequently found perching in the dry scrubland near but never directly at the river. From late afternoon onwards the number of specimens, including mating pairs, increased, while in the morning and midday only single, mainly female individuals not exhibiting reproductive behaviour were observed. Thus, *O. flexuosus* may copulate especially in the afternoon in its terrestrial habitats in the wider surroundings of the oviposition places (Schröter 2010a: 216). This supports the previous observations of scattered records quite far away from rivers in the daytime (Schröter et al. 2015: 329) which also applied to observations made at loc. (41) and (58). Moreover, the record at the latter locality confirmed the steady occurrence of adults even within densely built-up residential areas within the Georgian capital (Schröter et al. 2015: 329). Exuviae of *O. flexuosus* were found on gravel banks of the Alazani river in an almost upright position on stones, seldom on plant materials, directly along the water to around 2 m distance from it (Fig. 4). Exuviae were distinctly clean and not crusted by mud and as far as we know represented the first ones collected in Georgia. The shape of the almost hairless antennae of the exuviae of *O. flexuosus* was diagnostic and clearly distinguished them from *O. forcipatus albotibialis* (Fig. 5). Moreover, compared with *O. forcipatus albotibialis* we also confirmed Seidenbusch (1995)

who already stated that exuviae of *O. flexuosus* were more elongated; regarding as regarding specific characters of exuviae of *O. forcipatus albotibialis* from Georgian territory see Schröter et al. (2015: 330 ff.). Average length of Georgian *O. flexuosus* exuviae was intermediate between the sizes of exuviae from Turkmenistan and Tajikistan as given by Dumont et al. (1992). Compared to this, Georgian exuviae of *O. assimilis* were considerably larger (Fig. 5). For measurements and descriptions of distinguishing features of Georgian *Onychogomphus* exuviae see results section above.

The discovery of strong populations of *Aeshna serrata* at Paravani and Bugdasheni lakes confirmed the expectation by Schröter et al. (2015: 325) whereupon the species besides Madatapa lake should be found at further lakes of the Javakheti volcanic plateau.

Cordulia aenea is among the least recorded species of the Georgian odonate fauna. Since the discovery of the species in 1917 at a small mire lake near Bakuriani at the northern foothills of the Javakheti volcanic plateau (Bartenev 1924: 33; cf. Schröter et al. 2015: 320) not even a handful of records were made, our finding being thus the second only in post-Soviet age. However, these poor data do most likely not reflect real frequency and abundance in Georgia and it can be assumed that this early species is underrecorded and probably rather widespread in the montane belt.

Both, current status and history of discovery for *Leucorrhinia pectoralis* is quite similar to that of the latter species, as *L. pectoralis* was also found as new for the Georgian fauna in 1917 at the same small mire lake near Bakuriani (Bartenev 1924). After the second finding of the species by Shengelia (1964) our record is only the third for the country. However, recent observations of the species from the adjacent Armenian part of the Javakheti volcanic plateau (Durand & Rigaux 2015) suggested that this species might also generally be more widespread on the Armenian highland and we assume further populations will be discovered in the Georgian part as well.

The occurrence of *Sympetrum arenicolor* in the Caucasus region is puzzling. Taxonomic status and nature of the vicariant *Sympetrum* species *arenicolor* and *sinaiticum* as well as their decolorate congener *S. vulgatum decoloratum* have been confusing for a long time (Jödicke et al. 2000). Hence, while *S. arenicolor* was described only in 1994 (Jödicke 1994) there is at least indication that this species has been found before in the region. In his paper on Odonata from Mesopotamia Morton (1919: 191) noted the heterogeneity of his material of »*Sympetrum decoloratum* Selys.«, comprising *inter alia* rather small specimens collected from »Quetta and the Caucasus« which morphologically deviated from the »more robust looking« *S. vulgatum flavum* Bartenev, 1915 (= *S. vulgatum decoloratum* [Selys, 1884]). These statements suggested that *S. arenicolor* may have been included. Similar indications might be inferred from Shengelia (1975: 78) who, in referring to data collected

by Bartenev in eastern Georgia, e.g., Bartenev (1916), in addition to »*S. vulgatum flavum* Bart. (*S. vulgatum decoloratum* Grig.)« listed several records of »*Sympetrum decoloratum* Selys, 1884«. However, several *Sympetrum* specimens labelled as '*decoloratum*', examined during an initial examination of the remnants of the odonate collection of the Georgian National Museum (GNM), did not pertain to *S. arenicolor* but to *S. vulgatum decoloratum* (AS unpubl.).

Thus, for the time being it remains open to question whether in both cases *S. arenicolor* might have been involved. The first well-founded and verifiable record for *S. arenicolor* in the Caucasus region was made in 2008 in Azerbaijan at a brackish man-made lake in the semi-deserts of the Shirvan National Park in the lowland along the Caspian Sea (Jödicke et al. 2009) but since then no further records have been made in the country. Two years later an immature male of *S. arenicolor* was discovered in company with several fresh individuals of *S. striolatum* in the maturation habitat on mountain slopes in the outskirts of the Georgian capital (Schröter 2010a: 218). The three females at loc. (43) therefore represent the second record for Georgia and the first females found in this country. All were freshly emerged from a reedy ditch at the southwestern shore of Kumisi lake only about 15 km southeast from the locality of the first record and accompanied by several fresh *S. striolatum* as well. Available (poor) data thus suggested that the species is rather rare and sporadic in the Caucasus region. Even in its Central Asian core range east of the Caspian Sea the species is widespread but compared to most of its regional congeners rather inconspicuous, generally only moderately common and rarely found in higher abundances (Schröter 2010b: 50). However, due to a highly specialized life cycle with postponed reproductive maturation and seasonal migration to mountainous aestivation refuges individuals of this species spend most of their lifetime scattered in terrestrial habitats (Schröter 2011: 219) making the species especially prone to be overlooked.

The deeply red abdomen and the thoracic pattern of *Sympetrum vulgatum* phenotypically corresponded to the nominate taxon as known from Central-and Northern Europe, except the heads showed a paler and washed-out overall coloration with clearly reduced contrast. Both collecting sites (11) and (57) were geographically part of the Ciscaucasus and thus situated north of the drainage divide of the Caucasus main range, being part of the catchment areas of the Argun and Terek rivers flowing northwards through Chechnya and North Ossetia-Alania respectively (Russian Federation) into the Caspian Sea. An older record of the nominate taxon from this region north of the Caucasus main divide was reported by Bartenev (1930: 24) from »Крестовый перевал«, today's Jvari Pass (ჯვრის უღელტეხილი) at 2 352 m a.s.l. at the headwaters of the Terek river. This site was situated only about 18 km from our locality (57). Thus, over most of Georgia the crest of the Caucasus main range seems to delimit the nominate taxon from ssp. *decoloratum,* the latter

Fig. 3. Male *Ischnura fountaineae*. Alazani river, Vashlovani National Park, Georgia (25-vi--2016). Photo: MS

Fig. 4. Collecting site of *Onychogomphus flexuosus* exuviae. Alazani river, Vashlovani National Park, Georgia (25-vi-2016). Photo: MS

mainly found at the southern slopes of the Caucasus, in the Transcaucasian depression and the so called Lesser Caucasus (Schröter et al. 2015: 280). However, several older records of *Sympetrum vulgatum* ascribed to the nominate taxon from Pizunda (Abkhazia) as well as from the Russian Black Sea coast of the former Kuban Oblast adjacent to Georgia (cf. Bartenev 1930) indicated that both taxa meet at the northern edge of the Colchic depression were the narrow strip of the Black sea coast acts as corridor. Individuals phenotypically intermediate between both taxa as reported from Central Asian Kyrgyzstan (Schröter 2010b: 60 f.) have not been reported from Georgia yet.

The first Georgian record of *Pantala flavescens* was of a specimen collected by L. Gurgenidze at the upper reaches of Alazani river at 650 m a.s.l. in the Kakheti region of eastern Georgia (Shengelia 1975). Our records of this circumtropical wanderer well fit to an increasing number of observations in recent years from both Georgia and the Caucasus region (Durand & Rigaux 2015; Kalkman & Monnerat 2015).

Fig. 5. Exuviae of the three Georgian members of the genus *Onychogomphus* (from left to right, true-to-scale): *O. assimilis* from Bolnisistskali river (Kvemo Kartli). *O. forcipatus albotibialis* from Tsavkisistskali river (Tbilisi) without lateral spines on segment 6 and with detail view of antennae with long hair-like setae. *O. flexuosus* from Alazani river (Kakheti) with detail view of antennae with short, rough setae. Photo: MS

Acknowledgements. Andrzej Jadwiszczak, Steve Rooke, Natia Berdzenishvili and Nazi Berdzenishvili kindly provided records of Georgian dragonflies. Reinhard Jödicke confirmed the identification of the female specimens of *S. arenicolor* and Jean-Pierre Boudot gave valuable comments on the manuscript. We are indebted to them all.

References

Bartenev A.N. 1916. Notices sur les Odonates des environs de la ville Signach, gouvernement de Tiflis. *Revue russe d'Entomologie* 16: 343-345 [In Russian, French title]

Bartenev A.N. 1924. [On the Odonata fauna of the Caucasus]. *Bulletin du Musée de Géorgie* 2: 1-60 [In Russian]

Bartenev A.N. 1930. [Materials to the knowledge of the Odonata fauna of the Western Caucasus]. *Trudy Severo-Kavkazskoy assotsiatsii nauchno-issledovatel'skikh institutov* 72: 1-138 [In Russian]

Boudot J.-P., Riservato E. & Hardersen S. 2015. *Ischnura fountaineae* Morton, 1905. In: Boudot J.-P. & Kalkman V.J. (Eds), Atlas of the European dragonflies and damselflies. KNNV Publishing, Zeist

Dumont H.J., Demirsoy A. & Verschuren D. 1987. Breaking the *Calopteryx*-bottleneck: taxonomy and range of *Calopteryx splendens waterstoni* Schneider, 1984 and of *C. splendens tschaldirica* Bartenef, 1909 (Zygoptera: Calopterygidae). *Odonatologica* 16: 239-247

Dumont H.J., Haritonov A.Y. & Borisov S.N. 1992. Larval morphology and range of three West Asiatic species of the genus *Onychogomphus* Selys, 1854. (Insecta: Odonata). *Hydrobiologia* 245: 169-177

Dumont H.J. 2004. Dragonflies from Azerbaijan. *Zoology in the Middle East* 31: 87-92

Durand E. & Rigaux J. 2015. Further additions to the knowledge of the odonate fauna of Armenia, with first record of *Pantala flavescens* (Odonata: Libellulidae). *Notulae odonatologicae* 8: 184-190

Haritonov A.Yu. 1988. Strekosy roda *Ischnura* Charp. (Insecta, Odonata) fauny SSSR. In: Zolotarenko G.S. (Ed.), Taksonomiya zhivotnykh Sibiri. *Novye i Maloizvestnye Vidy Fauny Sibiri*. 20: 32-46 [In Russian]

Jödicke R. 1994. Subspecific division of *Sympetrum sinaiticum* Dumont, 1977, and the identity of *S. vulgatum decoloratum* (Selys, 1884) (Anisoptera: Libellulidae). *Odonatologica* 23: 239-253

Jödicke R., Borisov S.N., Haritonov A.Yu. & Popova O. 2000. Additions to the knowledge of *Sympetrum sinaiticum* Dumont (Odonata: Libellulidae). *International Journal of Odonatology* 3: 131-140

Jödicke R., Kunz B. & Wijker A. 2009. A further step in the differentiation between *Sympetrum arenicolor* and *S. sinaiticum* – photo documentation in the field. *Agrion* 13: 4-7

Kalkman V.J. & Monnerat C. 2015. *Pantala flavescens* (Fabricius, 1798). In: Boudot J.-P. & Kalkman V.J. (Eds), Atlas of the European dragonflies and damselflies. KNNV Publishing, Zeist

Morton K.J. 1919. Odonata from Mesopotamia. *The Entomologist's monthly Magazine* 55: 143-196

Schröter A. 2010a. On a collection of dragonflies from eastern Georgia, with the first record of *Sympetrum arenicolor* (Odonata: Libellulidae). *Libellula* 29: 209-222

Schröter A. 2010b. The Odonata of Kyrgyzstan, part I – Critical national checklist, annotated list of records and collected data of the summer half-years 2008 and 2009. *International Dragonfly Fund-Report* 28: 1-72

Schröter A. 2011. A mass migration of *Aeshna affinis* in southern Kyrgyzstan: attempt to provide a spatial and temporal reconstruction (Odonata: Aeshnidae). *Libellula* 30: 203-232

Schröter A., Seehausen M., Kunz B., Günther A., Schneider T. & Jödicke R. 2015. Update of the Odonata fauna of Georgia, southern Caucasus ecoregion. *Odonatologica* 44: 279-342

Seidenbusch R. 1995. Comparison of the last instar larvae of *Onychogomphus flexuosus* Schneider 1845 *Onychogomphus forcipatus albotibialis* Schmidt 1954. *Sulzbach-Rosenberger Libellenrundbrief* 2

Shengelia E.S. 1964. [Dragonflies (Odonata) in the alpine fauna of the High Caucasus within the limits of Georgia]. In: Fauna vysokogorya Bolshogo Kavkaza v predelakh Gruzii. Meznierеba, Tbilisi [In Russian]

Shengelia E.S. 1975. [The dragonflies (Odonata) of Georgia]. *Materialy k Faune Gruzii* 5: 61-81 [In Russian]

Skvortsov V.E. & Kuvaev A.V. 2010. *Ischnura fountaineae* Morton, *Lindenia tetraphylla* (Vander Linden) and *Selysiothemis nigra* (Vander Linden) new for European Russia (Zygoptera: Coenagrionidae; Anisoptera: Gomphidae, Libellulidae). *Notulae odonatologicae* 7: 49-51

Skvortsov V.E & Snegovaya N.Y. 2014. Additions to the knowledge of the Odonata fauna of Azerbaijan, with six new records. *Notulae odonatologicae* 8: 67-76

Skvortsov V.E & Snegovaya N.Y. 2015. A second addition to the Odonate fauna of Azerbaijan. *International Dragonfly Fund-Report* 87: 1-38

Received 19th July 2016