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NINE SLOVENIAN NEUROPTEROLOGICAL EXPEDITIONS TO THE BALKAN PENINSULA

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Abstract – In the past, the knowledge on the fauna of Neuropterida in the Balkan Peninsula was sparse. A brief historical review of the faunal research in the area is presented. In a period 2011–2019, zoologists from the Department of Biology of the University of Maribor organized nine Balkan neuropterological expeditions in Albania, Bosnia and Herzegovina, North Macedonia, and Serbia. The study of the neuropterid fauna of these countries resulted in a series of papers which, in general, doubled the known number of species at the country checklist level.

KEY WORDS: Neuropterida, Raphidioptera, Megaloptera, Neuroptera, fauna, Balkan Peninsula, expeditions

Izvleček – DEVET SLOVENSKIH NEVROPTEROLOŠKIH ODPRAV NA BALKANSKI POLOTOK

Poznavanje mrežekrilcev (Neuropterida) Balkanskega polotoka je bilo v preteklosti skromno. Za območje podajamo kratek zgodovinski pregled raziskav. Zoologi Oddelka za biologijo Univerze v Mariboru so v obdobju 2011–2019 izpeljali devet balkanskih nevropteroloških odprav, in sicer v Albanijo, Bosno in Hercegovino, Severno Makedonijo in Srbijo. Na osnovi terenskih raziskav mrežekrilcev v omenjenih deželah so objavili izsledke, kjer so se števila znanih vrst na vrstnih seznamih na nivoju držav v splošnem podvojila.

KLJUČNE BESEDE: Neuropterida, Raphidioptera, Megaloptera, Neuroptera, favna, Balkanski polotok, odprave

Introduction

For a period before 1980, when the monograph on the Neuropterida (Raphidioptera, Megaloptera, Neuroptera) in Europe (Aspöck et al. 1980) was published, the knowledge of the lacewings in the Balkan Peninsula was poor. Only two countries, Bulgaria and Romania were well explored. And even later, the distribution of lacewings on most of the peninsula was insufficiently known, documented mainly with sporadic data. Here, the Balkan Peninsula is regarded in the sense of physical geography (for detailed definition, see Popov 1992).

In a period 2011–2019, zoologists from the Department of Biology, Faculty of Natural Sciences and Mathematics, University of Maribor, organized nine neuropterological expeditions to the Balkan Peninsula with the aim of improving the knowledge of less investigated Balkan countries – Albania, North Macedonia, Serbia and Bosnia and Herzegovina. The aim of the collecting trips was to emend the species lists of Neuropterida for the Balkan countries. The next goal was to study neuropterids from a nature conservation and ecological point of view. In the present paper, details of the expeditions and the results of the field work are summarized.

Knowledge of the neuropterid fauna in the Balkan Peninsula before 2010

In a period between 1980 and 2010, further data on the occurrence of lacewings in the Balkan countries were accumulated. Known distribution of the neuropterids in the West Palaearctic was summarized in a catalogue published in 2001 (Aspöck et al. 2001). Later, Popov and Letardi (2010) reviewed the knowledge and compared the fauna in the Apennine and Balkan peninsulas.

Already in the 1980s, the two best-investigated Balkan countries were **Romania** and **Bulgaria**, mainly due to the activity of B. Kis and A. Popov. A monograph on Neuroptera of Romania (Kis et al. 1970) recognized as one of the first modern works on the order in Europe was an excellent foundation for early studies of the Balkan fauna. Bulgarian neuropterid fauna is probably the best investigated in the Peninsula; many data were published in a series of papers by Popov (for a review of papers, see Popov 2007; Dobosz & Popov 2018).

Despite of the fact that **Slovenia** was relatively well investigated, the Balkan part of the country representing one third of its area still remains under-explored. **Croatia** with a larger part in the Balkans was and still is relatively sufficiently studied (see for e.g., Saure 1989; Devetak 1992; Žanić and Igrc-Barčić 1996; Aistleitner 2007; Rausch and Weißmair 2007; Ábrahám 2008; Ivković and Weißmair 2011; Devetak et al. 2015b; Thierry and Canard 2015; Vilenica et al. 2018).

In the period 1980–2010, the Neuropterida in **Albania**, **North Macedonia**, and **Serbia** were almost unexplored. Only sporadic data were published (e.g., for N Macedonia: Pieper and Willmann 1980; Saure 1989; Popov 1997, 2004; Smiljkov et al. 2005; review: Hristovski et al. 2015; for Serbia: Malicky 1984; Stevanović and Bjelić 1985; Perić et al. 2009). For these countries, there were mostly older, sometimes unreliable data and some papers were published even more than a century ago (for bib-

liography, see: for Albania Devetak and Rausch 2016; for North Macedonia Hristovski et al. 2015; for Serbia Podlesnik et al. 2019). **Kosovo** which was in the past a part of former Yugoslavia, later unilaterally declaring independence from Serbia, is faunistically moderately well researched (Devetak and Jakšić 2003).

One of the least examined Balkan countries is **Bosnia and Herzegovina**. Due to the fact that after the Bosnian War (1992–1995) some areas of the country remain contaminated with unexploded ordnance representing a great threat and danger, collecting insects without the support of the locals can be risky.

Greece is well explored due to the intensive research in a period 1969–1993, when Austrian entomologists – Horst Aspöck, Ulrike Aspöck, Ernst Hüttinger, Hubert Rausch, Renate Rausch, Franz Ressl and Peter Ressl conducted a number of expeditions to different Balkan countries, with the main focus on Greek snakefly fauna (Rausch and Rausch 2004; see also Saure 1989).

Before 2010, there was a moderate knowledge on the neuropterid fauna of **Montenegro**; the only thoroughly studied area of the country was the Durmitor National Park (Devetak 1991; for a provisional checklist of the country, see Devetak and Jakšić 2019).

European part of Turkey was moderately well-studied country of the Balkans (Onar and Aktaç 2002; Onar 2007).

Nine Slovenian neuropterological expeditions to the Balkan Peninsula

In the period from 2011 to 2019, zoologists from the Department of Biology, University of Maribor conducted 9 neuropterological expeditions to the Balkans. Detailed information on the expeditions is presented in Table 1, superficial information with photo gallery one can find in URL site http://zooexpeditions.fnm.um.si/. The field trips were supported by 7 research funds and a number of companies (Table 2). In four countries (Albania, Bosnia and Herzegovina, North Macedonia, Serbia) 18 protected areas – national parks, natural parks and nature reserves were surveyed for lacewings at least superficially (Table 3). The long-term goal of the expeditions is to compile standard checklists and prepare publications of interactively generated neuropterid faunas for selected Balkan countries as part of the *Lacewing Digital Library's* World Neuropterida Faunas series (Oswald 2021).

From 2012 to 2014 three field trips were conducted in **Albania**. Up to that time, only about 39 Neuropterida species were known for the country. Since 2012, 51 species and two families (Coniopterygidae, Mantispidae) were reported for Albania for the first time. Most of these species were collected during Slovenian Balkan expeditions – see Devetak and Rausch 2016; for other species records see Sziráki 2014; Dvořák 2016; Devetak et al. 2020). Antlions were collected in the country with the aim to study their distributional pattern and predatory behaviour. Albania is characterized by rich flora and fauna, and a wide array of ecosystems considering its diverse relief (Figs. 1–9). A noteworthy finding was the discovery of a snakefly *Phaeostigma thaleri* (Aspöck & Aspöck, 1964) exactly one hundred years after collecting the first individual. In Albania (in Divjakë-Karavasta National Park) was confirmed the nort-

Table 1. A list of Slovenian neuropterological expeditions in the Balkan Peninsula in the period 2011–2019.

Year	Expedition with details	Results: published papers
2011	**First Balkan Neuropterological Expedition:** Macedonia (=FYROM) (now: North Macedonia). Period: 5–12 July 2011. Participants: Franc Janžekovič, Meta Janžekovič, Dušan Devetak, Vesna Klokočovnik. Tour: Multi-Purpose Area Jasen: Kula, Lake Kozjak, Blizansko, Vlaka, Nova Breznica, Rudine, Selište, Boro Pole, Karadžica, Gorna Belica; Treska, Katlanovo, Skopje.	Devetak and Klokočovnik 2011; Devetak et al. 2013a; Klokočovnik 2013; Devetak and Arnett 2015; Devetak et al. 2015a; Hristovski et al. 2015.
2012	**Second Balkan Neuropterological Expedition**: Albania. Period: 16–25 July 2012. Participants: Dušan Devetak, Franc Janžekovič, Meta Janžekovič, Vesna Klokočovnik, Jan Podlesnik. Tour: Tiranë, Berat, Çorovoda, River Osumi valley, Këlcyra, Gllava pass, River Vjosa valley, Fir of Hotovë-Dangelli National Park, Frashëri, Përmeti, Divjakë-Karavasta National Park, Apollonia.	Devetak and Janžekovič 2012; Devetak et al. 2012; Devetak et al. 2013b; Klokočovnik 2013; Devetak and Rausch 2016; Podlesnik et al. 2016; Devetak 2019.
2013	**Third Balkan Neuropterological Expedition:** Bosnia and Herzegovina and Albania. Period: 21–28 June 2013. Participants: Dušan Devetak, Tina Klenovšek, Vesna Klokočovnik, Jan Podlesnik; in Bosnia and Herzegovina also Mirza Dautbašić and Osman Mujezinović joined the team. Tour: Bosnia and Herzegovina: Blidinje area: Blidinje Nature Park, lake Blidinje jezero, Čvrsnica Mountain, Montenegro: Nikšić, Podgorica: river Zeta; Albania: Shkodër, Bjeshkët e Nemuna (=Prokletije) Mountains: Bogë – Theth National Park; Krujë, Berati, Divjakë-Karavasta National Park, Droboniku, Zhitomi, Poliçani.	Klokočovnik et al. 2014; Devetak and Rausch 2016; Devetak 2019.
2014	**Fourth Balkan Neuropterological Expedition:** Albania. Period: 25 June–2 July 2014. Participants: Dušan Devetak, Franc Janžekovič, Tina Klenovšek, Vesna Klokočovnik, Jan Podlesnik. Tour: Tiranë, Elbasani, Lake Ohrid, Korça, Fir of Drenovë National Park, Gramoz Mountains, Erseka, Gërmenji, River Vjosa valley, Butrint National Park.	Devetak and Rausch 2016; Klokočovnik et al. 2016; Podlesnik et al. 2016; Devetak et al. 2018, Devetak 2019; Devetak et al. 2019b.
2015	**Fifth Balkan Neuropterological Expedition:** Serbia. Period: 21–28 June 2015. Participants: Dušan Devetak, Franc Janžekovič, Tina Klenovšek, Vesna Klokočovnik, Jan Podlesnik. Tour: Pirot, Special Nature reserve (SNR) Jerma, Zvonačka Banja, Dimitrovgrad, Vidlič Mt., Niš, SNR Jelašnička river gorge, Tara National Park, Perućačko jezro. Reference: Klokočovnik and Devetak 2015.	Canard and Thierry 2017; Podlesnik et al. 2017; Devetak et al. 2019b; Podlesnik et al. 2019.
2016	**Sixth Balkan Neuropterological Expedition:** Serbia. Period: 3–10 July 2016. Participants: Dušan Devetak, Predrag Jakšić, Franc Janžekovič, Tina Klenovšek. Tour: Niš, Special Nature reserve (SNR) Suva Planina, Vidlič Mt., Nature Park Stara Planina: Balkan Mountains, Đerdap National Park - river Donava (the Danube) area, SNR Deliblatska peščara (Deliblato sands), Beograd (Belgrade).Reference: Devetak 2016.	Devetak et al. 2019a; Podlesnik et al. 2019; Ivajnšič and Devetak 2020.

2017	**Seventh Balkan Neuropterological Expedition:** North Macedonia. Period: Part I: 2–9 July 2017; Part II: 5–10 September 2017. Participants: Dušan Devetak, Franc Janžekovič, Tina Klenovšek, Jan Podlesnik, Slavcho Hristovski, Vladimir Krpač. Tour: Part I (DD, FJ, TK, JP, SH): Tetovo, Mavrovo National Park (Korab Mt., Janche), Struga, lake Ohridsko ezero, Galičica National Park, Pelister National Park, Mariovo mountains, Prilep, Skopje. Part II (DD, VKr): Skopje, Treska, Shar Planina Mountains, Pchinja Valley, Veles. Reference: Devetak et al. 2017.	Devetak and Zeqiri 2018; Devetak et al. 2019b; Devetak et al. 2021.
2018	**Eighth Balkan Neuropterological Expedition:** North Macedonia. Period: 31 May–6 June 2018. Participants: Franc Janžekovič, Boža Janžekovič, Slavcho Hristovski. Tour: Skopje, Veles, Kochani, Ovche Pole, Shtip, Demir Kapija, Josifovo, Negortsi, Kozhuf planina Mt., lake Dojransko ezero, Pelister National Park, lakes Prespansko ezero and Ohridsko ezero. Reference: Janžekovič et al. 2018.	
2019	**Ninth Balkan Neuropterological Expedition:** North Macedonia, Greece, and Bosnia and Herzegovina. Period: Part I (North Macedonia, Greece): 19–26 June 2019; Part II (Bosnia and Herzegovina): 5–7 August 2019. Participants: Part I: Dušan Devetak, Franc Janžekovič, Tina Klenovšek, Vesna Klokočovnik, Vladimir Krpač, Jan Podlesnik; Part II: Dušan Devetak. Tour: Part I: N. Macedonia (DD, TK, VK, JP, VKr): Demir Kapija, Gradsko-Stobi, valleys of rivers Vardar and Pchinja, Gjopčeli, Dojransko Ezero, Dojran, Gevgelija: river Konska, Prilep – Pelagonija, lake Prespansko Ezero, Galičica National Park, lake Ohridsko Ezero, Shar Planina Mt.; Greece (only FJ): Peloponnese: Kalogria-Metochi – Panachaiko Mountain – Mount Erymanthos – Mount Aroania (Helmos). Part II: Bosnia and Herzegovina (only DD): River Neretva valley, Mostar, Prenj Mt., confluence of rivers Buna and Neretva, Trebižat river: Nature reserve Kravica: Kravica waterfalls. Reference: Devetak et al. 2019c.	Devetak et al. 2019c; Devetak et al. 2021.

Table 2. Research funds and companies supporting the field trips in the Balkan Peninsula.

RESEARCH PROGRAMMES (*RProg*) / RESEARCH PROJECTS (*RProj*) / GRANTS (*GR*)	
Name	Acronym
RProg Biodiversity Research Programme (Slovenian Research Agency - SRA)	P1-0078
RProg Computationally Intensive Complex Systems (SRA)	P1-0403
RProg Infrastructure Research Programme, 2012–2017	IP-0552
RProg Infrastructure Research Programme CORE@UM, 2018–2021	I0-0029
RProj Biodiversity of the Neuropterida in the Balkan	RP BioDiv Neuropterida Balkan – ALBH 2013
RProj Biodiversity of the green lacewings (Neuroptera: Chrysopidae) in Serbia	RP BioDiv CHRYSER 2015
GR Erasmus+ grant	-
COMPANIES	
Name	Place (site)
AJM okna-vrata-senčila d.o.o.	Pesnica pri Mariboru
ATTEMS storitve d.o.o.	Slovenska Bistrica
BIOTEH d.o.o.	Radomlje

CARRERA Optyl d.o.o.	Ormož
CIZERL d.o.o.	Maribor
DOGŠA d.o.o.	Lendava-Lendva
EBLA d.o.o.	Maribor
GOLOB d.o.o.	Muta
KAMBIČ Laboratorijska oprema d.o.o.	Semič
LABORA d.o.o.	Maribor
MESSER d.o.o.	Ruše
MIKRO+POLO d.o.o.	Maribor
M PLUS podjetje za trženje d.o.o.	Maribor
OPTIKA ARENA d.o.o.	Maribor
ORGANIC NUTRIENTS, Bojan Kujavec s.p.	Maribor
PERGER 1757 d.o.o.	Slovenj Gradec
ROMIKS Didaktična oprema Sterkuš Robert s.p.	Laporje
ROTO Slovenija d.o.o.	Puconci
SIRARNA ČUŠ d.o.o.	Orehova vas
SNOPJE, proizvodnja in storitve d.o.o.	Ljutomer
TEHNOOPTIKA SMOLNIKAR d.o.o.	Ljubljana-Črnuče
TRATNJEK servis in trgovina d.o.o.	Murska Sobota

Table 3. Protected areas – national parks, nature parks and nature reserves visited during field trips in the period 2011–2019.

Country	Protected area; year(s) of visit
Albania	Butrint National Park; 2014 Divjakë-Karavasta National Park; 2012, 2013 Fir of Drenovë National Park; 2014 Fir of Hotovë-Dangelli National Park; 2012 Theth National Park; 2013
Bosnia and Herzegovina	Blidinje Nature Park; 2013 Nature reserve Kravica; 2019
North Macedonia	Galičica National Park; 2017, 2019 Mavrovo National Park; 2017 Multi-Purpose Area Jasen; 2011 Pelister National Park; 2017, 2018
Serbia	Đerdap National Park; 2016 Nature Park Stara Planina; 2016 Special Nature reserve Deliblatska peščara (Deliblato sands); 2016 Special Nature reserve Jerma; 2015 Special Nature reserve Jelašnička river gorge; 2015 Special Nature reserve Suva Planina; 2016 Tara National Park; 2015

Figs. 1–9: Albania. Fig. 1: Sand dunes in the Divjakë-Karavasta National Park, a place of rare antlions (*Myrmeleon hyalinus* Olivier, *Acanthaclisis* Rambur and *Synclisis* Navás). Fig. 2: Tirana, 25 June 2014. From left to right: F. Janžekovič, D. Devetak, V. Klokočovnik, T. Klenovšek, J. Podlesnik. Fig. 3: Bjeshkët e Nemuna (=Prokletije) Mountains: Bogë surroundings. Fig. 4: River banks with fine sand, a typical habitat of *Cueta lineosa* (Rambur); Osumi river near Berat. Fig. 5: Fir of Hotovë-Dangelli National Park: first mantidflies in Albania were found on a single maple tree. Fig. 6: Dry meadows in Qafa e Gllavës, a place of *Deleproctophylla* Lefèbvre. Fig. 7: Dry parts of the riverbed of Albanian rivers is a habitat of *Cueta*-larvae; river Vjosa near Tepelenë. Fig. 8: In the Fir of Drenovë National Park were collected a few rare or interesting snakeflies (e.g., *Phaeostigma thaleri* /Aspöck et Aspöck/, *P. pilicollis* /Stein/). Fig. 9: Forest edge of the mixed forest in the Fir of Drenovë National Park, a place of *Parvoraphidia microstigma* (Stein).

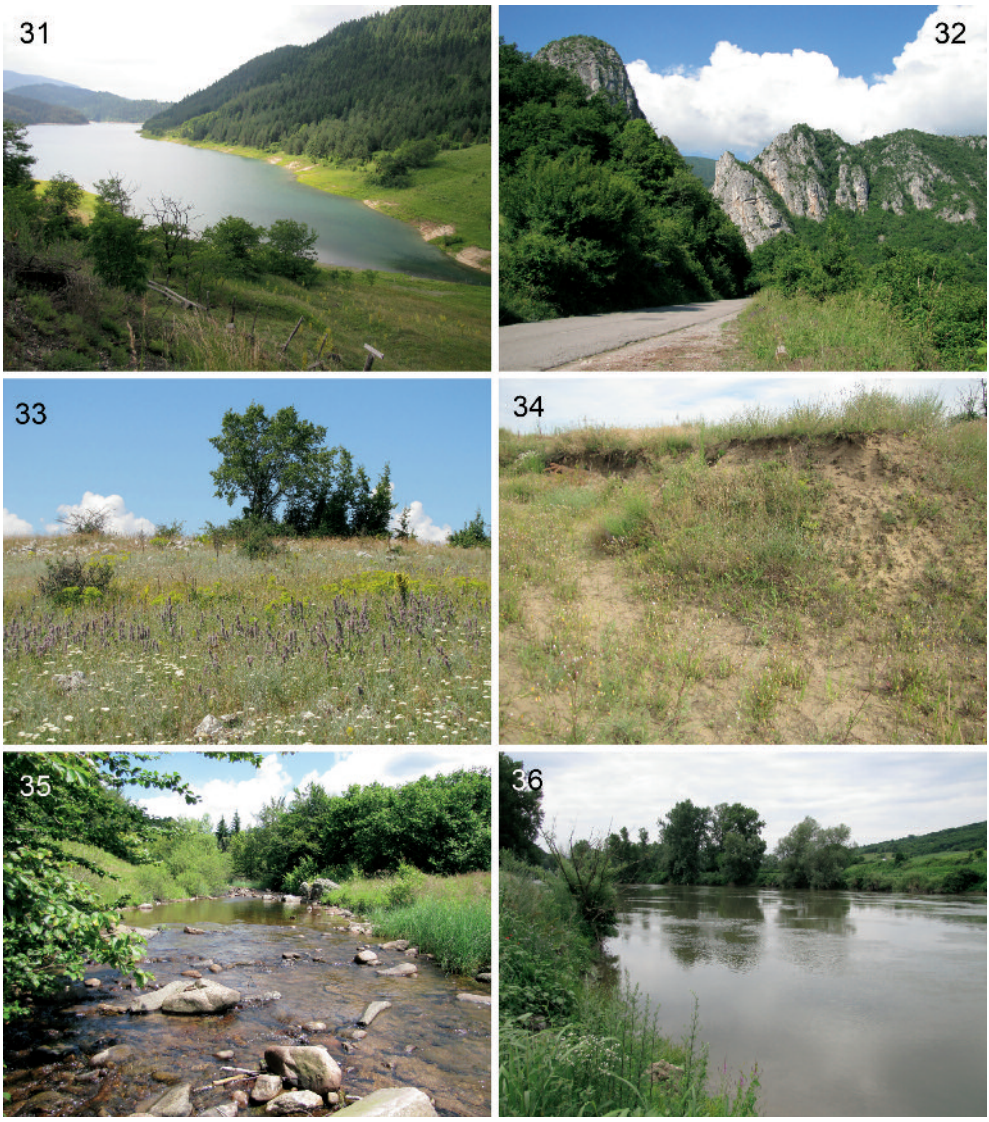
Figs. 10–16: Bosnia and Herzegovina. Fig. 10: Blidinje Nature Park, 22 June 2013. From left to right: Osman Mujezinović, T. Klenovšek, V. Klokočovnik, J. Podlesnik. Fig. 11: Lake Perućac on the Drina River was the first collecting place of *Sisyra nigra* (Retzius) in Bosnia. Fig. 12: Čvrsnica in the Blidinje Nature Park is the highest mountain in Herzegovina. Figs. 13 and 14: Two places in Herzegovina with spongillaflies: Buna River (Fig. 13) and Kravica waterfalls on the Trebižat River (Fig. 14). Fig. 15: Prenj is a mountain range in the Dinaric Alps. Fig. 16: Bosnian pine (*Pinus heldreichii* var. *leucodermis* /Antoine/ Markgr. ex Fitschen) is endemic for the Balkans; Prenj.

Figs. 17–28: North Macedonia. Fig. 17: Shar Mountains (Šar Planina), Popova Šapka, 24 June 2019. From left to right: J. Podlesnik, V. Klokočovnik, Vladimir Krpač, T. Klenovšek. Fig. 18: Slandol area, 8 July 2017. From left to right: F. Janžekovič, J. Podlesnik, T. Klenovšek, Slavčo Hristovski. Fig. 19: Multi-Purpose Area Jasen, 8 July 2011. F. Janžekovič and V. Klokočovnik. Fig. 20: Jasen Area: Lake Kozjak is in the background. Fig. 21: Korab mountain, above the Zhirovnica village. Figs. 22 and 23: Two places in North Macedonia with spongillaflies: Pchinja River near Veles (Fig. 22) and Crna Reka River between Shtavica and Vitolishte (Fig. 23). Fig. 24: Rudine in the Multi-Purpose Area Jasen is a plateau where two snakeflies, *Phaeostigma pilicollis* and *P. setulosa setulosa* (Aspöck et Aspöck) occur. Figs. 25 and 26: The brown lacewing *Hemerobius schedli* Hölzel was only recently confirmed for two mountains: Planina Baba mountain in the Pelister National Park (Fig. 25) and Shar Mountains (Fig. 26). Fig. 27: Fine sand in dry riverbed of the Konska River is a convenient substrate for antlion larvae. Fig. 28: Slandol area, central North Macedonia, is the driest part of the country.

hernmost Balkan locality of an antlion *Myrmeleon hyalinus* Olivier, 1811 (Devetak et al. 2013b; Devetak and Rausch 2016). Albania (Devetak 2019) was the first Bakan country with completed interactively generated fauna as part of the *Lacewing Digital Library's* World Neuropterida Faunas series (Oswald 2021).

There is only a handful of data from **Bosnia and Herzegovina** in the past, scattered in – mainly the old – literature (e.g., Klapálek 1898, 1899, 1900; Navás 1932; Aspöck et al. 1977, 1991). In 2013 and 2019, two short collecting trips were organized to the Blidinje Nature Park, Prenj Mountain, and the Neretva valley (Figs. 10–16). In these

Figs. 29–36: Serbia. Fig. 29: Suva planina, 4 July 2016. From left to right: T. Klenovšek, F. Janžekovič and Predrag Jakšić. Fig. 30: The Danube is the second-longest river in Europe; in the background is the Romanian bank of the River. Fig. 31: Typical landscape in the surrounding of the Lake Zaovine in the Tara National Park. Fig. 32: Jerma gorge is a protected river valley in southeast of Serbia. Fig. 33: Vidlič mountain is known for *Libelloides lacteus* (Brullé) and *Mantispa* spp. Fig. 34: Grassland habitats in the Special Nature reserve Deliblato Sands are endangered due to the overgrowing process. Fig. 35: Along the Dojkinačka reka River is one of a few places in Serbia with *Nevrorthus*-adults. Fig. 36: Zapadna Morava River, where *Sisyra terminalis* Curtis was surveyed. Photos: D. Devetak.



trips, besides some rare lacewings, spongillaflies (Sisyridae) were recorded in the country for the first time (in Neretva river basin and Drina river sub-basin; Podlesnik et al. 2017 and unpublished). This least surveyed Balkan country deserves more attention due to interesting discoveries in the two trips.

Before 2011, numerous papers dealing with Neuropterida in **North Macedonia** have been published, mostly containing only sporadic data (for review, see Hristovski et al. 2015, Devetak and Zeqiri 2018). Among old authors, the most famous is Doflein (1921) who published a magnificent book on natural and cultural heritage of the

country. Doflein's "Mazedonien" was a fundamental monograph on the Macedonian fauna in the period before WWII, a chapter of the book is devoted to antlions. Among recent publications reviewing knowledge at the family level has a great value a monograph on owlflies of the peninsula (Popov 2004) with distributional data for 4 species in the country. In 2011 and 2017–2019, four Balkan expeditions were conducted in North Macedonia (Figs. 17–28). Collecting trips in the country and support of local zoologists offered opportunity to survey a rich material of lacewings both deposited in the Macedonian Museum of Natural History in Skopje (Devetak and Zeqiri 2018) and collected in the field. On the other hand, additional neuropterids were submitted to the author by other entomologists (P. Jakšić, V. Krpač, A. Nahirnić-Beshkova, S. Beshkov, I. Sivec, V. Slavevska-Stamenković; Devetak et al. 2016, 2020). The field trips increased the species list of Neuropterida for the country from 53 to 107 species (Table 4). Three antlion species reported in 2013 (Kačírek 2013) which were not attributed to the expeditions were also added up in Table 4. However, North Macedonia is characterized by relatively high number of species, considering its relatively small area. The country is – following Bulgaria, Romania and Greece – the fourth Balkan country regarding the species numbers of Neuropterida.

Past records of Neuropterida in **Serbia** are scattered in numerous papers (review Podlesnik et al. 2019), some of them with a limited value due to the fact that the basic taxonomic questions at that time have not yet been resolved. Two expeditions (2015, 2016) increased the species list of Neuropterida for Serbia from 37 to 84 species (Table 4). The focus of the field trips in the landlocked country was the survey of the fauna in protected areas (Table 3), including lowland and montane habitats (e.g., Special Nature reserve Deliblato sands, Tara National Park; Figs. 29–36). In the future, a conservation status (extinct, endangered) should be verified for those antlion species which were reported for the country a century ago (Ivajnšič and Devetak 2020). With 84 neuropterid species only about two-thirds of the species to be expected for Serbia are known.

Unfortunately, the COVID-19 pandemic prevented the planned expedition in the Balkan Peninsula in 2020. Further collecting trips will add more species to the country checklists.

Conclusion

In the period 2011–2019 four less investigated Balkan countries (Albania, Bosnia and Herzegovina, North Macedonia, Serbia) were surveyed for Neuropterida. Collecting effort yielded 119 neuropterid species. Rich biodiversity of Neuropterida in the Balkan Peninsula is the result of the complex interactions of geomorphology, climate and vegetation creating a wide variety of ecoregions (Olson et al. 2001). While the first checklist on Albanian Neuropterida has already been published (Devetak and Rausch 2016), North Macedonia is among the four surveyed countries which has been the most thoroughly studied during the expeditions. Checklists of neuropterids of North Macedonia and Serbia are in preparation. Undoubtedly, further collecting trips will yield more species.

Table 4. Summary of the known species numbers of Neuropterida in three countries sorted by families.

Country	Albania		North Macedonia		Serbia (without Kosovo)	
	Known species number		Known species number		Known species number	
Time period	before 2011	present knowledge	before 2011	present knowledge	before 2011	present knowledge
Raphidioptera						
RAPHIDIIDAE	7	12*[1]	9	10	4	6
INOCELLIIDAE	0	1	1	1	0	0
Total Raphidioptera	7	13	10	11	4	6
Megaloptera						
SIALIDAE	0	1*[2]	1	2	2	3
Total Megaloptera	0	1	1	2	2	3
Neuroptera						
NEVRORTHIDAE	1	1	1	1	1	1
OSMYLIDAE	1	1	1	1	1	1
CHRYSOPIDAE	9	25	12	28	10	25
HEMEROBIIDAE	7	17	2	21	5	20
SISYRIDAE	0	0	0	2	0	2
CONIOPTERYGIDAE	0	6	9	14	1	9
DILARIDAE	1	1	1	1	0	0
MANTISPIDAE	0	3	2	3	0	2
BEROTHIDAE	1	1	1	1	0	0
NEMOPTERIDAE	0	0	1	1	0	0
MYRMELEONTIDAE	9	17	8	17*[3]	12	13
ASCALAPHIDAE	3	4	4	4	1	2*[4]
Total Neuroptera	32	76	42	94	31	75
Sum Neuropterida (Meg., Raph., Neur.)	39	90	53	107	37	84

*[1]Sziráki 2014 reported on three snakefly species.
*[2]Dvořák 2016.
*[3]Three antlion species listed by Kačírek (2013) are also included in the country list.
*[4]Report on an additional owlfly species by Petrović 2013 is also included.

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