

ISSN: 0583-4988 (printed version)
ISSN: 2545-4587 (on-line version)

ИЗДАНИЕ НА ПРИРОДОНАУЧНИОТ МУЗЕЈ НА МАКЕДОНИЈА

АСТА

MUSEI MACEDONICI SCIENTIARUM NATURALIUM

Volume 20

2017

Issue 1



Skopje—Скопје

Издавач:

Национална установа „Природонаучен музеј на Македонија“

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Издавањето на ова списание е целосно финансирано од Министерството за култура на Република Македонија.

Фотографија на насловната страна: изворот на реката Бабуна, планина Јакупица (Зоран Николов)
Дизајн на корица: Божин Божиноски

Содржината на ова списание може да се користи според одредбите содржани во лиценцата за Креативни заеднички содржини, за некомерцијална употреба.

Печати: Теди Трејд Ком, Скопје.

Тираж: 300 примероци

Интернет страница на електронската верзија: acta.musmacscinat.mk

Адреса на издавачот

Природонаучен музеј на Македонија

Булевар Илинден 86

1000 Скопје

Publisher:

National Institution “Macedonian Museum of Natural History”

Editorial board:

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The publication of this volume was fully supported by the Ministry of Culture of the Republic of Macedonia.

Photo on the cover page: the spring of river Babuna, mountain Jakupica (Zoran Nikolov)

Cover design: Božin Božinoski

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Print: Tedi Trejd Kom, Skopje.

Copies: 300

Web site of the electronic version: acta.musmacscinat.mk

Publisher's address

Macedonian Museum of Natural History

Boulevard Ilinden 86

1000 Skopje, Republic of Macedonia

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***Acta*, revived!**

It has been just over 23 years since I first read Dimovski's paper on the birds of Osogovo Mountains. The large capital letters, ACTA, dominated the cover page, accompanied by the information that it is a publication of the Natural History Museum in Skopje. A question quickly crossed my mind—shall I write something for the Museum one day? It was one year before I began my studies in biology. For the period that followed I was not aware that *Acta* was discontinued just one year after our first encounter. Dimovski's paper was published in 1957, as the 44th issue of *Acta*. In total, there were 159 issues published before 1995, each with a maximum of 32 pages, but all combined together, in the year 1997, they occupied about two cubic meters of the Museum hall. This is when every issue passed through my hands — just before they were stored away—and there were no newcomers.

I joined the Museum in 2014, with *Acta* playing on my mind. However, administrative procedures are slow, and priorities are very often somewhere else. In 2015 and 2016, they were focused on the Museum's 90th anniversary, and the Proceedings published on that occasion. I was honored to be appointed editor-in-chief for those proceedings. Still, that was not *Acta*. Then, just few months later, the good news came—*Acta*'s publication was approved by the Ministry of Culture. As it turned out, that was the easiest part of the revival process. Journals are many, and the standards are high. We needed an editorial board that will meet those standards, and above all, we needed papers. But *Acta* and the Museum have many friends. Some of them are with extensive experience in science, others are in their early careers. It seems they make a perfect team.

In its 20th volume, *Acta* restarts modestly. With a new shape, this time as a standard-form journal, it includes seven papers, each of them subjected to a review, and immediately available to the World via open-access publishing. The Museum expresses its cordial gratitude to all of the authors, reviewers, editors and the Ministry of Culture for making this volume of *Acta* happen. I personally extend this gratitude to the colleagues from the Museum, and especially to Zoran Nikolov.

Acta's destiny will now depend mostly on the readers' interest for it, and researchers' choice as their journal. To 'live long and prosper', the criteria for publication must be high, and ever-stricter. But, I encourage you all go give *Acta* a try.

Metodija Veleviski,

Editor-in-chief

Mass-spectrometric examinations ($\delta^{34}\text{S}$) of different baryte, pyrite, galena, sphalerite samples from the ore occurrences in the mixed series at Nežilovo village, Macedonia

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Abstract

In this paper we present the results of the $\delta^{34}\text{S}$ -mass spectrometric examinations of different baryte, pyrite, galena and sphalerite samples from the ore occurrences in the mixed series at Nežilovo village, Macedonia. The examined baryte samples (fine-grained and coarse-grained generations in total number of 16 samples) show a very narrow span of the $\delta^{34}\text{S}$ (+22.5 to +28.3 ‰ for the fine-grained barytes and +21 to +26 ‰ for the coarse-grained baryte generations). These $\delta^{34}\text{S}$ values for the examined barytes samples show a homogenous S-source probably of marine origin—marine sulphates. In five samples of different sulphide minerals: galena, sphalerite, cleiophane (from baryte schists), pyrite (from cymrite-quartz schists) were found very close $\delta^{34}\text{S}$ values, varying of +3.3 ‰ to +11.6 ‰. These values for examined sulphides show probably an endogenous-juvenile origin representing volcanic sulphides. Examined pyrite sample with hexahedral forms (from the albite-augen gneisses) shows $\delta^{34}\text{S}$ values of -10.5 ‰, being typical for S-source of sedimentary origin.

Key words: baryte, cleiophane, galena, mass-spectrometric, pyrite, sphalerite

Introduction

The mixed series at the Nežilovo village area is situated about 40 kilometers westward from the town Veles and belong to the central part of the Pelagonian massif in Macedonia (Arsovski 1960). This series is treated as a former volcano-sedimentary formation, later metamorphosed by the very complex poly-metamorphic processes (Arsovski 1960, Jančev 1975). As result of the those volcano-metamorphic processes, this series show very complex petrological composition, containing mainly albite-augen gneisses, micaschists, banded microcline gneisses, meta-rhyolites, dolomitic marbles, baryte schists, cymrite-quartz schists, tilasite veins etc. The aforementioned petrological members are very intimately connected among themselves, varying very intensively in vertical and lateral sense as a very common characteristic of this series. The complex mineral paragenesis from the ore occurrences in the mixed series are characterized by quantitative predomination of the oxide minerals, including gahnite, franklinite, hetaerolite, zincohoegbomite, rinmanite, ferri-

coronadite, nežilovite, zincovelesite in relation to the sulphide minerals (galena, sphalerite, pyrite, cleiophane) of subordinate importance (Chukanov et al. 2017). Very rare complex and oxide-mineral paragenesis as well as Pb, Zn, Fe-sulphide mineral paragenesis are enclosed in baryte schists and dolomitic marbles (Stojanov 1960, Ivanov 1961, Jančev 1975, 1990, Bermanec et al. 1996). We expect that $\delta^{34}\text{S}$ -mass spectrometric examinations of baryte and sulphide samples (galena, sphalerite, pyrite) will help us to determine the S-source origin.

Material and methods

Examined baryte samples as well as sulphide minerals (pyrite, galena, sphalerite) are taken from the ore-bearing petrological members (baryte, cymrite-quartz schists, tilasite vein) and rarely from the albite-augen gneisses in a total distance of 3 km) inside the mixed series of treated area (Tab. 1). All examined mineral samples were prepared as monomineral fractions by

Table 1. Analysed sulphate and sulphide minerals

BARYTE samples, description	$\delta^{34}\text{S}\text{‰}$	T°C	SrSO ₄ %
1. Coarse-grained (1cm) baryte associated with tilasite	+21.1	320	2.53
2. Coarse-grained (1-2cm) baryte associated with cymrite	+20.6	325	1.92
3. Coarse-grained (1cm) baryte from the banded gneisses	+26.5	255	2.41
4. Coarse-grained (1cm) baryte associated with hydrothermal dolomite	+28.0	235	2.47
5. Coarse-grained (2cm) baryte associated with hydrothermal dolomite	+26.20	252	2.51
6. Coarse-grained (1cm) baryte associated with tilasite	+21.03	320	1.67
7. Fine-grained (1mm) baryte associated with tilasite	+22.5	300	2.07
8. Fine-grained (0.5mm) baryte from ore occurrence No 9	+24.06	280	2.32
9. Fine-grained (1mm) baryte from ore occurrence No 13	+28.3	230	1.86
10. Fine-grained-fibrous baryte from ore occurrence No 6	+26.8	255	2.07
11. Fine-grained (1mm) baryte – contact area with cymrite	+24.8	280	-
12. Fine-grained (1mm) baryte from ore occurrence No 2	+30.7	205	2.20
13. Fine-grained (1mm) baryte associated with cleiophane from ore occurrence No 1	+23.0	290	-
14. Fine-grained (2mm) baryte from the banded gneisses	+26.5	255	2.74
15. Fine-grained (1mm) baryte from ore occurrence No 5	+28.2	230	2.15
16. Fine-grained (1mm) baryte from ore occurrence No 4	+25.3	275	2.55
GALENA, SPHALERITE, PYRITE samples, description			
17. Galena from Plavnik, microlocality	+3.3	-	-
18. Galena from ore occurrence No 1	+6.4	-	-
19. Sphalerite-cleiophane from ore occurrence No 1	+7.9	-	-
20. Pyrite from cymrite-quartz schists	+11.6	-	-
21. Pyrite associated with cymrite	+10.78	-	-
22. Pyrite-metamorphic from albite-augen gneisses	-10.5	-	-

means of a binocular microscope (Leitz, Wetzlar, Germany). The monomineral fractions of baryte, pyrite, galena, cleiophane (sphalerite) were directed in the mass-spectrometric procedures.

$\delta^{34}\text{S}$ contents in baryte and sulphide minerals (pyrite, galena, sphalerite, cleiophane) were analysed by standard mass-spectrometric procedures and technical equipment at the institutes “Ruđer Bošković”, Zagreb (Croatia) and “Jožef Stefan”, Ljubljana (Slovenia).

Sixteen barytes and six sulphides samples from the ore occurrences composed of baryte schists, quartz-cymrite schists, dolomitic marbles were analysed for $\delta^{34}\text{S}$ ‰.

Results and discussion

On the bases of the values of $\delta^{34}\text{S}$ ‰ obtained from the analysed samples (Tab. 1), we can conclude the following:

In nine samples of the fine-grained barytes $\delta^{34}\text{S}$ values of +22.5 ‰ to +28.3 ‰ were found, with a very narrow span (of ca. +5.8 ‰), instructing us to a conclusion for a homogenous S-source. Only in one sample (No 12) a value of $\delta^{34}\text{S}$ of +30.7 ‰ was found.

In five samples of coarse-grained baryte samples $\delta^{34}\text{S}$ values of +21 to + 26 ‰ were found, representing also a very narrow span, indicating also to a homogenous S-source.

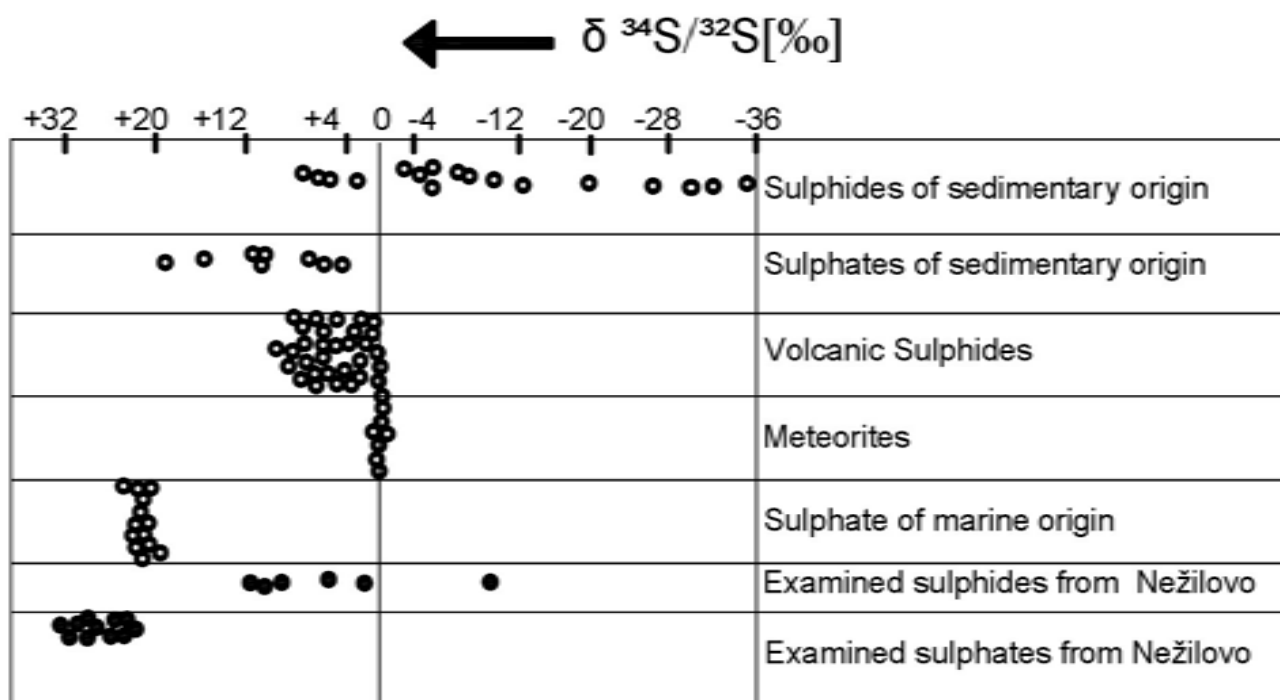


Figure 1. $\delta^{34}\text{S}$ contents in different geological materials from different origin (by Mayne 1960, in Smales and Wager 1960) and examined sulphates (barytes), sulphides (galena, sphalerite, pyrite) from treated area at Nežilovo

Fine-grained and coarse-grained baryte samples show very similar $\delta^{34}\text{S}$ -values, with a characteristic that fine-grained baryte samples are slightly enriched in $\delta^{34}\text{S}$.

According to Mayne (1960, in Smales and Wager 1960), it could be concluded that examined baryte samples are characterized with S from marine origin—marine sulphates (Fig. 1).

The measured temperatures (Tab. 1) starting from 200-320°C confirm the hydrothermal origin for the examined baryte samples.

The examined baryte samples from the study area near Nežilovo village show values of $\delta^{34}\text{S}$ comparable with the baryte occurrences from Gorski Kotar (Šiftar 1984) (Fig. 2).

Some stable isotopes of Sulphur were examined by Jančev et al. (1999) in the gypsum from Kosovrasti, Debar, Western Macedonia, where $\delta^{34}\text{S}$ ranges from +16.6 to +20.6 ‰. These results show an evaporitic origin of the gypsum from the Kosovrasti microlocality. However, presented data from Nežilovo area are much higher than 20 ‰ for $\delta^{34}\text{S}$.

According to their $\delta^{34}\text{S}$ values, the baryte samples from Nežilovo area are comparable with the baryte occurrences from Varež, Megen and Ramelsberg (Fig. 2).

Examined sulphides from Nežilovo area are similar to the sulphides of endogenous-juvenile origin from different areas (Fig. 3) whereas the pyrite from the albite-augen gneisses show sedimentary origin.

Conclusions

According to the literature data from the previous studies, as well as the results of the present analyses, we can conclude:

The mass-spectrometric values of $\delta^{34}\text{S}$ range from +21 ‰ to +28 ‰ for the examined baryte (BaSO_4) samples from Nežilovo area are showing a homogenous S-source of marine origin.

The mass spectrometric values ($\delta^{34}\text{S} = +3.3$ ‰ to +11.6 ‰) for the examined sulphide (pyrite from quartz-cymrite schists and galena, sphalerite from baryte schists) show also a homogenous S-source of narrow span, comparable with sulphides of volcanic origin.

$\delta^{34}\text{S}$ value (-10.5 ‰) for pyrite from albite-augen gneisses show typical value for S-source of sedimentary origin.

The obtained $\delta^{34}\text{S}$ results for the examined samples of baryte are in quite good concordance with the geological facts that the examined mixed series actually

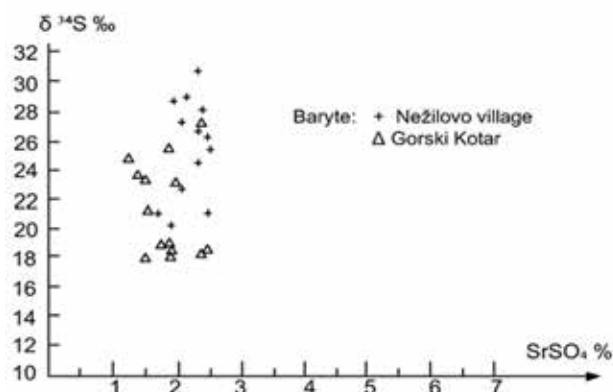


Figure 2. Comparative analysis of $\delta^{34}\text{S}$ between baryte from Gorski Kotar (Šiftar 1984) and baryte from Nežilovo area

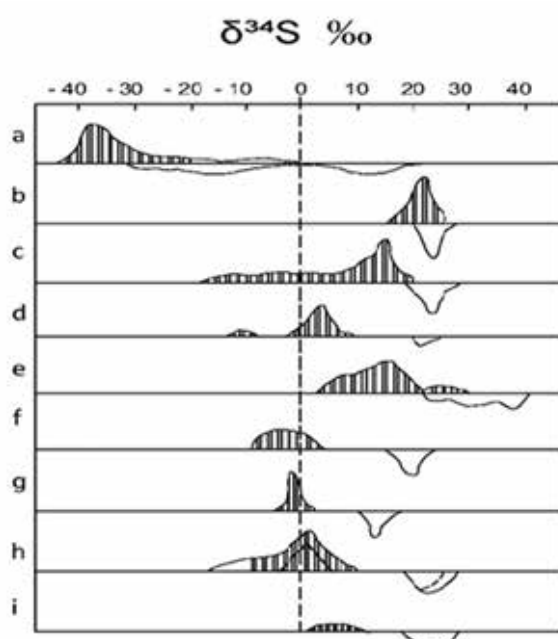


Figure 3. $\delta^{34}\text{S}$ -Distribution in sulphides (shaded area) and barytes from the ore occurrences: Cu-schists (a), Meggen (Germany) (b), Rammelsberg (Germany) (c), Shakanai (Japan) (d), Mississippi (USA) (e), Barytes-North Pennines (England) (f), Bad Grund, Harz (Germany) (g), Vareš, Bosnia and Herzegovina (h), Barytes and sulphides from Nežilovo (Macedonia) (i). Histograms are not in measure.

represents a transgressive series i.e. a volcano-sedimentary series originated in extremely elevated conditions at very high positive oxidation potentials.

Examined $\delta^{34}\text{S}$ results for the treated galena, sphalerite and pyrite are characteristic for sulphides of volcanic origin associated to the aegirine-meta-rhyolites from the mixed series of Nežilovo village area.

Acknowledgements

The authors are grateful to two anonymous reviewers for their comments to the earlier draft of the manuscript.

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Масино спектрометриски испитувања ($\delta^{34}\text{S}$) во различни минерални примероци на барит, галенит, пирит, сфалерит од рудоносните појави на мешаната серија во село Нежилово, Македонија

Симеон Јанчев и Билјана Карамачоска

Резултатите добиени од испитаните шеснаесет примероци на барит од мешаните серии кај Нежилово со различна грануларност (ситно зрнести и крупни зрнести генерации) укажаа на многу блиска вредност на $\delta^{34}\text{S}$ (+22.5 до +28.3 ‰ за ситно зрнените барити и +21 до +26 ‰ за крупно-зрнести барити од различна генерација). Овие $\delta^{34}\text{S}$ вредности на испитаните баритни примероци покажуваат хомогеност во изворот на сулфур, со што се смета дека тој најверојатно има морско потекло и потекнува од морски сулфати. Испитаните пет примероци од различните минерали (галенити, сфалерити во примероци од баритните шкрилци како и на пиритот од кумритно-кварцни шкрилци) покажуваат променлива содржината на $\delta^{34}\text{S}$ во граници од +3.3 ‰ до +11.6 ‰. Овие $\delta^{34}\text{S}$ резултати од испитуваните сулфиди покажуваат ендегени-јувенилни вредности што укажува дека тоа се вулкански сулфиди. Испитаниот пиритен примерок (со хексагонални форми) од албитните-аугенските гнајсеви покажува вредност на $\delta^{34}\text{S}$ од -10.5 ‰ што претставува типичен индикатор дека содржина на сулфур е од седиментно потекло.

Клучни зборови: барит, галенит, клеофан, масен-спектрометар, пирит, сфалерит

Noteworthy floristic records from Jablanica Mt., Republic of Macedonia

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Abstract

The first record of *Crepis reuteriana* for the flora of Macedonia and new records of 21 rare and obscurely known vascular plants from Mt. Jablanica (SW Macedonia) are presented: *Alkanna scardica*, *Bromopsis inermis*, *Carex ferruginea*, *Cephalaria ambrosioides*, *Corallorhiza trifida*, *Crepis conyzifolia*, *Cymbalaria muralis*, *Eleocharis quinqueflora*, *Epilobium roseum* subsp. *roseum*, *Epilobium palustre*, *Euphorbia lathyris*, *Hesperis matronalis*, *Inula bifrons*, *Medicago carstiensis*, *Peucedanum arenarium* subsp. *neumayeri*, *Rhinanthus mediterraneus*, *Scandix macrorhyncha*, *Seseli libanotis*, *Sesleria tenerrima*, *Veronica prostrata* and *Vicia pisiformis*.

Key words: *Crepis reuteriana*, flora, Macedonia, vascular plants

Introduction

Republic of Macedonia is a well known floristically reach region. Mt Jablanica is one of its most important areas with high plant diversity, which owns to its geographical position, heterogeneous geo-morphological composition, etc. This mountain is located in the SW part of Macedonia and adjacent part of E Albania, belonging to Adriatic watershed and Scardo-Pindic mountain chain. Macedonian part of this mountain was explored by many botanists, among whom the most abundant data presented: Černjavski (1943), Micevski (1985, 1993, 1995, 1998, 2001, 2005), Matevski (2010) etc.

Owing to my professional field work on mountain Jablanica in 2016 and 2017, I had an opportunity to visit numerous localities throughout its largest part and to collect an abundant herbarium of vascular plants belonging to various taxonomical groups. In this work a selected list of taxa is treated. Some unpublished data referring to some of the listed plants, based on author's collections from other localities in Macedonia, are also included.

Material and methods

The collected specimens were herbarised using standard methodology and stored in the herbarium of

the author ("A.T." in the text). The following literature was used for identification: Flora of the Republic of Macedonia (Micevski 1985, 1993, 1995, 1998, 2001, 2005, Matevski 2010), Flora Europaea (Tutin et al. 1964, 1968, 1972, 1976, 1980), Prodrum Flora peninsulae Balcanicae I-III (Hayek 1924-1927, 1928-1931, 1932-1933).

Results and discussion

Alkanna scardica Griseb.

Mt Jablanica – 0,8 km SW of Vevčanska Lokva, stony places, on conglomerate, 2060 m, 41°14'14.11"N, 20°31'36.40"E, 12.7.2017, leg. A. Teofilovski (herb. A.T.).

This Balkan endemic in addition to Macedonia is distributed also on Mt Prokletije (E Montenegro, N Albania, E Kosovo), Kosovo part of Mt Šar Planina and one locality in the vicinity of Kuks in N Albania (Rechinger 1965, Duraki et al. 2010). On the territory of Macedonia this species was previously known from Mt Dešat (Matevski 2010) and the wider area of Mt Šar Planina: Kobilica (*locus classicus*) (Grisebach 1844, Bornmüller 1928), between Elak and Lešnica (Matevski 2010), Raduša (Stevanović and Stevanović 1985) and Koža (Rechinger 1965). The reports from: Šiševo (Skopje), Alšar and between Zborsko and Alšar (Degen and Döerfler 1897), according to the Bornmüller's

(1928) revision of the herbarium collections, relate to *A. noneiformis* Griseb. Interestingly, the collection of Degen from the later locality was quoted by Rechinger (1965) as *A. scardica*, but even so, the presence of *A. scardica* on this locality is still questionable. Likewise, the collection from Prilep (Trojaci), reported by Stojanoff (1928) as *A. scardica*, was revised by Matevski (2010) also as *A. noneiformis*. Having in mind these revisions, Mt Dešat is considered the previously known southernmost point of the species range, and therefore, the discovery of *A. scardica* on Mt Jablanica is of a phytogeographic importance, shifting the border of its distribution range for ca. 40 km toward south.

***Bromopsis inermis* (Leyss.) Holub**

Struga (foothill of Mt Jablanica) - Kališta village, Elen Kamen, near the road to Livadišta, 740 m, 41° 8'21.25"N, 20°38'43.60"E, 12.6.2017, leg. A. Teofilovski (herb. A.T.); Skopje - Gazi Baba, near the railway, 42° 0'1.33"N, 21°28'38.49"E, 4.6.2014, leg. A. Teofilovski (herb. A.T.).

This species is known only from two reports. The first one is a rather general, referring to a large area comprising territories of several neighboring municipalities: Bitola, Prilep, Kruševo, and Demir Hisar (Todorovski 1969, sub *Bromus inermis* Leyss.), without data for any specific localities, while the second one is from the central part of Skopje (Teofilovski 2011).

***Carex ferruginea* Scop.**

Mt Jablanica – near Belička River, wet place, 1830 m, 41°13'48.80"N, 20°31'44.61"E, 12.7.2017, leg. A. Teofilovski (herb. A.T.); Mt Jablanica – 1,6 km W-NW from Gorna Belica village, wet place, 1630 m, 41° 13'33.07"N, 20°32'17.78"E, 14.6.2017, 12.7.2017, leg. A. Teofilovski (herb. A.T.); Mt Šar Planina – Lešnica, damp grassy place, 1460 m, 42°1'35.13"N, 20° 47'12.94"E, 20.6.2012 leg. A. Teofilovski (herb. A.T.).

This species is only recently mentioned for the first time in the flora of Macedonia, for high mountain regions of Mt Korab (Milanović et al. 2011), based on a personal communication with V. Stevanović. There is only another one report which refers just to Macedonia in general (Matevski 2013). Therefore, the new records from Mts Jablanica and Šar Planina, are the first ones in Macedonia which are based on specific herbarium collections. *Carex ferruginea* is a glacial relict species (Matevski 2013), distributed in the Alps, S Carpathians, and mountains of S Europe.

***Cephalaria ambrosioides* (Sibth. & Sm.) Roem. & Schult. (Fig. 1)**

Mt Jablanica – Belička River, 2,7 km SW from Oktisi village, 1130 m, 41°12'42.20"N, 20°35'14.56"E, 17.7.2017, leg. A. Teofilovski (herb. A.T.); Struga (foothill of Mt Jablanica) – Elen Kamen, near the road to Livadišta, 710 m, 41°08'9.51"N, 20°38'43.74"E, 31.5.2017, leg. A. Teofilovski (herb. A.T.).

The distribution of this species in Macedonia is restricted to its southern parts. Following are the previous reports: Demir Kapija, Bitola (Krkliño) (Vandas 1909), Alšar, Valandovo (Gradec) (Soška 1939), Ohrid (Grecescu 1899, sub *C. macropylla* Griseb.), Mt Galičica (Černjavski 1943, Weber 1951). On both newly discovered sites this robust perennial thrives abundantly, on open and bushy stony places, on carbonate geological substrate.

***Corallorhiza trifida* Châtel.**

Mt Jablanica – 1,6 km S-SE from Gorna Belica village, beech forest, carbonate substrate, 1570 m, 7.6.2017, leg. A. Teofilovski (herb. A.T.); Mt Jablanica – 4,1 km W from Boroec village, beech forest, 1750 m, 5.7.2017, leg. A. Teofilovski (herb. A.T.).

A typical forest species with a scattered occurrence in Macedonia. Following are the previous reports: Mt Suva Gora (Ćam) (Em 1974, Teofilovski 2011), Mt Skopska Crna Gora, Mt Šar Planina (Ljubotenska Reka), Gorna Radika, Mt Jakupica (Juručica), Mt Kožuf (Asan Češma), Mariovo (Gradešnica) (see Matevski and Kostadinovski 1999).

***Crepis conyzifolia* (Gouan) A. Kern. (Fig. 2)**

Mt Jablanica – 0,8 km SW of Vevčanska Lokva, stony places and subalpine meadows, on conglomerate, 1980 -2100 m, 12.7.2017, leg. A. Teofilovski (herb. A.T.).

This is a S European - Anatolian species, previously reported only from few localities on Mt Osogovo (Ajdučka Češma, Carev Vrv, Ruen, Sasa) (Micevski 1978a) and one on Mt Šar Planina (Plat) (Teofilovski 2014). On the new locality in subalpine belt of Mt Jablanica, it occurs frequently, on a relatively large area of 5 ha, on stony places and subalpine meadows. Interestingly, although widely considered as a calcifuge species (Sell 1976), on the discovered locality on Mt Jablanica it grows on conglomerate with a carbonate component, and on the locality Plat on Mt Šar Planina on limestone (Teofilovski 2014).

***Crepis reuteriana* Boiss. (Fig. 3)**

Mt Jablanica – NE from border pass Čafasan, 1030-1190 m, oak forest and roadside, carbonate substrate, 41°5'37.10"N, 20°36'15.38"E, 20.6.2017 leg. A. Teofilovski (herb. A.T.).

This is a new species in the flora of Macedonia. On the discovered site, several tenths of individuals were observed, growing on bushy and stony places near a forest road and in an oak forest, on carbonate geological substrate.

Crepis reuteriana is a Balkan - Anatolian endemic, distributed from W Albania, Corfu Island and W Greece, to N and W Anatolia, E Syria and N Israel (Lamond 1975, Sell 1980, Kamari 1991, Barina 2017, etc.). Its northernmost locality lies in European part of Turkey (Lamond 1975), but it is still not found on the territory of Bulgaria (Assyov et al. 2012). The southernmost point of its distribution range in Balkan Peninsula is Monanstriraki in W Greece (Anagnostopoulos 1997).

According to the distribution maps given by Anagnostopoulos (1997) and Barina (2017), the closest known localities to the newly recorded one on Mt Jablanica, are Elbasan in C Albania and Vrontero in NW Greece, c. 45 km west and 50 km southeast, respectively.

Description: Perennial; stems 30-75 cm, branching from near the base. Leaves pubescent or hispidulous; basal 4-18 x 1-3 cm, oblanceolate, lyrate-runcinate-pinnatifid or coarsely dentate, acute to obtuse; lower cauline like the basal or all bract-like. Involucre 10-13 x 4-7 mm; bracts linear-lanceolate, acute, mostly with a white margin, glabrous or sparsely pubescent, pubescent on inner face, the outer $\frac{1}{4}$ - $\frac{1}{3}$ as long as the inner. Achenes 4-5 x c. 0-5 mm, fusiform, attenuate at apex, slightly constricted above base, c. 15-ribbed. (Sell 1980)

This species belong to *Crepis* Sect. *Phaeacasium* (Cass.) Dumort., encompassing two additional species in Europe (Sell 1980), among which in Macedonia occurs only *C. pulhra* L., which is common species over the most of Macedonian mountains and valleys. Though similar in outline to *C. reuteriana*, it can be easily distinguished by its annual habitat, more leafy stem, etc.

***Cymbalaria muralis* P. Gaertn., B. Mey. & Scherb.**

Struga – foothill of Mt Jablanica, Kališta village, St. Bogorodica, carbonate rocks, 735 m, 31.5.2017, leg. A. Teofilovski (herb. A.T.); Struga - N periphery, near Crn Drim River, quay walls just over the river, 23.8.2016, observ. A. Teofilovski (photog.); Ohrid – near St. Kaneo, walls, 8.2005, observ. A. Teofilovski.

On the first locality only few specimens were observed, growing in the crevices of carbonate rocks, just near the gate of monastery St. Bogorodica, while on the two other localities this species occurs as a pioneer species between the stone blocks of the walls. So far it was known from three other localities: Ohrid (Sveti Naum), Skopje (quay of the Vardar River) and Veles (Izvor) (see Matevski and Kostadinovski 1999).

***Eleocharis quinqueflora* (Hartmann) O. Schwarz**

Mt Jablanica – below Labuniška Lokva, marshy place near a mountain stream, 1890 m, 4.7.2017, leg. A. Teofilovski (herb. A.T.).

A rare species in the flora of Macedonia, previously known only from the following two rather old reports, lacking any recent confirmation: Dojran (Furka) (Jurišić 1923) and Mt Rudoka (Rudski 1938). It is also reported from Greek part of Mt Nidže (Dobro Pole), close to Macedonian borderline (Velenovský 1922). Its distribution range comprises much of Europe, Asia, N America, and NW Africa.

Epilobium roseum* Schreb. subsp. *roseum

Mt Jablanica – 3,0 km W-SW from Radolišta village, wet place near a fountain in a beech forest, 1440 m, 10.8.2017, leg. A. Teofilovski (herb. A.T.).

This subspecies was only recently recorded for the first time in Macedonia, at the foothills of Mt Suva Gora (Gorna Lešnica) (Teofilovski 2011). In the treatment of *E. roseum* in the "The Flora of the Republic of Macedonia", only the presence of the subsp. *subsessilis* (Boiss.) Raven was confirmed (several localities in W Macedonia), but some of the reports of *E. roseum* s.l., may relate to subsp. *roseum* [Tetovo, Bitola, Veles (Prevalec), Strumica (Gabrovo, Kolešino)] (see Micevski 2001).

The distinction between subsp. *roseum* and *subsessilis* is based on the petioles length, 4-15 mm vs. 1-3 mm, respectively (Micevski 2001). The specimens in the collection from the vicinity of Radolišta village have petioles 4-12(15) mm, clearly matching to subsp. *roseum*.

***Epilobium palustre* L.**

Mt Jablanica – 3,1 km NW from Lakavica village, marshy place, 1440 m, 20.6.2018 leg. A. Teofilovski (herb. A.T.).

This species was known from several localities in mountain areas of NW, W and C Macedonia: Mt Šar Planina, Mt Korab, Mt Bistra, Gorna Radika, Mavrovska

Reka, Mavrovsko Pole, Mt Jakupica (see Micevski 2001). There is also a report from Greek side of Mt Nidže (Dobro Pole), close to the Macedonian border (Bornmüller 1927).

***Euphorbia lathyris* L. (Fig. 4)**

Struga – foothills of Mt Jablanica, Livadišta, near the road to Radožda village, 12.6.2017, leg. A. Teofilovski (herb. A.T.).

This is a rare adventive species in Macedonia, which probably originates from C and SE Asia. It was previously reported only from Probištip (Lesново) (Micevski 1998) and, as a cultivated plant, also from Gabrovo village (Strumica) (Stojanov 1921). According to Micevski (1998), this species no longer exists on the later locality.

On the newly discovered site, which is in an unsettled area, close to resort “Livadišta”, 7-8 fruiting individuals were recorded, growing between the fence of a vegetable garden and the road Livadišta – Radožda. The origin of this species on this locality is unknown. It could be in a connection with the high frequency of tourists in this area or with its possible cultivation in the nearby gardens, though according to some local residents, this species was never cultivated in the wider vicinity of this site.

***Hesperis matronalis* L.**

Mt Jablanica – NW and SE from Višni village, shrubby places, 1180-1320 m, 6.6.2017, leg. A. Teofilovski (herb. A.T.).

On the discovered site this species occurs very scattered, growing on shrubby places near beech forests and forest roads. It is a Europaeen and SE Asian species, separated to seven subspecies, two of which, subsp. *matronalis* and subsp. *cladotricha* (Borbás) Hayek, occurring natively in Balkan Peninsula (Marhold 2011). The collection from Mt Jablanica is not appropriate for discussing the subspecific affiliation of the discovered population.

H. matronalis was previously known from several reports, mostly of them referring to the species in *sensu lato* sense: Belasica [Borisovo (sub var. *runcinata* M. K.), Visoka Čuka] (Stojanov 1921), Prilep (Trojaci) (Stojanoff 1928), Gorna Radika (Adžina Reka), Debar (Bituše, Banjište) and Kavadarci (Majdan) (Micevski 1993).

***Inula bifrons* L.**

Mt Jablanica – 1,4 km S-SE from Gorna Belica vilage, near a forest road, carbonate substrate, 1450 m,

41°12'44.41"N, 20°33'48.06"E, 16.8.2017, leg. A. Teofilovski (herb. A.T.).

During the fieldwork in the area, only two exemplars of this noticeable species were recorded, growing near an abandoned forest road, in the belt of beech forests. This is a rare species in Macedonian flora, previously reported only from: Kavadarci (Rožden, Majdan) (Micevski 1983) and Kičevo (Izvor) (Rizovski 1984), with a general distribution in much of S Europe.

***Medicago carstiensis* Wulfen**

Mt Jablanica – near the road to Lakavica village, 1210 m, 13.7.2016, leg. A. Teofilovski (herb. A.T.); Mt Jablanica – near the forest road NW-W from Čafasan pass, 1030 m, 20.6.2017, leg. A. Teofilovski (herb. A.T.); Mt Jablanica – 0,35 km S from Višni village, near forest roads, 1220 m, 4.8.2017, leg. A. Teofilovski (herb. A.T.); Mt Jablanica – 1.3 km S of village of Modrič, near forest road, 1150 m, 30.6.2016, leg. A. Teofilovski (herb. A.T.); Mt Šar Planina – 1,1 km NE from Rogačevo village, open place, 930-1000 m, 22.7.2015, observ. A. Teofilovski; Mt Šar Planina – 0,9 km S from Selce Keč village, 1030 m, near forest road, 24.09.2015, leg. A. Teofilovski (herb. A.T.).

This species is distributed from NW Italy and Austria to SE Bulgaria, but it is still not found in Greece. In the flora of Macedonia it was reported for the first time from the vicinity of Debar (Banjište) (Micevski 1978), while recently it was registered also on Mt Šar Planina (Dobrošte, Otunje, Brezno) (Teofilovski 2011). Although Mt Jablanica lies on the south border line of its distribution range, this species is rather frequent and abundant on this mountain, occupying large areas alongside forest roads, between (900) 1000 and 1500 m, while on Mt Šar Planina it is significantly less frequent.

***Peucedanum arenarium* subsp. *neumayeri* (Vis.) Stoj. & Stef. (Fig. 5)**

Mt Jablanica – 2,8 km S-SW from Višni village, 41° 10'43.80"N, 20°34'14.45"E, 1750 m, 11.8.2017, leg. A. Teofilovski (herb. A.T.).

The discovered population is rather abundant, growing on a steep area of ca. 2000 m², on stony and rocky places, on carbonate geological substrate. The previous records for this taxa are mostly from the massif Kožuf - Nidže in S parts of Macedonia: Demir Kapija (Došnica), Kavadarci (Majden), Gevgelija (Negorci, Sermenin, Konjska Reka, Dlabok Dol), Mt Nidže (between Skočivir and Reder, Kajmakčalan) (Matevski

2005), with one northwestern outpost on Mt Suva Gora (Kunovo) (Teofilovski 2011). *Peucedanum arenarium* has a distribution range in SE Europe and Anatolia, while in Macedonia it is represented only by subsp. *neumayeri* (Matevski 2005), which occurs in the Balkan Peninsula and SW Anatolia.

***Rhinanthus mediterraneus* (Sterneck) Adamović (Fig. 6)**

Mt Jablanica – 2,2 km S from Gorna Belica village, 1735 m, 7.6.2017, leg. A. Teofilovski (herb. A.T.); Mt Jablanica – NW from Gorna Belica village, 1750 m, 15.6.2017; leg. A. Teofilovski (herb. A.T.); Mt Jablanica – 4,3 km E from Borovec village, 1780 m, 5.7.2017, leg. A. Teofilovski (herb. A.T.).

This is a Mediterranean orophyte species, discovered for the first time only recently on the territory of Macedonia, in the subalpine belt of Mt Galičica (Tepeno) (Teofilovski 2011). On Mt Jablanica numerous abundant subpopulations were observed in the vicinity of Gorna Belica, Višni, Labuništa, and Boroec villages, in the elevation belt between 1650–2000 m. It grows on stony places, mountain meadows, and pastures, on carbonate and conglomerate geological substrate.

***Scandix macrorhyncha* C. A. Mey.**

[Syn.: *S. pecten-veneris* L. subsp. *macrorhyncha* (C. A. Mey.) Rouy & E. G. Camus]

Mt Jablanica - Čuma, S slopes, rocky place, carbonate substrate, 1700 m, 8.6.2017, leg. A. Teofilovski (herb. A.T.); Struga – foothill of Mt Jablanica, Kališta village, near the church St. Atanasija, stony places, carbonate substrate, 700 m, 30.5.2017, leg. A. Teofilovski (herb. A.T.).

This is a S European species, previously known only from few other localities in the western third of the country: Mt Suva Gora, Mavrovo (Mavrovski Anovi, Koža), Mt Galičica, Prilep (Krasta), (see Micevski 2005, sub *S. pecten-veneris* subsp. *macrorhyncha*).

***Seseli libanotis* (L.) W. D. J. Koch (Fig. 7)**

Mt Jablanica – W-SW from Višni village, 1750 m, 11.8.2017, leg. A. Teofilovski (herb. A.T.); Mt Jablanica – near Belička River, 1580–1700 m, 3.7.2017, 12.7.2017, leg. A. Teofilovski (herb. A.T.); Mt Jablanica – 0,7 km SW from Labuniški Bačila, 1850–1880 m, 6.7.2017, leg. A. Teofilovski (herb. A.T.).

In all the recorded localities on Mt Jablanica this species grows on stony places and mountains mead-

ows, on carbonate geological substrate and only rarely also on conglomerate (near Belička River). It is a Eurasian species, previously known only from few mountain regions in W and NW Macedonia: Gorna Radika (Strezimir, Adžina Reka), Mt Stogovo (Gari) (Micevski 2005) and Mt Šar Planina (near Popova Šapka) (Teofilovski 2016).

***Sesleria tenerrima* (Fritsch) Hayek**

Mt Jablanica – 0,7 km W-SW from Labuniški Bačila, 1850 m, carbonate rocks, 41°16'4.22"N, 20°32'11.00"E, 21.6.2017, leg. A. Teofilovski (herb. A.T.); Mt Jablanica - Čuma, carbonate rocks, 1880–2000 m, 16.7.2017, observ. A. Teofilovski.



Figure 1. *Cephalaria ambrosioides* (Belička River) (photo A. Teofilovski)



Figure 2. *Crepis conyzifolia* (photo A. Teofilovski)



Figure 3. *Crepis reuteriana*, a - whole plant, b - flowering capitulas, c - fruiting capitula (photo A. Teofilovski)

This is S Balkan endemic, previously reported, though in some cases with question mark, from the following localities in western half of Macedonia: Mt Šar Planina (Turčin, ?Džinibeg, Selce), ?Mt Jakupica, Mt Golešnica (Patiška Reka), Mt Galičica, Mt Nidže (Bela Reka) (see Teofilovski 2011).

***Veronica prostrata* L.**

Mt Jablanica – Čuma, shrubby stony places, carbonate substrate, 1700 m, 41°13'34.28"N, 20°32'6.54"E, 14.6.2017, leg A. Teofilovski (herb. A.T.).

This species seems to be obscurely known in the flora of Macedonia, with only small number of reports: Mt Belasica (Gabrovo) (Stojanov 1921) and several localities in Skopje valley: Mt Žeden (Raduša, Dvorce) (Matvejeva 1965), Mt Osoj (Gorna Matka), and Vodno (Gorno Nerezi) (Krpač 2000). The report from Mt Žeden was not confirmed by Krpač (2000), in his monographic study of the genus *Veronica* in Skopje valley, and therefore should be considered as questionable.

***Vicia pisiformis* L.**

Mt Jablanica – near the road to Gorna Belica village, shrubby place, 1150–1190 m, 31.5.2017, leg. A. Teofilovski (herb. A.T.).

This is the most robust represent of the genus *Vicia* L. in the flora of Macedonia, previously known from three other mountain areas: Mt Baba (Ostrec, Velušina), Mt Šar Planina (Belovište) and Mt Suva Gora (Miletino) (see Teofilovski et al. 2012).

Conclusions

A list of 22 plants (20 species and two subspecies) from Mt Jablanica is presented, all of them being new for the flora of this mountain.

Crepis reuteriana is recorded for the first time in the flora of Macedonia.

Eleocharis quinqueflora is confirmed for the first time in the flora of Macedonia after about eight decades.

Carex ferruginea is confirmed for the first time for the territory of Macedonia based on specific herbarium collections.

The second locality on the territory of Macedonia is discovered for one subspecies and one species: *Epilobium roseum* subsp. *roseum* and *Rhinanthus mediteraneus*.

For the following five species a third locality on the territory of Macedonia is recorded: *Bromopsis inermis*, *Crepis conyzifolia*, *Eleocharis quinqueflora*, *Euphorbia lathyris*, *Inula bifrons* and *Medicago carstiensis*.

The forth locality is recorded for the following five species: *Alkanna scardica*, *Cymbalaria muralis*, *Scandix macrorhyncha*, *Seseli libanotis* and *Vicia pisiformis*.

One or more finding sites are added for the following rare plants in the flora of Macedonia: *Cephalaria ambrosioides*, *Corallorhiza trifida*, *Epilobium palustre*, *Hesperis matronalis*, *Peucedanum arenarium* subsp. *neumayeri*, *Sesleria tenerrima* and *Veronica prostrata*.

New southernmost point of the species range is established for *Alkanna scardica*.



Figure 4. *Euphorbia lathyris* (photo A. Teofilovski)



Figure 5. *Peucedanum arenarium* subsp. *neumayeri* (photo. A. Teofilovski)

Acknowledgements

The author is grateful to Vlado Matevski and an anonymous reviewer for their useful suggestions that improved the earlier draft of the manuscript.



Figure 6. *Rhinanthus mediterraneus* (photo A. Teofilovski)



Figure 7. *Seseli libanotis* (photo. A. Teofilovski)

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Значајни флористички податоци од планината Јабланица, Република Македонија

Ацо Теофиловски

Во оваа публикација авторот презентира листа од следните 22 виши растенија собрани на планината Јабланица (ЈЗ Македонија): *Alkanna scardica*, *Bromopsis inermis*, *Carex ferruginea*, *Cephalaria ambrosioides*, *Corallorhiza trifida*, *Crepis conyzifolia*, *Crepis reuteriana*, *Cymbalaria muralis*, *Eleocharis quinqueflora*, *Epilobium roseum* subsp. *roseum*, *Epilobium palustre*, *Euphorbia lathyris*, *Hesperis matronalis*, *Inula bifrons*, *Medicago carstiensis*, *Peucedanum arenarium* subsp. *neumayeri*, *Rhinanthus mediterraneus*, *Scandix macrorhyncha*, *Seseli libanotis*, *Sesleria tenerrima*, *Veronica prostrata* и *Vicia pisiformis*, кои се ретки или се со ограничено распространување во Македонија, додека видот *Crepis reuteriana* е нов вид во флората на земјата.

Клучни зборови: виши растенија, Македонија, флора, *Crepis reuteriana*.

***Geranium phaeum* L. (Geraniaceae) and *Scabiosa rhodopensis* Stoj. & Stef. (Dipsacaceae) in the flora of the Republic of Macedonia**

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Abstract

In this paper, new data of two, rather rare species in the flora of the Republic of Macedonia - *Geranium phaeum* and *Scabiosa rhodopensis*, are presented. *G. phaeum*, so far known only from literature data was found on Osogovo Mountains. That confirms the data of Urumov (1923), for the same mountains, but on other location. The only literature data for the presence of *S. rhodopensis* in the flora of the Republic of Macedonia, we find in the work of Soška (1939), for the locality "Lubenica" (=Labinica), in the region of Mariovo. In the same region, but on different location – Melnička Skrka (v. Melnica), we found well-developed population of *S. rhodopensis*.

Key words: distribution, new data, flora, rare species

Introduction

Although the flora of the Republic of Macedonia has been continuously studied by many botanists, for more than one and a half century, still data for new, rare or insufficiently known species appear. During the field-researches on Osogovo Mt, conducted in 2016, and, in the region of Mariovo, in 2010, populations of two rare species - *Geranium phaeum* and *Scabiosa rhodopensis* were found.

Material and methods

The material, collected during the field-researches, was processed by the standard methods. A relevant literature (Stojanoff and Stefanoff 1924, Hayek 1931, Tutin et al. 1968, Kokkini 1986, Micevski 2005, Petrova 2012) was consulted by the determination of the plant material. For the chorological data, the available floristic literature that considers the flora of the Republic of Macedonia, was checked out. Voucher specimens are deposited in the herbarium of the Macedonian Museum of Natural History (HMMNH).

Results and discussion

***Geranium phaeum* L.**

Mk: Osogovo Mountains (Kriva Palanka): village Stanci, along Stanečka River, 926 m a.s.l., N 42°10'41.2", E 22°22'56.2", 22.05.2016; Leg./Det. Z. Nikolov (HMMNH).

The genus *Geranium* L., in the flora of the Republic of Macedonia, is represented by 22 species (Micevski 2005). There are also some species of this genus that, according to the literature data, come on the territory of the Republic of Macedonia but their occurrence, during the investigations, was not confirmed. Consequently, those species were not listed in the Flora of the Republic of Macedonia. One of them is *G. phaeum* (Fig. 1, 2), recorded for the following mountains: Pelister (Jovanović 1904), Dautica (Petrović 1913), Osogovo Mt (Urumov 1923), Galičica (Černjavski 1943) and Bistra (Rizovski and Djekov, 1990). Beside the immense field-researches conducted on the whole territory of the Republic of Macedonia, Micevski (2005) did not confirmed the presence of the species. He assumed that *G. phaeum* might be confused by two, rather closely related species – *G. reflexum* L. and *G. aristatum*



Fig. 1. *Geranium phaeum* (Photo: Z. Nikolov)



Fig. 3. *Scabiosa rhodopensis* (Photo: Z. Nikolov)

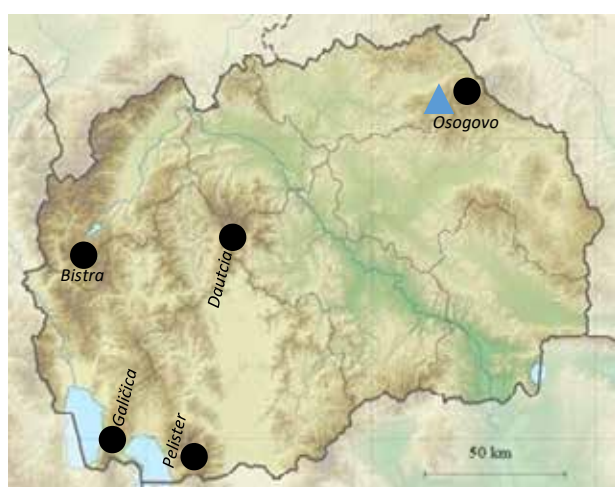


Fig. 2. Distribution of *Geranium phaeum* in the R. of Macedonia

▲ - new data ● - literature data



Fig. 4. Distribution of *Scabiosa rhodopensis* in the R. of Macedonia

▲ - new data ● - literature data

Frey. & Sint. In addition, all three species come on the same above-mentioned mountains.

During the field-researches in 2016, a vigorous population of *G. phaeum* was found on the Osogovo Mt. It grows mostly on shady and moisture places, along Stanečka River (v. Stanci, Kriva Palanka). This finding is

actually a confirmation of the data obtained by Urumov (1923) about the presence of this species on the Osogovo Mt, but on other location.

G. phaeum is a wide-spread species in most of Europe, including all Balkan countries, except Greece (Aedo 2009).

***Scabiosa rhodopensis* Stoj. & Stef.**

[Syn.: *Lomelosia rhodopensis* (Stoj. & Stef.) Greuter & Burdet; *S. graminifolia* subsp. *rhodopensis* (Stoj. & Stef.) Verlaque].

Mk: Mariovo: on the marble blocks of the locality "Melnička Skrka", in the vicinity of the abandoned village Melnica; N 41°10'39.9", E 021°47'06.7", 897 m.a.s.l, 18.06.2016; Leg./Det.: Z. Nikolov (HMMNH).

In the flora of the Republic of Macedonia, the genus *Scabiosa* is represented by several species. Among them, *S. rhodopensis* deserves special attention (Fig. 3, 4). This species, described by Stojanoff & Stefanoff (1924) for the Rhodopi Mt (Bulgaria) was so far considered to be endemic only for Bulgaria and Greece (Jasievič 1976; Kokkini 1986; Petrova 2012; Domina 2017). The only data of Soška (1939, locality "Lubenica" = Labinica, Mariovo) that *S. rhodopensis* comes on the territory of the Republic of Macedonia was not considered by the above-mentioned authors. The field-researches, conducted in the region of Mariovo, in 2010, when for the first time, well-developed population of this species was found on the locality "Melnička Skrka", in the vicinity of the abandoned v. Melnica (Fig. 4), confirmed the data of Soška (1939), about the presence of this species in the flora of the Republic of Macedonia. This finding was also confirmed in the years later, 2014 and 2016.

The distribution of *S. rhodopensis*, based on our new finding, that is, as we have already mentioned, confirmation of the data of Soška (1939), extends now from S. Bulgaria (Rhodopi Mt) and NE Greece (Falakron) to S. Macedonia (Mariovo).

It is interesting to mention that the latest investigations of the flora, in the region of Mariovo, also revealed data, for some other species, that match the case of *S. rhodopensis* (Matevski and Kostadinovski 1997, Matevski 2000-2001). Namely, the species *Chondrilla urumoffii* Degen and *Verbascum roripifolium* (Halacsy) I.K. Ferguson, considered to be endemic only for Bulgaria and Greece, were found in Mariovo, as well.

Acknowledgements

I wish to thank Vlado Matevski and Marjan Niketić for their valuable suggestions and comments on an earlier draft of the manuscript.

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***Geranium phaeum* L. (Geraniaceae) и *Scabiosa rhodopensis* Stoj. & Stef. (Dipsacaceae) во флората на Република Македонија**

Зоран Николов

И покрај тоа што флората на Република Македонија е предмет на проучување на поголем број ботаничари, во период подолг од 150 години, сепак податоци за нови, ретки или малку познати видови постојано се појавуваат. Во текот на теренските истражувања на Осоговските Планини (2016) и регионот на Мариово (2010), пронајдовме добро развиени популации од два, ретки за флората на Република Македонија, вида – *Geranium phaeum* и *Scabiosa rhodopensis*. Според Мицевски (2005), присуството на *G. phaeum*, и покрај интензивните теренски истражувања, особено на локалитетите за кои се наведува овој вид, не било потврдено. Тоа го поврзува со можноста овој вид да бил заменет со некој од блиските до него видови како *G. reflexum* L. и *G. aristatum* Freyn. & Sint., кои се развиваат, исто така, на наведените локалитети. Пронаоѓањето на *G. phaeum* на Осоговските планини е всушност потврда на податокот на Урумов (1923), за присуството на овој вид, на истиот планински масив. Единствениот податок за присуството на *S. rhodopensis*, на територијата на Република Македонија, го наоѓаме кај Soška (1939), за локалитетот “Лубеница” (= Лабиница), во регионот на Мариово. Во текот на нашите истражувања, на мермерните блокови на локалитетот Мелничка Скрка (с. Мелница), во регионот Мариово, пронајдовме добро развиена популација од *S. rhodopensis*, со што го потврдивме податокот на Soška (1939), за неговото присуство во флората на Република Македонија. *S. rhodopensis* е балкански ендемит, досега познат само за флорите на Бугарија и Грција. Со нашиот нов податок, кој е потврда на податокот на Soška (1939), ареалот на овој вид се проширува од јужниот дел на Бугарија и североисточниот на Грција, до јужниот дел на Република Македонија.

Клучни зборови: нови податоци, распространување, ретки видови, флора

Rediscovery of *Aldrovanda vesiculosa* L. and new data on its distribution in the Republic of Macedonia

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Abstract

Aldrovanda vesiculosa L., widely known as the waterwheel plant, is a rare aquatic plant that holds the status of a globally endangered (EN) species. Extant populations of *A. vesiculosa* are rare in Europe and there are only few sites left in the Balkans. In Macedonia, the species was last recorded in 1980 and according to many researchers the plant was considered as extinct in the area. In this paper, we present the recent finding of *Aldrovanda vesiculosa* and new data on its distribution in Macedonia, including an assessment on the specific habitat type and evident threats.

Key words: conservation, habitat, free-floating vegetation, Lake Prespa, threats, waterwheel plant

Introduction

Aldrovanda vesiculosa L. is a rare aquatic carnivorous plant that historically inhabited a wide variety of wetland habitats throughout Europe (Adamec 1995, Breckpot 1997), Asia, Africa and Australia (Cross 2012). Due to the decline in its natural habitat throughout its otherwise patchy distributional range, today *A. vesiculosa* is a rare "treat" and holds the status of a globally endangered (EN) species (Cross 2012). Extant populations of *A. vesiculosa* are rare in Europe (Adamec 1995, 1997, Breckpot 1997, Cross 2012) and there are only few sites in the Balkans (Breckpot 1997, Cross 2012). However, the number of localities with extant populations is "on the rise". Previously considered as extinct, the waterwheel plant was rediscovered in Serbia (Tomović et al. 2009) and Prespa Lake in Greece (Cross 2012). Generally, those areas known to sustain extant *A. vesiculosa* populations in the Balkans are mostly managed and protected areas like: "Srebarna" and "Dragoman Marsh Complex" (Bulgaria); the "Zasavica" Special Nature Reserve (Serbia) and Prespa Lake, all

listed as Ramsar sites (The Ramsar convention on wetlands 2017). Still, promotion and application of conservation measures within protected areas, without taking into account the landscape-scale effects over the intrinsic properties of wetland habitats, do not always succeed in sustaining those sensitive and vulnerable populations (as exemplified by the recent extinction of populations in the Obedska Bara Special Nature Reserve in Serbia, Cross 2012).

In Macedonia, the species was first registered by Micevski (1963) as part of the association *Lemneto-Spirodeletum polyrrhizae* W. Koch 1954 subass. *al-drovandetosum* (H-ic & Micev. 1960) H-ic & Micev. 1969. It is a very rare community known to be present only on one location in the littoral zone of Prespa Lake - below village Dolno Perovo (Micevski 1963, 2001). The plant was recorded in the shallow water fringed by common reed (*Phragmites australis*) beds, forming complex with other floating vegetation typical for this community (*Spirodela polyrrhiza*, *Lemna minor*, *Salvinia natans*, *Hydrocharis morsus-ranae*, *Utricularia australis*). Its presence was legitimately last recorded in 1980,

also by Kiril Micevski (MKNH 5857-5859; 5863-5867). Though *A. vesiculosa* was selected as an A (ii) species for appointing Prespa Lake littoral zone as an Important Plant Area (Melovski et al. 2010) according to many researchers the plant was considered as extinct in the area (Talevska et al. 2009, Angelova et al. 2014, Brajanoska et al. 2014).

In this paper, we present the recent finding of *Aldrovanda vesiculosa* at the known locality of village Dolno Perovo and new data on its distribution in Macedonia, including an assessment on the specific habitat type and evident threats.

Material and methods

Study area

The Prespa Lakes' watershed is located in the central-western part of the Balkan Peninsula and encompasses the Greater Prespa Lake that lies on the border of Macedonia, Greece and Albania and the Lesser Prespa Lake shared between Greece and Albania (Fig. 1). The Prespa Lakes' basin hosts unique habitats with international conservational importance (UNDP 2010, Wagner and Wilke 2011, Albrecht et al. 2012). Also, the Prespa region provides for 69 rural areas out of which 44 are in Macedonia (Perennou et al. 2009a). The main occupation of the local population inhabiting Prespa Lakes watershed is agriculture and the agricultural activities are most intensive in Macedonia, where 72% of the land is used for agricultural purposes. Macedonian part of Prespa region is known for apple production which is also the main source of income for generations as the region provides near 68% of the total apple production in the country (State statistical office of the Republic of Macedonia 2012). Intensive agriculture along with tourism and medium-size industrial enterprises contribute to overall environmental pressure. The continuous and intensive anthropogenic pressure led to increased eutrophication of the Prespa Lake (Krstić 2012, Petrovska et al. 2014) and triggered a "chain reaction" of ecosystem deprivation.

The unique twist of natural and anthropogenic attributes of the region caught the attention of a number of international donors and agencies (MAVA foundation, GEF, UNDP, SDC, KfW, GIZ) followed by implementation of various project that aimed to face the environmental challenges. Starting with the trilateral agreement for establishing a protected area

"Declaration on the creation of the Prespa Park and the Environmental Protection and Sustainable Development of the Prespa Lakes and their surroundings" signed in 2002, a number of NGOs committed for joint efforts to protect the Prespa Lakes watershed (Maragou and Mantziou 2000; Society for the Protection of Prespa et al. 2005). In 2010 another trilateral agreement "Agreement on the protection and Sustainable Development of the Prespa Park Area" (EU 2011) revived the "worn hopes" for transboundary conservation and sustainable management of the Prespa Lakes. In 2014, the Ohrid-Prespa area was declared as a transboundary UNESCO biosphere reserve. This international designations draw further attention to the importance of sustaining and managing the existing national categories of protected sites in the Prespa region. Particular attention is paid to Nature Park "Ezerani" where numerous conservation activities are foreseen (MES 2012, Ceroni 2013, Angelova et al. 2014) in order to sustain and improve the state of this wetland ecosystem. Recognizable by the large surface of reedbeds, Ezerani hosts a complex of plant communities and a great diversity of animal species, especially birds. The importance of reedbeds lies in its heterogeneity and the linking habitats of immersed, floating or submersed vegetation within (Angelova et al. 2014).

A decade of conservational activities and awareness raising has strived towards a measurable improvement of the overall integrity of the Prespa ecosystems (Perennou et al. 2009a, 2009b; Sekovski 2017). The Prespa region is still a pilot area for implementation of numerous conservational activities with joint transboundary efforts (PrespaNet 2017) to sustain and further improve the ecosystem of Lake Prespa.

Field surveys

The sites for detailed research were selected in accordance with the available historical information on the species range and distribution (Micevski 1963) and its habitat requirements (Adamec 1995, 1997, Breckpot 1997). In 2016 Prespa Lake shoreline was checked through continuous movement and the sites where *A. vesiculosa* was present were marked with a GPS point. The presence of *A. vesiculosa* was also expected in other localities in NP "Ezerani" and its immediate vicinity but due to the thick impassable belt of reed those sites could not be assessed. In 2017, the same localities visited a year before, were re-checked.

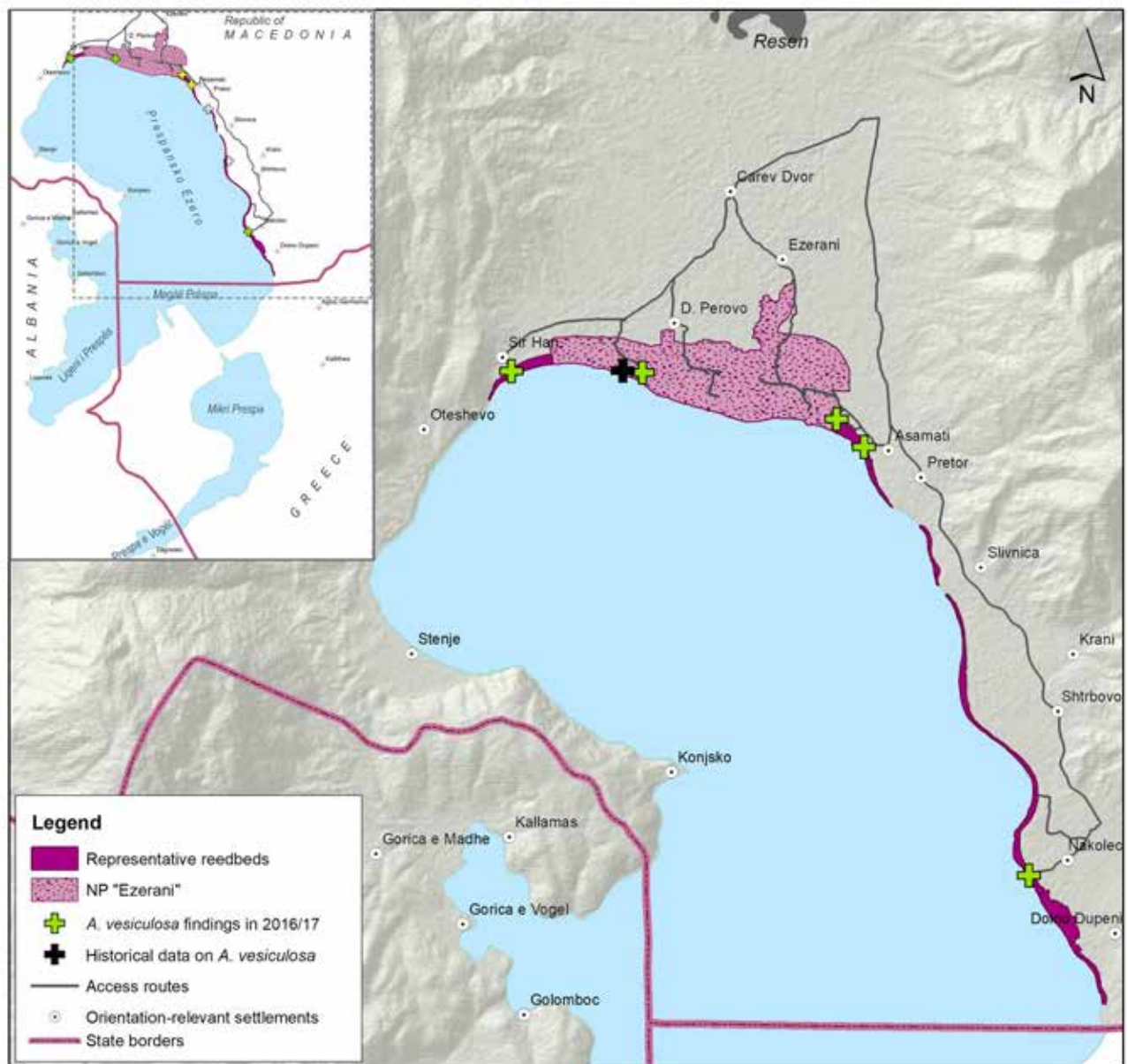


Figure 1. Distribution of *Aldrovanda vesiculosa* L. along Prespa Lake littoral in Macedonia including a general geographical representation of both Greater and Lesser Prespa Lakes

Laboratory work

Plant specimens were identified in accordance with Flora of the Republic of Macedonia (Micevski 1985, 1998, 2001) and Flora Europaea (Tutin et al. 1972, 1980). Plant nomenclature followed The Euro+Med PlantBase (Euro+Med 2006). The habitat types in which *A. vesiculosa* can be found, or is associated with, in Prespa were listed with reference to EUNIS (Davies et al. 2004). Taxon vulnerability was discussed in accordance with the data provided under the IUCN Red List of threatened species (Cross 2012) and assessed according to the guidelines of IUCN (2012). Collected specimens are stored in Herbarium Melovskiorum (MKMEL 11593, 11594).

Results and discussion

In 2016 abundant populations of *A. vesiculosa* were recorded in four sites within NP "Ezerani" and its immediate vicinity, and in one site Nakolec (Fig. 1, Tab. 1). The *A. vesiculosa* plant was observed in patches of shallow water arranged in-between the lake and the reedbed, mainly along the abandoned boat passages among the reeds, formerly used by fishermen in the area (Fig. 2). Also, the sites were always in the mere vicinity of the inflow of an intermittent lowland rivulets and streams. The *A. vesiculosa* population creates a complex with other floating or submersed plants, mainly: *Hydrocharis morsus-ranae* and *Salvinia natans*, includ-

ing other free-floating and rooted submerged vegetation of nutrient-rich waterbodies (*Najas marina* subsp. *major*, *Lemna minor*, *Utricularia australis*, *Ceratophyllum demersum*, *Myriophyllum spicatum*, *Potamogeton perfoliatus*).

Generally, it was observed that the preferred habitat of *A. vesiculosa* in Prespa Lake is very diverse and includes various floating or submersed plant communities that are fringed by reedmace—common reed *Scirpo-Phragmitetum* association. Considering this, it can be presumed that *A. vesiculosa* presence should be expected on few more localities along the strip of the most representative reedbeds along Prespa Lake shoreline (as assessed by Nikolov et al. 2012, elaborated in Angelova et al. 2014) - Nature Park Ezerani, Pretor, Nakolec and Shtrebovo (Fig. 1). Total reedbed area along the Macedonian shore of the lake was assessed to be 3.2 km² (Nikolov et al. 2012) and this area could be considered as potential Area of Occupancy (AOO) of *A. vesiculosa*.

Though *A. vesiculosa* is mostly observed to accompany other plants, it prospers only as long as the plant community remains open. On the sites where *Hydrocharis morsus-ranae* has dominant coverage, *A. vesiculosa* was absent. In general, *A. vesiculosa* is “sensitive to competition with filamentous algae and vascular aquatic plants that form denser stands” (Adamec 1997) and when in microhabitat of *Hydrocharidetum morsus-ranae* Langendonck 1935, *A. vesiculosa* specimens are suppressed (Kamiński 1987).

The habitat types in which *A. vesiculosa* can be found, or is associated with, in Prespa are listed under the C1.2 : Permanent mesotrophic lakes, ponds and pools and C1.3 : Permanent eutrophic lakes, ponds and pools with reference to EUNIS (Davies et al. 2004). Specifically: C1.222 Floating *Hydrocharis morsus-ranae* rafts; C1.225 Floating *Salvinia natans* mats; C1.226 Floating *Aldrovanda vesiculosa* communities; C1.32 Free-floating vegetation of eutrophic waterbodies and C1.33 Rooted submerged vegetation of eutrophic waterbodies. Details on the localities and the observed habitat threats are recorded in Tab. 1.



Figure 2. Typical *A. vesiculosa* habitat along Prespa Lake littoral (a) and *A. vesiculosa* L. (b)

The *A. vesiculosa* sites were re-visited in 2017 and it was noted that the number of sites was reduced. It was observed that there is a decrease of water level, as a result of typical fluctuations for Prespa Lake, most probably caused by natural variations in rainfall (Perennou et al. 2009a). The water level reduction resulted with reduction in available habitat and may have led to change of ecological parameters and increase of nutrient concentration on sites. In that direction, on a long-term, climate change could also be identified as a potential threat. Organic and solid waste disposal and abandonment of traditional fishing practices (encroachment of existing boat passages among the reeds) in exchange of intensive fishing on more availa-

ble and open sites, as use of nets and motor boats, could also be indicated as relevant contemporary threats.

The current presence of *A. vesiculosa* in the Prespa Lake littoral may be a “yield” of the joint conservation efforts and awareness rising in the Prespa Lake watershed. Wetland restoration and improved management of the Nature Park “Ezerani” in addition to the marked improvement of physical-chemical parameters in the Prespa Lake as stated in Sekovski (2017), may have allowed for Lake Prespa again to meet the ecological requirements of *A. vesiculosa* as described in (Kamiński 1987; Adamec 1995, 1997). Following, the re-appearance of *A. vesiculosa* on the Macedonian part of

Table 1. Locality specifics and observed habitat threats on all sites visited along Prespa Lake shoreline in 2016 and 2017.

Locality	Coordinates	Threats
Sir Han	X 20.941638 Y 41.003149	Most eminent threats were agriculture/organic waste disposal and solid waste discharge. In terms of species abundance, the habitat condition in 2016 could be assessed as more favorable than in 2017, mainly due to the observed decrease of water level and subsequent change of environmental parameters.
Ezerani (Dolno Perovo)	X 20.980713 Y 41.002819	No significant threats were recorded but solid waste disposal was observed in the mere vicinity of the locality. In terms of species abundance, the habitat condition in 2016 could be assessed as more favorable than in 2017, mainly due to the observed decrease of water level and subsequent change of environmental parameters.
Ezerani (Asamati)	X 21.038710 Y 40.992300	Most eminent threats were agriculture/organic and solid waste disposal and intensive fishery (use of nets and motor boats). In terms of species abundance, the habitat condition in 2016 could be assessed favorable. In 2017 the <i>A. vesiculosa</i> presence was not recorded.
Ezerani (Asamati)	X 21.046914 Y 40.986007	Most eminent threats were agriculture/organic and solid waste disposal and intensive fishery (use of nets and motor boats). In terms of species abundance, the habitat condition in 2016 could be assessed favorable. In 2017 the <i>A. vesiculosa</i> presence was not recorded.
Krani	X 20.941653 Y 41.003178	Most eminent threats were solid waste disposal and wastewater discharge and tourism. <i>A. vesiculosa</i> presence was not recorded.
Pretor	X 21.061495 Y 40.969747	Most eminent threats were solid waste disposal and wastewater discharge and tourism. <i>A. vesiculosa</i> presence was not recorded.
Nakolec	X 21.095974 Y 40.889005	Most eminent threats were agriculture/organic waste disposal and fishery (use of nets and motor boats). In terms of species abundance, the habitat condition in 2016 could be assessed as more favorable than in 2017, mainly due to the observed decrease of water level and subsequent change of environmental parameters. The presence of <i>A. vesiculosa</i> is also expected toward the bordering locality of Metileec (below village Dolno Shtrbovo). Due to the thick impassable belt of reed, the site could not be accessed without boat.

Prespa Lake could be a result of re-germination of dormant seeds. Still, the mechanisms regulating *A. vesiculosa* germination in its natural environment remain unresolved (Cross et al. 2016) and in the case of Prespa Lake, re-inhabiting by dispersal should also be considered. In this context it is worth noting that *A. vesiculosa* was too re-discovered on the Greek side of Prespa Lake in 2011 (Cross 2012). Considering that Prespa Lake is an interconnected system the plant may have been dispersed by the natural water flow or by birds - known to have an important role for short distance spread of *A. vesiculosa* (Breckpot 1997).

Considering the natural vulnerability of Prespa Lake ecosystem sensitive to lake level oscillations and anthropogenic impacts constant monitoring of the *A. vesiculosa* population is needed in order to detect the actual causes of fluctuation of its population in numbers and sites.

In view of its limited distribution in the country and following its global conservation status as endangered (EN), as the fact that *A. vesiculosa* has been regarded as critically endangered throughout most of Europe (Cross 2012), it is suggested that the species is placed in the group of critically endangered species (CR) within the territory of Macedonia under B2(a,c) and/or C2(b) criteria (IUCN 2012).

Furthermore, this paper encourages complementation and revision on data deficiency and a joint regional detailed assessment of the species distribution in order to provide an objective insight into the national and regional threat status of this species.

Acknowledgements

The presence of *A. vesiculosa* in 2016 was registered during the monitoring done within the project *Conserving wild plants and habitats for people in the south and east Mediterranean* (IPAmEd project) run by Plantlife UK and IUCN and sponsored by MAVA foundation, nationally coordinated by the Macedonian Ecological Society.

The distribution data in 2017 were obtained during the field studies organized in the frame of the 'Monitoring and conservation of lake-bound species and habitats', as part of the project: "Conservation and Sustainable Use of Biodiversity at Lakes Prespa, Ohrid and Shkodra/Skadar (CSBL), funded by Federal Ministry for Economic Cooperation and Development (BMZ),

implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit – GIZ and EuroNatur (Partnered with Ministry of Environment, Forestry and Water Administration of Albania, Ministry of Environment and Physical Planning of Macedonia, Ministry of Sustainable Development and Tourism of Montenegro).

We thank both reviewers for their contribution, especially Bojan Zlatković for his valuable input on an earlier version of the manuscript.

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Повторно откривање на *Aldrovanda vesiculosa* L. и нови податоци за нејзината дистрибуција во Република Македонија

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Воденичарчето (*Aldrovanda vesiculosa* L.) е ретко акватично растение кое има статус на глобално загрозен вид (EN). Природните популации на *A. vesiculosa* се ретки во Европа, а нејзиното распространување на Балканот е ограничено на неколку локалитети. Во Македонија, видот последен пат бил регистриран во 1980 година, а според многу истражувачи воденичарчето се сметало за исчезнато. Во трудот се дискутираат најновите податоци за распространувањето на *A. vesiculosa* во Македонија, специфичниот тип на живеалиште и евидентните закани. Воденичарчето е регистрирано на пет локалитети по должина на крајбрежниот појас на Преспанското Езеро. Од 2016 до 2017 година забележано е намалување на бројот на локалитети и промени во видовиот состав на заедниците на слободно-пловечка и флотантна вегетација. Имајќи ја предвид природната ранливост на Преспанско Езеро и антропогениот притисок врз овој екосистем, неопходен е постојан мониторинг на популацијата на *A. vesiculosa* со цел да се евидентираат вистинските причини за флукуација во популациите на воденичарчето во однос на бројност и локалитети. Со оглед на ограничената дистрибуција на воденичарчето во Македонија, притоа имајќи го предвид нејзиниот глобален статус на како загрозен вид (EN), како и тоа дека *A. vesiculosa* има статус на критично загрозен вид (CR) низ поголемиот дел од земјите во Европа, се предлага овој вид да се вклучи на листата на критично загрозени видови (CR) на територијата на Македонија според критериумите B2 (a, c) и/или C2 (b) (IUCN 2012). Воедно, неопходна е заедничка регионална детална проценка за постојната дистрибуција на воденичарчето, како и надополнување и ревизија на недостигот на податоци со цел да се обезбеди објективен увид во националниот и регионалниот статус на загрозеност на овој вид.

Клучни зборови: воденичарче, закани, зачувување, Преспанско Езеро, слободно-пловечка вегетација, хабитат

***Arianta arbustorum* (Linnaeus, 1758) (Mollusca: Gastropoda, Helicidae), a new snail for the fauna of the Republic of Macedonia**

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Abstract

The Copse Snail - *Arianta arbustorum* (Gastropoda: Helicidae) was for the first time recorded on the territory of Republic of Macedonia, in the region of city Skopje. The genus *Arianta* is newly recorded for Macedonian gastropod fauna, also.

Key words: Copse Snail, "Gastropoda terrestria", first record, museum collection

Introduction

The Copse Snail *Arianta arbustorum* has the largest distribution of all snail species within the subfamily Ariantinae: it is found in most of North and Central Europe, but it has not been confirmed in Belorussia and the southernmost parts of the continent: Portugal, Spain, Greece and Macedonia, as well as the Mediterranean Islands (Stanković et al. 2006, Groenenberg et al. 2012, Falkner et al. 2013). According to Haase et al. (2003), the current distribution of the Copse Snail largely coincides with the parts of Europe that were repeatedly covered with ice or subjected to permafrost during the Pleistocene ice ages.

It has been introduced to Russia (Moscow region) (Schileyko, 2013), North America (only known from Canada, McAlpine et al. 2009, McAlpine and Forsyth, 2014). It is not yet established in the USA, but it is considered as a pest with low pest potential, and an invasive species that can represent a potentially serious threat which could negatively affect agriculture, natural ecosystems, human health or commerce (Cowie et al. 2009, McAlpine and Forsyth 2014).

The Copse Snail shows a high degree of adaptation to different living conditions such as the type of habitat and altitude. It inhabits deciduous forests, humid meadows, rocky places, gardens, pastures along ditches and streams and marshes (Baur 1993, Lelo et al. 2002). It is also found in disturbed habitats, but always

requires humidity, and locally can tolerate non-calcareous substrate. In the Alps it has been found up to 2,700 m asl, in Britain up to 1,200 m, in Bulgaria up to 1,500 m, and in Bosnia and Herzegovina up to 600 m (Lelo et al. 2002, Welter-Schultes 2012).

The shell of *Arianta arbustorum* is brown with numerous pale yellowish rows of spots and usually with a brown band above the periphery, occasionally yellowish, reddish or with greenish hue, weakly striated. The animal is usually dark (Welter-Schultes 2012). Shell is depressed to globose, moderately thin, with 5-6 not very convex whorls. Body whorl markedly descending in front, evenly rounded. Aperture ovate to rounded, oblique; margins reflexed, sharp, with a strong inner lip. Umbilicus narrow to almost closed. Height is 10-24 mm, diameter 15-24 mm (Schileyko, 2013).

It has been classified in the category Least Concern on the IUCN Red List of Threatened Species (Falkner et al. 2013).

Material and methods

The specimens of *Arianta arbustorum* which are deposited in the museum collection of land snails were hand collected during 2008, 2009, 2013, 2014, 2015 and 2017 on five various localities (Fig. 1) along the right bank of the river Vardar in the Skopje city region. The data for the collected and analyzed samples are

Table 1. Inventory of the specimens of *A. arbustorum* in the Macedonian Museum of Natural History

Inventory number	Locality	Date	Collector	Number of samples
ПММ-3-П-6165	Aerodrom, Skopje region	06.03.2008	E. Stojkoska	15
ПММ-3-П-6166	Aerodrom, Skopje region	07.02.2009	E. Stojkoska	2
ПММ-3-П-6057	Vill. Orešani, Skopje region	07.11.2013	E. Stojkoska	1
ПММ-3-П-6056	Vill. Orešani, Skopje region	24.07.2014	E. Stojkoska; N. Stefanovska	21
ПММ-3-П-6167	Vill. Pakoševo, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	3
ПММ-3-П-6168	Vill. Pakoševo, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	6
ПММ-3-П-6370	Vill. Orešani, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	52
ПММ-3-П-6371	Vill. Orešani, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	28
ПММ-3-П-6372	Vill. Dolno Lisiče, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	9
ПММ-3-П-6373	Vill. Dolno Lisiče, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	1
ПММ-3-П-11315	Vill. Zelenikovo, Skopje region	28.08.2017	E. Stojkoska	11

given in Tab. 1. A total of 149 samples (dry shells and live specimens preserved in 75% and 96% alcohol) of *Arianta arbustorum* were analyzed.

For the need of determination, the morphological analysis of dry shells was made and dissection of numb live specimens for the isolation of the sex system was also done.

Results and discussion

Morphology

The shells of the samples of *Arianta arbustorum* which are found along the bank of the Vardar River have typical characteristics for the species (Fig. 2). They have a globular form with usually 5-6 whorls and narrow to almost closed umbilicus. The color of the shell at the base is brown with yellow streaks and spots. The animal is dark. The dimensions of the largest shell are: width – 21 mm and height – 11 mm. The size of the fully-grown specimens corresponds to the typical size for the species (Groenenberg et al. 2012, Welther-Schultes 2012, Schileyko 2013).

Anatomy

The dissection of fresh animals for isolation of the sex system showed that the construction of the sex system corresponds to that given by Beese et al. (2005) and Schileyko (2013). Flagellum is long, vermiform, epiphallus is about two times shorter. Penis is swollen,



Figure 1. A map of localities from which the samples were collected

bulky. Penial retractor is attaching to the epiphallus below its middle. The dart sac is relatively small, elongated to subglobose. There are two very long mucus glands, always undivided. Spermathecal stalk is with long neck and the reservoir is attending the albumen gland.

Habitats

The Macedonian population of the species was found very close to the river Vardar, in the riparian vegetation, on wet substrates under trees (*Populus*, *Alnus*, *Salix*, *Betula*), in the undergrowth, grass or leaf litter.



Figure 2. External view of adult Macedonian specimens

(Fig. 4). These habitats are known to be suitable for the species (Lelo et al. 2002, Welther-Schultes 2012).

Origin

The localities in Macedonia from which the samples of the Copse Snail were collected are not much further south than the southernmost localities of the species on the Balkan Peninsula (Stara Planina in Bulgaria, Groenenberg et al. 2012). Therefore, we can not be conclusive if the species has been native for the country, or it is an introduced species. If the later is a case, its introduction probably happened with the importation of garden plants, as the region where the samples were collected is very rich of gardens.

Acknowledgements

We are grateful to an anonymous reviewer for the useful suggestions to the earlier version of the manuscript.

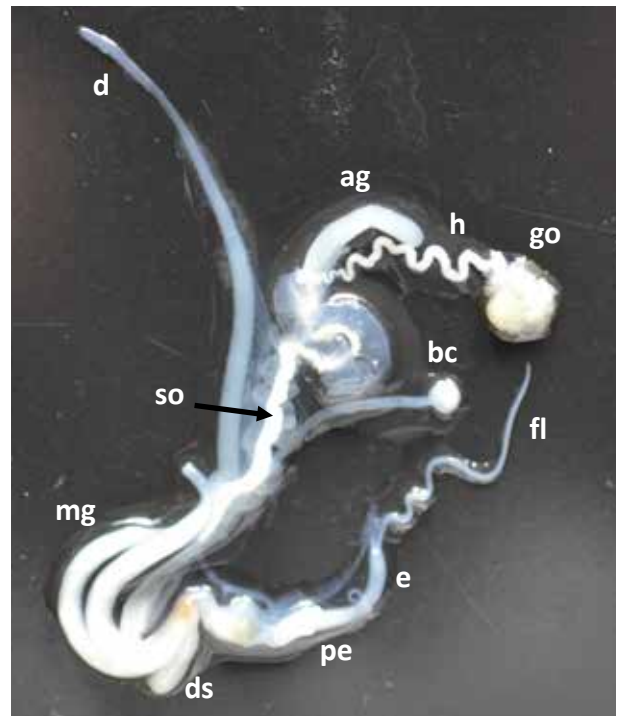


Figure 3. Sexual system of *Arianta arbustorum* from a specimen from Macedonia. Compare the anatomy with the figure 1b in Beese et al. (2005). Abbreviations: ag - albumen gland; bc - bursa copulatrix, d - diverticulum, ds - dart sac, e - epiphallus, fl - flagellum, go - gonad, h - hermaphroditic duct, mg - mucus glands, pe - penis, so - spermoviduct, vd - vas deferens;

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Figure 4. Habitats of *Arianta arbustorum* along river Vardar, Skopje city area, Macedonia

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***Arianta arbustorum* (Linnaeus, 1758) (Mollusca: Gastropoda, Helicidae), нов полжав за фауната на Република Македонија**

Емилија Стојкоска и Наташа Стефановска

Дамкавиот полжав *Arianta arbustorum* (Gastropoda: Helicidae) е за прв пат најден на територијата на Република Македонија, во околината на Скопје. Овој наод исто така претставува и прво наоѓање на родот *Arianta* во Македонската фауна.

Клучни зборови: дамкав полжав, музејска колекција, прв наод, "Gastropoda terrestria"

Ground beetle fauna (Coleoptera, Carabidae) of Lepenec river valley in the Republic of Macedonia

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Abstract

Faunistic data on ground beetles (Coleoptera, Carabidae) in riparian habitats of Lepenec river valley (north of Skopje, Republic of Macedonia) are presented in this study. The material was collected by pitfalls and hand collection. In total, 354 specimens of 56 ground beetle species were established. Highest numbers of species were recorded in muddy banks and wet meadows, while the lowest number was recorded in the degraded Poplar stands. *Dyschirius substriatus priscus* represents a new record for the Macedonian fauna. *Dyschirius laeviusculus*, *Parophonus planicollis*, *Ophonus ardosiacus* and *Ditomus calydonius* can be considered as rare species for Macedonia.

Key words: Carabidae, ground beetles, riparian habitats

Introduction

Species composition of ground beetles (Coleoptera, Carabidae) fauna of Macedonia is well known with 577 species (Hristovski and Guéorguiev 2015, Chehlarov et al. 2016, Neri 2017). However, many regions in Macedonia are still insufficiently explored. Hence, only few data on ground beetles of Lepenec river valley have been published only recently (Hristovski and Guéorguiev 2015). These data concern the area of the Lepenec inflow into river Vardar. The ground beetle fauna of the rest of the Lepenec valley in Macedonia has not been studied so far. Thus, the aim of this paper is to present the fauna of ground beetles of Lepenec river valley and degree of its association with riparian habitats.

Material and methods

River Lepenec is left tributary of river Vardar. Its headwaters are on Šar Planina mountain in Kosovo. Its total length is 75 km, out of which 15 km are in the Republic of Macedonia.

The study of ground beetles was conducted in the Macedonian part of river Lepenec. This part has characteristic of relatively slow running waters at an altitude between 350 and 250 m a.s.l. with marked alluvial sedimentation (Hadži Pecova et al. 2017).

The stream integrity of Lepenec river basin was assessed from good (entrance point from Kosovo in Macedonia) through fair to poor at the confluence in river Vardar while the main river valley itself was assessed as poor in all of its length in Macedonia, especially in terms of riparian vegetation cover, presence of wetlands, etc. (Jovanovska et al. 2013).

Ground beetles were collected by pitfall traps (vinegar+formaline solution was used as an attractant and for preservation of beetles) and by hand collection in seven localities (Fig. 1) in spring of 2016 and 2017. The following habitats were studied: Poplar stands with natural origin, but degraded (D); sandy and muddy river banks (C and B, respectively), meadows (A), wet meadows (F) and dry grasslands (E) and sparsely vegetated river bank (G). The material is kept in private collection of the author (cSH).



Figure 1. Study area in the Lepenec watershed with depicted sampling sites (A-G)

Results and discussion

In total, 354 specimens of 56 ground beetle species were identified during the research. This number included also the species published for the Lepenec inflow into river Vardar – Locality G in Tab. 1 (Hristovski and Guéorguiev 2015). The faunistic composition shows the domination of species characteristic for riparian habitats and smaller number of species that are connected to dry grassland habitats. The most common species were *Dyschirius agnatus*, *Stenolophus teutonius*, *Elaphrus aureus aureus*, *Limodromus assimilis*, *Chlaenius nitidulus* and *Bembidion subcostatum* vau (Tab. 1).

The richest habitats in species were muddy banks and wet meadows (28 and 27 species, respectively). The lowest number of species was recorded in Poplar stand, probably to the high level of degradation of this habitat in Lepenec valley (Jovanovska et al. 2013, Hadži Pecova et al. 2017) due to land conversion and wood exploitation. Otherwise, higher species diversity can be expected in better preserved Poplar habitats in Europe (Allegro and Sciaky 2003).

Dyschirius substriatus priscus represents a new record for the Macedonian fauna. This subspecies is distributed on the Pyrenees, Balkan Peninsula (Albania, Bulgaria, Greece, Romania), lower Dnieper area and Turkey (Fedorenko 1996, Loeb and Smetana 2003, Arndt et al. 2011).

Dyschirius laeviusculus, *Parophonus planicollis*, *Ophonus ardosiacus* and *Ditomus calydonius* can be considered rare species in Macedonia due to the small number of known localities (Hristovski and Guéorguiev 2015).

Acknowledgements

The study of ground beetles was supported by the City of Skopje administration within the study for establishment of green corridors along rivers Lepenec and Serava, elaborated by Dekons-Ema Ecological Consultancy (Skopje). For the help during the field work I would like to thank Trajče Mitev (Skopje) and Marjan Komnenov (Skopje). I am grateful to Lucija Šerić-Jelaška and Bobi Guéorguiev for their useful comments on the manuscript.

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Table 1. Ground beetles (Coleoptera, Carabidae) collected in Lepenec river valley

Species	A	B	C	D	E	F	G	Total
<i>Agonum</i> sp.		8				2		10
<i>Agonum viduum</i> (Panzer, 1796)		3				1		4
<i>Amara communis</i> (Panzer, 1797)	1							1
<i>Anchomenus dorsalis</i> (Pontoppidan, 1763)	6	2						8
<i>Anisodactylus binotatus</i> (Fabricius, 1787)	6	3						9
<i>Asaphidion flavipes</i> (Linnaeus, 1761)	11	4						15
<i>Bembidion articulatum</i> (Panzer, 1796)		4	9					13
<i>Bembidion azurescens azurescens</i> Dalla Torre, 1877		5	10					15
<i>Bembidion bualei bualei</i> Jacquelin du Val, 1852						1		1
<i>Bembidion dalmatinum dalmatinum</i> Dejean, 1831		1						1
<i>Bembidion splendidum splendidum</i> Sturm, 1825		1	1			3		5
<i>Bembidion subcostatum</i> vau Netolitzky, 1913	2	6	1			11		20
<i>Carabus granulatus interstitialis</i> Duftschmid, 1812	2							2
<i>Chlaenius festivus festivus</i> (Panzer, 1796)	1	5						6
<i>Chlaenius nitidulus</i> (Schrank, 1781)	5	16						21
<i>Chlaenius vestitus</i> (Paykull, 1790)	1	13				1		15
<i>Cicindela campestris campestris</i> Linnaeus, 1758						1		1
<i>Clivina collaris</i> (Herbst, 1784)	4	6				1		11
<i>Diachromus germanus</i> (Linnaeus, 1758)	1		1					2
<i>Ditomus calydonius calydonius</i> (P. Rossi, 1790)							1	1
<i>Dyschirius agnatus</i> Motschulsky, 1844		20	8					28
<i>Dyschirius intermedius</i> Putzeys, 1846	2		2					4
<i>Dyschirius laeviusculus</i> Putzeys, 1846		1						1
<i>Dyschirius substriatus priscus</i> J.Muller, 1922		1						1
<i>Elaphrus aureus aureus</i> P. W. J. Müller, 1821	4	19						23
<i>Harpalus autumnalis</i> (Duftschmid, 1812)	3							3
<i>Harpalus calceatus</i> (Duftschmid, 1812)							1	1
<i>Harpalus froelichii</i> Sturm, 1818							2	2
<i>Harpalus progrediens</i> Schaubberger, 1922	4							4
<i>Harpalus rubripes</i> (Duftschmid, 1812)	3				3			6

Table 1. Ground beetles (Coleoptera, Carabidae) collected in Lepenec river valley (continuation)

Species	A	B	C	D	E	F	G	Total
<i>Harpalus serripes serripes</i> (Quensel, 1806)				2	3	1		6
<i>Harpalus solitaris</i> Dejean, 1829							1	1
<i>Harpalus subcylindricus</i> Dejean, 1829	1				1	2		4
<i>Limodromus assimilis</i> (Paykull, 1790)	1	20				1		22
<i>Myas chalybaeus</i> (Palliard, 1825)				1				1
<i>Omophron limbatum</i> (Fabricius, 1777)	1	1						2
<i>Ophonus ardosiacus</i> (Lutschnik, 1922)							2	2
<i>Ophonus cribricollis</i> (Dejean, 1829)							1	1
<i>Ophonus oblongus</i> (Schaum, 1858)							2	2
<i>Ophonus rufibarbis</i> (Fabricius, 1792)				1				1
<i>Ophonus subquadratus</i> (Dejean, 1829)	2							2
<i>Paranchus albipes</i> (Fabricius, 1796)		3						3
<i>Paratachys micros</i> (Fischer von Waldheim, 1828)			1					1
<i>Parophonus dejeani</i> (Csiki, 1932)	14							14
<i>Parophonus hirsutulus</i> (Dejean, 1829)	1				3	3		7
<i>Parophonus maculicornis</i> (Duftschmid, 1812)	6							6
<i>Parophonus planicollis</i> (Dejean, 1829)							1	1
<i>Poecilus cupreus cupreus</i> (Linnaeus, 1758)		1						1
<i>Pterostichus anthracinus</i> (Illiger, 1798)	1	2				2		5
<i>Pterostichus elongatus</i> (Duftschmid, 1812)							1	1
<i>Pterostichus leonisi</i> Apfelbeck, 1904	1	1						2
<i>Pterostichus nigrita</i> (Paykull, 1790)		1						1
<i>Sinechostictus tarsicus</i> (Peyron, 1858)	1	2				5		8
<i>Stenolophus discophorus</i> (Fischer von Waldheim, 1823)		1						1
<i>Stenolophus teutonius</i> (Schrank, 1781)	20	3	1					24
<i>Syntomus obscuroguttatus</i> (Duftschmid, 1812)					1	1		2
Total number of specimens	105	153	34	4	11	35	12	354

A: Skopje, Lepenec, meadow, 310 m a.s.l., 05-19.06.2016. B: Skopje, Lepenec, muddy bank, 310 m a.s.l., 05-19.06.2016. C: Skopje, Lepenec, sandy bank, 310 m a.s.l., 05.06.2016. D: Skopje, Lepenec, Poplar stand, 285 m a.s.l., 05-19.06.2016. E: Skopje, Lepenec, dry grassland, 290 m a.s.l., 05-19.06.2016. F: Skopje, Lepenec, wet meadows, 250 m a.s.l., 25.03.2017. G: Skopje, Momin Potok, Lepenec inflow into Vardar, 250 m a.s.l., 04.08.2004 (published in Hristovski & Guèorguiev 2015).

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Фауна на тркачите (Coleoptera, Carabidae) во долината на реката Лепенец во Република Македонија

Славчо Христовски

Во оваа студија се прикажани фаунистички податоци за тркачите (Coleoptera, Carabidae) за крајречните хабитати во долината на реката Лепенец (северно од Скопје, Република Македонија). Од вкупно уловените 354 примероци беа констатирани 56 видови тркачи. Најголем број видови беше регистриран по калливите брегови на реката и влажните ливада, а најмал во деградираните топоволи состоини. *Dyschirius substriatus priscus* претставува нов вид за фауната на Република Македонија. Видовите *Dyschirius laeviusculus*, *Parophonus planicollis*, *Ophonus ardosiacus* and *Ditomus calydonius* се ретки видови во македонската фауна.

Клучни зборови: крајречни живеалишта, тркачи, Carabidae

Annotated check-list of the birds of the Republic of Macedonia

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Abstract

All published or accessibly reported data on bird species so far recorded in the Republic of Macedonia are overviewed. In total, for 318 species the information is considered to be reliable, and for further 16, concern on the identification and/or reporting is expressed. Accepted species belong to 189 genera, 63 families and 18 orders. For as many as 53 accepted species, there are not more than ten records in the country, and for them detailed information is presented. Where appropriate, the last cases of breeding, the single cases of breeding or the most recent observations, are reported. Within the bird fauna of the Republic of Macedonia, 108 species are considered monotypic. For all other documented subspecies are listed. The presence of more than one subspecies has been reported in 13 species.

Key words: bird taxa, critical assessment, literature review

Introduction

The bird fauna in Macedonia as among the most poorly studied in Europe. The first attempt to produce a national check-list was done by Dimovski and Matvejev (1955), where the authors report 278 species. Later on, Matvejev and Vasić (1973, 1976) report 302 species (including 11 species for which they have expressed concerns in the validity of the finding, or have assumed the presence in the country). Micevski (2003) lists 314 species, while Petkovski (2009) increases this number to 328 (including 7 “unlikely to be confirmed for Macedonia or in need of further verification”). However, in almost all of these lists omissions of published records have been made, or species not actually confirmed within the territory of Macedonia have been included. Moreover, in recent years there were several well documented sightings of vagrant species previously unrecorded in Macedonia, as well as few fresh cases of confirmations for species with dynamic range within Balkans. And finally, an year ago appeared the catalogue of Bird Collections from Macedonia (Vasić et al. 2016) with a number of clarifications and information poorly known before.

Therefore, the moment arrived for a new attempt to review the published data, to evaluate the reliability of the records, to include the new findings and to produce a baseline for further work on the national Fauna book and on the Atlas of the Birds of Macedonia. Although this list presents similar number of species to those reported by Micevski (2003) and Petkovski (2009), we hope, it will clear at least some of the challenges in the on-going programs for bird study and conservation. It will also facilitate the efforts of all ornithologist and birdwatchers, domestic and foreign, to put their results into perspective.

Material and methods

For the purpose of developing the list, we reviewed all available literature and unpublished accessible reports. This includes the 268 titles reported by Veleviski and Stumberger (2010) and the additional titles referred in this paper that became available, or were published after the reference overview.

Given the type of the available information, we had to adhere to certain criteria that need to be met to allow inclusion of the data as acceptable.

1. For the rarely recorded species for which only field observations have been published, we considered the details of the observation, and the probability of species occurrence within the territory of the Republic of Macedonia in the given period. This is rather subjective criterion, which, depending on the wider or stricter understanding, can result with different number of species accepted in the list. We therefore provide explanation of our reasoning behind all rejected reports basing on this criterion.

2. We accepted as Macedonian the museum specimens without labelled locality, only when we found no doubt of their origin.

3. The observations of the same or probably the same individual(s) were considered as a single record. In the Results, they are shown in one line or one paragraph.

4. We did not included our personal unpublished or otherwise unreported observations of rare species, and we did not consider information from different on-line sources, if they have not been previously subjected to any kind of review.

We decided to give the detailed information on the findings if up to 10 observations/records exist for a given species. In cases when a species ceased to breed in Macedonia, we provide the data for the last breeding, or we point out the single cases of breeding. In similar manner, we give detailed information on the last known records for some species.

In this work, we deliberately did not tackled the questions on breeding and migration statuses, and we hope to be able to complete this information in a future catalogue or in a faunistic publication.

We also provided Macedonian names for the listed species. We have decided not to give vernacular synonyms, although several of them are often in use. This should not be seen as an attempt to standardize the use of the Macedonian vernacular names, but rather as yet another proposal for some species. In doing so, we mostly followed Micevski (2003), but we introduced some names that have already been in use in the exhibitions of the Natural History Museum of Macedonia (in Skopje) or in the Biology department of the Museum in Struga. Also, some of the changes in the names were needed in order to reflect the more recent taxonomical splits. The need for a more formal standardization of the Macedonian vernacular names of the birds clearly ranks high among the priorities for future work, and a wider study encompassing all species from the Wester Palearctic is underway.

We accepted the English vernacular names, Latin nomenclature, systematics and the sequence of species proposed by Dickinson and Remsen Jr. (2013) and Dickinson and Christidis (2014).

When presenting the subspecies, we have had the works of Matvejev and Vasić (1973, 1976), Matvejev (1976), Simeonov et al. (1990), Nankinov et al. (1997), Nankinov (2009) and Ivanov (2011) as starting points in deciding on attribution of each case of species polytypy. The subspecies validity and distribution are in accordance with Dickinson and Remsen Jr. (2013) and Dickinson and Christidis (2014). In some cases, it was easy to make a decision basing on the museum specimens from Macedonia (Vasić et al. 2016). For few species, we used the general knowledge of their distribution given in the mentioned titles.

Results – the checklist

ORDER ANSERIFORMES

FAMILY ANATIDAE

1. *Oxyura leucocephala* (Scopoli, 1769) — White-headed Duck — белоглава патка

All records:

13.03.1954, Lake Dojran (Dimovski and Matvejev 1955)

28.10.1983, Lake Dojran (Micevski 2000)

29.01.1988, between Studenčičšta and St. Naum, Lake Ohrid (Vasić 2010)

2. *Cygnus olor* (J. F. Gmelin, 1789) — Mute Swan — црвеноклун лебед

3. *Cygnus columbianus* (Ord, 1815) — Tundra Swan — мал лебед

Cygnus columbianus bewickii Yarrell, 1830

Single record:

28.02.1998, Lake Dojran (Micevski 2003)

4. *Cygnus cygnus* (Linnaeus, 1758) — Whooper Swan — жолтоклун лебед

Most recent record:

04.12.1993, Lake Dojran (Micevski 2000)

5. *Branta ruficollis* (Pallas, 1769) — Red-breasted Goose — црвенограда гуска

All records:

14.02.2003, Lake Dojran (E. Stoyanov, in Velevski et al. 2010)

Without information, 1 specimen in the collection of the Faculty of Forestry, University Ss. Cyril and Methodius, Skopje

6. **Anser anser** (Linnaeus, 1758) — Greylag Goose — дива гуска
 - a. *Anser anser anser* (Linnaeus, 1758)
 - b. *Anser anser rubrirostris* Swinhoe, 1871
We believe that the information given for *Anser anser anser* (Linnaeus, 1758) by Micevski (1998) dated 13.06.1995 near the village Perovo, Lake Prespa, should refer to this subspecies, as the resident population at Lake Prespa belongs to it (Catsadorakis 1997).
Last breeding Lake Dojran, 1961-1963 (Apostolski and Jovetić 1967). It is not clear from the literature to which subspecies these former breeding populations belonged, which is also true for the Greylag Geese breeding up to 1939-1940 near Skopje (Karaman 1949).
7. **Anser fabalis** (Latham, 1787) — Bean Goose — полска гуска
 - a. *Anser fabalis fabalis* (Latham, 1787)
 - b. *Anser fabalis rossicus* Buturlin, 1933
Last record February 1969, Lake Dojran, without details on the subspecies (Dangel 1973)
8. **Anser albifrons** (Scopoli, 1769) — Greater White-fronted Goose — белочелна гуска
Anser albifrons albifrons (Scopoli, 1769)
9. **Clangula hyemalis** (Linnaeus, 1758) — Long-tailed Duck — долгоопашеста патка

All records:
Before 1950, Lake Ohrid (Matvejev 1950)
15.01.1980, Lake Ohrid (Vasić et al. 2016)
10. **Melanitta fusca** (Linnaeus, 1758) — Velvet Scoter/ White-winged Scoter — белокрила црнка
Melanitta fusca fusca (Linnaeus, 1758)

All records:
17.01.1943, 20.01.1943, 30.01.1943, r. Vardar near Veles (Münch 1997)
10.12.1978, pond at Železara factory, Skopje (Vasić et al. 2016)
Without data, three specimens, Lake Ohrid (Vasić et al. 2016), at least one of which might be from 1968 (Matvejev and Vasić 1973)
11. **Bucephala clangula** (Linnaeus, 1758) — Common Goldeneye — четириока патка
Bucephala clangula clangula (Linnaeus, 1758)
12. **Mergellus albellus** (Linnaeus, 1758) — Smew — бел нуркач
13. **Mergus merganser** Linnaeus, 1758 — Goosander/ Common Merganser — голем северен нуркач
Mergus merganser merganser Linnaeus, 1758
14. **Mergus serrator** Linnaeus, 1758 — Red-breasted Merganser — среден северен нуркач
15. **Tadorna tadorna** (Linnaeus, 1758) — Common Shelduck — гусковидна патка
16. **Tadorna ferruginea** (Pallas, 1764) — Ruddy Shelduck — лисеста гусковидна патка

Single record:
02.03.1991, fishpond at v. Dubrovo, Negotino (Micevski 2003)
17. **Marmaronetta angustirostris** (Mènètriès, 1832) — Marbled Teal — мраморна патка

Last breeding 1956, Katlanovsko Blato marsh, Skopje (Dimovski 1972)
18. **Netta rufina** (Pallas, 1773) — Red-crested Pochard — патка превез
19. **Aythya ferina** (Linnaeus, 1758) — Common Pochard — црвеноглав кожувар

Most recent breeding before 1997, v. Asamati fishponds, Lake Prespa (Micevski 1998)
20. **Aythya nyroca** (Güldenstädt, 1770) — Ferruginous Duck — црн кожувар
21. **Aythya fuligula** (Linnaeus, 1758) — Tufted Duck — цуцулест кожувар

Most recent breeding before 1997, v. Asamati fishponds, Lake Prespa (Micevski 1998)
22. **Aythya marila** (Linnaeus, 1758) — Greater Scaup — морски кожувар
Aythya marila marila (Linnaeus, 1758)

All records:
Without date, Lake Ohrid (Vasić et al. 2016)
24.01.1987, between Gorica and Sveti Naum, Lake Ohrid (Vasić 2010)
15.12.2013, Gorica, Lake Ohrid (Velevski and Avramoski 2015)
23. **Spatula querquedula** (Linnaeus, 1758) — Garganey — патка крецка
24. **Spatula clypeata** (Linnaeus, 1758) — Northern Shoveler — патка лажичарка
25. **Mareca strepera strepera** (Linnaeus, 1758) — Gadwall — сива патка
26. **Mareca penelope** (Linnaeus, 1758) — Eurasian Wigeon — патка свиркач
27. **Anas platyrhynchos** Linnaeus, 1758 — Mallard — дива патка
Anas platyrhynchos platyrhynchos Linnaeus, 1758

28. *Anas acuta* Linnaeus, 1758 — Northern Pintail — патка ластовичарка

29. *Anas crecca* Linnaeus, 1758 — Common Teal/ Green-winged Teal — патка берија

Anas crecca crecca Linnaeus, 1758

Most recent possible breeding 1968, fishpond "Bel Kamen", Bitolsko Pole field, 27.05.1968 (Corti & Simon 1970). Earlier, Ilić (in Makatsch 1950) found three nests in Crna Reka marshes (01.06.1938 and 02.06.1940).

ORDER GALLIFORMES

FAMILY PHASIANIDAE

30. *Coturnix coturnix* (Linnaeus, 1758) — Common Quail — потполошка

Coturnix coturnix coturnix (Linnaeus, 1758)

31. *Alectoris graeca* (Meisner, 1804) — Rock Partridge — еребица камењарка

Alectoris graeca graeca (Meisner, 1804)

32. *Phasianus colchicus* Linnaeus, 1758 — Common Pheasant — обичен фазан

Phasianus colchicus colchicus Linnaeus, 1758

Naturalized introduced species.

33. *Tetrastes bonasia* (Linnaeus, 1758) — Northern Hazel Grouse — лештарка

Tetrastes bonasia schiebeli (O. Kleinschmidt, 1943)

34. *Tetrao urogallus* Linnaeus, 1758 — Western Capercaillie — голем тетреб

Tetrao urogallus crassirostris C. L. Brehm, 1831

Precise observation data are lacking in the literature. Confirmed only for Šar Planina Mt., last breeding 1947 (Matvejev 1957)

35. *Perdix perdix* (Linnaeus, 1758) — Grey Partridge — полска еребица

Perdix perdix perdix (Linnaeus, 1758)

ORDER PHOENICOPTERIFORMES

FAMILY PHOENICOPTERIDAE

36. *Phoenicopeterus roseus* Pallas, 1811 — Greater Flamingo — розев фламинго

All records:

09.09.1995, v. Asamati, Lake Prespa (Micevski 1998)

16.04.2003, fishpond Bel Kamen, Bitolsko Pole field (Micevski 2003)

25.05.2007, v. Kuridere, Veles (Beran et al. 2007)

10.03.2013, v. Bogorodica, Gevgelisko Pole field (Petrov 2015)

FAMILY PODICIPEDIDAE

37. *Tachybaptus ruficollis* (Pallas, 1764) — Little Grebe — мал нуркач

Tachybaptus ruficollis ruficollis (Pallas, 1764)

38. *Podiceps grisegena* (Boddaert, 1783) — Red-necked Grebe — црвеноврат нуркач

Podiceps grisegena grisegena (Boddaert, 1783)

All records:

31.08.1935, Sveti Naum springs, Lake Ohrid (Thorpe et al. 1936)

14.06.1940, v. Logovardi, Bitolsko Pole field (Makatsch 1950)

Before 1950, Struga, Lake Ohrid (Makatsch 1950)

Before 1950, Struga, Lake Ohrid (Matvejev 1950)

March 1954, Lake Dojran (Apostolski and Matvejev 1955)

19.07.1955, Skopje (Vasić et al. 2016)

39. *Podiceps cristatus* (Linnaeus, 1758) — Great Crested Grebe — цуцулест нуркач

Podiceps cristatus cristatus (Linnaeus, 1758)

40. *Podiceps auritus* (Linnaeus, 1758) — Slavonian Grebe/Horned Grebe — ушест нуркач

Podiceps auritus auritus (Linnaeus, 1758)

All records:

Before 1941, Lake Ohrid (Karaman 1949)

January 1997, Lake Prespa (Micevski 1998; Fremuth et al. 2000)

41. *Podiceps nigricollis* C. L. Brehm, 1831 — Black-necked Grebe/Eared Grebe — црнооврат нуркач

Podiceps nigricollis nigricollis C. L. Brehm, 1831

ORDER COLUMBIFORMES

FAMILY COLUMBIDAE

42. *Columba livia* J. F. Gmelin, 1789 — Rock Dove/Rock Pigeon — див гулаб

Columba livia livia J. F. Gmelin, 1789

43. *Columba oenas* Linnaeus, 1758 — Stock Dove — горски гулаб

Columba oenas oenas Linnaeus, 1758

44. *Columba palumbus* Linnaeus, 1758 — Wood Pigeon — гулаб гурмиш

Columba palumbus palumbus Linnaeus, 1758

45. *Streptopelia turtur* (Linnaeus, 1758) — European Turtle Dove — грлица

Streptopelia turtur turtur (Linnaeus, 1758)

46. *Streptopelia decaocto* (Frisvoldszky, 1838) — Eurasian Collared Dove — гугутка

Streptopelia decaocto decaocto (Frisvoldszky, 1838)

ORDER CAPRIMULGIFORMES

FAMILY CAPRIMULGIDAE

47. *Caprimulgus europaeus* Linnaeus, 1758 — European Nightjar — козодој

- a. *Caprimulgus europaeus europaeus* Linnaeus, 1758
 b. *Caprimulgus europaeus meridionalis* E. Hartert, 1896

FAMILY APODIDAE

48. *Tachymarptis melba* (Linnaeus, 1758) — Alpine Swift — голема пиштарка

Tachymarptis melba melba (Linnaeus, 1758)

49. *Apus pallidus* (Shelley, 1870) — Pallid Swift — сива пиштарка

Apus pallidus illyricus (Tschusi 1907)

All records:

- 03.06.1989, v. Mavrovo, Bistra (Vasić et al. 2009)
 21.09.1998, Monastery Sveti Naum, Galičica (Vasić et al. 2009)
 07.06.2015, v. Trbotiviste, Pijanec region (M. Veleviski, in Stumberger and Ritter in press)
 18-19.05.2016, Popova Šapka, Šar Planina (H. Sierdsema, in Stumberger and Ritter, submitted)
 24.05.2016, v. Leunovo, Bistra (H. Sierdsema, in Stumberger and Ritter, submitted)
 2016, Kriva Palanka (V. Škorpíková, in Stumberger and Ritter, submitted)
 2016, Prilep (Per Underland, in Stumberger and Ritter, submitted)

50. *Apus apus* (Linnaeus, 1758) — Common Swift — обична пиштарка

Apus apus apus (Linnaeus, 1758)

ORDER CUCULIFORMES

FAMILY CUCULIDAE

51. *Clamator glandarius* (Linnaeus, 1758) — Great Spotted Cuckoo — цуцулеста кукавица

All records:

- 09.05.1927, v. Bašino Selo, Veles (Banzhaf 1931)
 21.05.1939, Stari Grad, Azot region (Kattinger 1942)
 14.05.1952, 16.05.1952, 22.05.1952, v. Gorno Lisiče and v. Dolno Lisiče, Skopsko Pole field (Jovetić 1953)
 17.05.1953, v. Idrizovo, Skopsko Pole field (Jovetić 1953)
 1956, v. Gorno Lisiče and v. Dolno Lisiče, Skopsko Pole field (Jovetić 1960)
 09.08.1979, v. Bardovci, Skopsko Pole field (Vasić et al. 2016)

15.05.2006, v. Kuridere, Veles (Škorpíková et al. 2006)

52. *Cuculus canorus* Linnaeus, 1758 — Common Cuckoo — кукавица

Cuculus canorus canorus Linnaeus, 1758

ORDER GRUIFORMES

FAMILY RALLIDAE

53. *Rallus aquaticus* Linnaeus, 1758 — Western Water Rail — барска кокошка

Rallus aquaticus aquaticus Linnaeus, 1758

54. *Crex crex* (Linnaeus, 1758) — Corncrake — крекс**55. *Porzana porzana* (Linnaeus, 1766) — Spotted Crake — дамчеста барска кокошка****56. *Zapornia parva* (Scopoli, 1769) — Little Crake — сива барска кокошка****57. *Zapornia pusilla* (Pallas, 1776) — Baillon's Crake — мала барска кокошка**

Zapornia pusilla intermedia (Hermann, 1804)

Single record:

21.06.1992, fishpond at v. Asamati, Prespa (Micevski 1998)

58. *Gallinula chloropus* (Linnaeus, 1758) — Common Moorhen — зеленонога блатна кокошка

Gallinula chloropus chloropus (Linnaeus, 1758)

59. *Fulica atra* Linnaeus, 1758 — Common Coot — црна лиска

Fulica atra atra Linnaeus, 1758

FAMILY GRUIDAE

60. *Grus grus* (Linnaeus, 1758) — Common Crane — сив жерав

Grus grus grus (Linnaeus, 1758)

Last breeding river Crna Reka marshes, 1942 (Kattinger 1960)

ORDER OTIDIFORMES

FAMILY OTITIDAE

61. *Tetrax tetrax* (Linnaeus, 1758) — Little Bustard — мала дропља

Last record 1972 near v. Crnilište, Ovče Pole (Trpkov et al. 1978)

62. *Otis tarda* Linnaeus, 1758 — Great Bustard — голема дропља

Otis tarda tarda Linnaeus, 1758

Last record 20.01.1979, near Gostivar, Polog plain (Vasić et al. 2016)

ORDER GAVIIFORMES

FAMILY GAVIIDAE

63. *Gavia stellata* (Pontoppidan, 1763) — Red-throated Diver/Red-throated Loon — мал морски нуркач

All records:

- 17.11.1909, Skopje (Karaman 1949; Vasić et al. 2016)
04.12.1939, Lake Ohrid (Vasić et al. 2016)
1960-1961, Lake Dojran (Apostolski and Jovetić 1960)
1961-1963, Lake Dojran (Apostolski and Jovetić 1967)
14.12.1995, s. Vratnica, Šar Planina/Raduša region (Vasić et al. 2016) (locality dubious, but small reservoir exists south of the village)
22.01.2010, Tikveš reservoir (M. Velevski and E. Lisičanec, in Petkovski et al. 2010)

64. *Gavia arctica* (Linnaeus, 1758) — Black-throated Diver/Arctic Loon — белец

Gavia arctica arctica (Linnaeus, 1758)

65. *Gavia immer* (Brünnich, 1764) — Great Northern Diver/Common Loon — голем морски нуркач

All records:

- 14-15.11.1968, 20-21.11.1968, Lake Dojran (Dangel, 1973)
31.12.1969, Lake Dojran (Johnson and Hafner 1970)

ORDER PELECANIFORMES

FAMILY CICONIIDAE

66. *Ciconia nigra* (Linnaeus, 1758) — Black Stork — црн штрк

67. *Ciconia ciconia* (Linnaeus, 1758) — European White Stork — штрк

Ciconia ciconia ciconia (Linnaeus, 1758)

FAMILY PELECANIDAE

68. *Pelecanus onocrotalus* Linnaeus, 1758 — Great White Pelican — обичен пеликан

Last breeding 1940, former river Crna Reka marshes, Pelagonia plain (Makatsch 1950)

69. *Pelecanus crispus* Bruch. 1832 — Dalmatian Pelican — кадроглав пеликан

Last breeding 1954, Lake Dojran (Matvejev and Vasić 1973), and possibly 1957, former river Crna Reka marshes, Pelagonia plain (Huges and Sumerfield 1957)

FAMILY ARDEIDAE

70. *Botaurus stellaris* (Linnaeus, 1758) — Eurasian Bittern — голем воден бик

Botaurus stellaris stellaris (Linnaeus, 1758)

71. *Ixobrychus minutus* (Linnaeus, 1758) — Little Bittern — мал воден бик

Ixobrychus minutus minutus (Linnaeus, 1758)

72. *Nycticorax nycticorax* (Linnaeus, 1758) — Black-crowned Night Heron — нојна чапја

Nycticorax nycticorax nycticorax (Linnaeus, 1758)

73. *Ardeolla ralloides* (Scopoli, 1769) — Squacco Heron — жолта чапја

Ardeolla ralloides ralloides (Scopoli, 1769)

74. *Bubulcus ibis* (Scopoli, 1769) — Cattle Egret — чапја говедарка

Bubulcus ibis ibis (Scopoli, 1769)

All records:

- 17.08.1935, Ohrid (Thorpe et al. 1936)
04.04.2010, Star Dojran at Lake Dojran (Hanžel 2010)

75. *Ardea cinerea* Linnaeus, 1758 — Grey Heron — сива чапја

Ardea cinerea cinerea Linnaeus, 1758

76. *Ardea purpurea* Linnaeus, 1758 — Purple Heron — црвена чапја

Ardea purpurea purpurea Linnaeus, 1758

77. *Ardea alba* Linnaeus, 1758 — Great Egret — голема бела чапја

Ardea alba alba Linnaeus, 1758

78. *Egretta garzetta* (Linnaeus, 1758) — Little Egret — мала бела чапја

Egretta garzetta garzetta (Linnaeus, 1758)

FAMILY THRESKIORNITHIDAE

79. *Platalea leucorodia* Linnaeus, 1758 — Eurasian Spoonbill—чапја лажичарка

Platalea leucorodia leucorodia Linnaeus, 1758

Last breeding probably before 1992, Ezerani Nature Park, Lake Prespa (Micevski 1998)

80. *Plegadis falcinellus* (Linnaeus, 1766) — Glossy Ibis — ибис

Last breeding possibly 1957 - 1959, former river Crna Reka marshes, Pelagonia plain (Huges and Sumerfield 1957; Terrasse and Terrasse 1961) and/or Lake Prespa, 1966 (v. Perovo, 06.06.1966, Bodenstein and Kroymann 1967)

FAMILY PHALACROCORACIDAE

81. *Microcarbo pygmaeus* (Pallas, 1773) — Pygmy Cormorant — мал корморан

82. *Phalacrocorax carbo* (Linnaeus, 1758) — Great Cormorant — голем корморан

Phalacrocorax carbo sinensis (Staunton, 1796)

ORDER CHARADRIIFORMES

FAMILY BURHINIDAE

83. *Burhinus oedicnemus* (Linnaeus, 1758) — Eurasian**Thick-knee/Eurasian Stone-curlew — чурлин***Burhinus oedicnemus oedicnemus* (Linnaeus, 1758)

FAMILY HAEMATOPODIDAE

84. *Haematopus ostralegus* Linnaeus, 1758 — Eurasian Oystercatcher — остригар*Haematopus ostralegus longipes* Buturlin, 1910

All records:

25.03.1976, Ohrid (Vasić et al. 2016)

17.08.1982, r. Bregalnica, Štip (Puzović 1987)

07.04.2014, Gradište, Lake Ohrid (Avramoski 2015)

Without date, Andon Dukov, Lake Ohrid (Vasić et al. 2016)

FAMILY RECURVIROSTRIDAE

85. *Recurvirostra avosetta* Linnaeus, 1758 — Pied Avocet — сабјарка

All records:

08.08.1950, Crna Reka marshlands at v. Gneotino, Bitolsko Pole field (Stantić 1950)

December 1959, Katlanovsko Blato (Dimovski 1972)

16.12.1981, v. Kališta, Lake Ohrid (Vasić et al. 2016)

16.12.1983, Skopje Fields (Vasić et al. 2016)

09.10.1989, river Brajchinska Reka at Lake Prespa (Ivanovski and Veleviski 2002)

20.04.1991, Ezerani Nature Park, Lake Prespa (Micevski 1998)

03.11.1992, Kočani rice fields (Ivanovski and Veleviski 2002)

04.12.1993, Star Dojran, Lake Dojran (Micevski 2000)

10.11.2002, "Bel Kamen" fishpond, Bitolsko Pole (Ivanovski and Veleviski 2002)

09.09.2003, Mantovo reservoir (Veleviski and Grubač 2015)

86. *Himantopus himantopus* (Linnaeus, 1758) — Black-winged Stilt — долгоног пескар*Himantopus himantopus himantopus* (Linnaeus, 1758)

FAMILY CHARADRIIDAE

87. *Pluvialis squatarola* (Linnaeus, 1758) — Grey Plover/Black-bellied Plover — сиво блатарче*Pluvialis squatarola squatarola* (Linnaeus, 1758)

All records:

16-17.05.1964, v. Perovo, Lake Prespa (Sage 1966)

07.04.1995, v. Perovo, Lake Prespa (Micevski 1998)

24.05.1995, v. Perovo, Lake Prespa (Micevski 1998)

21.09.2000, south of v. Sretenovo, Lake Dojran (Micevski 2000)

88. *Pluvialis apricaria* (Linnaeus, 1758) — Eurasian Golden Plover — златно блатарче*Pluvialis apricaria apricaria* (Linnaeus, 1758)

All records:

17.11.1916, Tabanovce (Gengler 1920)

17.09.1917, Madžari, Skopsko Pole (Gengler 1920)

05.12.1927 (or 1928), v. Petrovec, Skopsko Pole (Karaman 1929)

25.01.1956, Aračinovsko Blato marsh, Skopsko Pole (Vasić et al. 2016)

18.12.1977, Skopsko Pole (Vasić et al. 2016)

02.02.1987, Skopsko Pole (Vasić et al. 2016)

Two specimens without date and locality (one possibly before 1948, second in the period 1948 - 2007, probably Stuga region), in the Struga Museum (Matvejev 1950, Vasić et al. 2016).

89. *Eudromias morinellus* (Linnaeus, 1758) — Eurasian Dotterel — жолтоного блатарче

All records:

10.04.1918, Vodno (Stresemann, 1920)

21.03.1939, Katlanovsko Blato swamp, Skopsko Pole field (Karaman 1949)

26.03.1940, "Katlanovo", Skopsko Pole field (Vasić et al. 2016)

90. *Charadrius dubius* Scopoli, 1786 — Little Ringed Plover — мал пескар*Charadrius dubius curonicus* J. F. Gmelin, 1789**91. *Vanellus vanellus* (Linnaeus, 1758) — Northern Lapwing — калуѓерка****92. *Vanellus spinosus* (Linnaeus, 1758) — Spur-winged Lapwing — боцкокрила калуѓерка**

Single record:

04.11.2013, 09.11.2013, 23.11.2013, 17.01.2014, Star Dojran at Lake Dojran (Nikolov and Hristova-Nikolova 2015)

FAMILY SCOLOPACIDAE

93. *Numenius phaeopus* (Linnaeus, 1758) — Whimbrel — шарен српоклуч свиркач*Numenius phaeopus phaeopus* (Linnaeus, 1758)

Single record:

Without date, Ohrid-Struga field (Vasić et al. 2016)

94. *Numenius arquata* (Linnaeus, 1758) — Eurasian Curlew — голем српоклуч свиркач*Numenius arquata arquata* (Linnaeus, 1758)

- 95. *Limosa limosa* (Linnaeus, 1758) — Black-tailed Godwit — црноопашна блатарка**
Limosa limosa limosa (Linnaeus, 1758)
- 96. *Arenaria interpres* (Linnaeus, 1758) — Ruddy Turnstone — камењарче**
Arenaria interpres interpres (Linnaeus, 1758)
 All records:
 22.08.1935, Lake Ohrid (Thorpe et al. 1936)
 Before 1950, Ohrid-Struga region (Matvejev 1950)
 04.05.1963, Perovo, Lake Prespa (Sage 1966)
 19.05.1964, v. Perovo, Lake Prespa (Sage 1966)
 Without date, Ohrid-Struga field (Vasić et al. 2016)
- 97. *Calidris pugnax* (Linnaeus, 1758) — Ruff — бојник**
 Occurrences during breeding season in Skopje valley, 1954-1959 (Dimovski 1967, 1972) and at river Crna Reka marshes in 1957 (Huges and Sumerfield 1957) are not sufficient to assume possible breeding.
- 98. *Calidris falcinellus* (Pontoppidan, 1763) — Broad-billed Sandpiper — блатен свиркач**
Calidris falcinellus falcinellus (Pontoppidan, 1763)
 All records:
 15.08.1992, Ezerani, Lake Prespa (Micevski 1998)
 22.08.1993, Ezerani, Lake Prespa (Micevski 1998)
 17-18.08.2000, Andon Dukov to Podmolje, Lake Ohrid (Micevski 2003)
 August 2001, Andon Dukov to Podmolje, Lake Ohrid (Micevski 2003)
- 99. *Calidris ferruginea* (Pontoppidan, 1763) — Curlew Sandpiper — белокрстен свиркач**
 All records:
 04.09.1928, meadows at v. Petrovec, Skopsko Pole (Karaman 1929)
 Before 1949, "rarely in autumns", v. Petrovec, Skopsko Pole (Karaman 1949)
 14.05.1964, v. Asamati, Lake Prespa (Sage 1966)
 15.05.1980, marsh Studenčiško Blato, Lake Ohrid (Dijksen and Dijksen 1985b)
 15.08.1992, Ezerani Nature Park, Lake Prespa (Micevski 1998)
 21.08.1993, Ezerani Nature Park, Lake Prespa (Micevski 1998)
 24.05.1995, fishpond at v. Asamati, Prespa (Micevski 1998)
 27.04.2015, near Bitola (Blažič, 2015)
- 100. *Calidris temminckii* (Leisler, 1812) — Temminck's Stint — белоопашест свиркач**
 All records:
 14.05.1964, v. Asamati, Lake Prespa (Sage 1966)
- 04.05.1977, v. Volino, Struško Pole (Vasić et al. 2016)
- 101. *Calidris alba* (Pallas, 1764) — Sanderling — бел свиркач**
Calidris alba alba (Pallas, 1764)
 All records:
 19.05.1994, Ezerani, Lake Prespa (Micevski 1998)
 29.08.1996, Ezerani, Lake Prespa (Micevski 1998)
 03.05.2013, Lake Dojran (Stefanov, 2015)
 Without date, Ohrid-Struga field (Vasić et al. 2016)
- 102. *Calidris alpina* (Linnaeus, 1758) — Dunlin — обичен свиркач**
Calidris alpina centralis (Buturlin, 1932)
- 103. *Calidris minuta* (Leisler, 1812) — Little Stint — мал свиркач**
- 104. *Scolopax rusticola* Linnaeus, 1758 — Eurasian Woodcock — шумска шљука**
 Last breeding 1954-1959, rarely in the beech forests in Skopje region (Dimovski 1967, 1972)
- 105. *Gallinago media* (Latham, 1787) — Great Snipe — голема бекарина**
 Most recent record 21.03.1971, Ovče Pole (Vasić et al. 2016)
- 106. *Gallinago gallinago* (Linnaeus, 1758) — Common Snipe — обична бекарина**
Gallinago gallinago gallinago (Linnaeus, 1758)
- 107. *Limnospiza minima* (Brünnich, 1764) — Jack Snipe — мала бекарина**
- 108. *Actitis hypoleucos* (Linnaeus, 1758) — Common Sandpiper — речна тринга**
- 109. *Tringa ochropus* Linnaeus, 1758 — Green Sandpiper — шарена тринга**
- 110. *Tringa erythropus* (Pallas, 1764) — Spotted Redshank — црна тринга**
- 111. *Tringa nebularia* (Gunnerus, 1767) — Common Greenshank — зеленонога тринга**
- 112. *Tringa totanus* (Linnaeus, 1758) — Common Redshank — црвенонога тринга**
Tringa totanus totanus (Linnaeus, 1758)
 Possible breeding 1954-1959, Skopsko Pole field (Dimovski 1967) and river Crna Reka marshes, 1957 (Huges and Sumerfield 1957), at several locations in 1966 (06.06., v. Perovo, Lake Prespa; 07.06. near the fishpond "Bel Kamen", Bitolsko Pole field; 08.06.1966 — Katlanovsko Blato marsh, Skopje Region, Bodenstern and Kroymann 1967), and 25.-27.05.1968, at the fishpond "Bel Kamen", Bitolsko Pole field, Corti and Simon 1970)

113. *Tringa glareola* Linnaeus, 1758 — Wood Sandpiper — шумска тринга

114. *Tringa stagnatilis* (Bechstein, 1803) — Marsh Sandpiper — блатна тринга

FAMILY GLAREOLIDAE

115. *Glareola pratincola* (Linnaeus, 1766) — Collared Pratincole — блатна ластовица

Glareola pratincola pratincola (Linnaeus, 1766)

All records:

10.10.1928, v. Petrovec, Skopsko Pole field (Karaman 1949, Vasić et al. 2016)

1938, r. Crna Reka, Bitolsko Pole field (Makatsch 1950)

1939, r. Crna Reka, Bitolsko Pole field (Makatsch 1950)

20.05.1939, river Crna Reka marshes (Kattinger 1942)

08.07.1961, south of Bitola (Ganso 1962)

25-27.05.1968, fishpond "Bel Kamen", Bitolsko pole field (Corti and Simon 1970)

07.06.1966, by the road to Florina (GR), Bitolsko Pole field (Bodenstein and Kroymann 1967)

FAMILY STERCORARIIDAE

116. *Stercorarius parasiticus* (Linnaeus, 1758) — Arctic Scaup/Parasitic Jaeger — арктички поморник

Single record:

20.09.1988, Veles-Gradsko (Vasić et al. 2016)

117. *Stercorarius pomarinus* (Temminck, 1815) — Pomarine Scaup/Pomarine Jaeger — поморник

All records:

10.10.1976, v. Sopot, Veles (Vasić et al. 2016)

Without date, Lake Ohrid (Vasić et al. 2016)

FAMILY LARIDAE

118. *Rissa tridactyla* (Linnaeus, 1758) — Black-legged Kittiwake — тропрст галеб

Rissa tridactyla tridactyla (Linnaeus, 1758)

All records:

26.03.1940, Lake Ohrid (Vasić et al. 2016)

19.10.1984, Lake Ohrid (Vasić et al. 2016)

Without date, Lake Ohrid (Vasić et al. 2016)

119. *Chroicocephalus genei* (Breme, 1839) — Slender-billed Gull — тенкокун галеб

All records:

19.05.1964, v. Asamati, Lake Prespa (Sage 1966)

20.09.1998, v. Stenje, Lake Prespa (Vasić 2010)

05.08.2008, near v. Konjsko, Lake Prespa (M. Veleviski in Vasić 2010)

120. *Chroicocephalus ridibundus* (Linnaeus, 1766) — Black-headed Gull — езерски галеб

121. *Hydrocoloeus minutus* (Pallas, 1776) — Little Gull — мал галеб

122. *Rhodostethia rosea* (W. MacGillivray, 1824) — Ross's Gull — розев галеб

Single record:

23-24.04.2001, Ohrid, Lake Ohrid (Szabo 2001)

123. *Ichthyaeetus melanocephalus* (Temminck, 1820) — Mediterranean Gull — медитерански галеб

124. *Ichthyaeetus ichthyaeetus* (Pallas, 1773) — Pallas's Gull/Great Black-headed Gull — голем црноглав галеб

Single record

10.01.2010, Ačikot, Lake Dojran (Veleviski and Saveljić 2010)

125. *Larus canus* Linnaeus, 1758 — Mew Gull — обичен галеб

Larus canus canus Linnaeus, 1758

126. *Larus fuscus* Linnaeus, 1758 — Lesser Black-backed Gull — мал црногрб галеб

Larus fuscus fuscus Linnaeus, 1758

All records:

17.11.1955, Aračinovsko Blato swamp, Skopsko Pole field (Vasić et al. 2016)

30.90.1983, the east coast of Lake Prespa (Dijksen and Dijksen 1985a)

17.03.1994, Ezerani, Lake Prespa (Micevski 1998)

We doubt the validity of the determination by (Sage 1966) for 18. and 19.05.1964 at Lake Prespa, as he has reported juvenile birds while not mentioning the common *Larus michahellis michahellis* J. F. Naumann, 1840

127. *Larus michahellis* J. F. Naumann, 1840 — Yellow-legged Gull — жолтоног галеб

Larus michahellis michahellis J. F. Naumann, 1840

128. *Larus cachinnans* Pallas, 1811 — Caspian Gull — касписки галеб

All records:

10.01.2010, Lake Dojran (Veleviski 2016)

November 2016, Lake Prespa, eastern shores (Petkov and Illiev 2017)

129. *Sternula albifrons* (Pallas, 1764) — Little Tern — мала чигра

Sternula albifrons albifrons (Pallas, 1764)

All records:

01.09.1949, Katlanovsko Blato marsh (Vasić et al. 2016)

11.06.1993, pod s. Perovo, (Micevski 1998)

- 04.07.1999, Lake Dojran between Nov and Star Dojran (Micevski 2000)
- 14.05.2007, north of Gevgelija, r. Vardar (B. Hallmann in Škorpíková et al. 2009a)
- 17.06.2008, north of Gevgelija, r. Vardar (B. Hallmann in Škorpíková et al. 2009a)
- 04-05.06.2009, v. Prdejci, r. Vardar (Škorpíková et al. 2009a)
- 130. *Gelochelidon nilotica* (J. F. Gmelin, 1789) — Gull-billed Tern — дебелоклуна рибарка**
Gelochelidon nilotica nilotica (J. F. Gmelin, 1789)
 All records:
 8-19.05.1960, Ohridsko Ezero (Benson et al. 1960)
 14 and 17.5.1964, v. Perovo, Lake Prespa (Sage 1966)
 14 and 19.5.1964, v. Asamati, Lake Prespa (Sage 1966)
 01.06.1992, Ezerani, Lake Prespa (Micevski 1998)
- 131. *Hydroprogne caspia* (Pallas, 1770) — Caspian Tern — касписка рибарка**
 All records:
 16.04.1984, Lake Ohrid at v. Radožda (Vasić et al. 2016)
 Tikveš reservoir (M. Veleviski in Petkovski et al. 2010, date of recording is 08.04.2006)
- 132. *Chlidonias hybrida* (Pallas, 1811) — Whiskered Tern — белобрада рибарка**
Chlidonias hybrida hybrida (Pallas, 1811)
 Most recent breeding 1995, fishpond at v. Asamati, Lake Prespa (Micevski 1998)
- 133. *Chlidonias leucopterus* (Temminck, 1815) — White-winged Tern — белокрила рибарка**
 Most recent breeding 1995, fishpond at v. Asamati, Lake Prespa (Micevski 1998)
- 134. *Chlidonias niger* (Linnaeus, 1758) — Black Tern — црна рибарка**
Chlidonias niger niger (Linnaeus, 1758)
 Most recent breeding before 1973, v. Perovo, Lake Prespa (Bauer et al. 1973)
- 135. *Sterna hirundo* Linnaeus, 1758 — Common Tern — речна чигра**
Sterna hirundo hirundo Linnaeus, 1758
- 136. *Thalasseus sandvicensis* (Latham, 1787) — Sandwich Tern — тенкоклуна чигра**
Thalasseus sandvicensis sandvicensis (Latham, 1787)
 All records:
 18.09.1989, Carina, Lake Prespa (Micevski 1998)
 14.04.1994, Lake Dojran (Micevski 2003)
 29.06.1996, Ezerani, Lake Prespa (Micevski 1998)

ORDER ACCIPITRIFORMES

FAMILY PANDIONIDAE

- 137. *Pandion haliaetus* (Linnaeus, 1758) — Osprey — орел рибар**
Pandion haliaetus haliaetus (Linnaeus, 1758)
 Last breeding 1939, Demir Kapija (Vasić et al. 1985)

FAMILY ACCIPITRIDAE

- 138. *Pernis apivorus* (Linnaeus, 1758) — European Honey Buzzard — осојад**
- 139. *Gypaetus barbatus* (Linnaeus, 1758) — Bearded Vulture/Lammergeier — брадест мршојадец**
Gypaetus barbatus aureus (Hablizl, 1783)
 Last breeding 1985, Tikveš reservoir surrounding (Grubač 1990)
- 140. *Neophron percnopterus* (Linnaeus, 1758) — Egyptian Vulture — египетски мршојадец**
Neophron percnopterus percnopterus (Linnaeus, 1758)
- 141. *Circus gallicus* (J.F. Gmelin, 1788) — Short-toed Eagle — орел змијар**
- 142. *Gyps fulvus* (Hablizl, 1783) — Griffon Vulture — белоглав мршојадец**
Gyps fulvus fulvus (Hablizl, 1783)
- 143. *Aegypius monachus* (Linnaeus, 1766) — Cinereous Vulture — црн мршојадец**
 Last breeding 1988, Šar Planina Mt. (Grubač 1998)
- 144. *Clanga pomarina* (C.L. Brehm, 1831) — Lesser Spotted Eagle — мал орел кликач**
- 145. *Clanga clanga* (Pallas, 1811) — Greater Spotted Eagle — голем орел кликач**
 All records:
 26.08.1917, Skopje (Gengler 1920) - we consider the date doubtful, but as the author mentions both species of *Clanga* eagles, we can not easily dismiss this record.
 29.09.1983, Debar (Dijksen and Dijksen 1985a)
 Three specimens without information, one probably Skopje Region, two probably Struga region, are kept in the collections of the museums in Skopje and Struga (Vasić et al. 2016).
 We reemphasize and concur with the opinion given by (Vasić et al. 1985) that the reported breeding of this species near Bitola (McGregor 1906) is not reliable
- 146. *Aquila nipalensis* Hodgson, 1883 — Steppe Eagle — степски орел**
Aquila nipalensis orientalis Cabanis, 1854
 All records:
 15.07.2002, v. Rapeš, Mariovo (B. Hallmann, in

- Velevski et al. 2010)
14.06.2004, Vitačevo (E. Lisičanec and B. Hallmann, in Velevski et al. 2010)
- 147. *Aquila heliaca* Savigny, 1809 — Eastern Imperial Eagle — царски орел**
- 148. *Aquila chrysaetos* (Linnaeus, 1758) — Golden Eagle — златен орел**
Aquila chrysaetos chrysaetos (Linnaeus, 1758)
- 149. *Aquila fasciata* Vieillot, 1822 — Bonelli's Eagle — планински орел**
Aquila fasciata fasciata Vieillot, 1822
All records:
Before 1935, Ohrid-Prespa region (Thorpe et al. 1936)
28.06.1953, Karađica (Matvejev and Vasić 1973)
12.05.1954, Lake Dojran (Matvejev and Vasić 1973)
06-07.07.1961, r. Babuna Gorge, Veles (Ganso 1962)
Spring 2012, Galičica Mt. (Janković 2012)
- 150. *Hieraaetus pennatus* (J.F. Gmelin, 1788) — Booted Eagle — мал орел**
- 151. *Circus aeruginosus* (Linnaeus, 1758) — Western Marsh Harrier — блатна еја**
Circus aeruginosus aeruginosus (Linnaeus, 1758)
- 152. *Circus cyaneus* (Linnaeus, 1766) — Hen Harrier/ Northern Harrier — полска еја**
Circus cyaneus cyaneus (Linnaeus, 1766)
- 153. *Circus macrourus* (S.G. Gmelin, 1770) — Pallid Harrier — степска еја**
All records:
17.09.1939, v. Madzari, Skopsko Pole field (Vasić et al. 2016)
12.09.1949, Skopje (Vasić et al. 2016)
21.02.1984, Katlanovo, Skopsko Pole field (Vasić et al. 2016)
25.04.1984, v. Bač, Bitolsko Pole field (Vasić et al. 2016)
01.06.1992, v. Asamati, Prespa (Micevski 1998)
02.05.2007, north of Struga (Šćiban 2010)
Ovče Pole plain (Velevski 2015) (14.03.2012, near v. Stanjevcij)
- 154. *Circus pygargus* (Linnaeus, 1758) — Montagu's Harrier — ливадска еја**
- 155. *Accipiter brevipes* (Severtsov, 1850) — Levant Sparrowhawk — краткопрст јастреб**
- 156. *Accipiter nisus* (Linnaeus, 1758) — Eurasian Sparrowhawk — јастреб врапчар**
Accipiter nisus nisus (Linnaeus, 1758)
- 157. *Accipiter gentilis* (Linnaeus, 1758) — Northern Goshawk — јастреб кокошкар**
Accipiter gentilis marginatus (Piller & Mitterpacher, 1783)
- 158. *Haliaeetus albicilla* (Linnaeus, 1758) — White-tailed Sea Eagle — белоопашест орел**
Haliaeetus albicilla albicilla (Linnaeus, 1758)
Last breeding probably in 1970ies, Lake Prespa (Vasić et al. 1985)
- 159. *Milvus milvus* (Linnaeus, 1758) — Red Kite — црвена луња**
Milvus milvus milvus (Linnaeus, 1758)
Last breeding 1906 near Bitola (McGregor 1906).
Most recent record 1929, Skopje region (Makatsch 1950).
- 160. *Milvus migrans* (Boddaert, 1783) — Black Kite — црна луња**
Milvus migrans migrans (Boddaert, 1783)
- 161. *Buteo lagopus* (Pontoppidan, 1763) — Rough-legged Buzzard/Rough-legged Hawk — рајкест глувчар**
Buteo lagopus lagopus (Pontoppidan, 1763)
Most recent record January 1969, near Gevgelija (Vasić et al. 1985)
- 162. *Buteo buteo* (Linnaeus, 1758) — Eurasian Buzzard — глувчар**
Buteo buteo buteo (Linnaeus, 1758)
- 163. *Buteo rufinus* (Cretzchmar, 1829) — Long-legged Buzzard — лисест глувчар**
Buteo rufinus rufinus (Cretzchmar, 1829)
- ORDER STRIGIFORMES
FAMILY TYTONIDAE
- 164. *Tyto alba* (Scopoli, 1769) — Common Barn Owl — кукувија**
a. *Tyto alba alba* (Scopoli, 1769)
b. *Tyto alba guttata* (C. L. Brehm, 1831)
- FAMILY STRIGIDAE
- 165. *Athene noctua* (Scopoli, 1769) — Little Owl — кукумјавка**
Athene noctua indigena C. L. Brehm, 1855
- 166. *Aegolius funereus* (Linnaeus, 1758) — Tengmalm's Owl/Boreal Owl — шумска кукумјавка**
Aegolius funereus funereus (Linnaeus, 1758)
Imprecisely by Gengler (1920) and later on by Matvejev and Vasić (1973) for the northern parts of the country.

167. *Otus scops* (Linnaeus, 1758) — Eurasian Scops Owl — љук

Otus scops scops (Linnaeus, 1758)

168. *Asio otus* (Linnaeus, 1758) — Northern Long-eared Owl — ушест буг

Asio otus otus (Linnaeus, 1758)

169. *Asio flammeus* (Pontoppidan, 1763) — Short-eared Owl — блатен буг

Asio flammeus flammeus (Pontoppidan, 1763)

Most recent breeding before 1949 (Karaman 1949), most recent record 10.03.1992, Skopsko Pole field (Vasić et al. 2016)

170. *Strix aluco* Linnaeus, 1758 — Tawny Owl — шумска утка

Strix aluco aluco Linnaeus, 1758

171. *Strix uralensis* Pallas, 1771 — Ural Owl — уралска утка

Strix uralensis macroura Wolf, 1810

All records:

Before 1935, Ohrid-Prespa region (Thorpe et al, 1936)
31.05.2012, Galičica (Janković and Morin 2012)

172. *Bubo bubo* (Linnaeus, 1758) — Eurasian Eagle Owl — буг

Bubo bubo bubo (Linnaeus, 1758)

ORDER BUCEROTIFORMES

FAMILY UPUPIDAE

173. *Upupa epops* Linnaeus, 1758 — Common Hoopoe — пупунец

Upupa epops epops Linnaeus, 1758

ORDER PICIFORMES

FAMILY PICIDAE

174. *Jynx torquilla* Linnaeus, 1758 — Northern Wryneck/Eurasian Wryneck — вртивратка

Jynx torquilla torquilla Linnaeus, 1758

175. *Picus canus* J. F. Gmelin, 1788 — Grey-headed Woodpecker — сивоглав клукајдрец

Picus canus canus J. F. Gmelin, 1788

176. *Picus viridis* Linnaeus, 1758 — Green Woodpecker — зелен клукајдрец

Picus viridis karelini von Brandt, 1841

177. *Dryocopus martius* (Linnaeus, 1758) — Black Woodpecker — црн клукајдрец

Dryocopus martius martius (Linnaeus, 1758)

178. *Dendrocopos minor* (Linnaeus, 1758) — Lesser Spotted Woodpecker — мал клукајдрец

a. *Dendrocopos minor buturlini* (E. Hartert, 1912)

b. *Dendrocopos minor danfordi* (Hargitt, 1883)

Vasić et al. (2016) mention that one of the specimens in the collection in the Macedonian Museum of Natural History resembles *Dendrocopos minor hortorum* (C.L. Brehm, 1831), but additional studies are needed before a conclusive statement can be made.

179. *Dendrocopos medius* (Linnaeus, 1758) — Middle Spotted Woodpecker — среден клукајдрец

Dendrocopos medius medius (Linnaeus, 1758)

180. *Dendrocopos leucotos* (Bechstein, 1802) — White-backed Woodpecker — белорб клукајдрец

Dendrocopos leucotos ilfordi (Sharpe & Dresser, 1871)

181. *Dendrocopos syriacus* (Hemprich & Ehrenberg, 1833) — Syrian Woodpecker — сириски клукајдрец

Dendrocopos syriacus syriacus (Hemprich & Ehrenberg, 1833)

182. *Dendrocopos major* (Linnaeus, 1758) — Great Spotted Woodpecker — голем клукајдрец

a. *Dendrocopos major pinetorum* (C.L. Brehm, 1831)

b. *Dendrocopos major candidus* (Stresemann, 1919)

ORDER CORACIIFORMES

FAMILY MEROPIDAE

183. *Merops apiaster* Linnaeus, 1758 — European Bee-eater — пчеларка

FAMILY CORACIIDAE

184. *Coracias garrulus* Linnaeus, 1758 — European Roller — модроврана

Coracias garrulus garrulus Linnaeus, 1758

FAMILY ALCEDINIDAE

185. *Alcedo atthis* (Linnaeus, 1758) — Common Kingfisher — рибарче

a. *Alcedo atthis atthis* (Linnaeus, 1758)

b. *Alcedo atthis ispida* Linnaeus, 1758

ORDER FALCONIFORMES

FAMILY FALCONIDAE

186. *Falco naumanni* Fleischer, 1818 — Lesser Kestrel — степска ветрушка

187. *Falco tinnunculus* Linnaeus, 1758 — Common Kestrel — ветрушка

Falco tinnunculus tinnunculus Linnaeus, 1758

188. *Falco vespertinus* Linnaeus, 1766 — Red-footed Falcon — сина ветрушка

189. *Falco eleonoraе* Gené, 1839 — Eleonora's Falcon
— медитерански сокол

All records:

17.06.1985, Kožuf (Grubač 1988)

31.05.2007, Demir Kapija (Škorpíková et al. 2007)

190. *Falco columbarius* Linnaeus, 1758 — Merlin — мал сокол

Falco columbarius aesalon Tunstall, 1771

191. *Falco subbuteo* Linnaeus, 1758 — Eurasian Hobby — сокол ластовичар

Falco subbuteo subbuteo Linnaeus, 1758

192. *Falco biarmicus* Temminck, 1825 — Lanner Falcon — планински сокол

Falco biarmicus feldeggii Schlegel, 1843

193. *Falco cherrug* J. E. Gray, 1834 — Saker Falcon — ловџиски сокол

Falco cherrug cherrug J. E. Gray, 1834

All records:

23.10.1938, Ovče Pole field (Vasić et al. 2016)

22.04.1958, Skopsko Pole field (Dimovski 1972)

11.1954-1959, Skopsko Pole field (Dimovski 1972)

01.06.1976, near Negotino (Sterbetz 1978)

21.01.1985, near Negotino (Vasić et al. 2016)

24.04.-01.05.2010, between v. Dragoevo, v. Sofilari and r. Kriva Lakavica, Serta region (Hanžel 2012)

Ovče Pole (Veleviski 2015) (findings 21.04.2010 near v. Mustafino and 12.11.2011 near v. Orel)

194. *Falco peregrinus* Tunstall, 1771 — Peregrine Falcon — сив сокол

Falco peregrinus brookei Sharpe, 1873

ORDER PASSERIFORMES

FAMILY ORIOLIDAE

195. *Oriolus oriolus* (Linnaeus, 1758) — Eurasian Golden Oriole — саријазма

FAMILY LANIIDAE

196. *Lanius collurio* Linnaeus, 1758 — Red-backed Shrike — обично страче

197. *Lanius minor* J.F. Gmelin, 1788 — Lesser Grey Shrike — мало страче

198. *Lanius excubitor* Linnaeus, 1758 — Great Grey Shrike — големо страче

Lanius excubitor excubitor Linnaeus, 1758

199. *Lanius senator* Linnaeus, 1758 — Woodchat Shrike — црвеноглаво страче

Lanius senator senator Linnaeus, 1758

200. *Lanius nubicus* M.H.C. Lichtenstein, 1823 — Masked Shrike — нубиско страче

FAMILY CORVIDAE

201. *Pyrrhocorax pyrrhocorax* (Linnaeus, 1758) — Red-billed Chough — црвеноклучна галка

Pyrrhocorax pyrrhocorax docilis (S.G. Gmelin, 1774)

202. *Pyrrhocorax graculus* (Linnaeus, 1766) — Alpine Chough/Yellow-billed Chough — жолтоклучна галка

Pyrrhocorax graculus graculus (Linnaeus, 1766)

203. *Garrulus glandarius* (Linnaeus, 1758) — Eurasian Jay — сојка

Garrulus glandarius graecus Kleiner, 1939

204. *Pica pica* (Linnaeus, 1758) — Eurasian Magpie — страчка

Pica pica pica (Linnaeus, 1758)

205. *Nucifraga caryocatactes* (Linnaeus, 1758) — Eurasian Nutcracker — лешникарка

Nucifraga caryocatactes caryocatactes (Linnaeus, 1758)

206. *Corvus monedula* Linnaeus, 1758 — Eurasian Jackdaw/Western Jackdaw — чавка

Corvus monedula soemmerringii J.G. Fischer, 1811

207. *Corvus frugilegus* Linnaeus, 1758 — Rook — полска врана

Corvus frugilegus frugilegus Linnaeus, 1758

208. *Corvus corax* Linnaeus, 1758 — Common Raven — гавран

Corvus corax corax Linnaeus, 1758

209. *Corvus corone* Linnaeus, 1758 — Carrion Crow — сива врана

Corvus corone sharpii Oates, 1889

FAMILY PRUNELLIDAE

210. *Prunella collaris* (Scopoli, 1769) — Alpine Accentor — алпско попче

Prunella collaris subalpina (C.L. Brehm, 1831)

211. *Prunella modularis* (Linnaeus, 1758) — Dunnock/Hedge Sparrow — обично попче

Prunella modularis modularis (Linnaeus, 1758)

FAMILY PASSERIDAE

212. *Passer domesticus* (Linnaeus, 1758) — House Sparrow — домашно врапче

Passer domesticus balearoibericus von Jordans, 1923

213. *Passer hispaniolensis* (Temminck, 1820) — Spanish Sparrow/Willow Sparrow — шпанско врапче

Passer hispaniolensis hispaniolensis (Temminck, 1820)

- 214. *Passer montanus* (Linnaeus, 1758) — Eurasian Tree Sparrow — полско врапче**
Passer montanus montanus (Linnaeus, 1758)
- 215. *Petronia petronia* (Linnaeus, 1766) — Eurasian Rock Sparrow — врапче камењарче**
Petronia petronia petronia (Linnaeus, 1766)
- 216. *Montifringilla nivalis* (Linnaeus, 1766) — White-winged Snowfinch — снежна свингалка**
Montifringilla nivalis nivalis (Linnaeus, 1766)

FAMILY MOTACILLIDAE

- 217. *Anthus trivialis* (Linnaeus, 1758) — Tree Pipit — шумска трепетилка**
Anthus trivialis trivialis (Linnaeus, 1758)
- 218. *Anthus cervinus* (Pallas, 1811) — Red-throated Pipit — црвеногушеста трепетилка**
 All records:
 09.10.1938, Skopje (Vasić et al. 2016)
 29.04.1963, Lake Prespa (D. Harber in Sage 1966)
- 219. *Anthus pratensis* (Linnaeus, 1758) — Meadow Pipit — ливадска трепетилка**
- 220. *Anthus spinoletta* (Linnaeus, 1758) — Water Pipit — карпеста трепетилка**
Anthus spinoletta spinoletta (Linnaeus, 1758)
- 221. *Anthus campestris* (Linnaeus, 1758) — Tawny Pipit — полска трепетилка**
- 222. *Motacilla flava* Linnaeus, 1758 — Yellow Wagtail — жолта тресиопашка**
 a. *Motacilla flava feldegg* Michahelles, 1830
 b. *Motacilla flava cinerocapilla* Savi, 1831
 19.05.1964, v. Perovo, Lake Prespa (Sage 1966)
 c. *Motacilla flava flava* Linnaeus, 1758
 14.05.1918, v. Marvinci, Valandovsko Pole field (Stresemann 1920)
 15.05.1918, Skopje (Stresemann 1920)
- 223. *Motacilla cinerea* Tunstall, 1771 — Grey Wagtail — планинска тресиопашка**
Motacilla cinerea cinerea Tunstall, 1771
- 224. *Motacilla alba* Linnaeus, 1758 — White Wagtail — бела тресиопашка**
Motacilla alba alba Linnaeus, 1758

FAMILY FRINGILLIDAE

- 225. *Fringilla coelebs* Linnaeus, 1758 — Common Chaffinch — обична свингалка**
Fringilla coelebs coelebs Linnaeus, 1758
- 226. *Fringilla montifringilla* Linnaeus, 1758 — Brambling — северна свингалка**

- 227. *Coccothraustes coccothraustes* (Linnaeus, 1758) — Hawfinch — дебелоклун црешар**
Coccothraustes coccothraustes coccothraustes (Linnaeus, 1758)
- 228. *Pyrrhula pyrrhula* (Linnaeus, 1758) — Eurasian Bullfinch — зимовка**
Pyrrhula pyrrhula pyrrhula (Linnaeus, 1758)
- 229. *Chloris chloris* (Linnaeus, 1758) — European Greenfinch — обична зелентарка**
 a. *Chloris chloris chloris* (Linnaeus, 1758)
 b. *Chloris chloris aurantiiventris* (Cabanis, 1851)
 According to Matvejev and Vasić (1973), although precise data are lacking
 c. *Chloris chloris muehlei* Parrot, 1905
- 230. *Linaria cannabina* (Linnaeus, 1758) — Common Linnet — конопјарче**
Linaria cannabina mediterranea (von Tschusi, 1903)
- 231. *Loxia curvirostra* Linnaeus, 1758 — Red Crossbill — крстоклун**
Loxia curvirostra guillemardi von Madarász, 1903
- 232. *Carduelis carduelis* (Linnaeus, 1758) — European Goldfinch — билбилче**
 a. *Carduelis carduelis balcanica* Sachtleben, 1919
 b. *Carduelis carduelis carduelis* (Linnaeus, 1758)
- 233. *Serinus serinus* (Linnaeus, 1766) — European Serin — жолтарче**
- 234. *Spinus spinus* (Linnaeus, 1758) — Eurasian Siskin — елова зелентарка**

FAMILY EMBERIZIDAE

- 235. *Granativora melanocephala* (Scopoli, 1769) — Black-headed Bunting — црноглава стрнарка**
- 236. *Emberiza calandra* Linnaeus, 1758 — Corn Bunting — голема стрнарка**
Emberiza calandra calandra Linnaeus, 1758
- 237. *Emberiza cia* Linnaeus, 1766 — Rock Bunting — планинска стрнарка**
Emberiza cia cia Linnaeus, 1766
- 238. *Emberiza hortulana* Linnaeus, 1758 — Ortolan Bunting — градинарска стрнарка**
- 239. *Emberiza cirlus* Linnaeus, 1766 — Cirl Bunting — црногрла стрнарка**
- 240. *Emberiza citrinella* Linnaeus, 1758 — Yellowhammer/Eurasian Yellow Bunting — жолтогрла стрнарка**
Emberiza citrinella erythrogenys C.L. Brehm, 1855
- 241. *Schoeniclus schoeniclus* (Linnaeus, 1758) — Eurasian Reed Bunting — блатна стрнарка**
 a. *Schoeniclus schoeniclus reiseri* (E. Hartert, 1904)

- b. *Schoeniclus schoeniclus passerinus* (Pallas, 1771)
25.01.1907, Skopje (Vasić et al. 2016)
23.04.1939, v. Kučково, Raduša region (Vasić et al. 2016)
- c. *Schoeniclus schoeniclus stresemanni* (F. Stainbacher, 1930)
26.02.1939, Katlanovsko Blato swamp, Skopsko Pole field (Vasić et al. 2016)
One specimen without any data (Vasić et al. 2016)
- d. *Schoeniclus schoeniclus schoeniclus* (Linnaeus, 1758)

FAMILY PARIDAE

242. *Pariparus ater* (Linnaeus, 1758) — Coal Tit — елова сипка
Pariparus ater ater (Linnaeus, 1758)
243. *Lophophanes cristatus* (Linnaeus, 1758) — Crested Tit — цуцулеста сипка
Lophophanes cristatus bureschi (von Jordans, 1940)
244. *Poecile lugubris* (Temminck, 1820) — Sombre Tit — голема црноглава сипка
Poecile lugubris lugubris (Temminck, 1820)
245. *Poecile palustris* (Linnaeus, 1758) — Marsh Tit — мала црноглава сипка
a. *Poecile palustris palustris* (Linnaeus, 1758)
b. *Poecile palustris stagnatilis* (C.L. Brehm, 1855)
246. *Poecile montanus* (Conrad, 1827) — Willow Tit — планинска сипка
Poecile montanus montanus (Conrad, 1827)
247. *Cyanistes caeruleus* (Linnaeus, 1758) — Blue Tit — сина сипка
Cyanistes caeruleus caeruleus (Linnaeus, 1758)
248. *Parus major* Linnaeus, 1758 — Great Tit — голема сипка
Parus major major Linnaeus, 1758

FAMILY REMIZIDAE

249. *Remiz pendulinus* (Linnaeus, 1758) — European Penduline Tit — сипка торбарка
Remiz pendulinus pendulinus (Linnaeus, 1758)

FAMILY ALAUDIDAE

250. *Melanocorypha calandra* (Linnaeus, 1766) — Calandra Lark — голема чучулига
Melanocorypha calandra calandra (Linnaeus, 1766)
251. *Calandrella brachydactyla* (Leisler, 1814) — Greater Short-toed Lark — мала чучулига
Calandrella brachydactyla brachydactyla (Leisler, 1814)

252. *Eremophila alpestris* (Linnaeus, 1758) — Horned Lark/Shore Lark — ушеста чучулига

Eremophila alpestris balcanica (Reichenow, 1895)

253. *Lullula arborea* (Linnaeus, 1758) — Wood Lark — шумска чучулига

a. *Lullula arborea arborea* (Linnaeus, 1758)

b. *Lullula arborea pallida* Sarudny, 1902

254. *Alauda arvensis* Linnaeus, 1758 — Eurasian Sky Lark — полска чучулига

Alauda arvensis cantarella Bonaparte, 1850

255. *Galerida cristata* (Linnaeus, 1758) — Crested Lark — цуцулеста чучулига

Galerida cristata meridionalis C.L. Brehm, 1841

FAMILY PANURIDAE

256. *Panurus biarmicus* (Linnaeus, 1758) — Bearded Reedling — мустаклеста сипка

Panurus biarmicus biarmicus (Linnaeus, 1758)

FAMILY LOCUSTELLIDAE

257. *Locustella luscinioides* (Savi, 1824) — Savi's Warbler — штурче трскарче

Locustella luscinioides luscinioides (Savi, 1824)

FAMILY ACROCEPHALIDAE

258. *Iduna pallida* (Hemprich & Ehrenberg, 1833) — Olivaceous Warbler/Eastern Olivaceous Warbler — сиво гушанче

Iduna pallida elaeica (Lindermayer, 1843)

259. *Hippolais olivetorum* (Strickland, 1837) — Olive-tree Warbler — маслинар

260. *Hippolais icterina* (Vieillot, 1817) — Icterine Warbler — жолто гушанче

261. *Acrocephalus melanopogon* (Temminck, 1823) — Moustached Warbler — тенкоклуч трскар

Acrocephalus melanopogon melanopogon (Temminck, 1823)

262. *Acrocephalus schoenobaenus* (Linnaeus, 1758) — Sedge Warbler — мал трскар

263. *Acrocephalus palustris* (Bechstein, 1798) — Marsh Warbler — блатен трскар

264. *Acrocephalus scirpaceus* (Hermann, 1804) — Common Reed Warbler — трскар рогозар

Acrocephalus scirpaceus scirpaceus (Hermann, 1804)

265. *Acrocephalus arundinaceus* (Linnaeus, 1758) — Great Reed Warbler — обичен трскар

Acrocephalus arundinaceus arundinaceus (Linnaeus, 1758)

FAMILY HIRUNDINIDAE

266. *Delichon urbicum* (Linnaeus, 1758) — Northern House Martin — градска ластовичка
Delichon urbicum meridionale (E. Hartert, 1910)
267. *Cecropis daurica* (Laxmann, 1769) — Red-rumped Swallow — пештерска ластовичка
Cecropis daurica rufula (Temminck, 1835)
268. *Hirundo rustica* Linnaeus, 1758 — Barn Swallow — селска ластовичка
Hirundo rustica rustica Linnaeus, 1758
269. *Ptyonoprogne rupestris* (Scopoli, 1769) — Eurasian Crag Martin — карпеста ластовичка
270. *Riparia riparia* (Linnaeus, 1758) — Sand Martin/Bank Swallow — брегова ластовичка
Riparia riparia riparia (Linnaeus, 1758)

FAMILY PHYLLOSCOPIDAE

271. *Rhadina orientalis* (C.L. Brehm, 1855) — Eastern Bonelli's Warbler — источен планински свиркач
272. *Rhadina sibilatrix* (Bechstein, 1793) — Wood Warbler — шумски свиркач
273. *Phylloscopus trochilus* (Linnaeus, 1758) — Willow Warbler — брезов свиркач
a. *Phylloscopus trochilus trochilus* (Linnaeus, 1758)
b. *Phylloscopus trochilus acredula* (Linnaeus, 1758)
274. *Phylloscopus collybita* (Vieillot, 1817) — Common Chiffchaff — обичен свиркач
Phylloscopus collybita collybita (Vieillot, 1817)

FAMILY SCOTOCERCIDAE

275. *Cettia cetti* (Temminck, 1820) — Cetti's warbler — свиларче
Cettia cetti cetti (Temminck, 1820)
Šere (2009) considers that the population at Lake Dojran belong to the subspecies *Cettia cetti orientalis* Tristram, 1867. Further comparisons from other Balkan regions are needed.

FAMILY AEGITHALIDAE

276. *Aegithalos caudatus* (Linnaeus, 1758) — Long-tailed Tit — дологоопашеста сипка
Aegithalos caudatus macedonicus (Salvadori & Dresser, 1892)

FAMILY SYLVIIDAE

277. *Sylvia atricapilla* (Linnaeus, 1758) — Eurasian Blackcap — црноглаво грмушарче
Sylvia atricapilla atricapilla (Linnaeus, 1758)

278. *Sylvia borin* (Boddaert, 1783) — Garden Warbler — градинарско грмушарче

Possible breeding in 1968, at Katlanovo 01.05.1968 and on Babuna Mt. 25.05.1968, (Corti and Simon 1970). Most recent probable breeding 1969, Lake Prespa (Matvejev 1976).

279. *Curruca nisoria* (Bechstein, 1795) — Barred Warbler — дамчесто грмушарче

Curruca nisoria nisoria (Bechstein, 1795)

280. *Curruca crassirostris* (Cretzschmar, 1830) — Eastern Orphean Warbler — источно-медитеранско грмушарче

Curruca crassirostris crassirostris (Cretzschmar, 1830)

281. *Curruca curruca* (Linnaeus, 1758) — Lesser White-throat — мало грмушарче

Curruca curruca curruca (Linnaeus, 1758)

282. *Curruca cantillans* (Pallas, 1764) — Eastern Subalpine Warbler — црвеногушесто грмушарче

Curruca cantillans albistriata C.L. Brehm, 1855

283. *Curruca melanocephala* (J.F. Gmelin, 1789) — Sardinian Warbler — мало црноглаво грмушарче

Curruca melanocephala melanocephala (J.F. Gmelin, 1789)

284. *Curruca communis* (Latham, 1787) — Common Whitethroat — обично грмушарче

Curruca communis communis (Latham, 1787)

FAMILY REGULIDAE

285. *Regulus regulus* (Linnaeus, 1758) — Goldcrest — жолтоглаво кралче

Regulus regulus regulus (Linnaeus, 1758)

286. *Regulus ignicapilla* (Temminck, 1820) — Eurasian Firecrest — црвеноглаво кралче

Regulus ignicapilla ignicapilla (Temminck, 1820)

FAMILY BOMBYCILLIDAE

287. *Bombycilla garrulus* (Linnaeus, 1758) — Bohemian Waxwing — свиларка

Bombycilla garrulus garrulus (Linnaeus, 1758)

All records:

25.02.1927, Skopsko Pole (Vasić et al. 2016)

20.02.1944, v. Gorno Nerezi, Vodno (Vasić et al. 2016)

30.12.1970, Skopje (Vasić et al. 2016)

30.12.1974, Skopje (Vasić et al. 2016)

FAMILY CETHIIDAE

288. *Certhia brachydactyla* C.L. Brehm, 1820 — Short-toed Treecreeper — краткопрст ползач

- Certhia brachydactyla brachydactyla* C.L. Brehm, 1820
289. *Certhia familiaris* Linnaeus, 1758 — Eurasian Treecreeper — обичен ползач
Certhia familiaris familiaris Linnaeus, 1758

FAMILY SITTIDAE

- 290. *Sitta europaea* Linnaeus, 1758 — Eurasian Nuthatch — обичен лазач**
Sitta europaea caesia Wolf, 1810
291. *Sitta neumayer* Michahelles, 1830 — Western Rock Nuthatch — лазач грнчар
Sitta neumayer neumayer Michahelles, 1830
292. *Tichodroma muraria* (Linnaeus, 1766) — Wall-creeper — карполазач
Tichodroma muraria muraria (Linnaeus, 1766)

FAMILY TROGLODYTIDAE

- 293. *Troglodytes troglodytes* (Linnaeus, 1758) — Eurasian Wren — царче**
Troglodytes troglodytes troglodytes (Linnaeus, 1758)

FAMILY STURNIDAE

- 294. *Sturnus vulgaris* Linnaeus, 1758 — Common Starling/European Starling — обичен сколовранец**
Sturnus vulgaris vulgaris Linnaeus, 1758
295. *Pastor roseus* (Linnaeus, 1758) — Rosy Starling — розев сколовранец

FAMILY CINCLIDAE

- 296. *Cinclus cinclus* (Linnaeus, 1758) — White-throated Dipper — воден ќос**
Cinclus cinclus aquaticus (Bechstein, 1797)

FAMILY MUSCICAPIDAE

- 297. *Cercotrichas galactotes* (Temminck, 1820) — Rufous Scrub Robin — долгоопашесто свиларче**
Cercotrichas galactotes syriaca (Hemprich & Ehrenberg, 1833)
 All records:
 1917-1918, v. Kalukovo, Valandovo region (Fehringer 1922)
 1917-1918, v. Davidovo, Valandovo region (Fehringer 1922)
 20.05.1918, v. Dedeli, Boska region (Stresemann, 1920)
 22.05.1918, v. Dedeli, Boska region (Stresemann, 1920)
 22.07.1944, v. Udovo, Valandovo Region (Bodenstein, in Makatsch 1950)

- 23.07.1944, v. Udovo, Valandovo Region (Bodenstein, in Makatsch 1950)
 21 or 23.07.1959, Demir Kapija (Terrasse and Terrasse 1961)
 1968, near Nov Dojran (Dimovski 1971)
 1969, near Nov Dojran (Dimovski 1971)
 1970, near Nov Dojran (Dimovski 1971)
298. *Muscicapa striata* (Pallas, 1764) — Spotted Flycatcher — сиво муварче
Muscicapa striata striata (Pallas, 1764)
299. *Erithacus rubecula* (Linnaeus, 1758) — European Robin — црвеногушка
Erithacus rubecula rubecula (Linnaeus, 1758)
300. *Luscinia megarhynchos* C.L. Brehm, 1831 — Common Nightingale — славејче
Luscinia megarhynchos megarhynchos C.L. Brehm, 1831
301. *Ficedula parva* (Bechstein, 1792) — Red-breasted Flycatcher — црвеногушесто муварче
 All records:
 06.06.2008, below Propast, Galičica (Vasić 2010)
 Osogovo Mountains (Velevski 2009)
 (22.07.2007, Ozemnica, s. Jastrebnik;
 11.6.2009, Emiračka Reka and 04.09.2009, Jamiško Osoe)
 27.05.2009, Mala Reka, Kozjak - Kumanovo (Škorpíková et al. 2009b)
 Plačkovica Mt. (Velevski 2015) (12.05.2015, valley of river Blatešnica; 14.05.2015, Đumaja and valley of river Lomija; 28.6.2015, valley of river Lomija; 03.7.2015, Pripor, above v. Laki)
302. *Ficedula semitorquata* (von Homeyer, 1885) — Semi-collared Flycatcher — шарено муварче
303. *Ficedula hypoleuca* (Pallas, 1764) — European Pied Flycatcher — црноглаво муварче
Ficedula hypoleuca hypoleuca (Pallas, 1764)
304. *Ficedula albicollis* (Temminck, 1815) — Collared Flycatcher — беловрато муварче
305. *Phoenicurus phoenicurus* (Linnaeus, 1758) — Common Redstart — лисесто циганче
Phoenicurus phoenicurus phoenicurus (Linnaeus, 1758)
306. *Phoenicurus ochruros* (S.G. Gmelin, 1774) — Black Redstart — циганче
Phoenicurus ochruros gibraltariensis (J.F. Gmelin, 1789)
307. *Monticola saxatilis* (Linnaeus, 1766) — Common Rock Thrush — карпест дрозд
308. *Monticola solitarius* (Linnaeus, 1758) — Blue Rock Thrush — модар дрозд
Monticola solitarius solitarius (Linnaeus, 1758)

309. *Saxicola rubetra* (Linnaeus, 1758) — Whinchat—
обично ливадарче
310. *Saxicola rubicola* (Linnaeus, 1766) — European
Stonechat — планинско ливадарче
Saxicola rubicola rubicola (Linnaeus, 1766)
311. *Oenanthe oenanthe* (Linnaeus, 1758) — Northern
Wheatear — обично камењарче
Oenanthe oenanthe libanotica (Hemprich & Ehren-
berg, 1833)
312. *Oenanthe hispanica* (Linnaeus, 1758) — Black-
eared Wheatear — шпанско камењарче
Oenanthe hispanica melanoleuca (Güldenstädt, 1775)

FAMILY TURDIDAE

313. *Turdus viscivorus* Linnaeus, 1758 — Mistle Thrush
— имелов дрозд
Turdus viscivorus viscivorus Linnaeus, 1758
314. *Turdus philomelos* C.L. Brehm, 1831 — Song
Thrush — дрозд пејач
Turdus philomelos philomelos C.L. Brehm, 1831
315. *Turdus iliacus* Linnaeus, 1766 — Redwing —
лисест дрозд
Turdus iliacus iliacus Linnaeus, 1766
316. *Turdus merula* Linnaeus, 1758 — Eurasian Black-
bird — ќос
Turdus merula aterrimus (von Madarász, 1903)
317. *Turdus pilaris* Linnaeus, 1758 — Fieldfare —
дрозд боровинкар
One case of probable breeding reported,
20.05.1987, Kožuf (Hölzinger 1987)
318. *Turdus torquatus* Linnaeus, 1758 — Ring Ouzel —
белограден ќос
Turdus torquatus alpestris (C.L. Brehm, 1931)

Discussion on controversial cases and conclusions

The new check list of the Republic of Macedonia contains 334 species of birds. For 16 species, we express our concern in the validity of the available information, or that information is simply not sufficiently documented, or is not in line with present-day basic standards of reporting a new finding (absence of details on the determination, the circumstances of the finding, a photograph, etc.).

Therefore, we have reduced the number of species to 318 for which we believe that are sufficiently proved and documented. They belong to 189 genera, 63 families and 18 orders. For 53 of them, there are up to 10

records in the country in total, reflecting the insufficient knowledge on the bird fauna of Macedonia.

The remaining 16 species hang waiting new re-searches:

Anser erythropus (Linnaeus, 1758) — Lesser White-fronted Goose — мала белочелна гуска

It is reported as probably present in Macedonia (Matvejev and Vasić 1973), but in the available references there are no information for the finding of this species in the country.

Lyrurus tetrix (Linnaeus, 1758) — Eurasian Black Grouse — мал тетреб

Lyrurus tetrix tetrix (Linnaeus, 1758)

It is reported as present in the breeding period in Northern Macedonia (Matvejev and Vasić 1973), but with expressed doubt about the validity of the information. In the available references there are no information for confident finding of this species in the country.

Phalacrocorax aristotelis (Linnaeus, 1761) — European Shag — морски корморан

Phalacrocorax aristotelis desmarestii (Payraudeau, 1826)

It is reported as “very rare” at Lake Dojran (observation in December 1963) by Apostolski and Jovetić (1967), but details on the identification are not given, nor the finding has been subsequently published in a journal.

Observation of three individuals at Lake Ohrid during the mid-winter count of waterbirds in 1989 is also reported (Evans and Heath 2000), but we were unsuccessful in our attempts to find the source of this information.

Charadrius hiaticula Linnaeus, 1758 — Common Ringed Plover — среден пескар

Charadrius hiaticula tundrae (P.R. Lowe, 1915)

It is reported as probably present in Macedonia (Matvejev and Vasić 1973), but in the available literature there are no information for the finding of this species in the country.

Charadrius alexandrinus Linnaeus, 1758 — Kentish Plover — морски пескар

Charadrius alexandrinus alexandrinus Linnaeus, 1758

Reported only by Vogrin (1990), 12.08.1989, river Pčinja at village Šupli Kamen (Kumanovo), but details on the identification are missing.

***Numenius tenuirostris* Vieillot, 1817 — Slender-billed Curlew — тенкоклуч српоклуч свиркач**

It is reported as probably present in Macedonia (Matvejev and Vasić 1973), but in the available literature there are no information for the finding of this species in the country.

***Glareola nordmanni* J.G. Fischer, 1842 — Black-winged Pratincole — црнокрила блатна ластовица**

Reported for 17.05.1964, at village Perovo, Lake Prespa by Sage (1966), but details on the identification are missing.

***Linaria flavirostris* (Linnaeus, 1758) — Twite — нордиско конопјарче**

Linaria flavirostris flavirostris (Linnaeus, 1758)

The only reporting of this species comes from Mostert (2006) from Galičica Mt., 25.07 - 05.08.2006. This mountain is among the best studied regions in Macedonia. In combination with absence of the common *Linaria cannabina mediterranea* (von Tschusi, 1903) on Mostert's list, we consider this reporting as erroneous.

***Acanthis flammea* (Linnaeus, 1758) — Common Redpoll — огнено конопјарче**

Acanthis flammea flammea (Linnaeus, 1758)/*cabaret* (Statius Muller, 1776)

Reported only by Vogrin (1990), on 08.11.1989 in Skopje. Details on the observation are missing, therefore we have not included it in the list, although it should be regular in Macedonia in winters.

***Emberiza caesia* Cretzschmar, 1827 — Cretzschmar's Bunting — црвеногрла стрнарка**

Reported by Corti and Simon (1970) as the first record for what was SFR Yugoslavia, but details on the identification are missing. The location from where it was reported (the gorge of river Topolka, 23.05.1968) is a well studied site, without further registrations of the species. Therefore, we are doubtful about the accuracy of this information.

***Schoeniclus pusillus* (Pallas, 1776) — Little Bunting — мала стрнарка**

It is reported by Dimovski (1971) for the surrounding of Nov Dojran in the winter period, in the Kermes Oak *Quercus coccifera* association. As all previous reports of this species through specimens in the museum collections have been corrected by re-determination as *Schoe-*

niclus schoeniclus passerinus (Pallas, 1771), we also consider Dimovski's record as erroneous.

***Locustella naevia* (Boddaert, 1783) — Common Grasshopper Warbler — полски трскар**

Locustella naevia naevia (Boddaert, 1783)

The validity of observation by Gengler (1920), near v. Tabanovce (Kumanovo) 13.07.1916 or 1917 has been challenged by Stresemann (1920), being far from the species range. Later on, basing on the uncertain finding of Micholitsch (1957) at Crna Reka marshlands in 1956, Matvejev and Vasić (1973) listed it for Macedonia on migration, expressing concerns about the validity of the finding. We are on opinion that there is need of further evidence before the species can be accepted in the national checklist.

***Acrocephalus paludicola* (Vieillot, 1817) — Aquatic Warbler — воден трскар**

It is reported as present in Macedonia during migration (Matvejev and Vasić 1973), but in the available literature there are no information for the finding of this species in the country.

***Curruca conspicillata* (Temminck, 1820) — Spectacled Warbler — наочаресто грмушарче**

Curruca conspicillata conspicillata (Temminck, 1820)

It is reported only by Sage (1966), 19.05.1964 at v. Podmočani, Prespa region, but due to absence of details on the identification, we consider that it is too early to include this species in the national check-list.

***Phoenicurus erythrogastus* (Güldenstädt, 1775) — Güldenstädt's Redstart — кавкаска црвеноопашарка**

Reported by Micevski (2010) from v. Bituše, Dešat Mt., 11.06.2010, without further details on the observation, but with a note that it is the first record from Macedonia. Due to absence of observation and identification details and consequent publication in a journal, we have not included this species in the list at the moment, although findings of the species at large distances from the core breeding range are known (e.g., Škorpíková 2010).

***Oenanthe pleschanka* (Lepechin, 1770) — Pied Wheat-ear — шарено камењарче**

Reported only by Vogrin (1990) for the central dry parts of Macedonia (29.05.1989 and 02.09.1989,

Konečka Planina Mt., “Krivolak” military training grounds), as a new species for the country. Some years earlier, Matvejev (1976) stated a possibility that this species might have a population in the dry parts of Macedonia. As details on Vogrin’s identification are missing, and both authors of this paper have extensive field experience in the vicinity of this area (with the same environmental conditions) without being able to confirm the species, we consider this record as unreliable.

From the accepted species, 108 are monotypic. For 197, presence of only one subspecies has been reported, while for 13, there are available information (although not always with precise data), for occurrence of more than one subspecies. In total, 336 taxa are listed as accepted records.

Acknowledgements

The work on the checklist was partially funded by the Ministry of Culture of the Republic of Macedonia. We are grateful to Slobodan Puzović and Vlasta Škorpíková for their swift and useful comments on the earlier draft of the manuscript.

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Коментирана листа на птиците на Република Македонија

Методија Велевски и Воислав Васиќ

За изработката на листа на птици на Република Македонија беа проверени сите публикувани податоци и податоци од достапни извештаи. За вкупно 318 видови, информациите ги сметаме за соодветни, а за останати 16 видови искажуваме загриженост околу идентификацијата и/или пријавувањето. Прифатените видови припаѓаат кон 189 родови, 63 фамилии и 18 редови. За дури 53 од прифатените видови, постојат не повеќе од 10 податоци од земјата, и за нив се прикажани детални информации. Каде што е потребно, прикажани се последните случаи на гнездење, единствените слушаи на гнездење или најскорешните набљудувања. Од фауната на птици на Република Македонија, 108 видови се сметаат за монотипски. За сите други, наброени се и документираните подвидови. Присуство на повеќе од еден подвид е пријавено за 13 видови.

Клучни зборови: критички преглед, преглед на литература, таксони на птици

Acta Musei Macedonici Scientiarum Naturalium —journal scope and guidelines for submission of manuscripts

Journal's aim and scope

ACTA Musei Macedonici Scientiarum Naturalium is a peer-reviewed scientific journal, published by the Macedonian Museum of Natural History. *ACTA* is published with one issue, equaling one volume, per year, both on-line as an open-access journal, and in printed version. In the case of sufficient submissions, two issues will be released per year.

The first issue of *ACTA* was printed in 1953, and was published almost regularly until 1995. In 2017, *ACTA* has seen its revival after 22 years of dormancy. Now it comes in a new format, as a standard journal issue, but more importantly, it has incorporated many of the ever-growing guidelines for high-quality open access journal in its editorial and publication policy.

ACTA publishes original research papers, short notes, reviews and comments in geology, mineralogy, paleontology, zoology, mycology, botany, and ecology. Topics can also be from the fields of geomorphology, microbiology, molecular biology and nature conservation as long as they focus on natural processes and phenomena.

The geographic scope is not limited, however contributions from the Republic of Macedonia and the Balkan Peninsula are encouraged. *ACTA* will consider articles dealing with natural history museums and collections, description of new taxa, reporting of rare or otherwise important findings, and taxonomic inventories. Comments on papers already published in *ACTA*, in form of highly ethical discussion, are encouraged as one of the means to advance the science.

The submission process

Manuscripts for *ACTA* should be sent to the editor-in-chief, in electronic form, on the following e-mail: acta@musmacscinat.mk. Following an initial check, it will be forwarded to the most appropriate member(s) of the editorial board. The author(s) will be informed on the preliminary eligibility of the paper usually within a week of submission, and the manuscript will be sent to at least two reviewers. It is reviewers' decision whether they will stay anonymous, or not. Following

the review process, articles will be either published without or after minor corrections, returned to the authors for major corrections, or rejected. In cases when major revisions to the manuscripts are required, or when rejected manuscripts are re-submitted, they will undergo a full reviewing process again.

Following an acceptance for publication, technically edited articles will be published on-line as a PDF file within a month, and printed version will follow within the same calendar year. Supplementary materials (baseline data, technical information on the methodology or computing codes, larger number of photographs, shape-files or similar), will be published only on-line.

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work. *PLoS ONE* 9, e110552. <https://doi.org/10.1371/journal.pone.0110552>

Conference proceedings

Tewes, E., Terrasse, M., Bagnolini, C., Sánchez Artéz, J.J., 1998. Captive breeding of the European Black Vulture *Aegypius monachus* and the reintroduction project in France. pp. 417–435, in: Chancellor, R.D., Meyburg, B.-U., Ferrero, J.J. (Eds.), *Proceedings of the International Conference Holarctic Birds of Prey, ADENEX-WWGBP*, Mérida & Berlin

Books

Beckerman, A.P., Petchey, O.L., 2012. *Getting Started with R: An introduction for biologists*. Oxford University Press. Oxford. 125 pp.

Chapter in book

Colwell, R.K., 2009. Biodiversity: Concepts, Patterns, and Measurement. pp. 257–263, in: Levin, S.A., Godfray, H.C.J., Kinzig, A.P., Loreau, M., Losos, J.B., Walker, B., Wilcove, D.S. (Eds.), *The Princeton Guide to Ecology*. Princeton University Press, Princeton and Woodstock, 844 pp

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