

CATALOGUE OF THE ENTOMOLOGICAL COLLECTIONS
OF THE DIVISION OF ZOOLOGY OF THE FACULTY
OF SCIENCE IN ZAGREB
COLLECTION OF ORTHOPTERA (POLYNEOPTERA, ORTHOPTERIDA)
OF BOŽA POKOPAC

Lucija Šerić Jelaska¹ & Josip Skejo²

¹Department of Biology, Faculty of Science, University of Zagreb, Rooseveltov trg 6,
10000 Zagreb, Croatia, slucija@biol.pmf.hr

²Biology Students Association – BIUS, Rooseveltov trg 6, 10000 Zagreb, Croatia
skejojosp@gmail.com

*Both authors contributed equally

This is the first paper from the series *Catalogus collectionum entomologicarum Divisionis zoologicae Facultatis scientiarum naturalium et mathematicarum Zagrabiae* (Catalogue of the entomological collections of the Division of Zoology of the Faculty of Science in Zagreb). The paper presents the catalogue of the Boža Pokopac Orthoptera collection made in 1956 during Boža's master's thesis research into the Orthopteran fauna in the vicinity of Bjelovar. In total, 99 specimens of the 286 reported in the master's thesis were found. Among them is a new species for Croatian fauna – *Stenobothrus crassipes*. The need for the conservation of the entomological collections in Croatian faculties and museums is briefly noted.

Key words: grasshoppers, Croatian entomofauna, *Stenobothrus crassipes*

L. ŠERIĆ JELASKA i J. SKEJO: Katalog entomoloških zbirki Zoologijskog zavoda Prirodoslovno – matematičkog fakulteta u Zagrebu I.: Zbirka ravnokrilaca (Orthoptera) Bože Pokopac (Polyneoptera, Orthoptera). Entomol. Croat. Vol. 18. Num. 1–2: 59–71.

Ovo je prvi rad u seriji radova *Catalogus collectionum entomologicarum Divisionis zoologicae Facultatis scientiarum naturalium et mathematicarum Zagrabiae* (Katalog entomoloških zbirki Zoologijskog zavoda Prirodoslovno – matematičkog fakulteta u Zagrebu). Rad predstavlja katalog ravnokrilaca (Orthoptera) iz zbirke Bože Pokopac koja je izrađena 1956. tijekom istraživanja ravnokrilaca okoline Bjelovara za diplomski rad. Pronađeno je sveukupno 99 primjeraka iz originalne zbirke s 286 primjeraka navedenih u diplomskom radu. Predstavljena je nova vrsta za faunu Hrvatske – *Stenobothrus crassipes*. Raspravljena je potreba očuvanja entomoloških zbirki na hrvatskim fakultetima i muzejima.

Ključne riječi: ravnokrilci, zbirka, hrvatska entomofauna, *Stenobothrus crassipes*

Introduction

The entomological collection is the mainstay of undergraduate training in systematic entomology at the Division of Zoology, University of Zagreb. Contributions to the entomological collection began in 1890s, as a part of the overall Zoology collection. Firstly, it consisted of insects and other arthropods mainly preserved in fluids (formalin and alcohol) and served primarily in teaching. During the last century, the collection's holdings have grown to 21765 pinned insects originating from all over the country. In addition, there is much more unsorted material, dried and deposited in envelopes or wet preserved in small containers with ethanol and placed in cardboard boxes, as there is not enough space in the entomology room and cabinets for additional material to be stored.

The Entomological Collection at the Division of Zoology has been an important research tool since the 1950s, where scientists have been depositing the specimens collected as a part of their research studies, mainly collected by undergraduate, master's and doctoral students as a part of their projects. The most comprehensive part of the collections derives from research projects run by Professor P. Durbešić and her team, working primarily on beetles (Coleoptera) in forest ecosystems in the Dinaric karst area. As well as from Croatia, some smaller number of insects originated from neighbouring countries, e.g. Slovenia and Bosnia & Herzegovina.

The collection has been neglected for a few decades, as there were no investments in new cabinets and entomological boxes, and the collection room has been divided into two rooms, one used as student study room and the other used for deposition of the overall zoology collection. As a consequence of the reduced space, the entomological collections have been squeezed into a smaller number of cabinets. During last few years/decades, due to lack of space, there was no new material deposition at all.

As Croatian entomofauna is still insufficiently explored and lacking in the basic knowledge on many insect groups, the importance of this collection is thus even greater. From 2014, the first author of the paper has been assigned to curation of the dry pinned specimens from the entomological collection in the Division. After a quick inventory survey of 4 cabinets and 154 boxes, 21765 pinned insects were counted. Unfortunately, many specimens were not properly labelled or not labelled at all, while a lot of material has been severely damaged. Furthermore, most of the boxes are inappropriate for the purpose of preservation, as they are broken; some of them were not entomological boxes but card boxes primarily used for temporary that turned out to be permanent housing and probably might have contributed to existing damaged to the specimens, and is likely to cause more in the future.

As the Division of Zoology invested in 20 new boxes in 2014, old but well preserved material, with proper labels, have been transferred. Firstly, an inventory number was assigned to each specimen, and the species were then identified. Through a series of publications, valuable faunistic records on gall making insects, dragonflies, beetles etc., that have been forgotten and so far unattainable to the wider

society, will be presented aiming to provide additional knowledge on Croatian entomofauna.

In this paper, the Boža Pokopac Orthoptera collection, made as a part of her master's thesis work (Pokopac, 1956), has been presented. She surveyed the Orthoptera species inhabiting open habitats such as meadows, grasslands, vineyards and arable fields, in the lowland surroundings of Bjelovar. The aim of this paper is to provide a list of species/specimens that represent the baseline data on the insect diversity in the surveyed area. Furthermore, the aim of this paper is to list all the species and specimens currently present in the Boža Pokopac collection and to compare existing species and specimens with the data presented in Pokopac (1956). As it dates back more than 60 years, this dataset can be used in analysing the effects of habitat changes on the overall biodiversity within this time scale.

Material and Methods

Study sites

Insects (Orthoptera) were collected in the lowland of Bilogora hill, in the surroundings of Bjelovar (Figure 1, Table 1) with three rivers flowing through the landscape: the Česma, Bjelovarska and Plavnička rivers. Due to the type of soil, shape and elevation of the terrain four vegetation types were recorded: *Arrhenatheretum*

Table 1. List of the surveyed localities. The number in the table represents the number on the map (Figure 1). The second column gives the name of each locality, while in the third and fourth are the coordinates (north and east) of each locality.

NUMBER	LOCALITY	NORTH	EAST
1	Gudovac	45.875714	16.772269
2	Logor	45.878433	16.794353
3	Mlinovac	45.885692	16.857128
4	Plavnice (by the Plavnička river)	45.895061	16.803269
5	Novoseljani	45.898797	16.870238
6	Vojnović (W Bjelovar)	45.898992	16.828789
7	Bjelovarska river	45.909347	16.883003
8	Grginac	45.913067	16.893911
9	Šištat (by the forest)	45.914831	16.802947
10	Ivanovčani	45.915808	16.851494
11	Zverci (= Zvijerci)	45.921758	16.866436
12	Veliko Trojstvo	45.938375	16.941286

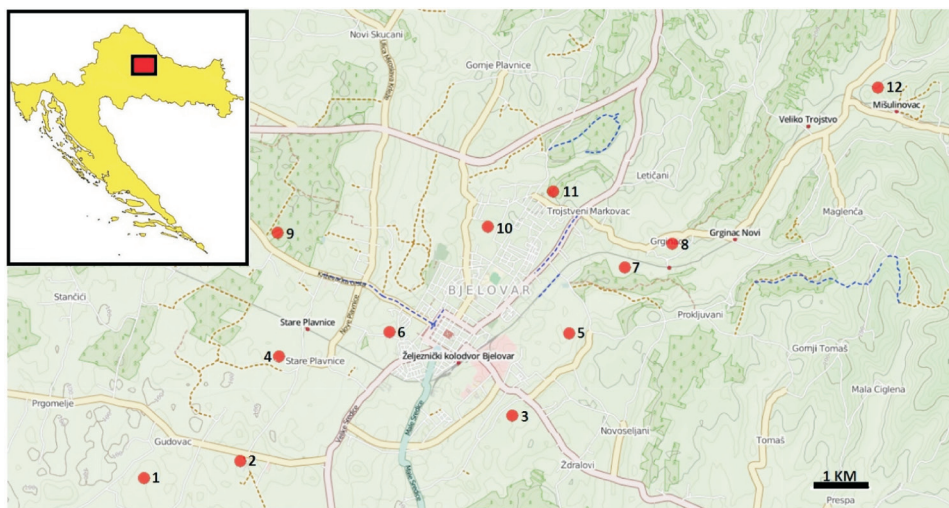


Figure 1. Map of the surveyed localities. Numbers indicated on the map represent numbers from the Table 1. Numbers are sorted from southernmost to the northernmost. Small map represents position of this area in Croatia.

elatoris Br.-Bl. ex Scherrer 1925, *Bromo-Cynosuretum cristati* H-ić. 1930, *Deschampsietum caespitosae* H-ić. 1930, *Caricetum tricostato-vulpinae* H-ić. 1930. The last two represented wetlands with water retention during spring and autumn seasons. Most of the meadows were mowed twice a year and manured three times a year. In addition to the meadows, pastures, vineyards and arable fields were also surveyed (Pokopac, 1956).

Sampling and collection preparation

According to the Boža Pokopac master's thesis (Pokopac, 1956), two sampling methods were used: entomology net with 30 cm diameter and by-hand method. Insects were collected from spring to autumn in 1952, 1953 and 1954. Acetyl-ether or cyanide was used for killing; the insects were preserved by removing the internal organs of abdomen, and replacing it with cotton wool moistened with boric acid. Insects were pinned, dried, and properly labelled.

Identification and taxonomy

Pokopac (1956) used primarily Chopard's (1951) key for material identification and systematic classification. The material has now been critically revised and species identifications checked according to the following keys – Harz (1969, 1975), Iorgu & Iorgu (2008) Vedenina & Helversen (2009) using currently accepted valid names of the species and systematic classification according to the Orthoptera Species File (Eades *et al.*, 2014), further in the text OSF.

Results

The Boža Pokopac (Figure 2A) Orthoptera Collection was part of her master's work (Figure 2B). Insects were sampled in the meadows and arable land in the vicinity of Bjelovar, from 1952 to 1954. In her thesis (Pokopac 1956), she listed 27 species with 286 individuals, while we have found only 18 species and 99 specimens within the Division of Zoology collection (Figure 2C). She found 16 species and 200 individuals belonging to Acrididae, six species and 65 individuals representing Tettigoniidae, four species with 17 individuals representing Gryllidae and one species and four individuals from Gryllotalpidae (for all the species ordered taxonomically according to OSF see Appendix I.). Her collection currently consists of nine species belonging to Acrididae with 64 pinned specimens, five species and 25 specimens belonging to Tettigoniidae, three species and nine specimens belonging to Gryllidae and one species and a single individual belonging to Gryllotalpidae (Figure 2C).

We provide here the list of the species within the entomological collection at the Division of Zoology with the inventory number of each specimen with the annotated sex, sampling location, habitat and sampling date (Table 2). The specimens originate from Bjelovar town and its surroundings, at the locations: Zverci, Šištat, Ivanovčani, Veliko Trojstvo, Novoseljani, Gudovac, Vojnović, Grginac, Mlinovac, Logor, Plavnice, and near the Bjelovarska River (Table 1, Figure 1). Eight specimens have no labels and eleven specimens do not have the precise sampling location. This is due to later handling of the material that was not according to the entomological code of conduct, especially in the case of the removal of old labels and the placing



Figure 2(A-C). A) Boža Tvratković born Pokopac (reproduced from the Fond Boža Tvratković official site, with permission), B) the title of the Pokopac's master/diploma work, C) Boža Pokopac Orthoptera Collection, 2 boxes.

of new labels or the removal of labels in general. We recognized this unlabeled material according to characteristics of the preservation of material, as well as according to the characteristics of the pin used and position (height) of the specimen on the pin (located very low).

Table 2. Catalogue of the Boža Pokopac Orthoptera collection. First column represents the inventory number (INVN) of each specimen (BP01-BP99), second - the valid scientific species name according to the OSF (Eades *et al.*, 2014), third - date of collecting, fourth - locality, fifth - habitat type (date, locality and habitat type were noted on the labels) and the last (sixth) column represents sex of each individual (nymphs whose sex is not determinable are marked with *juv.*).

INVN	VALID SCIENTIFIC NAME	DATE	LOCALITY	HABITAT	SEX
BP 01	<i>Tettigonia viridissima</i>	3.7.1954.	Ivanovčani	meadow	♀
BP 02	<i>T. viridissima</i>	9.7.1954.	Veliko trojstvo	vineyard	♂
BP 03	<i>T. viridissima</i>	5.7.1954.	Ivanovčani	-	♂
BP 04	<i>T. viridissima</i>	5.7.1954.	Ivanovčani	meadow	♀
BP 05	<i>T. caudata</i>	7.7.1954.	Ivanovčani	meadow	♀
BP 06	<i>Decticus verrucivorus</i>	5.7.1955.	Šištat	pasture	♀
BP 07	<i>D. verrucivorus</i>	15.7.1953.	Novoseljani	meadow	♀
BP 08	<i>D. verrucivorus</i>	15.7.1953.	Novoseljani	meadow	♀
BP 09	<i>D. verrucivorus</i>	15.7.1953.	Novoseljani	meadow	♂
BP 10	<i>D. verrucivorus</i>	10.7.1953.	Šištat	pasture	♂
BP 11	<i>D. verrucivorus</i>	10.7.1953.	Šištat	pasture	♂
BP 12	<i>D. verrucivorus</i>	20.7.1953.	Bjelovarska rijeka	meadow	♀
BP 13	<i>D. verrucivorus</i>	10.7.1953.	Šištat	garden	♂
BP 14	<i>D. verrucivorus</i>	20.7.1953.	Šištat	garden	♂
BP 15	<i>D. verrucivorus</i>	20.7.1953.	Šištat	garden	♂
BP 16	<i>Roeseliana roeselii</i>	24.7.1954.	Zverci	-	♀
BP 17	<i>R. roeselii</i>	20.7.1954.	Gudovac	meadow	♂
BP 18	<i>R. roeselii</i>	20.7.1954.	-	meadow	♀
BP 19	<i>R. roeselii</i>	20.7.1954.	Gudovac	shrub	♀
BP 20	<i>R. roeselii</i>	6.7.1954.	Zverci	shrub	♀
BP 21	<i>R. roeselii</i>	9.7.1954.	Bjelovarska rijeka	meadow	♂
BP 22	<i>R. roeselii</i>	12.7.1954.	Ivanovčani	meadow	♂
BP 23	<i>R. roeselii</i>	27.7.1954.	Novoseljani	meadow	♂
BP 24	<i>R. roeselii</i>	27.7.1954.	Novoseljani	meadow	♂
BP 25	<i>Ruspolia nitidula</i>	10.7.1954.	Gudovac	wet meadow	♀

BP 26	<i>Gryllus campestris</i>	5.5.1954.	-	meadow	♀
BP 27	<i>G. campestris</i>	5.5.1954.	-	meadow	juv
BP 28	<i>G. campestris</i>	5.5.1954.	-	meadow	juv
BP 29	<i>G. campestris</i>	2.6.1954.	-	arable land	-
BP 30	<i>G. campestris</i>	-	-	-	juv
BP 31	<i>Melanogryllus desertus</i>	2.6.1954.	-	arable land	♀
BP 32	<i>M. desertus</i>	12.6.1954.	-	arable land	♀
BP 33	<i>M. desertus</i>	7.7.1954.	-	arable land	♀
BP 34	<i>Modicogryllus frontalis</i>	12.7.1954.	-	meadow	♂
BP 35	<i>Gryllotalpa gryllotalpa</i>	20.8.1954.	-	garden	juv
BP 36	<i>Pezotettix giornae</i>	2.8.1954.	Bjelovar	shrub	♀
BP 37	<i>P. giornae</i>	12.7.1954.	-	-	♀
BP 38	<i>P. giornae</i>	24.7.1954.	Vojnović	shrub	♀
BP 39	<i>P. giornae</i>	24.7.1954.	Vojnović	shrub	♀
BP 40	<i>P. giornae</i>	30.7.1954.	Gudovac	hedge	♂
BP 41	<i>P. giornae</i>	30.7.1954.	Gudovac	hedge	♂
BP 42	<i>P. giornae</i>	15.7.1954.	Zverci	young forest	♀
BP 43	<i>P. giornae</i>	24.7.1954.	Zverci	-	♀
BP 44	<i>P. giornae</i>	24.7.1954.	Zverci	-	♀
BP 45	<i>Oedipoda caerulescens</i>	-	-	-	♀
BP 46	<i>Oe. caerulescens</i>	-	-	-	♀
BP 47	<i>Oe. caerulescens</i>	-	-	-	♀
BP 48	<i>Oe. caerulescens</i>	25.7.1954.	Bjelovar	-	♀
BP 49	<i>Oe. caerulescens</i>	25.7.1954.	Grginac	loess mound	♀
BP 50	<i>Oe. caerulescens</i>	28.7.1954.	Bjelovar	railway	♂
BP 51	<i>Oe. caerulescens</i>	28.7.1954.	Bjelovar	railway	♀
BP 52	<i>Oe. caerulescens</i>	28.7.1954.	Bjelovar	railway	♂
BP 53	<i>Oe. caerulescens</i>	28.7.1954.	Bjelovar	railway	♂
BP 54	<i>Sphingonotus caerulans</i>	-	-	-	♀
BP 55	<i>Aiolopus thalassinus</i>	27.7.1954.	Bjelovar	railway	♀
BP 56	<i>Stenobothrus crassipes</i>	4.8.1954.	Plavnice	meadow	♀
BP 57	<i>St. crassipes</i>	4.8.1954.	Plavnice	meadow	♀
BP 58	<i>Chorthippus brunneus</i>	6.8.1954.	Ivanovčani	meadow	♀
BP 59	<i>Ch. oschei pusztaensis</i>	9.7.1954.	Novoseljani	meadow	♀
BP 60	<i>Ch. oschei pusztaensis</i>	2.7.1954.	Gudovac	meadow	♀
BP 61	<i>Ch. oschei pusztaensis</i>	16.7.1954.	Bjelovarska river	meadow	♀
BP 62	<i>Ch. oschei pusztaensis</i>	29.7.1954.	Logor	meadow	♂

BP 63	<i>Ch. dorsatus</i>	-	-	-	♀
BP 64	<i>Ch. dorsatus</i>	-	-	-	♀
BP 65	<i>Ch. dorsatus</i>	14.7.1954.	Ivanovčani	meadow	♀
BP 66	<i>Ch. dorsatus</i>	7.7.1954.	Mlinovac	meadow	♀
BP 67	<i>Ch. dorsatus</i>	10.7.1954.	Bjelovarska river	meadow	♀
BP 68	<i>Ch. parallelus</i>	-	-	-	♂
BP 69	<i>Ch. parallelus</i>	8.8.1954.	V. Trojstvo	vineyard	♂
BP 70	<i>Ch. parallelus</i>	8.8.1954.	V. Trojstvo	vineyard	♀
BP 71	<i>Ch. parallelus</i>	4.8.1954.	Plavnice	meadow	♀
BP 72	<i>Ch. parallelus</i>	14.7.1954.	Ivanovčani	meadow	♀
BP 73	<i>Ch. parallelus</i>	4.7.1954.	Ivanovčani	meadow	♀
BP 74	<i>Ch. parallelus</i>	4.7.1954.	Ivanovčani	meadow	♂
BP 75	<i>Ch. parallelus</i>	4.7.1954.	Ivanovčani	meadow	♂
BP 76	<i>Ch. parallelus</i>	14.7.1954.	Ivanovčani	meadow	♂
BP 77	<i>Ch. parallelus</i>	2.8.1954.	Ljubešić bašća	grassland	♀
BP 78	<i>Ch. parallelus</i>	2.8.1954.	Ljubešić bašća	grassland	♂
BP 79	<i>Ch. parallelus</i>	2.8.1954.	Ljubešić bašća	grassland	♂
BP 80	<i>Ch. parallelus</i>	3.7.1954.	Mlinovac	meadow	♀
BP 81	<i>Ch. parallelus</i>	3.7.1954.	Mlinovac	meadow	♂
BP 82	<i>Ch. parallelus</i>	3.7.1954.	Mlinovac	meadow	♂
BP 83	<i>Ch. parallelus</i>	2.8.1954.	rijeka Bjelovarska	meadow	♀
BP 84	<i>Ch. parallelus</i>	2.8.1954.	rijeka Bjelovarska	meadow	♂
BP 85	<i>Ch. parallelus</i>	2.8.1954.	rijeka Bjelovarska	meadow	♂
BP 86	<i>Ch. parallelus</i>	29.7.1954.	Logor	meadow	♂
BP 87	<i>Ch. parallelus</i>	29.7.1954.	Logor	meadow	♀
BP 88	<i>Ch. parallelus</i>	29.7.1954.	Logor	meadow	♀
BP 89	<i>Ch. parallelus</i>	29.7.1954.	Logor	meadow	♀
BP 90	<i>Ch. parallelus</i>	5.8.1954.	Vojnović	meadow	♂
BP 91	<i>Ch. parallelus</i>	5.8.1954.	Vojnović	meadow	♀
BP 92	<i>Ch. parallelus</i>	5.8.1954.	Vojnović	meadow	♀
BP 93	<i>Ch. parallelus</i>	17.7.1954.	Novoseljani	meadow	♂
BP 94	<i>Ch. parallelus</i>	17.7.1954.	Novoseljani	meadow	♀
BP 95	<i>Ch. parallelus</i>	17.7.1954.	Novoseljani	meadow	♀
BP 96	<i>Ch. parallelus</i>	21.7.1954.	Gudovac	meadow	♂
BP 97	<i>Ch. parallelus</i>	21.7.1954.	Gudovac	meadow	♀
BP 98	<i>Ch. parallelus</i>	21.7.1954.	Gudovac	meadow	♀
BP 99	<i>Ch. parallelus</i>	21.7.1954.	Gudovac	meadow	♀

Discussion and Conclusion(s)

Boža Pokopac (by marriage Tvrtković) did her master's work on the Orthoptera survey in the vicinity of Bjelovar town, in inland Croatia. Nowadays, her collection deposited in the Division of Zoology comprises 99 specimens belonging to 18 species (Table 1), which makes less than 35% of the original material. Furthermore, nine species have not been found after inventorying the overall entomological collection in the Division of Zoology: six belonging to Acrididae (*Chortippus pulvinatus*, with 10 individuals; *Stauroderus biguttulus*, 4 individuals; *Omocestus haemorrhoidalis*, 2 individuals; *Stenobothrus stigmaticus*, 15 individuals, *Acrydium subulatum*, 2 individuals (now placed in Tetrigidae), *Mecostethus grossus*, 1 individual; *Acrida turrita*, 1 individual), Phaneropteridae (Tettigoniidae in the master's thesis) with *Phaneroptera falcata* (1 individual) and *Gryllus domesticus*, (1 individual) within Gryllidae family (Appendix I). All of the nine species have already been recorded for Croatian Orthopteran fauna.

As Orthoptera collections in Croatia (e.g. Hensch collection at the Faculty of Forestry in Zagreb, Košćec collection in Varaždin City Museum, Croatian Natural History Museum in Zagreb collections etc.) are scarce and composed of a relatively small number of exemplars, this collection certainly provides additional value for the knowledge of the Orthopteran fauna of Croatia. Moreover, the records of rare species (some are not so rare, but only overlooked or are rare due to the lack of research) such as *Modicogryllus frontalis*, *Acrida ungarica*, *Sphingonotus caeruleans*, and *Stenobothrus stigmaticus faberi* as well as the first record of the species *Stenobothrus crassipes* (Charpentier, 1825), new to Croatian Orthopteran fauna (Figure 3), make this collection exceptionally important.

Within the species of the genus *Stenobothrus* occurring in the Pannonian region (the Carpathian basin) *St. crassipes* is the most easily recognizable. All the other



Figure 3. *Stenobothrus crassipes* from the BP collection. Female habitus.

species (*St. eurasius*, *St. fischeri*, *St. lineatus*, *St. nigromaculatus* and *St. stigmaticus faberi*) are macropterous, especially males, while females of some species (e.g. *St. nigromaculatus*) are usually brachypterous (Nagy 2005). On the other hand, *St. crassipes* males are brachypterous and females are squamipterous (Figure 3). The main part of the species' distribution area is located in the eastern steppe region(s) of Hungary, northern Serbia and Bulgaria (Harz, 1975). In the eastern part of Austria, where the species was widespread in the past, only a few small isolated populations exist today (Zuna-Kratky *et al.*, 2009), while in Germany the species is restricted to Kyffhäusergebirge (Kyffhäuser Mts.) (Köhler, 2009). The ecology of the species has not been investigated in detail. We expected this species to be found in the inland part of Croatia because of the suitable habitats, and our expectation was fulfilled with the discovery of the specimens in Pokopac Collection. The species probably occurs at more localities within N Croatia, but due to the lack of the systematic research of this group in the country in the past, the species is probably under-recorded.

Since the material was sampled more than 60 years ago, we suggest that this dataset should be used as the baseline in analysing the effects of habitat changes on the overall biodiversity, especially due to the fact that the survey was done in habitats with strong anthropogenic influence such as meadows, pastures, gardens and grasslands, as well as arable land. The use of habitats has changed to a great extent within the last few decades, and thus many of those habitats may have gone under severe succession processes, and some of the previously present species may not be present nowadays.

As the entomological collection at the Division of Zoology, University of Zagreb has been founded primarily for training in systematic entomology, the revised and systematically ordered Boža Pokopac Orthoptera collection can provide an excellent teaching tool. As lot of other collections are still not revised, we call experts interested in revision of further entomogroups from the collections to participate in this *Catalogus*.

The first finding of *Stenobothrus crassipes* (Charpentier, 1825) in Croatia, as well as introducing the Boža Pokopac Orthoptera collection to the public, broadens the knowledge on insects fauna in Croatia, positioned among the world's biodiversity hot spots, with high conservation significance (Myers *et al.*, 2000).

The great national and global value of entomological collections gives strong motivation for the cataloguing of the rest of the previously ignored insect collections deposited in the Division of Zoology, Faculty of Science, Zagreb, and for the publication of a series such as *Catalogus collectionum entomologicarum Divisionis zoologicae Facultatis scientiarum naturalium et mathematicarum Zagrabiae*.

Acknowledgements

This paper is dedicated to the late Boža Tvrtković (born Pokopac), biology teacher. Additionally, we would like to thank Professor Paula Durbešić and Professor

Sven Jelaska for their support and valuable advice on the manuscript, technician Nada Vincek for her precious technical assistance, and Petra Đonlić, Mia Jurić and Mladen Zadravec for their suggestions and language editing. We are thankful also to two anonymous reviewers for improving the quality of this paper.

References

- CHOPARD, L. 1951. Faune de France. 56. Orthoptéroïdes. Lechevalier, Paris. 356 pp.
- EADES, D. C., OTTE, D., CIGLIANO, M. M. & BRAUN, H. 2014. Orthoptera Species File. Version 5.0/5.0 [2014 November 21st] <orthoptera.speciesfile.org>
- HARZ, K. 1969. Die Orthopteren Europas I. Series Entomologica 5. Dr. W. Junk Publishers, Hague. 749pp.
- HARZ, K. 1975. Die Orthopteren Europas II. Series Entomologica 11. Dr. W. Junk Publishers, Hague. 939pp.
- IORGU, I. Ş. & IORGU, E. I. 2008. Bush-crickets, crickets and grasshoppers from Moldavia (Romania). Edit. Pim Iaşi, Romania. 294 pp.
- KÖHLER, G. 2009. Zur Lebensgeschichte des Zwerggrashüpfers, *Stenobothrus crassipes* (Charpentier, 1825), im Vergleich zu *Stenobothrus lineatus* (Panzer, [1796]) und *Stenobothrus nigromaculatus* (Herrich-Schäffer, 1840). Articulata. 24 (1/2): 31-47.
- MYERS, N., MITTETMELER, R. A., MITTETMELER, C. G., DA FONESCA, G. A. B. & KENT, J. 2000. **Biodiversity hotspots for conservation priorities.** *Nature*. 403 (6772): 853-858.
- NAGY, B. 2005. Orthoptera fauna of the Carpathian Basin – recent status of knowledge and a revised checklist. Entomofauna Carpathica. 17: 14-22.
- POKOPAC, B. 1956. Skakavci u okolici Bjelovara. Master thesis. Division of Zoology, Faculty of Science, University of Zagreb. 24pp
- VEDENINA, V. & VON HELVERSEN, O. 2009. A re-examination of the taxonomy of the *Chorthippus al-bomarginatus* group in Europe on the basis of song and morphology (Orthoptera: Acrididae). Tijdschrift voor Entomologie. 152(1): 65-97.
- ZUNA-KRATKY, T., KARNER-RANNER, E., LEDERER, E., BRAUN, B., BERG, H.-M., DENNER, M., BEIRINGER, G., RANNER, A. & ZECHNER, L. 2009. *Verbreitungsatlas der Heuschrecken und Fangschrecken Ostösterreich.* Verlag Naturhistorisches Museum Wien, Wien, 304 pp.

Appendix I

Sistematic list of the Orthoptera reported from Bjelovar vicinity by Boža Pokopac in her Master thesis.

The species that have not been found in collection have the note '*not in collection*'. In the square parentheses generic and specific names presented in master thesis that are different from the currently valid scientific name(s) are noted.

– Suborder Ensifera

Superfamily Tettigonioidea

Family Tettigoniidae

Subfamily Tettigoniinae

1. *Tettigonia virididissima* (Linné, 1758)
2. *T. caudata* (Charpentier, 1842)
3. *Decticus verrucivorus* (Linné, 1758)
4. *Roeseliana roeselii* (Hagenbach, 1822) [in the genus *Metrioptera*]

Subfamily Conocephalinae

5. *Ruspolia nitidula* (Scopoli, 1786) [in the genus *Homorocoryphus*]

Family Phaneropteridae

Subfamily Phaneropterinae

6. *Phaneroptera falcata* (Poda, 1761) – not in collection

Superfamily Grylloidea

Family Gryllidae

Subfamily Gryllinae

7. *Gryllus campestris* (Linné, 1758) [in the genus *Liogryllus*]
8. *Melanogryllus desertus* (Pallas, 1771) [in the genus *Gryllus*]
9. *Modicogryllus frontalis* (Fieber, 1844) [in the genus *Gryllus*]
10. *Acheta domesticus* (Linné, 1758) [in the genus *Gryllus*] – not in collection

Family Gryllotalpidae

11. *Gryllotalpa gryllotalpa* (Linné, 1758) [specific name *vulgaris*]

– Suborder Caelifera

Superfamily Tetrigoidea

Family Tetrigidae

Subfamily Tetriginae

1. *Tetrix subulata* (Linné, 1758) [in the genus *Acrydium*] – not in collection

Superfamily Acridoidea

Family Acrididae

Subfamily Acridinae

2. *Acrida ungarica* (Herbst, 1786) [specific name *turrita*] – not in collection

Subfamily Catantopinae

3. *Pezotettix giornae* (Rossi, 1794) [specific name *giornai*]

Subfamily Oedipodinae

4. *Oedipoda caerulescens* (Linné, 1758 [specific name *coerulescens*])
5. *Sphingonotus caerulans* (Linné, 1767) [in the genus *Coerulans*, specific name *coerulans*]
6. *Aiolopus thalassinus* (Fabricius, 1781) [in the genus *Aelopus*]
7. *Stethophyma grossus* (Linné, 1758) [in the genus *Mecostethus*] – not in collection

Subfamily Gomphocerinae

8. *Stenobothrus crassipes* (Charpentier, 1825) [Ocskay listed as an author of the name]
9. *St. stigmaticus faberi* Harz, 1975 [*faberi* was not described at the time] – not in collection
10. *Omocestus haemorrhoidalis* (Charpentier, 1825) – not in collection
11. *Chorthippus brunneus* (Thunberg, 1815) [in the genus *Stauroderus*, specific name *bicolor*]
12. *Chorthippus biguttulus* (Linné, 1758) [in the genus *Stauroderus*] - not in collection
13. *Chorthippus oschei pusztaensis* Vedenina & Helversen, 2009 [specific name *elegans*]
14. *Chorthippus dorsatus* (Zetterstedt, 1821)
15. *Chorthippus parallelus* (Zetterstedt, 1821)
16. *Euchorthippus pulvinatus* (Fischer von Waldheim, 1846) [in the genus *Chorthippus*] – not in collection