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THE BASIC CHARACTERISTICS OF THE STUDY OF BUTTERFLY (RHOPALOCERA) FAUNA IN THE MOUNTAIN MASSIF OF SHARR, POLLOG VALLEY AND THE NATIONAL PARK OF MAVROVO

Xhezair Abdija
E-mail: xhezair_abdija@hotmail.com

Nexhbedin Beadini
E-mail: n_beadini@yahoo.com

Sheqibe Beadini
E-mail: sh_beadini@yahoo.com
Faculty of Natural Sciences and Maths, Study Program of Biology
State University of Tetovo, Macedonia

Abstract
Research on Butterfly (Rhopalocera) fauna in the mountain massif of Sharr, Pollog valley and the National Park of Mavrovo is being explored for several years now by different researchers. With special emphasis, the researchers consider that it should be explored again because this group requires a dimension-specific study with the particular research character on finding eventually any new possible species for the territory in research. Research so far has been done to over 1000 specimens belonging to the family Lycaenidae. Until now, there have been more than 3 subfamilies with 21 genera and 42 species. Samples were collected at 18 stations of different heights above sea level and different habitats. For each survey station were recorded data on habitat type, such as the sea level Altitude (α), geographic coordinate Latitude (φ), and length (λ) Longitude.
Keywords: Butterfly (Rhopalocera) fauna, species in research, the zoogeographical distribution of species, Sharr Mountain, Macedonia.

Introduction

Sharr Mountain represents the largest massif in the Republic of Macedonia. Sharr Mountain is located in the northwestern side of the Republic of Macedonia which includes a length of 85 km and width of 15 – 20 km and with a surface of 1607 km2 located in the northern geographic latitude 420 41, 43" and eastern 200 34' 51". It starts with an altitude above the sea level from 600 up to 2748m (Titov vrh) in which are interlocked a large number of various forest and grassy generations up to the alpine zone. Sharr Mountain is one of the richest massifs with species of the suborder Rhopalocera, Diurna (daily butterflies) not only in Macedonia but as well as in the Balkan Peninsula.

Pollog Valley is a low Valley, and is located 380 – 550m above the sea level. The Pollog Valley lies between the mountains of Sharr and of the Dry Mountain of Skopje. It has an almost meridian extension and, is 44km long and 7km wide (west – east), with a surface of 250km2. By the surface it is immediately after that of Pelagonija and Skopje. It is composed of Tetovo's Valley (The Lower Polog) and of Gostivar's Valley (The Upper Pollog).

Mavrovo National Park, an integral part of the Sharr mountain massif is characterized by a sensational Butterfly (Rhopalocera) fauna which requires a more detailed exploration for eventually any new species that can be found.

This Butterfly (Lepidoptera, Rhopalocera) fauna presents a scientific, practical and ecological interest. Dubbed as 'flying flowers' for the possession of stunning colors, Rhopalocera or the daily butterflies, constitute the most notable ssp of *Lepidoptera* order, with nearly 174,250 gathered species in 126 families. Today, in the world there are 17. 500 species of the daily butterflies (*Rhopalocera, Diurna*), whereas in Europe, there are 482 species and in the Republic of Macedonia there are 201 species. If these 201 species are calculated with %, it appears that 46% of the total number in Europe is found in Macedonia, that based on the area of the territory is a very high (%). This richness in Macedonia is consisted primarily by the presence of two climates: Mediterranean and

continental. This Butterfly (Lepidoptera) fauna of Macedonia generally is known through the researches of the three Austrians: Dr.Hans Rebel & Dr. Zerny [14] and Josef Thurner [18] and the researches of Scheider P., P. Jakšič [15], Krpach et al. [9]. In his last publication Krpach V.T. et al (2008) [10] reports 201 species of Butterfly (Lepidoptera) fauna in the Republic of Macedonia. So far, there are superficially recognized studies about Butterfly (Lepidoptera) fauna in the mountain massif of Sharr with its surroundings, Melovski, D. [5]. In the researches of these authors, there is left out of attention Butterfly (Rhopalocero) fauna in the present study area.

Material and methods

This research studied the Licenidae family with over 1000 samples which encountered by the researchers within the territory of the mountain massif of Sharr, the Pollog valley and the Mavrovo National Park.The material for the study was collected from 18 stations within the two year period April – November, calendar years 2011 to 2012 in the northwestern territory of R. of Macedonia (Fig. 1). Most stations are sometimes made several times collections of the material in different months and different hours of the day. In these expeditions, there was recorded a violation of characteristic and diversified habitats as regards the cover for flora and height above sea level. Our method was random capture with the net of all the individuals encountered in habitats as mentioned in this study. [20]

At each station, survey data were taken on the characteristics of the habitat, height above sea level, GPS geographical location data collection and fauna material. The research work of nearly two years has resulted in the collection of over 1000 adult individuals (male and female) of Rhopalocera (Lycaenidae) which are stored in the fund of the Scientific Research Program of Biology, Department of Zoology, Faculty of Mathematics and Natural Sciences of the State University of Tetovo. Determinations were performed in the scientific laboratory museum of Nature Sciences in Skopje with the help of stereomicroscope M5A Wild-type (Vladimir T. Krpach) based on morphological characteristics used in determination of all taxa. At times for the accuracy of determination it was also necessary genital use by sex. During the determination were not taken into account the sub-species, although their number in R. Macedonia is not minor. Number of copies taken to be considered for determination has been over five (5) in order to obtain more accurate data. For uniformity in the systematic presentation of Rhopalocera, everything was based on the systematic of the French author Leraut P. [11].

Figure a). Collecting Rhopalocera in the field
Figure b). Photographing Rhopalocera on flowers
Figure c). Preserving Rhopalocera in paper envelopes
Figure d). Exicator for alleviating the field (Rhopalocera) material
Figure e). Boards (extensors) for Rhopalocera preparation
Figure f). Entomological boxes for storing Rhopalocera – Lycaenidae collections.

Time of collection has been dependent on the height above the sea level, from early spring until late autumn. According to a timetable, it is made the seasonal surveyed stations involved in the research methodology. Pernicious types of Rhopalocera were evidenced in fruit trees and have been kept evidences for their injuries. There have been made pictures of butterflies in their favorite plants, related to the life of caterpillar (Fig. b). A part of the material collected so far of about 1,000 copies after they have been softened in advance in exicator for 48 hours (Fig. d.), then they have been stored for preparation and adjustment according to the rollout procedure (boards) for praparation for about 72 hours (Fig. e).

In the end, materials were gathered and stored from the field, defined, labeled and prepared in special boxes for the formation of enthomological research fund under the study Program of Biology at the State University of Tetovo (Fig. f).

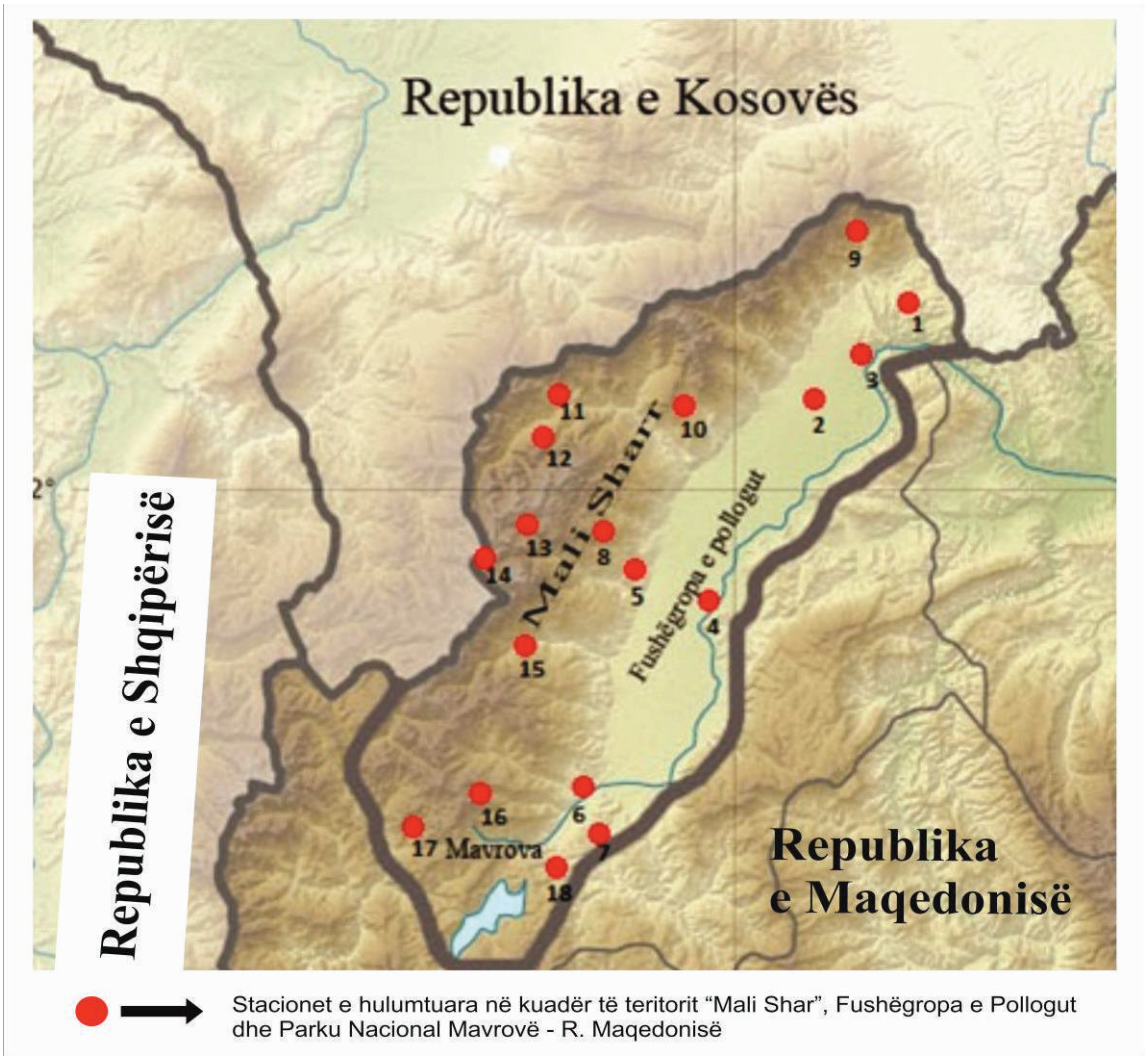

Figure 1. Map of the territory explored (Mountain Sharr, Pollog Valley and Mavrovo National Park), which includes a 1/10 or 9.4% of the total territory under R. of Macedonia.

With numbers from 1-18 and the red dots are evidenced stations (locations) within the mapped territory: **1.** Jazhincë; **2.** Përshevc – Jegunovc; **3.** Nerasht; **4.** Radiovc – Stençe; **5.** Pirok; **6.** Mirditë – Raven; **7.** Llakovicë; **8.** Kamjan – Jellovjan; **9.** Luboten; **10.** Tearcë – Jelloshnik; **11.** Brodec – Veshallë; **12.** Kodra e Diellit (Popova Shapka); **13.** Rakovec – Bistravec; **14.** Liqeni i Zi (Black Lake); **15.** Negotinë – Llomnicë; **16.** Mavrovë – Radikë; **17.** Bistra – Mavrovë; **18.** Simnicë.

Results and Discussion

The results of the research are presented in Table 1 in which data are given on: Family, Gender, genera, date, altitude and geographic width and length and localities. Table 1 lists the results in the determination of 42 species belonging to 20 Lycaenidae Gender within a subspecies of the Rhopalocera, family Lycaenidae.

Nr.	Family (Familia)	Gender (Genus)	Species (species)	Data	Latitude	Longitude	Altitude	Location
1	Lycaenidae	Satyrium Scudder	Satyrium ilicis Esp.	03.06.2012	N 41° 53' 17.32"	E 20°52' 21.11"	866 m	Negotinë-Llomnicë
2	Lycaenidae	-	Satyrium acaciae F.	03.06.2012	N 41° 53' 30.21"	E 20° 32' 37.07"	946 m	Negotinë-Llomnicë
3	Lycaenidae	-	Satyrium w-album Knoch	16.07.2012	N 41° 54' 31.15"	E 20° 52' 68.98"	610m	Pirok
4	Lycaenidae	-	Satyrium pruni L.	02.06.2012	N 41° 52' 41.66"	E 20° 52' 18.42"	728 m	Negotinë-Llomnicë
5	Lycaenidae	-	Satyrium spini D &Sch.	02.06.2012	N 41° 52' 41.66"	E 20° 52' 18.42"	728 m	Negotinë
6	Lycaenidae	Thecla Fabr.	Thecla betulae L.	19.08.2011	N 42° 00' 56.73"	E 20° 54' 37.02"	1463m	Popova Sapka (Kodra D.)
7	Lycaenidae	Callophrys Billb.	Callophrys rubi L.	30.06.2012	N 41° 57' 35.14"	E 20° 53' 45.32"	620 m	Kamenjan
8	Lycaenidae	Lycaena Fabr.	Lycaena phlaeas L.	19.07.2011	N 42° 00' 56.73"	E 20° 54' 37.02"	1463 m	Popova Sapka (Kodra D.)
9	Lycaenidae	-	Lycaena dispar Haw.	01.08.2011	N 42° 04' 16,08"	E 21° 05' 38.02"	475 m	Përshevc
10	Lycaenidae	-	Lycaena alciphron Rott.	02.06.2012	N 41° 54' 31.15"	E 20° 52' 68.98"	610 m	Pirok
11	Lycaenidae	-	Lycaena virgaureae L.	20.08.2011	N 42° 00' 56.73"	E 20° 54' 37.02"	1463 m	Popova Sapka (Kodra D.)
12	Lycaenidae	-	Lycaena tityrus Poda	05.05.2012	N 41° 42' 06.58"	E 20° 45' 26.81"	1011m	Mavrovë
13	Lycaenidae	-	Lycaena candens H. & S.	20.07.2011	N 41° 55' 42.65"	E 21° 03'40.51	1486m	Rakovec-Bistravec
14	Lycaenidae	-	Lycaena thersamon Esp.	05.05.2011	N 41° 42' 06.58"	E 20° 45' 26.81"	1011m	Mavrovë
15	Lycaenidae	Leptotes Scudder	Leptotes pirithous L.	15.08.2011	N 41° 54' 31.15"	E 20° 52' 68.98"	610 m	Pirok
16	Lycaenidae	Lampides Hüb.	Lampides boeticus L.	20.05.2013	N 41° 54' 31.15"	E 20° 52' 68.98"	610 m	Pirok
17	Lycaenidae	Celastrina Tutt	Celastrina argiolus L.	22.07.2012	N 42° 04' 16,08	E 21° 05' 38.02"	475m	Përshevcë-Jegunovc
18	Lycaenidae	Everes Hüb.	Cupido argiades Pall.	07,07.2012	N 41° 54' 31.15"	E 20° 52' 68.98"	610 m	Pirok
19	Lycaenidae	-	Cupido alcetas Staud.	12.08.2012	N 41° 52' 07.84"	E 20° 58' 56.98"	512 m	Stenç-Radiovc
20	Lycaenidae	-	Cupido decoloratus Stgr.	25.07.2012	N 41° 57' 35.14"	E 20° 53' 45.32"	890 m	Kamenjan
21	Lycaenidae	Cupido Schr.	Cupido minimus Feussly	24.06.2012	N 42° 08' 65.15"	E 21° 07' 67.72"	710 m	Jazhincë
22	Lycaenidae	-	Cupido osiris Meig.	15.05.2012	N 410 42' 06"	E 20° 45' 26"	1011 m	Mavrovë-Radikë
23	Lycaenidae	Maculinea Eecke	Maculinea arion L.	02.06.2012	N 41° 53' 56.78"	E 20° 52' 32.77"	720 m	Negotinë-Llomnicë
24	Lycaenidae	Iolana Baker	Iolana iolas Ochsen.	01.06.2012	N 41° 53' 56.78"	E 20° 52' 32.77"	720 m	Negotinë-Llomnicë
25	Lycaenidae	Glaucopsyche Scud.	Glaucopsyche alexis Poda	05.05.2012	N 41° 41' 28.76"	E 20° 47' 20.58"	1285 m	Mavrovë
26	Lycaenidae	Everes Hübner	Pseudophilotes vicrama Moore	01.05.2013	N 41° 44' 46.82"	E 20° 55' 29.69"	585m	Lakovicë
27	Lycaenidae	Scolitantides Hüb.	Scolitantides orion Pall.	04.07.2013	N 41° 45' 47.51"	E 20° 50' 01.45"	876 m	Mirditë - Raven
28	Lycaenidae	Plebeius Kluk	Plebeius argus L.	06.06.2012	N 42° 05' 16.34"	E 21° 07' 52.55"	424m	Nerasht
29	Lycaenidae	-	Plebeius idas L.	06.06.2012	N 42° 05' 16.34"	E 21° 07' 52.55"	424 m	Nerasht
30	Lycaenidae	Plebejides Sauter	Plebeius pylaon F.D.W	17.07.2012	N 410 47' 56.20"	E 210 03'40.51	1486 m	Rakovec - Bistravec
31	Lycaenidae	Plebeius Kluk	Plebeius argyrognomon Berg.	02.06.2012	N 41° 53' 56.78"	E 20° 52' 32.77"	720 m	Negotinë
32	Lycaenidae	Aricia Reichenbach	Aricia agestis D & S	25.07.2011	N 41° 44' 46.82"	E 20° 55' 29.69"	585 m	Lakovicë
33	Lycaenidae	Polyommatus Latreille	Polyommatus eroides Friv.	06.07.2013	N 42° 00' 56.73"	E 20° 54' 37.02"	1463 m	Popova Sapka (Kodra D.)
34	Lycaenidae	Cianiris Dalman	Polyommatus semiargus Rott.	02.06.2012	N 41° 53' 56.78"	E 20° 52' 32.77"	720 m	Negotinë-Llomnicë
35	Lycaenidae	Aricia Reichenbach	Aricia anteros Frr.	01.09.2012	N 41° 41' 28.76"	E 20° 47' 20.58"	1285 m	Mavrovë
36	Lycaenidae	Agrodiaetus Hübner	Polyommatus damon D & S	08.08.2012	N 42° 10' 58.70"	E 21° 08' 17.61"	1945 m	Luboten
37	Lycaenidae	Polyommatus Latreille	Polyommatus amanda Sch.	08.08.2012	N 410 47' 56.20"	E 210 03'40.51	1486m	Rakovec-Bistravec
38	Lycaenidae	Agrodiaetus Hübner	Polyommatus ripartii Frr.	08.08.2012	N 410 47' 56.20"	E 210 03'40.51	1486m	Rakovec-Bistravec
39	Lycaenidae	Meleageria Sagarra	Polyommatus daphnis D & S	17.07.2011	N 41° 41' 28.76"	E 20° 47' 20.58"	1285 m	Bistra-Mavrovë
40	Lycaenidae	-	Polyommatus coridon Poda	08.09.2012	N 41° 41' 28.76"	E 20° 47' 20.58"	1285 m	Bistra-Mavrovë
41	Lycaenidae	-	Polyommatus bellargus Rottemb.	02.06.2012	N 42° 05' 41.58"	E 21° 02' 40.68"	759 m	Tearcë - Jeloshnik
42	Lycaenidae	Polyomma tus Latreille	Polyommatus icarus Rottemb.	06.08.2012	N 42° 05' 41.58"	E 21° 02' 40.68"	759 m	Tearcë - Jeloshnik

According to data published by Austrian researchers Rebel & Dr. Hans. Zerny, PhDs about Sharr Mountain, they have found 7 Lycaenidaeve species [14] and Josef Thurner [18] has found 31 species for Sharr Mountain and to 52 species of Lycaenidae for Republic of Macedonia.

Referring to the later data from researcher Melovski D., who explored during the years 1995-1998 and 2000 in Sharr Mountain [5], confirmed the total of 102 species of Rhopalocerave in this area, with 23 species belonging to the family Lycaenidae.

A little more in-depth research is done by Jaksic P., & Scheider, P. [15] in Sharr Mountain during the years (1986,1988,1998), but we should remember that they provides data on the Sharr Mountain as a whole (to both Sections of Macedonia and Kosovo) and reported for 147 species of Rhopalocerave, where 46 of these species belong to the family Lycaenidae.

Publications by Krpach & Mihailova, 1997; Micevski & Micevski, 2003 [10] in the territory of the Republic Macedonia so far had found 55 species of Lycaenidae family.

If a comparison is made between the territory the research was conducted and the territory of the Republic of Macedonia, the researchers conclude that this territory is very prosperous with types of Rhopalocera because this is enabled by the diversity of habitats that own this territory. Even though in terms of area, it includes only the 1/10 or 9.4% of the total territory of Macedonia, if it is calculated in the presence of Lycenidae within the territory of the Republic Macedonia, 76.3% from the general number are present in this territory.

These findings clearly show that taken by the percentage of the presence of species indicates a significant number of family Lycaenidae, which is expressed in a higher percentage than other territories explored in the Republic of Macedonia.

Conclusion

This research is focused on the Butterfly (Rhopalocera) fauna of the Sharr Mountain massif, the Pollog valley, and Mavrovo National Park. This is regarded as one of the most valuable researches because it establishes a more expressed percentage of exploration. Therefore, a more thorough exploration is needed to study the specific dimension and character of research.

This endeavor has been focused on the possibility of the presence of the exact number of family Lycaenidae and eventually research findings of a new species for territory in research.

This also made explorations to over 1000 copies to the family of Lycaenidae, in different habitats in 18 research stations at different altitude and longitude coordinates and certain geographic latitude.

This investigation research provides a more complete information about the study area and the presence of the correct species of Rhopalocera fauna Licenidae within the territory explored.

Moreover, this will provide a valuable contribution not only to explore the territory of the mountain massif of Shar, the Pollog valley, and the Mavrovo National Park in particular, but also for the fauna of Lepidoptera in general.

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