References

Clarke, G. A., 1952, Hand pairing of *Papilio machaon* in February. Entomologist's Rec. 64:98-100.
Clarke, G.A. & Sheppard, P.M., 1956, Hand-pairing of Butterflies. Lepidopterist's News 10:47-53.
Federley, H., 1913-1953. see Soumalainen 1952.
Lorković, Z., 1947, Umjetni postupci kopulacije leptira. Glasnik biol. sekc. (Modes artificiels d'accouplement de papillons) Period. biolog. ser. II/B,: 86-97.
----, 1953, L'accouplement artificiel chez les lépidoptères et son application dans les recherches sur la fonction de l'appareil génital des insectes. Physiol. comp. et oecologia 3(2-3): 313-320.
----, 1974, Meiotic chromosome behaviour in *Pieris napi - P. melete* hybrids (Lep., Pieridae) and its taxonomic significance. Period. biol. 76: 93-100.
----, 1978, Types of hybrid sterility in diurnal Lepidoptera, speciation and taxonomy. Acta entomol. Jugosl. 14(1-2): 13-22.
----, 1985, Enzyme electrophorese and interspecific Hybridisation in Pieridae (Lepid. Rhopalocera). J. Res. Lepidopt. 24(4) 1985/6: 334-358.
----, 1990, The butterfly chromosomes and their application in systematics and phylogeny. In O. Kudrna (Ed.) "Butterflies of Europe" Vol.2. Introduction to Lepidopterology, pp. 332-396, AULA-Verlag, Wiesbaden.
Oliver, C.G. 1979a, Genetic differentiation and hybrid viability within and between some Lepidoptera species. Am. Natur. 114: 681-684.
----, 1979b, Experimental hybridisation between *Phyciodes tharos* and *Ph. batesii*. J. lep. Soc. 33(1): 6-20.
Shurian, K.G., 1989, Bemerkungen zu "*Lysandra cormion* Nabokov 1941" (Lepidoptera, Lycaenidae). Nachr. ent. Ver. Frankfurt, Apollo NF 10(2): 183-192.
----, 1991, Nachtrag zu den "Bemerkungen zu *Lysandra cormion*" (Lepidoptera, Lycaenidae). Nachr. ent. Ver. Frankf., Apollo NF 12(3): 193-195.
Suomalainen, E., 1952, Harry Federley †. Z. für Lepidopterologie 2(3): 142-157.

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LIST OF PSOCOPTERA (INSECTA) IN CROATIA

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During 1975 - 1995 in nature and in enclosed spaces, on different plants and stored-products a total of 7110 individuals of Psocoptera (males, females,nymphs), of 61 species were collected. The most aboundant species in nature was *Ectopsocopsis cryptomeriae* (Enderlein, 1907) and *Liposcelis decolor* (Pearman, 1925) in the enclosed spaces. Species of families Lachesillidae, Trogiidae, Peripsocidae, Caeciliidae, Stenopsocidae, Elipsocidae, Philotarsidae, Psyllipsocidae and Trichopsocidae, are less wide spread. All recorded insects of the order Psocoptera in the Republic of Croatia have suitable ecological conditions for their wide spreading.

Psocoptera, lists, faunistic studies, Croatia.

KALINOVIĆ, I., IVEZIĆ, M., Popis Psocoptera (Insecta) u Hrvatskoj. Entomol. Croat. Vol. 2(1996) 1997: Num. 1-2.: 11-16.
Tijekom 1975 - 1995 godine u prirodi i u zatvorenim prostorima, na različitom bilju i u uskladištenim proizvodima sakupljeno je 7 110 primjeraka Psocoptera (ženke, mužjaci, nimfe), ukupno 61 vrsta. Najzastupljenije u prirodi bile su vrste *Ectopsocopsis cryptomeriae* (Enderlein, 1907) i vrsta *Liposcelis decolor* (Pearman, 1925) u zatvorenim prostorima. Ostali pripadnici familija Lachesillidae, Trogiidae, Peripsocidae, Psocidae, Caecillidae, Stenopsocidae, Elipsocidae, Philotarsidae, Psyllipsocidae i Trichopsocidae, bili su manje brojno zastupljeni. Svi zabilježeni kukci reda Psocoptera u Republici Hrvatskoj za svoj život i razvoj imaju pogodne ekološke uvjete za široku rasprostranjenost.
Psocoptera, popisi, faunističke studije, Hrvatska.

Introduction

The order Psocoptera is a relatively small one, with about 3800 described species. They are not spectacular insects, because of their small size. In general they are not economically important, but in agriculture they can be significant pests of stored agricultural products. In some species they are medically important (responsible for allergic reactions in man). They could be important in the transmission of some sheep parasites too, and they cause damage to neglected collections of botanical and zoological specimens.

The insects of the order Psocoptera were completely uninvestigated in the Republic of Croatia up to 1975. Since then to 1995 they have been considerably researched in enclosed spaces - domestic psocids (KALINOVIĆ 1995), as well as in nature, living on different vegetation (GÜNTHER & KALINOVIĆ 1975, 1977, 1980; KALINOVIC & GÜNTHER 1982, 1985, 1987; KALINOVIĆ et al., 1977, 1978, 1979, 1980, 1980a).

This note is a review of Psocoptera from different regions of the Republic of Croatia.

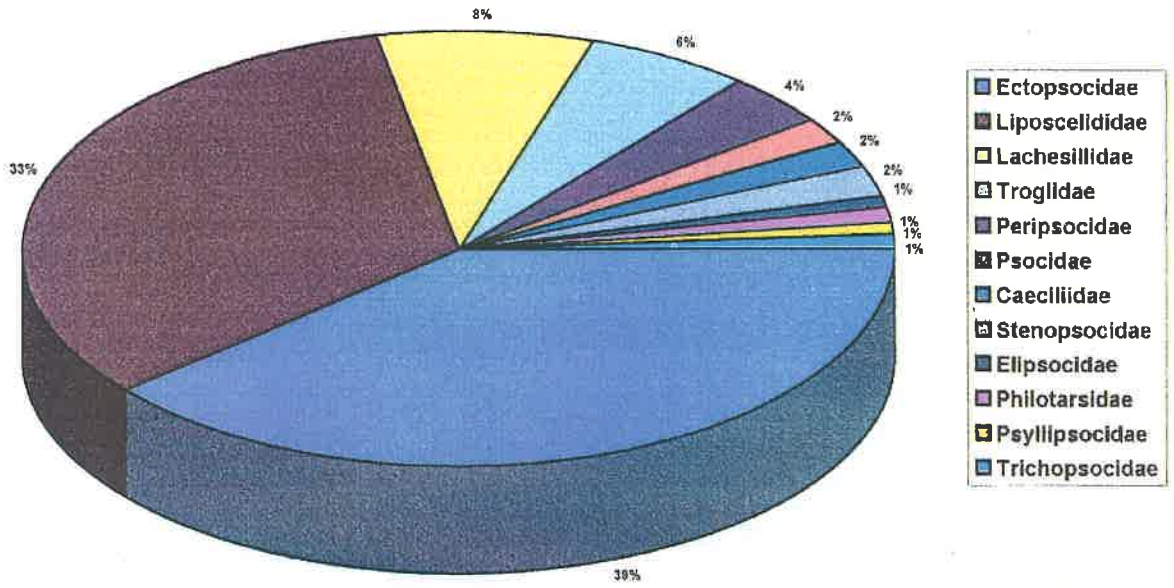

Fig. 1. Relative occurence of Psocoptera families in Croatia

Material and methods

Psocoptera have been collected on the territory of the Republic of Croatia from many localities registered by UTM Network of the Republic of Croatia (TOPIĆ 1993),Osijek CR24, Đakovo BR92, Čačinci YL25, Vukovar CR42, Županja CQ19, Lovas CR5O, Aljmaš CR44, Valpovo BR95, Tenja CR24, Korodj CR23, Tordinci CR22, Laslovo CR13, Antin CR22, Semeljci CR02, Ernestinovo CR13, Kaniža YK29, Kopački rit CR36, Beli Manastir CR17, Kneževi Vinogradi CR26, Darda CR25, Baranjsko Petrovo Selo CR07, Križevci XL19, Zagreb WL77, PlitviceWK47, SlunjWK49, Korenica WK55, ObrovacWJ59, Opatija VL42, Šibenik WJ74, Vodice VL23, Jankolovica WJ46, Vransko jezero WJ46, Makarska XH69, during 1975 - 1995.

From different agricultural plants (*Zea mays, Helianthus annuus, Triticum vulgare, Vitis vinifera, Prunus persicae, P. domestica*), forest trees (*Salix alba, Populus alba, P.nigra, Quercus robur, Castanea sativa, Cathalpa cathalpa, Robinia pseudoacacia, Fraxinus americana, F. excelsior, Tilia* sp., *Fagus sylvatica, Morus* sp., *Ulmus campestris, Pinus nigra, Abies* sp., *Picea* sp., *Cupressus sempervirens, Juniperus* sp.), from the swampy plants (*Typhoides arundinacea, Carex* sp., *Phragmites communis*), from different weeds and shrubs (*Syringa* sp., *Crataegus* sp., *Acer* sp., *Eupathorium cannabinum, Cornus sanguinea, Forsythia* sp., *Carpinus betulus, Matricaria chamomilla*) and decorative plants in parks (*Cedrus deodara, Cupressus sempervirens, Juniperus* sp., *Pinus nigra, Picea excelsa, Trachycarpus excelsa, Daphne mezereum, Laurus nobilis, Nerium oleander, Ruscus aculeatus, Musa* sp.), psocids have been collected by beating tray methods (GÜNTHER 1974; SMITHERS 198l).

Plant parts (peat, mouldy hay and other plants, dry algae (Algae), dry fishing nets, cane from the roof of a feeding place for venison), stored-products (wheat, maize, rice,

.Entomol. Croat. (1996) 1997: Vol. 2. Num. 1-2.: 11-16.
KALINOVIĆ, I., IVEZIĆ, M., List of Psocoptera (Ins.) in Croatia

dough, dry meat) and barn owl were investigated by sieving methods in the laboratory. Psocids from apiaries, wasp nests and from a wooden pole have been directly collected by aspirator or fine brush. All specimens (adults, nymphs) were preserved in 70% alcohol with glycerol and identified using the keys, given by GÜNTHER 1974 and SMITHERS 1990. Representatives of familiy Liposcelididae after maceration (GÜNTHER 1974) were identified by the same key.

The collected specimens and the prepared slides have been deposited in the Insect Collection, Institute of Plant Protection, Faculty of Agriculture, in Osijek.

Results

Tab. 1.Number of Psocoptera species and specimens on different plants and from other sources

Families/genera/species	Source	No. specimens
Suborder ***TROGIOMORPHA***		
1. Trogiidae		
1.1. *Trogium pulsatorium* (Linnaeus,1758)	St.p.,CR,P,DP,BO	42f,12m
1.2. *Cerobasis guestfalica* (Kolbe,1880)	F,CR,P,DP	8lf,6m,10n
1.3. *Lepinotus reticulatus* Enderlein,1905)	St.p.,BO,P	330f
1.4. *L.inquillinus* von Heyden,1850	St.p.,FN,AW,WP	8f
2. Psyllipsocidae		
2.1. *Dorypteryx domestica* (Smithers,1958)	St.p.,AP,P	5f
2.2. *Psyllipsocus ramburii* Sélys Longch. 1872 forma *destructor*	St.p.,AW	9f
2.3. *P.ramburii* forma *macroptera*	AW	1f
2.4. *P.ramburii* forma *brachyptera*	AW	1f
2.5. *P.ramburii* forma *troglodytes*	St.p.	1f,1n
Suborder ***TROCTOMORPHA***		
1.Liposcelididae		
1.1. *Liposcelis bostrichophila* Badonnel,1931	St.p.,P	116f,8m,1n
1.2. *L.corrodens* (Heymons,1909)	St.p.,P,BO	439f,17m,6n
1.3. *L.brunnea* Motschulsky,1852	St.p.,AP	4 f,1n
1.4. *L.decolor* (Pearman,1925)	St.p.,FN,AW,F	622f,4m,49n
1.5. *L.rufa* Broadhead,1950St.p.,AW	F,BO	19f,2m
1.6. *L.entomophila* Enderelein,1907	St.p.,AP,FN,BO	305f,29m,12n
1.7. *L.keleri* Günther,1974	AP,F	8f,29m
1.8. *L.silvarum* (Kolbe,1888)	F,CR	2f
1.9. *L.mendax* Pearman,1946	St.p.	12f
1.10. *L.paeta* Pearman,1942	St.p.	181f,10m,2n
1.11. *L.palatina* Roesler,1954	F	6f

Families/genera/species	Source	No. specimens
1.12. *L.pearmani* Lienhard,1990	St.p.,FN	400f,20m,7n
1.13. *L.pubescens* Broadhead,1947	St.p.	2f
1.14. *L.tricolor* Badonnel,1973	St.p.	20f,2m
Suborder ***PSOCOMORPHA***		
1. Caeciliidae		
1.1. *Caecilius fuscopterus* (Latreille,1799)	AP,F,W	8f,5m
1.2. *C.flavidus* (Stephens,1836)	F,W,P	18f,1n
1.3. *C.piceus* Kolbe,1882	F,P	6f,14m
1.4. *C.piceus* var. *brevipennis* Enderlein,1903	F	5f
1.5. *C.rhenanus* Tetens,1891	F	5f,6n
1.6. *C.burmeisteri* Brauer,1876	FP	11f,65 m
1.7. *C.atricornis* Mc Lachlan,1869	SP,AP	4f,6m
2.Stenopsocidae		
2.1. *Stenopsocus* immaculatus (Steph.,1836)	F,AP,W,P	39f,38m,40n
2.2. *S.stigmaticus* (Imhof & Labram,1846)	F,W	20f,11m,3n
2.3. *S.lachlani* Kolbe,1880	P	1f
2.4. *Graphopsocus cruciatus* (Linneaus,1768)	F	5f,9m,13n
3. Elipsocidae		
3.1. *Elipsocus moebiusi* Tetens,1891	W	1f
3.2. *Cuneopalpus cyanops* (Rostock,1876)	F	2f,1m,3n
4.Philotarsidae		
4.1. *Philotarsus picicornis* (Fabricius,1793)	W,P	2f
5. Peripsocidae		
5.1. *Peripsocus phaeopterus* (Stephens,1836)	AP,F,W,SP	29f,6m
5.2. *P.alboguttatus* (Dalman,1823)	F,AP,W	28f,35 m
5.3. *P.subfasciatus* (Rambur,1842)	F,AP,W,P	143f,8n
5.4. *P.parvulus* Kolbe,1880	F	2m
5.5. *P.reductus* Badonnel,1943	DP	4f,25m
6. Ectopsocidae		
6.1. *Ectopsocus briggsi* Mc Lachlan,1899	AP	26f,38m,1n
6.2. *E.meridionalis* Ribaga,1904	AP,W,F	20f,5m,3n
6.3. *Ectopsocopsis cryptomeriae* Enderlein,1907	AP,F,SP,P	134f,1609m,956n
7. Lachesillidae		
7.1. *Lachesilla quercus* (Kolbe,1880)	F,AP	29f,24m,10n

Families/genera/species	Source	No. specimens
7.2. *L.pedicularia* (Linnaeus,1758)	AP,F,W,SP,P,AW	354f,132m,10n
7.3. *L.pedicularia* forma *brevipenis* Enderlein,1903	F,AP	4f
7.4. *L.pedicularia* forma *holoptera* Enderlein,1903	AP	7f,4m
7.5. *L.pedicularia* forma *brachyptera* Enderlein,1903	AP	6f
7.6. *L.bernardi* Badonnel,1938	AP,W,SP	13f,4m
8. Psocidae		
8.1. *Amphigerontia bifasciata* (Latreille,1799)	AP,W	1f,1m
8.2. *A.contaminata* (Stephens,1836)	F	3m
8.3. *Blaste conspurcata* (Rambur,1842)	AP,F,P	5f,3m,4n
8.4. *B.quadrimaculata* (Letreille,1794)	F,AP,W,P	12m
8.5. *Psococerastis gibbosa* (Sulzer,1776)	F,SP30f	24f,17m,10n
8.6. *Metylophorus nebulosus* (Stephens,1836)	AP,F,W	19f,10m,16n
8.7. *Trichadenotecnum majus* (Kolbe,1880)	F,AP,P,W	10f,2m,2n
8.8. *T.sexpunctatum* (Linneaus,1758)	F	1f
8.9. *Neopsocus rhenanus* Kolbe,1882	AP	2f,1m
9. Trichopsocidae		
9.1. *Tricho psocus dalii* (Mc Lachlan,1867)	DP	38f,47 m,7n
Total: 3 Suborders 12 Families 24 Genera 61 Species		**7110 specimens**

Legend

AP (agricultural plants: *Zea mays, Helianthus annuus, Triticum vulgare, Vitis vinifera, Prunus persicae, P.domestica).*
AW (apiaries, wasp nests).
BO (barn owl).
CR (cane roof).
DP (decorative plants in parks: *Cedrus deodara, Cupressus sempervirens, Juniperus* sp., *Pinus nigra, Picea* sp., *Trachycarpus excelsa, Daphne mezereum, Laurus nobilis, Nerium oleander, Ruscus aculeatus, Musa* sp.).
F (forest: *Salix alba, Populus alba, P. nigra, Quercus robur, Castanea sativa, Ulmus campestris, Morus* sp., *Robinia pseudoacacia, Fraxinus americana, F. excelsior, Tilia* sp., *Fagus sylvatica, Cathalpa cathalpa, Pinus nigra, Abies* sp., *Picea* sp.,*Cupressus semperveirens).*
FN (dry fish nets).
P (plant parts).
St.p. (stored product: wheat, maize, rice, dough, dry meat).
SP (swampy plants: *Typhoides arundinacea, Carex* sp., *Phragmites communis).*
W (different weeds and shrubs: *Syringa* sp., *Crataegus* sp., *Acer* sp., *Eupathorium cannabinum, Cornus sanguinea, Forsythia* sp., *Carpinus betulus, Matricaria chamomilla).*
WP (wooden pole).
m (male); f (female); n (nymph)

Discussion

In Tab. 1 is shown the number of Psocoptera species and specimens on different plant and other sources, as in the legend. On the Fig.1 are shown the relative ocurrence of Psocoptera families. The most numerous were species of the family Ectopsocidae (39%), with *Ectopsocopsis cryptomeriae* (2969 specimens) frequently on agricultural plants, swampy plants, mouldy plant parts, etc. The first record of *E. cryptomeriae* in east Europa was in Baranya region, in 1974 (GÜNTHER & KALINOVIĆ 1975). Futher investigations confirmed wide occurence of *E. cryptomeriae* but only in the eastern part of Croatia (regions Slavonia and Baranya). Liposcelididae is the second commonest family of Psocoptera (33%), with 14 species; most numerous was *Liposcelis decolor* (675). Specimens were mostly recorded in stored products (domicole). Species of the families Lachesillidae 8%, Trogiidae 6%, Peripsocidae 4%, Psocidae 2%,Caecillidae 2%, Stenopsocidae 2%, Elipsocidae 1%, Philotarsidae 1%, Psyllipsocidae 1% and Trichopsocidae 1% have been less wide spread in Croatia. All the recorded species of Psocoptera have suitable climate and hosts for good and wide dispersal in the Republic of Croatia.

Acknowledgments: Many thanks to K.K. GÜNTHER (Berlin) and to Smila and Courtney SMITHERS (Sydney) for numerous valuable discussion and suggestions. We are particulary grateful to them for the taking us in to the insects world order Psocoptera.

References

Günther, K. K. 1974, Staubläuse, Psocoptera, In: Die Tierwelt Deutschlands, 61 Teil, pp. 314, 437 Fig.
Günther, K. K., Kalinović, I., 1975, *Ectopsocopsis cryptomeriae* (Enderelein, 1907), eine bemerkenswerte Art der Psocoptera Fauna Jugoslawiens (Peripsocidae, Psocoptera), Dtsch.ent. Z.., N.F. 22:351-357.
Günther, K. K., Kalinović, I., 1977, Beitrage zur Kenntnis der Psocoptera Fauna Jugoslawiens, Mitt. Zoll. Mus., 53 (2):307-323.
Günther, K. K., Kalinović, I., 1980, Bemerekenswerte Psocoptera Funde in Istrien (Hrvatska, Jugoslawien), Ent. Nachr., (2):19-23.
Kalinović, I., 1995, Fauna Psocoptera (Insecta) u skladištima poljoprivrednih proizvoda, Entomol. Croat. Vo.l:19-23 (Engl.Summ.).
Kalinović, I., Günther, K. K., 1982, Fauna Psocoptera pčelinjaka i osinjaka (Insecta), Znan. praksa poljopr. prehramben.. tehnol. 12(4):35-42 (Engl.Summ.).
Kalinović, I., Günther, K. K., 1985, Fauna Psocoptera raznih hibrida kukuruza (Insecta), Znan. praksa poljopr. prehramben. tehnol. 15,(1-2): 77-84 (Engl.Summ.).
Kalinović,I., Günther, K. K., 1987, Nove vrste Psocoptera za faunu Jugoslavije, Acta entomol. Jugosl. Vol.21(1-2): 49-54 (Engl.Summ.).
Kalinović, I., Günther, K. K., Pivar, G., 1977, Psocoptera Fauna im Freiland Slawoniens und Baranyas, Acta entomol. Jugosl. 13(1-2): 51-58 (Engl.Summ.).
Kalinović, I., Günther, K. K., Pivar, G., 1978, Faunistička istraživanja Psocoptera u specijalnom Zoološkom rezervatu Kopački rit u Baranji, Zbornik radova Poljoprivrednog fakulteta Osijek, 4(4): 63-67 (Engl.Summ.).
Kalinović, I., Günther, K. K., Pivar, G., 1979, Fauna Psocoptera na području Kopačkog rita (Insecta, Hemiptroidea), Zbornik radova Poljoprivrednog fakulteta u Osijeku, 5: 51-66 (Engl. Summ.).
Kalinović, I., Günther, K. K., Pivar, G., 1980, Fauna Psocoptera u prizemnom dijelu stabljika pšenice, Zbornik radova Poljoprivrednog fakulteta Osijek, 6:45-48 (Engl.Summ.).
Kalinović, I., Günther, K. K., Pivar, G., 1980a, Prilog istraživanju Psocoptera u Specijalnom zoološkom rezervatu Kopački rit u Baranji, Acta entomol. Jugosl. 16(1-2): 111-119 (Engl. Summ.).
Topić, J., 1993, UTM mreža za Hrvatsku s popisom lokaliteta, vlastito izdanje, Osijek, Pedagoški fakultet:1-23.
Smithers, C.N., 1990, Keys to the Families and Genera of Psocoptera (Arthropoda: Insecta), Techn. Reports of the Australian Museum, Australian Museum Sydney, 2: pp.82.

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OSE BILJARICE (HYMENOPTERA - SYMPHYTA) S TROGLAVA

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U šumskim zajednicama bukovo-jelovih šuma (*Fagetum croaticum abietetosum*) gdje se na osojnim stranama i udolinama pojavljuje i smreka, u šumama pretplaninske bukve (*Fagetum subalpinum*) , u šumama bora krivulja (*Pinetum mughi*), te na planinskim livadama i točilima na planini Troglav (Dinaridi) , entomološkom je mrežicom tijekom 1984. 1986., 1987. i 1988. godine prikupljeno 156 primjeraka osa biljarica (Hymenoptera-Symphyta), od kojih je registrirano 50 taksona. 46 taksona se po prvi put spominje za Bosnu i Herecegovinu.

Hymenoptera, Symphyta, ose biljarice, faunističke studije, Troglav, Dinara, Bosna i Hercegovina, Hrvatska.

PEROVIĆ, F., Symphyta (Hymenoptera) from Mt. Troglav. - Entomol. Croat. (1996) 1997, Vol 2. Num. 1-2.: 17-26.

In the forest communities of beech and fire *(Fagetum croaticum abietosum),* where spruce also appears on shady slopes and in the valleys; in the forests of subalpine beech *(Fagetum subalpinum),* mountain pine *(Pinetum mughi),* and on mountain meadows and water-holes of Mount Troglav (Dinaric Alps), 156 sawfly (Hymenoptera - Symphyta) species were collected through entomological net in the course of 1984, 1986, 1987 and 1988. Fifty taxa have been registered, with 46 being mentioned for the first time in connection to Bosnia and Herzegovina.

Hymenoptera-Symphyta, sawflies, faunal studies, Mt. Troglav, Dinaric Alps, Bosnia and Herzegovina, Croatia.

Uvod

Prilikom istraživanja leptira iz roda *Erebia* na temi akad.prof. dr. Zdravka LORKOVIĆA, uz leptire na Troglavu su prikupljeni i drugi kukci, uglavnom iz redova Coleoptera, Hymenoptera i Diptera. Preko 90% primjeraka ulovljeno je u 1987 i 1988 godini (sakupljači: S.LEINER, B. JALŽIĆ i F. PEROVIĆ), dok je ostali dio prikupljen prilikom ekskurzija 1984. i 1986 godine (sakupljači :B. JALŽIĆ, N. TVRTKOVIĆ i M. FRANKOVIĆ). Iako su istraživanja bila planirana za duži niz godina, zbog političke, a kasnije i ratne situacije, ona se na tim terenima više nisu provodila. Budući da u skorijoj budućnosti ne postoji mogućnost daljih istraživanja, objavljujemo dosad utvrđeno stanje.

Biotop

Dinarsko gorje, kao najdulji planinski masiv u nas, prirodna je granica između Dalmacije i Bosne., a time i granica mediteranske i submediteranske klime s jedne, i kontinentalne s druge strane. Masiv Troglava je karika koja povezuje vrh Dinaru (1831 m) s planinom Kamešnicom (vrh Konj 1849 m) i sa svojih oko 30 km duljine odvaja Cetinjsko polje od Livanjskog polja. Najviši vrh masiva je Troglav s 1913 m (Sl. 1).