

THE NOCTUIDAE (INSECTA, LEPIDOPTERA)
OF LIČKA PLJEŠEVICA MOUNTAIN (CROATIA)

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The noctuidae in the Igalffy Collection for the area Lička Plješevica include 81 previously unrecorded species, which together with data from literature (LORKOVIĆ, 1977; MLADINOV, 1985) make 83 species of noctuids for that area (Tab. 1). Fifty two new, unrecorded species were thus established for the Lika region as a whole, which indicates that both this region and that of the wider central mountain part of the Republic of Croatia have been very poorly covered. For 12 species of noctuids (Tab. 1) the find on Lička Plješevica is the first for the central mountain part of Croatia, because those species were not previously recorded either in Lika or Gorski kotar.

We recorded the noctuid *Hada proxima* Hbn. for the first time in the Republic of Croatia (Fig. 2). Comparing data on research into the noctuids of Lička Plješevica with those from the Gorski kotar region where 179 species were established, and considering that KOČA (1900, 1901, 1925) and MLADINOV (1958, 1975, 1975a, 1977, 1977a, 1985, 1986) give data for 295 species of noctuids for continental Croatia, we conclude that our results cover only 40-50% of the potential number species in Lička Plješevica area. From 179 species of the noctuids registered in Gorski kotar, we recorded 65 species (36%) in the area of Lička Plješevica, or 77% of all registered species for noticed area.

Zoogeographical analysis shows that Eurasian species are predominant (59.5%), which was expected considering the position of Plješevica, whereas the high percentage of Mediterranean-Asian species (25.0%) is somewhat of a surprise. It is the result of the Mediterranean influence on this region and of faunal migration.

The finds of noctuids *Brachylomia viminalis* Fab., *Agrochola macilenta* Hbn., *Agrochola humilis* D. & Sch., *Atethmia ambusta* D. & Sch., *Panthea coenobita* Esp. and *Phlogophora scita* Hbn., which are noted till now on just a few localities for the area of the Republic of Croatia, also as finds of species *Oligia versicolor* Bor., *Hydraecia petasitis vindelica* Fre. (MLADINOV, 1985) and *Hada proxima* Hbn., which are noted on Lička Plješevica as a new elements for fauna of Croatia, show special faunal significance of this croatian mountain and the need to continue sistematic resourch.

Key words: Fauna, Noctuids, Lička Plješevica, Croatia

Obradom sovcica iz zbirke "Igalffy," za područje Ličke Plješevice utvrdili smo 81 nezabilježenu vrstu, tako da su s literaturnim podacima (LORKOVIĆ, 1977; MLADINOV, 1985) s toga područja poznate 84 vrste sovcica (Tab. 1). Za područje Like utvrđene su 52 nove, nezabilježene vrste što ukazuje na veliku neistraženost ove regije. Za 12 vrsta sovcica (Tab. 1) nalaz na Ličkoj Plješevici je prvi za centralno-planinski dio Hrvatske, jer te vrste nisu do sada bile zabilježene na području Like ili Gorskog kotara. Sovcicu *Hada proxima* Hbn. (sl. 2) ovim smo istraživanjima prvi puta zabilježili za područje Republike Hrvatske.

Uspoređujući podatke o istraženosti faune sovica područja Ličke Plješevice i Gorskog kotara (za koji je utvrđeno 179 vrsta), kao i uzimajući u razmatranje radove KOČA (1900, 1901, 1925) i MLADINOV (1958, 1975, 1975a, 1977, 1977a, 1985, 1986) u kojima nalazimo podatke o 295 vrsta sovica zabilježenih u kontinentalnom dijelu Hrvatske, možemo zaključiti da smo ovim rezultatima obuhvatili 40-50% potencijalnih vrsta na području Plješevice. Od 179 registriranih vrsta u Gorskom kotaru, 65 (36%) zabilježili smo i za Ličku Plješevicu (Tab. 1), odnosno 77% svih utvrđenih vrsta za to područje.

Zoogeografska analiza pokazuje da su dominantne euroazijske vrste (59.5%) što je s obzirom na položaj Plješevice i za očekivati, dok donekle iznenađuje veliki postotak mediteranskoazijskih vrsta (25.0%) što je uvjetovano utjecajem mediterana na ovo područje, kao i pojavom migracija nekih faunističkih elemenata.

Nalazi sovica *Brachylochia viminalis* Fab., *Agrochola macilentata* Hbn., *Agrochola humilis* D. & Sch., *Atethmia ambusta* D. & Sch., *Panthea coenobita* Esp. i *Phlogophora scita* Hbn., koje su do sada na području Hrvatske zabilježene na svega nekoliko lokaliteta, kao i nalazi vrsta *Oligia versicolor* Bor., *Hydraecia petasitis vindelica* Fre. (MLADINOV, 1985) i *Hada proxima* Hbn., koji su novi elementi faune Hrvatske zabilježene na Ličkoj Plješevici, ukazuju na određene faunističke značajke ove hrvatske planine i potrebe nastavka daljnjih sistematskih entomoloških istraživanja.

Ključne riječi: fauna, Noctuidae, Lička Plješevica, Hrvatska

INTRODUCTION

A review of the extensive literature presenting the results of research into noctuids in the Republic of Croatia showed that Lička Plješevica and the mountain region in general are very poorly covered. Entomologists were primarily interested in the continental - lowland (VUKOTINOVIĆ, 1879; JURINAC, 1884, 1887; KOČA, 1900, 1901, 1925; MLADINOV, 1977, 1978, 1983) and the Adriatic regions of Croatia (STAUDER, 1920-29, BURGERMAISTER, 1964, MLADINOV, 1965, 1968, 1975, HABELER, 1976, 1989), leaving the Dinaric mountain region situated between them only partly covered and researched. An exception to this is the Gorski kotar mountain region.

The Igalffy Entomological Collection in the Croatian Natural History Museum contains important noctuid material collected on Lička Plješevica. This article presents the results of an analysis of the noctuids in that collection.

Lička Plješevica is a mountain massif about forty kilometres long situated in the central part of the Republic of Croatia, in the Lika region (Fig. 1). Some of its slopes descend into the Republic of Bosnia and Herzegovina. The highest peak is Ozeblin (1.657 m). Most of the mountain is under forests (85%) and the remainder are mountain meadows and, in the highest regions, moors and rockland. Beech forests prevail up to 800 metres and a mixture of beech and fir up to 1.300 metres, the predominant species being the fir.

Earlier insight into the noctuids of this region was very poor. MLADINOV (1985) gives two species: *Oligia versicolor* (BORKHAUSEN 1792) and *Hydraecia petasitis vindelica* (FREYER 1849), established in the Lička Plješevica area new elements of the fauna of Croatia and LORKOVIĆ (1977) quotes species *Luperina dumerilii* (DUPONCHEL 1827) as datum for collection "Igalffy". These were the only data about noctuids of that region.

MATERIAL AND METHODS

The light of the common mercury bulb was used for catching the moths. Most of the material (90%) was collected on the Kapela location at an altitude of 800 metres, and a lesser amount on Bubinka at an altitude of 1.100 metres. Both the locations are in the north-western part of Lička Plješevica. The moths were collected in the 1974-1982 period in the months of May, June, July, August, September and October. We analyzed 246 specimens of noctuids from the Igalffy

bibliographical data with their finds in the Lika and Gorski kotar regions.

In material determination we used the standard literature treating this family: SPULER (1910), SEITZ (1914), FORSTER-WOHLFAHRT (1971), BERIO (1985), SKINNER (1986), KOCH (1988).

We made preparations of genital organs for about ten species to establish their exact taxonomic status.

The genital morphological characteristics were analyzed according to KOSTROWICKI (1959), FORSTER-

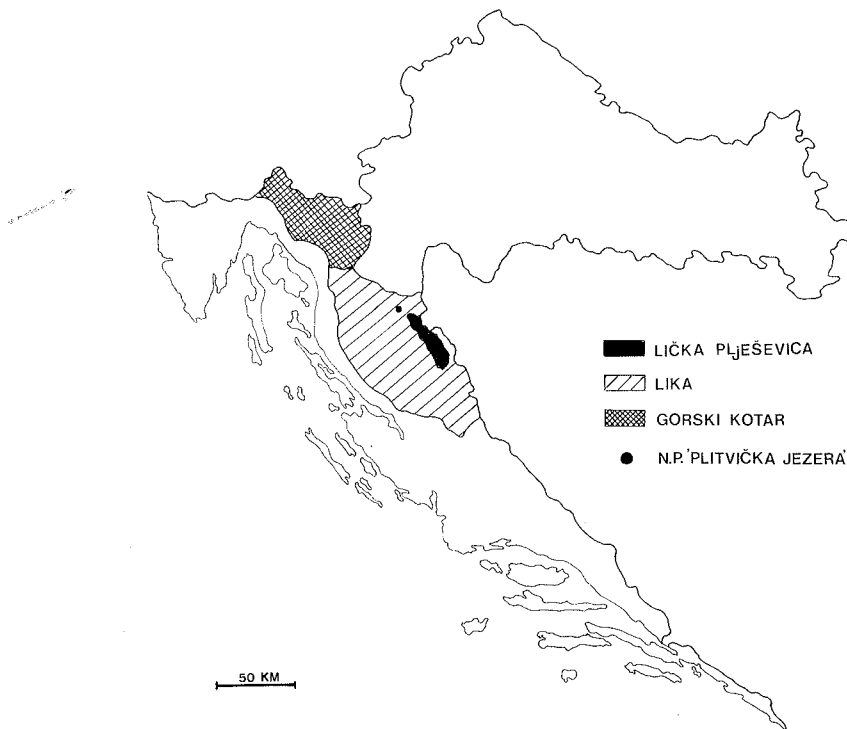


Fig.1 The location of Lička Plješevica, Lika and Gorski kotar in Croatia

Collection and consulted the Central Butterfly and Moth Collection of the Croatian Natural History Museum for those species to supplement our

WOHLFAHRT (1971) and BERIO (1985).

To show the degree to which Lička Plješevica has been covered, Table 1 presents the finds of established

species in the Lika and Gorski kotar included in the wider Gorski kotar regions (Fig. 1). Finds of noctuids in region, and finds in the Križpolje area the Ogulin and Josipdol areas were in the Lika region.

Tab. 1. A survey of established noctuids on Lička Plješevica.

SPECIES	Lika	G.K.	Z.D.
<i>Agrotis exclamationis</i> LINNÉ 1758	+	+	EA
<i>Agrotis ipsilon</i> HUFNAGEL 1766	-	+	CO
<i>Eugraphe sigma</i> DENIS & SCHIFF. 1775	-	+	EA
<i>Peridroma saucia</i> HUBNER 1803-1808	+	+	CO
<i>Diarsia brunnea</i> DENIS & SCHIFF. 1775	-	+	HA
<i>Xestia c-nigrum</i> LINNÉ 1758	+	+	HA
<i>Xestia baja</i> DENIS & SCHIFF. 1775	+	+	EA
<i>Anaplectoides prasina</i> DENIS & SCHIFF. 1775	-	+	HA
<i>Hada proxima</i> HUBNER 1808-1809	-	-	EA
<i>Hada nana</i> HUFNAGEL 1776	-	+	EA
<i>Polia nebulosa</i> HUFNAGEL 1766	-	+	EA
<i>Pachetra sagittigera</i> HUFNAGEL 1766	+	-	EA
<i>Heliophobus reticulata</i> GOEZE 1781	-	+	EA
<i>Mamestra persicariae</i> LINNÉ 1761	-	+	EA
<i>Mamestra w-latinum</i> HUFNAGEL 1766	+	+	EA
<i>Mamestra suasa</i> DENIS & SCHIFF. 1775	+	-	EA
<i>Mamestra pisi</i> LINNÉ 1758	-	-	EA
<i>Mamestra dysodea</i> DENIS & SCHIFF. 1775	-	-	EA
<i>Tholera cespitis</i> DENIS & SCHIFF. 1775	-	+	EA
<i>Tholera decimalis</i> PODA 1761	+	+	EA
<i>Egira conspiciellaris</i> LINNÉ 1758	-	-	MA
<i>Mythimna conigera</i> DENIS & SCHIFF. 1775	+	+	EA
<i>Mythimna ferrago</i> FABRICIUS 1787	-	+	EA
<i>Mythimna albipuncta</i> DENIS & SCHIFF. 1775	-	+	MA
<i>Mythimna vitellina</i> HUBNER 1803-1808	-	+	MA
<i>Mythimna l-album</i> LINNÉ 1767	-	-	EA
<i>Leucania comma</i> LINNÉ 1761	-	+	HA
<i>Episena glaucina</i> ESPEL 1789	-	-	MA
<i>Brachylomia viminalis</i> FABRICIUS 1777	-	-	EA
<i>Aporophyla lutulenta</i> DENIS & SCHIFF. 1775	-	+	AM
<i>Xylena exsoleta</i> LINNÉ 1758	-	-	EA
<i>Allophyes oxyacanthae</i> LINNÉ 1758	-	+	MA
<i>Ammonoconia caecimacula</i> DENIS & SCHIFF. 1775	-	+	EA
<i>Eupsilia transversa</i> HUFNAGEL 1766	+	+	EA
<i>Conistra vaccinii</i> LINNÉ 1761	+	+	EA
<i>Agrochola circellaris</i> HUFNAGEL	-	+	HA
<i>Agrochola macilentia</i> HUBNER 1809	-	+	MA
<i>Agrochola humilis</i> DENIS & SCHIFF. 1775	+	-	MA
<i>Agrochola litura</i> LINNÉ 1761	-	+	MA
<i>Agrochola lota</i> CLERCK 1759	+	-	EA
<i>Atethmia ambusta</i> DENIS & SHIFF. 1775	-	-	MA
<i>Panthea coenobita</i> ESPEL 1785	-	+	EA
<i>Colocasia coryli</i> LINNÉ 1758	+	+	EA
<i>Diloba caeruleocephala</i> LINNÉ 1758	-	+	MA
<i>Subacronicta megacephala</i> DENIS & SCHIFF. 1775	-	+	EA
<i>Triaena alni</i> LINNÉ 1767	-	+	EA
<i>Triaena psi</i> LINNÉ 1758	-	+	EA
<i>Viminia rumicis</i> LINNÉ 1758	-	+	EA
<i>Craniophora ligustri</i> DENIS & SCHIFF. 1775	-	+	EA
<i>Amphipyra pyramidea</i> LINNÉ 1758	-	+	EA
<i>Amphipyra tragopoginis</i> CLERCK 1759	-	-	HA

SPECIES	Lika	G.K.	Z.D.
<i>Dypterygia scabriuscula</i> LINNÉ 1758	-	+	HA
<i>Rusina ferruginea</i> ESPER 1785	+	+	MA
<i>Thalophila matura</i> HUFNAGEL 1766	-	+	MA
<i>Trachea atriplicis</i> LINNÉ 1758	+	+	EA
<i>Euplexia lucipara</i> LINNÉ 1758	+	+	HA
<i>Phlogophora meticulosa</i> LINNÉ 1758	+	+	MA
<i>Phlogophora scita</i> HUBNER 1790	-	-	MA
<i>Eucarta amethystina</i> HUBNER 1800-1803	+	+	EA
<i>Ipinorpha retusa</i> LINNÉ 1761	-	+	EA
<i>Ipinorpha subtusa</i> DENIS & SCHIFF. 1775	-	+	EA
<i>Cosmia trapezina</i> LINNÉ 1758	-	+	MA
<i>Actinotia polyodon</i> CLERCK 1759	-	+	EA
<i>Apamea monoglypha</i> HUFNAGEL 1766	+	+	EA
<i>Apamea lithoxyloa</i> DENIS & SCHIFF. 1775	-	+	EA
<i>Apamea lateritia</i> HUFNAGEL 1766	-	-	HA
<i>Apamea sordens</i> HUFNAGEL 1766	-	+	HA
<i>Oligia strigilis</i> LINNÉ 1758	-	+	EA
<i>Oligia versicolor</i> BORKHAUSEN 1792*	+	-	EA
<i>Masapamea secalis</i> LINNÉ 1758	+	+	EA
<i>Hydraecia petasitis vindelica</i> FREYER 1849*	+	-	EA
<i>Charanyca trigrammica</i> HUFNAGEL 1766	+	+	MA
<i>Hoplodrina ambigua</i> DENIS & SCHIFF. 1775	+	+	MA
<i>Caradrina morpheus</i> HUFNAGEL 1766	+	+	EA
<i>Paradrina selini</i> BOISDUVAL 1840	-	+	MA
<i>Deltote candidula</i> DENIS & SCHIFF. 1775	+	+	EA
<i>Emmelia trabalis</i> SCOPOLI 1763	+	+	EA
<i>Nycteola reayana</i> SCOPOLI 1772	-	+	MA
<i>Diachrysis chrysis</i> LINNÉ 1758	+	+	EA
<i>Plusia festucae</i> LINNÉ 1758	-	+	EA
<i>Autographa gamma</i> LINNÉ 1758	+	+	MA
<i>Scoliopteryx libatrix</i> LINNÉ 1758	+	+	EA
<i>Hypena proboscidalis</i> LINNÉ 1758	-	+	EA

*Data from literature

DENIS & SCHIFF. 1775 = DENIS & SCHIFFERMÜLLER 1775

G. K. = Gorski kotar

Z. D. = Zoogeographical dependence

EA = Euroasian species

MA = Mediterranean species

HA = Holarctic species

AM = Atlanticomediterranean species

CO = Cosmopolite species

The systematic presentation and biogeographical analysis (Table 1) were made according to DUFAY (1974), and for the *Diloba caeruleocephala* (DENIS & SCHIFFERMÜLLER 1775) according to HRUBY (1964).

To make it possible to use our results in faunal charting, we mention the following UTM locality designations: Vinkovci-CR21, Zagreb-WL77, Trnovec-WG61, Senj-VK96,

Vaganjski vrh-WK31, Bubinka-WK65, Kapela-WK65.

RESULTS AND DISCUSSION

The Igalffy Collection contains 81 perviously unrecorded species of noctuids from Lička Plješevica area, which with the addition of data from literature (MLADINOV, 1985) makes 84 known species from that area.

About 500 species of noctuids have been registered in the Republic of Croatia. In its continental part KOČA (1900, 1901, 1925) and MLADINOV (1958, 1975, 1975a, 1977, 1977a, 1985, 1986) registered 295 species. Thus about 17% all the species registered in Croatia were found in the Lička Plješevica area, or 28% of species registered in continental Croatia.

Gorski kotar and Lička Plješevica are ecologically similar regions. The noctuids of Gorski kotar are relatively well known, thanks primarily to the work of KOČA (1901, 1925), ABAGI-AIGNER et al. (1896), MLADINOV (1977, 1978, 1983), KOVAČEVIĆ & FRANJEVIĆ-OŠTRC (1978). 179 species of noctuids were registered in that region. If we compare the results of research into Lička Plješevica noctuids with those from the Gorski kotar region, and consider also data about the number of species recorded in continental Croatia, we may conclude that our results cover only 40-50% of the potential number of species on Plješevica.

Table 1 clearly shows that we recorded 52 new, previously unregistered, species of noctuids for the Lika region as a whole, which is clear proof of how poorly this region has been covered. The table also shows that 18 species of noctuids recorder on Lička Plješevica have not been registered in Gorski kotar, which on one hand indicates that this mountain has certain specific faunal features, and on the other the possibility that new faunal elements may still be found in Gorski kotar.

From 179 species of the noctuids in Gorski kotar, we recorded 65 species (36%) in the area of Lička Plješevica, or 77% of all registered species for noticed area.

Twelve of the species of noctuids found on Plješevica were found in the central mountain region of Croatia for the first time and were not previously registered either in Lika or in Gorski kotar (Tab. 1).

Several of the species are of great interest for the faunal analysis of that particular region, because they have been recorded in several localities in Croatia only: *Brachylomia viminalis* (FABRICIUS 1777), *Agrochola macilentata* (HÜBNER 1790), *Agrochola humilis* (DENIS & SCHIFFERMÜLLER 1775), *Atethmia ambusta* (DENIS & SCHIFFERMÜLLER 1775), *Panthea coenobita* (ESPER 1785), *Phlogophora scita* (HÜBNER 1790).

The *Hada proxima* HÜBNER 1808-1809 is especially interesting because this was the first time it was recorded in Croatia.

We will say more about those species.

Hada proxima Hbn. Two months (a male and a female) were caught in Bubinka locality on Lička Plješevica on 7 Aug 1981. Determination was performed from the morphological characteristics of the forewings (Fig. 2) and checked by making a genital preparation and consulting the anatomical characteristics for that species in BERIO (1985). In the Alps the moth reaches heights of 2.500

metres (FORSTER-WOHLFARTH, 1971). SEITZ (1914) lists the following regions as the range of this species: Switzerland, Germany, Armenia, Turkey, Siberia and Central Asia. BERIO (1985) records it in Italy, HRUBY (1964) in Czechoslovakia, THURNER (1964) in Macedonia and Albania, and HAFNER (1912) in Slovenia.

A review of entomological literature showed no published records about this species in Croatia, so we consider this find the first, and this moth a new element in the fauna of Croatia.

Brachylomia viminalis Fab. This is third time this moth was recorded in Croatia. It was first recorded by VUKOTINOVIĆ (1879) for the Zagreb region, and then by STAUDER (1925) for Senj. Two specimens were caught in the Kapela locality on 10 Aug 1980 and 7 Aug 1981. SEITZ (1914) gives its range as Siberia, North and Central Europe; BERIO (1985) as Italy, Asia Minor and Palestine; HRUBY (1964) recorded it in Czechoslovakia, HAFNER (1910) in Slovenia and THURNER (1964) in Macedonia and Armenia.

Agrochola macilenta Hbn. This moth belongs to the Mediterranean-Asian range. According to SEITZ (1914), it lives in the whole of Europe, Russia and Asia Minor, THURNER (1964) mentions it in Macedonia, REBEL (1904) in Bosnia and Herzegovina and HAFNER (1910) in Slovenia. In Croatia it was recorded by MLADINOV for the Zagreb region (1958) and for Osilnice

(1978). Two specimens were caught in the Kapela locality, on 13 Oct 1978 and 10 Oct 1979.

Agrochola humilis D. & Sch. Only one specimen was caught in the Plješevica area, on 19 Sept 1974 in the Kapela locality. SEITZ (1914) says that its range includes Central Europe, France, Belgium, Germany, Austria and Switzerland. HRUBY (1964) records it in Czechoslovakia. The first Croatian find was by KOČA (1901) for Vinkovci, and



Fig. 2. *Hada proxima* Hbn., a new species in the noctuid fauna of the Republic of Croatia.

the Central Collection includes a specimen caught in Gospić on 20 Sept 1974.

Atethmia ambusta D. & S. Only one moth was caught in Kapela on 9 Aug 1971. BERIO (1985) mentions its range as Central Europe, Asia Minor and Palestine, HRUBY (1964) records it in Czechoslovakia, REBEL (1904) in Bosnia and Herzegovina, and THURNER (1968) in Macedonia and Albania. This moth was first mentioned in Croatia by VUKOTINOVIĆ (1879) for Zagreb, STAUDER (1926) recorded it for Croatia not giving a closer locality, so that the

Plješevica find is the second precisely established locality in Croatia.

Panthea coenobita Esp. On 5-6 July 1975 several specimens of this European moth of the Mediterranean-Asian range were caught in Kapela locality. It was first mentioned in Croatia by ABAFI-AIGNER et al. (1896) for Rijeka, and then by MLADINOV (1977) for Osilnice.

Phlogophora scita Hbn. This is a moth of Mediterranean-Asian range. Only one specimen was caught in the Kapela locality on 5 July 1975. In the Alps it reaches heights of 1.600 metres (FORSTER-WOHLFAHRT 1971). SEITZ (1914) gives its range as Great Britain, Scandinavia, Armenia and Asia Minor; HRUBY (1954) recorded it in Czechoslovakia, REBEL (1904) in Bosnia and Herzegovina, HAFNER (1910) in Slovenia, and THURNER in Macedonia. In Croatia there are records by VUKOTINOVIĆ (1879) for Zagreb, ABAFI-AIGNER et al. (1896) for Velebit (Vaganjski vrh) and STAUDER (1925) for Senj.

A zoogeographical analysis of the number and percentage of species recorded the following:

Eurasian	50 species (59.5%)
Mediterranean-Asian	21 species (25.0%)
Holarctic	10 species (11.9%)
Cosmopolitan	2 species (2.4%)
Atlantic-Mediterranean	1 species (1.2%)

This faunal composition is primarily the result of the geographical, climatic, floral and ecological characteristics of Lička Plješevica. Eurasian biogeographical elements (59.5%)

predominate in faunal composition, which was expected considering the characteristics of the mountain. The significant find of Mediterranean-Asian species (25.0%) is somewhat surprising and is primarily the result of the proximity of the Mediterranean and its influence on this region, and of faunal migration.

CONCLUSION

An analysis of noctuids in the Igalffy Collection contributed not only to insight into the noctuids of Lička Plješevica, but also helped fill the "hole" in our knowledge about this family of moths in the Lika region and the central mountain region of the Republic of Croatia in general.

The find of some "rare" species of moth, like the *Oligia versicolor* Bor. *Hydraecia petasitis vindelica* Fre. (MLADINOV 1985) and *Hada proxima* Hbn., which were found on Lička Plješevica for the first time in the Republic of Croatia, indicate that this mountain has certain specific faunal features and that further systematic research is necessary.

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