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Xylocampa areola (Esper, 1789), *Eurois occulta* (Linnaeus, 1758) AND *Euxoa decora* (Denis & Schiffermüller, 1775), NEW ELEMENTS IN THE NOCTUID FAUNA (INSECTA: LEPIDOPTERA: NOCTUIDAE) OF CROATIA

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Three new noctuid species for Croatian fauna were found during entomological research in the lower part of the Neretva River and on Mt. Biokovo and Mt. Velebit: *Xylocampa areola* (Esper, 1789) (Neretva), *Eurois occulta* (Linnaeus, 1758) (Velebit Mt.) and *Euxoa decora* (Denis & Schiffermüller, 1775) (Biokovo Mt.). A brief faunistic review is given for all three species, as well as their biological and zoogeographical characteristics. The distribution of the genus *Euxoa* Hübner (1821) in Croatia is shown.

Key words: *Xylocampa areola* (Esper, 1789), *Eurois occulta* (Linnaeus, 1758), *Euxoa decora* (Denis & Schiffermüller, 1775), *Euxoa* Hübner (1821), distribution, fauna, Croatia.

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Entomološkim istraživanjima na području donjeg toka rijeke Neretve te planina Biokovo i Velebit, utvrđene su tri nove vrste sovica u fauni Hrvatske: *Xylocampa areola* (Esper, 1789) (Neretva), *Eurois occulta* (Linnaeus, 1758) (Velebit) i *Euxoa decora* (Denis & Schiffermüller, 1775) (Biokovo). Za sve vrste dan je kratak faunistički osvrt i prikaz njihovih bioloških i zoogeografskih značajki. Za rod *Euxoa* Hübner (1821) prikazana je rasprostranjenost na području Hrvatske.

Ključne riječi: *Xylocampa areola* (Esper, 1789), *Eurois occulta* (Linnaeus, 1758), *Euxoa decora* (Denis & Schiffermüller, 1775), *Euxoa* Hübner (1821), rasprostranjenost, fauna, Hrvatska.

INTRODUCTION

The paper confirms three new noctuid species in Croatian fauna and shows the distribution of *Euxoa* genus in Croatia. Research into the noctuid fauna in Croatia began about two hundred years ago. During that period a lot of surveys were done and important faunistic papers were published. The most interesting ones from the 19th century are: ABAFI-AINGER *et al.* (1896), BOTASCH (1891), KOČA (1900), MANN (1854, 1867, 1869), VUKOTINOVIĆ (1879), and in the first half of the 20th century ABAFI-AINGER (1910), REBEL (1912, 1913), GALVAGNI (1902, 1909, 1934), KOČA (1901, 1925), SCHAWERDA (1921), SCHWINGENSCHUSS & WAGNER (1925–1927), STAUDER (1925). In the last 40 years, research on this family has continued, and important faunistic reviews were published: BURGERMEISTER (1964), HAFNER (1994), CARNELUTTI (1994), KOVAČEVIĆ & FRANJEVIĆ-OŠTRC (1978), KRANJČEV (1985), KUČINIĆ & BREGOVIĆ (1996), KUČINIĆ & PEROVIĆ (1992/93), KUČINIĆ *et al.* (1993, 1994), MLADINOV (1977, 1978, 1983), MLADINOV & LORKOVIĆ (1985). Recently several new species were registered for Croatian noctuid fauna (CARNELUTTI, 1994; HAFNER, 1994; HABELER, 1998; HACKER, 1989; KUČINIĆ, 1992; KUČINIĆ & LORKOVIĆ, 1998; KUČINIĆ & PEROVIĆ, 1996; MLADINOV, 1990; RÁKOSY, 1996, ...). According to the presently available data, there are over 580 species of noctuids in Croatian fauna (KUČINIĆ, 1997).

MATERIAL AND METHODS

In the lower part of the Neretva River and on the Biokovo and Velebit mountains, systematic entomological research has been carried out for the last ten years. Croatian Natural History Museum (CNHM) workers started collecting Lepidoptera in the Biokovo area during 1988, on Velebit in 1995, and in the lower part of the Neretva in 1996. Material was collected with the help of UV-lamps and mercury light bulbs of 15, 30, 60 and 100 W. Determination of the material, and biological and zoogeographical characteristics of the determined species are presented according to BERIO (1985), FIBIGER (1990, 1993, 1997), FORSTER & WOHLFAHRT (1971), KOCH (1988), NOWICKI & FIBIGER (1996), RÁKOSY (1996), SKINNER (1986). The analysis of the morphological characteristics of the genitals of *Euxoa decora* D. & S. was done according to FIBIGER (1997), and of *Xylocampa areola* Esp. according to BERIO (1985). Systematic review was made according to NOWICKI & FIBIGER (1996).

Literature data for *Euxoa obelisca* D. & S. species (ABAFI-AINGER *et al.*, 1896; GALVAGNI, 1909; KOČA, 1925; REBEL, 1913; SCHWINGENSCHUSS & WAGNER, 1925–1927; SPEYER & SPEYER, 1862) probably refer to *E. temera* Hüb. and they are so presented in this article.

Entomological collections from the CNHM in Zagreb (Central collection HesperIIDae & Macroheterocera = coll. Središnja, coll. Igalffy, coll. Kučinić, coll. Lorković, coll. Vajdić, coll. Vozilíci), from the Municipal Museum in Varaždin (coll. Koščec), and from the Faculty of Forestry in Zagreb, as well as material collected recently, during the last fifteen years, were examined in order to fill in our data bases while working on this paper.

RESULTS AND DISCUSSION

On the basis of faunistic and ecological research carried out in the lower part of the Neretva and on Biokovo and Velebit mountains, three new species in Croatian noctuid fauna were registered: *Xylocampa areola* (Esper, 1789), *Eurois occulta* (Linnaeus, 1758) and *Euxoa decora* (Denis & Schiffermüller, 1775) (Fig. 1). These species, except for *E. decora* D. & S., are not mentioned in the available literature as members of our fauna, including the latest systematic check-list of European noctuids (NOWICKI & FIBIGER, 1996) which does not mention them for ex-Yugoslavia at all. The species *E. decora* was registered in the fauna of Slovenia (CARNELUTTI, 1992), Bosnia and Herzegovina (REBEL, 1904) and Macedonia (THURNER, 1964). A short faunistic review and the main biological features are given for each species. The distribution of *Euxoa* Hübner, 1821 species in Croatia is given.



Fig. 1. Distribution of *Xylocampa areola* Esp. (lower part of the Neretva), *Eurois occulta* L. (Velebit Mt.) and *Euxoa decora* D. & S. (Biokovo Mt.) species in Croatia.

Xylocampa areola (Esper, 1789)

The species was registered in the lower part of the Neretva (loc. Kremena) with two collected specimens, on 24.11.1997 (leg. B. Jalžić) (Fig. 2). The taxonomic status of the species was confirmed by checking the morphological characteristics of the male genitals (BERIO, 1985).



Fig. 2. *Xylocampa areola* Esp., coll. Središnja – HPM, Kremena, 24.11.1997, leg. B. Jalžić (photo D. Pelić).

This is a Mediterranean-Asian species, with a distribution area that comprises the whole of Europe, Syria, Asia Minor and Russia (BERIO, 1985). Feeding plants are most often various *Lonicera* species. It has one generation, probably spends the winter in the Mediterranean as imago, which is confirmed by this finding in the valley of the lower part of the Neretva, while in the north (Great Britain) it hibernates as pupa (SKINNER, 1986). The imago is present in different periods of the year. According to SKINNER (1986) and FORSTER & WOHLFAHRT (1971), in Northern and Central Europe this species has one generation, imago is present from March to May, and in Italy (BERIO, 1985) it can be found later in November and December.

Eurois occulta (Linnaeus, 1758)

The *Eurois* Hübner, 1821 genus comprises seven species (FIBIGER, 1993; RÁKOSY, 1996), but only *E. occulta* L. is a member of European fauna. It is registered with only one collected specimen in Lomska duliba (Velebit Mt.) on 29.7.1997 at 1260 m a.s.l. (leg. D. Pelić) (Fig. 3). According to FIBIGER (1993), the northern parts of Croatia are also included in the distribution area of this species (Fig. 4), although this is not the case in the systematic check-list of the butterflies of Europe (NO-

WACKI & FIBIGER, 1996), which does not include ex-Yugoslavia. The finding from Velebit is considered to be the first one for our fauna. This species is mentioned for Bosnia and Herzegovina (Sarajevo) by REBEL (1904) and for Slovenia by CARNELUTTI (1992).



Fig. 3. *Eurois occulta* L., coll. Središnja – HPM, Lomska duliba, Velebit Mt., 29.7.1997, leg. D. Pelić (photo D. Pelić).



Fig. 4. Distribution of *Eurois occulta* L. in Europe (FIBIGER, 1993).

This species lives in habitats dominated by the *Vaccinio-Piceetum* association (RÁKOSY, 1996), with feeding plants mostly from the genus *Myrica*, *Vaccinium*, *Calluna*, *Rubus* and *Epilobium*. It has a holarctic type of distribution, which includes some parts of the Palearctic and Nearctic. Apart from Europe, it reaches Japan, Southern Greenland, Canada and North America. The imago is present from July to October. It hibernates as a larva. In Romania it is registered from 600 to 2300 m a.s.l. (RÁKOSY, 1996).

Euxoa decora (Denis & Schiffermüller, 1775)

The *Euxoa* Hübner (1821) genus contributes 42 species to European fauna and 130 species to Palearctic fauna. It is the most numerous genus in the subfamily Noctuidae (FIBIGER, 1990). Male genitals have a characteristic shape, i.e. different lengths of valve endings, which is of great importance in determination. The *Euxoa* genus and the whole subfamily of Noctuidae are characterized by great variability among species, as well as within species. That is why morphological

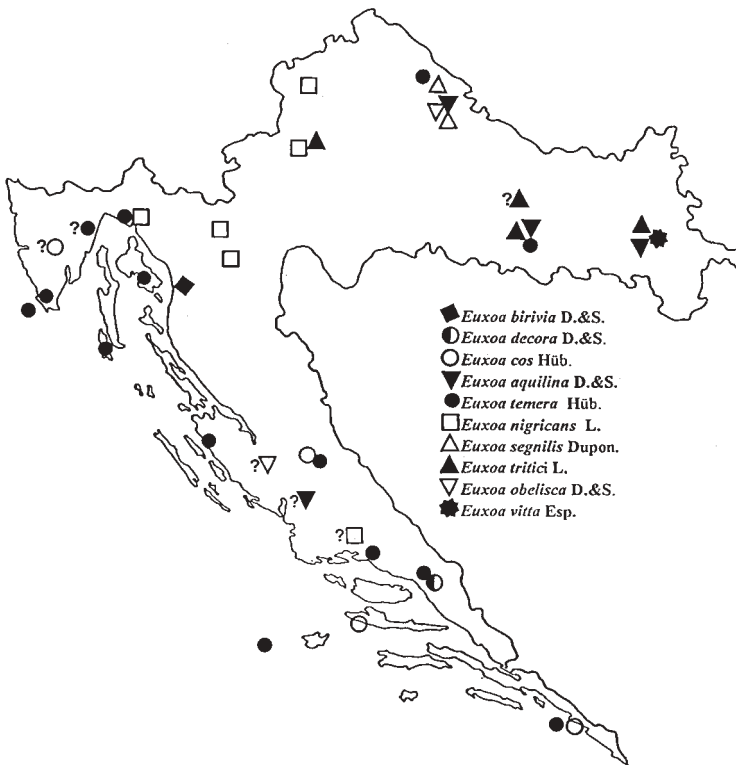


Fig. 5. Distribution of genus *Euxoa* Hübner, 1821 in Croatia. Question marks represent literature data that are not precisely defined: regions Dalmatia, Central Dalmatia, Istria, Papuk Mt. and Učka Mt.

characteristics of wings (shape and colour), and analysis of genitals, are necessary to determine material accurately and precisely. Because of the reasons given, but also because of the great taxonomic curiosity, entomologists from the Agricultural Institute of Ottawa are currently working on the revision of this genus (FIBIGER, 1990).

First record on species from the genus *Euxoa* can be found in some papers from the second half of 19th century (MANN, 1867; 1869; VUKOTINOVIĆ, 1879). Analysis of all available literature, entomological collections and recently collected material enabled us to determine 11 *Euxoa* species for Croatian fauna (Fig. 5, 6):

***Euxoa birivia* (Denis & Schiffermüller, 1775)**

Senj (STAUDER, 1925)

***Euxoa decora* (Denis & Schiffermüller, 1775)**

Biokovo Mt. (1600 m, Pod Sv. Jurom) 31.VIII.1989. (coll. Središnja, coll. Kučinić)

***Euxoa cos* (Hübner, 1824)**

Knin (CARNELUTTI, 1994; HAFNER, 1994); Gruž, Hvar (GALVAGNI, 1909); Gruž (SCHWINGENSCHUSS & WAGNER, 1925–1927); Hvar, Istra-loc.? (STAUDER, 1925); Gruž (THURNER, 1964)



Fig. 6. Localities on which *Euxoa* Hübner species were recorded

***Euxoa aquilina* (Denis & Schiffermüller, 1775)**

Vinkovci 23.VI.1894., ? VI.1909. (coll. Središnja); Pleternica (KOČA, 1901); Peskara (KRANJČEV, 1985); Dalmacija-loc.? (MANN, 1869)

***Euxoa temera* (HÜBNER, 1808)**

Kostrena 15.IX.1966., Zadar 1887. (coll. Središnja); Rijeka (ABAFI-AINGER *et al.*, 1896); Punat (BARTOL *et al.*, 1964); Lošinj, Pula, Svetac (GALVAGNI, 1909); Knin (HAFNER, 1994; CARNELUTTI, 1994); Pleternica (KOČA, 1925); Biokovo Mt. (1600 m, Pod Sv. Jurom) (MLADINOV & KUČINIĆ, 1993); Brijuni (REBEL, 1913); Pula, Rijeka, Split, Učka-loc.? (STAUDER, 1925); Rijeka (SPEYER & SPEYER, 1862); Sigetec (KRANJČEV, 1985); Gruž (SCHWINGENSCHUSS & WAGNER, 1925–1927)

***Euxoa nigricans* (Linnaeus, 1761)**

Trnovec ? VIII. 1915 (coll. Središnja); Josipdol, Ogulin, Rijeka (ABAFI-AINGER, 1896); Josipdol (MANN, 1867); Dalmacija-loc.? (MANN, 1869); Rijeka, srednja Dalmacija-loc.? (STAUDER, 1925); Zagreb (VUKOTINOVIĆ, 1879)

***Euxoa segnilis* (Duponchel, 1836)**

Peskara, Borik (KRANJČEV, 1985)

***Euxoa tritici* (Linnaeus, 1761)**

Papuk-loc.? (KOČA, 1900); Pleternica, Vinkovci (KOČA, 1901), Zagreb (VUKOTINOVIĆ, 1879)

***Euxoa obelisca* (Denis & Schiffermüller, 1775)**

Dalmacija-loc.? (MANN, 1869); Peskara (KRANJČEV, 1985)

***Euxoa vitta* (Esper, 1789)**

Vinkovci (coll. Središnja); Vinkovci (KOČA, 1925).

? *Euxoa cursoria* (Hufnagel, 1766)

Dalmacija (PROLA *et al.*, 1977)

During our research we registered one new species for Croatian fauna – *Euxoa decora* D. & S. During field work on Mt. Biokovo 31.8.1989 we collected three specimens of the species (1 male, 2 females; leg. M. Kučinić). The analysis of morphological features and genitalia of the imago showed the specimens to belong to *Euxoa decora* D. & S. Fig. 7 shows the distribution area of this noctuid, which has a few subspecies in European fauna (ssp. *simulatrix* Hüb., ssp. *splendida* Tur., ssp. *macedonica* Thur., ssp. *olympica* Tule., ssp. *hackeri* Fib. & Mob.) (FIBIGER, 1990). More specimens from Biokovo population should help us to determine the exact position of that subspecies.

There is a questionable mention of *Euxoa cursoria* as a member of Croatian fauna. This Holarctic species as an element of our fauna is mentioned by PROLA *et al.* (1977). Author mentions Dalmatia as the finding area, with no precise localities. Its distribution area is shown in Fig. 8 (FIBIGER, 1990). Its most southern border passes over 500 km north of Dalmatia, which makes its finding in Southern Croatia very questionable. The *Euxoa* genus is one of the taxonomically most complex in the Noctuidae subfamily, and one can suppose that some data from the literature may not be correct. Regardless of possible surprises that can happen in

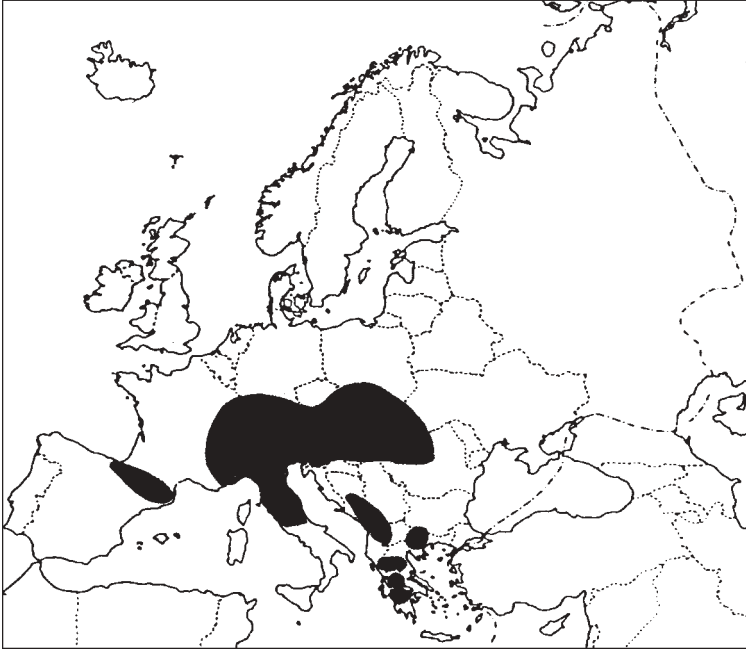


Fig. 7. Distribution of *Euxoa decora* D. & S. in Europe (FIBIGER, 1990).

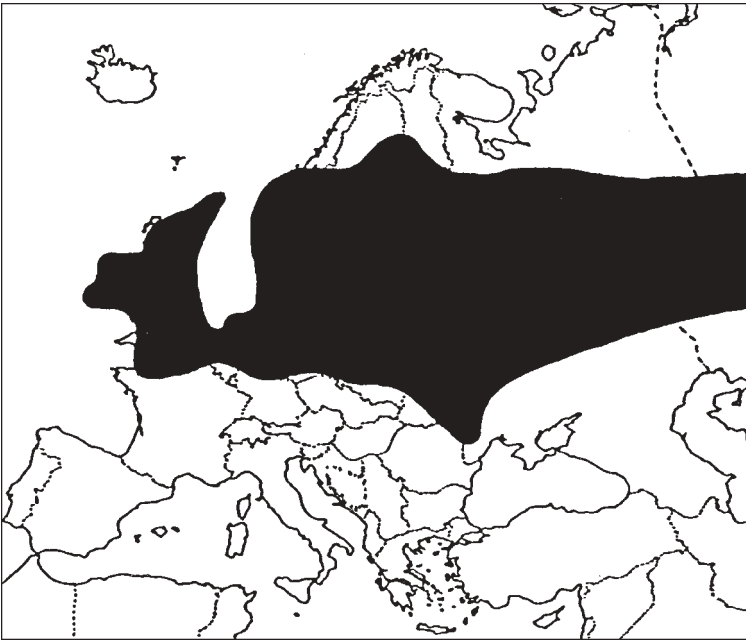


Fig. 8. Distribution of *Euxoa cursoria* Hufn. in Europe (FIBIGER, 1990).

systematic taxonomic research, finding of this species in Croatia is not very likely, except in cases of unperiodical and irregular migration.

These data made our knowledge of noctuids in Croatia more complete. We can assume that so far 95% of the potential species from this family for Croatia have been registered, according to data on diversity and numerousness of noctuid fauna in Austria (HUEMER & TARMANN, 1993), Slovenia (CARNELUTTI, 1992; 1992a), Romania (RÁKOSY, 1996), Greece (HACKER, 1989; NOWICKI & FIBIGER, 1996), and some other European countries (NOWICKI & FIBIGER, 1996).

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S A Ž E T A K

***Xylocampa areola* (Esper, 1789), *Eurois occulta* (Linnaeus, 1758) i *Euxoa decora* (Denis & Schiffermüller, 1775), novi elementi faune sovica (Insecta: Lepidoptera: Noctuidae) Hrvatske**

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Istraživanje faune sovica Hrvatske započinje prije dvjestotinjak godina. U tom periodu izvršen je velik broj istraživanja i objavljeni su značajni faunistički radovi. Među najzanimljivije radove u 19. stoljeću spadaju radovi: ABAFI-AINGER *et al.* (1896), BOTASCH (1891), MANN (1854, 1867, 1869), VUKOTINOVIĆ (1879), a u prvoj polovini 20. stoljeća ABAFI-AINGER (1910), REBEL (1912, 1913), GALVAGNI (1902, 1909, 1934), STAUDER (1925). U posljednjih četrdesetak godina nastavlja se rad na izučavanju te porodice, tako da je objavljen veći broj značajnih faunističkih priloga: BURGERMEISTER (1964), HAFNER (1994), CARNELUTTI (1994), KRANJČEV (1985), KUČINIĆ & PEROVIĆ (1992/93), KUČINIĆ & BREGOVIĆ (1996), KUČINIĆ *et al.* (1993, 1994), MLADINOV (1977, 1978, 1983), LORKOVIĆ & MLADINOV (1985). Posljednjih godina zabilježeno je nekoliko novih vrsta u fauni sovica Hrvatske (CARNELUTTI, 1994; HAFNER, 1994; HABELER, 1998; HACKER, 1989; KUČINIĆ, 1992; KUČINIĆ & LORKOVIĆ, 1998; KUČINIĆ & PEROVIĆ, 1996; MLADINOV, 1990; RÁKOSY, 1996, ...). Prema posljednjim podacima fauna te porodice na području Hrvatske broji nešto više od 580 vrsta (KUČINIĆ, 1997).

Na području donjeg toka rijeke Neretve i planina Velebit i Biokovo izvode se sistematska faunistička entomološka istraživanja u posljednjih desetak godina. Priкупljanje Lepidoptera od djelatnika Hrvatskog prirodoslovnog muzeja u Zagrebu započinju na području Biokova tijekom 1988. godine, Velebita 1995, a donjeg toka rijeke Neretve 1996. godine.

Entomološkim istraživanjima na spomenutim područjima utvrđene su tri još nezabilježene vrste u fauni sovica Hrvatske: *Xylocampa areola* (Esper, 1789) (Neretva) (Sl. 2), *Eurois occulta* (Linnaeus, 1758) (Velebit) (Sl. 3) i *Euxoa decora* (Denis & Schiffermüller, 1775) (Biokovo). Za sve tri vrste dan je kratak osvrt na njihovu biologiju, ekologiju i rasprostranjenost (Sl. 1, Sl. 4, Sl. 7), te detaljniji prikaz rasprostranjenosti roda *Euxoa* na području Hrvatske (Sl. 5, Sl. 6). Od vrsta iz roda *Euxoa* zabilježeno je u fauni Hrvatske 11 vrsta (Sl. 5). Od svih utvrđenih vrsta diskutabilna je navod o vrsti *Euxoa cursoria* Hufn. Tu holoarktičku vrstu kao elemente naše faune bilježi PROLA *et al.* (1977). Autor kao područje nalaza te sovice navodi prostor Dalmacije bez bližih oznaka lokaliteta na kojima je zabilježena. Areal te vrste prikazan na slici 8. (FIBIGER, 1990) u svojoj krajnjoj južnoj granici prolazi barem 500 km sjevernije od Dalmacije, tako da je veoma upitan njen nalaz na jugu Hrvatske. Budući da je rod *Euxoa* jedan od taksonomski najkompleksnijih unutar potporodice Noctuidae, može se pretpostaviti da su neki literaturni podaci pogrešni. Bez obzira na sva moguća iznenađenja koja pružaju sistematska faunistička istraživanja, nalaz te sovice na području Hrvatske malo je vjerojatan, osim u slučaju neperiodične i nepravilne migracije.

Ovim podacima upotpunjeno je poznavanje porodice sovica na području Hrvatske. Može se pretpostaviti da je prema podacima o raznolikosti i brojnosti faune sovica na području Austrije (HUEMER & TARMANN, 1993), Slovenije (CARNELUTTI, 1992, 1992a), Rumunjske (RÁKOSY, 1996), Grčke (HACKER, 1989, NOWICKI & FIBIGER, 1996), kao i nekih drugih europskih zemalja (NOWICKI & FIBIGER, 1996) registrirano oko 95 % potencijalnih vrsta te porodice u našoj fauni.