

NEUROPTERA IN OAK FORESTS IN THE SUBMEDITERRANEAN DISTRICT OF SLOVENIA

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In the Submediterranean District of Slovenia, Neuropteran assemblages in two types of oak forests have been investigated. For both forest types, data on plant substrate species are provided. The faunal composition of the two oak forests is compared with the fauna of the garrigue from the southernmost part of Istria. While in both woodland habitats arboreal species dominate, in the garrigue habitat the number of species preferring grassy steppes is much higher.

Key words: Neuroptera, Istria, Submediterranean District, oak forests

INTRODUCTION

Neuropteran communities in natural forests are generally poorly known. Woodland habitats show a mixed vegetation structure, so that the Neuropteran fauna in most cases is also a diverse one. Chrysopid assemblages in West Palearctic temperate forests are presented by ZELÉNY (1984). Lacewing populations in European coniferous forests have been studied by CZECHOWSKA (1985), and in deciduous forests by PANTALEONI (1984), CZECHOWSKA (1990) and SZIRÁKI (1996). Plant substrate specificity of Iberian Coniopterygidae and Chrysopidae has been studied by MONSERRAT and MARÍN (1992, 1994). For a review see also STELZL and DEVETAK (1999).

In the present study, the faunal composition of two oak forests in the Slovenian part of Istria has been investigated. Istria lies in the NW part of the Balkan Peninsula. The characteristic vegetation of the area consists of several types of Submediterranean woodland and scrub communities (for review see DEVETAK, 1998).

MATERIAL AND METHODS

The first forest type studied, located near Strunjan (Fig. 1), represents a fragment of macchia, which is a result of the destruction of the original Mediterranean sclerophyll forest. This fragment is classified as *Orno-Quercetum ilicis* subass. *cotinetosum*. The characteristic tree species, evergreen oak (*Quercus ilex*), occurs only sporadically. Common plant species include *Quercus pubescens*, *Ostrya carpinifolia*, *Fraxinus ornus*, *Myrtus communis*, *Cotinus coggygria* and *Spartium junceum*.

The second forest type, located at Osp (Fig. 1), belonging to the Submediterranean deciduous forests with *Quercus pubescens*, *Ostrya carpinifolia* and *Carpinus orientalis* as dominant tree species, is classified as *Ostryo-Quercetum pubescentis* subass. *pistacietosum terebinthi*. Other frequently occurring plant species are *Fraxinus ornus*, *Acer monspessulanum*, *Pistacia terebinthus* and *Celtis australis*.

The neuropteran fauna of the two oak forest was compared with the garrigue from the southernmost part of Istria (near Premantura, Fig. 1). This garrigue habitat is classified as *Cisto-Ericetum arboreae*.

Between May and September 1997, seven one-day samplings were carried out in the two forest habitats. Insects were collected by beating the vegetation with a handnet.

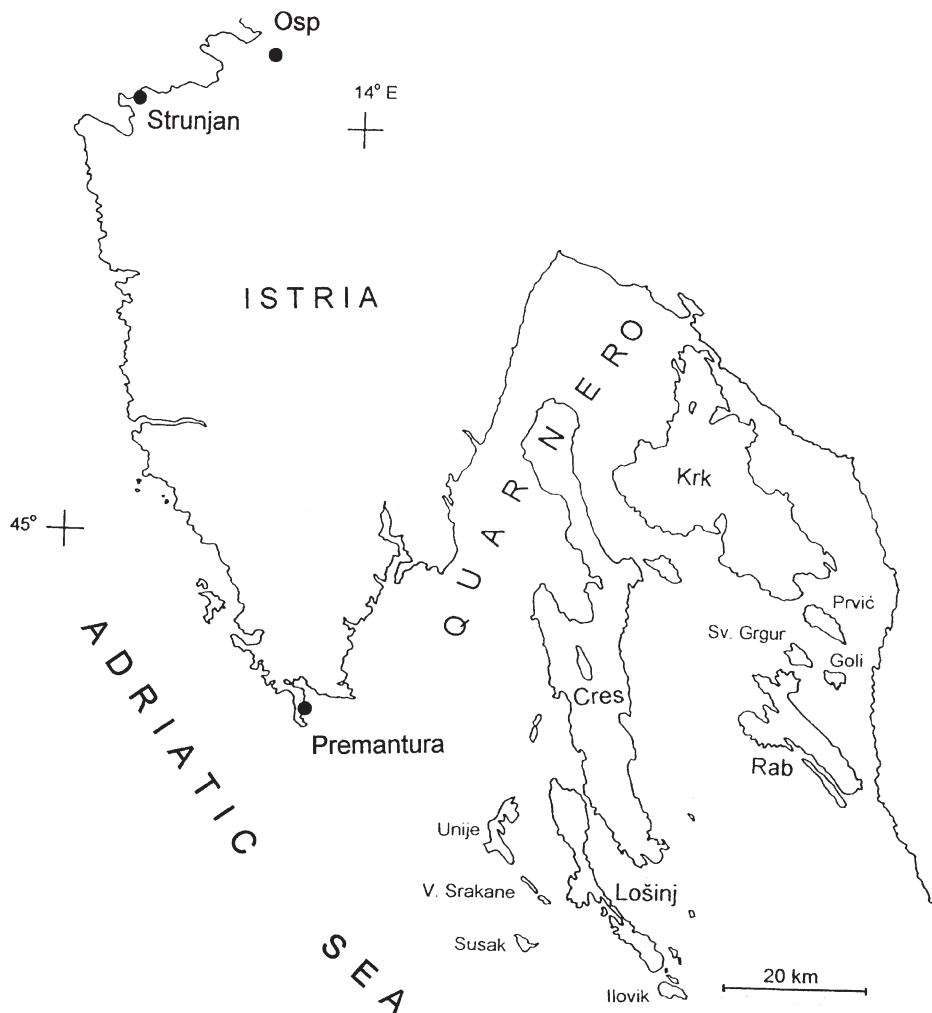


Fig. 1. Map of Istria with collecting sites

RESULTS AND DISCUSSION

Altogether, 157 individuals, belonging to 17 neuropteran species, were collected from the two forest habitats (Table 1). The most abundant species were *Dichochrysa flavifrons* (STEIN), *Hemerobius micans* OLIVIER, *Semidalis aleyrodiformis* (STEPHENS) and *Chrysoperla lucasina* (LACROIX).

Table 2 shows the neuropteran species arranged according to their recorded plant substrate. *Dichochrysa flavifrons* was collected on ten tree species and seems to be the most eurytopic species. The species *Semidalis* sp., *Hemerobius micans*, *Dichochrysa abdominalis* (BRAUER) and *Chrysoperla lucasina* are also very eurytopic, collected from five or more plant species. Most likely the unidentified species is *Semidalis aleyrodiformis* (females) because the specimens were collected on deciduous trees and shrubs, and not *Semidalis pseudouncinata* MEINAN-

Table 1. List of species of Neuroptera recorded in the oak forest habitats at Strunjan and Osp during 1997

Species	Osp	Strunjan
Coniopterygidae		
1. <i>Coniopteryx lentiae</i> H. ASPÖCK & U. ASPÖCK, 1964	+	
2. <i>Semidalis aleyrodiformis</i> (STEPHENS, 1836)	+	+
3. <i>Semidalis pseudouncinata</i> MEINANDER, 1963		+
Hemerobiidae		
4. <i>Wesmaelius subnebulosus</i> (STEPHENS, 1836)	+	+
5. <i>Hemerobius humulinus</i> LINNAEUS, 1758		+
6. <i>Hemerobius micans</i> OLIVIER, 1792	+	+
7. <i>Hemerobius gilvus</i> STEIN, 1863		+
8. <i>Sympherobius pygmaeus</i> (RAMBUR, 1842)	+	+
Chrysopidae		
9. <i>Nineta flava</i> (SCOPOLI, 1763)		+
10. <i>Chrysopa perla</i> (LINNAEUS, 1758)		+
11. <i>Chrysopa formosa</i> BRAUER, 1850		+
12. <i>Chrysopa viridana</i> SCHNEIDER, 1845	+	+
13. <i>Dichochrysa flavifrons</i> (BRAUER, 1850)	+	+
14. <i>Dichochrysa abdominalis</i> (BRAUER, 1856)	+	+
15. <i>Dichochrysa zelleri</i> (SCHNEIDER, 1851)		+
16. <i>Chrysoperla lucasina</i> (LACROIX, 1912)	+	+
Myrmeleontidae		
17. <i>Euroleon nostras</i> (GEOFFROY in FOURCROY, 1785)	+	+

DER which inhabits Cupressaceae. On the other hand, some neuropteran species were recorded from only one plant substrate species. These species are *Coniopteryx lentiae* ASPÖCK et ASPÖCK, *Semidalis pseudouncinata*, *Hemerobius humulinus*, *H. gilvus* STEIN, *Nineta flava* (SCOPOLI), *Chrysopa perla* (L.) and *Dichochrysa zelleri* (SCHNEIDER). At least some of these species are known in European temperate forests as eurytopic.

Table 2. Neuroptera on different substrate species in Osp and Strunjan

Neuropteran species	No. of substrate species	Substrate species
<i>Coniopteryx lentiae</i>	1	<i>Ostrya carpinifolia</i>
<i>Coniopteryx</i> sp.	3	<i>Ostrya carpinifolia</i> , <i>Quercus pubescens</i> , <i>Q. ilex</i>
<i>Semidalis aleyrodiformis</i>	4	<i>Cotinus coggygria</i> , <i>Crataegus</i> sp., <i>Fraxinus ornus</i> , <i>Ostrya carpinifolia</i>
<i>Semidalis pseudouncinata</i>	1	<i>Cupressus sempervirens</i>
<i>Semidalis</i> sp.	6	<i>Cotinus coggygria</i> , <i>Crataegus</i> sp., <i>Fraxinus ornus</i> , <i>Hedera helix</i> , <i>Quercus pubescens</i> , <i>Q. ilex</i>
<i>Wesmaelius subnebulosus</i>	3	<i>Fraxinus ornus</i> , <i>Hedera helix</i> , <i>Paliurus spina-christi</i>
<i>Hemerobius humulinus</i>	1	<i>Cotinus coggygria</i>
<i>Hemerobius micans</i>	6	<i>Cotinus coggygria</i> , <i>Crataegus</i> sp., <i>Fraxinus ornus</i> , <i>Ostrya carpinifolia</i> , <i>Quercus pubescens</i> , <i>Q. ilex</i>
<i>Hemerobius gilvus</i>	1	<i>Quercus pubescens</i>
<i>Symphorobius pygmaeus</i>	4	<i>Carpinus orientalis</i> , <i>Fraxinus ornus</i> , <i>Ostrya carpinifolia</i> , <i>Quercus pubescens</i>
<i>Nineta flava</i>	1	<i>Quercus pubescens</i>
<i>Chrysopa perla</i>	1	<i>Cotinus coggygria</i>
<i>Chrysopa formosa</i>	2	<i>Fraxinus ornus</i> , <i>Spartium junceum</i>
<i>Chrysopa viridana</i>	2	<i>Fraxinus ornus</i> , <i>Quercus pubescens</i>
<i>Dichochrysa flavifrons</i>	10	<i>Acer monspessulanum</i> , <i>Carpinus orientalis</i> , <i>Celtis australis</i> , <i>Cotinus coggygria</i> , <i>Crataegus</i> sp., <i>Fraxinus ornus</i> , <i>Ostrya carpinifolia</i> , <i>Pistacia terebinthus</i> , <i>Quercus pubescens</i> , <i>Q. ilex</i>
<i>Dichochrysa abdominalis</i>	6	<i>Acer monspessulanum</i> , <i>Fraxinus ornus</i> , <i>Hedera helix</i> , <i>Pistacia terebinthus</i> , <i>Quercus pubescens</i> , <i>Q. ilex</i>
<i>Dichochrysa zelleri</i>	1	<i>Ostrya carpinifolia</i>
<i>Chrysoperla lucasina</i>	5	<i>Carpinus orientalis</i> , <i>Cotinus coggygria</i> , <i>Fraxinus ornus</i> , <i>Ostrya carpinifolia</i> , <i>Quercus pubescens</i>

Table 3. Substrate species inhabited by Neuroptera

Substrate species	Osp		Strunjan	
	Number of species	Number of individuals	Number of species	Number of individuals
<i>Acer monspessulanum</i>	2	7	–	–
<i>Carpinus orientalis</i>	–	–	3	5
<i>Celtis australis</i>	1	1	–	–
<i>Cotinus coggygria</i>	2	2	6	18
<i>Crataegus sp.</i>	–	–	3	9
<i>Cupressus sempervirens</i>	–	–	1	1
<i>Fraxinus ornus</i>	3	8	8	21
<i>Hedera helix</i>	3	4	–	–
<i>Ostrya carpinifolia</i>	6	15	6	10
<i>Paliurus spina-christi</i>	1	1	–	–
<i>Pistacia terebinthus</i>	2	12	–	–
<i>Quercus pubescens</i>	1	1	10	24
<i>Quercus ilex</i>	–	–	5	6
<i>Spartium junceum</i>	–	–	1	1

Table 4. Neuropteran assemblages in oak forests (with *Quercus pubescens* and *Q. ilex*; Osp and Strunjan) and in the garrigue (Cisto-Ericetum arboreae; Premantura)

Species	Oak forests	garrigue
Coniopterygidae		
<i>Coniopteryx pygmaea</i> ENDERLEIN, 1906		+
<i>C. haematica</i> MCLACHLAN, 1863		+
<i>C. esbenpeterseni</i> TJEDER, 1930		+
<i>C. lentiae</i> H. ASPÖCK & U. ASPÖCK, 1964	+	
<i>Semidalis aleyrodiformis</i> (STEPHENS, 1836)	+	
<i>S. pseudouncinata</i> MEINANDER, 1963	+	+
Mantispidae		
<i>Mantispa styriaca</i> (PODA, 1761)		+
Hemerobiidae		
<i>Wesmaelius subnebulosus</i> (STEPHENS, 1836)	+	
<i>Hemerobius humulinus</i> LINNAEUS, 1758	+	
<i>Hemerobius micans</i> OLIVIER, 1792	+	
<i>Hemerobius gilvus</i> STEIN, 1863	+	
<i>Symphorobius pygmaeus</i> (RAMBUR, 1842)	+	+

Table 4 (continued)

Species	Oak forests	garrigue
Chrysopidae		
<i>Italochrysa italica</i> (ROSSI, 1790)		+
<i>Nineta flava</i> (SCOPOLI, 1763)	+	
<i>Chrysopa perla</i> (LINNAEUS, 1758)	+	
<i>Chrysopa dorsalis</i> BURMEISTER, 1839		+
<i>Chrysopa formosa</i> BRAUER, 1850	+	
<i>Chrysopa viridana</i> SCHNEIDER, 1845	+	+
<i>Chrysopa pallens</i> (RAMBUR, 1839)		+
<i>Dichochrysa flavifrons</i> (BRAUER, 1850)	+	+
<i>Dichochrysa abdominalis</i> (BRAUER, 1856)	+	+
<i>Dichochrysa zelleri</i> (SCHNEIDER, 1851)	+	
<i>Chrysoperla lucasina</i> (LACROIX, 1912)	+	+
Myrmeleontidae		
<i>Palpares libelluloides</i> (LINNAEUS, 1764)		+
<i>Euroleon nostras</i> (GEOFFROY in FOURCROY, 1785)	+	
<i>Macronemurus appendiculatus</i> (LATREILLE, 1807)		+
<i>Distoleon tetragrammicus</i> (FABRICIUS, 1798)		+
<i>Creoleon plumbeus</i> (OLIVIER, 1811)		+
Ascalaphidae		
<i>Deleproctophylla australis</i> (FABRICIUS, 1787)		+
<i>Libelloides macaronius</i> (SCOPOLI, 1763)		+

Table 3 shows the numbers of species and individuals of Neuroptera recorded at the two oak forest locations for each of the recorded plant substrates.

The faunal composition of the two oak forests is compared with the fauna of the garrigue from the southernmost part of Istria (Table 4). Whilst in both woodland habitats arboreal species dominate, in the garrigue habitat the number of species preferring grassy steppes is much higher.

The number of species recorded in the oak forests is considered likely to be artificially low as a consequence of the brevity of the sampling period.

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