



**CONTRIBUTION TO THE KNOWLEDGE  
OF GREEN LACEWINGS OF CROATIA  
(INSECTA: NEUROPTERIDA: CHRYSOPIDAE)**

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**Abstract** – We collected green lacewings in western Croatia by sweeping trees and edges, both at sea level and in more or less mountainous districts. Amongst the 11 occurring identified species, four are new to the Croatian fauna: *Nineta carinthiaca* (Hölzel, 1965) registered near the Lokve Lake, in the county of Gorski Kotar, *Pseudomallada ventralis* (Curtis, 1834) collected near Jezerce in the Plitvice National Park, *Ps. inornatus* (Navás, 1901) near Breze in Gorski Kotar and *Ps. venustus* (Hölzel, 1974) near Pirovac and Vrsine on the Dalmatian coast.

**KEY WORDS:** Lacewings, *Nineta carinthiaca*, *Pseudomallada inornatus*, *Ps ventralis*, *Ps. venustus*, fauna of Croatia.

**Izveček** – PRISPEVEK K POZNAVANJU TENČIČARIC HRVAŠKE (INSECTA: NEUROPTERIDA: CHRYSOPIDAE).

Na območju zahodne Hrvaške smo zbirali tenčičarice z drevja in robov, v obmorskih in gorskih predelih. Določili smo 11 vrst, od katerih so štiri nove za favno Hrvaške: *Nineta carinthiaca* (Hölzel, 1965) iz okolice jezera Lokve v Gorskem Kotarju, *Pseudomallada ventralis* (Curtis, 1834) iz bližine Jezerca v Narodnem parku Plitvice, *Ps. inornatus* (Navás, 1901) iz Breze v Gorskem Kotarju in *Ps. venustus* (Hölzel, 1974) blizu Pirovca in Vrsine na dalmatinski obali.

**KLJUČNE BESEDE:** tenčičarice, *Nineta carinthiaca*, *Pseudomallada inornatus*, *Ps ventralis*, *Ps. venustus*, favna Hrvaške.

## Introduction

Samples of green lacewings were collected by the senior author in several places of western Croatia, near the sea shore and in more or less mountainous regions during the summers 1989 and 2008. Eleven species were registered not to mention the constituting species of the *Chrysoperla carnea* (Stephens, 1836) complex, i.e. *Ch. carnea* sensu stricto, *Ch. affinis* (Stephens, 1836), *Ch. pallida* Henry *et al.*, 2002, *Ch. agilis* Henry *et al.*, 2003, for want of a neuropterists' consensus in the matter. Four species are new to the fauna of Croatia (see below). It bears so to 24 the number of green lacewings occurring in Croatia as previously mentioned by DEVETAK (1992a,c) and ASPÖCK *et al.* (2001).

## Method and sites

The insects were caught by hand net sweeping in the afternoon, on July 1989 and August 2008. Bushes and the canopy of edges of wooded places were sampled. All collected specimens were kept in alcohol and stored in the collection of D. THIERRY.

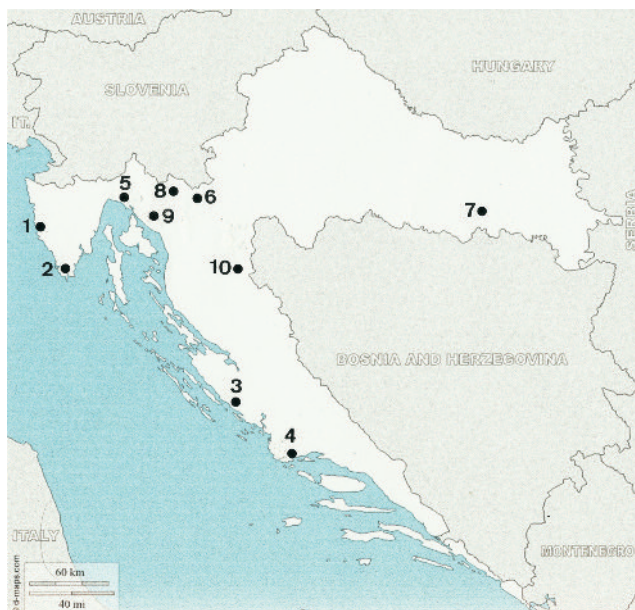
Ten places were investigated (Table I and Figure 1):

- 4 are on the sea shore: Vrsar (# 1) and Pula (# 2) in Istria, Pirovac (# 3) and Vrsine (# 4) on the Dalmatian coast ;
- 3 in hilly areas, at an altitude below 400 m asl: Rijeka (# 5), Bosanci (# 6), a more northern place and Slavonski-Brod (# 7) in the north-eastern part of the country,
- 3 others in various montane sites: near the Lokve lake (# 8) and Breze (# 9), and in the vicinity of Jezerce (# 10) in the Plitvice National Park.

## Faunistical results and comments

The total sample contains 201 specimens of green lacewings, distributed in the various biotopes as registered in the Table II. It may be noted the lack of *Chrysopa* spp. and subsequently the prevalence of *Chrysoperla carnea* s.l. (42 % of the total collection) together with that of *Pseudomallada* spp., mainly *Ps. prasinus* (Burmeister, 1839) which is the dominant green lacewing (45 %). Amongst the other *Pseudomallada*, three species are new to the Croatian fauna.

*Pseudomallada inornatus* (Navàs, 1901) is considered by the authors as uncommon, so that the relative observations are rare also. Its distribution was first qualified polycentric. However, taking in account various data, it occurs continuously from West to East in the terminal part of the Iberic Peninsula: at Lugo (MONSERRAT, 1985) up to Ukraine and Crimea, cited by ZAKHARENKO & KRIVOKHATSKY (1993), and from North to South, the German Rhine valley (TRÖGER, 1990) and north-eastern France, in Moselle (CANARD & JACQUEMIN, 2013) up to southern Italy and Sicily (IORI *et al.*, 1995) ; but it never reaches the trans-Mediterranean countries. *Pseudomallada inornatus* is new to Croatian neuropterological fauna, although already registered very closely, at Osp (near Koper/Capodistria) in the



**Fig. 1** – Collection places in Croatia.

Slovenian part of the Istrian peninsula (DEVETAK, 1998 and *in lit.*) but without any more circumstantial details and near the Slovenian border, in Podčetrtek (Lower Styria) (DEVETAK, 1984).

***Pseudomallada ventralis* (Curtis, 1834)** was collected in the mountainous biotopes of Jezerce (# 10) on isolated trees in a moist dale. Its occurrence does not show any surprise, excepted the absence of citation up to the present. *Pseudomallada ventralis* is common everywhere in Europe, from the Scandinavian region to the Iberian Peninsula and eastwards to Romania and Ukraine. It is known in the neighbouring countries: Slovenia, Hungary, Serbia, Bosnia-Herzegovina (ASPÖCK *et al.*, 2001).

***Pseudomallada venustus* (Hölzel, 1974)** was captured in the vicinity of Pirovac (# 3) on an isolated plum-tree, and at Vrsine (# 4), near orchards of olive- and fig-trees. This green lacewing is known as a xerothermophilous species, discreet, never abundant in hand nets of neuropterists. Initially described from the south-eastern France (Alpes-Maritimes), it has a north Mediterranean distribution (TILLIER, 2008) including continental Italy: Liguria and Calabria (IORI *et al.* 1995), mainland of Greece: Peloponesus, Dytiki Ellas and Attiki (CANARD, 2001), island of Crete, Cyprus (CANARD, 2007), Corsica (LETARDI *et al.*, 2008), Montecristo (HÖLZEL, 1974), Pantelleria in the Sicily Canal (PANTALEONI & LO VALVO, 1995) and Sicily (NICOLI ALDINI *et al.*, 2012) (Figure 2). However, it may be more frequent than appearing at now due to a possible confusion with the closely related *Ps. venosus* (Rambur, 1842). The occurrence of *Ps. venustus* on the Dalmatian coast is not surprising with respect to its Mediterranean distribution.

**Table I** – Characters of the collection places in Croatia.

|                  | #  | Location       | Latitude  | Longitude | County                | Biotope                               | Altitude     | Comments                 |
|------------------|----|----------------|-----------|-----------|-----------------------|---------------------------------------|--------------|--------------------------|
| sea shore        | 1  | Vrsar          | 45° 09' N | 13° 36' E | Istria                | sea shore                             | ... 0-20 ... | on bushes                |
|                  | 2  | Pula           | 44° 52' N | 13° 50' E | Istria                | oaks and pine trees                   |              | canopy                   |
|                  | 3  | Pirovac        | 43° 49' N | 15° 40' E | Šibenik-Knin          | peri-urban area                       |              | on an isolated plum tree |
|                  | 4  | Vrsine         | 43° 31' N | 31° 16' E | Split-Dalmatia        | orchard                               |              | olive and fig trees      |
| hilly area       | 5  | Rijeka         | 45° 19' N | 14° 26' E | Primorje-Gorski Kotar | dry calcareous table-land             | 300          | canopy                   |
|                  | 6  | Bosanci        | 45° 26' N | 15° 16' E | Karlovačka            | scattered trees on meadow             | 190          | canopy                   |
|                  | 7  | Slavonski-Brod | 45° 16' N | 18° 01' E | Brod-Posavina         | sub-urban area                        | 80           | canopy                   |
| mountainous area | 8  | Lokve          | 45° 21' N | 14° 45' E | Primorje-Gorski Kotar | edge of coniferous and deciduous wood | 700          | canopy                   |
|                  | 9  | Breze          | 45° 11' N | 14° 52' E | Primorje-Gorski Kotar | edge of coniferous wood               | 800          | canopy                   |
|                  | 10 | Plitvice Lakes | 44° 50' N | 15° 39' E | Lika-Senj & Karlovac  | wet wooded dale                       | 600          | canopy                   |
|                  |    |                |           |           |                       | grassy table-land                     | 650          | on an isolated lime tree |

*Nineta carinthiaca* (Hölzel, 1965) was caught near the Lake of Lokve, in the midst of the Velika Kapela massif, on the slope of a saddle for the road M 12, at more than 500 m up. Collections were done within the tree canopy vegetation on an open glade in a zone covered by both deciduous and coniferous trees.

Amongst the seven *Nineta* Navás, 1912 known in Europe, only *N. flava* (Scopoli, 1763) was already registered in Croatia. *Nineta carinthiaca* is thus new to the fauna

**Table II** – Green lacewing species and numbers of specimens collected in Croatia.

| Sites of capture                                   | 1        | 2         | 3         | 4         | 5         | 6         | 7         | 8        | 9        | 10        | Total      |
|--|----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|-----------|------------|
| <i>Italochrysa italica</i> (Rossi, 1790)           |          | 1         |           | 1         | 1         |           |           |          |          |           | 3          |
| <i>Nineta carinthiaca</i> (Hölzel, 1965)           |          |           |           |           |           |           |           | 2        |          |           | 2          |
| <i>Pseudomallada flavifrons</i> (Brauer, 1850)     |          | 3         |           |           |           |           |           |          |          | 2         | 5          |
| <i>Pseudomallada inornatus</i> (Navas, 1901)       |          |           |           |           |           |           |           |          | 1        |           | 1          |
| <i>Pseudomallada prasinus</i> (Burmeister, 1839)   |          | 19        | 3         |           | 6         | 8         | 4         |          |          | 52        | 92         |
| <i>Pseudomallada zelleri</i> (Schneider, 1851)     |          |           |           | 1         |           |           |           |          |          |           | 1          |
| <i>Pseudomallada ventralis</i> (Curtis, 1834)      |          |           |           |           |           |           |           |          |          | 7         | 7          |
| <i>Pseudomallada venustus</i> (Hölzel, 1974)       |          |           | 1         | 1         |           |           |           |          |          |           | 2          |
| <i>Pseudomallada clathratus</i> (Schneider, 1845)  |          |           |           |           |           |           |           |          |          | 1         | 1          |
| <i>Cunctochrysa albolineata</i> (Killington, 1935) |          |           |           |           |           |           |           |          |          | 2         | 2          |
| <i>Chrysoperla lucasina</i> (Lacroix, 1912)        | 5        | 7         | 9         | 12        | 3         | 3         | 4         |          | 3        | 6         | 52         |
| <i>Chrysoperla carnea</i> (Stephens, 1836) s.l.    |          | 4         | 11        |           | 1         | 3         | 5         |          |          | 9         | 33         |
| <b>Total</b>                                       | <b>5</b> | <b>34</b> | <b>24</b> | <b>15</b> | <b>11</b> | <b>14</b> | <b>13</b> | <b>2</b> | <b>4</b> | <b>79</b> | <b>201</b> |

of the country. It is a green lacewing everywhere considered rare because most often absent or casual in samples, considered endangered as in Slovenia (DEVETAK, 1992b).

It is of great size: its forewing measures 20 to 26 mm, the body is about 16-17 mm long. It is associated with *Fagus*, *Quercus* and other deciduous trees, on-wings in July and August, its life cycle is univoltine (ZELENY, 1984) overwintering probably as prepupae within the cocoon. It is easily separated from the other European *Nineta* species by means of the following characters:

1) from *vittata*: scape bulbous, more or less square, slightly longer than broad (*vs* cylindrical, narrow, at least twice longer than wide)

– axial extension of sternite 9 strongly curved forwards with a large brush (*vs* upturned or slightly curved, with small brush)

2) from *flava*, *gadarramensis* and *principiae*: anterior margin of the forewing straight or convex (*vs* concave, sinuous)

– cross veins of the costal space and gradates  $\pm$  black (*vs* green)

3) from *pallida*: Pseudomedian vein green (*vs* black)

– thorax green with a yellow axial stripe (*vs* lateral brown reddish marks)

– associated with deciduous trees (*vs* coniferous)

4) from *inpunctata*: longitudinal veins green (*vs* black)

– internal gradates' line parallel to Rs (*vs* converging with)

*Nineta carinthiaca* was first found in Carinthia, south Austria, in 1965. It was collected later successively in Anatolia (HÖLZEL, 1973), in Slovenia (SAURE, 1989), in the north eastern part of Hungary near the Ukrainian and Romanian frontier lines (SZIRÁKI, 1990 and *in lit.*), in the south eastern Switzerland (DUELLI *et al.*, 2006), at in farthest north east of Italy (LETARDI *et al.*, 2010), in the north eastern Czech Republic (Rymarov) by S. KREJCIK (web ref., 2011), and now in Croatia (Fig. 2).

The occurrence of *Nineta carinthiaca* in Croatia is not surprising if we consider its distribution as above mentioned, i.e. mainly in Central Europe and in the Anatolian



**Fig. 2** – Distribution of *Nineta carinthiaca* (round black spots) and *Pseudomallada venustus* (square red spots) in Europe.

district closest to Europe. Besides, it dwells also in the far east of Anatolia, near the Armenian border (ARI *et al.*, 2007), in Ukraine where precise locations were not indicated, and in numerous sites of Russia, as well the occidental part (ZAKHARENKO, unpubl. and *in lit.*) as far-eastern (MAKARKIN, 1985), in Kazakhstan, Korea and Japan. Nevertheless, Asian observations may be doubtful because of a possible confusion with another species previously described from Japan: *Nineta alpicola* (Kuwayama, 1956) (CANARD, 2004), proposed as synonym by TSUKAGUCHI (1995).

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### References

- Ari, I., Aktas, M. & Kiyak, S., 2007: Notes on the Chrysopidae (Neuroptera) fauna of Ardahan, Iğdir and Kars provinces of Turkey. – *Turkish Journal of Zoology*, 37: 201-208.
- Aspöck, H., Hölzel, H. & Aspöck, U., 2001: Kommentierter Katalog der Neuropterida (Insecta, Raphidioptera, Megaloptera, Neuroptera) der Westpaläarktis. – *Denisia*, 02: 1-206.



- Canard, M.**, 2001: Présence en Grèce continentale de *Chrysoperla carnea* (Stephens, 1836) sensu stricto (Neuroptera: Chrysopidae). – *Bulletin de la Société Entomologique de France*, 106: 416.
- Canard, M.**, 2004: World distribution of the genus *Nineta* Navás, 1912 (Neuroptera: Chrysopidae) with some taxonomic notes. – *Denisia*, 13: 153-161.
- Canard, M.**, 2007: Deux Chrysopes nouvelles pour la faune de Chypre: *Italochrysa italica* (Rossi, 1790) et *Cunctochrysa baetica* (Hölzel, 1972) (Neuroptera: Chrysopidae). – *Bulletin de la Société Entomologique de France*, 112: 406.
- Canard M. & Jacquemin, G.**, 2013: Présence de *Pseudomallada inornatus* (Navas) dans le nord-est de la France (Neuroptera, Chrysopidae). – *Bulletin de la Société Entomologique de France*, **118** (4): 489-492.
- Devetak, D.**, 1984: Megaloptera, Raphidioptera and Planipennia in Slovenia (Yugoslavia). Faunistical contribution. *Neuroptera International*, **3**: 55-72.
- Devetak, D.**, 1992a: Megaloptera, Raphidioptera and Planipennia (Neuropteroidea, Insecta) of Croatia. – *Znanstvena Revija*, 4(1): 89-114.
- Devetak, D.**, 1992b: Rdeči seznam ogroženih mrežekrilcev (Neuroptera s.l.) v Sloveniji. The Red List of endangered Neuroptera s.l. in Slovenia. – *Varstvo Narave* (Ljubljana), 17: 111-115.
- Devetak, D.**, 1992c: Present knowledge of the Megaloptera, Raphidioptera and Neuroptera of Yugoslavia (Insecta: Neuropteroidea). – In: Canard, M., Aspöck, H., Mansell, M.W. (eds): Current Research in Neuropterology. Proceedings of the Fourth International Symposium on Neuropterology, Bagnères-de-Luchon, France, 1991, Toulouse, France: 107-118.
- Devetak, D.**, 1998: Neuroptera in different habitats in Istria and Quarnero (NW Balkan). – *Acta Zoologica Fennica*, **209**: 95-98.
- Duelli, P., Moretti, M., Tonola, D. & Barbalat, S.**, 2006: Scented traps yield two large lacewing species (Neuroptera: Chrysopidae) new to Switzerland. – *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 79: 25-28.
- Hölzel, H.**, 1973: Die Netzflüger Kärntens. 1. Nachtrag. – *Carinthia II, Mitteilungen des Naturwissenschaftlichen Vereines für Karnten*, 83: 497-506.
- Hölzel, H.**, 1974: Zwei neue Chrysopiden-Arten aus Südwesteuropa (Planipennia: Chrysopidae). – *Entomologische Zeitschrift* (Stuttgart), 84: 257-260.
- Iori, A., Kathirithamby, J., Letardi, A., Pantaleoni, R.A. & Principi, M.M.**, 1995 : Neuropteroidea (Megaloptera, Raphidioptera, Planipennia), Mecoptera, Siphonaptera, Strepsiptera. In: Minelli A., Ruffo S. & La Posta (Eds), *Checklist delle Specie della Fauna Italiana*, **62**: 1-20. Bologna, Italy : Calderini.
- Krejčík, S.**, web ref. [<http://meloidae.com/en/pictures/27834/>]
- Letardi, A., Nicoli Aldini, R. & Pantaleoni, R.A.**, 2010: The Neuropterida of Triveneto (northern Italy): an updated faunal checklist with some zoogeographical remarks. – In: Devetak D., Lipovšek S., Arnett A.E. (eds): Proceedings of the Tenth International Symposium on Neuropterology. Piran, Slovenia, 2008. Maribor, Slovenia: 181-189.
- Letardi, A., Thierry, D., Tillier, P. & Canard, M.**, 2008: Mise à jour de la faune des Neuropterida de Corse (Raphidioptera & Neuroptera). – *Revue de l'Association Roussillonnaise d'Entomologie*, 17 (3): 95-105.

- Makarkin, V.N.**, 1985: New and little known Chrysopidae from Far-East. – *In*: Ler, P.A., Storozhenko, S.Y. (eds): Arthropod Taxonomy and Ecology in the Far-East, Far-East Centre, USSR Acad. Sci. Publ., Vladivostok, 48-52.
- Monserat, V.J.**, 1985: Contribucion al conocimiento de los Neuropteros de Lugo (Neuroptera, Planipennia). *Trabajos Compostelanos de Biologia*, **12**: 87-98.
- Nicoli Aldini, R., Letardi, A. & Pantaleoni, R.**, 2012: State of the art of Neuropterida of Sicily and Malta. – *Biodiversity Journal*, 3 (4): 445-458.
- Pantaleoni R., Lo Valvo F.**, 1995: Neuroptera. – *In*: Massa B. (ed.): Arthropoda di Lampedusa, Linosa e Pantelleria (Canale di Sicilia, Mar Mediterraneo). – *Il Naturalista Siciliano*, 19 (Suppl.): 351-356.
- Saure, Ch.**, 1989: Beitrage zur Kenntnis der Neuropterenfauna Jugoslawiens und Griechenlands (Insecta: Planipennia). – *Entomofauna. Zeitschrift für Entomologie*, 10: 33-41.
- Sziráki, G.**, 1990: A survey of Neuropteroidea of the nature conservation areas of Bátorliget. – *In*: The Bátorliget Nature Reserves — After Forty Years, 1990: 369-373.
- Tsukaguchi, S.**, 1995: Chrysopidae of Japan (Insecta: Neuroptera). Y. Instasu Publ., Osaka, Japan: 1-223.
- Tillier, P.**, 2008: Présence de *Dichochrysa venusta* (Hölzel, 1974) en Haute Balagne: nouvelle espèce pour la Corse et deuxième donnée pour la France (Neuroptera: Chrysopidae). – *L'Entomologiste*, 64 (4): 253-254.
- Tröger, E.J.**, 1990: Drei interessante Florfliegen (Neuropteroidea, Planipennia, Chrysopidae) aus der Oberrheingebiet. *Mitteilungen des Badischen Landesvereins für Naturkunde und Naturschutz*, **15**: 101-107.
- Zakharenko, A.V. & Krivokhatsky, V.A.** 1993: Neuroptera from the European part of the former USSR. – *Izvestiya of the Kharkov Entomological Society*, **1** (2): 34-83 [bilingual version Russian/English].
- Zeleny, J.**, 1984: Chrysopid occurrence in western Palaearctic temperate forests and derived biotopes. – *In*: Canard, M., Séméria, Y., New, T.R. (eds): Biology of Chrysopidae, Series Entomologica, 27: 151-160. Dr W. Junk Publ., The Hague, The Netherlands.

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