Notes on the Chrysopidae (Neuroptera) Fauna of Ardahan, Iğdır and Kars Provinces of Turkey

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Abstract: This study was based on 558 specimens belonging to 23 species of 10 genera of Chrysopidae of the order Neuroptera. These specimens were collected from Ardahan, Iğdır and Kars provinces between 2001 and 2003. Among the species, Dichochrysa ventralis Curtis, 1834 is a new record for the Turkish Neuroptera fauna. The distribution of each species, worldwide and in Turkey, is also presented.

Key Words: Neuroptera, Chrysopidae, fauna, Turkey

Introduction

The Chrysopidae is one of the largest and economically most important families of the Neuroptera. The family includes over 1200 currently recognised species and subspecies that are divided between 86 genera and subgenera. The larvae of all species and adults of a few genera are predaceous and most feed on aphids, coccids and other soft-bodied insects they encounter on foliage. For this reason, some species have been reared and successfully used for the biological control of agricultural pests (Brooks and Barnard, 1990).

The Chrysopidae fauna of Turkey has not yet been completed and requires further detailed study. To reach this goal, regional field studies should be carried out in every part of Turkey, yet have hitherto been conducted only in the western parts of the country; the eastern parts of Turkey have rarely been studied (Hözel, 1967a, 1967b; Gepp, 1974; Şengonca, 1979, 1980, 1981; Aspöck et al., 1980, 2001).

The north-east region of Turkey was chosen for the present study of the Neuroptera fauna and to the best of our knowledge there are no previous studies of the Chrysopidae fauna in this region. The study area consists of various ecosystems, such as forest, steppe vegetation, culture plants and marshes. Mediterranean and terrestrial climate prevails in the area of study. The topographic structure of the region is quite heterogeneous. The present study aimed to identify the Chrysopidae fauna of Ardahan, Iğdır and Kars provinces.

Materials and Methods

In total, 558 specimens were collected using a net trap and a light trap (a projector with white light) in Ardahan, Iğdır and Kars provinces between April and September of 2001-2003. After specimens were captured, they were killed in jars with ethyl acetate, kept in paper envelopes and brought to the laboratory. They were relaxed in boxes with water vapour and then spread
out. Each specimen was examined and were then labelled and put in boxes as entomological museum materials, according to Borror et al. (1992) and Kıyak (2000). Hölzel (1965, 1967b, 1978), Aspöck et al. (1980), Duelli (1996), and Şengonca (1980) were followed to identify the specimens. All the specimens are stored in the Zoological Museum of the Faculty of Science and Letters at Gazi University, Ankara, Turkey.

**Results**

Chrysopidae Schneider, 1851

Chrysopinae Schneider, 1851

Italochrysa italica (Rossi, 1770)

**Materials examined:** İğdır (Karakoyunlu), 860 m, 29.8.2003, 1v; (Aralık), 810 m, 1.9.2003, 1d; (Kübük), 895 m, 2.9.2003, 1d; (side of İğdır-Ağrı road), 1070 m, 3.9.2003, 3v, total: 6 specimens.


General Distribution: Austria, Belgium, Bulgaria, Algeria, Czechoslovakia, Denmark, Morocco, Finland, France, Holland, England, Iran, Ireland, Israel, Sweden, Switzerland, Spain, Italy, Cyprus, Lebanon, Libya, Luxembourg, Hungary, Malta, Egypt, Norway, Poland, Portugal, Romania, Russia, Syria, Tunisia, Turkey, Yugoslavia and Greece (Brauer, 1876; Hölzel, 1966; Aspöck et al., 1980, 1996;

202
Alrouechdi, 1984; Santas, 1984; Dinkins et al., 1994; Paulin, 2002; Popov, 2002b).

*Chrysopa dorsalis* Burmeister, 1839

**Materials examined:** Ardahan (Çamlıçatak). 1900 m, 28.7.2001, 2♀; Gölê (Karnacadüzü), 2005 m, 30.7.2001, 1♀, 1♂; (the side of Ardahan-Gölê road). 1850-1900 m, 1.8.2001, 1♀, 2♂; (Hanak), 1950-2000 m, 2.8.2001, 3♀; Posof (Asmakonak), 1550-1600 m, 6.8.2001, 2♀, 2♂; Posof (Çamyazi), 1600-1650 m, 10.8.2001, 1♀, 2♂; (Gölê, near Değirmendere). 1590 m, 21.7.2003, 1♀; (Çamlıçatak), 1865 m, 19.8.2003, 1♂; Gölê (Budaklı), 2005 m, 4.8.2002, 1♀; Çıldır (Beyrehatun), 1900 m, 6.8.2002, 1♀; *Kars* (Sankamış), 2050-2100 m, 23.7.2002, 4♀, 3♂; Sankamış (Meskitli), 1615 m, 28.7.2002, 1♂; Sankamış (Meskitli), 1575-1700 m, 20.8.2002, 5♂, 3♀, total: 39 specimens.


**General Distribution:** Austria, Germany, Belgium, Bulgaria, Czechoslovakia, Denmark, Finland, France, Georgia, Croatia, Holland, England, Spain, Israel, Switzerland, Italy, Liechtenstein, Luxembourg, Hungary, Norway, Poland, Romania, Russia, Slovenia, Turkey, Ukraine, Yugoslavia and Greece (Brauer, 1876; Aspák et al., 2001).

*Chrysopa perla* (Linnaeus, 1758)

**Materials examined:** Ardahan (Posof gendarmerie station). 1532 m, 5.8.2001, 1♀; Posof (Yeniköy), 1465 m, 6.8.2001, 1♀; Posof (Asmakonak), 1650 m, 8.8.2001, 1♂; Posof (Çamyazi), 1510-1890 m, 28.7.2002, 9♀, 4♂; Posof (Eminbey), 1440 m, 30.7.2002, 1♀; Gölê (Budaklı), 2010 m, 4.8.2002, 1♀; (vicinity of Gölê), 21.7.2003, 1♀, 1575 m, total: 19 specimens.

Distribution in Turkey: Ankara, Istanbul, Muğla and central and northern Anatolia (Schneider, 1845; Aspök et al., 1980, 1996; Santas, 1984).

**General Distribution:** Germany, Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, Finland, France, Georgia, Croatia, Holland, England, Spain, Israel, Switzerland, Italy, Liechtenstein, Luxembourg, Hungary, Norway, Poland, Romania, Russia, Slovenia, Turkey, Ukraine, Yugoslavia and Greece (Brauer, 1876; Aspök et al., 2001).

*Chrysopa astarte* Hölzel, 1967

**Materials examined:** Ardahan (Posof gendarmerie station). 1520 m, 6.8.2001, 1♀; (Gölê, near Değirmendere), 1580 m, 3.8.2002, 1♂; (Gölê, near Değirmendere), 1575-1605 m, 21.7.2003, 2♀, 1♂, total: 5 specimens.


*Chrysopa curdica* Hölzel, 1967

**Materials examined:** Kars (Sankamış), 2080 m, 23.7.2002, 1♂; (the bank of Kars Stream). 1760 m, 22.6.2002, 1♀, total: 2 specimens.


**General Distribution:** Afghanistan, Iran and Pakistan (Hölzel, 1967a; Aspök et al., 2001).

*Chrysopa walkeri* (McLachlan, 1893)

**Materials examined:** Ardahan (Posof), 1520 m, 6.8.2001, 1♀; (Gölê, near Değirmendere), 1580 m, 3.8.2002, 1♂; (Gölê, near Değirmendere), 1575-1605 m, 21.7.2003, 2♀, 1♂, total: 5 specimens.

Chrysopa abbreviata Curtis, 1834

Materials examined: Kars (Sarıkamış-Topyazı), 1950 m, 25.7.2002, 1♀, 1♂, total: 2 specimens.

Distribution in Turkey: Muğla-Patara (Schneider, 1845).

Chrysopa pallens (Rambur, 1838)

Materials examined: Iğdır (Karakoynulu), 860 m, 29.8.2003, 1♂; (Kullük), 895 m, 2.9.2003, 3♀♀, 1♂; (side of Iğdır-Ağrı road), 1070 m, 3.9.2003, 2♀♀ (Karakoynulu), 860 m, 4.9.2003, 1♀, 1♂, total: 9 specimens.


Cunctochrysa albolineata (Killington, 1935)

Materials examined: Ardahan (Hanak), 1950 m, 2.8.2001, 1♂; Posof (Çamyazı), 1615 m, 28.7.2002, 1♂; Iğdır (Anadolu-Yenidoğan), 970 m, 19.8.2001, 1♂; Kars (Sarıkamış-Mescitli), 1555 m, 20.8.2002, 2♀♀, 1♂, total: 6 specimens.

Distribution in Turkey: Central and south Anatolia (Şengonca, 1981).

Dichochrysa ventralis Curtis, 1834

Materials examined: Ardahan (Posof-Asmakonak), 1460 m, 7.8.2001, 2♀♀; Posof (Asmakonak), 1453 m, 8.8.2001, 1♂; Posof (Çamyazı), 1642-1842 m, 28.7.2002, 2♀♀, 1♂, total 6: specimens.

Distribution in Turkey: This species is new to the Turkish Chrysopidae fauna.

Dichochrysa subflavifrons (Tjeder, 1949)

Materials examined: Kars (Sankamış), 2050 m, 10.7.2001, 1♂; (Sankamış), 2075 m, 13.8.2001, 2♀♀; Ardahan (Göle), 2035 m, 30.7.2001, 2♀♀; (Center).
Materials examined: Kars (Sanikamşi), 2075 m, 13.8.2001, 19; Kağızman (Kötek), 1410 m, 11.8.2002, 2; Ardahan (Göl, near Değirmenlidere), 1590 m, 3.8.2002, 19; total: 4 specimens.


General Distribution: Albania, Austria, Belgium, Bulgaria, Algeria, Czechoslovakia, Morocco, Finland, France, Holland, England, Iran, Israel, Switzerland, Sweden, Italy, Ireland, Spain, Cyprus, Lebanon, Luxemburg, Hungary, Malta, Mongolia, Norway, Portugal, Romania, Siberia, Tunisia, Yugoslavia and Greece (Brauer, 1876; Aspóck et al., 1980, 1996; Mirmoayedi, 2002).

Dichochrysa zelleri (Schneider, 1851)

Materials examined: Kars, 1760-1780 m, 20.7.2001, 3; Kağızman (Pasil), 1655 m, 3.7.2002, 19; Ardahan (Çamlıça), 1860 m, 28.7.2001, 299, 19; (Posos), 1540 m, 1460 m, 5.8.2001, 1; (Posos), 1450 m, 7.8.2001, 299, 19; total: 16 specimens.


General Distribution: Afghanistan, Germany, Austria, Bulgaria, Algeria, Czechoslovakia, France, South Russia, Holland, England, Iran, Spain, Sweden, Switzerland, Italy, Japan, Luxemburg, Hungary, Norway, Poland, Portugal, Romania, Siberia, Turkey, Yugoslavia and Greece (Brauer, 1876; Aspóck et al., 1980, 1996; Alrouechdi, 1984; Santos, 1984; Paulin, 2002; Popov, 2002b).

Dichochrysa venosa (Rambur, 1842)

Materials examined: Ardahan, 10.7.2001, 299, 3; Kağızman, 1250 m, 14.7.2001, 19; (Center), 1775 m, 20.7.2001, 19; (Sanikamşi), 2025 m, 13.8.2001, 3; (Center), 1760 m, 22.6.2002, 19, 1; Kağızman (Kötek), 1410 m, 11.8.2002, 19; Ardahan (Çamlıça), 1860-1950 m, 28.7.2001, 399, 4; (Center), 1800 m, 29.7.2001, 19, 1; (Göl), 2005 m, 2030 m, 30.7.2001, 499, 19; (side of Ardahan-Göl road), 2005-2100 m, 1.8.2001, 1199, 5; (Hanak), 1950-2050 m, 2.8.2001, 599, 19; (Posos), 1540 m, 5.8.2001, 19; (Posos) (Yeniköy), 1510-1650 m, 6.8.2001, 599, 19; (Posos) (Asmakonak), 1540-1600 m, 7.8.2001, 899, 299; (the high plateau of Posos), 1850-1950 m, 9.8.2001, 299, 19; (Posos), 1450-1550 m, 10.8.2001, 299, 19; (Posos) (Çamyazı), 1585-1610 m, 28.7.2002, 699, 8; (Posos) (Eminey), 1445-1500 m, 30.7.2002, 399, 19; (Damlı) (Soğutören), 2200 m, 1.8.2002, 19; (Göl), 1660 m, 3.8.2002, 399; (Göl) (Budakli), 1900 m, 4.8.2002, 19; Çıldır (Beyrehatun), 1900-1950 m, 6.8.2002, 499, 4; (Göl), 1520-1600 m, 21.7.2003, 699, 19; (Posos) (Sergi), 1410-1450 m, 26.7.2003, 19, 19; (Çıldır) (Kurtkale), 1950-2000 m, 21.8.2003, 599; İğdır (Araklı-Yenidoan), 900 m, 19.8.2001, 19; total: 117 specimens.

Distribution in Turkey: Antalya, Antakya, Aydın, Batman, Çanakkale, Denizli, Diyarbakır, Edirne, Hakkari, Isparta, Kahramanmaraş, Kırşehir, Mardin, Mersin, Muğla, Samsun, Siirt, Şanlıurfa and Şırnak (Hölzel, 1967a; Gepp, 1974; Aspóck et al., 1980; Arı and Kıyak, 2000; Canbulat and Özbaş, 2004; Canbulat and Kıyak, 2005).

General Distribution: Afghanistan, Germany, Austria, Bulgaria, Algeria, Czechoslovakia, France, South Russia, Holland, England, Iran, Spain, Sweden, Switzerland, Italy, Japan, Luxemburg, Hungary, Norway, Poland, Portugal, Romania, Siberia, Turkey, Yugoslavia and Greece (Brauer, 1876; Aspóck et al., 1980, 1996; Alrouechdi, 1984; Santos, 1984; Paulin, 2002; Popov, 2002b).

Dichochrysa prasina (Burmeister, 1839)
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General Distribution: Afghanistan, Algeria, Morocco, southern Anatolia, southern France, southern Russia, Spain, Israel, Iran, Lebanon, Egypt, Mongolia, Pakistan, Portugal, Sudan, Saudi Arabia, Tunisia, Oman and Yemen (Brauer, 1876; Aspöck et al., 1980, 1996, 2001).

**Nineta pallida** (Schneider, 1846)

**Materials examined:** Ardahan (Posof-Asmakonak), 1525-1535 m, 6.8.2001, 7♀, 2♂; total: 9 specimens.

Distribution in Turkey: South-western Anatolia (Canbulat and Kıyak, 2002).

General Distribution: Austria, Germany, Czechoslovakia, Sweden, Italy, Finland, France, Hungary, Poland, Romania, Slovenia, Ukraine and Yugoslavia (Brauer, 1876; Aspöck et al., 1980, 2001).

**Nineta carinthiaca** (Hölzel, 1965)

**Materials examined:** Ardahan (Çıldır), 2525 m, 4.8.2001, 1♀; (Göle, near the Göle-Erzurum border), 1605 m, 3.8.2002, 1♀; (Göle, near Değirmenlidere), 1605 m, 21.7.2003, 3♀; total: 5 specimens.


General Distribution: Austria, Hungary, Slovenia and Turkey (Aspöck et al., 1980, 2001).

**Peyerimhoffina gracilis** (Schneider, 1851)

**Materials examined:** Ardahan (bank of Posof Stream), 1530 m, 6.8.2001, 2♀, 1♂; (Posof - Yeninköy), 1400 m, 26.7.2003, 3♀; total: 6 specimens.

Distribution in Turkey: Antalya, Isparta and north-western Anatolia (Aspöck et al., 1980; Canbulat and Kıyak, 2005).

General Distribution: Austria, Germany, Bosnia and Herzegovina, Algeria, Czechoslovakia, Morocco, Finland, France, Holland, Spain, Switzerland, Italy, Caucasia, Hungary, Macedonia, Moldova, Poland, Romania, Slovenia, Yugoslavia and Greece (Brauer, 1876; Aspöck et al., 1980, 2001; Santos, 1984).

**Suarius nanus** (McLachlan, 1839)

**Materials examined:** Kars (Sarkamış-Mescitli), 1670 m, 20.8.2002, 1♀; Iğdır (Karakoynulu), 860 m, 4.9.2003, 2♀; total: 3 specimens.


General Distribution: Afghanistan, Anatolia, Algeria, Iraq, Iran, Cyprus, Kyrgyzstan, Lebanon, Macedonia, Pakistan and Greece (Hölzel, 1966; Aspöck et al., 1980, 2001).

**Discussion**

At the study’s conclusion, it was determined that all the specimens belonged to 23 species of 10 genera of Chrysopidae. *Brinckochrysa* Tjeder, 1966 (n = 1), *Chrysoperla* Steinmann, 1964 (n = 282), *Chrysopa* Leach in Brewster, 1815 (n = 74), *Chrysotropia* Navas, 1911 (n = 9), *Cunctochrysa* Hölzel, 1970 (n = 6), *Dichocharisa* Yang, 1991 (n = 157), *Italochrysa* Principi, 1946 (n = 6), *Nineta* Navas, 1912 (n = 14), *Peyerimhoffina* Lacroix, 1920 (n = 6) and *Suarius* Navas, 1914 (N = 4) are presented in this work.

All species identified in this study are new records for the collection site. *Dichocharisa ventralis* Curtis, 1834 is new to the Turkish Chrysopidae fauna, but *Nineta pallida* (Schneider, 1846), *Chrysopa abbreviata* Curtis, 1834 and *Chrysopa curdica* Hölzel, 1967 are second records for the Turkish Chrysopidae fauna. *Nineta pallida* (Schneider, 1846) was recorded from south-western Turkey (Canbulat and Kıyak, 2002). With this study, its distribution range has been extended to the north-east part of Turkey. *Chrysopa abbreviata* was first recorded from Pataara, a district of Muğla, 160 years ago (Schneider, 1845), but it was also found in Posof, a district of Ardahan, as a second record for the Turkish neuropteran fauna. *Chrysopa curdica* Hölzel, 1967 was described and recorded from Van (Hölzel, 1967b) and its distribution range has been expanded to include Kars in this study.

Of the 23 species, 12 have a larger distribution range and they are found in 3 phytogeographical regions. Of the 23 species, 7 are present in 2 different phytogeographical regions (Table). *Chrysopa astarte* Hölzel, 1967, *C. curdica* Hölzel, 1967, *Dichocharisa subflavifrons* (Tjeder, 1949) and *Nineta carinthiaca* (Hölzel, 1965) are confined to one region. *Chrysopa astarte* Hölzel, 1967 and *C. curdica* Hölzel, 1967 are present in the Irano-Turanian region, *Dichocharisa subflavifrons* (Tjeder, 1949) was found in the Mediterranean region and the distribution of *Nineta carinthiaca* (Hölzel, 1965) is limited to the European-Siberian region (Table). The most unexpected result was related to *Dichocharisa subflavifrons* (Tjeder, 1949), with a distribution previously limited to the
Mediterranean region; it was determined in this study that this species exists in north-east Anatolia. Specimens belonging to *Chrysotropia ciliata* (Wesmael, 1841), *Italochrysa italica* (Rossi, 1970), *Brinckochrysa amseli* (Hölzel, 1967) and *Suarius nanus* (McLachlan, 1839) were caught by light trap.

*Dichochrysa ventralis* Curtis, 1834 is similar to the species *Dichochrysa prasina* (Burmeister, 1839). The main diagnostic character of *D. ventralis* Curtis, 1834 is that all sternites of the abdomen are black; thus it makes

*Dichochrysa ventralis* Curtis, 1834 different from *D. prasina* (Burmeister, 1839).

The Turkish Chrysopidae fauna was previously represented by 47 species and 1 subspecies (Hölzel, 1967a, 1967b; Arı and Kıyak, 2000; Aspöck et al. 2001; Onar and Aktaş, 2002; Canbulat and Kıyak, 2002, 2003, 2004, 2005). With this study, however, the number of species of Chrysopidae in Turkey has increased to 48 species and 1 subspecies.

**References**

