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**The distribution of *Chrysoperla mutata* (MCLACHLAN 1898)
and *Chrysoperla pudica* (NAVÁS 1914)
(Neuroptera: Chrysopidae)**

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Abstract

The distribution of *Chrysoperla mutata* and of *Chrysoperla pudica* are given, together with some bioecological and geographical remarks. The occurrence of *Ch. mutata* in Europe is pointed out and validated, showing that this species is possibly more frequent than appearing until now.

Key words: Neuroptera, Chrysopidae, *Chrysoperla*, *Ch. mutata*, *Ch. pudica*, European fauna.

Zusammenfassung

Über die Verbreitung sowie bioökologische und geografische Gegebenheiten von *Chrysoperla mutata* and of *Chrysoperla pudica* wird berichtet. Die Verbreitung von *Ch. mutata* in Europa zeigt, dass diese Art möglicherweise häufiger ist als bisher angenommen.

Introduction

The genus *Chrysoperla* STEINMANN 1964 includes about forty species as recorded by BROOKS (1994) who nevertheless did not take in consideration the Chinese species. Their distribution is mainly holarctic. In the Palaearctics, three species constitute a particular group. In addition to the numerous gonosetae they bear on male genitalia, (1) they have a gonarcus arch broad with large, reniform plates and small entoprocessus and their acumen is swollen apically; (2) they show complex spinellae formed from five or more spines on each tubercle; (3) the transverse nerves in the forewing are blackened, especially the gradates. Two species, *Chrysoperla mutata* (MCLACHLAN 1898) and *Ch. pudica* (NAVÁS 1914) are widespread whereas the third, *Chrysoperla nigrinervis* BROOKS 1994, closely related to *Ch. pudica*, is localised and endemic to the Canary Islands.

Distribution of *Chrysoperla mutata*

Chrysoperla mutata is a thermophilous and xerophilous green lacewing of palaeartic origine (MONSERRAT & RODRIGO 1992). It spreads into a large Afro-Asian latitudinal zone, north of the Tropic of Cancer up to 40 °N and longitudinally between 25 °W and 75 °E of Greenwich. The countries in which the species occurs are (Fig. 1):¹

- in Africa: Mauritania (MR), Morocco (MA) (MONSERRAT et al. 1990), Algeria (DZ) including a part of the southern territories, Tunisia (TN), Libya (LY), Egypt (EG), Sudan (SD) (OHM & HÖLZEL 1992)
- in Mediterranean Asia: Anatolia (TR), Cyprus (CY) (ASPÖCK et al. 2001), Israel Palestine (PS) (BODENHEIMER 1937), Israel (IL) as *Chrysopa expurgata* TJEDER 1949, and Jordan (JO)
- Saudi Arabia (SA), United Arab Emirates (AE), Kuwait (KW)
- in Middle East: Iraq (IQ) (HÖLZEL 1967), Iran (IR), as well in the northern districts: Rasht; Mazandaran (GAHARI et al. 2010) as in the southern ones: Khuzestan (SHARIFIFARD & MOSADEGH 2006)
- and eastward in Asia: western Pakistan (PK) (Baluchistan) and the most north-western districts of India (IN) (Pendjab, Rajasthan).
- In Europe, rare collections were pointed out (see below).

Chrysoperla mutata in Europe

The first encounter with *Ch. mutata* in Europe was realized from a single exemplar collected on September 14th 1976 in a McPhail trap hung on olive trees of Aguistri island in Saroniki gulf, Greece (GR) (CANARD & LAUDÉHO 1977). Later five males were caught at light on July 22-24th 1983 at Chios island, a Greek Aegean island (CANARD 2003). One may note that these specimens were labelled as "European" only because of the

(¹) The names of the countries in which the species occur are followed by the standard number of the Codes ISO 3166 in parentheses.

freakish drawing of the frontier with the Turkish territories with respect of the biogeographical status of the island: the site of collection (Cambos plain) is distant of only few kilometers from the Ionian coast. Some rare specimens were identified later in baited traps in Crete, near Heraklion (RODITAKIS unpubl.). Further handnetted collections were made on the southern part of the island on September 2002 in olive groves, providing a more significant number of *Ch. mutata*. That bears out an actual implantation of this species in an east-Mediterranean island.

Besides, a male of *Ch. mutata* was found in the western part of the Mediterranean basin, at Jaen (Spain ES), on August 14th 1991. That was the first collection in continental and occidental Europe (MONSERRAT & RODRIGO 1992). Later, two other specimens were identified among the big sample of 14,748 green lacewings analysed for vegetal substrate specificity, on *Eucalyptus globulus* and *Quercus rotundifolia*, respectively (MONSERRAT & MARÍN 1994).

It appears so that *Ch. mutata* is able to invade and to live in the Mediterranean zone. But, due to the difficulty in identifying the Common green lacewings, it is possible that this species is more frequent but not recognized in other similar sites as Sicily and Malta islands, both near by the Maghribin coasts.

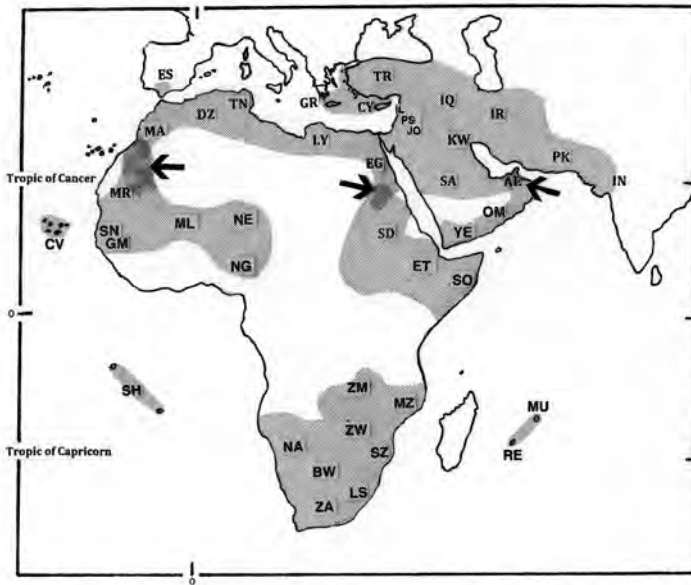


Fig. 1: Distribution of *Chrysoperla mutata* and *Chrysoperla pudica*.

Distribution of *Chrysoperla pudica*

Chrysoperla pudica is a green lacewing of Afrotropical origine, occurring in the savannah areas of the two sides of the median lowland rainforest but not in the central sahelian region (Fig. 1) (HÖLZEL & OHM 2002). The countries in which it was found are:

- in the south hemisphere
- the whole southern Africa excepted the eastern coast: Republic of South Africa (ZA), Lesotho (LS), Swaziland (SZ), Namibia (NA), Botswana (BW), Zimbabwe (ZW) (TJEDER 1966), Mozambique (MZ), Zambia (ZM) (BROOKS 1994)
- in the Atlantic islands of St Helena and Ascension (SH) (RÖHRICHT 1998) and in the Mascarene islands: Mauritius (MU) (BROOKS 1994) and La Réunion (RE) (OHM & HÖLZEL 1997; OHM 2003) as *Hemerobius brevicollis* RAMBUR 1842 if we follow the synonymy established by BROOKS
- in the north hemisphere: the sahelian zone from Senegal (SN) to Niger (NE), Nigeria (NG) as *Chrysopa nigriciana* NAVÁS 1931 and Mali (ML), Koulikoro district, as *Chrysoperla incongrua* (NAVAS 1914) (BROOKS 1994), Senegal and Gambia (GM) (HÖLZEL et al. 1994), Mauritania, Cape Verde Islands (CV), Marocco (OHM & HÖLZEL 1982)
- in eastern Africa: Somalia (SO) (HÖLZE & OHM 1991), Ethiopia (ET) (HÖLZEL et al. 1999) and Sudan (OHM & HÖLZEL 1982, 1992)
- besides, by an Asian inroad to southern Arabic peninsula: Oman (OM) and Yemen (YE) (HÖLZEL 1998), Arabic Emirates.

Bioecological and biogeographical remarks

As many green lacewings do, the two above mentioned *Chrysoperla* prey on various softbodied arthropods during larval development and eat pollens and sugar juices as adults. Rearings in laboratory conditions attested to these diets, see e.g. with the aphid *Hyalopterus pruni* (GEOFFROY 1762) and/or the mealybug *Nipaecoccus vastator* (MASKELL 1895) (ABID et al. 1985), various aphids (SHARIFIFARD & MOSADEGH 2006) for *Ch. mutata*, aphids and eggs of the bollworm moth *Heliothis armigera* (HÜBNER 1809) for *Ch. pudica* (BRETTELL 1982).

In the field, *Chrysoperla mutata* was most often collected at light, in the deserts or oasis of lowlands of the Saharo-Arabian regions. It feeds on the dubas planthopper *Ommatissus libycus* DE BERGEVIN 1930 (Tropiduchidae) which is a serious sucking pest on date palm trees. That is a biocontrol agent of this planthopper in Iran and Iraq (e.g. HAMAD & AL-RAWY 2009) considered of significant value. It was also collected in paddy fields in Iran (GAHARI et al. 2010). It is a predator of spider mites such as a stawberry mite *Tetranychus turkestanii* (UGAROV & NIKOLSKI 1937) (ZHANG 2003), It is sometimes dominant on bitter orange trees in the Arabic Emirates.

In the field, *Chrysoperla pudica* is considered an arboreal fauna element living most often in dry and stony countries with sparse vegetation, on *Acacia*, similar trees and bushes. However, its eurytopy allows it to colonize crops like cotton fields in Zimbabwe (BRETTELL 1982), *Citrus* groves harbouring aphids and vines infested with mealy bugs. It was a common garden insect in Pretoria (TJEDER 1966).

The seasonal development of *Ch. pudica* is of tropical type and so that it breeds continuously (CANARD & PRINCIPI 1984). It occurs all around the year, except in Sudan where it disappeared from the middle of October to the beginning of February, i.e. during the relatively colder period (OHM & HÖLZEL 1992), The seasonal adaptations of

Ch. mutata are unknown, but it was expected to overwinter in adults as do the Common green lacewings (CANARD 2005) or to be diapauseless in Crete like *Chrysoperla lucasina* (LACROIX 1912) (THIERRY et al. 2004).

The two closely related *Chrysoperla* live both together (arrows in the Fig. 1): – (1) in the Waldi Halfa district of Sudan near the northern border of the country, crossing from north (*Ch. mutata*) and south (*Ch. pudica*) along the Nile valley; – (2) in the Arabic Emirates; – (3) another possible overlapping spot may be the Atlantic basin of the range in Mauritania and Morocco, although these observations need corroboration.

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