

What is the true position of *Chrysoperla nanceiensis* SÉMÉRIA, 1980 in the common green lacewings' complex?

(Neuropterida: Chrysopidae)

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Abstract

The taxon *nanceiensis* was described summarily on the basis of green lacewings collected in Lorraine and assigned to a sub-species in the complex of the Common green lacewings (*Chrysoperla carnea* (STEPHENS, 1836)). The recent discovery of specimens from the original series allowed us to describe several characteristics that are typical of the basic morphology of *Chrysoperla affinis* (STEPHENS, 1836) (Cc4 in the song-species system) of which it therefore becomes a new synonym (**syn. nov.**). A tentative explanation is provided for its curious cephalic ornamentation.

Introduction

Yves SÉMÉRIA (1980) described a new morph of a green lacewing that he assigned to *Chrysoperla carnea* (STEPHENS, 1836) sensu lato, without providing further information on any possible affinity with any of the sibling species constituting the *Chrysoperla carnea* complex. For detailed information on the nomenclature and synonymies within the group, see CANARD & THIERRY (2007). The descriptor gave the new morph a sub-specific status as *Ch. carnea nanceiensis*, after the city of Nancy (F-54, Meurthe-et-Moselle Department) where the specimens were found. This taxon was later synonymized with *Ch. carnea* sensu lato by LERAUT (1991), was re-instated as a valid species by SÉMÉRIA (1992), and synonymized again by BROOKS (1994). This green lacewing remains enigmatic, however; to the best of our knowledge, it has never been collected in the field and the expectation was that it would be strictly localized in northeastern France („*région Grand-Est*“) in the neighborhood of Nancy. Despite its formal description in a scientific journal, neither a type nor paratypes have been deposited by the author-descriptor in any public institution as far as may be determined.

Material and methods

After a long and tedious search, we found several specimens of the original series though, unfortunately, many of them are in a poor state of conservation. We could nevertheless observe details that complete the general outline of the present population. The 23 specimens were stored in alcohol, labelled „*Chrysoperla nanceiensis* Séméria (Nancy) 1979-1980“ and complemented by four microscope slides, labelled:

- «*Chrysoperla nanceiensis*. Séméria. Spermathèque. Nancy (212) –
Baume du Canada. Leg: Yves SÉMÉRIA. Det/prep: Y. Séméria. 16 aout 1978. »
- «*Chrysoperla nanceiensis*. Séméria. Spermathèque. Nancy (213) –
Baume du Canada. Leg: Yves Séméria. Det/prep: Y. Séméria. 23 aout 1978. »
- «*Chrysoperla nanceiensis*. Séméria. Genitalia ♂. Nancy (214) –
Baume du Canada. Leg: Yves Séméria. Det/prep: Y. Séméria. 17 avril 1979. »
- «*Chrysoperla nanceiensis*. Séméria. Patte (1991). Nancy (215) –
Baume du Canada. Leg: Yves Séméria. Det/prep: Y. Séméria. 23 aout 1978. »

The specimens and slides are deposited in the Natural History Museum of Angers (F-49, Maine-et-Loire Department).

Results

Generic attribution

The first step of our investigation was to verify if the proposed sub-species is truly a member of the genus *Chrysoperla* STEINMANN, 1964. When describing it as a sub-genus of *Chrysopa* LEACH, 1758, STEINMANN based his taxonomic discrimination on the ornamentation of the head, a feature later considered of little value because of superficial convergences (BROOKS 1994). When raising *Chrysoperla* to genus level, SÉMÉRIA (1977) took into account ethological traits, such as the nakedness of the larvae (which never carry debris), their swiftness of movement and eco-physiological characteristics such as the absence of any larval or prepupal interruption in development, overwintering as diapausing adults and ability to change the body colour during winter. BROOKS & BARNARD (1990) and later BROOKS (1994) presented more significant morphological traits, including:

- the head is pale unicolorous, spotless;
- there is no brown spot at the basis of the costal vein of the wings;
- both fore and hind wings are narrow, the ratio length/width ranges from 2.9 to 3.8/1;
- the intramedian cell is oval, short and straight so that its apex does not reach the first cross veinlet of Rs in each case;
- the abdominal sternites 8 and 9 are fused and continue apically in a glove-finger-shaped extension called the lip;
- the male internal genitalia have an arcuate tignum, a gonarcus that is long, straight, arcuate, the entoprocessus is very short or even missing, there is no gonapsis, no median plate, and no pseudopenis.

All these characters are present in the individuals studied, if we ignore the conspicuous brown marks on the frons and on the two first antennal segments (see below). This makes them, unambiguously, members of the genus *Chrysoperla*.

Coloration on the head and the antennae

An astonishing feature in SÉMÉRIA's description of *Ch. nanceiensis* is the ornamentation on the head. He observes (**fig. 1**):

- 1) a big brown mark on the vertex just behind the inter-antennal zone;
- 2) brown spots on the ventral sides of the two first antennal segments, the other segments of the flagellum being green. Such an arrangement is quite unusual in *Chrysoperla* spp.

To the best of our knowledge, the only exception to the common pattern is shown in the north-American green lacewing *Chrysoperla mexicana* BROOKS, 1994, which occurs in the Sinaloa State, on the western coast of Mexico, along the Californian Gulf. The scapus of this Mexican species bears a brown stripe on the apical part and the pedicels along with the flagellum are totally brown-black (BROOKS 1994).

No comments were made in the original text concerning constancy or variation of this curious arrangement in the population.

A careful examination of SÉMÉRIA's sample was enlightening. First, we noticed that the ornamentation varied between individuals. By scrutinizing heads detached in the liquid preservative we could understand the true nature of the ornamentation: it was not induced by an ordinary cuticular pigment, but by pellets of mould spores that were destroying the tissue of the exoskeleton of the samples. After careful cleaning, the cuticle was restored to its original transparent condition without coloration. The ornamentation observed was therefore the result of an artifact caused by the moulds.



Chrysoperla carnea
ssp. *nanceiensis*
ssp. nov.

Fig. 1: *Chrysoperla carnea* (STEPHENS, 1836) ssp. *nanceiensis* SÉMÉRIA, 1980: head and prothorax as drawn in the original description (after Y. SÉMÉRIA).

Coloration of the maxillae (stipes)

As the observed specimens have an external brown stripe on the stipes, that eliminates possible likeness with *Chrysoperla carnea* sensu stricto (= *Chrysoperla pallida* HENRY et al., 2002, = Cc 2 in the song-species system) that does not have such ornamentation (CANARD et al. 2013).

Thorax and abdomen

The best preserved samples, one male and three females, showed the thorax and the abdomen spotless, uniformly pale green. The pleural membrane of the first abdominal segments was not brown-shaded as it is in *Chrysoperla lucasina* (LACROIX, 1912) (= Cc 1 in the song-species system) (THIERRY et al. 1992).

The wings

All the veins in the wings were green, including the anal veins 1A and 2A which are black in *Ch. mexicana*. The mean ratio between the length and the width in the forewing was 2.83 ($n = 1$ male + 5 females). Such a value is within the range for the reference samples of the three species of the *carnea*-complex: *Chrysoperla affinis* 2.81 SE = 0.13; *Ch. carnea* 2.99 SE = 0.15; *Ch. lucasina* 2.85 SE = 0.21.

The costal setae length near the first radial sector measure in the same sample 130 to 150 μm , i.e. similar to that of *Ch. affinis* and *Ch. carnea*, but longer than that of *Ch. lucasina*: 80 μm SE = 0.23 (THIERRY et al. 1992).

The tarsal claw

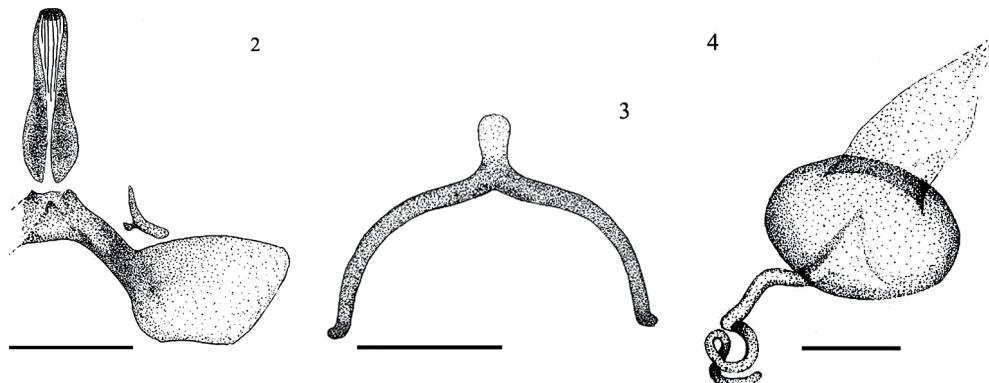
The claws of the legs show a basal quadrangular dilation, similar to that of *Ch. affinis* (THIERRY et al. 1998).

Genital structure

In the male, the lip of 8 + 9 sternites is prominent and rounded, over a small chin bearing long and sparse setae as in *Ch. affinis* (HENRY et al. 2002). The apodeme of tergit 9 extends beyond the cercus' callus, is oval and well-developed. On one male specimen, the right side bears 28 trichobothria.

Concerning the internal genitalia, the arcessus in side view was slightly arcuate bearing a hook-like, down-turned apex, sharp-pointed and brownish. The arcessus and the gonarcus are at an angle of about 50°. The gonarcus shows laterally two large arms that are approximately trapezoidal; the arcessus is longitudinally striated on its ventral area (fig. 2); the tignum presents with long arched branches, the acumen long, rounded apically. There are no spinellae (fig. 3).

In the female, the sub-genital plate is bilobed and has a broad base, the spermatheca is large, the vela and the spermatic duct are short (fig. 4).



Figs. 2 & 3: *Chrysoperla nanceiensis*, male genitalia: gonarcus, arcessus and entoprocessus (Fig. 2), tignum (Fig. 3). Scale bar 200 μm .

Fig. 4: *Chrysoperla nanceiensis*, female spermathecal, after a slide labelled „*Chrysoperla nanceiensis* Séméria. Spermatheque Nancy (213) / Baume du Canada. leg. Y. SÉMÉRIA, det./prep.: august 23rd 1978“. Scale bar 100 μm .

Discussion and conclusion

Except for the supposed cephalic ornamentation, *Chrysoperla nanceiensis* shows all the characteristics of the morphotype *Ch. affinis* of which 10 specimens are deposited in the collections of the Université Catholique de l’Ouest, IRFA, Angers, F-49, Maine-et-Loire Department, labelled *Chrysoperla kolthoffi* (NAVÁS, 1927) (LEMESLE et al. 1998). *Ch. affinis* occurs in the Department of Meurthe-et-Moselle, where *Ch. carnea* had not been reported (CANARD et al. 2014).

The populations of *Ch. affinis* overwinter mainly in dry and wind-protected places (THIERRY et al. 2002) such as barns and/or other unheated buildings. They may gather in great number at the end of summer. When spring is beginning, overwintering green lacewings occasionally cannot find an exit to fly away from these winter shelters, and they die inside. Large numbers of dead insects that are trapped in this way can accumulate over the years in unheated buildings (THIERRY et al. 1994). It was probably the case, for example, in the building of the Faculty of Sciences of Nancy, where old dry specimens were sampled to describe *Ch. nanceiensis*.

Chrysoperla nanceiensis is found once again to be synonymous, this time with the Cc4 song species *Chrysoperla affinis* (STEPHENS, 1836) (**syn.nov.**).

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Zusammenfassung

Das Taxon *Ch. nanceiensis* wurde in Kurzform auf der Basis von in Lorraine gefangenen grünen Florfliegen beschrieben und als Unterart der Gemeinen Grünen Florfliege (*Chrysoperla carnea* (STEPHENS, 1836)) zugeordnet. Die kürzliche Entdeckung der Originalerlaubte uns mehrere Charakteristika der grundlegenden Morphologie von *Chrysoperla affinis* (STEPHENS, 1836) zu beschreiben (Cc4 im song-species System) und damit die Synonymie von *nanceiensis* zu *Chrysoperla affinis* festzulegen (**syn. nov.**). Eine vorläufige Erklärung für die seltsame Auszeichnung des Kopfes wird angefügt.

Résumé

Le taxon *nanceiensis* fut décrit de manière sommaire à partir de Chrysopes récoltées en Lorraine et alors reconnues comme une sous-espèce dans le complexe des Chrysopes vertes communes (*Chrysoperla carnea* (Stephens, 1836)). La récente découverte de spécimens de la série originale nous permet de donner des détails morphologiques fondamentaux qui font de cet insecte un représentant typique de *Chrysoperla affinis* (Stephens, 1836) (Cc4 dans le “song-species system”) dont il devient ainsi un nouveau synonyme (**syn. nov.**). La curieuse ornementation céphalique apparente fait l’objet d’une tentative d’explication. Le statut actuel de *Chrysoperla nanceiensis*, synonyme de *Chrysoperla affinis*, est confirmé.

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