

Distribution of *Suarius nanus* (McLachlan, 1893) (Neuroptera: Chrysopidae) on the Balkan Peninsula

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Abstract: Until this study, green lacewing species *Suarius nanus* had been known in Europe only from Croatia, Macedonia and Greece (Balkan Peninsula). New records of this species and first data for Albania are provided, together with its distribution on the Balkan Peninsula and some morphological and ecological characteristics of the species.

Key words: Neuroptera, green lacewings, *Suarius*, distribution, new record, Balkan Peninsula

Introduction

Neuropteran fauna of the Balkan Peninsula is very diverse (DEVETAK 1992; POPOV 1992; POPOV & LETARDI 2010) and, though mostly well studied, somewhere it is still insufficiently investigated (ASPÖCK 1972; ASPÖCK *et al.* 1980, 2001). The aim of the paper is to show distribution of the green lacewing species *Suarius nanus* (McLachlan, 1893) in this part of Europe supported by new findings. Information on the species morphology and ecology is also included.

The genus *Suarius* (s.str.) NAVÁS, 1914, has a Palearctic distribution. Currently, 22 species are known (BROOKS & BARNARD 1990; ASPÖCK *et al.* 2001). In Europe, the genus is represented by four species (DIÁZ-ARANDA & MONSERRAT 1996; ASPÖCK 2001; MONSERRAT & DIÁZ-ARANDA 2012). *Suarius nanus* is known from the Eastern Mediterranean to Iran and Afghanistan, *S. walsinghami walsinghami* Navás, 1914 and *S. tigridis* (Morton, 1921) are occurring in North Africa, the Middle East, on the Arabian and Iberian Peninsulas (DIÁZ-ARANDA & MONSERRAT 1996), while *S. iberiensis* Hölzel, 1974, is endemic for the Iberian Peninsula.

Initially, *Suarius nanus* was described by McLachlan (1893) as *Chrysopa nana* from Adana, Turkey. Later, Navás (1914) described a new genus and species *Suarius walsinghami*. Kimmings (1940) transferred the species *Chrysopa nana* into the genus *Suarius* as *S. nanus*. He believed *S. walsinghami* was a synonym of *S. nanus*, which later proved to be wrong. Hölzel (1978) studied the material from

North Africa, the Middle East, Turkey and Europe, distinguishing three species. *Suarius nanus* is one of them, a Ponto-Mediterranean element, and the only species of this genus occurring on the Balkan Peninsula. Except for Europe, it is present in Turkey, Cyprus, Lebanon, Iran, Afghanistan and Kyrgyzstan (Hölzel 1978; ASPÖCK *et al.* 1980, 2001). For this species only sparse information exists for the Balkan Peninsula. Until recently, only records from Croatia, Macedonia and Greece were reported (Navás 1910; Esben-Petersen 1925; Hölzel 1965, 1978; Canard & Laudeho 1977, 1980; Neuenschwander & Michelakis 1980; Neuenschwander *et al.* 1981; Santas 1984).

Adult morphology of *S. nanus* was described in detail by McLachlan (1893) and later by Hölzel (1978). Some morphological features are shown in Figs. 2-4. The larvae of the genus *Suarius* were unknown until the end of the last century when a detailed study of larval morphology for *S. walsinghami walsinghami* and *S. tigridis* was carried out (DIÁZ-ARANDA & MONSERRAT 1990, 1996).

Little is known about the ecology of *S. nanus*. Few data exist about occurrence of adults of *S. nanus* in olive groves, oak, maple and *Crataegus* trees (Canard & Laudeho 1977, 1980; Hölzel 1978; ASPÖCK *et al.* 1980). DIÁZ-ARANDA & MONSERRAT (1996) observed that eggs of *Suarius* sp. were laid on the tip of twigs of *Tamarix gallica*. Larvae are very active and cover themselves with remains of prey, particles of substratum of host tree and their own lar-

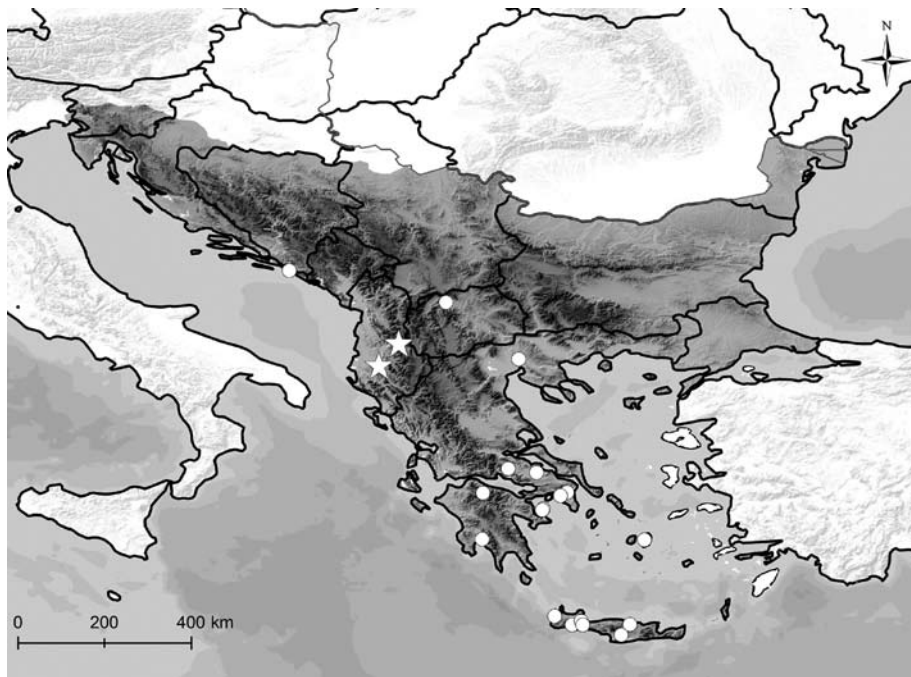


Fig. 1. Distribution of *Suaris nanus* in the Balkan Peninsula. New records are marked with stars, while literature records are marked with dots

val exuvium. Generally predatory, chrysopid larvae are known to be important pest regulators in different agricultural groves (CANARD *et al.* 1984; STELZL & DEVETAK 1999; MCEWEN *et al.* 2001). Green lacewing species of the genus *Suaris* are important bio-control agents in agro-ecosystems which regulate pests (SZENTKIRÁLYI 2001). VAN DEN BERG *et al.* (1987) reports that *Suaris* larvae have been observed to attack eggs of an important psyllid citrus pest *Trioza erythrae*, while other green lacewings attacked and consumed nymphal stages of the same species in citrus groves in South Africa.

In this article, we summarise data on the distribution of *Suaris nanus* on the Balkan Peninsula (including new records from Albania) and provide information on some morphological and ecological characteristics of the species.

Material and Methods

Suaris nanus was recorded twice during collecting trips in Albania: in 2012 and 2014. Animals were collected with an insect net and preserved in 70% ethanol. Photos of the wings, legs and the head were taken with a stereomicroscope Nikon SMZ 800 using a digital camera Nikon DS-Fi2 and processed with NIS-Elements D 4.20. We followed the zoogeographical categorisation of neuropteran fauna of the Balkan Peninsula following POPOV & LETARDI (2010). Specimens are deposited in the collection of the last author.

The map of distribution of the species was created with ArcGIS 9.3.

Results

Suaris nanus (McLACHLAN, 1893)

Chrysopa nana McLACHLAN, 1893

Chrysopa pretiosa GERSTÄCKER, 1894

Chrysopa nymphula NAVÁS, 1910

Cintameva egena NAVÁS, 1940

The known distribution of *Suaris nanus* on the Balkan Peninsula is shown in Fig. 1.

Literature records:

Croatia

ESBEN-PETERSEN (1925): Dubrovačko-Neretvanska County: Gruž. The author erroneously identified one specimen as “*Chrysopa lucasi*”.

Macedonia

HÖLZEL (1978): Skopje County: Treska near Skopje.

Greece

NAVÁS (1910): Attica region.

CANARD & LAUDEHO (1977): Agistri Island: Skala, Limenaria.

HÖLZEL (1978): Attica region: Athens - Mount Parnitha; Peloponnese region: Kalamata; Achaia region: Kalavryta; Agistri Island; Naxos Island; Crete Island: Platanos, Knossos, Samaria, Askylou, Ag. Ioannis, Vourvoulitis.

CANARD & LAUDEHO (1980): Beocia region: Akraifnio.

NEUENSCHWANDER & MICHELAKIS (1980): Crete Island

NEUENSCHWANDER *et al.* (1981): Crete Island

SANTAS (1984): Central Greece region; Macedonia region; Peloponnesus region; Crete Island; Aegean Islands.

Material examined:

Albania

Berat County: Berat - Castle Park; 165 m; 40° 41.48' N, 19° 57.36' E; 16-22.VII.2012; 1 ♂; Klokočovnik, Podlesnik, Janžekovič, Devetak leg.

Elbasan County: Hotolisht-nearriver Shkumbin; 250 m; 41° 9.14' N, 20° 22.13' E; 26.VI.2014; 1 ♂; Klokočovnik, Klenovšek, Podlesnik, Janžekovič, Devetak leg.

First record for Albania.

Suarius nanus is, with the exception of Greece, a rare species for the Balkan Peninsula, characteristic for olive groves and some other broadleaf trees.

Zoogeographical categorisation: Ponto-Mediterranean element.

Notes on the morphology

Wings long and oval, veins with sparse black hairs and only slightly spotted brown, distinct large and distinct oblong black spot on the crossvein between Cua and Cup (Fig. 2).

Head and thorax yellowish; both sides of thorax with broad brown marginal/lateral band (Fig. 3). Medial fine brown line usually visible on pronotum. Vertex of the head with short but thick black line (Fig. 3). With brown dot on frons, between antennae.

Legs with two brown rings, one at the insertion of coxae and another at the distal end of femora. Tibiae with small brown spot approximately in a position of the subgenital organ (Fig. 4).

Discussion

Some Balkan countries are still poorly studied regarding neuropteran fauna. The neuropterids of Albania are still insufficiently studied and only a small number of sporadic records exist on the spe-

cies occurrence in this country (PONGRÁCZ 1923; NAVÁS 1932; CAPRA 1945; ZELENÝ 1964; DEVETAK & JANŽEKOVIČ 2012; DEVETAK *et al.* 2012, 2013; KLOKOČOVNIK *et al.* 2014).

Only sparse data exist about the distribution of *S. nanus* in Europe, with the exception of Greece where SANTAS (1984) reported high population densities of the species in some locations. Most authors, who found

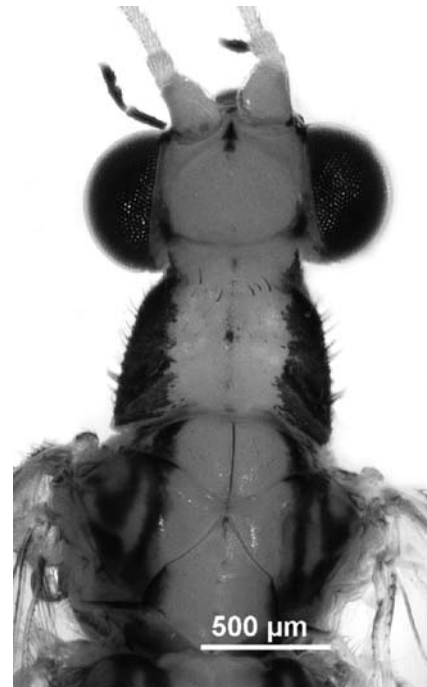


Fig. 3. Head and thorax of *Suarius nanus* with characteristic features

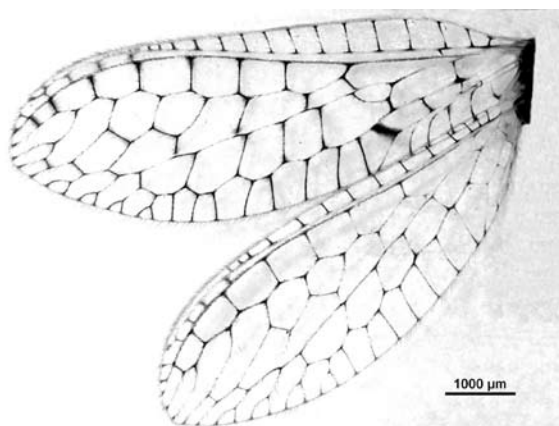


Fig. 2. Fore and hind wing of *Suarius nanus*



Fig. 4. Middle leg of *Suarius nanus* with characteristic features

higher population densities (2–22% of all chrysopid and hemerobiid species), collected samples in olive groves (CANARD & LAUDEHO 1977, 1980; NEUENSCHWANDER & MICHELAKIS 1980; NEUENSCHWANDER *et al.* 1981; SANTAS 1984). In our case, only individual specimens were found, one in 2012 in Berat, near a dry pine forest flying to the light, and another in 2014, trapped inside, probably due to the night illumination.

References

- ASPÖCK H. 1972. Die Erforschung der Neuropteren Europas – Rückblick, Standortsbestimmung und Ziele. – *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen*, **24** (1/2): 2-30.
- ASPÖCK H., U. ASPÖCK & H. HÖLZEL & H. RAUSCH 1980. Die Neuropteren Europas. I-II. Krefeld (Goecke & Evers), 495 & 355 p.
- ASPÖCK H., H. HÖLZEL & U. ASPÖCK 2001. Kommentierter Katalog der Neuropterida (Insecta: Raphidioptera, Megaloptera, Neuroptera) der Westpaläarktis. – *Denisia*, **2**: 606 p.
- BROOKS S. J. & P. C. BARNARD 1990. The green lacewings of the world: a generic review (Neuroptera: Chrysopidae). – *Bulletin of the British Museum, Natural History, Entomology*, **59** (2): 117-286.
- CANARD M. & Y. LAUDEHO 1977. Les Néuroptères captures au piège de McPhail dans les oliviers en Grèce. 1: L'île d'Augustri. – *Biologia Gallo-Hellenica*, **7**: 65-75.
- CANARD M. & Y. LAUDEHO 1980. Les Néuroptères captures au piège de McPhail dans les oliviers en Grèce. 2: L'île d'Augustri. – *Biologia Gallo-Hellenica*, **9**: 139-146.
- CANARD M., Y. SÉMÉRIA & T.R. NEW (eds.) 1984. Biology of Chrysopidae. The Hague (W. Junk), 294 p.
- CAPRA F. 1945. Alcuni Odonati e Neuroteri dell'Albania settentrionale. – *Annali del Museo Civico di Storia Naturale Giacomo Doria*, **62**: 292-300.
- DEVETAK, D. 1992. Present knowledge of the Megaloptera, Raphidioptera and Neuroptera of Yugoslavia (Insecta: Neuropteroidea). – In: CANARD, M., H. ASPÖCK & M.W. MANSELL (Eds.): Current Research in Neuropterology. Proceedings of the Fourth International Symposium on Neuropterology (24-27 June 1991, Bagnères-de-Luchon, Haute-Garonne, France). Toulouse, France (Privately printed), 107-118.
- DEVETAK D., R. DOBOSZ, R. JASKULA, J. PODLESNIK & V. KLOKOČOVNIK 2012. First record of Mantispidae (Neuroptera) from Albania. – *Acta entomologica slovenica*, **20** (2): 153-156.
- DEVETAK D. & F. JANŽEKOVIC 2012. First record of Deleproctophylla australis (Fabricius, 1787) (Insecta: Neuroptera: Ascalaphidae) in Albania. – *Annales, Series Historia Naturalis*, **22** (1): 13-16.
- DEVETAK D., J. PODLESNIK, V. KLOKOČOVNIK & F. JANŽEKOVIC 2013. Antlions (Insecta: Neuroptera: Myrmeleontidae) of Albania. – *Turkish Journal of Zoology* **37**: 362-366.
- DIÁZ-ARANDA L.M. & V.J. MONSERRAT 1996. On the larval stages of genus *Suaris* Navás, 1914 in Europe (Neuroptera: Chrysopidae). – *Deutsche Entomologische Zeitschrift*, N.F. **43** (1): 89-97.
- ESBEN-PETERSEN P. 1925. Notizen zur Neuropterenfauna Dalmatiens. – *Konowia*, **4**: 66-68.
- GERSTÄCKER A. 1894. Über neue und weniger gekannte Neuropteren aus der Familie Megaloptera BURM. – *Mitteilungen des naturwissenschaftlichen Vereins für Neu Vorpommern und Rügen*, **25**: 93-173.
- HÖLZEL H. 1974. Zwei neue Chrysopiden-Arten aus Südwesteuropa (Planipennia, Chrysopidae). – *Entomologische Zeitschrift*, **84**: 257-260.
- HÖLZEL H. 1978. Beitrag zur Kenntnis der Gattung *Suaris* Navas: Die Arten des nanus-Komplexes (Planipennia, Chrysopidae). – *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen*, **30** (1/2): 3-12.
- KIMMINS D.E. 1940. Notes on some types of Chrysopidae (Neuroptera) in the British Museum Collections. – *Annals & Magazine of Natural History*, **5** (11): 442-449.
- KLOKOČOVNIK V., D. DEVETAK, T. KLENOVŠEK & J. PODLESNIK 2014. Contribution to the knowledge of brown lacewings from Albania (Neuroptera, Hemerobiidae). – *Spixiana*, **37** (2): 233-237.
- MCEWEN P. K., T. R. NEW & A. E. WHITTINGTON (eds.) 2001. Lacewings in the crop environment. Cambridge (Cambridge University Press), 546 p.
- McLACHLAN R. 1893. On species of *Chrysopa* observed in the Eastern Pyrenees; together with descriptions of, and notes on, new or little known Palearctic forms of the genus. – *Transactions of the Entomological Society of London*, **1893**: 227-234.
- MONSERRAT V.J. & L.M. DIÁZ-ARANDA 2012. Los estadios larvarios de los Crisópidos ibéricos (Insecta, Neuroptera, Chrysopidae), nuevos elementos sobre la morfología larvaria aplicables a la sistemática de la familia. – *Graellsia*, **68** (1): 31-158.
- MORTON K. J. 1921. Neuroptera, Mecoptera, and Odonata from Mesopotamia and Persia. – *Entomologist's Monthly Magazine*, **57**: 213-225.
- NAVÁS L. 1910. Crisópidos nuevos ó poco conocidos. – *Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales de Madrid*, **9**: 473-480.
- NAVÁS L. 1914. Les Chrysopides du Musée de Londres. – *Annales de la Société Scientifique de Bruxelles*, **38** (2): 73-114.
- NAVÁS, L. 1932. Alcuni insetti del Museo di Zoologia della R. Università di Torino. – *Bollettino dei Musei di Zoologia ed Anatomia Comparata della Reale Università di Torino*, **42** (26): 1-38.
- NAVÁS L. 1940. Neurópteros nuevos o críticos. – In: VI Congreso Internacional de Entomología, Madrid, 6-12 de septiembre de 1935. Vol. 1 (2). Laboratorio de Entomología del Museo Nacional de Ciencias Naturales, Madrid, 97-102.
- NEUENSCHWANDER P. & S. MICHELAKIS 1980. The seasonal and spatial distribution of adult and larval chrysopids in olive trees in Crete. – *Acta Oecologica*, **1**: 93-102.
- NEUENSCHWANDER P., M. CANARD & S. MICHELAKIS 1981. The attractivity of protein hydrolysate baited McPhail traps to different chrysopid and hemerobiid species [Neuroptera] in a Cretan olive orchard. – *Annales de la Société Entomologique de France* (N.S.), **17**: 213-220.
- PONGRÁCZ S. 1923. Recésszárnyúak. Neuropteroiden. – In: Csiki Ernő Állattani Kutatásai Albániában. Explorationes zoologicae ab E. Csiki in Albania peractae. IX. A. Magyar Tudományos Akadémia Balkán-Kutatásainak Tudományos Eredményei. Budapest, **1** (1): 143-166.
- POPOV A. 1992. Zoogeographical analysis of Neuropteroidea (Insecta) of the Balkan Peninsula. – In: CANARD M., H. ASPÖCK and M. MANSELL (Eds.): Current Research in Neuropterology. Toulouse, Sacco, 319-330.
- POPOV, A. & A. LETARDI 2010. Comparative zoogeographical analysis of Neuropterida of the Apennine and Balkan peninsulas. – In: DEVETAK, D., S. LIPOVJEK and A.E. ARNETT (Eds.): Proceedings of the Tenth International Symposium on Neuropterology. Maribor: 239-256.
- SANTAS A.L. 1984. On some Chrysopidae of Greece. – In: GEPP J., H. HÖLZEL (eds.). Progress in World's Neuropterology. Graz, 167-172.
- STELZL M. & D. DEVETAK 1999. Neuroptera in agricultural ecosystems. – *Agriculture, Ecosystems and Environment*, **74**: 305-321.
- SZENTKIRÁLYI F. 2001. Lacewings in fruit and nut crops. – In: P. MCEWEN, T.R. NEW and A.E. WHITTINGTON (Eds.): Lacewings in the Crop Environment. Cambridge (Cambridge University Press), 172-238.
- VAN DEN BERG M. A., V. E. DEACON, C. J. FOURIE & S. H. ANDERSON 1987. Predators of the citrus psylla, *Trioza erytraea* (Hemiptera: Triozidae), in the Lowveld and Rustenburg areas of Transvaal. *Phytophylactica*, **19**: 285-289.
- ZELÉNY J. 1964. Ergebnisse der Albanien-Expedition 1961 des Deutschen Entomologischen Institutes. 24. Beitrag. Neuroptera. – *Beiträge zur Entomologie*, **14**: 323-336.

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