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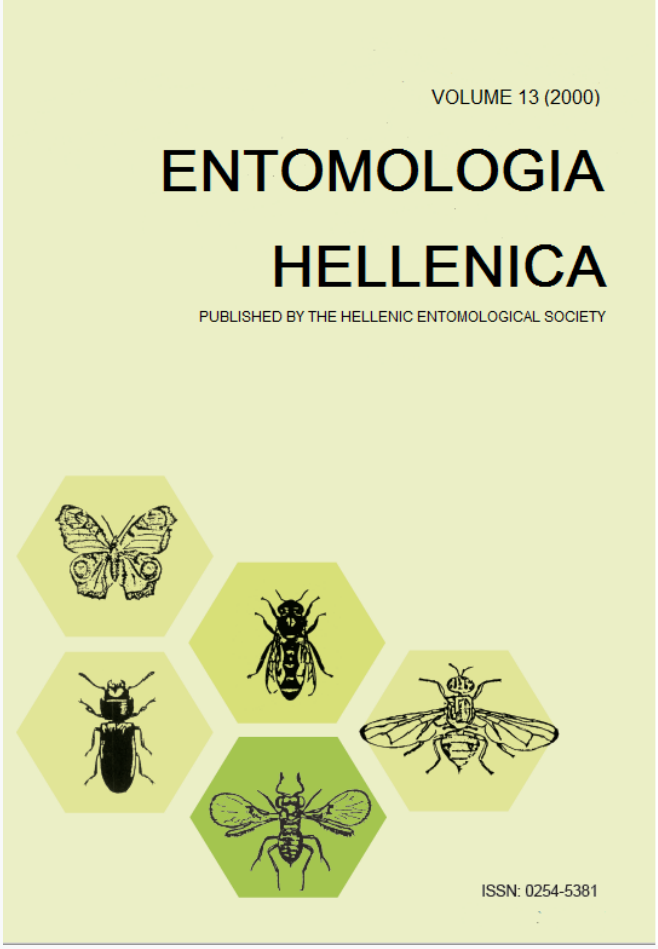

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Eupeodes luniger (Diptera, Syrphidae) a new record to Greece and a key for the genus Eupeodes in this country[1]

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ABSTRACT

Eupeodes luniger (Meigen, 1822) (Diptera, Syrphidae), an aphidophagous hoverfly species that acts also as pollinator, was recorded for the first time in Greece. Based on the Greek records, we provide the first identification key for the genus *Eupeodes* Osten Sacken, 1877 in Greece.

Introduction

Hoverflies (Diptera, Syrphidae) are among the most beneficial insects to man, acting both as aphid predators and pollinators. This is why a considerable amount of research has been carried out in Europe during the last 20 years and augmented our knowledge on this matter (Gilbert 1986, De Bruck 1990, Rotheray 1993, Stubbs and Falk 1993, Dirickx 1994). However, this does not hold for the syrphids of Greece, because either very few and fragmentary studies were carried out on the subject (Leclercq 1958, Claussen and Lucas 1988) or were only studied related subjects (Santas 1980, Hurkmans 1985, Petanidou 1991a, 1991b). Consequently, there has been no attempt to develop either a check list or a key of the syrphid fauna of Greece.

According to existing literature, the syrphid fauna of the Mediterranean Basin consists of approximately 730 species. Out of these only 98 have been recorded in Greece (Dirickx 1994), which is a very small number, indeed, especially if we consider the following: 1. Syrphid species constitute a largely migrating group with very large distributions; 2. In only a very small area of 30 ha, 10 km west of Athens, there were found 50 hoverfly species out of which three were new to science (Petanidou 1991a, 1991b); 3. Greece has a high rate of endemism, which applies to all groups of biota, presumably also to hoverflies. We assume, therefore, that the real syrphid fauna of Greece consists of many more species than 98. Among all areas within the country only the island of Crete has been systematically surveyed with 61 species out of which 13 have not been recorded in continental Greece (Claussen and Lucas 1988).

Syrphids are very important insects from the economic point of view. In their larval stage they can act as predators (aphidophagous hoverflies, such as the genera *Eupeodes* and *Episyrphus*), or as pests damaging the bulbs of some Liliaceae (genus *Merodon* and some species of the genus *Eumerus*). As adults can be important because they visit the flowers for nectar and pollen, the latter being in some cases indispensable for the reproduction of the females. Because of this relationship, some anthophilous hoverflies are very important pollination agents for plants (Speight and Lucas 1992).

Eupeodes luniger (Meigen, 1822) *(Metasyrphus luniger)* is an important hoverflies acting both as aphid predator and as a pollinator. Adults use

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the floral pollen as protein source for egg maturation and look for aphid colonies where females oviposit (Rotheray 1993). In northern Europe the species shows an obligatory migratory behaviour (Stubbs and Falk 1993) and its populations fluctuate strongly from one year to the other (Torp 1994). The larvae are associated with conifer aphids, although they soon quit the conifers to feed on a wide range of low vegetation aphids (Rotheray 1993). The immature stages have been described by Bhatia (1939), Scott (1939) and Dixon (1960). The species has two generations per year (bivoltine). The larvae pupate in late autumn and hibernate as pupae or adults (Gilbert 1986).

The species has a very wide geographical distribution, being present in Nearctic, Palaearctic and Oriental Regions. Though very widespread throughout Europe and common in other European countries of the Mediterranean Basin and North Africa (Dirickx 1994), this species has not been recorded in Greece. This work documents the presence of *Eupeodes luniger* in Greece, thus increasing the number of *Eupeodes* Osten Sacken, 1877 ever recorded in the country to three, after *E. corollae* (Fabricius, 1794) and *E. lapponicus* (Zettersted, 1838). As a first step to contribute to the knowledge of the Greek hoverflies, we give the first identification key for the *Eupeodes* spp. known for Greece.

Materials and Methods

The specimens, two males and one female, were collected on 19 and 20 May 1997 in the farm of the Aristotle University, at Thermi, ca. 14 km East of the city of Thessaloniki, Northern Greece. All specimens were caught while visiting the flowers of *Phacelia tanacetifolia* Bentham (Hydrophyllaceae) for nectar and mainly for pollen. *P. tanacetifolia* is a melliferous plant introduced from California into Europe since 1832. As the plant was occasionally and only for experimental reasons cultivated in the study area (Petanidou 1998), we assume that *Eupeodes luniger* is not mutually related to *P. tanacetifolia,* constituting one of the oligo- to polylectic flower visitors of the area.

For the identification of the Greek specimens of *Eupeodes luniger* we used the keys of Dusek and Laska (1976), Stubbs and Falk (1993), Torp (1994) and Verlinden (1994). We also consulted reference material originating from other Mediterranean countries. This material was borrowed from the Entomological Collection of Alicante University (CEUA) where the Greek specimens were also deposited.

Results and Discussion

Diagnosis of *E. luniger* is essential, especially if we consider the importance of this species as predator of crop aphids (i.e. on *Vicia faba* and *Zea mays*) (Rojo and Marcos-García 1998) and ground layer aphids (Rotheray 1993). Herewith we provide the main differential characteristics of *E. luniger* and the first identification key for the Greek *Eupeodes* species.

Diagnosis. Male: Alula with a bare patch, devoid of tiny hairs. Angle between eyes at top of head distinctly less than 90°. Abdominal margin more black than yellow, or completely black. Female: Posterior half or more of area between simple eyes and antennae black (excluding the large gold dust spots that spread so that only one third of distance between eyes is exposed). Abdominal yellow spots do not reach side margins. Front femora with pale hairs in posterior side.

In his work on the syrphids of the Mediterranean region Dirickx (1994) summarises the number of species assigned to several European countries. The number of syrphid species assigned to Greece is by far the smallest (98). This is certainly an underestimate as indicated by the fact that Bulgaria, occupying a smaller surface, exceeds by far Greece in syrphid biodiversity (291).

We conclude that Greece is the only European country in the Mediterranean Basin where the aphidophagus and other syrphid fauna is poorly known. Considering the diversity of the adjacent countries (Bulgaria: 291; Italy: 369) we expect that the number of syrphid species of Greece can be much higher (Dirickx 1994). Yet, even the distribution of the recorded species is little known. On the other hand, syrphids, and in particular *Eupeodes luniger* as well as other species of the genus *Eupeodes*, are very important agents in the Mediterranean ecosystem food webs, acting not only as aphid predators but also as pollinators (Petanidou 1991a, 1998; Rojo and Marcos-García 1998; Speight 1998). Completion of knowledge on these insects will help in the ecological management both for habitat use and conservation.

Key of the species of *Eupeodes* known from Greece

1 **a.** Metasternum bare. Wing with vein R_{4+5} strongly dipped (curved) at middle *Eupeodes lapponicus*

b. Metasternum hairy. Wing with vein R_{4+5} slightly curved at middle 2

2 **a.** Holoptic eyes **(Males)** 3

b. Dichoptic eyes **(Females)** 4

3 **a.** Genitalia large, almost reaching forward to sternite 4. Tergites 3 and 4 with over 50% of lateral margins yellow *Eupeodes corollae*

b. Genitalia small, not reaching sternite 4. Tergites 3 and 4 with lateral margins entirely black or only up to 25% yellow *Eupeodes luniger*

4 **a.** Black area on frons reaching 1/4 to 1/3 of distance between ocellus and base of antennae. Abdominal spots reaching the side margins. Scutellum almost always wholly pale-haired *Eupeodes corollae*

b. Black area on frons with a narrow Y-shaped form, reaching half or more of distance between ocellus and base of antennae. Abdominal spots not reaching side margins. Hairs on scutellum almost always predominantly black *Eupeodes luniger*

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KEY WORDS: *Eupeodes luniger*, biodiversity, Syrphidae of Greece, Mediterranean.

Πρώτη διαπίστωση του είδους *Eupeodes luniger* (Meigen) στην Ελλάδα και κλείδα για τα είδη του γένους Eupeodes (Diptera: Syrphidae) στη χώρα αυτή

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ΠΕΡΙΛΗΨΗ

Το *Eupeodes luniger* (Meigen, 1822) (Diptera: Syrphidae) αποτελεί ένα από τα κατ' εξοχήν αφιδοφάγα είδη της οικογένειας των Συρφίδων κατά το προνυμφικό στάδιο, ενώ ως ενήλικο επισκέπτεται άνθη για λήψη νέκταρος και γύρης που είναι απαραίτητη για την αναπαραγωγική ωρίμανση των θηλυκών. Το είδος αυτό βρέθηκε για πρώτη φορά στην Ελλάδα ως ανθικός επισκέπτης του φυτού *Phacelia tanacetifolia* Bentham στο αγρόκτημα του Αριστοτελείου Πανεπιστημίου στη Μίκρα, 14 χιλιόμετρα ανατολικά της πόλης της Θεσσαλονίκης. Με την εργασία αυτή αυξάνονται οι γνώσεις μας επί της κατανομής του *Eupeodes luniger*, καθώς η Ελλάδα αποτελούσε την χώρα όπου παρετηρείτο ασυνέχεια στην κατανομή του είδους αυτού στην περιοχή της Μεσογειακής Ευρώπης και των Βαλκανίων. Τόσο η αφιδοφάγος όσο και η επικονιαστική δραστηριότητα του εντόμου αυτού, καθώς και των ομογενών του (Eupeodes Osten Sacken, 1877), είναι σημαντικές για τον άνθρωπο από άποψη βιολογικής καταπολέμησης και επικουρικής επικονίασης για αύξηση της παραγωγής και διαχείριση οικοσυστημάτων. Παρουσιάζουμε εδώ την πρώτη κλείδα για τα 3 είδη του γένους στην Ελλάδα, που διαφοροποιείται ελαφρώς από τις συναφείς κλείδες άλλων χωρών.