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On some Chrysopidae of Greece

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Summary

In a country-wide survey of Chrysopidae, twenty-one species were found. This study was based upon organised uniform recordings, causal observations, continuous collecting and breeding during the last ten years (1970 to 1979). The studied areas included the mainland and most of the Islands in different crops and spontaneous vegetation. The distribution of the Chrysopids has shown differences in various areas of Greece.

From these 21 species, *Chrysoperla carnea* (STEPHENS) was encountered in all surveyed areas and all year round, *Chrysopa septempunctata* WESM., *Anisochrysa zelleri* (SCHNEIDER), *Anisochrysa flavifrons* (BRAUER) and *Anisochrysa genei* (RAMBUR) ranked second in abundancy and they are less spread than *C. carnea*. The rest of the species have demonstrated limited distribution.

Introduction

The family Chrysopidae is a large group of predaceous insects which includes several species of economic importance in the world as well as in Greece. As efforts are currently being made in Greece to develop biological and integrated pest control programs on various agricultural crops, the biological control agents should be studied.

The Chrysopidae may have an important part to play in the biological control, for that it is essential to find out as much as possible about these insects, since by now little has been known concerning this family in Greece.

Some data, here and there, also some local records of this family were published by various entomologists which will be noted hereunder, while discussing the relevant data.

During the last ten years (1970–1979) a country-wide survey of the Chrysopids was carried out and the data which were accumulated, on the species and the geographical distribution, are reported.

These surveys were carried out exclusively in the major cultivations of the country, that is olive trees, citrus trees, cotton and deciduous fruit trees. In the survey the conifer trees (Pines and fir trees) were also included because these trees are of special interest to our apiculture.

Review

Very little were known concerning the Chrysopidae of Greece prior to HÖLZEL's studies. The known data were records on different studies concerning similar entomological researches.

Thus *Chrysoperla carnea* has been recorded as preying on *Ceroplastes sinensis* DELGUER which scale infested *Myoporon sp.* in Attiki (17). A second record of this predator is on the scale *Marchalina hellenica* (GENADIOUS) feeding on *Pinus spp.* in Evia (18). *Chrysoperla carnea* has also been recorded preying on *Aphis gossypii* GLOVER feeding on cotton

in different areas of the country and on *Myzus persicae* SULZER feeding on *Citrus sp.* in Argolis (19).

Anisochrysa flavifrons has been found preying on the scale *Marchalina hellenica* (GENADIOUS) feeding on *Pinus spp.* in Attikii and Evia (16, 18) and it has also been recorded preying on *Aphis gossypii* GLOVER feeding on cotton in Laconia area(19).

Chrysopa septempunctata has been observed preying on *Aphis nerii* B. d. F. which was feeding on *Nerium oleander* L. in Attiki and on *Toxoptera aurantii* B. d. F. feeding on *Citrus sp.* in Messologi and Chania (17, 19). It has also been found preying on the scale *Marchalina hellenica* (GENADIOUS) feeding on *Pinus spp.* in Attiki and Evia (16, 18) and on the aphid *Myzus persicae* SULZER feeding on *Citrus spp.* in Peloponnesus (19). A great number of this Chrysopid has been found preying on *Aphis gossypii* GLOVER feeding on cotton in Viotia and Macedonia (19).

Chrysopa formosa and *Chrysopa dubitans* have been noticed preying on *Aphis nerii* B. d. F. feeding on *Nerium oleander* L. in Attiki (19).

Anisochrysa clathrata and *Anisochrysa prasina* have been observed preying on *Aphis gossypii* GLOVER feeding on cotton in Peloponnesus and Thessali (19).

Chrysopa phyllochroma has also been found preying on *Aphis gossypii* GLOVER feeding on cotton in Macedonia (19).

A great number of unidentified species of Chrysopidae preying on different hosts have been recorded as *Chrysopa spp.* by various entomologists (KAÏLIDIS 1962, STATHOPOULOS 1964, ARGYRIOU 1967, 1968, 1976) (1, 2, 3, 14, 20).

Hölzel, H. collecting Chrysopidae in Greece, found several species and he gave data on them. Among these, two, namely *Rexa raddai* (HÖLZEL) and *Anisochrysa ariadne* HÖLZEL have been described by him as new species (9, 13).

Canard, M. working on a F. A. O. Programme for Research on the Control of Olive Pests and Diseases in Chania-Crete observed by chance, species of Chrysopidae which were captured in McPhail traps in olive groves in three areas of Greece and he identified and gave data for fifteen species (4, 5, 6, 7).

KAÏLIDIS (15) also recorded the Chrysopid *Chrysopa perla* L. as preying on the Aphid *Phloemyzus redelei* H. R. L. feeding on *Populus canadensis* MONCH in East-Macedonia and CANARD (4, 7) the *Chrysoperla mutata* (McL.) in Agistri.

These two last Chrysopids were not found in our surveys.

Methods

Four principal methods were used for the project described in this paper.

The first method involved the collection of dead adults in insect traps using fluorescent ultraviolet "black light" lamps (15 watt). The light traps were placed in plain air and the lamp was on a height of about 1,20 m over the ground.

With the second method, the collection of Chrysopids were made in the McPhail traps which were hung on the trees (Fig. 1). A 3% diammonium phosphate ($(NH_4)_2HPO_4$) solution was used as an attractant.

The third method used for this project involved the spraying of the trees and the collection of the dead Chrysopidae on cloth trays placed under the trees (cloth trays covering an area of about 10 m^2). The spray was applied with a high pressure sprayer and an organophosphorus insecticide was used. The adults Chrysopids that fell on to the trays were collected within twenty-four hours of spraying.

The fourth method involved the collection of live Chrysopids, in one of three ways: (a) the insects were observed on the trees, shrubs or other plants and collected straight off the branches or leaves. (b) the trees, their branches, shrubs or other plants were shaken and the Chrysopids were collected by a net. (c) the insects were observed around the lights and collected.

Fig. 1: McPhail's trap suspended on an olive tree in an olive grove.

Results and discussion

I. Species of Chrysopidae collected

During the period of study (1970–1979), twenty-one species belonging to the family Chrysopidae were collected (Table I), in various regions and areas (Fig. 2).

1. First method: This method, by light traps, was employed in Attiki area, north Evia and almost to all cotton growing areas of Greece (one light trap in Attiki, one in Evia and one in each cotton growing county of the country).

In these areas Mediterranean geographical features are dominant. In Attiki the biotope is the typical urbanized area in north Evia the dominant plants are olive trees while the rest areas are characterized by cotton plantations.

Six species were collected with this method (Table I).

2. Second method: It was known, since years ago, that McPhail traps (Fig. 1) with 3% diammonium phosphate solution as attractant, been used in olive groves for checking the flight and population of olive fly *Dacus oleae* GMEL. (Dipt.: Trypetidae) trapped also other species of insects, among them species of the family Chrysopidae. Thus a network of McPhail traps were installed in various areas of Greece, in major cultivations of the country, in forest (Pine and fir trees), and some times in other plantations.

Specifically, the traps were established in olive-groves, almost in all olive growing areas, in citrus groves in Attiki and Peloponnesus, in cotton plantations in almost all cotton growing areas and in fir and pine forests in the mountains Parnis in Attiki, Parnassos, Kalidromon, Agrapha in Central-Greece and Chelmos in Peloponnesus.

The traps were suspended on the trees, or in cotton plantations on a wooden pole at a height of about 1,20 m over the grownd.

The collection of the Chrysopids, depending on the season or other factors was done in two to ten days interval.

All together fifteen species were collected with this method (Table I).

3. Third method: This method which is the spraying of the trees, was employed to a small extend all over Greece in olive and citrus groves and in deciduous fruit trees.

With this method fifteen species were collected (Table I).

II. Population density and distribution of the species

From the twenty-one species of Chrysopidae collected, five of them, namely *Chrysoperla carnea, Anisochrysa zelleri, Anisochrysa flavifrons, Chrysopa septempunctata* and *Anisochrysa genei* showed the largest distribution in the country (Table I). *Ch. carnea* is wide spread all over the country, being recorded in all areas and almost in all samples its population was always moderate to high. *A. zelleri* and *A. flavifrons* were less widely distributed than *C. carnea,* although in some areas they were found in large population density, which agrees with the observations made by CANARD (5, 6). *C. septempunctata* was even less widely distributed and its population density was less than that of the previous species. However, it showed a high frequency especially in the cotton plantations. The last species *A. genei* showed a wide distribution in the country, but it was always found in very small population.

The rest of the species, listet in Table I, were found only in certain regions of the country and in small population density but in some cases *Suarius nanus* was observed in large population density. So, that species in the area of Oropos-Attiki and in central Evia outnumbered all other species collected by McPhail traps in olive groves during the autumn.

Some of them were found only in certain areas while a few were observed only in one area and in very small numbers. Thus, only three adults of *Chrysopa dubitans* were found and only in Attiki areas (Votanikos–Athen), although this species has been recorded by HÖLZEL and CANARD (7, 8, 11) in Crete. Also only three specimens of *Chrysopa nigricostata* were found by spraying olive trees and only in one area (Phokis, Central-Greece). *Chrysopa phyllochroma,* although widely distributed in Europe (11), was collected by light traps only in two occasions, on cotton plantations in Chalkidiki area (Macedonia).

Among the few species which were not found in olive groves is *Anisochrysa ventralis* which was collected by McPhail traps in two cases, on *Populus sp.* in Imathia area (Macedonia) and on *Pinus sylvestris* L. in the central area of Western-Greece.

Species	Central Greece	Western Greece	Macedonia	Thraki	Peloponnesus	Crete	Aegean Islands	Ionian Islands
1. Chrysopa septempunctata WESMAEL[1,2,3]	+	–	+	+	+	+	–	–
2. Chrysopa formosa BRAUER[1,2,3]	+	–	–	–	+	–	–	–
3. Chrysopa dubitans MCLACHLAN[2]	+	–	–	–	–	–	–	–
4. Chrysopa viridana SCHNEIDER[2,3]	+	+	–	–	–	+	–	–
5. Chrysopa nigricostata BRAUER[3]	+	–	–	–	–	–	–	–
6. Chrysopa dorsalis BURMEISTER[2]	+	–	+	–	–	–	–	–
7. Chrysopa phyllochroma WESMAEL[1]	–	–	+	–	–	–	–	–
8. Anisochrysa zelleri (SCHNEIDER)[2,3]	+	+	+	–	+	+	+	+
9. Anisochrysa flavifrons (BRAUER)[1,2,3]	+	+	+	+	+	+	+	+
10. Anisochrysa clathrata (SCHNEIDER)[2,3]	+	–	–	–	+	+	–	+
11. Anisochrysa prasina (BURMEISTER)[1,2,3]	+	+	+	–	+	–	–	+
12. Anisochrysa ventralis (CURTIS)[2]	–	+	+	–	–	–	–	–
13. Anisochrysa genei (RAMBUR)[2,3]	+	+	+	–	+	+	+	–
14. Anisochrysa ariadne HÖLZEL[3]	–	–	–	–	–	+	–	–
15. Cunctochrysa albolineata (KILL.)[3]	+	–	+	–	–	–	–	–
16. Brinckochrysa michaelseni (ESB.-PET.)[3]	+	–	–	–	–	–	–	–
17. Chrysoperla carnea (STEPHENS)[1,2,3]	+	+	+	+	+	+	+	+
18. Tjederina gracilis (SCHNEIDER)[2]	+	+	–	–	+	–	–	–
19. Suarius nanus (MCLACHLAN)[2,3]	+	–	+	–	+	+	+	–
20. Rexa raddai (HÖLZEL)[3]	–	–	–	–	+	–	–	–
21. Italochrysa italica (ROSSI)[2]	+	–	–	–	–	–	–	–

Tab. 1: Species of Chrysopidae collected in different regions of Greece (1970–79). + denotes species found in the region – denotes species not found in the region. Species collected by: 1. Light traps, 2. McPHAIL traps, 3. Spraying the plants.

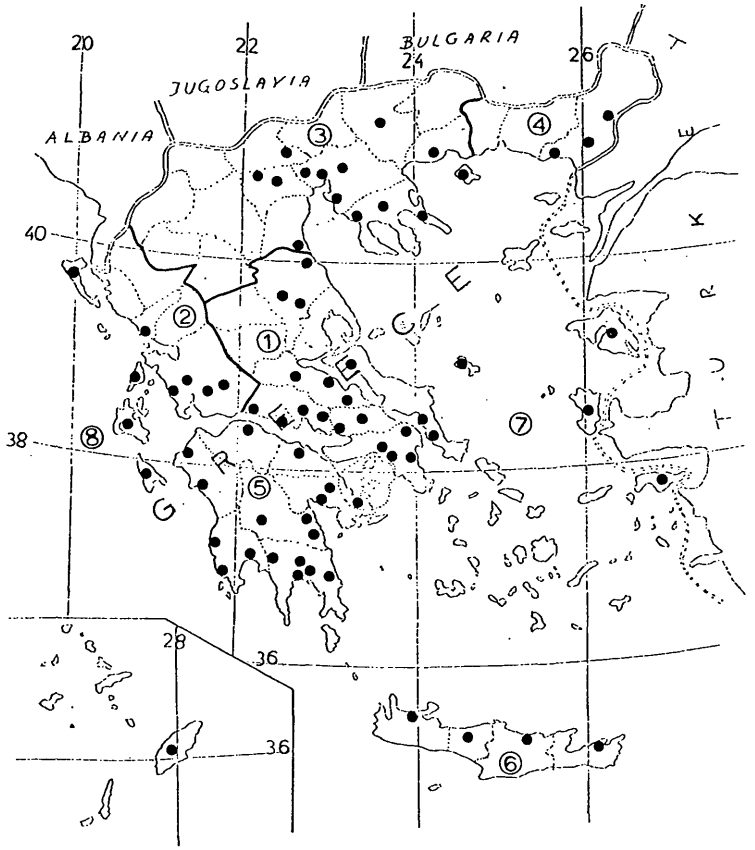

Fig. 2: Map of Greece showing the eight regions O and the areas ● within these regions where Chrysopids were collected.
1 = Central Greece, 2 = Western Greece, 3 = Macedonia, 4 = Thraki, 5 = Peloponnesus, 6 = Crete, 7 = Aegean Islands, 8 = Ionian Islands.

The species *Anisochrysa ariadne* which HÖLZEL (13) found in Crete and described for the first time and which CANARD (6) recorded from the same area, was found also in the valley of Lassithi in Crete on spraying olive trees.

Cunctochrysa albolineata which has been recorded by HÖLZEL in Turkey and Europe (10, 11) was found during our survey, by spraying the olive trees in Central Greece and Macedonia (Table I).

One african species (21) – *Brinckochrysa michaelseni* – was collected (1974) by spraying olive trees in Marathia–Lidoriki area (Central-Greece). Although this species was supposed to be accidentally found, it seems that it has a larger distribution in our country, because it was recorded later (1977 and 1979) by CANARD (4, 6, 7) in Agistri island and Crete.

The species *Tjederina gracilis* was collected by McPhail traps only on fir-trees in Parnitha and Parnassos mountains in Central-Greece and in Chelmos mountain in Peloponnesus.

Very few specimens of *Rexa raddai* were collected by spraying olive trees in Kalamata area in Peloponnesus. This species was collected for the first time by HÖLZEL (9) in Macedonia and later CANARD recorded it in Crete, too (6).

Italochrysa italica was found in McPhail traps on olive trees along the coast of central Evia and Oropos area in August and September (1977, 1978).

As far as the biotope of Chrysopids in Greece is concerned it was found from our studies that olive groves is a very important habitat for most of the collected species. From the twenty-

one collected species during our survey in our country, seventeen of them were found in olive groves.

In the cotton growing areas where the same intensity of sampling took place, only six species of Chrysopids were collected.

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