

Vertical Distribution of Neuroptera (Insecta, Neuroptera) In Middle Black Sea Region (Çorum, Tokat, Amasya Provinces)

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Abstract: Lacewing specimen was collected from 57 localities in in Middle Black Sea Region (Çorum, Tokat and Amasya province) of Turkey between the months of May-August 2015. Specimens were caught from different altitude biotopes coniferous trees, deciduous trees, ferns, shrub, herb, others type (open areas of forest, open steppes, under the bridge) and light trap. The ecosystem diversity and altitudinal variation were taken into account when localities were chosen. Altitudes, route tracks, and directions were recorded using a manual GPS device (Garmin). Live insect specimens were identified immediately after capture. If specimens could not be identified in the field, they were brought back to laboratory alive and killed with ethyl acetate (but Coniopterygidae specimens were killed in 70% alcohol and stored). All the lacewing specimens were pinned with their wings spread, then dried and preserved. Most of the lacewing samples were found in the coniferous trees, deciduous trees. When the vertical distributions of the specimens were examined the most narrowly distributed species *Chrysopa formosa*, *Chrysotropia ciliata*, *Nineta flava*, *Peyerimhoffina gracilis*, *Aleuropteryx loewii*, *Aleuropteryx umbrata*, *Symphorobius (Symphorobius) elegans*, *Wesmaelius (Kimminsia) ravus*, *Mantispa aphavexelte*, *Mantispa scabricollis*, *Delfimeus irroratus*, *Euroleon nostras*, *Macronemerus bilineatus*, *Myrmecaelurus trigrammus*, *Myrmeleon (Morter) inconspicius* the most widely distributed species *Chrysoperla carnea*, *Dichochrysa prasina*.

Key words: Neuroptera, Turkey, Middle Black Sea Region, vertical distributions

1. Introduction

The order Neuroptera is one of the smallest and primitive among the holometabolic insects. The adults and larvae from most families are predators, which make them very interesting to many entomologists, since some can have a considerable value as predators to be used in biological control programs [1].

The order Neuroptera includes 687 species and 17 subspecies in the Palaearctic region and about 6000 species in the world [2]. Aspöck et al. [2,3] revised the faunistical records and compiled to date. These works are still the richest source of data on the European and Turkish neuropteran fauna. A checklist study published by Canbulat [4] 193 species and 6 subspecies of ten families from Turkey were indicated. In the following years, continuing research in Turkey [5-9]; addition 10 species are recorded.

Until 2014, as a result of research conducted Neuroptera in Turkey, includes 11 families (including Sisyridae, Coniopterygidae, Osmylidae, Berothidae, Mantispidae, Dilaridae, Hemerobiidae, Chrysopidae, Myrmeleontidae, Nemopteridae, Ascalaphidae) and 203 species and 6 subspecies are known.

According to previous research, 8 species *Chrysoperla carnea*, *Chrysopa formosa*, *Chrysopa hungarica*, *Cunctochrysa baetica*, *Coniopteryx (Metaconiopteryx) arcuata*, *Hemerobius (Hemerobius) gilvus*, *Macronemurus appendiculatus*, *Nemoptera sinuata* were found in Çorum, Tokat, Amasya provinces [10-15].

The objective of this study was to provide detailed information on families and their distribution in the Çorum, Tokat, Amasya Provinces, and to make a contribution to species composition (species distributions of subfamilies and genera), ecological properties of species (faunistic richness, heterogeneity of populations, abundance, dominance of species, habitat affinities, habitat preference, habitat similarity of species) of Neuroptera families of Turkey.

2. Materials and Methods

Lacewing specimen was collected from 57 localities in in Middle Black Sea Region (Çorum, Tokat and Amasya province) of Turkey between the months of May-August 2015. A total of 641 specimens of 52 species were collected from this region.

Specimens were caught from different altitude biotopes coniferous trees, deciduous trees, ferns, shrub, herb, others type (open areas of forest, open steppes, under the bridge) and light trap. The ecosystem diversity and altitudinal variation were taken into account when localities were chosen. Altitudes, route tracks, and directions were recorded using a manual GPS device (Garmin).

Live insect specimens were identified immediately after capture. If specimens could not be identified in the field, they were brought back to laboratory alive and killed with ethyl acetate (but Coniopterygidae specimens

were killed in 70% alcohol and stored). All the lacewing specimens were pinned with their wings spread, then dried and preserved. Most of the lacewing samples were found in the coniferous trees, deciduous trees.

Coordinates of species "Microsoft Office Excel" program and transferred to the "ESRI ArcView GIS version 3.1" map program, on the map localities of the species caught were processed by treatment (Figure 1).

The graphics are prepared in the "OriginPro 7.0" program (Figure 2-5). Specimens are deposited in Kastamonu University's zoology museum.

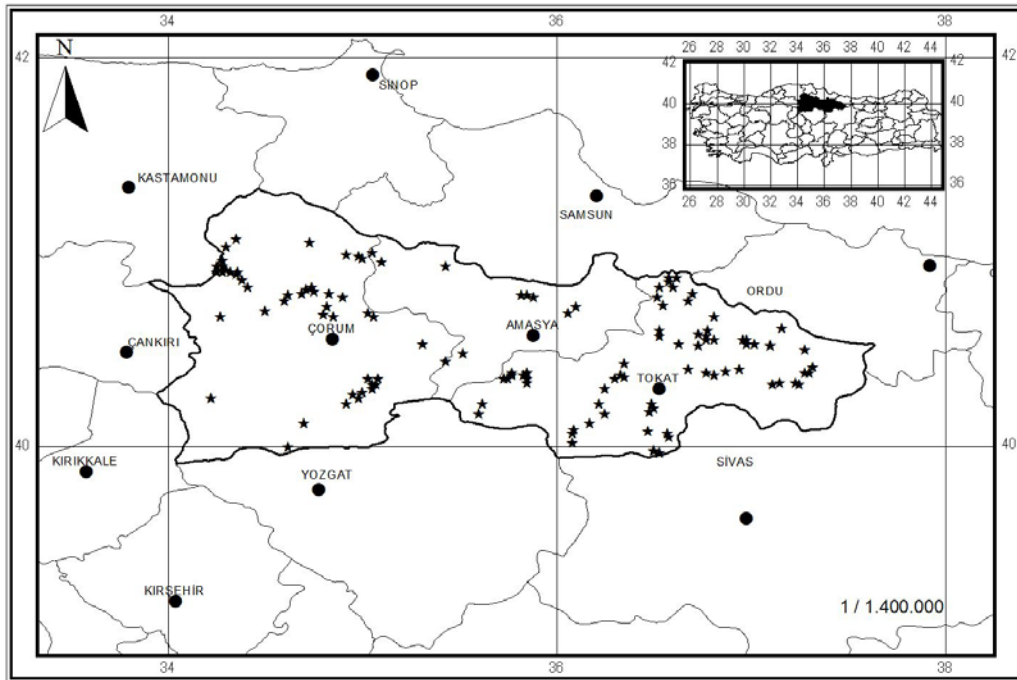


Figure 1. Map of Çorum, Tokat, Amasya Provinces, Middle Black Sea Region of Turkey collecting sites (star), and borders between the provinces are depicted by thin lines.

3. Results

Lacewing specimen was collected from 57 localities in in Middle Black Sea Region (Çorum, Tokat and Amasya province) of Turkey between the months of May-August 2015. A total of 641 specimens of 52 species were collected from this region.

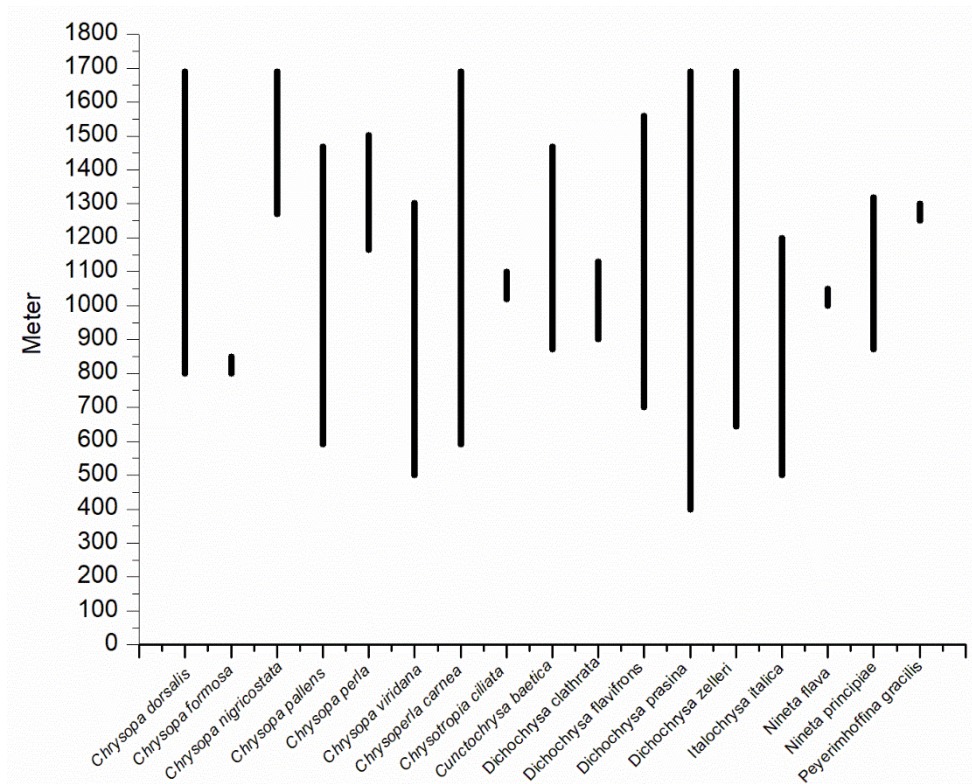


Figure 2. Flight activity of species of Chrysopidae families

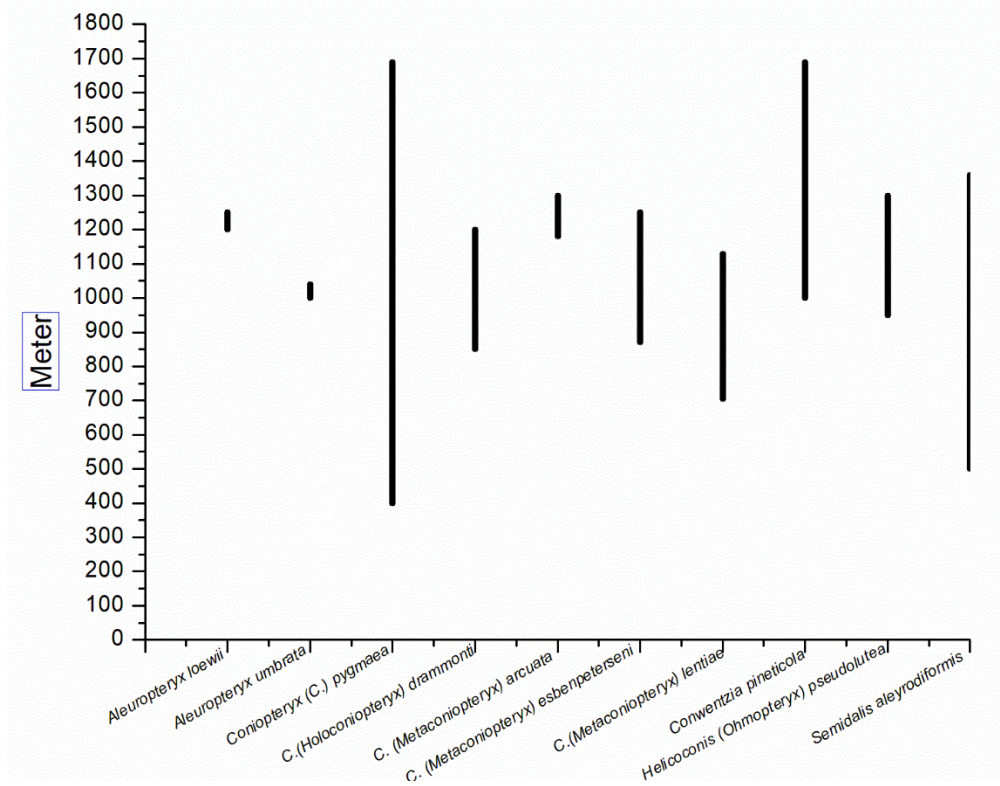


Figure 3. Flight activity of species of Coniopterygidae families

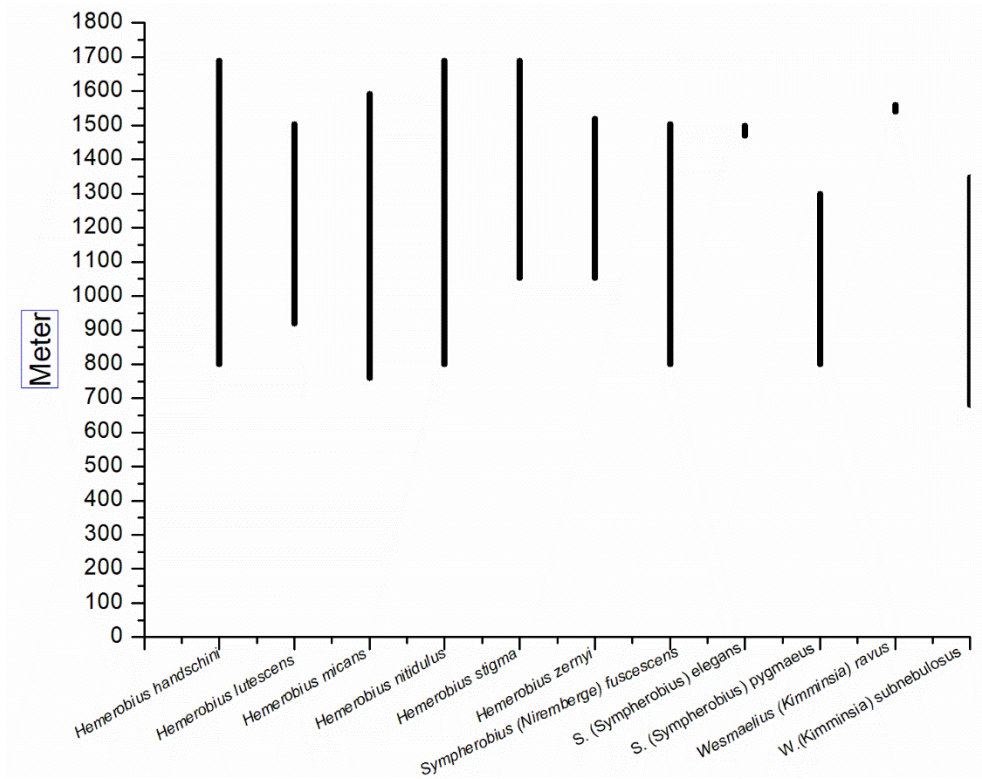


Figure 4. Flight activity of species of Hemerobiidae families

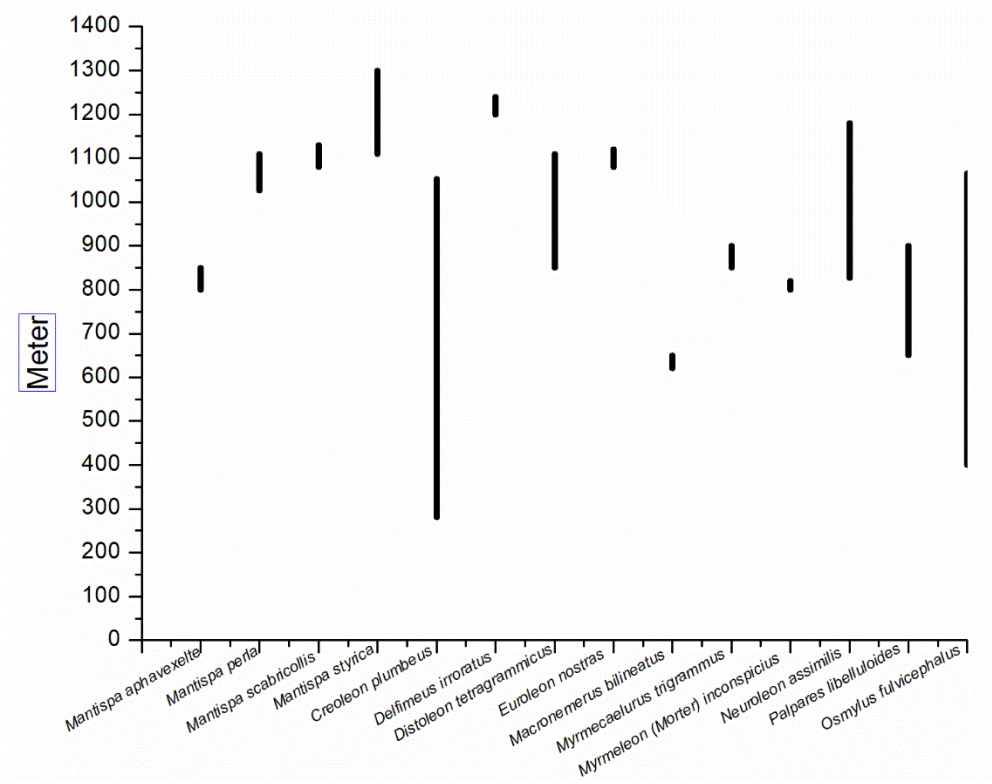


Figure 5. Flight activity of species of Mantispidae, Myrmeleontidae and Osmylidaefamilies

When the vertical distributions of the specimens were examined the most narrowly distributed species *Chrysopa formosa*, *Chrysotropia ciliata*, *Nineta flava*, *Peyerimhoffina gracilis*, *Aleuropteryx loewii*, *Aleuropteryx umbrata*, *Coniopteryx (Metaconiopteryx) arcuata*, *Symphorobius (Symphorobius) elegans*, *Wesmaelius (Kimminsia) ravus*, *Mantispa aphavexelte*, *Mantispa perla*, *Mantispa scabricollis*, *Delfimeus irroratus*, *Euroleon nostras*, *Macronemerus bilineatus*, *Myrmecaelurus trigrammus*, *Myrmeleon (Morter) inconspicuis* the most widely distributed species *Chrysoperla carnea*, *Dichochrysa prasina*. these results are similar to the literature [5-15].

4. Conclusion

I conclude that for neuropterid communities is effective vertical distribution. Further investigations will provide more data on the vertical distribution specificity of the lacewing species studied here, especially for those not clearly associated with the Turkey plant substrates considered. Likewise, studies in the Turkey and other countries could provide interesting data for comparing both behavior on plant substrate and vertical distribution preferences.

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