# ON THE NEUROPTERA OF THE AZORES [1]

By Bo Tjeder [2]

Our knowledge of the Neuroptera of the Azores is chiefly based on the collections made in 1938 during an expedition by Drs. Richard Frey, Ragnar Storå and Carl Cedercreutz and reported by the author in 1948. Their collections contained 67 specimens, representing 6 species. Three of these species had previously been reported from the islands in papers by McLachlan (1899) and Navás (1933). The Lund University expedition in 1957 by Dr. and Mrs. Per Brinck and Dr. and Mrs. Erik Dahl worked in the islands in February, March and April, thus during months which are most unsuitable for collecting lace-wings. Nevertheless, one specimen was captured, a ♂ of *Hemerobius stigma* Steph., which species, in the Azores as well as in Europe, therefore seems to have also a winter brood in addition to the summer broods.

All the hitherto known captures of lace-wings in the Azores are enumerated in the following list.

## Fam. ***Hemerobiidae***

1. ***Micromus angulatus*** (Steph.) 1836.

*Hemerobius angulatus* Stephens, Ill. Brit. Ent., Mand., 6, 106 (1836)

S. Miguel: Furnas, 1 ♀, 23.VI.-1.VII. 1938 (Frey leg.)

Distribution: Holarctic species, recorded from Kamtchatka, Siberia, Japan, Palestine, Europe, Madeira, the Azores, Canada (from Newfoundland as far west and north as British Columbia and Yukon) and the United States (from the Atlantic as far west and south as Colorado).

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1) Report No. 26 from the Lund University Expedition in 1957 to the Azores and Madeira.

2) Zoological Institute of the University of Lund, Sweden.

2. ***Hemerobius humuli*** L. 1758.

Linnaeus, Syst. Nat. ed. X, 1, p. 550, 1758.

S. Miguel: Lagoa do Congro, 2 ♂♂, 21.V.1938 (Storå leg.); Furnas, 1 ♀, 19.-21.V.1938 (Storå leg.); Furnas, 4 ♂♂, 9 ♀♀, 23.VII.-1.VIII.1938 (Frey leg.); Furnas, VIII.-IX.1930 (A. Méquignon and L. Chopard leg., according to Navás, 1933).

Flores: Sta. Cruz, 1 ♀, 16.-30.VI.1938 (Storå leg.).

Distribution: Holarctic species, known from Kamtchatka, Japan, China, Siberia, Turkestan, northern and central Europe, the Azores, Canada (from Newfoundland and Nova Scotia as far west as British Columbia) and the United States (from the Atlantic as far west as central Kansas and as far south as Tennessee and N. Carolina).

3. ***H. azoricus*** Tjed. 1948

Tjeder, Soc. Sci. Fenn., Comment. Biol. 8. 13. p. 3, f. 1-3 (1948)

S. Jorge: Ribeira do Salto, 4 ♂♂, 18.-23.VI.1938 (Frey leg.), Type locality.

S. Miguel: Furnas, 3 ♂♂, 3 ♀♀, 23.VII.-1.VIII.1938 (Frey leg.); 1 ♂ 19-21.V.1938 (Storå leg.); Lago do Congro, 1 ♂, 21.V.1938 (Storå leg.); Sete Cidades, 1 ♂, 17.V.1938 (Frey leg.).

Distribution: Endemic species.

4. ***H. stigma*** Steph. 1836

Stephens, Ill. Brit. Ent., Mand., 6. 112 (1836).

S. Miguel: São Roque, 1 ♀, 13.-15.V.1938 (Frey leg.); Ponta Delgada, 2 km N E of town, in swimming pool, 1 ♂, 5.III.1957 (Brinck and Dahl leg.).

Distribution: Holarctic species, recorded from Japan, northern and central Europe, Madeira, the Azores, Canada (from Labrador and Newfoundland to British Columbia) and the United States, where it is very wide-spread.

The species has been described under many names, cf. Tjeder (1960).

5. ***Boriomyia subnebulosa*** (Steph.) 1836.

*Hemerobius subnebulosus* Stephens, Ill. Brit. Ent., Mand. 6. 107 (1836).

Fayal: Horta, 1 ♂, 11.-14.VII. 1938 (Storå leg.).

São Jorge: Near Ribeira de São Jorge, 26.XI.1880 (according to McLachlan, 1899).

Distribution: Holarctic species, recorded from Siberia, Turkestan, Europe, Morocco, Madeira, the Azores and the United States (Connecticut and New York).

## Fam. ***Chrysopidae***

### 6. ***Chrysopa carnea*** Steph. 1836

Stephens, Ill. Brit. Ent., Mand. 6. 103 (1836).

Flores: Sta. Cruz, 1 ♀, 16.-30.VI.1938, 1 ♀, 1.-15.VII.1938 (Storå leg.); Ribeira da Cruz, 16.VI.1938 (Storå leg.).

Fayal: Horta, several ♂♂ and ♀♀, 11.-14.VII.1938 (Storå leg.); Horta, 1 ♂, 1 ♀, 28.VIII.1938 (Dionísio leg.); Ribeira, 1.VII.1938 (Frey leg.); Caldeira, 4.VII.1938 (Frey leg.).

Pico: Silveira, 7.VIII.1938 (Storå leg.).

São Jorge: Calheta, 1 ♀, 14.-20.VI.1938 (Frey leg.).

Terceira: Monte Brasil, VIII-IX.1930 (A. Mêquignon and L. Chopard leg.; according to Navás, 1933); Monte Brasil, 29.V.-2.VI.1938 (Frey leg.).

S. Miguel: Ponta Delgada, 1 ♂, 19.VII.1938 (Storå leg.); Furnas, VIII.-IX.1930 (A. Mêquignon and L. Chopard leg.; according to Navás, 1933); Furnas, 1♀, 23.VI.-1.VII.1938, several specimens 23.VII.-1.VIII.1938 (Frey leg.).

Distribution: Holarctic species. The most common and widely distributed species of the genus as well in the Palaearctic as in the Nearctic regions. It occurs in Japan, China, Formosa, Siberia, India, Afghanistan, Persia, Mesopotamia, Palestine, Asia Minor, throughout Europe and north Africa, the Azores, Alaska, Canada, and the United States.

Note: The species, represented by the above mentioned specimens from the Azores was in my paper of 1948 dealt with as *Chrysopa vulgaris* Schneid. 1851. I stated that I was of the opinion that *Chrysopa carnea* Steph. and *vulgaris* Schneid. were to be considered as different species. The differences in the genital structures upon which I based that opinion seem, however, to be of uncertain specific value. The matter is not yet settled but I prefer for the present to deal with the two forms as conspecific and

use the older name. In North America the species is known under the name of *plorabunda* Fitch (1856), cf. Tjeder 1960.

## Ecological and Zoogeographical Account

Five of the six species hitherto known from the Azores have, as stated above, a holarctic distribution. One of them, *Hemerobius stigma* Steph., seems to be exclusively associated with conifers. *Micromus angulatus* (Steph.) occurs usually in rank herbage, frequently on Rosa, Rubus and Ribes in gardens, but also on deciduous trees, more seldom on conifers. *Boriomyia subnebulosa* (Steph.) is a common garden-insect in Europe, occurs more seldom in woods on deciduous trees but has even (in England) been taken on Douglas fir. *Hemerobius humuli* L. and *Chrysopa carnea* Steph. are also common in gardens and orchards and in woods on deciduous trees, *Chrysopa carnea* also on conifers. These five species are easily spread with cultivated plants, as eggs, fixed on the plants, as larvae or as pupae hidden in earth and soil on the roots of plants. Knowing of the fact that a very important importation of plants, also conifers, from Europe to the Azores has taken place, it seems very probable that the mentioned five species have reached the islands in such a way. The specimens from the Azores agree in all respects with specimens from Europe. Thus they do not show any modifications which might be expected to occur if the isolation in the islands bad been established during an earlier epoch than the present one.

The sixth species, *Hemerobius azoricus* Tjed., is endemic and belongs to a small group of «Atlantic» species. The other species of this group are *H. eatoni* Mort. 1906 from the Canaries and *H. madeirae* Tjed. 1939 from Madeira. These three species are very closely allied and have, as far as we know, no near relatives in other regions of the world. It seems probable that they have developed from a common, now extinct ancestor (perhaps allied to *H. humuli* L.) which once lived in the region, and that the differentiation has been caused by isolation in the three groups of islands. A long time must be considered to have passed after their isolation in their respective archipelagos. We know, unfortunately, nothing about the ecology of these three species.

## Catalogue of the Neuroptera of the Azores and their Distribution in the Archipelago

| NEUROPTERA | | Corvo | Flores | Faial | Pico | São Jorge | Graciosa | Terceira | S. Miguel | Sta. Maria |
|---|---|---|---|---|---|---|---|---|---|---|
| **Fam. Hemerobiidae** | | | | | | | | | | |
| 1. *Micromus angulatus* (Steph.) | (holarctic) | — | — | — | — | — | — | — | o | — |
| 2. *Hemerobius humuli* L. | » | — | o | — | — | — | — | — | o | — |
| 3. *H. azoricus* Tjed. | (endemic) | — | — | — | — | o | — | — | o | — |
| 4. *H. stigma* Steph. | (holarctic) | — | — | — | — | — | — | — | o | — |
| 5. *Boriomyia subnebulosa* (Steph.) | » | — | — | o | — | o | — | — | — | — |
| **Fam. Chrysopidae** | | | | | | | | | | |
| 6. *Chrysopa carnea* Steph. | (holarctic) | — | o | o | o | o | — | o | o | — |
| | | 0 | 2 | 2 | 1 | 3 | 0 | 1 | 5 | 0 |

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