The fastigial seta *ft''* of tarsus I is eupathidial in the adults of *H. arthurbakeri, H. shawi* and *H. bipilis* ; it is not in the adults of *H. cumbrensis* and *H. formosa.*

Acknowledgements

This is an extension of a Sc. D. thesis achieved under Prof. Ph. Lebrun to whom I am deeply indebted. I am also grateful to Prof. G.W. Krantz (Oregon State University) for reviewing the MS and to Miss A.S. Baker (British Museum) for the loan of the *Proctotydaeus* female mentioned above.

Summary

Two new tydeid mites collected on bark in Belgium are described : *Homeotydeus bipilis* and *H. formosa.* A key to the species of *Homeotydeus* is presented.

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ON THE PHENOLOGY OF SOME PIPUNCULIDAE (DIPTERA) IN BELGIUM*

by M. DE MEYER** and L. DE BRUYN**

Introduction

Pipunculidae are a group of small flies, closely related to the hoverflies (Syrphidae). They are parasites of Homoptera during their larval stage and the adults are inconspicuous insects, found hovering among low vegetation or foliage of shrubs and trees (Coe, 1966).

Because of their specific life history, the phenology of these insects is closely related to the phenology of their hosts. During the last years, some articles were published in Great Britain on this subject (Rothschild, 1964 ; Waloff, 1975 ; Whittaker, 1969).

Within the scope of a M. Sc. degree, the authors made a preliminary study of the Belgian Pipunculidae (De Meyer, 1983 ; De Meyer & De Bruyn, in prep.). A part of that study concerns the phenology of some common species.

Material and methods

Most of the material was collected with three Malaise and six emergence traps at three different sites on a study area at Turnhout (UTM-grid FS.38) during 1982 (leg. L. De Bruyn & M. De Meyer). In addition, material collected with a Malaise trap in a garden at Ottignies (UTM-grid FS.01) during 1981 and 1982 (leg. P. Des-

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sart) and at Ethe-Buzenol (UTM-grid FQ.89) during 1981 (leg. P. Grootaert) was studied. Also the specimens in the collection of the K.B.I.N. (Brussel) and some private collections (De Meyer, Marnef and Michiels) were revised.

The traps were emptied weekly (at Ethe-Buzenol every fortnight). For a description of the study areas at Turnhout and Ottignies we refer respectively to De Bruyn & De Meyer (1983) and Fassotte & Grootaert (1981).

In order to compare the results of the traps with the material of the collections, the latter were grouped into periods of seven days, based on the dates on the labels. The numbers of individuals from the traps were directly plotted on a time axis, whereas the results from the revision of the collections were plotted after being reordered by means of the method of « running averages » (Pollard, 1977). Thereby three-weeks running averages were used. This method was applied because of the heterogenity of the material (different collectors, sites, etc...).

The results from the Malaise trap at Ethe-Buzenol were included in the results from the collections, except for *Pipunculus thomsoni*. Only the graphs with sufficient numbers are represented in this article.

Results and discussion

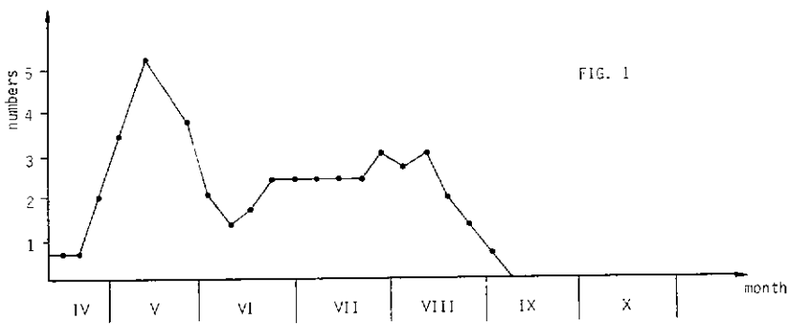
1. *Chalarus spurius* (Fallen, 1816).

In our opinion, one can not distinguish any possible generations since the material, usually identified as *Chalarus spurius* belongs to several species. This is confirmed by Dr. Jervis (in litt.) who makes a revision of the genus *Chalarus*. According to him, all of Coe's, Hardy's and Fallen's species of *Chalarus*, are species complexes.

Therefore no statement can be made concerning voltinity. The species complex « *Chalarus spurius* » (all *Chalarus* spp. with a posteroventral fringe of black or brown hairs on the mid femora) occur during a long period (fig. 1) : from the second half of April till the beginning of October.

2. *Verrallia aucta* (Fallen, 1816).

We found *Verrallia aucta* during the month of June and the beginning of July (fig. 2). This period agrees with the results of



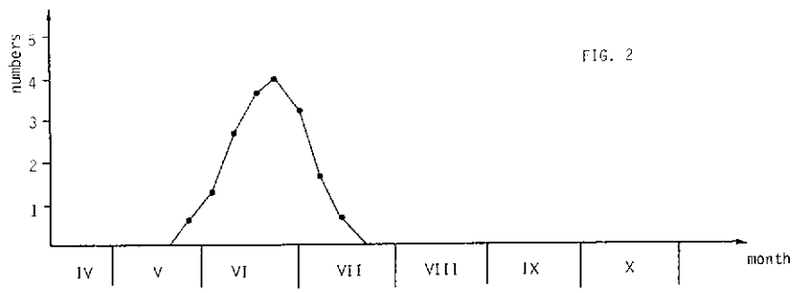


Fig. 1. — *Chalarus spurius*, collection material, three-weeks running averages.

Fig. 2. — *Verrallia aucta*, collection material, three-weeks running averages.

Fig. 3. — *Verrallia setosa*, numbers of flies caught weekly at Turnhout in 1982 (Malaise trap).

Waloff (1975) and Whittaker (1969). *Verrallia aucta* is a parasite of the adults of *Philaenus spumarius* and *Neophilaenus lineatus*. The occurrence of the first adults of these cicades agrees well with the occurrence of the adults of *Verrallia aucta* (WHITTAKER, 1969). So *Verrallia aucta* seems to show one generation a year.

3. *Verrallia setosa* VERRALL, 1901.

Apparently *Verrallia setosa* appears a little earlier than the previous species (fig. 3). We found it during the month of May till the beginning of June. WHITTAKER (1969) reports this species from early in June but he has started collecting only from this month on. WALOFF (1975) reports the species from May. The host of *Verrallia setosa, Neophilaenus campestris* (according to WHITTAKER, 1969) has one generation a year (OSSIANNILSSON, 1981). *Verrallia setosa* seems to be a univoltine species, emerging somewhat earlier than *Verrallia aucta*.

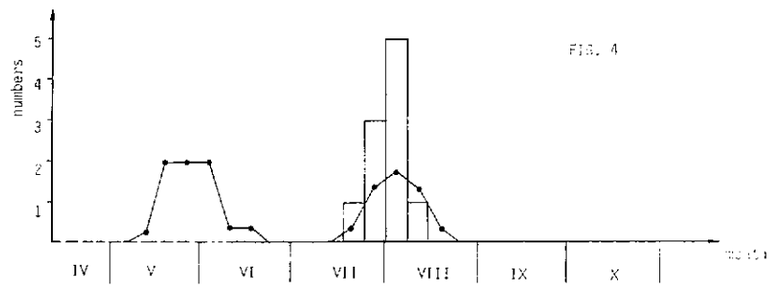
4. *Dorylomorpha xanthopus* (THOMSON), 1869.

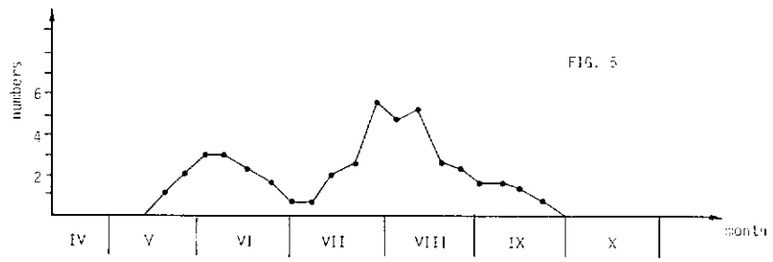
Two peakperiods can be distinguished (fig. 4): one from the end of May till the beginning of June and a second one at the end of July, beginning of August. At Turnhout, we could only detect the second peak of activity but this is probably due to the fact that the traps were placed too late. The two periods are separated by an interval of about ten weeks. This seems to be the usual period between two generations (HARDY, 1943; WALOFF, 1975). So *Dorylomorpha xanthopus* has probably two generations a year.

This conclusion is further supported by the fact that WALOFF (1975) reports *Psammotettix confinis* as a host species. This species is bivoltine and the occurrence of the nymphs corresponds with the emergence of the adults of *Dorylomorpha xanthopus*. Other pipunculids parasitising on *Psammotettix confinis* have also two generations and are found in the same periods (e.g. *Alloneura sylvatica*).

5. *Alloneura sylvatica* (MEIGEN, 1824).

This is clearly a bivoltine species with a peakperiod around the beginning of June and a second one around the beginning of





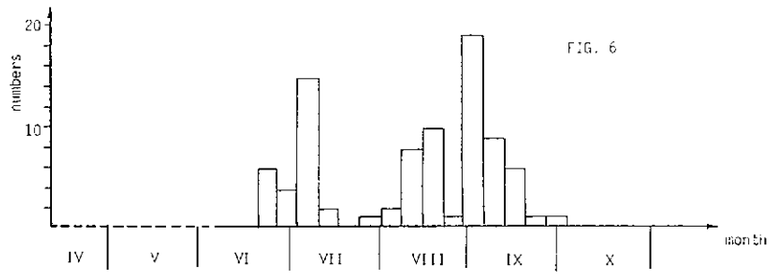


FIG. 4. — *Dorylomorpha xanthopus*, collection material, three-weeks running averages (continuous line); numbers of flies caught weekly at Turnhout in 1982 (emergence traps) (histogram). The broken line on the X-axis indicates the period before the traps were placed.

FIG. 5. — *Alloneura sylvatica*, collection material, three-weeks running averages.

FIG. 6. — *Cephalops semifumosus*, numbers of flies caught weekly at Turnhout in 1982 (emergence traps). The broken line on the X-axis indicates the period before the traps were placed.

August (fig. 5). WALOFF (1975) gives the same conclusion and reports several bivoltine host species.

6. *Pipunculus campestris* LATREILLE, 1804.

Although this species occurs during a long period (from May till August), it is not possible to point out any distinct peakperiods on the results from the traps and neither on the results from the data of the collections. According to WALOFF (1975) this is a bivoltine species and its hosts, *Psammotettix confinis* and *Euscelis plebejus* are also bivoltine. Probably the peakperiods agree with these of other Pipunculidae which parasitize on the the same hosts (e.g. *Alloneura sylvatica* and *Dorylomorpha xanthopus*).

7. *Pipunculus thomsoni* BECKER, 1897.

The results obtained from the material in the collections as well as the catches of the traps at Turnhout (fig. 7) and Ethe-Buzenol, show one generation : from the end of June till the beginning of August.

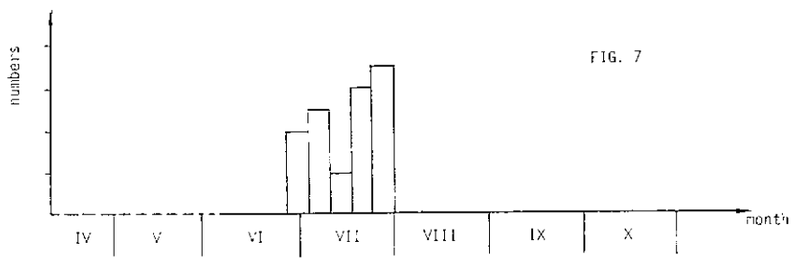
8. *Cephalops semifumosus* (KOWARZ, 1887).

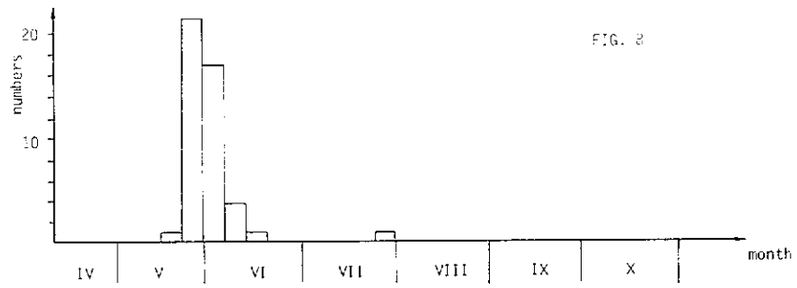
It is possible to distinguish two periods of activity (fig. 6). A first peak was reached at the end of June and the beginning of July while a second was found at the end of August and the beginning of September. These periods differ slightly from the results obtained by ROTHSCHILD (1964) ; in this study the peaks occur earlier (mid July and August).

It seems as if the second generation contains usually a much larger number of individuals than the first one.

9. *Eudorylas subterminalis* COLLIN, 1956.

We found *Eudorylas subterminalis* only at Turnhout in large numbers. The species was captured with a Malaise trap from the end of May till the beginning of June (fig. 8). Because the emergence traps were placed too late (fig. 9) we could not detect this peak. On the other hand, we found in the emergence traps a maximum at the end of August and the beginning of September. Due to some reason *Eudorylas subterminalis* did not occur in the Malaise trap during this period (except for one specimen).





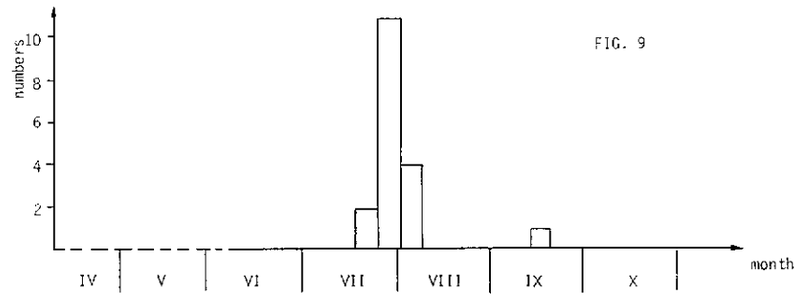


FIG. 7. — *Pipunculus thomsoni*, numbers of flies caught weekly at Turnhout in 1982 (emergence traps). The broken line on the X-axis indicates the period before the traps were placed.

FIG. 8. — *Eudorylas subterminalis*, numbers of flies caught weekly at Turnhout in 1982 (Malaise trap).

FIG. 9. — *Eudorylas subterminalis*, numbers of flies caught weekly at Turnhout in 1982 (emergence traps). The broken line on the X-axis indicates the period before the traps were placed.

So we found two maxima : one from the end of May till the beginning of June and a second from the end of August till the beginning of September, but it was not possible to detect these two generations in the same traps. *Eudorylas subterminalis* resembles *Alloneura sylvatica* in its host specificity (Waloff, 1975) as well as in its time of occurrence. Because of the resemblance we assume that *Eudorylas subterminalis* has two generations and so the results of WALOFF (1975) can be confirmed.

Conclusions

Of the 9 species, here discussed, three are univoltine : *Verrallia aucta, Verrallia setosa* and *Pipunculus thomsoni.* Four are bivoltine : *Dorylomorpha xanthopus, Alloneura sylvatica, Cephalops semifumosus* and *Eudorylas subterminalis.*

No conclusions can be made regarding the voltinity of *Chalarus spurius* because of the species complexity of this « species ». *Pipunculus campestris* has probably two generations a year.

Our results agree with earlier investigations in Great Britain (ROTHSCHILD, 1964 ; WALOFF, 1975 ; WHITTAKER, 1969) except for *Cephalops semifumosus* which in Belgium seems to occur slightly later than stated in the study of ROTHSCHILD, 1964.

In general, our conclusions are based on small numbers of individuals, therefore our results could not be tested statistically.

Acknowledgements

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Summary

The period of occurrence and the voltinity of some common Pipunculidae in Belgium was discussed on the base of material collected with Malaise and emergence traps and dry collections. The results were compared with similar studies in Great Britain.

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