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Annotated list of the entomophagous complex associated with pear psylla, *Psylla pyri* (L.) (Hom. : Psyllidae) in France

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SUMMARY

Among the 56 beneficial insects collected and observed associated with pear psylla in France, 16 were abundant ; these arthropods included 2 parasitoids, *Prionomitus mitratus* (Dalman) and *Trechmites psyllae* (Ruschka) (Encyrtidae), and 14 predators, *Anthocoris nemoralis* (F.), *A. nemorum* (L.), *Orius horvathi* (Reuter), *O. vicinus* (Ribaut) (Het. : Anthocoridae) ; *Heterotoma meriopterum* (Scopoli), *Campyloneura virgula* (Herrich-Schäffer), *Orthotylus nassatus* (F.) (Het. : Miridae) ; *Stethorus punctillum* (Weise), *Scymnus rubromaculatus* (Goeze), *S. subvillosus* (Goeze), *Coccinella septempunctata* L. (Col. : Coccinellidae) ; *Chrysoperla carnea* (Stephens) (Neur. : Chrysopidae) ; *Coniopteryx borealis* Tjeder (Neur. : Coniopterygidae) and the mite *Allothrombium fuliginosum* Hermann. All these species are polyphagous but only the first three are tied to pear psylla. It was shown that the environment of the orchards, comprising hawthorn and nettle, is a reservoir for the main pear psylla enemies. Other prey or hosts and host plants of these beneficial arthropods are cited from recent literature.

Additional key words : Pear trees, parasitoids, predators, worldwide literature review on the hosts and prey of the *P. pyri* natural enemies.

RÉSUMÉ

Inventaire commenté des espèces du complexe biologique du psylle du poirier, Psylla pyri (L.) (Hom. : Psyllidae) en France.

Parmi les 56 auxiliaires inventoriés dans le complexe biologique du psylle du poirier en France, 16 sont relativement abondants ; ce sont 2 parasites, *Prionomitus mitratus* (Dalman) et *Trechmites psyllae* (Ruschka) (Encyrtidae), et 14 prédateurs, *Anthocoris nemoralis* (F.), *A. nemorum* (L.), *Orius horvathi* (Reuter), *O. vicinus* (Ribaut) (Het. : Anthocoridae) ; *Heterotoma meriopterum* (Scopoli), *Campyloneura virgula* (Herrich-Schäffer), *Orthotylus nassatus* (F.) (Het. : Miridae) ; *Stethorus punctillum* (Weise), *Scymnus rubromaculatus* (Goeze), *S. subvillosus* (Goeze), *Coccinella septempunctata* L. (Col. : Coccinellidae) ; *Chrysoperla carnea* (Stephens) (Neur. : Chrysopidae) ; *Coniopteryx borealis* Tjeder (Neur. : Coniopterygidae) et l'acarien *Allothrombium fuliginosum* Hermann. Toutes ces espèces sont polyphages ; seules les 3 premières citées sont étroitement liées au psylle du poirier. L'environnement immédiat des vergers, contenant aubépines et orties, s'est révélé être un réservoir des principaux ennemis du psylle du poirier. D'autres proies, hôtes et plante-hôtes de ces auxiliaires sont signalés d'après la littérature.

Mots clés additionnels : Poiriers, parasites, prédateurs, revue bibliographique mondiale sur les hôtes et les proies des ennemis naturels de *P. pyri*.

I. INTRODUCTION

Psylla pyri (L.) (Hom. : Psyllidae) has long been known as the main pest of pear trees in France (BONNEMAISON & MISSONNIER, 1956 ; GEOFFRION, 1981). Two other pear psyllids, *Psylla pyrisuga* Foerster and *Psylla pyricola* Foerster, are sporadically distributed in France and their damage is not significant (BONNEMAISON & MISSONNIER, 1956 ; ATGER, 1978 ; GEOFFRION, 1981).

ATGER (1977) emphasized that the general upsurge of *P. pyri* populations was closely related to the increase in number of chemical applications made to control it. These treatments both induced increased resistance in the pest and also contributed to reduction of antagonistic fauna (ATGER, 1977, 1978, 1979a, 1979b ; ATGER *et al.*, 1979). Failure of chemical control of *P. pyri* forced growers to reconsider their methods. Better knowledge of biology of the pest and of climatic, agricultural, ecological

and human factors for regulation of its populations, led to use of an integrated control strategy. In France, it is mainly based on use of soft pesticides applied during low activity of predators and in such a manner as to protect the orchard's environment, which is an excellent reservoir for beneficial insects (ATGER *et al.*, 1979).

Possibility of control of pear psylla by its natural enemies was noted in early studies on this pest in Europe (WILLE, 1950 ; BONNEMAISON & MISSIONNIER, 1956 ; OVERMEER, 1961). The major natural enemies of pear psylla recorded in the literature in Europe are listed in table 1, which completes and updates the inventory of PHILOGENE & CHANG (1978).

In France, most authorities agree that only 3 species, *Anthocoris nemoralis* (F.) (Het. : *Anthocoridae*), *Prionomitus mitratus* (Dalman) and *Trechmites psyllae* (Ruschka) (Hym. : *Encyrtidae*) are closely tied to pear psylla and locally very effective in reducing it (FAUVEL & ATGER, 1981 ; NGUYEN *et al.*, 1981). However, when natural control of the psylla occurs, it cannot be done without the aid of many other species (BOUYJOU *et al.*, 1984 ; NGUYEN & DELVARE, 1984) and we do not precisely know their relationship and impact on *P. pyri* (FAUVEL & ATGER, 1981).

Our objective was to inventory parasitoids and predators of pear psylla in 3 orchards in France. By recording abundance of each species, we attempted to determine the most appropriate species for use in biological control.

II. MATERIALS AND METHODS

A. The orchards

We collected insects in a 7-hectare commercial orchard near Toulouse (Haute-Garonne) Southwestern France, in a 2-hectare abandoned plot in an orchard near Avignon (Vaucluse) Southeastern France, and in three 5 000 m² plots at Chanteloup-les-Vignes (Yvelines), Paris region.

At Avignon, the climate was mediterranean, moderated by the Rhone valley. The climate was more humid at Toulouse and much more humid at Chanteloup-les-Vignes. In the orchards visited, pear varieties were "Yellow Williams" at Avignon, and "Red Williams", "Beurré-Hardy" and "Dr. Guyot" at Toulouse and at Chanteloup-les-Vignes. The environment of the orchards was especially rich in the 3 regions. At Avignon, the orchard was surrounded by rows of poplar and hedges of various shrubs, with hawthorn dominating. At Toulouse, the orchard was also surrounded by hawthorn hedges and was close to several groves of deciduous trees (*Quercus*, *Carpinus*, *Ulmus*). At Chanteloup-les-Vignes, the pear plots were situated in a polyculture truck farming plain, the irrigation canals of which are hedged with nettle, *Urtica dioica* L. In southern France, hawthorn was mainly attacked by 2 psyllids, *Psylla melanoneura* Foerster and *Psylla crataegi* (Schrank) ; in northern France, it was also attacked by a third species *Psylla peregrina* Foerster. Nettle mainly was attacked by a psyllid, *Trioza urticae* L., by an aphid *Microlophium evansi* (Theobald) and by cicadellids, the most

frequent of which were *Eupteryx urticae* (F.) and *Eupteryx aurata* (L.). We regularly explored the spontaneous vegetation surrounding the orchards to determine if it harbored alternate hosts and prey for pear psylla enemies.

B. Methods

Adult psyllids and larvae and adults of predators were collected by beating branches over a 0.5 m² tray. Pear psylla nymphs and mummies were collected by cutting twigs bearing them. In the laboratory, mummies were isolated until parasites emerged. Living larvae were transferred to fresh ligneous pear twigs bearing tender leaves. The twigs, standing in aerated water, were placed in an incubator with 16-hour photoperiod and rather low constant temperature (16 °C) to avoid wilting. Mummies which formed on these twigs were also isolated.

III. RESULTS : ANNOTATED LIST OF SPECIES

Species inventoried, their hosts or prey, host plants, abundance and localities of collections are listed in table 2.

A. Parasitoids

The polyphagous encyrtid, *P. mitratus* was one of the most frequent primary parasitoids found in our pear psylla and hawthorn psylla samples (table 2). This confirmed the high attraction of the latter plant as a reservoir for beneficial insects for natural control of pear psylla. *P. mitratus* hibernated as an adult (LAL, 1934) and attacked 4th and 5th instar psylla nymphs (NGUYEN *et al.*, 1981). It occurred early in the year on the most precocious psyllae, *P. melanoneura* on hawthorn and *P. pyrisuga* on pear.

In Europe *P. mitratus* has often been noted on pear psylla (table 1), as sometimes being very efficacious against various psyllids (LAL, 1934 ; CARL & ZWÖLFER, 1965 ; TALITSKII, 1966), and especially against *P. pyri* (NGUYEN *et al.*, 1981 ; DELVARE *et al.*, 1981). *P. mitratus* was recently redescribed by DELVARE *et al.* (1981) and its development and ethology studied in detail by DELVARE (1977). It is holarctic in distribution (KROMBEIN *et al.*, 1979) and has been noted from Canada (PHILOGENE & CHANG, 1978), and in several states in the USA (JENSEN, 1957) on many species of psyllids.

According to FERRIERE (1961), *Prionomitus tiliaris* (Dalman) has rarely been noted in Europe ; HELLEN (1949) collected it in Finland from an unknown host. FERRIERE (1961) noted its strong affinity to *P. peregrina*. However, ARZONE (1979) and GIUNCHI (1980) mentioned *P. tiliaris* as a very efficacious parasitoid of *P. pyri* at Pimerolo, Italy. We personally found it abundant on *P. peregrina* in the Paris region but also at Avignon on other hawthorn psyllids (table 2).

In abundance *T. psyllae* was the second primary parasitoid in our samples (table 2). It has been noted several times in Europe on pear psylla (table 1) as being responsible for a high rate of parasitism

TABLE 1

Biocomplex of pear psylla in Europe (Literature review).
Complexe biologique des psylles du poirier en Europe (Revue bibliographique).

Order & Family	Species or Genus	Location	References	
PARASITOIDS				
HYMENOPTERA				
Encyrtidae	<i>Prionomitus mitratus</i> (Dalman)	Scotland	LAL (1934).	
		Switzerland	WILLE (1950).	
		France	BONNEMAISON & MISSONNIER (1956), ATGER (1979 <i>b</i>), ATGER <i>et al.</i> (1979), NGUYEN <i>et al.</i> (1981), DELVARE (1977), DELVARE <i>et al.</i> (1981), FERRIERE (1926, 1961).	
		Poland	WOJNAROWSKA (1962).	
		Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).	
	<i>Prionomitus tiliaris</i> (Dalman)	Italy	ARZONE (1979), GIUNCHI (1980).	
		Germany	RUSCHKA (1923).	
		France	BONNEMAISON & MISSONNIER (1956), NGUYEN <i>et al.</i> (1981).	
	<i>Trechmites psyllae</i> (Ruschka)	England	GEORGALA (1957).	
		Russia	TALITSKII (1966).	
<i>Psyllaephagus</i> sp.	Italy	ARZONE (1979), GIUNCHI (1980).		
	Italy	GOLFARI (1937), GRANDI (1951).		
	England	GEORGALA (1957).		
	DIPTERA			
Cecidomyiidae	<i>Endopsylla agilis</i> de Meijere	England	BAGNALL & HARRISON (1924).	
		Scotland	BARNES (1930), LAL (1934).	
		Holland	BARNES (1930).	
		Switzerland	CARL (1969).	
		Austria	CARL (1969).	
		Germany	CARL (1969).	
		France	CARL (1969).	
	<i>Endopsylla</i> sp.	Italy	CARL (1969).	
		Scotland	LAL (1934).	
	HYPERPARASITOIDS			
HYMENOPTERA				
Encyrtidae	<i>Aphidencyrtus cantabricus</i> (Mercet)	Italy	ARZONE (1979), GIUNCHI (1980).	
		France	NGUYEN <i>et al.</i> (1981).	
		Russia	TALITSKII (1966).	
		France	BONNEMAISON & MISSONNIER (1956).	
		Russia	TALITSKII (1966).	
	<i>Marietta picta</i> (André)	Russia	YAKHONTOV (1929).	
		Encyrtus sp.	Russia	TALITSKII (1966).
		<i>Pachyneuron aphidis</i> Bouché	Russia	NGUYEN <i>et al.</i> (1981).
			France	ARZONE (1979), GIUNCHI (1980).
			Italy	NGUYEN <i>et al.</i> (1981).
Pteromalidae	<i>Pachyneuron concolor</i> (Foerster)	France	TALITSKII (1966).	
		Russia	LAL (1934).	
	<i>Pachyneuron solitarium</i> (Hartig)	Scotland	GOLFARI (1937), GRANDI (1951).	
		Italy	BONNEMAISON & MISSONNIER (1956).	
	Ceraphronoidea	<i>Asaphes vulgaris</i> Walker	Scotland	LAL (1934).
Scotland			LAL (1934).	
<i>Lygocerus semiramosus</i> Kieffer		England	GEORGALA (1957).	
		France	BONNEMAISON & MISSONNIER (1956).	
PREDATORS				
HETEROPTERA				
Anthocoridae	<i>Anthocoris gallarum-ulmi</i> (DeGeer)	Yugoslavia	VRABL & MATIS (1977).	
		England	BRONNIMANN (1964), CRANHAM (1980).	
		Europe	CARL & ZWOLFER (1965), IOBC (1980).	
		Switzerland	FIELDS & BEIRNE (1973), KEIMER (1983), BAGGIOLINI <i>et al.</i> (1979).	
		Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), PEZZI (1982).	
	<i>Anthocoris nemoralis</i> (F.)	France	ATGER (1979 <i>b</i>), ATGER <i>et al.</i> (1979), NGUYEN <i>et al.</i> (1981), FAUVEL & ATGER (1981), GEOFFRION (1981).	
		England	GEORGALA (1957), BRONNIMANN (1964).	
		Poland	WOJNAROWSKA <i>et al.</i> (1960).	
		Europe	CARL & ZWOLFER (1965).	
		France	BONNEMAISON & MISSONNIER (1956), NGUYEN <i>et al.</i> (1981).	
<i>Anthocoris nemorum</i> (L.)	Switzerland	SCHEURER <i>et al.</i> (1975).		

Table 1 (continued)

Order & Family	Species or Genus	Location	References
Miridae	<i>Orius minutus</i> (L.)	France	BONNEMAISON & MISSONNIER (1956), NGUYEN <i>et al.</i> (1981).
		Yugoslavia	VRABL & MATIS (1977).
		Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Orius niger</i> (Wolff)	France	NGUYEN <i>et al.</i> (1981).
	<i>Orius vicinus</i> (Ribaut)	France	ATGER (1979 <i>b</i>), ATGER <i>et al.</i> (1979), FAUVEL & ATGER (1981), NGUYEN <i>et al.</i> (1981), GEOFFRION (1981).
	Anthocoridae spp.	Holland	OVERMEER (1961).
	<i>Campylomma verbasci</i> Meyer-Duer	France	FAUVEL & ATGER (1981).
	<i>Deraeocoris lutescens</i> (Schilling)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
		France	ATGER <i>et al.</i> (1979), FAUVEL & ATGER (1981).
	<i>Deraeocoris ruber</i> (L.)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Deraeocoris serenus</i> Douglas & Scott	France	FAUVEL & ATGER (1981).
	<i>Deraeocoris</i> sp.	France	ATGER (1979 <i>b</i>), NGUYEN <i>et al.</i> (1981).
	<i>Heterotoma meriopterum</i> (Scopoli)	France	FAUVEL & ATGER (1981).
	<i>Orthotylus nassatus</i> (F.)	France	FAUVEL & ATGER (1981).
Nabidae	<i>Phytocoris</i> spp.	France	FAUVEL & ATGER (1981).
		Denmark	THYGESEN <i>et al.</i> (1973).
	<i>Pilophorus perplexus</i> (Doug. & Sc.)	France	FAUVEL & ATGER (1981).
	<i>Aptus myrmecoides</i> (O.C.)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Himacerus apterus</i> (F.)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
COLEOPTERA Coccinellidae	<i>Adalia bipunctata</i> (L.)	Poland	WOJNAROWSKA <i>et al.</i> (1960), WOJNAROWSKA (1962).
		U.S.S.R.	SHALAMBERIDZE (1980).
		Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Calvia 14-guttata</i> (L.)	Italy	ARZONE (1979), GIUNCHI (1980).
	<i>Coccinella 7-punctata</i> L.	Poland	WOJNAROWSKA <i>et al.</i> (1960), WOJNAROWSKA (1962).
		Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Scymnus</i> sp.	France	ATGER (1979 <i>b</i>).
	<i>Stethorus punctillum</i> Weise	France	ATGER <i>et al.</i> (1979), FAUVEL & ATGER (1981).
	<i>Stethorus</i> sp.	France	ATGER (1979 <i>b</i>).
	Coccinellidae spp.	France	BONNEMAISON & MISSONNIER (1956), ATGER (1979 <i>b</i>), NGUYEN <i>et al.</i> (1981), FAUVEL & ATGER (1981).
NEUROPTERA Chrysopidae		Holland	OVERMEER (1961).
		Belgium	KNAPEN & VANWETSWINKEL (1977).
		Yugoslavia	VRABL & MATIS (1977).
	<i>Chrysopa carnea</i> Stephens	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
		France	NGUYEN <i>et al.</i> (1981).
		U.S.S.R.	SHALAMBERIDZE (1980).
	<i>Chrysopa flavifrons</i> Brauer	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Chrysopa perla</i> (L.)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Chrysopa 7-punctata</i> Wesmael	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Chrysopa</i> sp.	Poland	WOJNAROWSKA <i>et al.</i> (1960), WOJNAROWSKA (1962).
	Chrysopidae spp.	France	BONNEMAISON & MISSONNIER (1956), BASSINO <i>et al.</i> (1975), ATGER <i>et al.</i> (1979), ATGER (1979 <i>b</i>), FAUVEL & ATGER (1981).
		Yugoslavia	VRABL & MATIS (1977).
	<i>Drepanepteryx phalaenoides</i> (L.)	Italy	ARZONE (1979), GIUNCHI (1980).
	<i>Hemerobius lutescens</i> F.	Italy	ARZONE (1979), GIUNCHI (1980).
	<i>Hemerobius micans</i> Olivier	Italy	ARZONE (1979), GIUNCHI (1980).
Hemerobiidae	Hemerobiidae spp.	France	BONNEMAISON & MISSONNIER (1956), ATGER <i>et al.</i> (1979), NGUYEN <i>et al.</i> (1981).
			ATGER <i>et al.</i> (1979).
Coniopterygidae	Coniopterygidae spp.	France	ATGER <i>et al.</i> (1979).
DIPTERA Syrphidae	<i>Episyrphus balteatus</i> (DeGeer)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Lasiophthicus pyrastris</i> (L.)	Italy	ARZONE (1979), GIUNCHI (1980).
	<i>Platycheirus albimanus</i> (F.)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	<i>Platycheirus sticticus</i> (Meigen)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).

Table 1 (continued)

Order & Family	Species or Genus	Location	References
	<i>Sphaerophoria scripta</i> (L.)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
	Syrphidae spp.	France	BONNEMAISON & MISSONNIER (1956), BASSINO <i>et al.</i> (1975), ATGER <i>et al.</i> (1979), ATGER (1979b), NGUYEN <i>et al.</i> (1981).
		Yugoslavia	VRABL & MATIS (1977).
ORTHOPTERA			
Tettigoniidae	<i>Meconema thalassinum</i> (DeGeer)	Italy	ARZONE (1979), GIUNCHI (1980).
Gryllidae	<i>Oecanthus pellucens</i> (Scopoli)	Italy	VIDANO <i>et al.</i> (1977-1978), ARZONE (1979), GIUNCHI (1980).
HYMENOPTERA			
Formicidae	Formicidae spp.	France	NGUYEN <i>et al.</i> (1981).
ARACHNIDA			
Araneidae	Araneidae spp.	France	FAUVEL & ATGER (1981).
PATHOGEN			
Entomophthoraceae	<i>Entomophthora</i> sp.	France	BONNEMAISON & MISSONNIER (1956).
		Italy	VIDANO <i>et al.</i> (1977-1978), PICCO (1978), ARZONE (1979), GIUNCHI (1980).

TABLE 2

Biocomplex of Psylla spp. on pear trees, hawthorn and nettle in France, by F. HERARD

Complexe biologique des psylles du poirier, aubépine et ortie en France, par F. HERARD

Species	Host or Prey PP = Pear psylla	Host Plant PT = Pear tree H = Hawthorn N = Nettle	Locality A = Avignon T = Toulouse C = Chanteloup- les-vignes S = Sèvres	Abundance 0 = rare + = not very abundant ++ = rather abundant +++ = abundant
PARASITOIDS				
HYMENOPTERA				
Encyrtidae				
<i>Prionomitus mitratus</i> (Dalman)	<i>Psylla pyri</i> (L.)	PT	A, T	++
	<i>Psylla pyrisuga</i> Foerster	PT	A, T	0
	<i>Psylla melanoneura</i> Foerster	H	A	+
	<i>Psylla peregrina</i> Foerster	H	S	++
	<i>Psylla crataegi</i> (Schrank)	H	A	+++
<i>Prionomitus tiliaris</i> (Dalman)	<i>P. melanoneura</i>	H	A	+
	<i>P. peregrina</i>	H	S	+++
	<i>P. crataegi</i>	H	A	+
<i>Trechnites psyllae</i> (Ruschka)	<i>P. pyri</i>	PT	A, T, C	++
	<i>P. pyrisuga</i>	PT	A, T	0
	<i>P. crataegi</i>	H	A	+
<i>Coccophagus ? obscurus</i> Westwood	<i>P. peregrina</i>	H	S	0
HYPERPARASITOIDS				
HYMENOPTERA				
Encyrtidae				
<i>Aphidencyrus mamitus</i> (Walker)	<i>P. mitratus</i>			
	in <i>P. pyri</i>	PT	A, T	+
	in <i>P. pyrisuga</i>	PT	A, T	+
	in <i>P. peregrina</i>	H	S	+
	in <i>P. crataegi</i>	H	A	+
	<i>P. tiliaris</i>			
	in <i>P. peregrina</i>	H	S	+++
	<i>T. psyllae</i>			
	in <i>P. pyri</i>	PT	A, T, C	+
	in <i>P. pyrisuga</i>	PT	A, T	+
<i>Aphidencyrus ? taeniatu</i> s (Foerster)	<i>P. mitratus</i> in <i>P. pyri</i>	PT	A	0
<i>Aphidencyrus ? aphidivorus</i> (Mayr)	<i>P. tiliaris</i>			
	in <i>P. peregrina</i>	H	S	0

Table 2 (continued)

Species	Host or Prey PP = Pear psylla	Host Plant PT = Pear tree H = Hawthorn N = Nettle	Locality A = Avignon T = Toulouse C = Chanteloup- les-vignes S = Sèvres	Abundance 0 = rare + = not very abundant ++ = rather abundant +++ = abundant
Pteromalidae				
<i>Pachyneuron concolor</i> (Foerster) (= <i>muscarum</i> (L.))	<i>P. mitratus</i> in <i>P. peregrina</i> in <i>P. crataegi</i> in <i>P. pyri</i>	H H PT	S A A, T, C	0 0 +
<i>Hyperimerus pusillus</i> (Walker)*	<i>P. tiliaris</i> in <i>P. peregrina</i>	H	S	0
<i>Coruna clavata</i> Walker	<i>P. tiliaris</i> in <i>P. peregrina</i>	H	S	0
Cynipoidea				
Alloxystidae				
<i>Dilyta subclavata</i> Foerster	<i>P. mitratus</i> in <i>P. pyri</i>	PT	A, T	0
Ceraphronoidea				
Megaspilidae				
<i>Dendrocercus psyllarum</i> Dessart**	<i>P. tiliaris</i> in <i>P. peregrina</i>	H	S	0
PREDATORS				
HETEROPTERA				
Anthocoridae				
<i>Anthocoris nemoralis</i> (F.)	PP <i>P. peregrina</i> <i>P. crataegi</i>	PT H H	A, T, C S A	+++ ++ +
<i>Anthocoris nemorum</i> (L.)	PP <i>Trioza urticae</i> L.	PT N	C C, S	++ +
<i>Anthocoris confusus</i> Reuter	PP	PT	C	0
<i>Orius horvathi</i> (Reuter)	PP	PT	A, T, C	+++
<i>Orius vicinus</i> (Ribaut)	PP <i>P. peregrina</i>	PT H	A, T, C S	++ +
<i>Orius minutus</i> (L.)	PP <i>P. peregrina</i>	PT H	A, T, C S	+ +
<i>Orius niger</i> (Wolff)	PP <i>T. urticae</i>	PT N	T, C T, C	+ +
<i>Orius laevigatus</i> (Fieber)	PP	PT	A, T, C	0
<i>Orius majusculus</i> (Reuter)	PP	PT	A, C	0
<i>Temnostethus pusillus</i> (Herrich-Schäffer)	PP	PT	T	0
<i>Cardiastethus fasciventris</i> (Garb.)	Psocidae, <i>Psylla</i> ?	PT H	A, T S	0 0
Miridae				
<i>Heterotoma meriopterum</i> (Scopoli)	PP <i>P. crataegi</i> <i>P. peregrina</i> <i>T. urticae</i>	PT H H N	A, T, C A S S	+++ ++ + ++
<i>Campyloneura virgula</i> (Herrich-Schäffer)	PP <i>P. peregrina</i> <i>P. crataegi</i>	PT H H	A, T, C S A	+++ + +
<i>Orthotylus nassatus</i> (F.)	PP <i>P. crataegi</i>	PT H	A, T A	+++ +
<i>Deraeocoris lutescens</i> (Schilling)	PP <i>P. crataegi</i>	PT H	A, T A	+ 0
<i>Deraeocoris ruber</i> (L.)	PP	PT	C	0
<i>Pilophorus perplexus</i> (Douglas & Scott)	PP	PT	A, T	+
<i>Pilophorus gallicus</i> Remane	PP	PT	A	0
<i>Pilophorus clavatus</i> (L.)	PP	PT	T	+
<i>Mimocoris rugicollis</i> (Costa)	PP	PT	A	0
<i>Psallus ambiguus</i> (Fallen)	PP <i>P. peregrina</i>	PT H	T S	0 0
<i>Phytocoris longipennis</i> Flor	PP	PT	T, C	0
<i>Phytocoris ulmi</i> (L.)	PP	PT	T	0
Nabidae				
<i>Himacerus apterus</i> (L.)	PP	PT	T, C	0
<i>Nabis ferus</i> (L.)	PP	PT	T	0
<i>Nabis punctatus</i> Costa	PP	PT	T	0

* First host record ; ** New species ; ? Species = means that the identification is not certain, because the specimen is aberrant, usually too small, with unevident characters.

Table 2 (continued)

Species	Host or Prey PP = Pear psylla	Host Plant PT = Pear tree H = Hawthorn N = Nettle	Locality A = Avignon T = Toulouse C = Chanteloup- les-vignes S = Sèvres	Abundance 0 = rare + = not very abundant ++ = rather abundant +++ = abundant
COLEOPTERA				
Coccinellidae				
<i>Stethorus punctillum</i> (Weise)	Mites, <i>Psylla</i> ?	PT	A	+++
<i>Scymnus rubromaculatus</i> (Goeze)	PP	PT	A, T	+++
	<i>P. crataegi</i>	H	A	+
<i>Scymnus subvillosus</i> (Goeze)	PP	PT	A	+++
<i>Scymnus interruptus</i> (Goeze)	PP	PT	A	0
<i>Rhyzobius chrysomeloides</i> (Herbst)	PP	PT	A	0
	<i>P. peregrina</i>	H	S	0
<i>Clitostethus arcuatus</i> (Rossi)	White flies	H	S	+
	<i>P. peregrina</i>	H	S	0
<i>Adalia bipunctata</i> (L.)	PP	PT	A, T, C	+
<i>Synharmonia conglobata</i> (L.)	PP	PT	A, T	0
<i>Synharmonia lyncea</i> Olivier	PP	PT	T	0
<i>Propylea quatuordecimpunctata</i> (L.)	PP	PT	A, T	0
<i>Coccinella septempunctata</i> L.	PP	PT	A, T	++
<i>Chilocorus renipustulatus</i> (Scriba)	PP	PT	T	0
<i>Coccinula quatuordecimpustulata</i> (L.)	PP	PT	T	0
<i>Thea vigintiduopunctata</i> (L.)	PP	PT	A	+
Carabidae				
<i>Demetrias atricapillus</i> (L.)	PP	PT	A, T	+
NEUROPTERA				
Chrysopidae				
<i>Chrysoperla carnea</i> (Stephens)	PP	PT	A, T, C	+++
<i>Anisochrysa prasina</i> (Burmeister)	PP	PT	A	0
<i>Anisochrysa picteti</i> (McLachlan)	PP	PT	A	0
Hemerobiidae				
<i>Hemerobius humulinus</i> L.	PP	PT	A, T	+
	<i>P. crataegi</i>	H	A	+
<i>Wesmaelius subnebulosa</i> (Stephens)	PP	PT	A	0
<i>Symphorobius pygmaeus</i> (Rambur)	PP	PT	A	0
Coniopterygidae				
<i>Coniopteryx borealis</i> Tjeder	PP	PT	A, T	++
	<i>P. peregrina</i>	H	S	+
	<i>P. crataegi</i>	H	A	+
DIPTERA				
Syrphidae				
<i>Meliscaeva auricollis</i> (Meigen)	PP	PT	T	+
<i>Syrphus vitripennis</i> (Meigen)	PP	PT	T	+
<i>Episyrphus balteatus</i> (De Geer)	PP	PT	T	+
ACARI				
<i>Anystis</i> sp.	PP	PT	A, T	+
<i>Allothrombium fuliginosum</i> Hermann	PP	PT	A, T	++
PATHOGEN				
<i>Entomophthora</i> sp.	<i>P. peregrina</i>	H	S	0

(TALITSKII, 1966). We also obtained it from *P. crataegi* nymphs at Avignon in 1981. In contrast to *P. mitratus*, *T. psyllae* generally were abundant in late summer and in autumn. It hibernated in the larval stage inside its mummified host. In early winter, we observed that *P. pyri* nymphs parasitized by *T. psyllae* moved downward on pear trees, 2 to 3 meters from the crown. There they stopped in crevices of the bark and mummified. We trapped them in large numbers using undulated cardboard traps placed at the base of the tree. This implies that the parasitoid can influence the behavior of its host in autumn thus affording it a favorable hibernating site at the moment of host mummification. In contrast, we found that in autumn unparasitized 5th instar

nymphs abandoned leaves which were going to fall and come to rest on twigs 10 to 30 cm from their original feeding site. There they moult to become adults and to overwinter. Interestingly, in summer, the parasitized nymphs of pear psylla did not mummify further than 30 cm from their feeding site.

T. psyllae was introduced several times in California between 1965 and 1968 (CLAUSEN, 1978) to contribute to the control of *P. pyricola*. This encyrtid has also been found in Ontario, Canada, where its introduction probably was fortuitous.

Specimens of *Coccophagus* (?) *obscurus* Westwood which we obtained from *P. peregrina* were considered by Dr. BOUCEK (pers. com.), who identified them, most probably as primary parasitoids of this psyllid.

This encyrtid has been recorded as a primary parasitoid of the coccid, *Euphilippia olivina* Berl. & Silv., on olive in Italy (SCALTRITI, 1982).

B. Hyperparasitoids

In our samples of pear and hawthorn psyllid mummies, the encyrtids, *P. mitratus*, *P. tiliaris* and *T. psyllae*, were sometimes parasitized by *Aphidencyrus mamitus* (Walker) (table 2). According to NGUYEN *et al.* (1981), this encyrtid can attack 2nd and 5th instar larvae and prepupae of *P. mitratus* and *T. psyllae* inside *P. pyri*. STARY (1970) obtained *A. mamitus* from the sycamore aphid *Drepanosiphum platanoides* (Schränk) in Czechoslovakia.

We obtained *Aphidencyrus* (?) *taeniatus* (Foerster) from *P. pyri* nymphs parasitized by *P. mitratus*. In the USSR, TALITSKII (1966) noted *A. taeniatus* as a primary and occasionally a secondary parasitoid of *P. pyri*.

We reared *Aphidencyrus* (?) *aphidivorus* (Mayr) from *P. peregrina* parasitized by *P. tiliaris*. From references recorded in table 3, *A. aphidivorus* is holarctic in distribution and generally collected from aphids, sometimes as a primary parasitoid but most often as a hyperparasitoid.

Among the pteromalid hyperparasitoids found in our pear and hawthorn psyllid samples, *Pachyneuron concolor* (Foerster) (= *muscarum* (L.)) was the commonest (table 2). It was recorded in 1939 from *P. peregrina* (GRAHAM, 1969), very probably as a hyperparasitoid of this psyllid. NGUYEN *et al.* (1981) observed it as an ectoparasitoid of 5th instar larvae, prepupae and pupae of *P. mitratus* and *T. psyllae* inside *P. pyri* mummies. *P. concolor* is polyphagous and was sometimes mentioned as a primary parasitoid (table 4). More often it has been a hyperparasitoid and sometimes as a tertiary parasitoid on members of its own species, as well as on various other chalcidoids that have developed as secondary parasitoids in an encyrtid host (ROSEN & KFIR, 1983).

We obtained *Hyperimerus pusillus* (Walker) from *P. peregrina* nymphs parasitized by *P. tiliaris*. According to Dr. BOUCEK (pers. com.) who identified this Pteromalid, it is a first host record. Biology of *H. pusillus* is unknown (GRAHAM, 1969), but it was collected in Britain, Sweden, Czechoslovakia, Yugoslavia, and now in France. A related nearctic species, *Hyperimerus corvus* Girault, was mentioned as a parasitoid of *Chrysopa* sp., *Hemerobius* sp. and *Symphorobius* sp., closely associated with *Pseudococcus* in its native environment (KROMBEIN *et al.*, 1979).

TABLE 3

Host of Aphidencyrus aphidivorus (Mayr) noted in recent literature.

Hôtes d'A. aphidivorus signalés récemment dans la littérature.

Primary host	Secondary host	Host plant	Location	References
Aphids				
<i>Aphis gossypii</i> Glover	.....	cotton	Bulgaria India	RADEV (1968). PALANISWAMI & PILLAI (1980).
<i>Aphis fabae</i> Scopoli	.....	broad bean	Iraq	SELIM (1977).
<i>Aphis pomi</i> De Geer	.....	apple	India	HAYAT (1981).
<i>Aphis craccivora</i> Koch	.....	leguminous crops	Pakistan	HAMID <i>et al.</i> (1977).
<i>Uroleucon compositae</i> (Theobald)	.....	safflower	India	THONTADARYA <i>et al.</i> (1976).
<i>Rhopalosiphum maidis</i> (Fitch)	.....	sorghum	India	RADKE & BARWAD (1978).
Hymenoptera				
Aphids				
?	<i>Toxoptera aurantii</i>			
	Boyer de Fonscolombe	citrus	Greece	SANTAS (1979).
?	<i>Diuraphis noxia</i> (Mordvilko)	barley, wheat	U.S.S.R.	BEREST (1980a).
?	<i>Schizaphis graminum</i> (Rondani)	barley, wheat	U.S.S.R.	BEREST (1980a).
?	<i>A. gossypii</i>	cotton	China	SHI (1982).
<i>Aphelinus flavus</i> Thomson	<i>Drepanosiphum platanoides</i> (Schränk)	sycamore	Scotland	HAMILTON (1973).
<i>Aphelinus abdominalis</i> (Dalman)	<i>Metopolophium dirhodum</i> (Walker)	<i>Phalaris</i> sp.	Argentina	BOTTO (1981).
<i>Aphelinus nigritus</i> Howard	<i>R. maidis</i>	sorghum	U.S.A.	SUMMY <i>et al.</i> (1979), ARCHER <i>et al.</i> (1974), JACKSON <i>et al.</i> (1970).
<i>Aphelinus varipes</i> (Foerster)	<i>R. maidis</i>	sorghum	U.S.A.	ARCHER <i>et al.</i> (1974), JACKSON <i>et al.</i> (1970).
<i>Aphidius colemani</i> Viereck	<i>S. graminum</i>	sorghum	Brazil	GRAVENA (1982).
<i>Aphidius smithi</i>				
Sharma & Subba Rao	<i>Acyrtosiphon pisum</i> (Harris)	lucerne, red clover	U.S.A.	PASS & PARR (1971).
<i>Diaeretiella rapae</i> (Mc Intosh)	<i>S. graminum</i>	sorghum	Brazil U.S.A.	GRAVENA (1979). WALKER <i>et al.</i> (1973).
<i>Lysiphlebus testaceipes</i> (Cresson)	<i>S. graminum</i>	sorghum	U.S.A.	JACKSON <i>et al.</i> (1970), WALKER <i>et al.</i> (1973), ARCHER <i>et al.</i> (1974), SUMMY <i>et al.</i> (1979).

TABLE 4

Hosts of Pachyneuron concolor (Foerster) noted in recent literature.
Hôtes de P. concolor signalés récemment dans la littérature.

Primary host	Secondary host	Host plant	Location	References
<i>Sphaerolecanium prunastri</i> (Fonsc.)	.....	fruit trees	Serbia	MITIC-MUZINA (1967).
<i>Dendrolimus pini</i> (L.) eggs	.....	pin	Hungary	BENEDEK (1969).
<i>Oscinella frit</i> (L.)	.....	cereals	Israel	ROSEN & KFIR (1983).
<i>Leucopis</i> sp.	.....	various plants	Israel	ROSEN & KFIR (1983).
?	soft scales	various plants	U.S.S.R.	SUGONYAEV & BABAIEV (1978).
?	<i>Psylla peregrina</i> Foerster	hawthorn	Scotland	GRAHAM (1969).
<i>Prionomitus mitratus</i> (Dalman)	<i>Psylla pyri</i> (L.)	pear	France	NGUYEN <i>et al.</i> (1981).
<i>Trechmites psyllae</i> (Ruschka)	<i>P. pyri</i>	pear	France	NGUYEN <i>et al.</i> (1981).
<i>Microterys flavus</i> (Howard)	<i>Coccis hesperidum</i> L.	citrus	Israel	KFIR & ROSEN (1981).
<i>Microterys hortulanus</i> Erdős	<i>S. prunastri</i>	sloe	Poland	PODSIADLO (1981).
<i>Coccophagus lycimnia</i> (Walker)	<i>S. prunastri</i>	peach, cherry, almond	Greece	ARGYRIOU & PALOUKIS (1976).
<i>Discoides coccophagus</i> (Ratzeburg)	<i>S. prunastri</i>	sloe	Poland	PODSIADLO (1981).
<i>Metaphycus silvestrii</i> Sugonyaev	<i>S. prunastri</i>	sloe	Poland	PODSIADLO (1981).
<i>Metaphycus lounsburyi</i> (Howard)	<i>Saissetia oleae</i> (Olivier)	olive	Italy	MONACO (1976).
Encyrtids	coccids, mealybugs, coccinellids	various plants	Israel	ROSEN & KFIR (1983).
<i>Trichogramma embryophagum</i> (Hartig)	<i>Acantholyda pinivora</i> Enslin eggs	pin	Poland	KOEHLER (1967).

We found *Coruna clavata* Walker as a hyperparasite of *P. peregrina* (parasitized by *P. tiliaris*) in the Paris region. According to GRAHAM (1969), this Pteromalid is widely distributed in Europe, USSR and North America. It generally has been noted as a hyperparasite of aphids through various species of *Aphidiidae* (SHANDS *et al.*, 1965; GRAHAM, 1969; DEAN, 1974; HAMILTON, 1973; JONES, 1979; KROMBEIN *et al.*, 1979).

We found *Dilyta subclavata* Foerster as a hyperparasite of *P. pyri* through *P. mitratus* in Southern France. Nothing is known on this species. Other species belonging to the same family *Alloxystidae* parasitize braconid or chalcidoid primary parasites of aphids or other *Homoptera* (KROMBEIN *et al.*, 1979).

From some of the *P. peregrina* nymphs (parasitized by *P. tiliaris*) collected in the Paris region, a new species of *Ceraphronoidea* (*Megaspilidae*) emerged which DESSART described and named *Dendrocerus psyllarum* (DESSART, 1983). Specimens previously obtained from *P. pyri* mummies at Versailles by BONNEMAISON & MISSONNIER in 1956, were also used by DESSART for describing the species. Other *Dendrocerus* were already mentioned as hyperparasitoids of psyllids; in Britain, *Lygocerus* (= *Dendrocerus*) *semiramosus* Kieffer (LAL, 1934), a hyperparasitoid of *P. peregrina* through *P. mitratus* and *Lygocerus* sp. was obtained from 5th instar nymphs of *P. pyricola* (GEORGALA, 1957). In France, BONNEMAISON & MISSONNIER (1956) recorded *Lygocerus* sp. from *P. pyri* mummies.

C. Predators

1. Heteroptera

a) Anthocoridae

The anthocorid *A. nemoralis* was the most abundant predator in all the orchards infested with

P. pyri which we examined and the most efficacious enemy of this pest. A literature review (table 1) showed that *A. nemoralis* is a permanent component of the biocomplex of pear psylla in Europe. It is a very polyphagous predator, but its most common prey are psyllids (ANDERSON, 1962a). It preferably frequents the tree and shrub stratum and a few conifers, but over all, it prefers deciduous species, mainly fruit trees (PERICART, 1972). Its distribution includes Europe and the mediterranean countries (PERICART, 1972). Its main prey other than pear psylla, based on recent literature, are listed in table 5. *A. nemoralis* was introduced in 1963 in North America in a pear orchard infested with *P. pyricola* near Summerland, British Columbia, where its establishment was successful (McMULLEN & JONG, 1967b; FIELDS & BEIRNE, 1973; CLAUSEN, 1978). Release in other locations resulted in establishment as well, i.e. Ontario (KELTON, 1978; HAGLEY & SIMPSON, 1983). *A. nemoralis* has dispersed and replaced the native predators, *Anthocoris antevolens* White and *Anthocoris melanocerus* Reuter as the most common anthocorid predator in some orchards (FIELDS & BEIRNE, 1973).

We did not observed *Anthocoris nemorum* (L.) in pear orchards in southern France, but it was abundant in the Paris region, especially in autumn. Otherwise, we found it abundantly in spring and summer in the herbaceous stratum, especially on nettle close to orchards. That led us to study some components of its ecology and ethology to evaluate its relationship to pear psylla and its potential as a biological control agent against this pest. These results were presented in another paper (HERARD & CHEN, 1985) and complete information already furnished by HILL (1957), ANDERSON (1962a, b, c), COLLYER (1967), RUSSEL (1970, 1972), PARKER (1975), EVANS (1976a), CAMPBELL (1977), LAUENSTEIN (1976, 1977, 1980) on this predator.

TABLE 5

Prey of Anthocoris nemoralis (F.), other than pear psylla, noted in recent literature.
Proies d'A. nemoralis (sauf les psylles du poirier), signalées récemment dans la littérature.

Prey	Host plants	Location	References
Aphids			
<i>Phorodon humuli</i> (Schrank)	hops	England	AVELING (1981a, 1981b), CAMPBELL (1977, 1978).
<i>Eriosoma ulmi</i> (L.)	elm	Poland	JANISZEWSKA-CICHOCKA (1971).
<i>Brevicoryne brassicae</i> (L.)	cabbage	Bulgaria	TSACHEV (1972).
Cecidomyiids			
<i>Dasineura mali</i> (Kieffer)	apple	Germany	CARL (1980).
<i>Macrolabis</i> sp.	apple	Germany	CARL (1980).
Aleurodids			
<i>Siphoninus phillyreae</i> (Haliday)	pear	Bulgaria	PELOV & TRENCH (1973).
	hawthorn	Bulgaria	PELOV & TRENCH (1973).
Lepidoptera			
<i>Leucoptera scitella</i> (Zeller)	apple	Bulgaria	IVANOV (1978).
<i>Phyllonorycter blancardella</i> (F.)	apple	Bulgaria	IVANOV (1978).
<i>Phyllonorycter corylifoliella</i> (Herbst)	apple	Bulgaria	IVANOV (1978).
<i>Stigmella malella</i> (Sainton)	apple	Bulgaria	IVANOV (1978).
<i>Cydia pomonella</i> (L.)	apple	England	GLEN (1975).
		Bulgaria	KARADZHOV (1973a).
Mites			
<i>Panonychus ulmi</i> (Koch)	apple	England	SOLOMON (1982).
		Bulgaria	KARADZHOV (1973b).
		Poland	KORCZ (1971).
<i>Bryobia rubrioculus</i> (Scheuten)	apple	Poland	KORCZ (1971).
<i>Tetranychus urticae</i> Koch	apple	Poland	KORCZ (1971).
<i>Tetranychus viennensis</i> Zacher	apple	Poland	KORCZ (1971).
Tetranychids	various plants	Bulgaria	BALEVSKI (1977).
Various prey			
aphids, psyllids, thrips, noctuid larvae, mites	apple	Sweden	NORDLANDER (1977).
	various plants	Turkey	ONDER (1982).

A. nemorum is distributed throughout Europe, Russia, Siberia (except the steppes regions), and China. However, it is rare in the mediterranean region (PERICART, 1972). It is an ubiquitous species and very eclectic in the choice of its prey (PERICART, 1972). Although it accepts many prey, there are great differences among them in nutritive value for the predator (HERARD & CHEN, 1985). *A. nemorum* has sometimes been noted on pear (table 1), and a long list of its prey was prepared by COLLYER (1967). Table 6 presents a list of prey besides pear psylla, as noted in the literature since 1965. Unsuccessful attempts to introduce *A. nemorum* into North America for control of *P. pyricola* were made in 1962 (CLAUSEN, 1978). New attempts were made in 1982 and 1983 in the state of Washington (USA), using predators reared and supplied by us. Results of these U.S. releases to control the pest are yet unknown, but our observations on this predator lead us to believe that it cannot be an efficient species against pear psylla (HERARD & CHEN, 1985).

We collected very small numbers of the predator *Anthocoris confusus* Reuter on pear trees in the Paris region (table 2). This anthocorid has been noted from Europe, Siberia and Japan, but in France, it is most common in the northern half of the country, occurring on deciduous and fruit trees (PERICART, 1972). It was observed mainly as a predator of aphids, notably of *D. platanoides* on sycamore in Scotland (RUSSEL, 1970 ; DIXON & RUSSEL, 1972 ; HAMILTON,

1973) ; in England, as a predator of *Acyrtosiphon pisum* (Harris) (ELLIOTT, 1970) and of *Aulacorthum circumflexum* (Buckton) (EVANS, 1976b, c, d, e) on broad bean, and of *Phorodon humuli* (Schrank) on hops (AVELING, 1981b). In France, it has been listed as a predator of various prey on apple (FAUVEL, 1974a).

Among the 6 species of *Orius* inventoried in pear orchards, 3 were abundant, *Orius horvathi* (Reuter), *Orius vicinus* (Ribaut), *Orius minutus* (L.), and 3 were rare, *Orius niger* (Wolff), *Orius laevigatus* (Fieber) and *Orius majusculus* (Reuter).

We observed *O. horvathi* in high numbers in the pear psylla infested orchards we examined (table 2). According to FAUVEL (1974a), this anthocorid seems more tied to phytophagous mites than to psyllids and aphids in orchards. However, it has been noted as a predator of *Aphis pomi* De Geer (STRAWINSKI, in PERICART, 1972), and of aphids, psyllids, thrips, noctuid larvae, and mites in Turkey (ONDER, 1982). Distribution of *O. horvathi* is throughout the western and eastern palearctic regions (PERICART, 1972) to China (ZHENG, 1982).

We found *O. vicinus* associated with *P. pyri* in all orchards examined and with *P. peregrina* in the Paris region, as well (table 2). This anthocorid was previously mentioned as being associated with pear psylla (table 1), but it accepts many other prey, from many plants (PERICART, 1972). *O. vicinus* and *A. nemoralis* are the most common predator of

TABLE 6

Prey of Anthocoris nemorum (L.) other than pear psylla, noted in the literature since 1965.

Proies d'A. nemorum (sauf les psylles du poirier), signalées dans la littérature depuis 1965.

Prey	Host plants	Location	References
Aphids			
<i>Drepanosiphum platanoides</i> (Schrank)	sycamore	Scotland	RUSSEL (1970), DIXON & RUSSEL (1972), HAMILTON (1973).
<i>Phorodon humuli</i> (Schrank)	hops	England	CAMPBELL (1977, 1978) AVELING (1981b), PARKER (1981).
<i>Aphis pomi</i> DeGeer	apple	Germany	ASCARI (1966).
Aphids spp.	apple	France	FAUVEL (1974a).
	fruit trees	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Acyrthosiphon pisum</i> (Harris)	broad bean	England	ELLIOTT (1970).
	pea	England	EVANS (1976a).
Aphids spp.	Brussels sprouts	England	SMITH (1976).
	cabbage, beet, potato	France	BONNEMAISON (1971).
Psyllids			
<i>Psyllopsis fraxini</i> (L.)	ash	England	HODKINSON & FLINT (1971).
Aleurodids			
<i>Trialeurodes vaporariorum</i> (Westwood)	tomato, cucumber	Sweden	EKBOM (1981).
Diptera			
<i>Thomasiniana theobaldi</i> Barnes	raspberry	U.S.S.R.	BOLDYREV (1968b).
<i>Dasineura tetensi</i> (Rübsaamen)	black currant	U.S.S.R.	GONCHAROVA (1968), GONCHAROVA & SAMOSUDOV (1979).
<i>Dasineura mali</i> (Kieffer)	apple	Germany	CARL (1980).
<i>Macrolabis</i> sp.	apple	Germany	CARL (1980).
<i>Oscinella frit</i> (L.)	cats	England	JONES (1969).
Coleoptera			
<i>Coccinella septempunctata</i> L.	hibernating site	U.S.S.R.	LIPA & SEM'YANOV (1967).
	various plants	U.S.S.R.	SEM'YANOV (1981).
<i>Coccinella quinquepunctata</i> L.	hibernating site	U.S.S.R.	LIPA & SEM'YANOV (1967).
<i>Adalia bipunctata</i> (L.)	hibernating site	U.S.S.R.	LIPA & SEM'YANOV (1967).
Coccinellids	various plants	Bulgaria	GRIGOROV (1983).
<i>Byturus tomentosus</i> (DeGeer)	raspberry	U.S.S.R.	BATASHEVA (1979).
<i>Gastrophysa viridula</i> (DeGeer)	<i>Rumex</i>	England	SMITH & WHITTAKER (1980).
Lepidoptera			
<i>Orthotaenia undulana</i> (Denis & Schiff.)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Choristoneura diversana</i> (Hübner)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Archips rosanus</i> (L.)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Archips xylosteanus</i> (L.)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Archips podanus</i> (Scopoli)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Ptycholoma lecheanum</i> (L.)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Pandemis cerasana</i> (Hübner)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Hedya nubiferana</i> (Haworth)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Syndemis musculana</i> (Hübner)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Eulia ministrans</i> (L.)	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Cnephasia</i> sp.	raspberry	U.S.S.R.	BATASHEVA (1981).
<i>Cydia funebrana</i> (Treitschke)	plum	U.S.S.R.	GOLUBENKO (1969).
<i>Cydia pomonella</i> (L.)	apple	England	GLEN (1975).
<i>Phyllonorycter pyrifoliella</i> (Gerasimov)	apple	U.S.S.R.	BOLDHYREV (1968a, 1975).
<i>Sitotroga cerealella</i> (Olivier)	laboratory	Poland	NIEMCZYK (1970).
Mites			
<i>Panonychus ulmi</i> (Koch)	apple	U.S.S.R.	SIDLYAREVICH (1965).
		Poland	KORCZ (1971).
		Bulgaria	KARADZHOV (1973a, 1973b).
		France	FAUVEL (1974a).
		England	SOLOMON (1982).
	orchards	U.S.S.R.	SIDLYAREVICH (1968).
<i>Bryobia rubrioculus</i> (Scheuten)	apple	Poland	KORCZ (1971).
<i>Tetranychus urticae</i> Koch	apple	Poland	KORCZ (1971).
<i>Tetranychus viennensis</i> Zacher	apple	Poland	KORCZ (1971).
Tetranychids spp.	various plants	Bulgaria	BALEVSKI (1977).
Various prey			
	apple	East Germany	ZELETZKI & RINNHOFFER (1966).
		Poland	KORCZ (1967), NIEMCZYK (1969, 1978b).
		Sweden	NORDLANDER (1977).
		Norway	AUSTRENG & SOMME (1980), SKANLAND (1981).
	various plants	Yugoslavia	GOLLNER-SCHIEDING (1978).
		Germany	LAUENSTEIN (1977, 1980).

P. pyri in southeastern France (ATGER, 1979b). It generally shows a degree of specificity for a prey in a particular habitat, for example in apple orchards, for *Panonychus ulmi* (Koch) (FAUVEL, 1974a), *Thrips major* Uzel, and *Thrips flavus* Schrank (FAUVEL *et al.*, 1980) and in pear orchards, for *P. ulmi* (FAUVEL & ATGER, 1981). It prefers the phytophagous mite, *Aceria fraxinivora* (Nal.), and the predacious cecidomyiid, *Arthrocnodax fraxinella* (Meade), in ash spangle galls (FAUVEL *et al.*, 1978), *Coryihucha ciliata* (Say) on plane trees (D'AGUILAR *et al.*, 1977), *Aphis gossypii* Glover, *Thrips tabaci* Lindemann, and spider mites on cucurbitaceous crops and egg plant (AKRAMOVSKAYA, 1978). In some cases, *O. vicinus* was noted as a pollen feeder (FAUVEL, 1974b). The distribution of *O. vicinus* is not completely known ; it seems widely distributed in Europe south of the 60th

parallel, and we have very little information on its distribution in Asia (PERICART, 1972). It has been noted recently from China (ZHENG, 1982).

We observed *O. minutus* associated with pear and hawthorn psyllids in the south of France and in the Paris region (table 2). *O. minutus* has already been reported several times as a predator of eggs and larvae of pear psylla (table 1). Apparently it is a very polyphagous predator, encountered on many species of plants in Europe, Siberia, Turkestan and China ; it seems rare in the mediterranean region, but it has been noted from North Africa (PERICART, 1972). Its prey, besides pear psylla, as listed in recent literature are listed in table 7.

We collected *O. niger* on pear trees, where it attacks eggs and larvae of *P. pyri*, but overall it was most common on nettle infested with *T. urticae*

TABLE 7

Prey of Orius minutus (L.) (other than pear psylla) noted in recent literature.
Proies d'O. minutus (sauf les psylles du poirier) signalées récemment dans la littérature.

Prey	Host plants	Location	References
Mites			
<i>Panonychus ulmi</i> (Koch)	apple	Yugoslavia Poland China	ARCANIN & BALARIN (1973). NIEMCZYK (1978c). ZHANG <i>et al.</i> (1982).
<i>Tetranychus urticae</i> Koch	laboratory apple	Poland Poland	NIEMCZYK (1978b). NIEMCZYK (1978a).
<i>Tetranychus viennensis</i> Zacher	laboratory apple	Poland China	NIEMCZYK (1978b). ZHANG <i>et al.</i> (1982).
Tetranychids	various crops	Bulgaria	BALEVSKI (1977).
Thrips			
<i>Haplothrips niger</i> (Osb.)	berry-fruit crops	U.S.S.R.	DYADECHKO (1967).
<i>Megalurothrips distalis</i> (Karny)	<i>Gliricidia sepium</i> L.	India	VISWANATHAN & ANANTHAKRISHNAN (1974).
<i>Frankliniella schultzei</i> (Tryb.)	<i>G. sepium</i>	India	VISWANATHAN & ANANTHAKRISHNAN (1974).
<i>Haplothrips ganglbaueri</i> Schmutz	<i>G. sepium</i>	India	VISWANATHAN & ANANTHAKRISHNAN (1974).
<i>Thrips tabaci</i> Lindemann	cucumber, sweet pepper	Netherlands	RAMAKERS (1978).
Diptera			
<i>Dasineura mali</i> (Kieffer)	apple	Germany	CARL (1980).
<i>Macrolabis</i> sp.	apple	Germany	CARL (1980).
<i>Jaapiella cirsiicola</i> Rübsaamen	rose sowthistle	U.S.S.R.	SHUROVENKOV (1981).
Lepidoptera			
<i>Cydia pomonella</i> (L.)	apple	England	GLEN (1975).
<i>Heliothis armigera</i> (Hubner)	cotton	China	WU <i>et al.</i> (1981).
<i>Sitotroga cerealella</i> (Olivier)	laboratory	Poland	NIEMCZYK (1978b).
<i>Ephestia kuehniella</i> Zeller	laboratory	Poland	NIEMCZYK (1978b).
Coleoptera			
<i>Leptinotarsa decemlineata</i> (Say)	potato	Poland	KANIA <i>et al.</i> (1976).
Coccids			
<i>Planococcus citri</i> (Risso)	citrus	Turkey	SOYLU & UREL (1977).
Aleurodids			
<i>Dialeurodes citri</i> (Ashmead)	citrus	Turkey	SOYLU (1980).
Aphids			
<i>Aphis pomi</i> DeGeer	laboratory	Poland	NIEMCZYK (1978b).
Various prey			
Various prey	apple	Sweden	NORDLANDER (1977).
Various prey	apple	Poland	KORCZ (1967).
aphids, psyllids, thrips, noctuid larvae, mites	various plants	Turkey	ONDER (1982).

surrounding the orchards (table 2). It had been noted once previously, associated with *P. pyri* (NGUYEN *et al.*, 1981). It is distributed over most of the western palearctic region (PERICART, 1972), and it has been also noted from China (ZHENG, 1982). Its prey, besides *P. pyri*, noted in recent literature, are listed in table 8.

We found *O. laevigatus* in small numbers in pear orchards of southern France and in the Paris region, as well (table 2). According to PERICART (1972), this *Orius* is characteristic of the western palearctic region under seaboard influence; it is common in the mediterranean basin. It was observed on many host plants, mostly shrubs and herbaceous plants (PERICART, 1972). It has been collected several times in Egypt, where it is abundant and widespread (TAWFIK & ATA, 1974). It was observed there, as a predator of various insect species in fields of clover and cotton (HAFEZ *et al.*, 1975), mainly as a predator of *A. gossypii* and *T. tabaci* (AFIFI *et al.*, 1980). It also belongs to fauna of apple trees in Egypt, essentially as a predator of *Tetranychus turkestanii* (Ugar. & Nik.) (ABDEL-SALAM, 1967).

We rarely encountered *O. majusculus* in orchards attacked by *P. pyri* in Avignon and in the Paris region, although this species is mentioned by PERICART (1972) as common and ubiquitous in France. *O. majusculus* is known to feed on many species of trees and herbaceous plants, mainly consuming aphids and mites (PERICART, 1972). It was recently noted as

a predator of the aphids, *Diuraphis noxia* (Mordvilko) and *Schizaphis graminum* (Rondani), in barley and wheat in the USSR (BEREST, 1980a). It was already known as a predator of *Trialeurodes vaporariorum* (Westwood) on greenhouse crops in Italy (ARZONE, 1976) and as a predator of various prey in apple orchards in Poland (KORCZ, 1967) and of *P. ulmi* and *Tetranychus* sp. in apple orchards in France (FAUVEL, 1974a).

Although these species of *Orius* showed some food preferences in particular habitats, they were essentially polyphagous. They were from the same geographical region, but we observed some differences in their distribution, namely in *O. minutus*, which was more northerly than *O. vicinus*.

Temnostethus pusillus (Herrich-Schaeffer) was very rare in our samples of pear tree fauna (table 2). Although it is known to feed on aphids, psyllids and coccids, its occurrence in fruit trees seems to be related to the presence of lichens; it is known all over Europe and in western USSR (PERICART, 1972).

The presence of *Cardiastethus fasciventris* (Garbiglietti) in our samples probably was not exclusively related to the presence of *P. pyri*. In fact, this predator seems mainly to live at the expense of psocids (PERICART, 1972). Psocids feeding on fumagine were numerous on pear trees examined. The known distribution of *C. fasciventris* is throughout western Europe and North Africa; it has also been observed in Egypt (PERICART, 1972).

TABLE 8

Prey of Orius niger (Wolff) (other than pear psylla), noted in recent literature.
Proies d'O. niger (sauf les psylles du poirier), signalées récemment dans la littérature.

Prey	Host plants	Location	References
Aphids			
<i>Aphis gossypii</i> Glover	cotton	U.S.S.R.	AKRAMOVSKAYA (1978), SUKHORUCHENKO <i>et al.</i> (1981).
<i>Schizaphis graminum</i> (Rondani)	wheat	U.S.S.R.	BEREST (1980b).
	rice	U.S.S.R.	MYRZIN & LUK'YANCHIKOV (1981).
<i>Diuraphis noxia</i> (Mordvilko)	wheat	U.S.S.R.	BEREST (1980b).
<i>Sitobion avenae</i> (F.)	wheat	U.S.S.R.	BEREST (1980b).
<i>Acyrtosiphon gossypii</i> Mordvilko	cotton	U.S.S.R.	SUKHORUCHENKO <i>et al.</i> (1981).
Thrips			
<i>Thrips tabaci</i> Lindemann	cucurbits, eggplant	U.S.S.R.	AKRAMOVSKAYA (1978).
<i>T. tabaci</i>	tobacco	Bulgaria	DIMITROV (1975).
<i>Thrips</i> spp.	berry-fruit crops	U.S.S.R.	DYADECHKO (1967).
Aleurodids			
<i>Trialeurodes vaporariorum</i> (Westwood)	greenhouse crops	Italy	ARZONE (1976).
Diptera			
<i>Jaapiella cirsicola</i> Rübsaamen	rose sowthistle	U.S.S.R.	SHUROVENKOV (1981).
Lepidoptera			
<i>Heliothis armigera</i> (Hübner)	cotton	U.S.S.R.	SUKHORUCHENKO <i>et al.</i> (1981).
Mites			
<i>Panonychus ulmi</i> (Koch)	apple	Yugoslavia	ARCANIN & BALARIN (1973).
<i>Tetranychus urticae</i> Koch	cotton	U.S.S.R.	SUKHORUCHENKO <i>et al.</i> (1981).
mites	cucurbits, eggplant	U.S.S.R.	AKRAMOVSKAYA (1978).
Various prey			
aphids, psyllids, thrips, noctuid larvae, mites	various plants	Turkey	ONDER (1982).

b) *Miridae*

Heterotoma meriopterum (Scopoli) was not only one of the most common mirids in the pear orchards we visited but also on hawthorn and nettle, where it feeds mainly on psyllids and aphids. It has one generation per year, the egg overwintering (FAUVEL, 1974a). On pear trees, eggs are laid in young twigs. We cut these twigs in autumn, obtained many individuals and placed them in a refrigerator. Normal and unavoidable pruning of pear trees in winter intensely depressed predator populations in the orchard. Consequently, plants such as hawthorn were very useful for survival of this pear psylla enemy and to retain them near the orchards. Its abundance in orchards is not constant since FAUVEL & ATGER (1981) found it in low numbers. It has also been noted as a predator of aphids and of the mite, *Bryobia rubrioculus* (Scheuten), on apple (FAUVEL, 1974a). It sometimes feeds on plant sap (WAGNER & WEBER, 1964; FAUVEL & GRIVAUT, 1976). It is widely distributed in Europe and North Africa (WAGNER & WEBER, 1964).

Campyloneura virgula (Herrich-Schaeffer) was the second most common mirid found in our samples from pear orchards, being as abundant in southern France as in the Paris region, where it also occurred on hawthorn (table 2). This polyphagous predator, already observed on various deciduous trees, *Fraxinus*, *Tilia*, *Alnus*, *Fagus* (WAGNER & WEBER, 1964), has not been reported in orchards before. It is a poorly known species. We verified that it is exclusively represented by females; its reproduction very probably is parthenogenetic (WAGNER & WEBER, 1964). It is distributed throughout Europe, North Africa and the Near East (WAGNER & WEBER, 1964).

Orthotylus nassatus (F.) was the third most abundant mirid collected in pear orchards in southern France (table 2). It is a polyphagous predator encountered notably on *Quercus*, *Tilia*, *Fraxinus* and *Salix* and known throughout Europe (WAGNER & WEBER, 1964). It has already been noted on pear (FAUVEL & ATGER, 1981) but seems more tied to locuses of infestation of the mite *P. ulmi* than of pear psylla. *O. nassatus* was fortuitously, and successfully, introduced in North America, probably in nursery stock. It has been found in Pennsylvania on pear (HENRY, 1977) and on maple (HENRY & WHEELER, 1979). It has been found in Canada on maple, walnut, and lime infested with aphids and on pear infested with *P. pyricola* (KELTON, 1982).

All other mirids cited below were rare in pear orchards examined.

Deraeocoris lutescens (Schilling) has already been reported as a predator associated with pear psylla (table 2), mainly as a predator of its eggs (FAUVEL & ATGER, 1981), of aphids on lime and oak (WAGNER & WEBER, 1964), and above all as a predator of *P. ulmi* in apple orchards (ARCANIN & BALARIN, 1973) and in pear orchards (FAUVEL & ATGER, 1981). *D. lutescens* is a mediterranean species also found in central Europe (WAGNER & WEBER, 1964) and in Poland (NIEMCZYK *et al.*, 1972).

Deraeocoris ruber (L.) has been known as an occasional predator of *P. pyri* in Italy (table 1), of aphids, young caterpillars, mites, and various small

insects on apple (FAUVEL, 1974a), on *Rubus* and *Urtica* (WAGNER & WEBER, 1964) and on *Corylus* (VIGGIANI, 1971). The most commonly observed aphids, which served as prey on hazel in Italy, were *Myzocallis coryli* (Goeze) and *Corylobium avellanae* (Schrank) (VIGGIANI, 1971). It is distributed everywhere in Europe, but is more common in the south. It was recorded for the first time in the US on egg plant at Newark, New Jersey, in 1979 (USDA, 1980).

Pilophorus perplexus (Douglas & Scott) has already been noted as a predator of *P. pyri* in France (FAUVEL & ATGER, 1981), though not very abundant in orchards. In apple orchards it has been also known as a predator of *A. pomi* and *B. rubrioculus* in France (FAUVEL, 1974a) and of *P. ulmi* in Russia (SIDLYAREVICH, 1968) and in Canada (LORD, 1968, 1971). *P. perplexus* has been found on various other deciduous trees, *Fraxinus*, *Alnus*, *Tilia*, *Acer*, *Quercus*, and *Salix* (WAGNER & WEBER, 1964).

Pilophorus gallicus Remane was very rare in our samples of predators collected on pear trees near Avignon. Formerly, it was only known on *Populus* and *Salix* in southern France (WAGNER & WEBER, 1964).

Pilophorus clavatus (L.) was rare on pear trees near Toulouse. It has been recorded from *Salix*, *Tilia*, *Quercus* and *Populus* in Europe and North America (WAGNER & WEBER, 1964).

Mimocoris rugicollis (Costa) was also very rare on pear trees in Avignon. This mediterranean species has already been observed on *Quercus ilex* (WAGNER & WEBER, 1964).

We observed *Psallus ambiguus* (Fallen) in low numbers on pear and hawthorn (table 2). According to WAGNER & WEBER (1964), this polyphagous predator, which is occasionally phytophagous, is known throughout Europe. It has been observed on *Pirus*, *Alnus* and *Salix* and especially on apple in France (FAUVEL, 1974a), in England (MORRIS, 1968), in Yugoslavia (ARCANIN & BALARIN, 1973), in Poland (KORCZ, 1967; NIEMCZYK, 1967, 1968) and in Norway (AUSTRENG & SOMME, 1980; SKANLAND, 1981). Its most common prey are *P. ulmi*, *Bryobia* spp., *Psylla mali* Schmidberger, *A. pomi*, and *Brachycaudus helichrysi* (Kaltenbach) (NIEMCZYK, 1968).

We encountered some specimens of *Phytocoris longipennis* Flor in pear orchards at Toulouse and in the Paris region (table 2). This predator has already been recorded feeding on small insects in apple orchards (FAUVEL, 1974a) and on *Acer*, *Corylus*, *Quercus* and *Fagus* (WAGNER & WEBER, 1964). According to these authors, it is distributed throughout Europe but is more common in northern and central Europe. It was noted recently in Turkey (ERKIN, 1983).

Phytocoris ulmi (L.) was found in very low numbers in the pear orchard visited at Toulouse. It had previously been noted in France on apple (FAUVEL, 1974a) and as a possible vector of fireblight on the shoots of pear in Denmark (THYGESEN *et al.*, 1973). Moreover, it is known on *Ulmus*, *Acer*, *Prunus*, *Fagus*, *Corylus*, *Salix* and *Cistus* (WAGNER & WEBER, 1964). These authors indicated that its

distribution is throughout Europe, North Africa, Asia Minor and Caucasias.

c) *Nabidae*

Nabid predators were very rare in the examined orchards and were represented by only 3 species (table 2). *Himacerus apterus* (L.) has previously been noted on apple in Poland (KORCZ, 1967) and in France (FAUVEL, 1974a), but has been encountered most frequently on herbaceous plants and bushes as a predator of aphids and young caterpillars. It occurs throughout Europe (FAUVEL, 1974a). It has also been noted as a predator of aphids in pine plantations grown for seed in Russia (SMETANIN, 1970).

Nabis ferus (L.) has been noted in apple orchards in France (FAUVEL, 1974a) and the USA (WHALON & PARKER, 1978), but it mainly occurs in grass and bushes. The list of its main prey is presented in table 9.

Nabis punctatus Costa was previously observed on apple in France (FAUVEL, 1974a) and in the USSR as a predator of aphids on various plants (PUCHKOV, 1980) and as one of the main predators of cereal aphids, *D. noxia*, *S. graminum* and *Sitobion avenae* (F.) (BEREST, 1980b).

2. *Coleoptera*

a) *Coccinellidae*

Small ladybird beetles of the *Scymnini* tribe were represented in our samples by 4 species, 3 of which, *Stethorus punctillum* (Weise), *Scymnus rubromaculatus* (Goeze) and *Scymnus subvillosus* (Goeze), were abundant on pear trees at Avignon (table 2). According to IPERTI (1974), GOURREAU (1974), FAUVEL & ATGER (1981), *S. punctillum* shows a degree of

specificity for fruit tree mites, notably for *P. ulmi* and *Tetranychus urticae* Koch. It probably is an occasional predator of pear psylla. Its main prey are listed in table 10.

The coccinellid, *S. rubromaculatus*, very common in France and in the major part of the palearctic region, has been known as a predator of aphids on oak, willow, hazel, peach, juniper, box and various cereals, mainly maize (GOURREAU, 1974). Since aphids did not proliferate in the orchard visited at Avignon, presence of this predator is most probably related only to pear psylla.

Previously, *S. subvillosus* had been often observed on various fruit trees, orange, peach, plum (GOURREAU, 1974) and apple (IPERTI, 1974), and on many other host plants, oak, juniper, hazel, laurel, tamarisk, pine, maize (GOURREAU, 1974). *S. subvillosus* has generally been noted as a predator of aphids, of *Brevicoryne brassicae* (L.) on cultivated crucifers in Rumania (CONSTANTINESCU, 1972), cereal aphids on wheat, oats and barley in the USSR (ABDULKHAIROVA, 1979), *Aphis craccivora* Koch on liquorice in the USSR (KESTEN, 1975), *Brachycaudus amygdalinus* (Schouteden) and *B. helichrysi* on almond, and of some coccids, *Planococcus citri* (Risso) on grape vine, citrus and pomegranate in the USSR, and *Saissetia oleae* (Olivier) on olive in Greece (ARGYRIOU & KATSOYANNOS, 1977).

Scymnus interruptus (Goeze) was very rare on pear trees attacked by *P. pyri* at Avignon, probably due to its high preference for aphids. In fact, TAWFIK *et al.* (1974a) found that its development and reproduction are possible only when aphids are available as prey.

S. interruptus is known in the major part of the palearctic region from many plants (GOURREAU, 1974), but it is especially efficacious against *A. gossypii* on cotton in Egypt (HASSANEIN *et al.*, 1968; REZK *et al.*, 1975; HABIB *et al.*, 1980). In Egypt, *S. interruptus* was also found preying on *Aphis nerii*

TABLE 9

Prey of Nabis ferus (L.), noted in recent literature.
Proies de N. ferus, signalées récemment dans la littérature.

Prey	Host plants	Location	References
Mirids			
<i>Lygus lineolaris</i> (Palisot de Beauvois)	apple	U.S.A.	WHALON & PARKER (1978). GERTSSON (1980).
<i>Lygus rugulipennis</i> Poppius	strawberry	Sweden	
Aphids	various plants	U.S.S.R.	PUCHKOV (1980). SMETANIN (1970).
	pine	U.S.S.R.	
Lepidoptera			
<i>Pectinophora gossypiella</i> (Saunders)	cotton	Mexico	ESTRADA & CARRILLO (1971). ESTRADA & CARRILLO (1971).
<i>Heliothis zea</i> (Boddie)	cotton	Mexico	
Coleoptera			
<i>Leptinotarsa decemlineata</i> (Say)	potato	Poland	ZIARKIEWICZ (1976).
Diptera			
<i>Jaapiella cirsicola</i> Rübsaamen	rose sowthistle	U.S.S.R.	SHUROVENKOV (1981).
Thrips			
<i>Thrips tabaci</i> Lindemann	tobacco	Bulgaria	DIMITROV (1975).

TABLE 10

Prey of Stethorus punctillum (Weise) (other than pear psylla), noted in recent literature.

Proies de S. punctillum (sauf les psylles du poirier), signalées récemment dans la littérature.

Prey	Host plants	Location	References
Mites			
<i>Panonychus ulmi</i> (Koch)	apple	France Italy	AUDEMARD (1973). PASQUALINI (1979), PAPAIOANNOU-SOULIOTI (1980), MORI & VIANELLO (1980), PASQUALINI <i>et al.</i> (1982). VERESHCHAGINA (1981).
<i>Panonychus citri</i> (McGeer)	strawberry	U.S.S.R.	PAPAIOANNOU-SOULIOTI (1980).
<i>Eotetranychus pruni</i> (Oudm.)	citrus	Italy	GARCIA MARI & RÍVERO (1982).
	grapevine	Spain	BAYAN (1981).
<i>Eotetranychus carpini vitis</i> (Boisd.)	various orchards	Bulgaria	KARTASHEVA & LESTEVA (1979).
	grapevine	U.S.S.R.	LAFFI (1982).
Tetranychid & Eriophyid mites	various plants	Italy	BALEVSKI (1977).
various mites	apple	Bulgaria	IPERTI (1974).
	various orchards	France	LIVSHITS & MITROFANOV (1981b).
		U.S.S.R.	
Aphids			
<i>Aphis craccivora</i> Koch	liquorice	U.S.S.R.	KESTEN (1975).
Coccids			
<i>Saissetia oleae</i> Olivier	olive	Greece	ARGYRIOU & KATSOYANNOS (1977).
Various prey mites, aphids	lime, citrus, apple, hazel, plum, peach, oak, pine, cypress, raspberry, ivy, maize, <i>Pittosporum</i> , tobacco, rose, moss.	Palaearctic region	GOURREAU (1974).

Boyer on *Nerium oleander* L., on *Aphis verbasci* Schrank on *Buddleia asiatica* Lour., on *Aphis punicea* Passerini on *Duranta* sp. and on *Rhopalosiphum maidis* (Fitch) on maize (TAWFIK *et al.*, 1974b). It can feed on nectar and secretions from the leaves. CONSTANTINESCU (1972) observed *S. interruptus* as a predator of *B. brassicae* on cultivated crucifers in Rumania.

Rhyzobius chrysomeloides (Herbst) was also rare in our samples and we did not find it noted as a predator of any pest of economic importance in the literature.

Clitostethus arcuatus (Rossi) was collected on hawthorn, but its presence was probably tied more to the presence of aleurodids than to psyllids on this host plant. *C. arcuatus* has been noted as the main natural enemy of *Dialeurodes citri* (Ashmead) on citrus in Italy (PRIORE, 1969; LIOTTA & MANIGLIA, 1975; LOI, 1979; DELRIO *et al.*, 1981; LIOTTA, 1981), in Turkey (SOYLU, 1980), and in the USSR (AGEKYAN, 1977). It has also been observed as a predator of *Aleurothrixus floccosus* (Mask.) (*Aleurodidae*) on *Citrus* in Italy (LIOTTA, 1982) and in Portugal (MAGALHAES, 1980). On apple and pear, *C. arcuatus* has been noted as a predator of the aleurodid, *Siphoninus phillyreae* (Haliday), in Greece (MENTZELOS, 1967) and in Italy (TREMBLAY, 1969). *C. arcuatus* has been found preying on *T. vaporariorum* on tobacco in the USSR (AGEKYAN, 1977). However, it seemed to be capable of attacking prey other than aleurodids; it has been noted in wooded areas and occasionally was observed preying on aphids (AGEKYAN, 1977).

We observed *Adalia bipunctata* (L.) in low numbers in all pear orchards infested with pear psylla (table 2). This coccinellid was already noted as an enemy of *P. pyri* in Poland and in the USSR (table 1). However, its main prey are aphids of trees of the family of *Rosaceae* (IPERTI, 1978a, b). Its main prey from recent literature are listed in table 11. *A. bipunctata* has been reared and released in pear orchards for control of *P. pyricola* in central Washington (USA) without apparent establishment (FYE, 1981).

Synharmonia conglobata (L.) was very rare in pear orchards examined (table 2). This coccinellid has already been collected in Israel as a predator of *P. pyricola* (SWIRSKI, 1954). Its main prey were aphids (table 12). It has been reared and released against *P. pyricola* in central Washington (USA), without apparent establishment (FYE, 1981).

Synharmonia lyncea Olivier was found in very small numbers on pear trees at Toulouse (table 2). This coccinellid generally was rare in the field. It has been collected on oak and lime infested with aphids in East Germany (WITSACK, 1971). According to this author it accepts *Aphis fabae* Scopoli and *Myzus persicae* (Sulzer) as prey in the laboratory. Its known prey in the field are *Dysaphis sorbi* (Kaltenbach) and *Eucalopteris tiliae* (L.) (WITSACK, 1971).

Propylea quattuordecimpunctata (L.) was present in very small numbers in pear orchards at Avignon and Toulouse. It is essentially a predator of aphids (table 13). It has been reared and released in pear orchards in central Washington (USA) without apparent establishment (FYE, 1981).

TABLE 11

Prey of Adalia bipunctata (L.) (other than pear psylla), noted in recent literature.
Proies d'A. bipunctata (sauf les psylles du poirier), signalées récemment dans la littérature.

Prey	Host plants	Location	References
Aphids			
<i>Microlophium carnosum</i> (Buckton)	oats, wheat, barley, rye, maize	Argentina	SERANTES DE GONZALEZ & SIERRA DE NUNEZ (1976).
<i>Macrosiphoniella artemisiae</i> (Boyer)	<i>Urtica dioica</i> L.	Czechoslovakia	HONEK (1978).
<i>Myzus cerasi</i> (F.)	<i>Artemisia vulgaris</i> L.	Czechoslovakia	HONEK (1978).
<i>Aphis fabae</i> Scopoli	cherry	France	IPERTI (1978a).
	sugar beet	England	HEATHCOTE (1978).
	<i>Euonymus alatus</i> (Thunb.)	U.S.A.	WHEELER & STIMMEL (1979).
<i>Eucallipterus tiliæ</i> (L.)	lime	England	DIXON & BARLOW (1979), MILLS (1982).
<i>Brevicoryne brassicae</i> (L.)	cabbage	U.S.S.R.	YASTREBOV (1979).
<i>Metopolophium dirhodum</i> (Walker)	wheat, <i>Bromus unioloides</i> (Willd.)	Argentina	BOTTO <i>et al.</i> (1979).
<i>Lachnus roboris</i> (L.)	<i>Quercus robur</i> L.	U.S.S.R.	BLAZHIEVSKAYA (1980).
<i>Rhopalosiphum padi</i> (L.)	<i>Prunus padus</i> L.	West Germany	BODE (1980a).
aphids	apple	France	IPERTI (1974).
	cereals	U.S.S.R.	ABDULKHAIROVA (1979).
	wheat	England	DEAN (1982).
	pome & stone fruit trees	Turkey	ERKIN (1983).
Coleoptera			
<i>Chrysomela populi</i> L.	poplar	Romania	TEODORESCU (1980).
<i>Chrysomela saliceti</i> (Weise)	poplar	Romania	TEODORESCU (1980).
<i>Chrysomela tremula</i> F.	poplar	Romania	TEODORESCU (1980).
Lepidoptera			
<i>Colias lebia</i> (F.)	lucerne	Argentina	BOTTO & CROUZEL (1981).
Coccids			
<i>Pseudaulacaspis pentagona</i> (Targioni-Tozzetti)	Kwanzan cherry	U.S.A.	STIMMEL (1982).
Various prey			
	apple	Sweden	NORDLANDER (1977).
		Hungary	LOVEI (1981), RADWAN & LOVEI (1982).
	orchards	U.S.S.R.	LIVSHITZ & MITROFANOV (1981b).
	various trees	England	MILLS (1979).

Among the species of large coccinellids, *Coccinella septempunctata* L. was the most abundant on pear trees examined at Avignon and Toulouse (table 2). It has already been noted as a predator of *P. pyri* in Europe (table 1) and of *P. pyricola* in Israel (SWIRSKI, 1954). It has been reared and released against *P. pyricola* in central Washington (USA); it survived the mild winter there but without lasting establishment in pear orchards (FYE, 1981). *C. septempunctata* is a very polyphagous predator; its main prey are listed in table 14.

We collected some specimens of *Chilocorus renipustulatus* (Scriba) on pear trees at Toulouse (table 2). This coccinellid has been recognized as a predator of coccids, but it has also been noted as a predator of mites. *C. renipustulatus* is considered in the USSR to be one of the main predators of the coccid, *Quadraspidiotus perniciosus* (Comstock), on fruit trees (PANTYUKHOV, 1968; MURASHEVSKAYA, 1969; POPOVA, 1971, 1974). In Bulgaria, TSACHEV (1978) observed it on apple and willow as a predator of *Lepidosaphes ulmi* (L.). In France, BAYLAC (1980) observed it as a predator of *Cryptococcus fagi* (Baerensprung) on beech, and IPERTI (1974) as a predator of various coccids on apple. GOKSU & ATAK (1969) observed *C. renipustulatus* as a predator of the

mite *P. ulmi* on a wide variety of fruit trees and also vines and hazel in Turkey.

We found *Coccinula quatuordecimpustulata* (L.) in very low numbers on pear trees at Toulouse (table 2). This coccinellid has been recorded in the literature most often as a predator of aphids. In the USSR, it attacks *A. pisum* on leguminous crops (KANTERINA, 1974) and various aphids on cereal crops and alfalfa (FEDOSIMOV & TSEDEV, 1970). It was observed as a predator of aphids in Poland on alfalfa (PRUSZYNSKI & LIPA, 1971) and on potato (KACZMAREK, 1973), and in Bulgaria on herbaceous crops (GRIGOROV, 1977a).

Some specimens of *Thea vigintiduopunctata* (L.) were collected on pear trees at Avignon (table 2). This coccinellid has already been noted several times in orchards, as a predator of coccids in Turkey (ALTAY *et al.*, 1973) and in Iran on apple trees infested with *Lepidosaphes malicola* Borkhs. (MOSTAAN *et al.*, 1972). *T. vigintiduopunctata* also was noted as predator of the two-spotted spider mite *T. urticae* on bean (*Phaseolus*) in Turkey (ONGOREN *et al.*, 1975). It was noted in the USSR as a predator of cereal aphids on wheat, oats and barley (ABDULKHAIROVA, 1979), as a predator of *S. graminum* on rice (MYRZIN & LUK'YANCHIKOV, 1981) and of *A. pisum* on alfalfa

TABLE 12

Prey of Synharmonia conglobata (L.) (other than pear psylla), noted in recent literature.
Proies de S. conglobata (sauf les psylles du poirier), signalées récemment dans la littérature.

Prey	Host plants	Location	References
Aphids			
<i>Aphis gossypii</i> Glover	cotton	U.S.S.R.	ALEKSEEV & NIYAZOV (1975).
	citrus	Greece	ARGYRIOU (1970).
<i>Aphis craccivora</i> Koch	liquorice	U.S.S.R.	KESTEN (1975).
<i>Brachycaudus amygdalinus</i> (Schouteden)	almond	Lebanon	TALHOUK (1977).
<i>Brachycaudus helichrysi</i> (Kaltenbach)	almond	Lebanon	TALHOUK (1977).
<i>Toxoptera aurantii</i> (Boyer)	citrus	Greece	ARGYRIOU (1970).
<i>Myzus persicae</i> (Sulzer)	citrus	Greece	ARGYRIOU (1970).
aphids	apple	France	IPERTI (1974).
	trees, shrubs	Bulgaria	GRIGOROV (1977a).
	wheat, oats, barley	U.S.S.R.	ABDULKHAIROVA (1979).
	pome & stone fruit		
	trees	Turkey	ERKIN (1983).
Coccids			
<i>Quadraspidiotus perniciosus</i> (Comstock)	orchards	Turkey	ALTAY <i>et al.</i> (1973).
<i>Pseudaulacaspis pentagona</i> (Targioni-Tozzetti)	orchards	Turkey	ALTAY <i>et al.</i> (1973).
<i>Parlatoria</i> spp.	orchards	Turkey	ALTAY <i>et al.</i> (1973).
<i>Eulecanium prunastri</i> (Fonscolombe)	orchards	Turkey	ALTAY <i>et al.</i> (1973).
<i>Parthenolecanium corni</i> (L.)	orchards	Turkey	ALTAY <i>et al.</i> (1973).
<i>Ceroplastes sinensis</i> Del G.	orchards	Turkey	ALTAY <i>et al.</i> (1973).
<i>Lepidosaphes ulmi</i> (L.)	orchards	Turkey	ALTAY <i>et al.</i> (1973).
Coleoptera			
<i>Altica quercetorum</i> Foudr.	oak	U.S.S.R.	PLUGARU (1969).
<i>Altica</i> sp.	<i>Elaeagnus angustifolia</i> (Nakai)	China	CHEN (1982).

TABLE 13

Prey of Propylea quattuordecimpunctata (L.), noted in recent literature.
Proies de P. quattuordecimpunctata, signalées récemment dans la littérature.

Prey	Host plants	Location	References
Aphids			
<i>Aphis fabae</i> Scopoli	sugar-beet	England	HEATHCOTE (1978).
		U.S.S.R.	GUMOVSKAYA (1982).
<i>Aphis gossypii</i> Glover	cucumber	U.S.S.R.	YARKULOV (1978).
<i>Metopolophium dirhodum</i> (Walker)	wheat	England	CHAMBERS <i>et al.</i> (1982).
<i>Metopolophium festucae</i> (Theobald)	wheat	England	CHAMBERS <i>et al.</i> (1982).
<i>Sitobion avenae</i> (F.)	wheat	England	CHAMBERS <i>et al.</i> (1982).
<i>Rhopalosiphum maidis</i> (Fitch)	maize	France	IPERTI (1978a).
<i>Rhopalosiphum padi</i> (L.)	<i>Prunus padus</i> L.	West Germany	BODE (1980a).
<i>Brachycaudus helichrysi</i> (Kaltenbach)	sunflower	Yugoslavia	THALJI (1981).
aphids	cultivated bushes	France	IPERTI (1978b).
	wheat, oats, barley	U.S.S.R.	ABDULKHAIROVA (1979).
	lucerne, clover, cereals	Czechoslovakia	HONEK (1982).
Lepidoptera			
<i>Plutella xylostella</i> (L.)	cabbage	U.S.S.R.	SLABOSPITSKII (1980).
<i>Artogeia rapae</i> (L.)	cabbage	U.S.S.R.	SLABOSPITSKII (1980).
<i>Mamestra brassicae</i> (L.)	cabbage	U.S.S.R.	SLABOSPITSKII (1980).
Aleurodids			
<i>Trialetrodes vaporariorum</i> (Westwood)	cucurbits	U.S.S.R.	LYASHOVA (1981).
Various prey			
	pine	U.S.S.R.	MOLCHANOV (1981).

(LAKHIDOV, 1970). *T. vigintiduopunctata* is not only a predator ; it feeds on the spores and mycelium of various injurious fungi, mainly on powdery mildew, *Erysiphe graminis* f. *tritici*, infesting wheat in Bulgaria (KUNOVSKI, 1969).

b) Carabidae

Only one Carabid predator was occasionally encountered on pear trees at Toulouse and Avignon, *Demetrias atricapillus* (L.). This species has been

TABLE 14

Prey of Coccinella septempunctata L. (other than pear psylla), noted in recent literature.
Proies de C. septempunctata (sauf les psylles du poirier), signalées récemment dans la littérature.

Prey	Host plants	Location	References
Aphids			
<i>Aphis craccivora</i> Koch	groundnut	India	TALATI & BUTANI (1979), BAKHETIA & SIDHU (1977).
	liquorice	U.S.S.R.	KESTEN (1975).
	leguminous crops	Pakistan	HAMID <i>et al.</i> (1977).
	vetch	U.S.A.	TEDDERS & ANGALET (1981).
<i>Aphis gossypii</i> Glover	citrus	Italy	BARBAGALLO & PATTI (1983).
	cucumber	U.S.S.R.	YARKULOV (1978).
	cotton	China	WU <i>et al.</i> (1981).
<i>Aphis gossypii</i> complex	chilli	India	AGARWALA & RAYCHAUDHURI (1981).
<i>Aphis fabae</i> Scopoli	sugar-beet	England	HEATHCOTE (1978).
		U.S.S.R.	GUMOVSKAYA (1982).
	broad bean	Spain	NOTARIO <i>et al.</i> (1978).
<i>Aphis pomi</i> DeGeer	apple	Hungary	MESZLENY & SZALAY-MARZSO (1979).
<i>Aphis citricola</i> v. d. Goot	citrus	Italy	BARBAGALLO & PATTI (1983).
<i>Aphis</i> sp.	potato	India	WADHI & PARSHAD (1980).
<i>Metopolophium dirhodum</i> (Walker)	wheat	England	CHAMBERS & SUNDERLAND (1983).
		Spain	CASTANERA (1983).
	oats, wheat	West Germany	BASEDOW (1982).
<i>Metopolophium festucae</i> (Theobald)	wheat	England	CHAMBERS & SUNDERLAND (1983).
<i>Schizaphis graminum</i> (Rondani)	wheat	U.S.S.R.	NOVOKHATKA <i>et al.</i> (1980), BABENKO (1980).
		Romania	VARVARA <i>et al.</i> (1982).
	rice	U.S.S.R.	MYRZIN & LUK'YANCHIKOV (1981).
<i>Rhopalosiphum padi</i> (L.)	<i>Prunus padus</i> L.	West Germany	BODE (1980a).
	wheat	Spain	CASTANERA (1983).
	oats, wheat	West Germany	BASEDOW (1982).
	oats	U.S.S.R.	PUKINSKAYA <i>et al.</i> (1981).
<i>Rhopalosiphum insertum</i> (Walker)	apple	Hungary	MESZLENY & SZALAY-MARZSO (1979).
<i>Acyrtosiphon pisum</i> (Harris)	broad bean	West Germany	GAUDCHAU (1979).
	vetch	U.S.A.	TEDDERS & ANGALET (1981).
	potato	U.S.A.	OBRYCKI <i>et al.</i> (1982).
<i>Sitobion avenae</i> (F.)	wheat	U.S.S.R.	BABENKO (1980).
		England	CHAMBERS & SUNDERLAND (1983).
		Spain	CASTANERA (1983).
	oats, wheat	West Germany	BASEDOW (1982).
<i>Myzus persicae</i> (Sulzer)	tobacco, pepper, potato	Bulgaria	GRIGOROV (1978).
	potato	U.S.A.	OBRYCKI <i>et al.</i> (1982).
<i>Brachycaudus amygdalinus</i> (Schouteden)	peach	Iraq	MAHMOUD <i>et al.</i> (1981).
<i>Brachycaudus helichrysi</i> (Kaltenbach)	sunflower	Yugoslavia	THALJI (1981).
<i>Hyalopterus pruni</i> Geoffroy	peach	Iraq	MAHMOUD <i>et al.</i> (1981).
	fruit trees	Romania	VARVARA <i>et al.</i> (1982).
<i>Dysaphis plantaginea</i> (Passerini)	apple	Hungary	MESZLENY & SZALAY-MARZSO (1979).
<i>Eriosoma lanigerum</i> Hausmann	apple	Hungary	MESZLENY & SZALAY-MARZSO (1979).
<i>Diuraphis noxia</i> (Mordvilko)	wheat	U.S.S.R.	BABENKO (1980).
<i>Uroleucon carthami</i> (H.R.L.)	safflower	India	UPADHYAY <i>et al.</i> (1981).
<i>Toxoptera aurantii</i> (Boyer)	citrus	Italy	BARBAGALLO & PATTI (1983).
<i>Brevicoryne brassicae</i> (L.)	cabbage	U.S.S.R.	YASTREBOV (1979).
<i>Lipaphis erysimi</i> (Kaltenbach)	mustard	India	SINHA <i>et al.</i> (1982).
<i>Macrosiphum euphorbiae</i> (Thomson)	potato	U.S.A.	OBRYCKI <i>et al.</i> (1982).
aphids	cereals	France	IPERTI (1978a).
	wheat, oats, barley	U.S.S.R.	ABDULKHAIROVA (1979).
	cotton	U.S.S.R.	ADASHKEVICH <i>et al.</i> (1981).
	lucerne, clover	Czechoslovakia	HONEK (1982).
	low-growing plants	France	IPERTI (1978b).
		Czechoslovakia	ZELENY (1978).
Lepidoptera			
<i>Plutella xylostella</i> (L.)	cabbage	U.S.S.R.	SLABOSPITSKII (1980).
<i>Artogeia rapae</i> (L.)	cabbage	U.S.S.R.	SLABOSPITSKII (1980).
<i>Mamestra brassicae</i> (L.)	cabbage	U.S.S.R.	SLABOSPITSKII (1980).
<i>Heliothis armigera</i> (Hubner)	cotton	U.S.S.R.	RUSTAMOVA (1981).
leafrollers	raspberry	U.S.S.R.	BATASHEVA (1981).
Diptera			
<i>Contarinia sorghicola</i> (Coquillett)	sorghum	India	THONTADARYA <i>et al.</i> (1979).
Coleoptera			
<i>Sitona</i> spp.	beet	U.S.S.R.	RYBCHIN (1982).
Various prey			
	apple	Norway	SKANLAND (1981).
		Hungary	RADWAN & LOVEI (1982).
		Sweden	NORDLANDER (1977).
	lucerne	Iraq	KHALIL <i>et al.</i> (1979).

recorded as a general predator on small insects in orchards, (STEINER, 1974 ; LIVSHITS & MITROFANOV, 1981b). It was also recorded in England as a predator of cereal aphids (SUNDERLAND, 1975 ; SUNDERLAND & VICKERMAN, 1980) and of the chrysomelid *Gastrophysa polygoni* (L.) on knot grass (*Polygonum aviculare* L.) and black bindweed (*P. convolvulus* L.) in cereal fields (SOTHERTON, 1982). In Italy, it was noted as a predator of the curculionid *Ceuthorrhynchus rapae* Gyllenhal on hemp (*Cannabis sativa*) (TREMBLAY, 1968).

3. Neuroptera

a) Chrysopidae

Chrysoperla carnea (Stephens) was abundant in all pear orchards examined (table 2). Larvae of this chrysopid have already been noted as predator of pear psylla in Europe (table 1), in the U.S.A. and in Canada, and as predator on many other pests in many other countries as well (table 15).

Anisochrysa prasina (Burmeister) was captured in very small numbers on pear trees at Avignon. This chrysopid was already recorded from southeastern France as predator of olive pests (ALROUECHDI *et al.*, 1981b) and as predator of eggs of *Tortrix viridana* (L.) (*Lep. : Tortricidae*) on *Quercus ilex* L. and *Quercus pubescens* Willd. (DU MERLE, 1983).

Anisochrysa picteti (Mc Lachlan) was also very rare in orchards at Avignon. It is definitely a mediterranean species, exclusively xerophilous, limited to warm habitats of dense vegetation (CANARD, pers. com.).

b) Hemerobiidae

Hemerobius humulinus L. was present on pear and hawthorn surrounding the orchards at Avignon and Toulouse (table 2). This very polyphagous predator is widely distributed all over the world. In apple orchards, it attacks aphids and *P. ulmi* (PRINCIPI & CANARD, 1974 ; SZABO & SZENTKIRALYI, 1981 ; ZELENY, 1978), and in the U.S.A., it attacks *Cydia pomonella* (L.), and *Anuraphis plantaginea* (Passerini) (HOLDSWORTH, 1970a, b). It has also been noted in grape vineyards in the U.S.A. (JUBB & MASTELLER, 1977), in windbreaks in the U.S.S.R. (TSYBUL'SKAYA *et al.*, 1977) and in cotton fields in China (CHAO & CHANG, 1978).

Wesmaelius subnebulosa (Stephens) was very rare on pear trees at Avignon. This hemerobiid has previously been noted in apple orchards in Hungary (SZABO & SZENTKIRALYI, 1981).

Sympherobius pygmaeus (Rambur) was also very rare in pear orchards at Avignon. This hemerobiid was already known as a predator of the coccid, *Trabutina leonardii* Silvestri, infesting *Tamarix africana* Webb. in Italy (MONACO, 1977).

c) Coniopterygidae

Coniopteryx borealis Tjeder was the one coniopterygid found on pear trees at Avignon and Toulouse. It was also collected on hawthorn infested with psyllids (table 2). Coniopterygids are known as

predators of aleurodids, aphids, coccids and mites on many plants, especially on apple (PRINCIPI & CANARD, 1974).

4. Diptera

The syrphid *Meliscaeva auricollis* (Meigen) was found in small numbers on pear trees at Toulouse. This species has already been recorded as a predator of aphids on pome and stone fruit trees in Turkey (ERKIN, 1982) and of *A. pomi*, *Dysaphis plantaginea* (Passerini) and *Eriosoma lanigerum* Haussmann in apple orchards in Italy (SETTI, 1973).

Syrphus vitripennis (Meigen) was found in low numbers on pear trees at Toulouse. According to LYON & GOLDLIN DE TIEFENAU (1974), it is a very polyphagous predator, mostly aphidiphagous, as the list of its prey from the literature shows (table 16). PEK (1975) believed it to be a predator of general occurrence and not associated with a particular environment.

Some specimens of *Episyrphus balteatus* (DeGeer) were collected on pear trees infested with *P. pyri* at Toulouse. Rariness of the syrphid in these orchards was due to the fact that it is essentially a predator of aphids, as indicated by the list of its prey from the literature (table 17). However, it has already been noted several times in Italy as a predator of *P. pyri* (table 1).

5. Acari

A predacious mite of the genus *Anystis* was observed several times on pear trees at Avignon and Toulouse. Psyllids have previously been cited as prey of these mites, especially *Psyllopsis distinguenda* Edw. on ash trees and *Trioza chenopodii* Reut. on beet and spinach, as prey of *Anystis baccharum* (L.) in Czechoslovakia (LAUTERER, 1982). In orchards, *A. baccharum* was also noted as a predator of various pests in the U.S.S.R. (LIVSHITS & MITROFANOV, 1981a), of tortricids on apple trees in New Zealand (BAKER, 1983), and of the mite *Panonychus citri* (McG.) on *Citrus* in South Korea (KIM *et al.*, 1978). An unidentified species of *Anystis* was noted as predator of the phytophagous mites, *P. ulmi*, *B. rubrioculus* and *Tetranychus viennensis* Zacher on fruit trees in the U.S.S.R. (PAURIENE, 1970), and another species of *Anystis*, as predator of *Scirtothrips aurantii* Faure on citrus, in South Africa (MILNE, 1977). The genus *Anystis* contains very polyphagous species ; *A. baccharum* was also recorded as predator of *Oulema melanopus* L. on cereal crops in Sweden (BORG, 1983), and various *Anystis* as predators of aphids on non-crop plants in Canada (FRAZER & NELSON, 1981). *Anystis* species were also found on conifers in forests, as predators of *Adelges* spp. in India (RAO & GHANI, 1972), and of *Matsucoccus matsumurae* Kuw. on pine in China (CHENG & MING, 1979). In ornamental hedges of *Euonymus japonicus* Thunb. in England, *Unaspis euonymi* (Comstock) was observed to be preyed upon by *Anystis* sp. (DENNIS, 1969).

TABLE 15

Prey of Chrysoperla carnea (Stephens) (other than pear psylla in Europe) noted in recent literature.

Proies de C. carnea (sauf les psylles du poirier en Europe), signalées récemment dans la littérature.

Prey	Host plants	Location	References
Psyllids			
<i>Psylla pyricola</i> (Foerster)	pear	U.S.A.	NICKEL <i>et al.</i> (1965), WESTIGARD <i>et al.</i> (1968), BURTS (1970), WESTIGARD (1979).
		Canada	McMULLEN & JONG (1967a, 1967b), WILDE (1962).
Aphids			
<i>Rhopalosiphum padi</i> (L.)	<i>Prunus padus</i> L. maize oats wheat	West Germany France Finland West Germany	BODE (1980a). MOREAU (1983). RAUTAPAA (1977). HELLPAP (1982).
<i>Schizaphis graminum</i> (Rondani)	cereals	Spain U.S.S.R.	CASTANERA (1983). BEREST (1980b).
<i>Sitobion avenae</i> (F.)	rice cereals wheat	U.S.S.R. U.S.S.R. West Germany	MYRZIN & LUK'YANCHIKOV (1981). BEREST (1980b). HELLPAP (1982).
<i>Metopolophium dirhodum</i> (Walker)	wheat	Spain England West Germany	CASTANERA (1983). DEAN (1982). HELLPAP (1982).
<i>Diuraphis noxia</i> (Mordvilko)	cereals	Spain U.S.S.R.	CASTANERA (1983). BEREST (1980b).
<i>Aphis craccivora</i> Koch	liquorice	U.S.S.R.	KESTEN (1975).
<i>Aphis gossypii</i> Glover	cotton	Egypt Pakistan U.S.S.R.	HABIB <i>et al.</i> (1980). AFZAL & KHAN (1978). RADZIVILOVSKAYA (1980), ISHANKULIEVA (1979).
<i>Brevicoryne brassicae</i> (L.)	clover cabbage	Egypt England U.S.S.R.	AFIFI <i>et al.</i> (1980). AKINLOSOTU (1978). YASTREBOV (1979).
<i>Acyrtosiphon pisum</i> (Harris)	lucerne	U.S.A.	BAUMGAERTNER <i>et al.</i> (1981).
<i>Myzus persicae</i> (Sulzer)	potato	U.S.A.	MACK & SMILOWITZ (1979).
<i>Illinoia pepperi</i> (Mac Gillivray)	blueberry	U.S.A.	WHALON & ELSNER (1982).
<i>Hyalopterus pruni</i> (Geoffroy)	peach	Iraq	MAHMOUD <i>et al.</i> (1981).
<i>Brachycaudus amygdalinus</i> (Schouteden)	peach	Iraq	MAHMOUD <i>et al.</i> (1981).
Coccids			
<i>Saissetia oleae</i> (Olivier)	olive	France	ALROUECHDI <i>et al.</i> (1980).
<i>Aspidiotus nerii</i> Bouché	olive	Greece Chile	ARGYRIOU & KOURMADAS (1980). MATTA (1979).
<i>Hemiberlesia lataniae</i> (Signoret)	olive	Chile	MATTA (1979).
<i>Planococcus citri</i> (Risso)	grapefruit	Israel	BERLINGER <i>et al.</i> (1979).
<i>Pulvinaria innumerabilis</i> (Rathvon)	urban shade trees	U.S.A.	ANONYMOUS (1982).
coccids spp.	citrus	France	PANIS (1980).
Aleurodids			
<i>Bemisia tabaci</i> (Gennadius)	cotton	Egypt	HAFEZ <i>et al.</i> (1983).
Lepidoptera			
<i>Prays oleae</i> (Bernard)	olive	France Syria	ALROUECHDI <i>et al.</i> (1981a). ALROUECHDI (1981).
<i>Heliothis armigera</i> (Hubner)	cotton	U.S.S.R.	RUSTAMOVA (1981), SUKHORUCHENKO <i>et al.</i> (1981).
		Israel	BAR <i>et al.</i> (1979).
<i>Heliothis zea</i> (Boddie)	cotton	Egypt U.S.A.	ISMAIL & SWAILEM (1976). WILSON & GUTIERREZ (1980).
<i>Heliothis virescens</i> (F.)	cotton	Turkey	KISMIR & SENGONCA (1981).
<i>Heliothis</i> spp.	cotton	Turkey	KISMIR & SENGONCA (1981).
<i>Pectinophora gossypiella</i> (Saunders)	cotton	U.S.A.	SMITH <i>et al.</i> (1978).
<i>Trichoplusia ni</i> (Hubner)	cotton	Egypt	ABUL-NASR <i>et al.</i> (1978).
<i>Spodoptera littoralis</i> (Boisduval)	cotton	U.S.A.	WILSON & GUTIERREZ (1980).
<i>Spodoptera praefica</i> (Grote)	lucerne	Egypt	MAHER-ALI <i>et al.</i> (1983), HABIB <i>et al.</i> (1980).
<i>Gymnoscelis rufifasciata</i> Haworth	artichoke	U.S.A.	BISABRI-ERSHADI & EHLEH (1981).
<i>Tortrix viridana</i> (L.)	<i>Quercus ilex</i> L.	France	SADDIK & EL-MINIAMI (1978). DU MERLE (1983).
Coleoptera			
<i>Leptinotarsa decemlineata</i> (Say)	potato, egg plant	U.S.S.R.	FILIPPOV (1982).
<i>Hypera brunneipennis</i> (Boheman)	tomato	Egypt	AFIFI <i>et al.</i> (1980).
Diptera			
<i>Pegomya hyoscyami</i> (Panzer)	sugar-beet	West Germany	GROH & TANKE (1980).

Table 15 (continued)

Prey	Host plants	Location	References
Thrips			
<i>Thrips tabaci</i> Lindemann	cotton clover	Egypt Egypt	HABIB <i>et al.</i> (1980). AFIFI <i>et al.</i> (1980).
Acari			
<i>Tetranychus urticae</i> Koch	cotton	U.S.S.R.	ISHANKULIEVA (1979).
<i>Eotetranychus pruni</i> (Oudm.)	orchards	U.S.S.R.	KARTASHEVA & LESTEVA (1979).

TABLE 16

Prey of Syrphus vitripennis (Meigen), noted in recent literature.

Proies de S. vitripennis, signalées récemment dans la littérature.

Prey	Host plants	Location	References
Aphids			
<i>Myzus persicae</i> (Sulzer)	cucumber	U.S.S.R.	KARELIN (1980).
	green vegetables	Bulgaria	NATSKOVA (1977).
<i>Myzus humuli</i> (Schränk)	plum	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Myzus cerasi</i> (F.)	cherry	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Myzus cerasi pruniavium</i> Börner	cherry	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Capitophorus ribis</i> (L.)	currants	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Brachycaudus cardui</i> (L.)	plum	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Brachycaudus helichrysi</i> (Kaltenbach)	plum	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Rhopalosiphum oxyacanthae</i> (Schränk)	apple	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Rhopalosiphum nymphaeae</i> (L.)	plum	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Rhopalosiphum padi</i> (L.)	<i>Prunus padus</i> L.	U.S.S.R.	CHERKASHINA (1973).
<i>Aphis pomi</i> DeGeer	apple	Italy	SETTI (1973).
		Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Aphis schneideri</i> (Börner)	currants	Poland	WIACKOWSKI & WIACKOWSKA (1968).
<i>Aphis gossypii</i> Glover	cucumber	U.S.S.R.	KARELIN (1980).
	green vegetables	Bulgaria	NATSKOVA (1977).
<i>Aphis craccivora</i> Koch	green vegetables	Bulgaria	NATSKOVA (1977).
<i>Aphis fabae</i> Scopoli	green vegetables	Bulgaria	NATSKOVA (1977).
	sugar-beet	France	LYON (1971).
<i>Aphis sambuci</i> L.	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
<i>Anoecia corni</i> (F.)	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
<i>Macrosiphum rosae</i> (L.)	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
<i>Macrosiphum euphorbiae</i> (Thomas)	cucumber	U.S.S.R.	KARELIN (1980).
	green vegetables	Bulgaria	NATSKOVA (1977).
<i>Acyrtosiphon pisum</i> (Harris)	green vegetables	Bulgaria	NATSKOVA (1977).
<i>Eriosoma lanigerum</i> (Hausmann)	apple	Italy	SETTI (1973).
<i>Eriosoma ulmi</i> (L.)	elm	Poland	JANISZEWSKA-CICHOCKA (1971).
<i>Disaphis plantaginea</i> (Passerini)	apple	Italy	SETTI (1973).
		Poland	WNUK (1972), WIACKOWSKI & WIACKOWSKA (1968).
<i>Hyalopterus pruni</i> (Geoffroy)	peach	France	REMAUDIERE & LECLANT (1971).
	plum	Poland	SMOLARZ (1970).
<i>Brevicoryne brassicae</i> (L.)	green vegetables	Bulgaria	NATSKOVA (1977).
	cultivated crucifers	Rumania	CONSTANTINESCU (1972).
<i>Amphorophora lactucae</i> (L.)	fruit trees, ornamental shrubs	Poland	KOZLOWSKA (1978), WNUK (1972).
	currants	Poland	WIACKOWSKI & WIACKOWSKA (1968).
aphids spp.	cabbage	Czechoslovakia	DUSEK & LASKA (1974).
	pome & stone fruit trees	Turkey	ERKIN (1983).
Psyllids			
<i>Craspedolepta dorecinia</i> sp. n.	<i>Artemisia</i> spp.	U.S.S.R.	KONOVALOVA (1978).
<i>Craspedolepta chasanica</i> sp. n.	<i>Artemisia</i> spp.	U.S.S.R.	KONOVALOVA (1978).
<i>Calophya nigra</i> Kuway.	<i>Phellodendron sachalinense</i> F. Schmidt., <i>Phellodendron amurense</i> Rupr.	U.S.S.R.	KONOVALOVA (1978).

TABLE 17

*Prey of Episyrrhus balteatus (DeGeer) (other than pear psylla), noted in recent literature.**Proies d'E. balteatus (sauf les psylles du poirier), signalées récemment dans la littérature.*

Prey	Host plants	Location	References
Aphids			
<i>Acyrtosiphon pisum</i> (Harris)	lucerne	Bulgaria	ABDULMADZHID (1973).
	green vegetables	Bulgaria	NATSKOVA (1977).
	broad bean	West Germany	TANKE (1976).
<i>Anoecia corni</i> (F.)	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
<i>Aphis craccivora</i> Koch	green vegetables	Bulgaria	NATSKOVA (1977).
<i>Aphis fabae</i> Scopoli	broad bean	England	CHANDLER (1968).
	sugar-beet	France	LYON (1971).
	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
	green vegetables	Bulgaria	NATSKOVA (1977).
<i>Aphis gossypii</i> Glover	green vegetables	Bulgaria	NATSKOVA (1977).
	cucumber	U.S.S.R.	KARELIN (1980).
<i>Aphis pomi</i> DeGeer	apple	France	LYON & GOLDLIN DE TIEFENAU (1974), MARBOUTIE (1976).
		Italy	SETTI (1973).
		Poland	WNUK (1977).
<i>Aphis sambuci</i> L.	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
<i>Aphis spiraephaga</i> Müller	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
<i>Brachycaudus amygdalinus</i> (Schouteden)	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
<i>Brachycaudus helichrysi</i> (Kaltenbach)	almond	Lebanon	TALHOUK (1977).
	almond	Lebanon	TALHOUK (1977).
<i>Brevicoryne brassicae</i> (L.)	cabbage	Czechoslovakia	LASKA (1967).
		Bulgaria	TSACHEV (1972), STRAKA (1976).
		U.S.S.R.	SHLYAKHOVOI & BOBONICH (1975), YAS- TREBOV (1979).
	brussels sprouts	England	POLLARD (1969).
	cultivated crucifers	Rumania	CONSTANTINESCU (1972).
	green vegetables	Bulgaria	NATSKOVA (1977).
	tobacco	Japan	TAKAOKA (1975).
<i>Cinara pilicornis</i> (Hartig)	spruce	Czechoslovakia	KULA (1982).
<i>Dysaphis plantaginea</i> (Passerini)	apple	France	LYON & GOLDLIN DE TIEFENAU (1974).
		Italy	SETTI (1973).
<i>Eriosoma lanigerum</i> (Hausmann)	apple	France	LYON & GOLDLIN DE TIEFENAU (1974).
		Italy	SETTI (1973).
<i>Eriosoma ulmi</i> (L.)	elm	Poland	JANISZEWSKA-CICHOCKA (1971).
<i>Hyalopterus pruni</i> (Geoffroy)	plum	Poland	SMOLARZ (1970).
	peach	France	REMAUDIERE & LECLANT (1971).
<i>Hysteroneura setariae</i> (Thomas)	peach	Taiwan	LEE & HSU (1979).
<i>Lachnus tropicalis</i> (v. d. Goot)	chestnut	Japan	TOGOSHI (1976).
<i>Lipaphis erysimi</i> Kaltenbach	cabbage	Pakistan	KHAN & YUNUS (1970).
		India	ROY & BASU (1978), AGARWALA & RAY- CHAUDHURI (1981).
<i>Macrosiphum euphorbiae</i> (Thomas)	<i>Eruca sativa</i> (Miller)	India	BAKHETIA & SHARMA (1979).
	green vegetables	Bulgaria	NATSKOVA (1977).
	cucumber	U.S.S.R.	KARELIN (1980).
<i>Macrosiphum rosae</i> (L.)	roses	Bulgaria	NATSKOVA (1971).
	ornamental shrubs	Poland	ZIARKIEWICZ & KOZLOWSKA (1973).
<i>Metopolophium dirhodum</i> (Walker)	cereals	England	DEAN (1974).
	wheat	Belgium	LATTEUR (1973).
		West Germany	BODE (1980b).
		England	CHAMBERS <i>et al.</i> (1982).
<i>Metopolophium festucae</i> (Theobald)	wheat	Belgium	LATTEUR (1973).
		England	CHAMBERS <i>et al.</i> (1982).
		England	CHAMBERS <i>et al.</i> (1982).
<i>Myzus persicae</i> (Sulzer)	tobacco	Japan	TAKAOKA (1975).
		Bulgaria	DIRIMANOV & DIMITROV (1975).
	green vegetables	Bulgaria	NATSKOVA (1977).
	cucumber	U.S.S.R.	KARELIN (1980).
	cabbage	India	AGARWALA & RAYCHAUDHURI (1981).
		Japan	ITO & IWAO (1977).
	peach	France	REMAUDIERE & LECLANT (1971).
		Bulgaria	GRIGOROV (1978).
	<i>E. sativa</i>	India	BAKHETIA & SHARMA (1979).
<i>Pemphigus fuscicornis</i> (Koch)	sugar-beet	Bulgaria	GRIGOROV (1977b).
<i>Rhopalosiphum insertum</i> (Walker)	apple	France	LYON & GOLDLIN DE TIEFENAU (1974).
<i>Rhopalosiphum padi</i> (L.)	wheat	Belgium	LATTEUR (1973).
	maize	Poland	JASIOLEK <i>et al.</i> (1974).
	<i>Prunus padus</i> L.	U.S.S.R.	CHERKASHINA (1973).
		West Germany	BODE (1980b).
<i>Schizaphis graminum</i> (Rondani)	maize	Poland	JASIOLEK <i>et al.</i> (1974).
	rice	U.S.S.R.	MYRZIN & LUK'YANCHIKOV (1981).
<i>Schizaphis hypersiphonata</i> Basu	pangola grass	Australia	BROADLEY & ROGERS (1978).

Table 17 (continued)

Prey	Host plants	Location	References
<i>Sitobion avenae</i> (F.)	wheat	Belgium West Germany England Poland	LATTEUR (1973). BODE (1980b). CHAMBERS <i>et al.</i> (1982), DEAN (1982). JASIOLEK <i>et al.</i> (1974).
<i>Toxoptera aurantii</i> (Boyer)	maize	England	DEAN (1974).
aphids spp.	cereals	Greece	ARGYRIOU (1970).
	citrus	Poland	WNUK (1983).
	fruit trees, bushes	Turkey	ERKIN (1983).
	pome & stone fruit trees	Bulgaria	NATSKOVA (1973).
	pepper		
	sorghum, maize, pulse, egg-plant, mustard, cole	India	PATNAIK <i>et al.</i> (1977).
	tea, fennel, <i>Malus</i>	Azores	GOMES (1980).
Various prey	cotton	U.S.S.R.	NARZIKULOV & UMAROV (1975).

Another predacious mite *Allothrombium fuliginosum* Hermann was common in the orchards at Toulouse and Avignon and observed as a predator of *P. pyri*. *A. fuliginosum* has been noted in the literature as predator of a large variety of prey. In orchards in Italy, it was observed preying upon winter eggs of the aphid, *D. plantaginea*, on apple (BARONIO, 1971) and upon the coccid *Filippia follicularis* Targioni, on olive (SCALTRITI, 1982). It was also observed in the U.S.S.R. as a predator of eggs of *Leptinotarsa decemlineata* (Say) (KOVAL, 1968) and of *A. craccivora* on liquorice (KESTEN, 1975). Also, it was observed attacking *Pegomya betae* (Curtis) on sugar beet in France (MISSONNIER, 1971) and *B. brassicae* on cultivated crucifers in Rumania (CONSTANTINESCU, 1972).

D. Fungi

We did not encounter *P. pyri* larvae infected with fungi, although some cases of attack by *Entomophthora* sp. are already known in France and Italy (table 1). On the other hand, we did find a few *P. peregrina* larvae parasitized by *Entomophthora* sp. in the Paris region.

IV. DISCUSSION & CONCLUSION

Among the 66 species inventoried, 56 had a useful role, to varying degrees, in limiting populations of pear psylla. Only 16 species were fairly abundant and seem to be especially appropriate for biological control. Among these are the 3 species traditionally well tied to pear psylla, *P. mitratus*, *T. psyllae* and *A. nemoralis*, plus 13 predators as follows :

A. nemorum, *O. horvathi*, *O. vicinus*, *H. meriopterum*, *C. virgula*, *O. nassatus*, *S. punctillum*, *S. ru-*

bromaculatus, *S. subvillosus*, *C. septempunctata*, *C. carnea*, *C. borealis* and *A. fuliginosum*.

The main beneficial insects for biological control of pear psylla were also found on hawthorn where they also attack psyllids ; moreover, 2 predators common on pear trees, *A. nemorum* and *H. meriopterum*, abundantly frequented nettle attacked by *T. urticae* and aphids inside or surrounding the orchards. Not only hawthorn and nettle, but many other host plants serve as a reservoir for the beneficial insects occurring in pear orchards. The richness of the orchard's natural environment may have contributed to maintain and to increase the population of pear psylla natural enemies.

The main enemies mentioned above are not active during the total development of the 5 to 7 generations of *P. pyri* which occur in France. Some species occur early in the season and others later, in such a way that the limiting combined and complementary action of these enemies definitely covers almost the entire season (HERARD, 1985).

This literature review shows that the inventoried species are basically polyphagous. The parasites, *P. mitratus* and *T. psyllae*, attack various psyllids, and the main predators are either common in various kinds of orchards, or predaceous on insects of a particular taxonomic group, such as aphids, which have a wide spectrum of host plants.

This lack of specificity for the pear psylla among its enemies must be considered if using any of them in biological control. It remains to be seen whether any of these beneficial species could survive on a diet of largely pear psylla, would lead themselves to economical mass production in the laboratory, would disperse, too, rapidly considering their apparent need for diversity, to effect control of the pest and could be applied when and where needed in adequate quantity.

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REFERENCES

- Abdel-Salam F., 1967. Über die Wirkung von Phosphorsäureestern auf einige Arthropoden innerhalb der Apfelbaum-Biozönose in Abhängigkeit von ihrer Dichte. *Z. angew. Zool.*, 54 (2), 233-283.
- Abdulkhairova S., 1979. The injuriousness of cereal aphids. *Zashch. Rast.*, 10, 44 (in russian).
- Abdulmadzhid A. A., 1973. Control of *Acyrtosiphon pisum* with natural enemies and insecticides. *Rast. Zashch.*, 21 (7), 39-41 (in bulgarian).
- Abul-Nasr S. E., Tawfik M. F. S., Ammar E. D., Farrag S. M., 1978. Occurrence and causes of mortality among active and resting larvae of *Pectinophora gossypiella* (Lep.: Gelechiidae) in Giza, Egypt. *Z. Angew. Entomol.*, 86 (4), 403-414.
- Adashkevich B. P., Adylov Z. K., Rasulev F. K., 1981. The biomethod in action. *Zashch. Rast.*, 9, 9-10 (in russian).
- Afifi A. M., Farghali H. T., Rezk G. N., Ragab Z. A., 1980. Seasonal abundance of certain pests and predators in clover fields in Egypt. *Bull. Entomol. Soc. Egypt.*, 60, 273-278.
- Afzal M., Khan M. R., 1978. Life history and feeding behaviour of green lacewing, *Chrysopa carnea* Stephens (Neu.: Chrysopidae). *Pakistan J. Zool.*, 10 (1), 83-90.
- Agarwala B. K., Raychaudhuri D. N., 1981. Note on some aphids affecting economically important plants in Sikkim. *Indian J. Agr. Sci.*, 51 (9), 690-692.
- Agekyan N. G., 1977. *Clitostethus arcuatus* Rossi (Col.: Coccinellidae) — a predator of citrus whitefly in Adzharia. *Entomol. Obozrenie*, 56 (1), 31-33 (in russian).
- Akinlosotu T. A., 1978. The inter-relationship of the cabbage aphid parasite, *Diaeretiella rapae* McIntosh (Hym.: Aphididae) and the entomophagous predators of the aphid. *Nigerian J. Entomol.*, 3 (1), 5-9.
- Akramovskaya E. G., 1978. The biology of some predatory bugs of the family Anthocoridae in the conditions of the Ararat valley in Armenia. *Biol. Z. Armenii*, 31 (9), 959-964 (in russian).
- Alekseev Y. I., Niyazov O. D., 1975. Composition and seasonal dynamics of numbers of predacious arthropods on cotton in the Murgab lowlands. *Izvestiya Akademii Nauk Turkmenkoi SSR, Biologicheskikh Nauk*, 5, 57-64 (in russian).
- Alrouechdi K., 1981. Relations comportementales et trophiques entre *Chrysoperla carnea* (Stephens) (Neu.: Chrysopidae) et trois principaux ravageurs de l'olivier. I. La teigne de l'olivier *Prays oleae* Bern. (Lep.: Hyponomeutidae). *Neuroptera International*, 1 (3), 122-134.
- Alrouechdi K., Canard M., Pralavorio R., Arambourg Y., 1980. Répartition des adultes et des pontes de chrysopides (Neuroptera) récoltés dans une oliveraie de Provence. *Neuroptera International*, 1 (2), 65-74.
- Alrouechdi K., Canard M., Pralavorio R., Arambourg Y., 1981a. Influence du complexe parasitaire sur les populations de Chrysopides (Neuroptera) dans un verger d'oliviers du Sud-Est de la France. *Z. Angew. Entomol.*, 91 (4), 411-417.
- Alrouechdi K., Pralavorio R., Canard M., Arambourg Y., 1981b. Coïncidence et relations prédatrices entre *Chrysopa carnea* (Stephens) (Neu.: Chrysopidae) et quelques ravageurs de l'olivier dans le Sud-Est de la France. *Mitt. Schw. Entomol. Gesell.*, 54 (3), 281-290.
- Altay M., Gurses A., Uyar K., 1973. Studies on scale insects (Coccoidea) in the Marmara region. *Uzerinde calismalar*, 29, 155.
- Anderson N. H., 1962a. Growth and fecundity of *Anthocoris* spp. reared on various prey (Het.: Anthocoridae). *Entomol. exp. appl.*, 5, 40-52.
- Anderson N. H., 1962b. Studies on overwintering of *Anthocoris* (Hem.: Anthocoridae). *Entomol. Mon. Mag.*, 98, 1-3.
- Anderson N. H., 1962c. Bionomics of six species of *Anthocoris* (Het.: Anthocoridae) in England. *Trans. R. entomol. Soc. Lond.*, 114 (3), 67-95.
- Anonymous, 1982. Biocontrol of cottony maple scale on urban shade trees. *IPM Practitioner*, 4 (10), 3.
- Arcanin B., Balarin I., 1973. Predatory species of *Heteroptera* represented in the fauna of Croatian apple orchards. *Acta Entomol. Jugoslavica*, 8 (1/2), 11-21 (in yugoslavian).
- Archer T. L., Cate R. K., Eikenbary R. D., Starks K. J., 1974. Parasitoids collected from greenbugs and corn leaf aphids in Oklahoma in 1972. *Ann. Entomol. Soc. Am.*, 67 (1), 11-14.
- Argyriou L. C., 1970. Les aphides nuisibles aux agrumes en Grèce et leurs ennemis naturels. *Ann. Inst. Phytopathol. Benaki*, 9 (2), 114-117.
- Argyriou L. C., Katsoyannos P., 1977. Coccinellid species found in the olive groves of Greece. *Ann. Inst. Phytopathol. Benaki*, 11 (4), 331-345.
- Argyriou L. C., Kourmadas A. L., 1980. The phenology and natural enemies of *Aspidiotus nerii* Bouché in central Greece. *Fruits*, 35 (10), 633-638.
- Argyriou L. C., Paloukis S. S., 1976. Some data on biology and parasitism of *Sphaerolecanium prunastri* Fonscolombe (Hom.: Coccidae) in Greece. *Ann. Inst. Phytopathol. Benaki*, 11 (3), 230-240.
- Arzone A., 1976. Indagini su *Trialeurodes vaporariorum* ed *Encarsia tricolor* in pien'aria. *Inf. Fitopatol.*, 26 (11/12), 5-10.
- Arzone A., 1979. Indagini sui limitatori naturali di *Psylla pyri* (L.) in Piemonte. *Boll. Lab. Entomol. Agrar. Portici*, 36, 131-149.
- Asgari A., 1966. Untersuchungen über die im Raum Stuttgart-Hohenheim als wichtigste Prädatoren der grünen Apfelblattlaus (*Aphidula pomi* Deg.) auftretenden Arthropoden. *Z. angew. Zool.*, 53 (1), 35-93.
- Atger P., 1977. Le psylle du poirier est-il un faux problème ? *La défense des végétaux*, 187, 1-7.
- Atger P., 1978. La lutte contre le psylle du poirier. Aspects nouveaux. *Arboriculture fruitière*, 288, 33-36.
- Atger P., 1979a. Aménagement de la lutte contre les psylles du poirier dans les basses vallées du Rhône et de la Durance. *C.R. Journées Fruitières d'Avignon-Montfavet*, 16-17 nov. 1978, 93-99.
- Atger P., 1979b. Les psylles du poirier. Biologie et contrôle en verger. *Phytoma*, 311, 19-22.
- Atger P., Feron M., Bassino J. P., 1979. La protection intégrée en vergers de poiriers et plus particulièrement la lutte contre les psylles. *Symp. Int. OILB/SROP sur la lutte intégrée en agriculture et en forêt, Wien 8-12 Oct. 1979*, 313-319.
- Audemard H., 1973. L'aménagement de la lutte chimique contre le carpocapse (*Laspeyresia pomonella* L.) en verger de pommiers. Un premier pas dans la lutte intégrée. *Rev. Zool. Agric. Pathol. Vég.*, 72 (2), 33-47.
- Austreng M. P., Somme L., 1980. The fauna of predatory bugs (Het.: Miridae and Anthocoridae) in Norwegian apple orchards. *Fauna Norvegica*, B, 27 (1/2), 3-8.

- Aveling C.**, 1981a. The role of *Anthocoris* species (Hem.: Anthocoridae) in the integrated control of the damson-hop aphid (*Phorodon humuli*). *Ann. Appl. Biol.*, 97 (2), 143-153.
- Aveling C.**, 1981b. Action of mephosfolan on anthocorid predators of *Phorodon humuli*. *Ann. Appl. Biol.*, 97 (2), 155-164.
- Babenko V. A.**, 1980. A test on the rational control of aphids. *Zashch. Rast.*, 6, 14-15 (in russian).
- Baggiolini M., Schmid A., Jucker W., Frischknecht M.**, 1979. Applications pratiques des régulateurs de croissance des insectes, analogues de l'hormone juvénile, contre les psylles du poirier. *Mitt. Schw. Entomol. Gesel.*, 52 (1), 3-11.
- Bagnall R. S., Harrison H.**, 1924. New British Cécidomyiidae. *V. Entomol. Rec. J. Var.*, 26, 38.
- Baker R. T.**, 1983. Predation of leafroller larvae by spiders and mites. *Weta*, 6 (1), 22-23.
- Bakhetia D. R., Sharma A. K.**, 1979. Preliminary observations on aphids infestation on *Eruca sativa* Mill. *Indian J. Entomol.*, 41 (3), 288-289.
- Bakhetia D. R., Sidhu A. S.**, 1977. Biology and seasonal activity of the groundnut aphid, *Aphis craccivora* Koch. *J. Res., Punjab Agr. Univ.*, 14 (3), 299-303.
- Balevski A.**, 1977. Natural enemies of mites. *Rast. Zashch.*, 25 (2), 11-14 (in bulgarian).
- Bar D., Gerling D., Rossler Y.**, 1979. Bionomics of the principal natural enemies attacking *Heliothis armigera* in cotton fields in Israel. *Environ. Entomol.*, 8 (3), 468-474.
- Barbagallo S., Patti I.**, 1983. Citrus aphids and their entomophagous in Italy. In: *Aphid antagonists. Proceedings of a meeting of the EC Experts' group, Portici, Italy, 23-24 Nov. 1982* (edited by Cavalloro R.), Rotterdam, Netherlands, A. A. Balkema, 116-669.
- Barnes H. F.**, 1930. Gall midges (Cécidomyiidae) as enemies of the Tingidae, Psyllidae, Aleurodidae and Coccidae. *Bull. Entomol. Res.*, 21, 319-329.
- Baronio P.**, 1971. Ricerche su un metodo di campionamento per rilevare la densità e la distribuzione delle uova di *Dysaphis plantaginea* Pass. (Hom.: Aphididae) in un meloto. Nota preliminare. *Boll. Oss. Mal. Pianta, Bologna*, 2, 1-13.
- Basedow T.**, 1982. Untersuchungen zur Populationsdynamik des Siebenpunktarienkäfers *Coccinella septempunctata* L. (Col.: Coccinellidae) auf Getreidefeldern in Schleswig-Holstein von 1976-1979. *Z. Angew. Entomol.*, 94 (1), 66-82.
- Bassino J. P., Fort G., Gendrier J. P., Reboulet J. N.**, 1975. Lutte intégrée en vergers de poiriers. *C. R. 5^e Symp. Lutte intégrée en vergers, OILB/SROP*, 153-174.
- Batasheva Z. N.**, 1979. The raspberry beetle in the Tula region. *Zashch. Rast.*, 6, 30-31 (in russian).
- Batasheva Z. N.**, 1981. Leafrollers on raspberry. *Zashch. Rast.*, 6, 41 (in russian).
- Baumgaertner J. U., Gutierrez A. P., Summers C. G.**, 1981. The influence of aphid prey consumption on searching behavior, weight increase, developmental time, and mortality of *Chrysopa carnea* (Neu.: Chrysopidae) and *Hippodamia convergens* (Col.: Coccinellidae) larvae. *Can. Entomol.*, 113 (11), 1007-1014.
- Bayan A. K.**, 1981. Population dynamics of the harvest apple mite on grapevine and of some acarophages. *Rast. Zashch.*, 29 (4), 24-29 (in bulgarian).
- Baylac M.**, 1980. Faune associée à *Cryptococcus fagi* (Baer.) (Hom.: Coccoidea) dans quelques hêtraies du nord de la France. *Acta Oecol., Oecol. Appl.*, 1 (2), 199-208.
- Benedek P.**, 1969. Causes of the collapse of a *Dendrolimus pini* outbreak. A zoocenological study. *Acta phytopathol. Acad. Sci. hung.*, 4 (4), 305-311.
- Berest Z. L.**, 1980a. Parasites and predators of the aphids *Brachycolus noxius* and *Schizaphis graminum* in crops of barley and wheat in the Nikolaev and Odessa regions. *Vestnik Zoologii*, 2, 80-81 (in russian).
- Berest Z. L.**, 1980b. Entomophagous insects controlling the numbers of cereal leaf aphids in wheat fields of the steppe zone of Pravoberezh'ya, Ukrainian S.S.R. *Vestnik Zoologii*, 5, 84-87 (in russian).
- Berlinger M. J., Tzahor J., Gol'berg A. M.**, 1979. Contribution to the phenology of *Chilocorus bipustulatus* L. (Coccinellidae) in citrus groves and the control of *Planococcus citri* (Pseudococcidae) in Israel, p. 49-54. In: *XXXI International Symposium on Crop Protection. Mededelingen van de Faculteit Landbouwwetenschappen Rijksuniversiteit Gent*, 44 (1, I; 2, II), 1-476; 477-1007.
- Bisabri-Ershadi B., Ehler L. E.**, 1981. Natural biological control of western yellow-striped armyworm, *Spodoptera praefica* (Grote), in hay alfalfa in northern California. *Hilgardia*, 49 (5), 1-23.
- Blazhievskaya A. P.**, 1980. The variegated oak aphid and ants. *Zashch. Rast.*, 1, 37 (in russian).
- Bode E.**, 1980a. Untersuchungen zum Auftreten der Haferblattlaus *Rhopalosiphum padi* (L.) (Hom.: Aphididae) an ihrem Winterwirt *Prunus padus* L. I. Biologie der Haferblattlaus *Rhopalosiphum padi* (L.) am Winterwirt. *Z. Angew. Entomol.*, 89 (4), 363-377.
- Bode E.**, 1980b. Aphids in winter wheat: abundance and limiting factors from 1976 to 1979, p. 49-57. In: *Ecologie des pucerons des céréales. Réunion du sous-groupe du Groupe de Travail « Lutte intégrée en Céréales », Colmar (France) 14-15 Nov. 1979. Bulletin OILB/SROP*, 3 (4), 119 p.
- Boldyrev M. I.**, 1968a. The apple leaf-mining moth *Lithocolletis pyrifoliella*. *Zashch. Rast.*, 13 (6), 26-27 (in russian).
- Boldyrev M. I.**, 1968b. The raspberry cane midge. *Zashch. Rast.*, 13 (10), 35-36 (in russian).
- Boldyrev M. I.**, 1975. Insect enemies of the lower-surface mining moth. *Zashch. Rast.*, 1, 25 (in russian).
- Bonnemaïson L.**, 1971. Observations sur les fluctuations des populations aphidiennes du chou, de la betterave et de la pomme de terre. *Ann. Soc. Entomol. Fr.*, (N.S.) 7 (3), 505-551.
- Bonnemaïson L., Missonnier J.**, 1956. Le psylle du poirier (*Psylla pyri* L.). Morphologie et biologie. Méthodes de lutte. *Ann. Epiphyties*, 7 (2), 263-331.
- Borg A.**, 1983. The cereal leaf beetle (*Oulema melanopa* L.), some observations and tests on control. *Växtskyddsnotiser*, 46 (4), 74-80 (in swedish).
- Botto E. N.**, 1981. *Aphelinus asychis* Walker y *Aphelinus abdominalis* (Dalman), dos nuevos parasitos para los « pulgones verde y amarillo de los cereales », en la Argentina. *Rev. Soc. Entomol. Argentina*, 39 (3/4), 197-202.
- Botto E. N., Crouzel I. S. de**, 1981. Contribution al conocimiento de las causas de mortalidad de la « isoca de la alfalfa » *Colias lesbia* (F.) en Castelar, Buenos Aires. *Rev. Soc. Entomol. Argentina*, 40 (1/4), 201-210.
- Botto E. N., Hernandez M. C., Boggiatto M. E., Crouzel I. S. de**, 1979. Resultados preliminares de estudios bioecológicos sobre el « pulgón amarillo de los cereales » *Metopolophium dirhodum* (Walker), realizados en Castelar, Buenos Aires, durante 1976 a 1979. I. Estudios de campo. *Rev. Soc. Entomol. Argentina*, 38 (1/4), 37-46.
- Bouyjou B., Canard M., Nguyen T. X.**, 1984. Analyse par frappe des principaux prédateurs et proies potentielles en verger de poiriers non traité, p. 148-166. In: *Colloque international sur la lutte intégrée contre les psylles du poirier, Toulouse, 27-29 Sept. 1983, Bull. OILB/SROP*, VII (5), 388 p.
- Broadley R. H., Rogers D. J.**, 1978. Pests of pangola grass in north Queensland pastures. *Queensland Agric. J.*, 104 (4), 320-324.
- Bronnimann H.**, 1964. Rearing anthocorids on an artificial medium. *Tech. Bull. Commonw. Inst. Biol. Contr.*, 4, 147-150.
- Burts E. C.**, 1970. The pear psylla in central Washington. *Washington Agric. Exp. Stn. Circ.* 516, 13 p.
- Campbell C. A. M.**, 1977. A laboratory evaluation of *Anthocoris nemorum* and *A. nemoralis* (Hem.: Anthocoridae) as predators of *Phorodon humuli* (Hom.: Aphididae). *Entomophaga*, 22 (3), 309-314.
- Campbell C. A. M.**, 1978. Regulation of the damson-hop aphid (*Phorodon humuli* (Schränk)) on hops (*Humulus lupulus* L.) by predators. *J. Hort. Sci.*, 53 (3), 235-242.
- Carl K. P.**, 1969. Observations on *Endopsylla agilis* de Meijere (Dipt.: Cecidomyiidae), an endoparasite of *Psylla* spp. (Hom.: Psyllidae). *Tech. bull., C.I.B.C.*, 12, 147-156.
- Carl K. P.**, 1980. Beobachtungen über die Apfelgallmücke, *Dasi-neura mali* Kieffer und eine neue Art aus Apfelblattgallen, *Macrolabis* sp. (Dipt.: Cecidomyiidae). *Anz. Schäd. Pflanz. Umw.*, 53 (7), 99-102.
- Carl K., Zwölfer H.**, 1965. Untersuchungen zur biologischen

Bekämpfung einiger unkräuter und Schädlinge in Landwirtschaft und Obstbau. 2. Bericht über die Arbeiten der Europäischen Station des Commonwealth Institute of biological control, Delémont, Schweiz. 1. Teil. *Anz. Schädlingssk.*, 38 (6), 81-87.

Castanera P., 1983. The relative abundance of parasites and predators of cereal aphids in central Spain. In: *Aphid antagonists. Proceedings of a meeting of the EC Experts' Group, Portici, Italy*, 23-24 Nov. 1982 (Edited by Cavalloro R.), Rotterdam, Netherlands. A. A. Balkema, 76-82.

Chambers R. J., Sunderland K. D., 1983. The abundance and effectiveness of natural enemies of cereal aphids on two farms in southern England. In: *Aphid antagonists. Proceedings of a meeting of the EC Experts' Group, Portici, Italy*, 23-24 Nov. 1982. (Edited by Cavalloro R.), Rotterdam, Netherlands. A. A. Balkema, 83-87.

Chambers R. J., Sunderland K. D., Stacey D. L., Wyatt I. J., 1982. A survey of cereal aphids and their natural enemies in winter wheat in 1980. *Ann. Appl. Biol.*, 101 (1), 175-178.

Chandler A. E. F., 1968. Height preferences for oviposition of aphidophagous Syrphidae (Diptera). *Entomophaga*, 13 (3), 187-195.

Chao C. C., Chang S. T., 1978. Population fluctuations of green lacewings in cotton fields. *Acta Entomol. Sinica*, 21 (3), 271-278 (in chinese).

Chen H. Q., 1982. A preliminary observation on *Altica* sp. *Kun-chong Zhishi*, 19 (6), 21-23 (in chinese).

Cheng H. Y., Ming W. J., 1979. Population dynamics and biological control of *Matsucoccus matsumurae* Kuwana (Hom.: Margarodidae). *Acta Entomol. Sinica*, 22 (2), 149-155 (in chinese).

Cherkashina A. S., 1973. The biology of some entomophagous Syrphidae (Diptera) in the Maritime Territory, p. 135-139. In: L. A. IVLIEV. *Entomological researches in the Far East. Issue 2. Diptera of the Far East. Trudy Biologo-poch-vennogo Instituta, Dal'nevostochnyi Nauchnyi Tsentr, Akademiya Nauk S.S.S.R.*, 5, 192 p. (in russian).

Clausen C. P., 1978. Introduced parasites and predators of Arthropod pests and weeds. *U.S.D.A. Agr. Handb.*, 480, Washington D.C., 545 p.

Collyer E., 1967. On the ecology of *Anthocoris nemorum* (L.) (Hem.: Heteroptera). *Proc. R. Entomol. Soc. Lond.*, (A), 42 (7-9), 107-118.

Constantinescu V., 1972. Factors limiting the multiplication of the grey cabbage aphid (*Brevicoryne brassicae* L.). *Analele Inst. Cerc. Prot. Plant.*, 8, 103-110 (in rumanian).

Cranham J. E., 1980. Integrated pest control in orchards. *Garden*, 105 (10), 406-409.

D'Aguilar J., Pralavorio R., Rabasse J. M., Mouton R., 1977. Introduction en France du tigre du platane *Corythucha ciliata* (Say) (Het.: Tingidae). *Bull. Soc. Entomol. Fr.*, 82 (1/2), 2-6.

Dean G. J., 1974. Effects of parasites and predators on the cereal aphids *Metopolophium dirhodum* Wlk.) and *Macrosiphum avenae* (F.) (Hem.: Aphididae). *Bull. Entomol. Res.*, 63 (3) 411-422.

Dean G. J., 1982. Phenology of aphidophagous predators. *Ann. Appl. Biol.*, 101 (1), 182-184.

Delrio G., Ortu S., Prota R., 1981. Prospettive di lotta integrata nell'agrumicoltura sarda. *Studi Sassaresi*, 27, 205-232.

Delvare G., 1977. Etude de la reproduction et de la diapause de *Prionomitus mitratus* Dalm., *Encyrtidae*, parasite du psylle du poirier *Psylla pyri* (L.). Thèse, Toulouse, France, 76 p.

Delvare G., Mirkarimi A., Nguyen T. X., 1981. Redescription de *Prionomitus mitratus* Dalman (Hym.: Encyrtidae) endoparasite de psylles (Hom.: Psyllidae). *Ann. Soc. Entomol. Fr.*, 17 (2), 171-178.

Dennis E. B., 1969. Control of euonymus scale. *Plant Pathology*, 18 (2), 78-82.

Dessart P., 1983. *Dendrocerus psyllarum* n. sp. (Hym.: Ceraphronoidea, Megaspilidae) parasite ou hyperparasite de psylles (Hom.: Psyllidae) en France et en Belgique. *Bull. Ann. Soc. r. belge Entomol.*, 119, 222-226.

Dimitrov A., 1975. Forecasting of *Thrips tabaci*. *Rast. Zashch.*, 23 (10), 19-22 (in bulgarian).

Dirimanov M., Dimitrov A., 1975. Role of useful insects in the control of *Thrips tabaci* Lind. and *Myzodes persicae* Sulz. on tobacco, p. 71-72. In: *VIII International Plant Protection Congress, Moscow 1975. Reports and informations. Section V. Biological and genetic control. Moscow, U.S.S.R.*, 225 p.

Dixon A. F. G., Barlow N. D., 1979. Population regulation in the lime aphid. *Zool. J. Linnean Soc.*, 67 (3), 225-237.

Dixon A. F. G., Russel R. J., 1972. The effectiveness of *Anthocoris nemorum* and *A. confusus* (Hem.: Anthocoridae) as predators of the sycamore aphid *Drepanosiphum platanoides*. II. Searching behaviour and the incidence of predation in the field. *Entomol. exp. appl.*, 15 (1), 35-50.

Du Merle P., 1983. Les facteurs de mortalité des œufs de *Tortrix viridana* L. (Lep.: Tortricidae). I. Le complexe des prédateurs (Hym.: Formicidae; Derm.: Forficulidae; Orth.: Phaneropteridae; Neur.: Chrysopidae). *Agronomie*, 3 (3), 239-246.

Dusek J., Laska P., 1974. Overwintering and spring emergence of some common species of aphidophagous syrphids (Syrphidae). *Folia Fac. Sci. Nat. Univ. Purkynianae Brunensis*, 15 (1), 71-75.

Dyadechko N. P., 1967. Entomophagous insects and the causal agents of fungus diseases in phytophagous species of thrips. *Zashch. Rast.*, 4, 149-151 (in russian).

Ekbom B. S., 1981. Efficiency of the predator *Anthocoris nemorum* (Het.: Anthocoridae) against the greenhouse whitefly *Trialeurodes vaporariorum* (Hom.: Aleurodidae). *Z. Angew. Entomol.*, 92 (1), 26-34.

Elliot W. M., 1970. The action of some systemic aphicides on the nymphs of *Anthocoris nemorum* (L.) and *A. confusum* Reut. *Ann. appl. Biol.*, 66 (2), 313-321.

Erkin E., 1983. Investigations on the hosts, distribution and efficiency of the natural enemies of the family Aphididae (Homoptera) harmful to pome and stone fruit trees in Izmir Province of Aegean Region. *Türk. Bitki Koruma Dergisi*, 7 (1), 29-49.

Estrada S. J., Carrillo S. J. L., 1971. Importancia de la fauna entomofaga del algodonero en la Comarca Lagunera. *Agr. Tec. Mexico*, 2 (12), 539-544.

Evans H. F., 1976a. The role of predator-prey size ratio in determining the efficiency of capture by *Anthocoris nemorum* and the scape reactions of its prey, *Acyrtosiphon pisum*. *Ecol. Entomol.*, 1 (2), 85-90.

Evans H. F., 1976b. The effect of prey density and host plant characteristics on oviposition and the fertility in *Anthocoris confusus* (Reuter). *Ecol. Entomol.*, 1 (3), 157-161.

Evans H. F., 1976c. The searching behaviour of *Anthocoris confusus* (Reuter) in relation to prey density and plant surface topography. *Ecol. Entomol.*, 1 (3), 163-169.

Evans H. F., 1976d. Mutual interference between predatory anthocorids. *Ecol. Entomol.*, 1 (4), 283-286.

Evans H. F., 1976e. The population dynamics of *Anthocoris confusus* in a laboratory ecosystem. *J. Anim. Ecol.*, 45 (3), 773-789.

Fauvel G., 1974a. Les hétéroptères prédateurs en verger, p. 125-149. In: *Les organismes auxiliaires en verger de pommiers, OILB/SROP, Groupe de travail pour la lutte intégrée en arboriculture*, Broch. 3, 242 p.

Fauvel G., 1974b. Sur l'alimentation pollinique d'un anthocoride prédateur *Orius* (Heterorius) vicinus Rib. (Hémiptère). *Ann. Zool. Ecol. Anim.*, 6 (2), 245-258.

Fauvel G., Atger P., 1981. Etude de l'évolution des insectes auxiliaires et de leurs relations avec le psylle du poirier (*Psylla pyri* L.) et l'acarien rouge (*Panonychus ulmi* Koch) dans deux vergers du Sud-Est de la France en 1979. *Agronomie*, 1 (9), 813-820.

Fauvel G., Grivaut G., 1976. Faut-il attribuer certains dégâts d'hétéroptères sur pommes à des *Orius* (Het.: Anthocoridae)? *Rev. Zool. Agr. Path. Vég.*, 75 (3), 81-92.

Fauvel G., Rambier A., Cotton D., 1978. Activité prédatrice et multiplication d'*Orius* (Heterorius) vicinus (Het.: Anthocoridae) in the galls of *Eriophyes fraxinivorus* (Acarina: Eryophyidae). *Entomophaga*, 23 (3), 261-270.

Fauvel G., Cotton D., Lefeuvre M., Lemoine J., 1980. La responsabilité des thrips dans la genèse des piqures sur pommes. *Arboriculture fruitière*, 321, 40-42.

Fedosimov O. F., Tsedev D., 1970. The useful insects of Mongolia. *Zashch. Rast.*, 15 (6), 51 (in russian).

Ferriere C., 1926. Un parasite de *Psylla pyrisuga*: *Prionomitus mitratus* Dalm. (Hym.: Encyrtidae). *Ann. Soc. Entomol. Fr.*, 95 (2), 189-194.

Ferriere C., 1961. Encyrtides paléarctiques parasites des psylles. *Entomophaga*, 6 (1), 39-51.

- Fields C. J., Beirne B. P.**, 1973. Ecology of Anthocorid predators of the pear psylla in the Okanagan Valley, British Columbia. *J. Entomol. Soc. Br. Columbia*, 70 (1), 18-19.
- Filippov N.**, 1982. Integrated control of pests of vegetable crops grown in the open in Moldavia. *Acta Entomol. Fennica*, 40, 6-9.
- Frazer B. D., Nelson C.**, 1981. Note on the occurrence of predatory *Anystis mites* (Acari : *Anystidae*) in SW British Columbia. *J. Entomol. Soc. Br. Columbia*, 78, 46.
- Fye R. E.**, 1981. Rearing and release of coccinellids for potential control of pear psylla. *U.S.D.A., A.R.S., Adv. Agric. Tech., AAT-W-20*, 9 pp.
- García Mari F., Rivero J. M. Del**, 1982. El acaro rojo *Panonychus citri* (McGregor), nueva plaga de los cítricos en España. *Bol. Serv. Def. Plagas Insp. Fitopatol.*, 7 (1/2), 65-77.
- Gaudchau M.**, 1979. Vergleichende Untersuchungen zum Einfluss von Prädatoren auf die Populationsentwicklung der Erbsenblattlaus, *Acyrtosiphon pisum* (Harr.). *Z. Angew. Entomol.*, 88 (5), 504-513.
- Geoffrion R.**, 1981. Les psylles du poirier. *Phytoma*, 325, 5-6.
- Georgala M. B.**, 1957. A contribution to the biology of the pear sucker *Psylla pyricola*. 44th Rep. E. Malling Res. Sta. 1955-1956, 135-141.
- Gertsson C. A.**, 1980. The occurrence of bugs in strawberry fields in southern Sweden. *Entomol. Tids.*, 101 (2/3), 71-74 (in Swedish).
- Giunchi P.**, 1980. Possibilities of biological control of pear insects, p. 48-49. In : *Biological control in orchards, IOBC/WPRS Bull.*, III (6), 88 p.
- Glen D. M.**, 1975. The effects of predators on the eggs of codling moth *Cydia pomonella*, in a cider-apple orchard in south-west England. *Ann. Appl. Biol.*, 80 (1), 115-119.
- Goksu M. E., Atak E. D.**, 1969. Investigations on the European red mite (*P. ulmi*) in the region of Marmara and Thrace. *Bitki Koruma Bül.*, 9 (1), 19-36.
- Golfari L.**, 1937. Contributi a la conoscenza dell'entomofauna del pero (*Pyrus communis* L.). *Bol. Istit. Entomol. Univ. Bologna*, 9, 206-249.
- Gollner-Scheidig U.**, 1978. Beitrag zur Kenntnis der Heteropterenfauna Mazedoniens. *Acta Mus. Macedonici Sci. Nat.*, 15 (6), 145-150.
- Golubenko N. N.**, 1969. A test of integrated control of the plum fruit moth *Laspeyresia funebrana* Tr. (Lep. : *Tortricidae*). *Ent. Obozr.*, 48 (3), 502-506 (in Russian); *Entomol. Rev.*, 48 (3), 318-321.
- Gomes A.**, 1980. Syrphids caught during the 2nd aphidological expedition to the Azores archipelago (Dipt. : *Syrphidae*). *Bol. Soc. Port. Entomol.*, 9, 1-6 (in Portuguese).
- Goncharova N. G.**, 1968. Differentiated complex of control measures against the black-currant leaf gall midge. *Izv. timiryazev. sel'-khoz. Akad.*, 1, 138-149 (in Russian).
- Goncharova N. G., Samosudov V. N.**, 1979. Protection of black currant from the leaf gall-midge. *Zashch. Rast.*, 10, 38-39 (in Russian).
- Gourreau J. M.**, 1974. Systématique de la tribu des *Scymnini* (Coccinellidae). *Ann. Zool. Ecol. anim.*, H.S., 211 p.
- Graham M. W. R. de V.**, 1969. The *Pteromalidae* of the North Western Europe (Hym. : *Chalcidoidea*). *Bull. Brit. Mus. (Nat. Hist.)*, Entomol. Suppl. 16, London, 908 p.
- Grandi G.**, 1951. Introduzione allo studio dell'entomologia. *Edizione Agricola Bologna*, 1, 814-822.
- Gravena S.**, 1979. Population dynamics of the greenbug, *Schizaphis graminum* (Rondani) (Hom. : *Aphididae*) and its natural enemies associated with grain sorghum in Jaboticabal, Sao Paulo, Brazil. *Anais Soc. Entomol. Brasil*, 8 (2), 325-334 (in Portuguese).
- Grigorov S.**, 1977a. Biological peculiarities of some ladybird beetle species (Col. : *Coccinellidae*). *Rast. Nauki*, 14 (9), 133-142 (in Bulgarian).
- Grigorov S.**, 1977b. Study on the biology of the sugar beet root aphid *Pemphigus fuscicornis* Koch (Hom. : *Aphididae*). *Rast. Nauki*, 14 (6), 120-128 (in Bulgarian).
- Grigorov S.**, 1978. A study of the biology of the peach aphid *Myzus persicae* Sulz. (Hom. : *Aphididae*). *Rast. Nauki*, 15 (9/10), 184-193 (in Bulgarian).
- Grigorov S.**, 1983. Parasites and diseases of species of the family *Coccinellidae*. *Rast. Nauki*, 20 (2), 113-121 (in Bulgarian).
- Groh K., Tanke W.**, 1980. Untersuchungen zum Einfluss von Herbizidapplikationen auf die Fauna in Zuckerrüben-Anbauflächen, p. 493-497. In : *Russ K. & Berger H. edit., Proceedings International symposium of IOBC/WPRS on integrated control in agriculture and forestry, Vienna, 8th-21th Oct. 1979. Vienna, Austria.*, 393-605.
- Gumovskaya G. N.**, 1982. The role of ladybirds in the suppression of the beet aphid. *Zashch. Rast.*, 5, 29-30 (in Russian).
- Habib A., Rezk G. N., Farghaly H. T., Ragab Z. A.**, 1980. Seasonal abundance of some predators in cotton fields and its relation to certain pests. *Bull. Entomol. Soc. Egypt.*, 60, 191-196.
- Hafez M., Khalil F. M., Abd-El-Kawi A.**, 1975. Survey of predators occurring in clover and cotton fields at Assiut locality. *Agr. Res. Rev.*, 53 (1), 43-45.
- Hafez M., Tawfik M. F. S., Awadallah K. T., Sarham A. A.**, 1983. Natural enemies of the cotton whitefly, *Bemisia tabaci* (Genn.), in the world and in Egypt. *Bull. Soc. Entomol. Egypte*, 62, 9-13.
- Hagley E. A. C., Simpson C. M.**, 1983. Effect of insecticides on predators of the pear psylla *Psylla pyricola* (Hem. : *Psyllidae*), in Ontario. *Can. Entomol.*, 115, 1409-1414.
- Hamid S., Shah M. A., Anwar A. M.**, 1977. Some ecological and behavioural studies on *Aphis craccivora* Koch (Hem. : *Aphididae*). *Tech. Bull. Commonwealth Inst. Biol. Contr.*, 18, 99-111.
- Hamilton P. A.**, 1973. The biology of *Aphelinus flavus* (Hym. : *Aphelinidae*), a parasite of the sycamore aphid *Drepanosiphum platanoides* (Hem. : *Aphididae*). *Entomophaga*, 18 (4), 449-462.
- Hassanein M. H., Afify A. M., Farghaly H. T.**, 1968. Daily and seasonal density of four entomophagous predators on cotton in Upper Egypt. *Entomophaga*, 13 (2), 143-150.
- Hayat M.**, 1981. Taxonomic notes on Indian *Encyrtidae* (Hym. : *Chalcidoidea*), III. *Colemania*, 1 (1), 13-14.
- Heathcote G. D.**, 1978. Coccinellid beetles on sugar beet in eastern England, 1961-1975. *Plant Pathology*, 27 (3), 103-109.
- Hellen W.**, 1949. Zur Kenntnis der Encyrtiden Finnlands. *Notulae Entomol.*, 29, 41-50.
- Hellpap C.**, 1982. Untersuchungen zur Wirkung verschiedener Insektizide auf Prädatoren von Getreideblattläusen unter Freilandbedingungen. *Anz. Schädl. Pflanz. Umw.*, 55 (9), 129-131.
- Henry T. J.**, 1977. *Orthotylus nassatus*, a European plant bug new to North America (Het. : *Miridae*). *Coop. Plant Pest Rep.*, 2 (31), 605-608.
- Henry T. J., Wheeler A. G. Jr.**, 1979. Palearctic *Miridae* in North America : records of newly discovered and little-known species (Hem. : *Heteroptera*). *Proc. Entomol. Soc. Washington*, 81 (2), 257-268.
- Herard F.**, 1985. Analysis of parasite and predator populations observed in pear orchards infested by *Psylla pyri* (L.) (Hom. : *Psyllidae*) in France. *Agronomie*, 5 (9), 773-778.
- Herard F., Chen K.**, 1985. Ecology of *Anthocoris nemorum* (L.) (Het. : *Anthocoridae*) and evaluation of its potential effectiveness for biological control of pear psylla. *Agronomie*, 5 (10), 855-864.
- Hill A. R.**, 1957. The biology of *Anthocoris nemorum* in Scotland (Hem. : *Anthocoridae*). *Trans. R. entomol. Soc. Lond.*, 109 (13), 379-394.
- Hodkinson I. D., Flint P. W. H.**, 1971. Some predators from the galls of *Psyllopsis fraxini* L. (Hem. : *Psyllidae*). *Entomol. Mon. Mag.*, 107 (1280/1282), 11-12.
- Holdsworth R. P. Jr.**, 1970a. Codling moth as part of an integrated program in Ohio. *J. econ. Entomol.*, 63 (3), 894-897.
- Holdsworth R. P. Jr.**, 1970b. Aphids and aphid enemies : effect of integrated control in an Ohio apple orchard. *J. econ. Entomol.*, 63 (2), 530-535.
- Honek A.**, 1978. Les facteurs qui déterminent la composition de l'ensemble des adultes de Coccinellidae et Chrysopidae sur trois espèces de mauvaises herbes, p. 357-358. In : *Colloque Franco-Tchécoslovaque sur la « Spécificité » des entomophages » (C.R. Antibes)*, 26 Sept.-1^{er} Oct. 1977, I.N.R.A. Ann. Zool. Ecol. Anim., 10 (3), 357-358.
- Honek A.**, 1982. Factors which determine the composition of field communities of adult aphidophagous *Coccinellidae* (Coleoptera). *Z. Angew. Entomol.*, 94 (2), 157-168.

- I.O.B.C.**, 1980. Biological control in orchards. Biology and control of codling moth. Wye (U.K.), 25-29 March 1980. *Bull. SROP*, 3 (6), 88 p.
- Iperti G.**, 1974. Les coccinelles, p. 111-121. In : *Les organismes auxiliaires en verger de pommiers*, OILB/SROP, Broch. 3, 242 p.
- Iperti G.**, 1978a. Comportement alimentaire des coccinelles, p. 406-406. In : *Colloque Franco-Tchécoslovaque sur la Spécificité des entomophages* (C.R. Antibes) (26 Sept. au 1^{er} Oct. 1977) (I.N.R.A.). *Ann. Zool. Ecol. Anim.*, 10 (3), 315-459.
- Iperti G.**, 1978b. Coïncidence spatiale des coccinelles et des pucerons, p. 373-375. In : *Colloque Franco-Tchécoslovaque sur la « Spécificité des entomophages »* (C.R. Antibes) (26 Sept. au 1^{er} Oct. 1977) (I.N.R.A.). *Ann. Zool. Ecol. Anim.*, 10 (3), 315-459.
- Ishankulieva T.**, 1979. The use of larvae of the common lacewing in the control of pests of cotton. *Izv. Akad. Nauk Turkmenskoi S.S.R., Biol. Nauk*, 1, 17-21 (in russian).
- Ismail I. I., Swailem S. M.**, 1976. On the biology of the bollworm *Heliothis armigera* (Hubner) (Lep. : Noctuidae). *Bull. Soc. Entomol. Egypte*, 59, 207-216.
- Ito K., Iwao S.**, 1977. Oviposition behavior of a syrphid, *Episyrphus balteatus* in relation to aphid density on the plant. *Jap. J. Appl. Entomol. Zool.*, 21 (3), 130-134 (in japanese).
- Ivanov S.**, 1978. A system for the control of leafmining moths on fruit trees. *Rast. Zashch.*, 26 (4), 2-4 (in bulgarian).
- Jackson H. B., Coles L. W., Wood Jr. E. A., Eikenbary R. D.**, 1970. Parasites reared from the greenbug and corn leaf aphid in Oklahoma in 1968 and 1969. *J. econ. Entomol.*, 63 (3), 733-736.
- Janiszewska-Cichocka E.**, 1971. The biology of the currant root aphid *Eriosoma ulmi* L. (Hom. : Aphidoidea). *Rocz. Nauk Rolniczych, Ser. E*, 1 (2), 25-55 (in polish).
- Jasiolek Z., Kania C., Sobota G.**, 1974. Hover-flies (Dipt. : Syrphidae) destroying aphids on maize. *Polskie Pismo Entomol.*, 44 (2), 425-430.
- Jensen D. D.**, 1957. Parasites of the Psyllidae. *Hilgardia*, 27 (2), 71-99.
- Jones M. G.**, 1969. The effect of weather on frit fly (*Oscinella frit* L.) and its predators. *J. appl. Ecol.*, 6 (3), 425-441.
- Jones M. G.**, 1979. Abundance of aphids on cereals from before 1973 to 1977. *J. Appl. Ecol.*, 16 (1), 1-22.
- Jubb G. L. Jr., Masteller E. C.**, 1977. Survey of arthropods in grape vineyards of Erie County, Pennsylvania : Neuroptera. *Environ. Entomol.*, 6 (3), 419-428.
- Kaczmarek S.**, 1973. Studies on the aphidophagous Coccinellidae of cultivated fields in the Koszalin administrative district. *Ekologia Polska*, 21 (26), 377-403.
- Kania C., El-Fayoumi M., Kelm M., Koroluk L.**, 1976. Heteroptera in a potato agrocoenosis in Pawlowice Wielkie near Wroclaw in 1971-1974. *Polskie Pismo Entomol.*, 46 (3), 595-605 (in polish).
- Kanterina N. F.**, 1974. Beneficial insects in sowings of leguminous crops. *Zashch. Rast.*, 2, 23 (in russian).
- Karadzov S.**, 1973a. The problem of harmful Acarina on apple. *Rast. Zashch.*, 21 (11), 21-26 (in bulgarian).
- Karadzov S.**, 1973b. Dynamics of the phytophagous and predacious mites in a biological system of pest control on apple. *Grad. Loz. Nauka*, 10 (5), 51-62 (in bulgarian).
- Karelin V. D.**, 1980. Conditions for the use of syrphids. *Zashch. Rast.*, 11, 40-41 (in russian).
- Kartasheva T. T., Lesteva E. E.**, 1979. The role of acarophages in the regulation of numbers of fruit spider mites in orchards in Kirgizia. *Entomol. Issled. Kirgizii*, 13, 82-85 (in russian).
- Keimer C.**, 1983. La protection intégrée contre le psylle du poirier, exemple d'application pratique de la recherche entomologique. *Mitt. Schw. Entomol. Ges.*, 56 (1-2), 182.
- Kelton L. A.**, 1978. The insects and arachnids of Canada. Part 4. The Anthocoridae of Canada and Alaska (Het. : Anthocoridae). *Canada Dept. Agr., Ottawa, Canada*, 101 p.
- Kelton L. A.**, 1982. New records of European *Pilophorus* and *Orthotylus* in Canada (Het. : Miridae). *Can. Entomol.* 114 (3), 283-287.
- Kesten L. A.**, 1975. Insect enemies of the lucerne aphid. *Zashch. Rast.*, 11, 28 (in russian).
- Kfir R., Rosen D.**, 1981. Biology of the hyperparasite *Pachyneuron concolor* (Förster) (Hym. : Pteromalidae) reared on *Microterys flavus* (Howard) in brown soft scale. *J. Entomol. Soc. South Africa*, 44 (1) 151-163.
- Khalil F. M., Awadallah K. T., Mahmoud T. T.**, 1979. Seasonal abundance of natural enemies associated with alfalfa plants in Hamman Al-Alil. *Deutsche Entomol. Z.*, 26 (4/5), 181-186.
- Khan S., Yunus M.**, 1970. Biology of *Syrphus balteatus* DeGeer. *Pakistan J. Zool.*, 2 (2), 215-217.
- Kim H. S., Moon D. Y., Lippold P. C., Chang Y. D., Park J. S.**, 1978. Studies on the integrated control of citrus pests. I. Bionomics of citrus red mite and natural enemies. *Korean J. Plant Prot.*, 17 (1), 7-13.
- Kismir A., Sengonca C.**, 1981. Studies on the development of methods of mass-rearing *Anisochrysa carnea* (Neur. : Chrysopidae). *Türkiye Bitki Koruma Dergisi*, 5 (1) 35-41 (in turkish).
- Knapen H., Vanwetswinkel G.**, 1977. Pear psylla (*Psylla pyri*) biology and control, p. 1315-1322. In : *XXIX International Symposium on Phytopharmacy and Phytiatry*, 1977. Mededelingen van de Faculteit Landbouwwetenschappen Rijksuniversiteit Gent, 42 (2, I ; 2, II), VII + 819-1290 ; VI + 1261-1847.
- Koehler W.**, 1967. Considerations for the discussion on the use of *Trichogramma* sp. (Hym. : Chalcidoidea) in the biological method of forest protection, p. 587-596. In : *IUFRO-Kongress, München 1967. Referate-Papers-Exposés. V. Section 24*, ix + 888 p.
- Konovalova Z. A.**, 1978. New and little-known species of psyllids (Hom. : Psylloidea) of the Far East, p. 24-30. In : Krivolutskaia G. O. (edit.), *New data on the insects of Sakhalin and the Kuril Islands. Trud. Biol.-pochv. Inst., Nov. Ser.*, 50 (153), 168 p. (in russian).
- Korc A.**, 1967. The predator bug fauna on apple trees in the vicinity of Poznan. *Polskie Pismo entomol.*, 37 (3), 581-586.
- Korc A.**, 1971. Predacious bugs of the order Heteroptera in orchards and their role in the control of mites (Tetranychidae). *Prace Nauk. Inst. Ochr. Roslin*, 12 (2), 3-77 (in polish).
- Koval Y. V.**, 1968. Predators of the Colorado potato beetle. *Zashch. Rast.*, 13 (4), 52 (in russian).
- Kozłowska A.**, 1978. Hover flies (Dipt. : Syrphidae) feeding on aphids associated with fruit trees and berry shrubs in the environs of Lublin, Poland. *Polskie Pismo Entomol.*, 48 (4), 677-686 (in polish).
- Krombein K. V., Hurd P. D. Jr., Smith D. R., Burks B. D.**, 1979. Symphyta and Apocrita (Parasitica). In : *Catalog of Hymenoptera in America North of Mexico*, 1, 1198 p., Smithsonian Institution Press, Washington D. C.
- Kula E.**, 1982. The syrphid flies (Dipt. : Syrphidae) of spruce forest. *Folia Fac. Sci. Nat. Univ. Purkynianae Brunensis, Biol.*, 23 (7), 61-64.
- Kunovski Z.**, 1969. The 22-spotted lemon-coloured ladybird. *Rast. Zashch.*, 17 (11), 13-16 (in bulgarian).
- Laffi F.**, 1982. Il ragnetto giallo della vite. *Eotetranychus carpini* Oud. f. vitis Dosse. *Inf. Fitopatol.*, 32 (6), 31-34.
- Lakhidov A. I.**, 1970. Aphidophagous Coccinellids on Leguminosae. *Zashch. Rast.*, 15 (11), 48-49 (in russian).
- Lal K. B.**, 1934. Insect parasites of Psyllidae. *Parasitology*, 26 (3), 325-334.
- Laska P.**, 1967. The effects of isolation cages on the injuriousness of the cabbage aphid (*B. brassicae*) to cabbage. *Bull. vyzk. Ust. zelin. Olomouc*, 11, 66-75.
- Latteur G.**, 1973. Etude de la dynamique des populations des pucerons des céréales. Premières données relatives aux organismes aphidiphages en trois localités différentes. *Parasitica*, 29 (3), 134-151.
- Lauenstein G.**, 1976. Untersuchungen zu Biologie und Verhaltensweisen der räuberischen Blumenwanze *Anthocoris nemorum* L. (Het. : Anthocoridae). *Diss. Univ., Göttingen*.
- Lauenstein G.**, 1977. Untersuchungen zu Fruchtbarkeit und Eiablage der räuberischen Blumenwanze *Anthocoris nemorum* L. (Hem. : Heteroptera). *Z. Angew. Entomol.*, 83 (4), 355-363.
- Lauenstein G.**, 1980. Zum Suchverhalten von *Anthocoris nemorum* L. (Het. : Anthocoridae). *Z. Angew. Entomol.*, 89 (5), 428-442.
- Lauterer P.**, 1982. New data on the occurrence, bionomics and taxo-

- mony of some Czechoslovakian *Psylloidea* (Homoptera). *Casopis Moravského Musea, Vedy Prirodni*, 67, 133-162.
- Lee P. P., Hsu T. C.**, 1979. Some additions to the aphid fauna of Taiwan. *NTU Phytopathologist and Entomologist*, 6, 23-37.
- Liotta G.**, 1981. Osservazioni bio-etologiche su *Clitostethus arcuatus* (Rossi) (Col. : Coccinellidae) in Sicilia. *Redia*, 64, 173-185.
- Liotta G.**, 1982. La mosca bianca fioccosa degli agrumi. *Inf. Fito-patol.*, 32 (12), 11-15.
- Liotta G., Maniglia G.**, 1975. Action des huiles blanches contre les stades hivernants de *Dialeurodes citri* (Ashm.) (Hom. : Aleurodidae) sur citronnier, p. 323-327. In : *XXVII International Symposium on Phytopharmacy and Phytiatry, 1975. Mededelingen van de Faculteit Landbouwwetenschappen Rijksuniversiteit Gent*, 40 (2, I ; 2, II), (12 +) 203-705 ; (6 +) 751-1247.
- Lipa E. Y., Sem'yanov V. P.**, 1967. Parasites of coccinellids (Col. : Coccinellidae) in the Leningrad region. *Entomol. Obozr.*, 46 (1), 75-80 (in russian).
- Livshits I. Z., Mitrofanov V. I.**, 1981a. Beneficial insects and mites in fruit orchards. *Zashch. Rast.*, 6, 49-52 (in russian).
- Livshits I. Z., Mitrofanov V. I.**, 1981b. Beneficial insects and mites in fruit orchards. *Zashch. Rast.*, 9, 56-58 (in russian).
- Loi G.**, 1979. Osservazioni eco-etologiche sul coleottero coccinellide scimmino *Clitostethus arcuatus* (Rossi), predatore di *Dialeurodes citri* (Ashm.) in Toscana. *Frustula Entomol.*, 1, 123-125.
- Lord F. T.**, 1968. Influence of the proportion of fruiting to non-fruiting clusters on the distribution of insect predators on apple trees. *Can. Entomol.*, 100 (3), 308-312.
- Lord F. T.**, 1971. Laboratory tests to compare the predatory value of six Mirid species in each stage of development against the winter eggs of the European red mite, *Panonychus ulmi* (Acari : Tetranychidae). *Can. Entomol.*, 103 (12), 1663-1669.
- Lovei G. L.**, 1981. Coccinellid community in an apple orchard bordering a deciduous forest. *Acta Phytopathol. Acad. Sci. Hungaricae*, 16 (1/2), 143-150.
- Lyashova L. V.**, 1981. The 14-spotted propylea. *Zashch. Rast.*, 11, 29-30 (in russian).
- Lyon J. P.**, 1971. Les syrphides (Diptères) prédateurs des pucerons de la betterave. *Parasitica*, 27 (4), 103-111.
- Lyon J. P., Goidlin de Tiefenau P.**, 1974. Les Syrphes prédateurs de pucerons, p. 163-170. In : *Les organismes auxiliaires en verger de pommiers, OILB/SROP, broch. 3*, 242 p.
- Mack T. P., Smilowitz Z.**, 1979. Diel activity of green peach aphid predators as indexed by sticky traps. *Environ. Entomol.*, 8 (5), 799-801.
- Magalhães G. S.**, 1980. Note in the introduction of *Aleurothrixus floccosus* (Mask.) (Hom. : Aleurodidae) in south Portugal and its control by *Cales noacki* How. (Hym. : Aphelinidae), p. 572-573. In : *Russ K., Berger H. (edit.), Proceedings International Symposium of IOBC/WPRS on integrated control in agriculture and forestry. Vienna, 8th-12th Oct. 1979*, 393-605.
- Maher-Ali A., Moftah S. A., Rizk G. A.**, 1983. Evaluation of the impact of certain predators on the population density of egg-masses of the cotton leafworm, *Spodoptera littoralis* (Boisd.) in cotton fields. *Bull. Soc. Entomol. Egypte*, 62, 111-116.
- Mahmoud T. T., Khalil F. M., Awadalla K. T.**, 1981. Population dynamics of aphids and enemies on peach trees in Mosul region, Iraq. *Mesopotamia J. Agric.*, 16 (2), 167-183.
- Marboutie G.**, 1976. Premiers résultats d'essais de lutte biologique en vergers de pêchers et de pommiers. *Rev. Zool. Agric. Pathol. Vég.*, 75 (1), 23-30.
- Matta V. A.**, 1979. Enemigos naturales de las conchuelas blancas del olivo en el valle de Azapa, Arica-Chile. *Idesia*, 5, 231-242.
- McMullen R. D., Jong C.**, 1967a. The influence of three insecticides on predation of the pear psylla, *Psylla pyricola*. *Can. Entomol.*, 99 (12), 1292-1297.
- McMullen R. D., Jong C.**, 1967b. New records and discussion of predators of the pear psylla, *Psylla pyricola* Förster, in British Columbia. *J. Entomol. Soc. Br. Columbia*, 64, 35-40.
- Mentzelos I. A.**, 1967. Contribution to the study of the entomophagous insects of *Siphoninus phillyreae* Halid. (= *inaequalis* Gautier) (Aleurodidae) on pear trees in central Macedonia. *Rep. Pl. Prot. agric. Res. Stn Thessaloniki*, 3, 92-102 (in greek).
- Meszleny A., Szalay-Marzso L.**, 1979. Data on aphids (Hom. : Aphidina) in apple orchard with particular emphasis on their fight dynamics and natural control factors (Studies in apple ecosystems N. 6). *Acta Phytopathol. Acad. Sci. Hungaricae*, 14 (3/4), 465-479.
- Mills N. J.**, 1979. *Adelia bipunctata* (L.) as a generalist predator of aphids. Thesis, East Anglia University, Norwich, UK., 91 p.
- Mills N. J.**, 1982. Voracity, cannibalism and coccinellid predation. *Ann. Appl. Biol.*, 101 (1), 144-148.
- Milne D. L.**, 1977. Biological control of citrus thrips, *Scirtothrips aurantii* : what are the prospects ? *Citrus and Subtropical Fruit Journal*, 528, 14-16.
- Missonnier J.**, 1971. Role des ennemis naturels de la pégomyie de la betterave en France. *Parasitica*, 27 (4), 112-114.
- Mitic-Muzina N.**, 1967. The parasites of the spherical scale (*Eulecanium prunastri*). *Zast. Bilja*, 18 (93-95), 183-187.
- Molchanov R. V.**, 1981. Entomological complexes of the undergrowth and saplings of pine forests of Byelorussia. *Trudy Vsesoyuznogo Entomol. Obsh.*, 63, 14-16 (in russian).
- Monaco R.**, 1976. Nota su *Metaphycus lounsburyi* (How.) (Hym. : Encyrtidae) parassita di *Saissetia oleae* (Oliv.). *Entomologica*, 12, 143-151.
- Monaco R.**, 1977. Note bio-ecologique sulla *Trabutina leonardii* Silv. (Hom. : Coccidae) e suoi predatori. *Entomologica*, 13, 155-163.
- Moreau J. P. H.**, 1983. Aphid pullulations in maize crops : damage induced natural control by antagonists. In : *Aphid antagonists. Proceedings of a meeting of the EC Experts' Group, Portici, Italy, 23-24 Nov. 1982* (ed. Cavalloro R.). Rotterdam, Netherlands : A. A. Balkema, 93-99.
- Mori P., Vianello G.**, 1980. Integrated control of *Carpocapsa pomonella* L. with diflubenzuron (test results), p. 455-457. In : *Russ K., Berger H. (edit.), Workshop sessions. Proceedings. International symposium of IOBC/WPRS on integrated control in agriculture and forestry. Vienna, 8th-12th oct. 1979*, 393-605.
- Morris M. G.**, 1968. The effect of sprays on the fauna of apple trees. V. DDT/BHC and lead arsenate/nicotine applied at the green cluster stage. *J. appl. Ecol.*, 5 (2) 409-429.
- Mostaan M., Seyedoleslami H., Farivar-Mahin G., Farahbakhch G., Daftari K.**, 1972. Complementary study of the biology and methods of control of *Lepidosaphes malicolicola* Borkh. in Iran. *Entomol. Phytopathol. Appl.*, 33, 4-20 (in iranian).
- Murashevskaya Z. S.**, 1969. Species of *Chilocorus*. *Zashch. Rast.*, 14 (11), 36-38 (in russian).
- Myrzin A. S., Luk'yanchikov V. P.**, 1981. Aphid enemies on rice. *Zashch. Rast.*, 11, 44 (in russian).
- Narzikulov M. N., Umarov S. A.**, 1975. The theory and practice of integrated control of cotton pests. *Entomol. Obozr.*, 54 (1), 3-16 (in russian).
- Natskova V.**, 1971. The parasites and predators of aphids on roses. *Rast. Zashch.*, 19 (11), 19-22 (in bulgarian).
- Natskova V.**, 1973. The effect of aphid predators on the abundance of aphids on peppers. *Rast. Zashch.*, 21 (1), 20-22 (in bulgarian).
- Natskova V.**, 1977. Natural enemies of aphids on vegetable crops. *Rast. Zashch.*, 25 (2), 7-10.
- Nguyen T. X., Delvare G.**, 1984. Biocoenose des psylles du poirier (*Psylla pyri* L. et *Psylla pyrisuga* Foerster) dans la région toulousaine, France, p. 191-197. In : *Colloque international sur la lutte intégrée contre les psylles du poirier*, Toulouse, 27-29 sept. 1983, *Bull. OILB/SROP*, VII (5), 388 p.
- Nguyen T. X., Bouyjou B., Delvare G.**, 1981. Les psylles du poirier et leur complexe parasitaire. *La défense des végétaux*, 209, 221-226.
- Nickel J. L., Shimizu J. T., Wong T. T. Y.**, 1965. Studies in natural control of pear psylla in California. *J. econ. Entomol.*, 58 (5), 970-976.
- Niemczyk E.**, 1967. *Psallus ambiguus* (Fall.) (Het. : Miridae). Part I. Morphology and biology. *Polskie Pismo entomol.*, 37 (4), 797-842.
- Niemczyk E.**, 1968. *Psallus ambiguus* (Fall.) (Heteroptera, Miridae). Part II. Its nutrition and role in orchard biocoenoses. *Polskie Pismo entomol.*, 38 (2), 387-416 (in polish).
- Niemczyk E.**, 1969. The occurrence of *Heteroptera* in sprayed and

- unsprayed apple orchards. *Prace Inst. Sadow. Skiern.*, 12, 355-363 (in polish).
- Niemczyk E., 1970. The development and fecundity of the bark bug *Anthocoris nemorum* (L.) (Het. Anthocoridae) reared on the eggs of the Angoumois grain moth *Sitotroga cerealella* Oliv. (Lep. : Gelechiidae). *Polskie Pismo Entomol.*, 40 (4), 857-865.
- Niemczyk E., 1978a. Food requirement searching abilities and role of *Orius minutus* L. (Het. Anthocoridae) in controlling the two-spotted mite *Tetranychus urticae* Koch. *Polskie Pismo Entomol.*, 48 (3), 445-451.
- Niemczyk E., 1978b. *Orius minutus* (L.) (Het. : Anthocoridae) : the occurrence in apple orchards, biology and effect of different food on the development. *Polskie Pismo Entomol.*, 48 (2), 203-209.
- Niemczyk E., 1978c. The role of *Orius minutus* (L.) in controlling the European mite *Panonychus ulmi* Koch on young apple trees. *Polskie Pismo Entomol.*, 48 (2), 211-229.
- Niemczyk E., Miszczak M., Nowakowski Z., 1972. The influence of pesticides on some predacious insects. In : Wegorek W. (edit.), *Papers presented at the 12th Scientific Session of the Institute for Plant Protection 3rd-5th Feb. 1972*. Biul. Inst. Ochr. Roslin, 52, 556 p. (in polish).
- Nordlander G., 1977. Observations on the insect fauna in apple trees in connection with tests on insecticides for integrated control. *Wäxtskyddsnotiser*, 41 (2), 39-48 (in swedish).
- Notario A., Castresana Estrada L., Iglesias Gonzalez L., 1978. Contribucion al estudio biologico de *Coccinella septempunctata* L. (Col. : Coccinellidae). *An. Inst. Nac. Invest. Agrar., Prot. Veg.*, 8, 65-77.
- Novokhatka V. G., Krivovvaz I. Z., Dubovoi V. I., 1980. Towards control of the cereal aphid. *Zashch. Rast.*, 10, 41 (in russian).
- Obrycki J. J., Nechols J. R., Tauber M. J., 1982. Establishment of European lady beetle in New York State. *New York's Food and Life Sci. Bull.*, 94, 4 p.
- Onder F., 1982. The turkish fauna of Anthocoridae (Heteroptera) : Taxonomic and faunistic studies. *Ege Univ. Ziraat Fak. Yayinlari*, 459, 159 p. (in turkish).
- Ongoren K., Kaya N., Turkmen S., 1975. Investigations on the identification of the species of red spider-mites injurious to vegetables in the Aegean region, and on the biology, control measures and natural enemies of the most widely distributed species, the two-spotted spider-mite *Tetranychus urticae* (Koch). *Bitki Koruma Bül.*, 15 (1), 3-29 (in turkish).
- Overmeer W. P. J., 1961. Investigations on species of pear psyllids in the Netherlands. *Tijdschr. Plziekt.*, 67 (4), 281-289.
- Palaniswami M. S., Pillai K. S., 1980. Parasites on *Aphis gossypii* G. infesting taro and tannia. *Current Science*, 49 (21), 830.
- Panis A., 1980. Dégâts de Coccidae et Pseudococcidae (Hom. : Coccoidea) citrus en France et effets particuliers de quelques pesticides sur l'entomocénose du verger. *Fruits*, 35 (12), 779-782.
- Pantukhov G. A., 1968. On the photoperiodic reaction of *Chilocorus renipustulatus* Scriba (Col. : Coccinellidae). *Entomol. Obozr.*, 47 (1), 45-50 (in russian). *Entomol. Rev.*, 47 (1), 26-29.
- Papaioannou-Soulioti P., 1980. A simple technique for breeding *Panonychus ulmi* (Koch) (Acarina : Tetranychidae). *Ann. Inst. Phytopathol. Benaki*, 12 (2), 179-182.
- Parker N. J. B., 1975. An investigation of reproductive diapause in two British populations of *Anthocoris nemorum* (Hem. : Anthocoridae). *J. Entomol. (A)*, 49 (2), 173-178.
- Parker N. J. B., 1981. A method of mass rearing the aphid predator *Anthocoris nemorum*. *Ann. Appl. Biol.*, 99 (3), 217-223.
- Pasqualini E., 1979. Evoluzione delle popolazioni di *Panonychus ulmi* Koch (Acarina : Tetranychidae) e del suo predatore *Stethorus punctillum* Weise (Col. : Coccinellidae) su melo. *Boll. Ist. Entomol. Univ. St. Bologna*, 34, 1-14.
- Pasqualini E., Briolini G., Memmi M., 1982. Indagini preliminari sul danno da *Panonychus ulmi* Koch (Acarina : Tetranychidae) su melo in Emilia Romagna. *Boll. Ist. Entomol. Univ. St. Bologna*, 36, 173-190.
- Pass B. C., Parr J. C., 1971. Seasonal occurrence of the pea aphid and a Braconid parasite *Aphidius smithi* in Kentucky. *J. econ. Entomol.*, 64 (5), 1150-1153.
- Patnaik N. C., Satpathy J. M., Bhagat K. C., 1977. Note on the occurrence of aphidophagous insect predators in Puri district (Orissa) and their predation on the sorghum aphid *Longiunguis sacchari* (Zhnt.). *Indian J. Agric. Sci.*, 47 (11), 585-586.
- Pauriene P., 1970. Predacious mites on orchards plants in the Lithuanian SSR. *Acta Entomol. Lituanica*, 1, 178-179 (in russian).
- Pek L. V., 1975. Predacious hoverflies of Kirgizia (Dipt. : Syrphidae), p. 79-82. In Protsenko A. I. (edit.), *Entomological investigations in Kirgizia*. Vol. 10. Izdatel'stvo « Ilim », 136 p. (in russian).
- Pelov V., Trenchev G., 1973. The pear whitefly and its natural enemies. *Rast. Zashch.*, 21 (11), 26-27 (in bulgarian).
- Pericart J., 1972. Hémiptères, Anthocoridae, Cimicidae et Microphysidae de l'Ouest-Paléarctique. *Faune de l'Europe et du Bassin méditerranéen*, 7, 402 p., Masson & Cie éd., Paris.
- Pezzi A., 1982. Osservazioni sulle fluttuazioni delle popolazioni della *Psylla pyri* e del suo predatore *Anthocoris nemoralis* (F.). *Inf. fitopatol.*, 32 (3), 51-53.
- Philogene B. J. R., Chang J. F., 1978. New records of parasitic chalcidoids of pear psylla (Hom. : Psyllidae) in Ontario, with observations on the current world status of its parasitoids and predators. *Proc. Entomol. Soc. Ontario*, 53-60.
- Picco D., Picco A. M., 1978. Even the pear psylla (*Psylla pyri* L.) can be placed under control by its natural biotic enemy complex, in the protection of *Pomaceae* by « complementary control ». *Not. Mal. Piante*, 98/99, 101-117.
- Plugaru S. G., 1969. On the biology of the oak leaf-beetle in Moldavia. *Vred. polez. Fauna Bespozyon. Moldavii*, 4/5, 56-64 (in russian).
- Podsiadlo E., 1981. Parasitic wasps (Hym. : Chalcidoidea) reared from females of the globose scale *Sphaerolecanium prunastri* (Fonscolombe) in Warsaw (Hom. Coccidae). *Polskie Pismo Entomol.*, 51 (1), 153-158 (in polish).
- Pollard E., 1969. The effect of removal of arthropod predators on an infestation of *Brevicoryne brassicae* (Hem. : Aphididae) on brussels sprouts. *Entomol. exp. appl.*, 12 (1), 118-124.
- Popova A. I., 1971. *Chilocorus* in the control of the California scale. *Zashch. Rast.*, 16 (12), 42-43 (in russian).
- Popova A. I., 1974. Parasites of the males of the California scale. *Zashch. Rast.*, 3, 56 (in russian).
- Principi M. M., Canard M., 1974. Les Névroptères, p. 151-162. In : *Les organismes auxiliaires en verger de pommiers*. OILB/SROP, broch. 3, 242 p.
- Priore R., 1969. Il *Dialeurodes citri* (Ashmead) (Hom. Aleyrodidae) in Campania. (Note di morfologia e biologia). *Boll. Lab. Entomol. Agrar. Filippo Silvestri, Portici*, 27, 287-316.
- Pruszyński S., Lipa J. J., 1971. The occurrence of predatory Coccinellidae on alfalfa crops. *Ekologia Polska*, 19 (26), 365-386.
- Puchkov A. V., 1980. Particulars of the biology of predacious *Nabis* spp. *Zashch. Rast.*, 8, 44 (in russian).
- Pukinskaya G. A., Solov'eva O. M., Didenko I. V., 1981. Aphidophagous insects and the numbers of ceral aphids. *Zashch. Rast.*, 9, 25 (in russian).
- Radev R., 1968. Studies on the bioecology of the cotton leaf aphid *Aphis gossypii* Glov. (Hom. : Aphididae) on cotton. *Rast. Nauki*, 5 (10), 109-131 (in bulgarian).
- Radke S. G., Barwad W. L., 1978. New record of parasite *Aphidencyrus aphidivorus* (Mayr) (Hym. : Encyrtidae) on *Rhopalosiphum maidis* (Fitch) and the efficacy of the various insecticides on the host and effect on parasitism. *Indian J. Entomol.*, 40 (1), 59-62.
- Radwan Z., Lovei G. L., 1982. Distribution and bionomics of ladybird beetles (Col. Coccinellidae) living in an apple orchard near Budapest, Hungary. *Z. Angew. Entomol.*, 94 (2), 169-175.
- Radzivilovskaya M. A., 1980. The chrysopid against aphids on cotton. *Zashch. Rast.*, 10, 26 (in russian).
- Ramakers P. M. J., 1978. Possibilities for biological control of *Thrips tabaci* Lind (Thysanoptera : Thripidae) in glasshouses, p. 463-469. In : *XXX International Symposium on crop protection. Mededelingen van de Faculteit Landbouwwetenschappen Rijksuniversiteit Gent*, 43 (2, I ; 2, II), ix + 351-908 ; iii + 909-1322.
- Rao V., Ghani M. A., 1972. Studies on predators of *Adelges* spp. in the Himalayas. *Misc. publ. Commonwealth Inst. Biol. Control, Trinidad*, 3, 116 p.
- Rautapaa J., 1977. Evaluation of predator-prey ratio using

- Chrysopa carnea* Stephens in control of *Rhopalosiphum padi* (L.). *Ann. Agric. Fenniae*, 16, 103-109.
- Remaudiere G., Leclant F.**, 1971. Le complexe des ennemis naturels des aphides du pêcher dans la moyenne vallée du Rhône. *Entomophaga*, 16 (3), 255-267.
- Rezk G. N., Iss-Hak R. R., Ragab Z.**, 1975. Competition between three different species of predator insects and their effect on the population density of *Aphis gossypii* Glov., in cotton fields. *Z. Angew. Entomol.*, 78 (2), 181-185.
- Rosen D., Kfir R.**, 1983. A hyperparasite of coccids develops as a primary parasite of fly puparia. *Entomophaga*, 28 (1), 83-87.
- Roy P., Basu S. K.**, 1978. Bionomics of aphidophagous syrphid flies. *Indian J. Entomol.*, 39 (2), 165-174.
- Ruschka F.**, 1923. Beiträge zur Kenntnis einiger Encyrtidengattungen (Hym.: Chalcidoidea). *Verh. Zool. Bot. Ges. Wien*, 72, 13.
- Russel R. J.**, 1970. The effectiveness of *Anthocoris nemorum* and *A. confusus* (Hem.: Anthocoridae) as predators of the sycamore aphid, *Drepanosiphum platanoide*. I. The number of aphids consumed during development. *Entomol. exp. & appl.*, 13, 194-207.
- Russel R. J.**, 1972. Defensive responses of the aphid *Drepanosiphum platanoide* in encounters with the bug *Anthocoris nemorum*. *Oikos*, 23, 264-267.
- Rustamova M. R.**, 1981. Entomophagous insects on cotton. *Zashch. Rast.*, 3, 36 (in russian).
- Rybachin V. E.**, 1982. Enemies of root-nodule weevils. *Zashch. Rast.*, 2, 30-31 (in russian).
- Saddik A., El-Miniawi S. F.**, 1978. A study on infestation of artichoke *Cynara cardunculus* v. *scolymus* L. by looper caterpillars and other pests, p. 179-187. In: *Proceedings of the Fourth Conference of Pest Control, Sept. 30-Oct. 3, 1978 (Part 1)*, (2 +) vii + 677 p.
- Santas L. A.**, 1979. Distribution of aphids of citrus and cotton and their parasites in Greece. *Biol. Gallo-Hellenica*, 9, 315-319.
- Scaltriti G. P.**, 1982. Osservazioni biologiche sulla *Euphilippia olivina* Berl. & Silv. nel Veneto (Hom.: Coccidae). *Mem. Soc. Entomol. Italiana*, 60 (2), 289-297.
- Scheurer R., Ruzette M. A., Fluck V.**, 1975. Effects of treatment with an insect growth regulator on the pear psylla (*Psylla pyri* L.) under field conditions. *Z. Angew. Entomol.*, 78 (3), 313-316.
- Selim A. A.**, 1977. Some notes on the activity of certain insects predators and parasites of the Hammam Al-Alil area. *Mesopotamia J. Agric.*, 12 (61), 65-73.
- Sem'yanov V. P.**, 1981. New data on the parasites and predators of *Coccinella septempunctata* L. (Col.: Coccinellidae). *Trud. Vsesoy. Entomol. Obshch.*, 63, 11-14 (in russian).
- Serantes de Gonzalez H., Sierra de Nunez A.**, 1976. *Microlophium carnosum* (Buckton, 1876) (Hom.: Aphididae). *Rev. Soc. Entomol. Argentina*, 35 (1/4), 11-16.
- Setti M.**, 1973. Ricerche sulla attività di alcune specie di sirfidi (Diptera) predatori di afidi del melo. *Boll. Ist. Entomol. Univ. St. Bologna*, 30, 103-132.
- Shalamberidze N.**, 1980. The pear psyllid. *Zashch. Rast.*, 7, 27 (in russian).
- Shands W. A., Simpson G. W., Muesebeck C. F. W., Wave H. E.**, 1965. Parasites of potato-infesting aphids in northeastern Maine. *Bull. Me agric. Exp. Stn*, T 19, 77 p.
- Shi D. S.**, 1982. Studies on the hymenopterous parasite complex and its fluctuation on the cotton aphid (*Aphis gossypii* Glover) in Shanghai. *Contrib., Shanghai Inst. Entomol.*, 1, 215-219 (in chinese).
- Shlyakhovoi N. A., Bobonich V. M.**, 1975. Natural regulators of the numbers of pests. *Zashch. Rast.*, 5, 31 (in russian).
- Shurovenkov B. G.**, 1981. Indigenous natural enemies of rose sawthistle. *Zashch. Rast.*, 10, 54-55 (in russian).
- Sidlyarevich V. I.**, 1965. The importance of predacious mites and bugs in reducing the numbers of *Metatetranychus ulmi* Koch in the Byelorussian SSR. *Trud. Inst. Zashch. Rast.*, 24, 240, 247 (in russian).
- Sidlyarevich V. I.**, 1968. Predacious bugs of the families *Anthocoridae* and *Miridae*, their biology and useful activities in the orchards of Byelorussia, p. 256-266. In: *Zimin L. S. (edit.), The biological method of plant protection. Trud. vses. Zashch. Rast.*, 31, 448 p. (in russian).
- Sinha T. B., Pandey R. K., Rajendra Singh, Tripathi C. P. M., Kumar A.**, 1982. The functional response of *Coccinella septempunctata* L., a coccinellid predator of mustard aphid *Lipaphis erysimi* Kalt. *Entomon*, 7 (1), 7-10.
- Skandland H. T.**, 1981. Studies on the arthropod fauna of a Norwegian apple orchard. *Fauna Norvegica*, B, 28 (1), 25-34.
- Slabospitskii A. I.**, 1980. Insect enemies of cabbage pests. *Zashch. Rast.*, 5, 23 (in russian).
- Smetanin A. N.**, 1970. Entomophagous arthropods in seed-producing forest area. *Zashch. Rast.*, 15 (1), 48 (in russian).
- Smith J. G.**, 1976. Influence of crop background on natural enemies of aphids on Brussels sprouts. *Ann. Appl. Biol.*, 83 (1), 15-29.
- Smith J. W., Scott W. P., Parencia C. R.**, 1978. Predator-prey ratios for control of *Heliothis* species on cotton, p. 111-113. In: *Brown J. M. (edit.), 1978 Proceedings, Beltwide Cotton Production Research Conferences, Jan. 9-11, 1978, Dallas, Texas*, iv + 225 p.
- Smith R. W., Whittaker J. B.**, 1980. Factors affecting *Gastrophysa viridula* populations (Col.: Chrysomelidae) in different habitats. *J. Anim. Ecol.*, 49 (2), 537-548.
- Smolarz S.**, 1970. The biology of the mealy plum aphid *Hyalopterus pruni* (Geoff.) (Hom.: Aphidoidea). *Polskie Pismo Entomol.*, 40 (2), 287-328 (in polish).
- Solomon M. G.**, 1982. Phytophagous mites and their predators in apple orchards. *Ann. Appl. Biol.*, 101 (1), 201-203.
- Sotherton N. W.**, 1982. Predation of a chrysomelid beetle (*Gastrophysa polygona*) in cereals by polyphagous predators. *Ann. Appl. Biol.*, 101 (1), 196-199.
- Soylu O. Z.**, 1980. Investigations on the biology and control of citrus whitefly *Dialeurodes citri* Ashmead, injurious in citrus orchards in the mediterranean region of Turkey. *Bitki Koruma Bül.*, 20 (1/4), 36-53 (in turkish).
- Soylu O. Z., Urel N.**, 1977. Investigations on the parasites and predators of insects injurious to citrus orchards in the region of South Anatolia. *Bitki Koruma Bül.*, 17 (2/4), 77-112 (in turkish).
- Stary P.**, 1970. Host life-cycle and adaptation of parasites of the sycamore aphid, *Drepanosiphum platanoide* (Schrank) in central Europe. *Acta Entomol. Bohemoslov.*, 67 (6), 351-359.
- Steiner H.**, 1974. Carabidae, Staphylinidae, Cantharidae, p. 122-124. In: *Les organismes auxiliaires en verger de pommiers. OILB/SROP, broch. 3*, 242 p.
- Stimmel J. F.**, 1982. Seasonal history of the white peach scale, *Pseudaulacaspis pentagona* (Targ.-Tozz.) (Hom.: Diaspididae) in northeastern Pennsylvania. *Proc. Entomol. Soc. Washington*, 84 (1), 128-133.
- Straka F.**, 1976. Biological and economic effectiveness of aphidophagous enemies of the green cabbage aphid (*Brevicoryne brassicae* L.). *Rast. Nauka*, 4, 82-91 (in bulgarian).
- Sugonyaev E. S., Babaev T.**, 1978. On the chalcidoid (Hym.: Chalcidoidea) parasites of the false scales (Hom.: Coccoidea) in Tadzhikistan. *Entomol. Obozr.*, 57 (1), 148-167 (in russian).
- Sukhoruchenko G. I., Smirnova A. A., Vikar E. V., Kapitani A. I.**, 1981. The effects of pyrethroids on arthropods of the cotton agrobiocenosis. *Entomol. Obozr.*, 60 (1), 5-15 (in russian).
- Summy K. R., Gilstrap F. E., Corcoran S. M.**, 1979. Parasitization of green-bugs and corn leaf aphids in west Texas. *Southwestern Entomol.*, 4 (3), 176-180.
- Sunderland K. D.**, 1975. The diet of some predatory arthropods in cereal crops. *J. Appl. Ecol.*, 12 (2), 507-515.
- Sunderland K. D., Vickerman G. P.**, 1980. Aphid feeding by some polyphagous predators in relation to aphid density in cereal fields. *J. Appl. Ecol.*, 17 (2), 389-396.
- Swirski E.**, 1954. The bionomics of the pear psylla, *Psylla pyricola* Foerst. in Israel. *Ktavim (Engl. edn)*, 4 (4), 61-68.
- Szabo S., Szentkiralyi F.**, 1981. Communities of *Chrysopidae* and *Hemerobiidae* (Neuroptera) in some apple orchards. *Acta Phytopathol. Acad. Sci. Hungaricae*, 16 (1/2), 157-169.
- Takaoka I.**, 1975. Ecological studies on aphid and their natural enemies, p. 1-8. In: *Yasumatsu K., Mori H. (edit.), Approaches to biological control. Tokyo, Japan: Japanese Committee for the International Biological Program, University of Tokyo Press*, viii + 142 p.
- Talati G., Butani P. G.**, 1979. Predatory capacity of *Coccinella septempunctata* on groundnut aphid. *Indian. J. Plant Prot.*, 7 (1), 107.

- Talhok A. S.**, 1977. Contribution to the knowledge of almond pests in East Mediterranean countries. VI. The sap-sucking pests. *Z. Angew. Entomol.*, 83 (3), 248-257.
- Talitskii V. I.**, 1966. Hymenoptera that are parasites of the pear sucker (*Psylla pyri* L.) in Moldavia. *Trudy moldav. nauchno-issled. Inst. Sadov. Vinogr. Vinod.*, 13, 191-221 (in russian).
- Tanke W.**, 1976. Bemerkungen zur Dauerzucht von *Epistrophe balteata* Deg. (Dipt. : Syrphidae). *Nach. Deutsch. Pflanz.*, 28 (4), 55-56.
- Tawfik M. F. S., Ata A. M.**, 1974. The life-history of *Orius laevigatus* (Fieber) (Hem. : Anthocoridae). *Bull. Soc. Entomol. Egypte*, 57, 145-151.
- Tawfik M. F. S., Abul-Nasr S., Saad B. M.**, 1974a. On the feeding habits of *Scymnus interruptus* Goeze (Col. : Coccinellidae). *Bull. Soc. Entomol. Egypte*, 57, 41-54.
- Tawfik M. F. S., Abul-Nasr S., Saad B. M.**, 1974b. The biology of *Scymnus interruptus* Goeze (Col. : Coccinellidae). *Bull. Soc. Entomol. Egypte*, 57, 9-26.
- Tedders W. L., Angalet G. W.**, 1981. Colonization of *Coccinella septempunctata* L. in Georgia. *J. Georgia Entomol. Soc.*, 16 (1), 47-53.
- Teodorescu I.**, 1980. Beneficial insect fauna (predators) in the woods of northern Oltenia. *St. Cercetari Biol., Biol. Anim.*, 32 (1), 3-6 (in rumanian).
- Thalji R.**, 1981. Natural enemies of the aphid *Brachycaudus helichrysi* Kalt. (Hom. Aphididae), a pest of sunflower in Vojvodina. *Zastita Bilja*, 32 (2), 147-153 (in Yugoslavian).
- Thontadarya T. S., Bhumannavar B. S., Govindan R.**, 1976. Parasitization of the safflower aphid by *Aphidencirtus aphidivorus* (Meyr) (Hym. : Encyrtidae). *Current Science*, 45 (22), 811-812.
- Thontadarya T. S., Rao K. J., Awaknavar J. S.**, 1979. Addition to the list of insects that predate the sorghum earhead midge *Contarinia sorghicola* (Coq.). *Current Research*, 8 (4), 64-65.
- Thygesen T., Esbjerg P., Eiberg H.**, 1973. Fireblight transmission by insects. *Tidsskrift Plant.*, 77, 324-336 (in danish).
- Togoshi I.**, 1976. Insect community associated with a large chestnut aphid (Hem. : Aphididae). (Insect fauna of chestnut orchards in Ishikawa Prefecture II). *Mushi*, 49 (9), 87-93.
- Tremblay E.**, 1968. Osservazioni sui punteruoli della canapa (Col. Curculionidae). Note morfologiche, biologiche e lotta chimica. *Boll. Lab. Entomol. agrar. Filippo Silvestri*, 26, 139-190.
- Tremblay E.**, 1969. Il controllo del *Siphoninus phillyreae* (Haliday) in Campania. Studi del gruppo di lavoro del C.N.R. per la lotta integrata contro i nemici animali delle piante : XL. *Boll. Lab. Entomol. Agrar. Filippo Silvestri, Portici*, 27, 161-176.
- Tsachev S.**, 1972. The integrated control of the cabbage aphid. *Rast. Zashch.*, 20 (7), 32-34 (in bulgarian).
- Tsachev S.**, 1978. The mussel scale of apple and its parasites. *Rast. Zashch.*, 26 (7), 26-28 (in bulgarian).
- Tsybul'skaya G. N., Kryzhanovskaya T. V., Pham van Lam**, 1977. *Neuropteroides* inhabiting windbreaks in the Kiev region. *Entomol. Obozr.*, 56 (4), 758-761 (in russian).
- Upadhyay V. R., Kaul C. L., Talati G. M.**, 1981. Seasonal incidence of aphid, *Dactynotus carthami* and coccinellids in correlation to weather conditions. *Indian J. Plant Prot.*, 8 (2), 117-121.
- Usda**, 1980. A mirid bug (*Deraeocoris ruber*). New Jersey, new state record. *Cooperative Plant Pest Report*, 5 (31), 585.
- Varvara M., Patrascanu E., Sava L.**, 1982. Investigations on the biology, ecology and the economic importance of the predacious insect *Coccinella septempunctata* L. in Moldavia. *Analele Stiintifice de Universitatii « Al. I. Cuza » din Iasi, Biologie*, 28, 95-98.
- Vereshchagina V. V.**, 1981. An experiment on the integrated protection of apple. *Zashch. Rast.*, 1, 34-35 (in russian).
- Vidano C., Arzone A., Meotto F.**, 1977/78. Fitofagi preoccupanti di attualità in frutteti piemontesi. *Annali Accad. Agric. Torino*, 120, 65-78.
- Viggiani G.**, 1971. Osservazioni biologiche sul Miride predatore *Deraeocoris ruber* (L.) (Rhynchota, Heteroptera). *Boll. Lab. Entomol. agrar. Filippo Silvestri*, 29, 270-286.
- Viswanathan T. R., Ananthakrishnan T. N.**, 1974. Population fluctuations of 3 species of anthophilous *Thysanoptera* in relation to the numerical response of their predator, *Orius minutus* L. (Hem. : Anthocoridae). *Current Science*, 43 (1), 19-20.
- Vrabi S., Matis G.**, 1977. A contribution to the knowledge of the biology of the pear psyllids (*Psyllidae, Homoptera*) in Slovenia, and the possibilities of its control. *Zastita Bilja*, 28 (1), 41-52.
- Wadhi S. R., Parshad B.**, 1980. Some new records of *Coccinellidae* from Nepal Himalayas. *Bull. Entomol.*, 21 (1/2), 144-147.
- Wagner E., Weber H. H.**, 1964. Hétéroptères Miridae. In : *Faune de France*, 67, 589 p., *Féd. Fse Soc. Sci. Nat., Paris*.
- Walker A. L., Bottrell D. G., Cate J. R. Jr.**, 1973. Hymenopterous parasites of biotype C greenbug in the high plains of Texas. *Ann. Entomol. Soc. Am.*, 66 (1), 173-176.
- Westgard P. H.**, 1979. Integrated pest management of insects and mites of pear, p. 151-202. In : *Pest Management programs for deciduous tree fruits and nuts*. D. J. Boethel & R. D. Eikenbary edit., Plenum Press, N. Y., 256 p.
- Westgard P. H., Gentner L. G., Berry D. W.**, 1968. Present status of biological control of the pear psylla in southern Oregon. *J. econ. Entomol.*, 61 (3), 740-743.
- Whalon M. E., Elsner E. A.**, 1982. Impact of insecticides on *Illinoia pepperi* and its predators. *J. econ. Entomol.* 75 (2), 356-358.
- Whalon M. E., Parker B. L.**, 1978. Immunological identification of tarnished plant bug predators. *Ann. Entomol. Soc. Am.*, 71 (3), 453-456.
- Wheeler A. G. Jr., Stimmel J. F.**, 1979. Bean aphid on ornamental *Euonymus* : seasonal history and damage. *Melsheimer Entomol. Series*, 27, 26-29.
- Wiackowski S. K., Wiackowska I.**, 1968. Investigations on the entomofauna accompanying aphids occurring on fruit trees and bushes. *Polskie Pismo entomol.*, 38 (2), 255-283.
- Wilde W. H. A.**, 1962. Bionomics of the pear psylla, *Psylla pyricola* Foerster, in pear orchards of the Kootenay Valley of British Columbia, 1960. *Can. Entomol.*, 94, 845-849.
- Wille H. P.**, 1950. Untersuchungen über *Psylla pyri* L. und andere Birnblattsäugerarten im Wallis. *Promotionsarb. eidg. tech. Hochsch. Zürich*, 113 p.
- Wilson L. T., Gutierrez A. P.**, 1980. Within-plant distribution of predators on cotton : comments on sampling and predator efficiencies. *Hilgardia*, 48 (2), 3-11.
- Witsack W.**, 1971. Zur Biologie und Ökologie von *Synharmonia lyncea* Ol. (Col. : Coccinellidae). *Entomol. Nachrichten*, 15 (2), 16-20.
- Wnuk A.**, 1972. Studies on the species composition of predacious hoverflies (*Syrphidae, Diptera*) occurring in aphid colonies on fruit trees and bushes. *Polskie Pismo Entomol.*, 42 (1), 235-247 (in polish).
- Wnuk A.**, 1977. Evaluation of the effectiveness of *Episyrphus balteatus* (Deg.) (Dipt. : Syrphidae) in the control of *Aphis pomi* Deg. (Hom. : Aphididae). *Polskie Pismo Entomol.*, 47 (4), 755-760 (in polish).
- Wojnarowska P.**, 1962. *Psylla pyrisuga* Foerst. — a pest of pears. *Prace nauk. Inst. Ochr. Rosl.*, 4 (2), 153-177.
- Wojnarowska P., Baranowna I., Lipowa I.**, 1960. *Psylla pyri* L. — a pest of pears. *Prace nauk. Inst. Ochr. Rosl.*, 2 (1), 143-161 (in polish).
- Wu Y., Li Y. P., Jiang D. Z.**, 1981. Integrated control of cotton pests in Nanyang region. *Acta Entomol. Sinica*, 24 (1), 34-41 (in chinese).
- Yakhontov V. V.**, 1929. List of pests of economic plants in the region of Bokhara and their parasites and insect predators. *Trudui Shirabud. opuitn. s-kh. Sta. otel Zashch. Rast.*, 2, 46 p. (in russian).
- Yarkulov F. Y.**, 1978. A test of the biological protection of cucumbers in the Maritime Region. *Zashch. Rast.*, 6, 9 (in russian).
- Yastrebov I. O.**, 1979. Enemies of cabbage pests. *Zashch. Rast.*, 1, 34 (in russian).
- Zeleny J.**, 1978. Les fluctuations spatio-temporelles des populations de Névroptères (*Planipennia*) comme élément indicateur de leur spécificité, p. 359-366. In : *Colloque Franco-Tchécoslovaque sur la « Spécificité des entomophages »* (C. R. Antibes) (26 sept. au 1^{er} oct. 1977) (INRA). *Ann. Zool. Ecol. Anim.*, 10 (3), 315-459.
- Zeletzki C., Rinnhofer G.**, 1966. Über Vorkommen und Wirksamkeit von Prädatoren in Obstanlagen I. Eine Mitteilung über Ergebnisse zweijähriger Klopffänge an Apfelbäumen. *Beitr. Entomol.*, 16 (5/6), 713-720.

Zhang C. R., Feng S. C., Shi G. Y., Li Y., 1982. A preliminary report on *Orius minutus* L. — an important predator of injurious mites in apple orchards. *Kunchong Zhishi*, 19 (4), 13-15 (in chinese).

Zheng L. Y., 1982. Two new species of *Orius* Wolff from China (Hem. : Anthocoridae). *Acta Entomol. Sinica*, 25 (2), 191-194 (in chinese).

Ziarkiewicz T., 1976. *Heteroptera* occurring in an agrocenosis of potato in Felin near Lublin in 1971-73. *Polskie Pismo Entomol.*, 46 (3), 483-487 (in polish).

Ziarkiewicz T., Kozłowska A., 1973. Contribution to the knowledge of the species composition of hoverflies (*Syrphidae*, *Diptera*) occurring among colonies of aphids on ornamental shrubs. *Polskie Pismo Entomol.*, 43 (3), 621-626 (in polish).